INFORMATION HANDOUT

WATER QUALITY

WQ1 California Regional Water Quality Control Board Order R2-2002-0011
(Issued January 23, 2002)
and California Regional Water Quality Control Board Order 01-120
(Issued October 17, 2001)

PERMITS

P1 California Department of Fish and Game (CDFG) Incidental Take Permit No. 2081-2001-021-03 (Issued November 19, 2001), and Amendments

P2 U.S. Army Corp of Engineers (ACOE) Permit No. 023013-0S
(Issued December 4, 2001), and letters of modification

P3 San Francisco Bay Conservation and Development Commission (BCDC) Permit No. 8-01,
(Issued on November 20, 2001), and Amendments

P4 U.S. Coast Guard (USCG) Bridge Permit, Permit No 3-01-11,
(Dated December 11, 2011)

P5 U.S. Fish and Wildlife Service (USFWS) Biological Opinions,
(Dated October 29, 2001)

P6 National Marine Fisheries Service (NMFS) Biological Opinion, and Incidental Take Statement,
(Issued October 30, 2001), and Supplemental Biological Opinions and Conference Opinions

P7 National Marine Fisheries Service (NMFS) Incidental Harassment Authorizations and Letters of Authorization, Dated February 2011

P8 U.S. Coast Guard License No. DTCG-Z71111-03-RP-010L and DTCG Z7111-03-RP-002L,
(Dated December 2002), and USCG License No. HSCG-Z71111-09-RP-060L, (Dated July 2009)

AGREEMENTS

A1 Memorandum of Agreement Between the United States Coast Guard and the Department,
(Dated June 21, 2001)

A2 Memorandum of Agreement among the Federal Highway Administration, United States Coast Guard, CSHP, and ACHP for the SFOBB project,
(Dated June 2002)

MATERIALS INFORMATION

M1 San Francisco-Oakland Bay Bridge East Span Underwater Debris Diagram, (Dated May 2001)

M2 SFOBB East Span Survey Information, Control Diagram, (Dated December 30, 2002)

M3 USCG Private Aid to Navigation Sample Application Form

M4 Geotechnical & Material Report for YBI

M5 Site Investigation Report, SFOBB East Span Seismic Safety Project, Yerba Buena Island, Geocon, (Dated June 2001)

M6 Supplemental Site Investigation Report, Yerba Buena Island Duct Bank, Geocon, (Dated June 2001)

M7 Ground Penetration Report No. 6488-01, GEO Vision, (Dated November 2006)

M8 Historical Maps (1917, 1932, 1933)

M9 Construction Vibration Monitoring Field Data Form

M10 Plot Map titled, Pier 7-Area for Contractor's Use, Quitclaim Easement Deed, and Settlement Agreement

M11 Pedestrian Turnstile Installation Manual

M12 Contract No. 04-0120Q4 As-Built Plans, regarding USCG guard booth and reinforced concrete canopy, and existing soldier pile retaining wall

M13 Pier E1 As-Built Plans

M14 USCG Gabion Wall As-Built Plans

M15 USCG Parking Canopy As-Built Plans

M16 USCG Guard Booth (Entrance Canopy) As-Built Plans

M17 Interim Seismic Retrofit-East Bay Cantilever Truss (Contract No. 04-043004)

M18 Cantilever Structure-Lower Chord Damage Repair (Contract No. 04-035104)

M19 Reconstruction Steel Work East Bay

M20 Storm Water Information Handout

M21 Bird Management Plan for Bridge Dismantling

M22 Underground Classifications No. C091-075-11T, (Dated February 18, 2011), and Nos. C157-075-11T thru C158-075-11T

M23 San Francisco-Oakland Bay Bridge Design Criteria, (Dated April 8, 2002) by T. Y. Lin International/Moffatt & Nichol Engineers, a Joint Venture

M24 Mass Concrete Report (Dated January 25, 2001 by Ric Maggenti, P.E. Materials & Research Engineer of Caltrans

M25 Appendix to Mass Concrete Report: Mass Concrete Pours at Dublin 580/680 Interchange

M26 Test Method for Coefficient of Linear Thermal Expansion of Concrete, (Dated June 1, 1981)

M27 Notification of California Department of Transportation Qualification Requirement for Ultrasonic Testing Personnel Form

M28 Recommendations of CEB-FIP Model Code 1978 for Concrete Structures

M29 NCHRP Report 402

M30 Integrated Shop Drawing (ISDs) for EB On-Ramp
M31 SFOBB Cantilever Truss Inspection Reports

M32 Cantilever Truss Original Construction Sequence

M33 Eye-Bar Condition Survey, (Dated December 2011)

M34 SFOBB East Span Design Specifications – Superstructure Circa 1933

M35 SFOBB East Span Cantilever Construction Sequence Photographs (1935/1936)

M36 Updated Foundation Recommendation for Temporary EB On-Ramp, Yerba Buena Island, SFOBB, dated July 2007

M37 Pile Installation Demonstration Project (PIDP) Geotechnical Report: Main Text & Appendices, dated March 2001

M38 Ground Motion Report: Main Text and Appendices, dated February 2001

M39 Final Marine Geophysical Survey Report, dated March 2001:
Volume-1, Main Text and Appendices
Volume-2, Maps

M40 Final Marine Geotechnical Site Characterization Report, March 2001:
Volume-1, Main Text and Illustrations. Volume-2A through Volume-2H

M41 Phase-I Subcontractor Reports - Preliminary Geotechnical Site Characterization: Volume-1 through Volume-4

M42 Phase-II Subcontractor Reports - Preliminary Geotechnical Site Characterization: Volume-1 through Volume-3

M43 Final Yerba Buena Island Geotechnical Site Characterization Report: Volume-1, Main Text, Volume-2 through 4

M44 Geotechnical Foundation Report for the Yerba Buena Island Approach and Self-Anchored Suspension Bridge

M45 Geotechnical Report for Design and Construction of Retaining Walls No. 51 and 50A, Eastern Tunnel Approach (Goat) Slopes, Yerba Buena Island (YBI)

M46 Geotechnical Report for Design and Construction of Retaining Walls No. 50, 52, 53, and 55, YBITS#1, Eastern Tunnel Approach (Goat) Slopes, Yerba Buena Island (YBI)

M47 Analysis and Design Procedures for Pile Foundations Supporting Temporary Towers Skyway Structures: Main Text & Appendices dated March 2001

M48 Revised Final Oakland Shore Approach Geotechnical Site Characterization Report, dated March 2001: Volumes 1, 2A, 2B, 3, and 4

M49 Geotechnical Foundation Report for South-South Detour (04-0120R4) Contract

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1.1 California Department of Fish and Game Incidental Take Permit (CDFG) 2001.pdf	P1 State of California Department of Fish and Game(CDFG), Permit No. 2081-2001-021-03, dated November 19, 2001, and Amendments.
1.1 CDFG Major Amnd 2 (2012).pdf	
1.3 U.S. Army Corps of Engineers (ACOE) Permit No.023013S.pdf	P2 United States Army Corps of Engineer (ACOE), Permit No. 23013S, dated December 04, 2001 and letter of modification.
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2 debris.pdf	M1 San Francisco-Oakland Bay Bridge East Span Underwater Debris Diagram, dated May 2001 (Note: Debris Location is based on "PHASE 1 Archaeological Survey Report-Maritime Archaeology and Addendum Archaeological Survey Reports- Maritime Archaeology)

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6 geotch27.pdf	M42 PHASE II Subcontractor Reports – Final Geotechnical Site Characterization, dated March 2001, prepared for Caltrans by Fugro-Earth Mechanics A Joint Venture Volume 1 of 3, Borehole Geophysics & Televiewer Logs

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12 Geotch10.pdf	M48 Volume -4, Preliminary Study of Approach Fills, Study-Other Reports; Lateral Spreading of Fills, Findings-Trench and Pit Excavations and Geotechnical Testing for the East-Bay Crossing of SFOBB By UC Berkeley
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California Regional Water Quality Control Board (RWQCB) Permit

For the

San Francisco-Oakland Bay Bridge East Span
Seismic Safety Project

October 2001

California Regional Water Quality Control Board
San Francisco Bay Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov
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Gray Davis
Governor

Date: OCT 19 2001
File No. 2198.11 (KHL)

Ms. Mara Melandry
Environmental Manager, Caltrans
Mail Station 12-C
P.O. Box 23660
Oakland, CA 94623-0660

Subject: Corps Interagency Meeting Comments Summary, Bay Bridge Replacement Project, Alameda County.

Dear Ms. Melandry:

Enclosed please find a copy of Order 01-120, which was adopted by the Board on October 17, 2001.

Please note the various required submittals and due dates for reports and plans that are a part of the Order. We look forward to working with Caltrans in the development of these reports. In addition, leading up to the Board's scheduled January 2002 consideration of Waste Discharge Requirements for the project, we will continue to work with you to develop plan schedules, details, and other information for elements of the project including self-monitoring plans during dredging, the post-construction storm water management plan, and the wetland mitigation plan.

If you have any questions, please contact Keith Lichten of my staff via email to khl@rb2.swrcb.ca.gov, or at (510) 622-2380.

Sincerely,

Bruce D. Wolfe, for
Loretta K. Barsamian
Executive Officer

cc: Bruce Wolfe, RWQCB
Dale Bowyer, RWQCB
Tim Vedlinsky, USEPA, WTR-8
Bob Smith, U.S. Army Corps of Engineers, Regulatory Division

cc (cont.):

Richard Smith, USFWS
Margaret Roper, CDFG
Bob Batha, BCDC
David Woodbury, NMFS

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER No. 01-120

WATER QUALITY CERTIFICATION FOR:

CALIFORNIA DEPARTMENT OF TRANSPORTATION

SAN FRANCISCO-OAKLAND BAY BRIDGE EAST SPAN SEISMIC SAFETY PROJECT (EAST SPAN PROJECT), CITY AND COUNTY OF SAN FRANCISCO AND CITY OF OAKLAND, ALAMEDA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter Board, finds that:

1. The California Department of Transportation (hereinafter, Caltrans) on September 12, 2001, applied to the Board for Water Quality Certification under Section 401 of the Clean Water Act for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (hereinafter, the Project). Caltrans proposes to replace the existing East Span of the San Francisco-Oakland Bay Bridge with a new bridge constructed north of that span. The Project will be located on San Francisco Bay between the cities of San Francisco, at Yerba Buena Island (YBI) and Oakland.

2. The existing East Span is not expected to withstand a maximum credible earthquake (MCE) on the San Andreas or Hayward fault. The Project will replace the East Span with a new bridge that will withstand a MCE and will meet current roadway design standards for operations and safety to the greatest extent possible.

3. Caltrans has indicated in its application for water quality certification that the Project is a seismic retrofit project subject to California Streets and Highways Code (CSHC) Section 180, et seq. CSHC Section 180.4 requires that all State and local agencies with permitting authority over a seismic retrofit project act on a permit application within 15 days of its submission. As stated in its October 3, 2001, letter to Board staff, Caltrans recognizes the Board's difficulty in meeting this permitting timeline and agrees to Board staff's strategy that the Board act on Caltrans' water quality certification application at the October 17, 2001, Board meeting and act on an application for waste discharge requirements (WDRs) at the January 16, 2002, Board meeting. As such, that letter states that Caltrans agrees to extend the 15-day action requirement to these dates.

Project Description and Impacts

4. Project construction will occur over a seven-year period, including five years to construct the new bridge and two years to remove the existing East Span. Construction of the new bridge will be divided among four separate contracts as follows: 1) Skyway contract, 2)

Self-Anchored Suspension Span and Transition Structures at Yerba Buena Island contract, 3) Oakland Approach Structures contract, and 4) Geofill contract at the Oakland Touchdown. There would be an additional demolition contract to remove the existing bridge. Caltrans intends to open bids on the Skyway contract on November 14, 2001, and award that contract shortly thereafter.

5. The Project would require the use of large-scale equipment and involve labor-intensive activities. Materials and equipment would arrive to the site by land and water. Dredging of approximately 615,000 cubic yards of Bay mud and soil will also be required.

6. This Order applies to the permanent and temporary direct and indirect impacts to waters of the State associated with the Project, which is comprised of the Project components listed above. Total direct permanent and temporary Project impacts to waters of the State are approximately 8.59 acres. These impacts occur in areas known as special aquatic sites. The majority of Project impacts will occur near the Oakland Touchdown area due to dredging for a temporary barge access channel, placement of fill to construct a new westbound roadway, relocation of Caltrans' existing maintenance road, and permanent shading from the new east and westbound roadways. Relatively minor impacts to eelgrass beds adjacent to YBI to construct a temporary barge dock will occur.

7. The Project's direct permanent impacts include elimination of approximately 3.24 acres of eelgrass habitat and approximately 4.19 acres of sand flat habitat. The Project's direct temporal impacts during construction include approximately 0.36 acres of eelgrass habitat and approximately 0.80 acres of sand flat habitat.

8. The Project may temporarily impact special aquatic sites, including eelgrass and sand flats, and open waters of the Bay over the estimated seven years of bridge construction and demolition. Impacts may occur through the discharge of construction and demolition materials and debris, indirect impacts from equipment access and changes to erosion and sedimentation during project dredging and fill placement.

9. The Project will directly impact the beneficial uses of waters of the State for estuarine habitat and preservation of rare and endangered species through construction stage impacts including pile driving. Pile driving was shown to cause fish kills during a pilot project for the new bridge. Caltrans will complete mitigation, including adaptive management to maximize mitigation effectiveness, to minimize these impacts, and is working with the National Marine Fisheries Service (NMFS) to develop a mitigation plan.

10. To mitigate for the Project's direct impacts, Caltrans plans to implement measures on-site to restore special aquatic sites affected during Project construction including:

    a. Harvesting approximately 0.54 acres of eelgrass from the footprint of the temporary barge access channel prior to dredging, planting test plots in adjacent eelgrass beds, and monitoring to evaluate performance;

b. Restoring to its pre-construction bathymetry up to approximately 1.73 acres of the barge access channel with dredge material and excavated sand to facilitate eelgrass colonization and then replanting with eelgrass. Caltrans will monitor replanted eelgrass to evaluate its performance;

c. Restoring approximately 0.80 acres of sand flats that are temporarily affected by the placement of a geotube or mud boils from engineered fill;

d. Implementing measures on-site to replace and/or restore shorebird roosting habitat and commorant habitat; and,

e. Implementing measures to minimize impacts to protected salmonids and to improve water quality at the Emeryville Crescent and portions of the Eastshore State Park.

11. Caltrans will provide additional mitigation for the Project's direct impacts at off-site locations. Caltrans will provide $10.5 million in funds to be divided between the following:

a. Provide funding to the East Bay Regional Park District (EBRPD) to restore, enhance or create new aquatic habitat and transitional uplands at the Eastshore State Park and within Central San Francisco Bay. Potential mitigation sites include:

- Radio Beach Area-potential shoreline restoration including intertidal habitat and upland transition zones;
- Brickyard Cove Area-potential shoreline restoration including intertidal habitat, the removal of riprap and upland transition zones;
- Albany Beach Area-potential beach restoration/nourishment including the removal of parking areas; and,
- Hoffman Marsh Area – potential tidal marsh restoration including the removal of fill and improving tidal action and water circulation.

b. Provide funding to the United States Fish and Wildlife Service (USFWS) to acquire, cleanup contaminants, and initiate restoration of approximately 3,000 acres of diked historic baylands at Skaggs Island, Sonoma County, to tidal marsh and seasonal wetlands.

12. Operation and maintenance of the Project's new bridge, roads, and reconfigured plaza area will indirectly impact beneficial uses through the discharge of polluted storm water and other urban runoff pollutants (e.g., oil and grease, heavy metals, pathogens, nutrients, etc.).

13. To address the Project's post-construction storm water impacts, Caltrans proposes to permanently capture and treat storm water runoff from a portion of the new bridge, the reconstructed metering lights and toll plaza area, and east to the Powell Street interchange in Emeryville. An area totaling approximately 155 acres is proposed for capture and

treatment. This treatment would improve the quality of water draining into the Emeryville Crescent and Central San Francisco Bay, and thus would enhance wildlife habitat.

14. This Order requires Caltrans to submit, acceptable to the Executive Officer, the following documents, reports, or plans prior to beginning construction of the Project, or within specified dates following contract award for the Skyway, to adequately mitigate the Project's impacts. As of the date of adoption of this Order, the items listed below either have been submitted to the Board and are not complete or not otherwise acceptable to the Board, or have not been submitted. Because of project phasing, some plans may be submitted separately, over time, prior to the beginning of construction for the Project's different contracts.
    a. On-site mitigation plan;
    b. Off-site mitigation proposal;
    c. Dredging Operations Plan;
    d. Storm Water Management Plan for activities identified in Finding 13;
    e. Storm Water Pollution Prevention Plan;
    f. Construction phasing schedule; and,
    g. Financial Assurance/Project Budget Authority.

15. This Order requires Caltrans to prepare and implement a post-construction Storm Water Management Plan for activities identified in Finding 13 (SWMP) and construction-stage Storm Water Pollution Prevention Plan or Plans (SWPPP), in compliance with its statewide NPDES permit for storm water runoff. Because of the Project's proximity to sensitive resources, including special status species habitat, and potential to discharge materials that could significantly impact those resources, this Order requires Caltrans to submit a SWPPP(s) for the Project, at least 30 days prior to the beginning of construction for the Project. As a part of the Board's consideration of appropriate mitigation measures for the Project's post-construction/ operation-stage direct and cumulative impacts, this Order requires Caltrans to submit, within one year of contract award for the Skyway, a site-specific SWMP, acceptable to the Executive Officer, including appropriate design measures and storm water treatment controls to minimize and mitigate these impacts.

16. This Order is conditioned upon Caltrans' compliance with waste discharge requirements (WDRs), to be adopted at a future Board meeting. WDRs are necessary to ensure implementation of the work described in the documents, reports, and plans listed in Finding 14 above to address water quality impacts; to further ensure protection of beneficial uses of waters of the State from the Project; and to allow the Board to timely address any changes to the Project and thus any material changes in the character, location and volume of any proposed waste discharges.

Regulatory Framework

17. The Board, on June 21, 1995, adopted, in accordance with CWC, Division 7, Chapter 3, Article 3, a revised Water Quality Control Plan, San Francisco Bay Basin (Basin Plan).

The State Water Resources Control Board and the Office of Administrative Law approved this updated and consolidated revised Basin Plan on July 20, 1995, and November 13, 1995, respectively. A summary of regulatory provisions is contained in 23 CCR Section 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwaters. This Order is in compliance with the Basin Plan.

18. The Project is located with the Central portion of San Francisco Bay. Central San Francisco Bay has the following existing beneficial uses defined in the Basin Plan: estuarine habitat, industrial service supply, fish migration, navigation, industrial process supply, preservation of rare and endangered species, water contact recreation, non-contact water recreation, shellfish harvesting, and fish spawning.

19. Caltrans submitted a Clean Water Act 404(b)(1) Alternatives Analysis in its application package, which demonstrates that appropriate effort was made to avoid and then to minimize impacts to waters of the State, as required by the Basin Plan. Board staff held extensive additional discussions with Caltrans regarding its Alternatives Analysis. The Board concurs with the conclusions of the Alternatives Analysis.

20. The Basin Plan Wetland Fill Policy (policy) establishes that there is to be no net loss of wetland acreage and no net loss of wetland value, and a long-term net gain in both, when the project and any proposed mitigation are evaluated together, and that mitigation for wetland fill projects is to be located in the same area of the Region, whenever possible, as the project. The policy further establishes that wetland disturbance should be avoided whenever possible, and if not possible, should be minimized, and only after avoidance and minimization of impacts should mitigation for lost wetlands be considered.

21. The goals of the California Wetlands Conservation Policy (Executive Order W-59-93, signed August 23, 1993) include ensuring "no overall loss" and achieving a "...long-term net gain in the quantity, quality, and permanence of wetland acreage and values...." Senate Concurrent Resolution No. 28 states that "[i]t is the intent of the legislature to preserve, protect, restore, and enhance California's wetlands and the multiple resources which depend on them for benefit of the people of the State." Section 13142.5 of the CWC requires that the "[h]ighest priority shall be given to improving or eliminating discharges that adversely affect...wetlands, estuaries, and other biologically sensitive areas."

22. The California Environmental Quality Act (CEQA) requires that all projects approved by State agencies comply with CEQA. On September 18, 1998, Caltrans filed a Notice of Exemption indicating that the Project, as an emergency project, is exempt from CEQA, pursuant to CSHC Section 180.2 and Pub. Res. Code Section 21080 and 14 Cal. Code of Regs. Section 15269. The Board finds that the Project is exempt from CEQA pursuant to 14 Cal. Code of Regs. Section 15269.

23. The Board has notified the U.S. Army Corps of Engineers (the Corps) and other interested agencies and persons of its intent to issue Water Quality Certification for the Project.

24. The Board, in a public meeting, heard and considered all comments pertaining to the Project.

IT IS HEREBY ORDERED that, with the incorporation of the following conditions, the Board certifies that any discharge from Caltran's Project described herein, will comply with the applicable provisions of sections 301 ("Effluent Limitations"), 302 ("Water Quality Related Effluent Limitations"), 303 ("Water Quality Standards and Implementation Plans"), 306 ("National Standards of Performance"), and 307 ("Toxic and Pretreatment Effluent Standards") of the Clean Water Act. The following conditions are associated with this certification:

1. Caltrans shall submit a Report of Waste Discharge Form 200 to the Board's Executive Officer by November 16, 2001. Upon the Board's issuance to Caltrans of Waste Discharge Requirements pursuant to CWC Section 13263 for the Project, Caltrans shall immediately comply with such requirements.

2. Caltrans shall comply with all necessary approvals and/or permits for the Project and its mitigation projects from applicable government agencies, including, but not limited to, Bay Conservation Development Commission, California Department of Fish and Game, NMFS, USFWS, and the Corps, and submit copies of such approvals and/or permits to the Board's Executive Officer prior to the start of construction activity.

3. Not later than 60 days prior to the beginning of construction activity, Caltrans shall submit a construction-phasing schedule.

4. Not later than 60 days prior to the beginning of dredging, Caltrans shall submit, acceptable to the Executive Officer, a Dredging Operations Plan. Upon the Executive Officer's determination that the Plan is acceptable, the Executive Officer may determine that work may begin sooner than 60 days following submittal of the acceptable Plan. Submittal of plans for later phases (e.g., dredging for demolition access) may be completed at future dates, but not later than 90 days prior to the beginning of construction activity/demolition, including staging and dredging, for those phases.

5. Not later than one year following the contract award for the Skyway, Caltrans shall submit, acceptable to the Executive Officer, a plan that addresses the proposed on-site mitigation for special aquatic sites including eelgrass beds and sand flats. The plan shall include all appropriate detail for earthwork and plantings, as well as an implementation schedule, performance standards, and monitoring.

6. Not later than 60 days prior to the beginning of construction activity, Caltrans shall submit, acceptable to the Executive Officer, a final implementation plan describing the additional mitigation activities to be undertaken with EBRPD and USFWS. The

implementation plan shall include detailed descriptions of the proposed activities, including appropriate project plans, an implementation schedule, and reporting. The plan or subsequent report shall demonstrate that Caltrans has fully funded $10.5 million or has $10.5 million in funds available for all activities identified in Finding 11 to be completed by a third party by no later than 60 days prior to the beginning of construction activity. Upon the Executive Officer's determination that the plan is acceptable, the Executive Officer may determine that work may begin sooner than 60 days following submittal of the acceptable plan.

7. Within one year of contract award for the Skyway, Caltrans shall submit, acceptable to the Executive Officer, a conceptual post-construction SWMP including appropriate design measures and storm water treatment controls to address the project's urban runoff impacts to waters of the State. The SWMP shall provide for the appropriate treatment of at least 85% percent of average annual runoff from the area to be treated and shall include appropriate design details, implementation and completion schedules, planting plans, maintenance plans, funding mechanism(s), and all other information, as appropriate.

8. Not later than 30 days prior to the beginning of construction activity of the design measures and treatment controls in the conceptual SWMP, Caltrans shall submit, acceptable to the Executive Officer, a final SWMP with final construction details and all other information, as appropriate, for all appropriate information included in the conceptual SWMP.

9. As soon as feasible following contract award for the Skyway, and not later than 30 days prior to the beginning of construction activity, Caltrans shall submit, acceptable to the Executive Officer, a SWPPP to address the Project's expected construction stage impacts. SWPPPs may be submitted separately for each phase of construction activity/demolition, but must all be submitted, acceptable to the Executive Officer, at least 30 days prior to beginning of each phase of construction activity/demolition.

10. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to CWC §13330 and 23 CCR §3867.

11. This certification action is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR Subsection 3855(b) and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

12. Certification is conditioned upon total payment of the full fee required in State regulations (23 CCR Section 3833) and owed by the applicant. The fee for this certification has been paid in full.

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on October 17, 2001.

Loretta K. Barsamian

Loretta K. Barsamian
Executive Officer

California Regional Water Quality Control Board
San Francisco Bay Region

Winston H. Hickox
Secretary for Environmental Protection

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Gray Davis
Governor

Date: JAN 30 2002
File Nos. 2198.11, 2199.9430
Site No. 02-01-C0528 (KHL)

Certified #7001 0320 0002 3610 0894

Ms. Mara Melandry
Environmental Manager, Caltrans
Mail Station 12-C
P.O. Box 23660
Oakland, CA 94623-0660

Subject: Transmittal of Adopted Order No. R2-2002-0011 for Caltrans' Bay Bridge East Span Seismic Safety Project.

Dear Ms. Melandry:

Enclosed please find a copy of the above-referenced Order, as adopted by the Board at its January 23, 2002, meeting.

Please note the various required submittals and due dates for reports and plans that are a part of the Order. We look forward to continue to work with Caltrans in the development of these reports.

If you have any questions or further comments, please contact Keith Lichten of my staff via email to khl@rb2.swrcb.ca.gov, or at (510) 622-2380.

Sincerely,

Loretta K. Barsamian
Executive Officer

Enclosure: Board Order No. R2-2002-0011
cc: Dale Bowyer, RWQCB
Bruce Wolfe, RWQCB
Tim Vedlinski, USEPA, WTR-8
Bob Smith, U.S. Army Corps of Engineers, Regulatory Division
Bob Batha, BCDC

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at http://www.swrcb.ca.gov.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER No. R2-2002-0011

WASTE DISCHARGE REQUIREMENTS FOR:

CALIFORNIA DEPARTMENT OF TRANSPORTATION

SAN FRANCISCO-OAKLAND BAY BRIDGE EAST SPAN SEISMIC SAFETY PROJECT (EAST SPAN PROJECT), CITY AND COUNTY OF SAN FRANCISCO AND CITY OF OAKLAND, ALAMEDA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter Board, finds that:

1. The California Department of Transportation (hereinafter Caltrans) on November 28, 2001, submitted a Report of Waste Discharge to the Board for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (hereinafter, the Project). Caltrans proposes to replace the existing East Span of the San Francisco-Oakland Bay Bridge with a new bridge constructed north of that span. The Project will be located on San Francisco Bay between the cities of San Francisco, at Yerba Buena Island (YBI), and Oakland.

2. The existing East Span is not expected to withstand a maximum credible earthquake (MCE) on the San Andreas or Hayward fault. The Project will replace the East Span with a new bridge that will withstand a MCE and will meet current roadway design standards for operations and safety to the greatest extent possible.

3. The Board issued Water Quality Certification for the Project at its October 17, 2001, meeting, as Order No. 01-120, with the understanding that waste discharge requirements would subsequently be adopted for the Project.

<u>Project Description and Impacts</u>

4. Project construction is proposed to occur over a seven-year period, including five years to construct the new bridge and two years to remove the existing East Span. Construction of the new bridge will be divided among four separate major contracts as follows: 1) Skyway contract, 2) Self-Anchored Suspension Span and Transition Structures at Yerba Buena Island contract, 3) Oakland Approach Structures contract, and 4) Geofill contract at the Oakland Touchdown. There will be an additional demolition contract to remove the existing East Span. Caltrans opened bids on the geofill contract on December 12, 2001, and on the skyway contract on December 19, 2001.

5. The Project would require the use of large-scale equipment and involve labor-intensive activities. Materials and equipment would arrive to the site by land and water. Dredging of approximately 617,000 cubic yards of Bay mud and soil will also be required.

6. This Order applies to the permanent and temporary direct and indirect impacts to waters of the State associated with the Project, which is comprised of the Project components listed above. Total direct permanent and temporary Project impacts to waters of the State are approximately 8.59 acres. These impacts occur in areas known as special aquatic sites. The majority of Project impacts to special aquatic sites will occur near the Oakland Touchdown area due to dredging for a temporary barge access channel, placement of fill to construct a new westbound roadway, relocation of Caltrans' existing maintenance road, and permanent shading from the new westbound roadway. Relatively minor impacts to eelgrass beds adjacent to YBI to construct a temporary barge dock will occur.

7. The Project's direct permanent impacts include elimination of approximately 3.24 acres of eelgrass habitat and approximately 4.19 acres of sand flat habitat. The Project's direct temporal impacts during construction include approximately 0.36 acres of eelgrass habitat and approximately 0.80 acres of sand flat habitat.

8. The Project may temporarily impact special aquatic sites, including eelgrass and sand flats, and open waters of the Bay over the estimated seven years of bridge construction and demolition. Impacts may occur through the discharge of construction and demolition materials and debris, indirect impacts from equipment access and changes to erosion and sedimentation during project dredging and fill placement.

9. The Project will directly impact the beneficial uses of waters of the State for estuarine habitat and preservation of rare and endangered species through construction stage impacts including pile driving. Approximately 259 large piles will be constructed, requiring an estimated 1,300 hours of pile driving time. An additional 1,030 to 2,060 smaller piles will be required for temporary structures, supports, falsework, docks, etc. Pile driving was shown to cause fish kills during a pilot project for the new bridge. In its Biological Opinion for the Project (File No. 151422-SWR99-SR-190), the National Marine Fisheries Service (NMFS) stated:

   "Underwater sound pressure waves generated by [large] pile driving activities are expected to expose both adult and juvenile listed salmonids to lethal and injurious conditions. Most juvenile anadromous salmonids within a 69 m [meter]… radius of the pile during operation of large hammers will be killed instantaneously. …up to a distance of 440 m…from a pile driving operation, fish are expected to experience trauma in many organs including the inner ear, eyes, blood, nervous system, kidney, and liver. These injured fish are expected to have some difficulty in maneuvering or maintaining orientation in the water column, and many will be subject to delayed mortality. Still further out from the pile driving activity, up to possibly 4,400 m…during the driving of

large piles, fish may exhibit temporary abnormal behavior indicative of stress or exhibit a startle response, but not sustain permanent harm or injury."

Caltrans will complete mitigation, including: implementation of a fisheries and hydroacoustic monitoring plan; installation, operation, and maintenance of an air-bubble curtain noise attenuation device around pile driving activities; and funding, in the amount of $4 million, of an off-site steelhead restoration and enhancement fund, to be used to restore and enhance steelhead fisheries in central or south San Francisco Bay tributaries. However, up to $500,000 of the fund may be used for monitoring fisheries impacts, sound pressure levels, and other impacts associated with pile driving. The $4 million fund is in addition to the $10.5 million provided for off-site wetland mitigation, described in Finding 12.

10. To mitigate for the Project's permanent impacts to habitat, Caltrans plans to implement measures on-site to restore special aquatic sites affected during Project construction including:

    a. Harvesting approximately 0.55 acres of eelgrass from the footprint of the temporary barge access channel prior to dredging, planting test plots in adjacent eelgrass beds, and monitoring to evaluate performance;

    b. Restoring to its pre-construction bathymetry up to approximately 1.73 acres of the barge access channel with dredge material and excavated sand to facilitate eelgrass colonization and then replanting with eelgrass. Caltrans will monitor replanted eelgrass to evaluate its performance;

    c. Restoring approximately 0.80 acres of sand flats that are temporarily affected by the placement of a geotube or mud boils from engineered fill;

    d. Implementing measures on-site to replace and/or restore shorebird roosting habitat and cormorant habitat; and,

    e. Implementing measures to improve water quality at the Emeryville Crescent and portions of the Eastshore State Park.

11. Caltrans has committed to an eelgrass habitat mitigation effort negotiated with the National Marine Fisheries Service. This effort consists of a commitment of $800,000 to $1 million by Caltrans to the following elements: survey potential areas of eelgrass beds within San Francisco Bay; investigate appropriate methods to restore, enhance, or create new eelgrass beds; design appropriate studies such as a limiting factors analysis, to define critical elements of restoring eelgrass habitats; design and locate site-specific eelgrass pilot projects for future restoration; prepare a report and guideline for implementing eelgrass replacement in the Bay; and, fully restore two acres of eelgrass. This effort is expected to help guide eelgrass restoration efforts completed as parts of other Project

mitigation.

12. Caltrans will provide additional mitigation for the Project's direct impacts to habitat at off-site locations. Caltrans will provide $10.5 million in funds to be divided between the following:

    a. Provide funding (a minimum of $2.5 million) to the East Bay Regional Park District (EBRPD) to restore, enhance or create new aquatic habitat and transitional uplands at the Eastshore State Park and within Central San Francisco Bay, pursuant to the "Draft Work Plan for Central Bay Mitigation Sites within East Shore State Park," dated November 2001. Potential mitigation sites include:

    - Radio Beach Area – potential shoreline restoration including intertidal habitat and upland transition zones;
    - Brickyard Cove Area – potential shoreline restoration including intertidal habitat, upland transition zones, and the removal of rip-rap;
    - Albany Beach Area – potential beach restoration/nourishment including the removal of parking areas; and,
    - Hoffman Marsh Area – potential tidal marsh restoration including the removal of fill and improving tidal action and water circulation.

    b. Provide funding (a maximum of $8 million) to the United States Fish and Wildlife Service (USFWS), pursuant to the "Draft Work Plan for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Skaggs Island Restoration Program," dated November 2001, to acquire, cleanup contaminants, and initiate restoration of approximately 3,000 acres of diked historic baylands at Skaggs Island, Sonoma County, to tidal marsh and seasonal wetlands.

13. Operation and maintenance of the Project's new bridge, roads, and reconfigured plaza area will indirectly impact beneficial uses through the discharge of polluted storm water and other urban runoff pollutants (e.g., oil and grease, heavy metals, pathogens, nutrients, etc.).

14. To address the Project's post-construction stormwater impacts, Caltrans proposes to permanently capture and treat storm water runoff from a portion of the new bridge, the metering lights and toll plaza area, and east to the Powell Street interchange in Emeryville. An area totaling approximately 155 acres is proposed for capture and treatment. This treatment would improve the quality of water draining into the Emeryville Crescent and Central San Francisco Bay, and thus would enhance wildlife habitat.

15. On November 28, 2001, Caltrans submitted a construction-phasing schedule for the Project, briefly describing the major project activities and their proposed scheduling from

2001 through 2008 (see Appendix A). This phasing schedule is acceptable to the Board.

16. On November 28, 2001, Caltrans submitted a finalized discussion of evidence of financial assurance for the success of the Project and its associated mitigation. This evidence is acceptable to the Board.

17. This Order requires Caltrans to submit, acceptable to the Executive Officer, the following documents, reports, or plans prior to beginning construction of the Project, or within specified dates following contract award for the Skyway, to adequately mitigate the Project's impacts. As of the date of adoption of this Order, the items listed below either have been submitted to the Board and are not complete or not otherwise acceptable to the Board, or have not been submitted. Because of project phasing, some plans may be submitted separately, over time, prior to the beginning of construction for the Project's different contracts.

    a. Dredging Operations Plan. On November 28, 2001, Caltrans submitted a proposed "Self-Monitoring Plan for Turbidity" for the Project. The Self-Monitoring Plan is part of the larger Dredging Operations Plan. The Turbidity Plan is acceptable to the Board, with the incorporation of the requirements of the SMP that is part of this Order;

    b. On November 28, 2001, Caltrans submitted a "Draft Work Plan for Central Bay Mitigation Sites within East Shore State Park," dated November 2001, and a draft Memorandum of Understanding between Caltrans and EBRPD for Central Bay mitigation. These documents provide substantial information on Caltrans' proposed Central Bay wetland mitigation activities. This Work Plan is acceptable to the Board, but may be subsequently amended with the approval of the Executive Officer;

    c. On November 28, 2001, Caltrans submitted a "Draft Work Plan for On-Site Eelgrass Restoration Program," dated November 2001. The Plan provides substantial information regarding Caltrans' proposed on-site eelgrass mitigation, but must be further developed with the participation of the involved agencies prior to acceptance.

    d. On December 3, 2001, Caltrans submitted the "Draft Work Plan for the [Project's] Skaggs Island Restoration Program," dated November 2001. This Work Plan is acceptable to the Board, but may be subsequently amended with the approval of the Executive Officer;

    e. This Order requires Caltrans to prepare and implement a post-construction Storm Water Management Plan for activities identified in Finding 13 (SWMP) and construction-stage Storm Water Pollution Prevention Plan or Plans (SWPPP), in compliance with its statewide NPDES storm water permit (State Water Resources Control Board Order No. 99-06-DWQ). Because of the Project's proximity to sensitive resources, including special status species habitat, and potential to

discharge materials that could significantly impact those resources, this Order requires Caltrans to submit a SWPPP(s) for the Project, at least 30 days prior to the beginning of construction for the Project, except that the Order requires submittal of a SWPPP for the geofill contract at least 21 days prior to the beginning of construction for that phase only. Separate SWPPPs may be submitted for each separate phase (i.e., major contract) of construction and demolition, but at least 30 days prior to the beginning of construction or demolition of each phase.

On November 28, 2001, Caltrans submitted a proposed "Work Plan for Implementation of Stormwater Treatment Measures," dated November 2001, outlining the tasks that must be completed prior to the phased construction of post-construction storm water treatment controls from Fall 2003 to as late as summer 2009. The phasing proposed in this Plan is not acceptable to the Board, and this Order directs Caltrans to submit a finalized work plan, acceptable to the Executive Officer, no later than 60 days after the date this Order is adopted.

18. The Board participates in the Dredged Material Management Office (DMMO); a working group with representatives of the state and federal agencies with regulatory authority over Bay Area dredging projects. Staff representatives of the Board, the U.S. Army Corps of Engineers (Corps), the U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Conservation and Development Commission (BCDC), and the California State Lands Commission meet regularly to jointly review dredging projects and make consensus-based recommendations to their respective agencies about permit conditions and the suitability of sediments for proposed disposal sites. Representatives from the California Department of Fish and Game (CDFG) and from the National Marine Fisheries Service (NMFS) also participate in the DMMO as commenting agencies. Each DMMO agency retains its independent decision-making authority, but the group has significantly reduced project review time by concurrent consideration of projects.

19. The DMMO has reviewed and made recommendations on the suitability of proposed disposal sites for the sediments to be dredged during construction of the new bridge span. The DMMO has not made any recommendations on material proposed for dredging during demolition of the existing span.

    This Order requires that Caltrans submit technical information characterizing these sediments and receive a suitability recommendation from the DMMO and written approval of the Executive Officer prior to commencement of any dredging associated with the demolition of the existing span.

20. The major dredging-related construction features of the Project are described below. The Project would dredge a total of approximately 617,000 cubic yards of material. The major construction features are:

a. Dredging of approximately 216,230 cubic yards of material at the Oakland approach structures for a barge access channel adjacent to the existing East Span at the Oakland Touchdown, foundation construction, and pile cap construction. Immediately adjacent to the Oakland Touchdown, the barge access channel would be dredged to a depth of 12 feet. Elsewhere, the channel would be dredged to a depth of 14 feet. Material from this area is proposed to be disposed of at the San Francisco deep ocean disposal site (SF-DODS), approximately 50 nautical miles west of the Golden Gate Bridge, or beneficial reuse sites;

b. Dredging of approximately 187,087 cubic yards of material for installation of piers, footings, and foundations for the new bridge. A hydraulic or mechanical dredge may be used. Within piles, material will be dredged to a depth of about 164 feet below the Bay bottom. The upper 12 feet of Piers E1 through E6, and E15 through E18 will be disposed of at appropriate upland facilities. Otherwise, material is proposed to be disposed of at the Alcatraz disposal site (SF-11); and,

c. Dredging of approximately 190,680 cubic yards of material for creation of a barge access channel to dismantle the existing bridge and to remove piers from the existing bridge. This material must be appropriately characterized and final reports reviewed and approved by DMMO prior to the commencement of this phase of dredging. At present, this material is conceptually proposed to be disposed of at the deep ocean disposal site (SF-DODS), at an upland wetland reuse site, or at a landfill reuse site. For removal of the existing piers, approximately 22,724 cubic yards of material would be dredged. This material would be disposed of at the Alcatraz Island site (SF-11).

21. The Corps distinguishes the different types of material that will be dredged (or excavated) in the Project as follows:

a. Young Bay Muds. This is an upper layer of materials that was deposited beginning about 10,000 years ago, and which consists primarily of clay, with some silt, sand, and shell fragments. With the exception of pier construction, removed sediment is expected to be comprised of Young Bay Muds.

b. Other materials. Pier construction is expected to result in the removal of Young Bay Muds, Merritt Sands, Yerba Buena Mud, the upper and lower Alameda Formations, and Franciscan Bedrock.

22. **Sediment suitability determinations.**

a. The dredged material to be generated by the construction portion of the Project has been evaluated by Board staff in conjunction with the DMMO. Demolition-related material will subsequently be evaluated by DMMO. After approving the sediment sampling and analysis plan, the DMMO participants review the results of the testing and make recommendations to their respective agencies regarding the suitability of sediments for proposed disposal and reused locations.

b. Sediments to be dredged as part of the Project were or will be characterized to determine their suitability for various disposal options: ocean disposal, in-Bay disposal, wetland creation (cover and non-cover material[1]), construction material, and landfill disposal. None of the sediments were found to have levels of contaminants that would lead to their classification as hazardous waste, therefore requiring disposal in a landfill. However, landfill disposal or reuse of sediments as daily cover are potential disposal options for sediments generated by the Project. Sediments to be dredged for barge access to and pier removal during the demolition phase of the existing East Span have not yet been appropriately characterized, and this Order requires such characterization to be completed, and an acceptable proposal to be submitted before that work may commence.

c. The Board finds that material to be generated by the Project is suitable for placement at locations as described below. The majority of material has been determined to be suitable for aquatic disposal, based on pre-dredge testing. Additional testing may be completed to determine the final suitability of some material. While the DMMO also made suitability determinations relating to use of sediments in wetland restoration, each wetland restoration project will have sediment acceptance and testing criteria established by a site-specific Board action, which would be the final determinant of what sediments could be used at each site.

23. The proposed dredged material disposal sites for material to be generated by the Project are:

a. **San Francisco Deep Ocean Disposal Site (SF-DODS).** Located approximately 50 nautical miles offshore of the Golden Gate, at a depth of about 760 feet, and beyond the jurisdiction of the Board, this disposal site was established by the USEPA in 1994, designated under Section 102 of the Marine Protection, Research, and Sanctuaries Act. Publication of the final rule guiding its use and management in the Federal Register occurred in 1999. Only material determined to be suitable for ocean disposal may be disposed of at this site.

b. **Alcatraz Island Site (SF-11).** This site is located approximately 0.3 miles south of Alcatraz Island, approximately 5 miles from the Project site. The site was formally designated as a sediment disposal site in 1972.

24. Construction of the Project is expected to require construction-stage dewatering, including discharges of groundwater from areas of known groundwater and soil contamination, and other work in areas of known groundwater and soil contamination. These discharges and other work include:

[1] As defined in the 1992 Board staff report "Interim Sediment Screening Criteria and Testing requirements for Wetland Creation and Upland Beneficial Reuse," Wetland Non-Cover material is a category of dredged material suitable for use in wetland creation projects, but that must be covered by at least three feet of cleaner, Wetland Cover material.

a. Construction of piles in an existing landfill at YBI, to support a temporary bridge detour at YBI. Known landfill contaminants include heavy metals and hydrocarbons;

b. Construction of a new storm drain through an area of known hydrocarbon contamination from old pipelines and tanks in the Coast Guard area of YBI;

c. Construction in areas of known surficial lead contamination at YBI;

d. Pile cofferdam dewatering; and,

e. Other dewatering and/or construction activities at contaminated or potentially contaminated sites at YBI and/or at the Oakland Touchdown.

25. To mitigate for the Project's potential construction-stage impacts to water quality and beneficial uses of waters from discharges described in Finding 24, Caltrans has proposed to, separate from this Order, obtain coverage under and comply with the Board's General NPDES Permit No. CAG912002, for the discharge or reuse of extracted and treated groundwater resulting from the cleanup of groundwater polluted by fuel leaks and other related wastes, and/or NPDES Permit No. CAG912003, for the discharge or reuse of extracted and treated groundwater resulting from the cleanup of groundwater polluted by volatile organic compounds. The Board finds that Caltrans' use of these permits for the Project's proposed discharges described in Finding 24, where appropriate, is acceptable.

26. This Order requires Caltrans to submit, at least 30 days prior to the beginning of construction of a project phase in which dewatering is taking place, a dewatering plan that includes a description of how it will address and obtain appropriate approvals for the Project's discharges described in Finding 24.

27. The term "beginning of construction," as used in this Order, refers to the initiation of construction activities with the potential to discharge pollutants to waters of the State (e.g., on-site equipment and/or materials mobilization and staging, in-water construction-related activities, upland earth movement, etc.). It does not include activities without the potential to pollute (e.g., letting the contract and ordering structural steel).

28. The Board, on June 21, 1995, adopted, in accordance with CWC, Division 7, Chapter 3, Article 3, a revised Water Quality Control Plan, San Francisco Bay Basin (Basin Plan). The State Water Resources Control Board and the Office of Administrative Law approved this updated and consolidated revised Basin Plan on July 20, 1995, and November 13, 1995, respectively. A summary of revisions to the regulatory provisions is contained in 23 CCR Section 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwaters. This Order is in compliance with the Basin Plan.

29. The Project is located with the Central portion of San Francisco Bay. Central San Francisco Bay has the following existing beneficial uses defined in the Basin Plan: ocean, commercial and sport fishing, estuarine habitat, industrial service supply, fish migration, navigation, industrial process supply, preservation of rare and endangered species, water contact recreation, non-contact water recreation, shellfish harvesting, and fish spawning.

30. Caltrans submitted an Alternatives Analysis, prepared pursuant to federal guidelines, in its application package. The Alternatives Analysis demonstrates that appropriate effort was made to avoid and then to minimize impacts to waters of the State, as required by the Basin Plan. Board staff held extensive additional discussions with Caltrans regarding its Alternatives Analysis. The Board concurs with the conclusions of the Alternatives Analysis.

31. The Basin Plan Wetland Fill Policy (policy) establishes that there is to be no net loss of wetland acreage and no net loss of wetland value, and a long-term net gain in both, when the project and any proposed mitigation are evaluated together, and that mitigation for wetland fill projects is to be located in the same area of the Region, whenever possible, as the project. The policy further establishes that wetland disturbance should be avoided whenever possible, and if not possible, should be minimized, and only after avoidance and minimization of impacts should mitigation for lost wetlands be considered.

32. The goals of the California Wetlands Conservation Policy (Executive Order W-59-93, signed August 23, 1993) include ensuring "no overall loss" and achieving a "…long-term net gain in the quantity, quality, and permanence of wetland acreage and values…." Senate Concurrent Resolution No. 28 states that "[i]t is the intent of the legislature to preserve, protect, restore, and enhance California's wetlands and the multiple resources which depend on them for benefit of the people of the State." Section 13142.5 of the CWC requires that the "[h]ighest priority shall be given to improving or eliminating discharges that adversely affect…wetlands, estuaries, and other biologically sensitive areas."

33. With the successful implementation of the mitigation measures described in these findings, the Board finds that the Project will comply with the California Wetlands Conservation Policy and Basin Plan Wetland Fill Policy referenced in Findings 31 and 32.

34. The California Environmental Quality Act (CEQA) requires that all discretionary projects approved by State agencies comply with CEQA. On September 18, 1998, Caltrans filed a Notice of Exemption indicating that the Project, as an emergency project, is exempt from CEQA, pursuant to CSHC Section 180.2 and Pub. Res. Code Section 21080(b)(4) and 14 Cal. Code of Regs. Section 15269(e). The Board finds that the Project is exempt from CEQA pursuant to these statutory and regulatory exemptions.

35. The Board has notified the Corps and other interested agencies and persons of its intent to issue WDRs for the Project.

36. The Board, in a public meeting, heard and considered all comments pertaining to the WDRs.

37. Project files are maintained at the Board under file numbers 2198.11, 2199.9430, and site number 02-01-C0528. The Corps file number for the project is 23013S.

IT IS HEREBY ORDERED that Caltrans, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, shall comply with the following, pursuant to authority under CWC Sections 13263 and 13267:

A. Discharge Prohibitions

1. The direct discharge of wastes, including concrete, steel, drilling muds, rubbish, refuse, bark, sawdust, or other solid or liquid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plains, is prohibited.

2. The discharge of floating oil or other floating materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity, or discoloration in surface waters is prohibited.

3. The discharge of silt, sand, clay, or other earthen materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity, or discoloration in surface waters is prohibited.

4. The wetland fill activities subject to these requirements shall not cause a nuisance as defined in CWC §13050(m).

5. The discharge of decant water from active dredging or fill sites and dredged material stockpile or storage areas to surface waters or surface water drainage courses, and/or the discharge or potentially contaminated dewatered ground or surface water are prohibited, except as conditionally allowed following the submittal of a discharge plan or plans as described in the Provisions.

6. Surface and groundwater in the vicinity of the Project shall not be degraded as a result of the Project's activities or the placement of fill for the Project.

7. The discharge of materials other than storm water, which are not otherwise regulated by a separate NPDES permit or allowed by this Order, to waters of the State is prohibited.

B. Discharge Specifications

1. Caltrans shall ensure to the extent practicable that the turbidity generated by construction activities, including dredging, excavation, and placement in the Bay of solid materials permitted by this Order, does not exceed the following in waters of the State more than 100 feet beyond the Project Boundary for all areas of dredging, excavation, and/or fill placement, when that work occurs within 3200 feet (1000 meters) of an eelgrass bed or sand flat:

   Turbidity of the waters of the State, as measured in NTUs, shall not increase above background levels by more than the following, to the extent practicable. If turbidity does increase above the below levels, Caltrans shall follow remedial measures as described in the Self-Monitoring Program (SMP) that is part of this Order.

Receiving Waters Background	Incremental Increase
≥ 50 units	10% of background, maximum

   The Project Boundary for the dredged areas is to be defined by the silt curtain required by Caltrans of its contractors. In the event a silt curtain is not used to control turbidity, the Project Boundary shall be defined as the daily limit of dredging, excavation, and/or fill placement in any area where such work occurs.

2. In accordance with Section 13260 of the CWC, Caltrans shall file a report with the Board of any material change or proposed material change in the character, location, or volume of the discharge. Any proposed material change shall be reported to the Executive Officer at least 7 days in advance of implementation of any such proposal.

3. Caltrans' responsible representative shall immediately notify Board staff by telephone whenever an adverse condition occurs as the result of this discharge. An adverse condition includes, but is not limited to, a violation or threatened violation of the conditions of this Order, a significant spill of petroleum products or toxic chemicals, or damage to control facilities that could affect compliance. Pursuant to Section 13267(b) of the CWC, a written notification of the adverse condition shall be submitted to the Board within 30 days of occurrence. The written notification shall identify the adverse condition, describe the actions necessary to remedy the condition, and specify a timetable, subject to the modifications of the Board and/or Executive Officer, for the remedial actions.

C. Receiving Water Limitations

1. The dredging and/or disposal of sediments shall not cause:

a. floating, suspended or deposited macroscopic particulate matter or foam in waters of the State at any place more than 100 feet from the Project Boundary or point of discharge of return flow, except as authorized under Section B, Discharge Specifications, of this Order.
b. visible floating, suspended, or deposited oil or other products of petroleum origin in waters of the State at any place.
c. waters of the State to exceed the following quality limits at any time during construction activities:
   i) Dissolved oxygen: 5.0 mg/l minimum. When natural factors cause lesser concentrations, then this discharge shall not cause further reductions in the concentration of dissolved oxygen.
   ii) Dissolved sulfide: 0.1 mg/l maximum.
   iii) pH: A variation of natural ambient pH by more than 0.5 pH units.
   iv) Toxic or other deleterious substances: None shall be present in concentrations or quantities which may cause deleterious effects on aquatic biota, wildlife, or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.

2. The concentrations of chemicals of concern, as found in grab samples taken no more than 100 feet beyond the Project Boundary, shall not exceed the Receiving Water Limits in Table A-1 of the attached Self-Monitoring Program, unless it can be shown that site conditions are not significantly different from ambient concentrations of those chemicals (as measured in the open waters of the Central Bay in the vicinity of YBI).

D. Provisions

1. Caltrans shall comply with all Discharge Prohibitions, Discharge Specifications, Receiving Water Limitations, and Provisions of this Order immediately upon adoption of this Order or as provided below.

2. Caltrans shall obtain and comply with all necessary approvals and/or permits for the Project and its mitigation projects from applicable government agencies, including, but not limited to, BCDC, CDFG, NMFS, USFWS, and the Corps, and submit copies of such approvals and/or permits to the Board's Executive Officer prior to the start of construction activity. Additionally, Caltrans shall continue to comply with Water Quality Certification Order No. 01-120.

3. Prior to the beginning of construction of a project phase that includes dredging, Caltrans shall submit, a copy of the Dredging Operations Plan submitted to and as accepted by the Corps, and including all revisions required by the Corps.

4. Caltrans shall fully implement its submitted plans accepted in this Order, and plans required to be submitted in the future and that are accepted by the Executive Officer or approved by the Board (e.g., construction SWPPPs, its post-construction storm water management plan, dewatering plans, wetland mitigation work plans, etc.).

5. Not later than 18 months following the contract award for the Skyway, Caltrans shall submit, acceptable to the Executive Officer, a plan that addresses implementation of the proposed on-site mitigation for special aquatic sites including eelgrass beds and sand flats. The plan shall include all appropriate design details for earthwork and plantings, as well as an implementation schedule, performance standards, and monitoring. In the event eelgrass beds cannot be restored on-site, Caltrans shall propose alternate eelgrass and sand flat mitigation equivalent to the on-site mitigation presently proposed and accepted in this Order.

6. Caltrans shall implement its "Draft Work Plan for Central Bay Mitigation Sites within East Shore State Park," dated November 21, 2001, including complying with all dates and deadlines listed therein, and as may subsequently be incorporated into amended versions of the plan accepted by the Executive Officer. This Plan may be amended with the written approval of the Executive Officer. A minimum of $2.5 million shall be deposited into an interest-bearing escrow account no later than 120 days following adoption of this Order. All interest from this account shall be used for the funding of mitigation to be completed as a part of the referenced Work Plan.

7. Caltrans shall implement its "Draft Work Plan for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project: Skaggs Island Restoration Program," dated November 2001 (Skaggs Draft Work Plan), including complying with all dates and deadlines listed therein, and as may subsequently be incorporated into amended versions of the plan accepted by the Executive Officer. This Plan may be amended with the written approval of the Executive Officer. Caltrans shall fund this work with a maximum of $8 million dollars, which total amount shall be deposited into an interest-bearing escrow account no later than 120 days following adoption of this Order. All interest from this account shall be used for the funding of mitigation to be completed as a part of the referenced Work Plan or completed under the "Draft Work Plan for Central Bay Mitigation Sites within East Shore State Park," as referenced above.

8. The funding for the Skaggs Island restoration shall be redirected to other efforts as described below:

    a. If Skaggs Island restoration work fails to meet the dates set forth in the Skaggs Draft Work Plan, Section 5.13 *Contingency,* as may subsequently be amended, then Caltrans shall identify other potential mitigation sites and shall convene an interagency group to determine the acceptability of those sites, including acceptable designs and timing for their construction. Priority shall be given to

potential mitigation sites at the East Shore State Park not already part of the plan described in Provision E.5. Proposed alternative mitigation sites, including proposed plans for construction of alternative mitigation, shall be brought before the Board for its approval. Construction may not begin at alternative mitigation sites until the sites and plans have received approval by the Board.

b. If other funding is obtained for the Skaggs Island work, or it is otherwise determined that the funding for Skaggs Island is greater than that needed for the restoration project, then Caltrans shall identify other potential mitigation sites and shall convene an interagency group to determine the acceptability of those sites, including acceptable designs and timing for their construction. Priority shall be given to potential mitigation sites at the East Shore State Park not already part of the plan described in Provision E.5. Proposed alternative mitigation sites, including proposed plans for construction of alternative mitigation, shall be brought before the Board for its approval. Construction may not begin at alternative mitigation sites until the sites and plans have received approval by the Board.

9. Caltrans shall implement its "Draft Work Plan for On-Site Eelgrass Restoration Program," dated November 2001, including complying with all dates and deadlines listed both therein and below, and as may subsequently be incorporated into amended versions of the plan accepted by the Executive Officer. This Plan may be amended with the written approval of the Executive Officer.

a. Caltrans shall further develop mitigation monitoring standards and success criteria for its proposed on-site eelgrass mitigation as described in the Draft Work Plan, and shall submit a revised Work Plan or a Mitigation Plan/Conceptual Restoration Plan incorporating acceptable standards and criteria no later than August 1, 2002.

b. Preliminary design and engineering for on-site restoration shall be completed no later than October 1, 2002.

c. Other work shall be completed as per the timetable listed in the Draft Work Plan, as may subsequently be amended with the approval of the Executive Officer.

10. Not later than 60 days following adoption of this Order, Caltrans shall submit, acceptable to the Executive Officer, a final work plan for implementation of post-construction stormwater treatment measures (SWMP Work Plan). The SWMP Work Plan shall include:

a. Conceptual designs for all catchments, including proposed treatment measure types and conceptual designs, volumes of water to be treated (i.e., the water quality design storms), treatment times, and all other information, as appropriate. Proposed treatment measures utilizing detention shall have a minimum detention time of 48 hours for treated storms.

b. Completion of designs for catchments 2, 3, 4, 5, and 6 no later than December 2002. Designs shall provide for the appropriate treatment of at least 85% percent of average annual runoff from the area to be treated and shall include appropriate design details, implementation and completion schedules, planting plans, maintenance plans, funding mechanism(s), and all other information, as appropriate.

c. Completion of designs for catchment 1 no later than August 2003, or concurrent with completion of design for the proposed EBRPD park, if that occurs later.

d. Construction of measures proposed for catchments 2, 3, 4, 5, and 6 beginning no later than July 2003, with completion of all related construction in those catchments no later than July 2004.

e. Completion of construction of measures proposed for catchment 1 no later than 1 year following the completion of the demolition contract to remove the existing East Span and no later than concurrently with the construction of the proposed EBRPD park.

f. A proposal to complete a water quality monitoring plan to appropriately monitor the effectiveness of all installed treatment measures for a minimum of 5 years following completion of their construction. The water quality plan shall include provisions for monitoring of removal of stormwater pollutants including, but not limited to, hydrocarbons, heavy metals, pathogens, nutrients, sediment, and trash, and shall include provisions for all other appropriate monitoring, including, but not limited to, treatment measure hydrology (e.g., amount of infiltration, ground water levels, etc.), maintenance requirements, effects of salinity, vegetation growth and survival, and vectors, and shall include provisions for annual reporting of this information to the Board.

g. Not later than 30 days prior to the beginning of construction activity of the design measures and treatment controls specified in the SWMP Work Plan, Caltrans shall submit, acceptable to the Executive Officer, a final SWMP (storm water management plan) with final construction details and all other information, as appropriate, for all appropriate information included in the SWMP Work Plan.

11. As soon as feasible following contract award for each phase of construction and/or demolition, and not later than 30 days prior to the beginning of construction or demolition activity for that project phase, Caltrans shall submit, acceptable to the Executive Officer, a SWPPP to adequately address the Project's expected construction stage impacts. SWPPPs may be submitted separately for each phase of construction or demolition activity, but must all be submitted, acceptable to the Executive Officer, at least 30 days prior to beginning of each phase of construction or demolition activity. However, for the geofill contract only, Caltrans shall submit the required SWPPP for that contract, acceptable to the Executive Officer, at least 21 days prior to the beginning of construction

of that phase.

12. Caltrans shall conduct monitoring and reporting activities according to the Self-Monitoring and Reporting Program (SMP) attached to this Order, and as may be amended by the Executive Officer. At any time after adoption of this Order, Caltrans may file a written request proposing modifications to the attached SMP. If the proposed modifications are acceptable, the Executive Officer may issue a letter of approval incorporating the revisions into the SMP.

13. Caltrans shall provide technical monitoring reports regarding the impacts of the discharge on waters of the State, pursuant to Section 13267 of the California Water Code (CWC). This monitoring provides necessary information about Bay water quality, including both instantaneous data on the impacts of dredged material disposal and information about long-term impacts of that disposal. Caltrans may elect to participate in the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP) to fulfill this requirement or provide comparable data on an individual basis. Since 1992, many Bay Area dischargers have decided to provide this information through the RMP, rather than through individual monitoring programs. The San Francisco Estuary Institute (SFEI), located in Richmond, California, administers the program with oversight by the Board. Dischargers now contribute annually to the SFEI, and the Board recognizes these payments as fulfilling requirements to provide information on water quality impacts under Section 13267. The SFEI will send an invoice for $0.22 per cubic yard of material disposed in-Bay to all dischargers in July of the year following the disposal episode(s). Disposal volumes will be calculated using pre- and post-dredge surveys, or using bin volumes if surveys are not available.

14. Caltrans shall comply with the conditions of the Biological Opinion issued by NMFS and the Incidental Take Statement issued by CDFG for the Project. Additionally, from December 1 to March 31 of any construction year, a professional biologist will be present to identify herring spawning activity during all dredging operations. If herring spawning is detected at or within 200 meters of the dredging operations, dredging within 200 meters of the spawning activity shall cease within 8 hours of notification to the contractor for a minimum of 14 days, or until it can be determined that the herring hatch has been completed.

15. Discharges of dredged material shall comply with annual and seasonal volume target limits for disposal at in-Bay sites set in the Basin Plan.

16. Dredging shall be limited to the project depths described in the report: *Sediment Sampling and Analysis Report, San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, Alameda and San Francisco Counties, California*, dated June 2000.

17. Caltrans shall submit, on a monthly basis, a report summarizing all dredging and disposal activities and locations. Reports shall be submitted no later than the 15th day of the month following a month in which dredging takes place, and shall include: a summary of dredging and disposal volumes by location, a summary of dredging methods, maps showing dredge and disposal locations, a summary of related activities (e.g., associated dredged sediment dewatering), and all other information, as appropriate. Caltrans is requested to send a copy of these reports to the DMMO and all other interested agencies.

18. Not later than 30 days prior to the beginning of pile driving activities, Caltrans shall submit for Board staff review an effective fisheries and hydroacoustic monitoring plan. The fisheries and hydroacoustic monitoring plan shall include all related requirements of NMFS and CDFG, provision for reporting to the Board of information reported to other agencies, on a schedule consistent with that required by NMFS, and all other information, as appropriate. Staff shall work with NMFS and CDFG regarding the acceptability of the specified plans.

19. Caltrans shall notify the Board immediately whenever violations of this Order are detected.

20. Caltrans shall regularly, as described in the SMP that is part of this Order, monitor total suspended solids concentrations using turbidity meters during excavation/dredging of and/or placement of fill into channels or other project features that are within 1000 meters of mapped eelgrass beds. Turbidity meters shall be calibrated with enough grab samples to reduce the error in any measurement to less than 100 mg/L.

21. Caltrans shall use silt curtains or an equivalent method to effectively control turbidity for all proposed dredging activities.

22. No overflow or decant water shall be discharged from any barge, with the exception of spillage incidental to clamshell dredge operations.

23. To appropriately address potential impacts from its dewatering activities, Caltrans shall file for coverage under and comply with the Board's General NPDES Permit Nos. CAG912002 and/or CAG912003, as appropriate. The Board or Executive Officer may determine that Caltrans must obtain individual NPDES permits for the discharges, pursuant to the relevant NPDES permit provisions.

24. Caltrans shall submit, no later than 30 days prior to the beginning of construction of a project phase in which dewatering is taking place, a dewatering plan, acceptable to the Executive Officer, that includes a description of how it will address and obtain appropriate approvals for its proposed discharges. The dewatering plan shall include:

    a. A description of dewatering locations;

b. An estimate or estimates of discharge rates and volumes;

c. A listing of expected pollutants and concentrations;

d. The expected timing and scheduling of the proposed discharges; and,

e. All other information, as appropriate to mitigate for dewatering impacts (e.g., measures to mitigate the potential for erosion caused by dewatering discharges at their outfall(s)).

25. Caltrans shall install any additional monitoring devices required to fulfill the terms of any SMP issued to Caltrans, in order that the Board may evaluate compliance with the conditions of this Order.

26. Caltrans shall file with the Board a report of any material change or proposed change in the character, location, or quantity of this waste discharge. For the purpose of these requirements, this includes any proposed change in the boundaries of the disposal areas or the ownership of the site.

27. Dredging and disposal of dredged material associated with demolition of the existing East Span shall not commence until authorized in writing by the Executive Officer. The review process for this dredging shall occur through the DMMO by the same process as is used for other Bay Area dredging projects. Caltrans shall follow applicable federal and state guidance on a tiered testing framework and on the preparation of reports.

28. Caltrans shall maintain a copy or copies of this Order at the Project site so as to be available at all times to site operating personnel.

29. Caltrans is considered to have full responsibility for correcting any and all problems that arise in the event of a failure that results in an unauthorized release of waste or wastewater from the Project.

30. Caltrans shall maintain all devices and/or designed features installed in accordance with this Order such that they function without interruption for the life of the Project.

31. Caltrans shall permit the Board or its authorized representative, upon presentation of credentials:

a. Entry onto to premises on which wastes are located and/or in which records are kept.

b. Access to copy any records required to be kept under the terms and conditions of this Order.

c. Inspection of any treatment equipment, monitoring equipment, construction area(s), or monitoring method completed as part of the Project.

d. Sampling of any discharge or surface water covered by this Order.

e. This Order does not authorize commission of any act causing injury to the property of another or of the public; does not convey any property rights; does not remove liability under federal, state, or local laws, regulations or rules of other programs and agencies; nor does this Order authorize the discharge of wastes without appropriate permits from this agency or other agencies or organizations.

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on January 23, 2002.

Loretta K. Barsamian

Loretta K. Barsamian
Executive Officer

Attachments:

Appendix A: Project components: Schedule and brief description.
Appendix B: Self-Monitoring and Reporting Program.

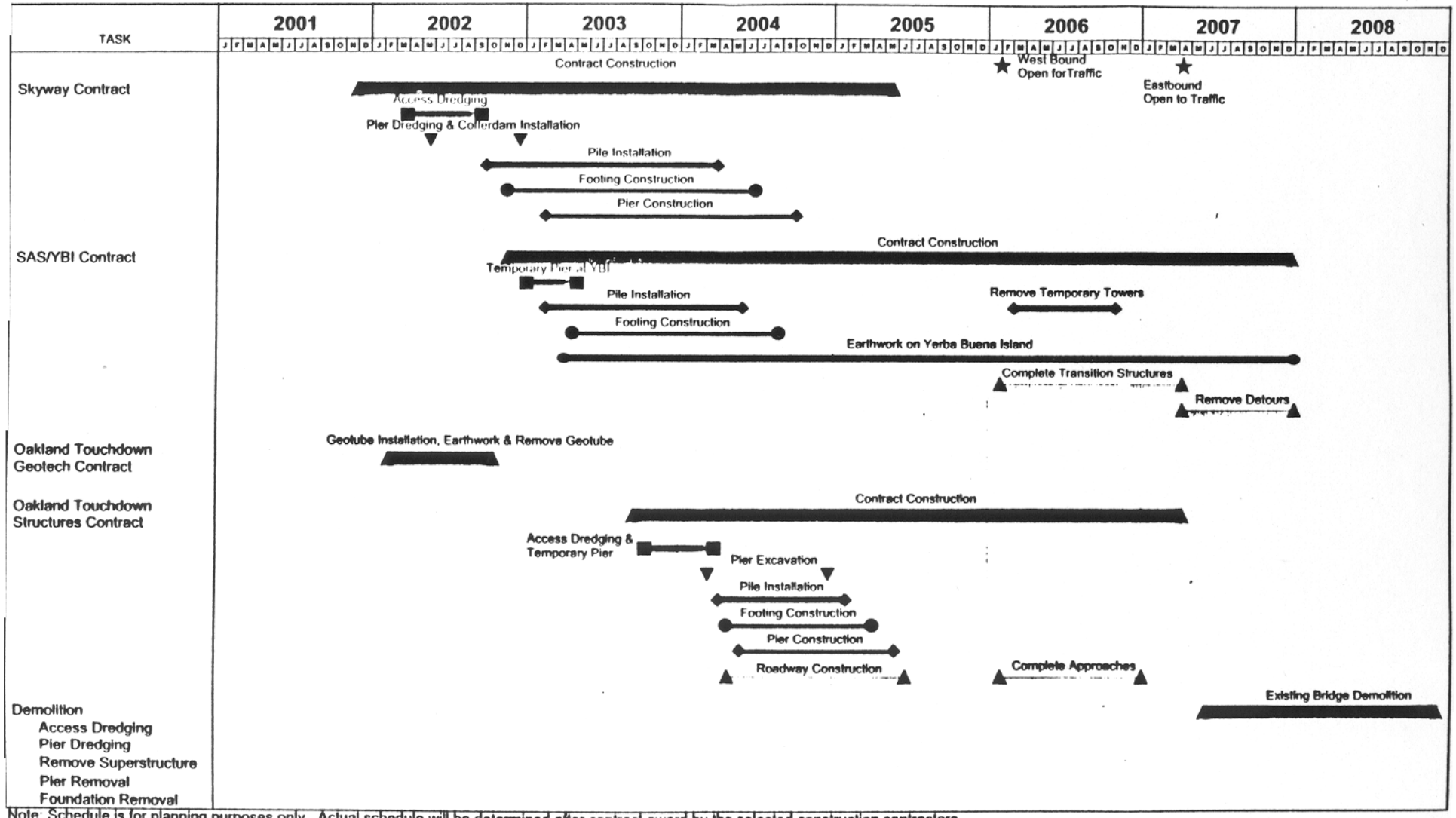
Order No. R2-2002-0011

Appendix A
East Span Project Components:
Schedule and Brief Description

SFOBB - East Span Seismic Safety Project

Construction Milestones

11/14/01



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

A Brief Explanation of Items listed in the Schedule

Access Dredging -

Dredging for barge access channels will occur twice during construction: first, to provide barge access for construction of a replacement structure, and later to provide barge access for dismantling of the existing structure. Approximately 216,230 cubic yards will be dredged for construction access early in the project and 190,680 cubic yards will be dredged late in the project for dismantling access.

Pier Dredging & Cofferdam Installation -

Cofferdams may be installed to construct over-water piers and on-land bents at the Oakland Touchdown and to dismantle the existing bridge piers. Cofferdams will be dewatered and sediment will be removed by reverse circulation drilling, jetting, airlifting or by clamshell excavation. Approximately 22,724 cubic yards may be dredged from cofferdams to remove the existing foundations and piles 1.5 feet below the mud line.

Pile Installation -

Hollow steel pipe piles will be driven and cleaned out. The shells will be filled with composite reinforced concrete. Approximately 187,087 cubic yards will be dredged for new pier construction.

Footing Construction -

For construction of the footings, piles will be driven, sheet pile, soldier piles and/or other temporary shoring may be used to excavate soil so forms can be built for pile caps; the forms will be filled with reinforcing steel and concrete and removed after the concrete has cured. The towers and bent caps will then be erected.

Geotube Installation, Earthwork & Remove Geotube -

At the Oakland Touchdown area, a portion of the new westbound roadway encroaches into the Bay, requiring the use of engineered fill. To construct the westbound roadway, a geotube will be placed north of the Oakland Touchdown to temporarily protect the work area from tidal and wave action. A geotube is a large diameter tube of permeable geotextile fabric into which Bay sand and water will be pumped.

Existing Bridge Demolition -

After the new bridge is constructed, the existing bridge will be dismantled. The techniques for dismantling the superstructure will involve separating and removing large, essentially intact pieces of the span. The pieces will be lowered onto barges, then transported to an upland site for appropriate disposal. The bridge foundations will then be removed and existing piles will be cut off below the mud line.

Temporary Pier at YBI -

Temporary detours will be required on YBI to construct the main span and skyway without interrupting traffic on the existing East Span. For construction of the bents, piles will be driven, forms will be built for pile caps or spread footings; the forms will be filled

with reinforcing steel and concrete and removed after the concrete has cured. The towers and bent caps will then be erected.

Earthwork on Yerba Buena Island -

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

Pier Construction -

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

Order No. R2-2002-0011

Appendix B:
East Span Project
Self-Monitoring Program

CALIFORNIA REGIONAL WATER QUALITY CONTROL PLAN
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM

FOR ORDER No. R2-2002-0011

Caltrans San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

I. GENERAL

A. Basis

Reporting responsibilities of the Project Proponent as "waste discharger" are specified in Sections 13225(a), 13267(b), 13268, 13383, and 13387(b) of the California Water Code and this Regional Board's Resolution No. 73-16. This Self-Monitoring Program (SMP) is issued in accordance with the applicable Provisions of Board Order No. R2-2002-0011.

B. Purpose

The principal purposes of a monitoring program by a discharger, also referred to as a Self-Monitoring Program, are (1) to document compliance with effluent requirements and prohibitions established by this Board; (2) facilitate self-policing by the discharger in the prevention and abatement of pollution arising from improper effluent; (3) to develop or assist in the development of effluent or other limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards; (4) to prepare water and wastewater quality inventories; and, (5) to assist the discharger in complying with the requirements of the California Code of Regulations.

C. Sampling and Methods

Sample collection, storage and analysis shall be performed according to 40 CFR Section 136, or other methods approved by the Executive Officer.

Water analyses conducted on samples collected for laboratory analysis shall be performed by a laboratory approved by the State of California Department of Health Services (DHS) or a laboratory approved by the Executive Officer.

All monitoring instruments and equipment, including instruments and equipment used in field sampling and analysis, shall be properly calibrated and maintained to ensure accuracy of measurements.

Routine sampling shall follow Quality Assurance/ Quality Control procedures including the use of field, equipment and laboratory blanks and laboratory surrogate samples.

All Quality Assurance/Quality Control measures and results shall be reported along with the data.

II. DEFINITION OF TERMS

Grab Sample is defined as a discrete individual sample collected in a short period of time not exceeding 15 minutes. They are to be used primarily in determining compliance with receiving water limits. Grab samples only represent the condition that exists at the time the water and effluent are collected.

Receiving waters refers to any surface or groundwater which actually or potentially receives surface or groundwater, or which pass over, through, or under waste materials or contaminated soils. For these requirements, the samples to evaluate the condition of the receiving water should be taken within 100 feet of the Project Boundary.

Project Boundary, as defined in Board Order R2-2002-0011, is any point along the silt curtain at areas of dredging, excavation, or fill placement in the vicinity of eelgrass beds or mud flats, or, in the event a silt curtain is not used, the immediate limits of daily project work (e.g., daily limits of dredging).

Standard Observations refer to:

1. Receiving waters

    a. Evidence of floating and suspended materials generated by the construction and/or demolition activities, as recorded by visual observations, video or photographic records, continuous, fixed-turbidity meters that have been calibrated to total suspended solids and grab samples.
    b. Discoloration and turbidity: description of color, source, and size of affected area.
    c. Evidence of odors, presence or absence, characterization, source, and distance of travel from source.

Operations monitoring refers to the following information:

1. A description of and a map showing the area(s) dredged during the previous month, when dredging activity occurs in that month.
2. Estimates of the daily volume in cubic yards and the disposal location(s) of dredged materials removed during each day of the previous month, when dredging activity occurs in that month.

Construction activities refers to dredging, excavation, filling, construction, and demolition activities associated with the Project.

Duly Authorized Representative is one whose:

a. authorization is made in writing by a principal executive officer, or

b. authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity (e.g; field supervisor, project manager, chief engineer).

III. SPECIFICATIONS FOR SAMPLING AND ANALYSES

Caltrans is required to perform sampling and analyses as found in accordance with the following conditions and requirements:

A. Receiving Waters

1. At least once every 24 hours, and prior to start of dredging, excavation, or fill activities in waters of the State, depth-averaged background water samples shall be collected from at least 300 yards from active areas of the site. Background samples shall be collected such that they are representative of background conditions unaffected by potential discharges related to the Project.

   These samples shall be analyzed for the following constituents:

Constituents	Type of sample	Units
Turbidity	Grab	NTUs
pH	Grab	Not Applicable
Dissolved Oxygen	Grab	mg/l
Dissolved Sulfide	Grab	mg/l
Total Suspended Solids	Grab	mg/l
Temperature	-	degrees

2. Depth-averaged turbidity measurements shall be completed at established locations along the Project Boundary. Locations shall be established every 500 feet longitudinally along a line parallel to the Project Boundary and 100 feet away from the Project Boundary. Samples shall be taken, or measurements completed every 2 hours while work is being completed. Sampling shall continue after work has halted, if measured turbidity levels exceed the following, and for as long as measured turbidity levels exceed the following, measured in NTU:

Receiving Waters Background	Incremental Increase
≥ 50 units	10% of background, maximum

3. Samples shall be depth-integrated when possible, or otherwise taken at least one foot below the surface of the water body.

4. If analytical results for constituents analyzed on-site show that any grab sample exceeds any receiving water limit, confirmation samples shall be taken within 1 hour and every subsequent hour, and analyzed for all constituents for which on-site analysis is required. Sampling at this higher frequency shall continue until the exceedance has been corrected.

5. If any receiving water limit for a constituent or constituents is exceeded, then Caltrans shall follow the following process to address the exceedance:

    a. Identify source of exceedance;
    b. Correct source of exceedance;
    c. Resample to determine whether exceedance has been corrected.

6. If any receiving water limit for a constituent or constituents is exceeded for: a continuous period of 4 hours or more; or for 8 hours or more in any 1-week period from October 1 – March 31; or 16 hours or more in any 1 week period from April 1 – September 30; then Caltrans shall immediately suspend all dredging, excavation, or fill work causing or contributing to the exceedance, until turbidity levels have fallen below exceedance levels and remained there for a minimum of 4 consecutive hours. Additionally, Caltrans shall implement control measures necessary to prevent a reoccurrence of the exceedance when work is resumed, and shall immediately notify the Board by telephone and telefax of the exceedance and how it is correcting or will correct it.

7. If any receiving water limit for a consituent or constituents is exceeded for: 12 hours or more in any 1-week period from October 1 – March 31; or 24 hours or more in any 1 week period from April 1 – September 30, then Caltrans shall immediately halt the dredging, excavation, or fill causing the exceedance, until the cause of the violation is found and sampling demonstrates that the exceedance has been corrected or when Caltrans has provided the Board with a corrective action plan, acceptable to the Executive Officer, that provides alternative methods of compliance. Caltrans shall immediately notify the Board by telephone and telefax of the exceedance and of how they are correcting or will correct the exceedance.

8. For other violations, Caltrans shall notify the Board immediately whenever violations are detected and discharge shall not resume until Caltrans has provided the Board with a corrective action plan, acceptable to the Executive Officer, that provides alternative methods of compliance.

B. Standard Observations

The following observations shall be recorded by Caltrans on every day of operation:

1. Receiving Water:

    a. Floating and suspended materials of waste origin (to include oil, grease, algae, and other macroscopic particulate matter): presence or absence, source and size of affected area.

b. Discoloration and turbidity: description of color, source and size of affected area.

c. Odor: presence or absence, characterization, source, distance of travel and wind direction.

d. Hydrographic condition including: time and height of corrected low and high tides; and depth of water columns and sampling depths.

e. Weather condition including: air temperatures, wind direction and velocity and precipitation.

2. Progress and location of active dredging and control measures, noted on a map of the site.

C. Records to be Maintained

1. Written reports, strip charts, calibration and maintenance records, and other records shall be maintained by Caltrans and accessible at all times. Records shall be kept for a minimum of three years. Records shall include notes and observations for each sample as follows:

   a. Identity of each sample, sampling station, and observation station by number.

   b. Date and time of sampling.

   c. Date and time analyses are started and completed and the name of personnel conducting analyses.

   d. Complete procedure used, including methods of preserving and analyzing sample and identity and volumes or reagents used. A reference to a specific section of Standard Methods is satisfactory.

   e. Calculations of results.

   f. Results of analyses and/or observations, including a comparison of the laboratory and field results for duplicate samples, and detection limits for each analysis.

2. Records shall include a map or maps of the site showing the location sampling locations, work areas (e.g., coffer dams, dredging areas, etc.), and all other appropriate information.

3. If any receiving water limit for a constituent or constituents is exceeded, or if Caltrans otherwise violates any applicable water quality limits, then Caltrans shall maintain a tabulation showing the following flow data:

   Total time of exceedance on a daily basis for each monitoring station in exceedance, and an estimate of the area of waters in exceedance (e.g., sketch map).

IV. REPORTS TO BE FILED WITH THE REGIONAL BOARD

A. Written monitoring reports shall be filed according to the schedule set forth in Table A-1. Reports shall be submitted no later than the 15th of the month following the month they are reporting on. The reports shall contain the following:

a. Letter of Transmittal

A letter transmitting the essential points in each report should accompany each report. Such a letter shall include a discussion of any requirement violations found during the last report period, and actions taken or planned for correcting the violations. If Caltrans has previously submitted a detailed time schedule for correcting requirement violations, a reference to the correspondence transmitting such schedule will be satisfactory. If no violations have occurred in the last report period, this shall be stated in the letter of transmittal. Monitoring reports and the letter transmitting the monitoring reports shall be signed by the Caltrans District Director or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates. The letter shall contain a statement by the official, under penalty of perjury, that to the best of the signer's knowledge the report is true, complete, and correct.

b. Each monitoring report shall include a compliance evaluation summary. The summary shall contain:

i. An estimate of the volume of any Project discharge on a daily, weekly, and monthly basis.
ii. The method and time of measurement, equipment, and methods used to monitor turbidity and other monitored constituents in the field.

c. A map or aerial photograph shall accompany each report showing observation and monitoring station locations.

d. Laboratory statements of results of analyses specified in Part B must be included in each report. The director of the laboratory whose name appears on the laboratory certification shall supervise all analytical work in his/her laboratory and shall sign all reports of such work submitted to the Board.

i. The methods of analyses and detection limits must be appropriate for the expected concentrations. Specific methods of analyses must be identified. If methods other than USEPA-approved methods or Standard Methods are used, the exact methodology must be submitted for review and approved by the Executive Officer.

ii. In addition to the results of the analyses, laboratory quality assurance/quality control (QA/QC) information must be included in the monitoring report. The

laboratory QA/QC information should include the method, equipment and analytical detection limits, the recovery rates, an explanation for any recovery rate that is less than the recovery acceptance limits specified in the USEPA method procedures or the laboratory's acceptance limits, if they are more stringent than those in the USEPA method procedures; the results of equipment and method blanks; the results of spiked and surrogate samples; the frequency of quality control analysis; and the name and qualifications of the person(s) performing the analyses.

e. A summary and certification of completion of all Standard Observations for the Project, including the Project Boundary(ies) in the receiving waters.

f. A summary and certification of completion of all water quality analyses.

B. Contingency Reporting

a. A report to the Executive Officer and the Board case manager shall be made by telephone of any accidental discharge of whatever origin immediately after it is discovered. A written report shall be filed with the Board within five days thereafter. This report shall contain the following information:

   i. A map showing the location(s) of discharge(s);
   ii. Approximate flow rate and/or volume;
   iii. Duration of discharge;
   iv. Day and time of day of discharge;
   v. Nature of effects (i.e., all pertinent observations and analyses); and,
   vi. Corrective measures underway or proposed.

C. Final Reporting

Caltrans shall notify the Board by letter upon completion of each project phase and of the Project. Project completion is considered to be the date on which all dredged material has been deposited at its final disposal location(s), the new bridge has been completed and is open to traffic, the demolition of the existing East Span and removal of temporary structures have been completed, and construction equipment has been demobilized and staging areas have been restored. This date is considered separately from the required monitoring and implementation of other actions associated with post-construction stormwater and wetland mitigation. Caltrans shall also submit a final report containing the following information:

a. A comprehensive discussion of the compliance record, and the corrective actions taken or planned, which were needed for compliance with the Project's WDRs;
b. A comprehensive discussion of the effectiveness of receiving water monitoring methods;
c. An evaluation of the effectiveness of dredging and filling methods used (at minimizing water quality impacts);

d. An estimate of the total volume of material dredged or excavated from each discrete site during the project and the total volume of material placed at each disposal or reuse location; and,
e. An estimate of the total volume of decant water generated from dewatering of the dredged material, if applicable.

PART B: MONITORING AND OBSERVATION SCHEDULE

I. DESCRIPTION OF MONITORING STATIONS AND ANALYSES

1. RECEIVING WATERS

   a. Number and locations of turbidity (optical backscatter) meters:[1]

      i. Minimum of one turbidity meter no more than 100 feet beyond the Project Boundary and longitudinally every 500 feet parallel to the Project Boundary in environmentally sensitive areas (e.g., at eelgrass beds and mud flats) (monitoring for constituents other than turbidity is described in Table A-1);

      ii. Minimum of one turbidity meter per construction area where dredging and/or pile driving are being completed, no more than 100 feet beyond the Project Boundary.

         1. If simultaneous construction activities (e.g., multiple pile driving locations, multiple dredging locations or similar) occur more than 300 yards apart, each construction area will have a turbidity meter located no more than 100 feet beyond the boundary of that particular area, as defined by the silt curtain.

         2. If simultaneous construction areas occur more than 100 feet, but less than or equal to 300 yards apart, Caltrans may deploy one turbidity meter for both areas.

      iii. One turbidity meter located more than 300 yards from all construction activities to measure ambient conditions.

II. SCHEDULE OF SAMPLING AND ANALYSIS

The schedule of sampling and analysis is provided in the attached Table A-1.

III. REPORTING SCHEDULE

Reports submitted in compliance with this SMP shall be submitted by Caltrans on the following basis:

Monthly reporting: Monthly reports shall be submitted during all dredging and fill placement operations. Monthly reports shall be submitted by the 15th day of the month following the reporting period, beginning with the first month of dredging. Monthly reports shall include the measurements, observations, and monitoring as described in Table A-1.

Final reporting: Caltrans shall notify the Board by letter upon completion of project phases, within 60 days of completion of each project phase, and within 60 days of Project completion.

All reports shall be submitted to the Board case manager at

San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing Self-Monitoring Program:

1. Has been developed in accordance with the procedures set forth in this Board's Resolution No. 73-16, in order to obtain data and document compliance with discharge requirements established in Regional Board Order No. R2-2002-0011.

2. Was adopted by the Board on, January 23, 2002.

3. May be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the Discharger, and revisions will be ordered by the Executive Officer or Board.

Loretta K. Barsamian

Loretta K. Barsamian
Executive Officer

Attachment: Table A-1

SCHEDULE FOR SAMPLING, MEASUREMENTS, AND ANALYSIS

for

CALTRANS'
SAN FRANCISCO-OAKLAND BAY BRIDGE EAST SPAN SEISMIC SAFETY PROJECT
CITIES OF OAKLAND, ALAMEDA COUNTY, AND
SAN FRANCISCO, SAN FRANCISCO COUNTY.

ORDER No. R2-2002-0011

Table A-1: Surface Water Sampling Schedule for samples taken at near-environmentally sensitive area stations, as located pursuant to the SMP.

Sample Type	**Sampling Frequency**	**Reporting Period**[2]
Total Suspended Solids	Daily	Monthly
Turbidity	As specified in SMP	Monthly
pH (units) field	Daily	Monthly
Dissolved Oxygen	Daily	Monthly
Dissolved sulfide	Daily	Monthly
Water temperature & depth: surface, thermocline & bottom, or every 5 feet.	Daily	Monthly

[2] As specified in this table, or as otherwise specified in the SMP.

California Department of Fish and Game Permit

For the

San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

November 2001

State of California

Business, Transportation and Housing Agency

Memorandum

To: Mr. Stephen Puccini
Staff Counsel
Department of Fish and Game
1416 Ninth Street
Sacramento, CA 95814

Date: November 26, 2001

File: 04-SF-80 KP 12.2/14.3
04-ALA-80 KP 0.0/2.1
EA# 04-251-012000

From: **DEPARTMENT OF TRANSPORTATION**
TOLL BRIDGE PROGRAM

Subject: California Endangered Species Act Incidental Take Permit (No. 2081-2001-021-03) for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project.

Please find enclosed one original fully executed copy of the subject permit.

Mara Melandry

Mara Melandry
Environmental Manager, SFOBB

Enclosed

Robert W. Floerke, Regional Manager
Department of Fish and Game – Central Coast Region
✓ Steve Hulsebus, D 4, Toll Bridge Program
Susan Chang, D 4, Toll Bridge Program
Cindy Adams, HQ, Division of Environmental Analysis

RECEIVED
NOV 28 2001
BY: pc

California Department of Fish and Game

California Endangered Species Act
Incidental Take Permit No. 2081-2001-021-03
CALIFORNIA DEPARTMENT OF TRANSPORTATION
SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

Authority

The Department of Fish and Game ("Department") is issuing this incidental take permit ("permit") to the California Department of Transportation ("Caltrans" or "the permittee") in conjunction with the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project ("project") pursuant to its authority under the California Endangered Species Acts ("CESA") (Fish & G. Code, § 2050 et seq.). CESA generally prohibits the take[1] of any species that is listed as endangered or threatened, or is a candidate species,[2] under CESA ("listed species"). However, CESA authorizes the Department to issue a permit that allows a permittee to take a listed species if the take is incidental to an authorize lawful activity and the other conditions specified in section 2081(b) and (c) of the Fish and Game Code are met.

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[1]"Take" means "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture or kill." (Fish & G. Code, § 86.) As used in this permit, "take" shall have the same meaning as "take" under section 86 of the Fish and Game Code.

[2]"Candidate species" are species of wildlife that have not yet been placed on the list of endangered or threatened species under CESA, but are under formal consideration by the Fish and Game Commission.

Permittee

California Department of Transportation

Permittee's Contact Person

Mr. Randell Iwasaki, District Director, District 4
California Department of Transportation
c/o Ms. Mara Melandry
Environmental Manager, SFOBB
Box 23660
Oakland, CA 94623-0660

Project Description

The project consists of replacing the existing East Span of the San Francisco-Oakland Bay Bridge ("Bay Bridge") between the City of San Francisco and the East Bay with a new East Span ("East Span"), thereafter removing the existing East Span, and completing all mitigation work required under this permit and by other interested state and federal agencies. Caltrans will construct the new East Span over a five-year period and remove the existing East Span over a two-year period after the new East Span is constructed. The project will therefore take seven years to complete. Caltrans will construct the new East Span under four separate contracts, described as follows: (1) Self-Anchored Suspension/Yerba Buena Island Main Span; (2) Skyway; (3) Oakland Approach Structures; and (4) Geofill at the Oakland Touchdown. Caltrans will remove the existing East Span under a separate demolition contract.

The project will require the use of large-scale equipment and involve labor-intensive activities. Materials and equipment will arrive at the project site by land and water. To provide barge access to construction areas, access channels will be dredged near the Oakland approach structures. The initial dredging on the north side of the existing East Span will generate approximately 216,230 cubic yards ("cy") of material, which will be disposed of at the San Francisco-Deep Ocean Disposal Site ("SF-DODS"). This phase of dredging will be completed over a six month period. Construction of the piers and footings for the new East Span will result in dredging and disposal of 187,087 cy of material. This material will be dredged in smaller amounts over a four year period. This material will be disposed of at the Alcatraz disposal site ("SF-11"), except for the upper twelve feet of material for piers E1 - E6, which will require upland disposal. After the East Span is completed, dismantling of the existing East Span will begin. This will require the dredging of 190,680 cy of material. This material will be beneficially re-used at the Hamilton wetlands restoration site or disposed of at SF-DODS. Demolition of the piers for the existing East Span will result in the dredging of 22,724 cy of material. This

material will be disposed of at SF-11.

To construct the new East Span, Caltrans estimates that 259 large diameter steel piles will need to be driven into San Francisco Bay. Of these,189 piles will be 8.2 feet in diameter and 70 piles will be 5.9 feet in diameter. These large piles may require a hammer energy level of up to 1,700 kilo Joules ("kJ") (see Attachment 1). Caltrans estimates that 1,300 hours of driving time will be needed to install all the large piles. The length of the piles range from 135 to 358 feet. In order to construct all permanent structures, 1,030 to 2,060 smaller piles will need to be installed to temporary structures, supports, falsework, docks, and construction trestles. These temporary structures will be removed when they are no longer needed. The project also includes all mitigation work required under this permit and by other interested state and federal agencies, including, but not limited to, restoration of salmon habitat in tributaries to central and south San Francisco Bay, on tidal lands along the east shore of San Francisco Bay, on Skaggs Island in Sonoma County, and, potentially, at other locations in San Francisco Bay.

Project Location

The project, including the area around the piers of the new East Span and the area necessary to accommodate construction-related equipment, such as work barges and cranes, is located in San Francisco Bay, between Yerba Buena Island ("YBI") and the City of Oakland. The western limit of the project is the east portal of the YBI tunnel located in the City of San Francisco. The eastern limit of the project is located approximately 1,312 feet (400 meters) west of the Bay Bridge toll plaza on a spit of land referred to as the Oakland Touchdown area in the City of Oakland. The new East Span will be constructed north of the existing East Span and will be approximately 2.18 miles (3.5 kilometers) in length and 230 feet (70 meters) in width, including a 50-foot (15.3-meter) minimum space between the eastbound and westbound bridge decks.

Covered Species

This permit applies to the following species only:

Name	Status[3]
1. Sacramento River winter run chinook salmon (*Oncorhynchus tshawytscha*)	Endangered

[3]Refers to the status of the species under CESA only.

2. Sacramento River spring run chinook salmon (*Oncorhynchus tshawytscha*) — Threatened

3. Coho salmon north of San Francisco (*Oncorhynchus kisutch*) — Candidate

The above-listed species, and only those species, are hereinafter referred to as "covered species."

Effective Date and Expiration Date of Permit

This permit shall be executed in duplicate original form and shall become effective after a duplicate original is acknowledged by the applicant/permittee (see below) and returned to the Department. Unless renewed by the Department, this permit, which authorizes the incidental take of a covered species, shall expire on October 31, 2009.

Incidental Take Authorization

The Department authorizes the permittee and its employees, contractors, and agents to take a covered species incidental to completing the project, subject to the limitations described in this section and the conditions of approval identified below. This permit does not authorize the intentional take of a covered species; the take of a covered species in the course of activities outside the scope of the project, as described above; the take of a covered species resulting from a violation of the terms and conditions of this permit; or the take of any species listed under CESA or the federal Endangered Species Act ("ESA") that is not a covered species.

Fully Protected Species

This permit does not authorize the take of any fully protected species, including those species listed in sections 3511, 4700, 5050, and 5515 of the Fish and Game Code. The Department has determined that the project could have an adverse effect on the following fully protected species: American peregrine falcon (*Falco peregrinus anatum);* California brown pelican (*Pelecanus occidentalis*); and California least tern (*Sterna albifrons browni*). In an effort to avoid take of these species, the permittee will adhere to the following mitigation measures outlined in the Biological Opinion issued by the U.S. Fish and Wildlife Service ("USFWS") for the project:

1. **California least tern.** A large breeding colony of least terns is present at the Naval Air Station in Alameda ("NAS") south of the project site, and a smaller breeding colony of least terns is present at the Albany mudflats north of the project site. Least terns are known to forage in the shallow

waters of San Francisco Bay, which are similar to the waters at the east end of the project site. If through monitoring it is determined that project construction activities have resulted in the take of one or more least terns, Caltrans shall consult with the Department within twenty-four hours from the time Caltrans discovers or learns of the take to determine the cause of the take and to identify measures to avoid additional take. In addition, Caltrans, after negotiating with the Department and USFWS, will be required to take actions to provide additional predator and vegetation controls at the least tern breeding colony at NAS. Caltrans's restoration of eelgrass beds disturbed by the project will partially address impacts to least tern foraging habitat. Additionally, consistent with the *California Least Tern Recovery Plan* (USFWS, 1977), Caltrans will participate in processes to establish additional California least tern breeding areas at appropriate locations around San Francisco Bay to help stabilize and increase least tern populations.

2. **California brown pelican.** If through monitoring it is determined that the project construction activities have resulted in the take of one or more brown pelicans, Caltrans shall work with the Department and USFWS to evaluate methods to avoid additional project-related impacts to brown pelicans.

3. **American peregrine falcon.** Peregrine falcons, as well as cormorants, which are not fully protected, are known to nest on the existing East Span. Caltrans, in consultation with the Department, shall develop a management plan that addresses potential impacts to peregrine falcons and cormorants. The management plan shall discuss all bridge construction, removal, and maintenance activities and develop schedules for activities in order to avoid the take of peregrine falcons and cormorants, especially during their critical nesting periods.

Conditions of Project Approval

The Department's issuance of this permit and the permittee's authorization to take covered species under this permit, are subject to the permittee's full compliance with, and implementation of, the following conditions of approval:

1. The permittee shall comply with all applicable federal, state, and local laws in effect now, or hereafter enacted, in completing the project.

2. The permittee shall fully implement and adhere to the conditions in the "Bubble Curtain Background and Specifications" attached hereto as

Attachment 1.

3. To ensure that impacts to the covered species are minimized and the mitigation required under this permit is implemented, the permittee shall do all of the following:

a. Install and maintain an effective air bubble sound attenuation curtain around all large steel piles (i.e., 5.9 - 8.2 feet in diameter) during pile driving activities, unless other equally effective methods (e.g., cofferdams) are used, or as otherwise directed by the Department and the National Marine Fisheries Service ("NMFS") for the purpose of collecting performance data. "Effective" for purposes of this permit shall mean a continuous stream of air bubbles enclosing all permanent in-water piles and/or pile groups from the bottom of San Francisco Bay to its water surface. Airflow to the bubble curtain system shall be sufficient to provide a bubble flux of three cubic meters of air per minute per linear meter of pipeline in each concentric ring.

b. To maintain the integrity of the air bubble curtain, no barges, boat traffic, or other structure or equipment may penetrate the bubble curtain during pile driving activities.

c. To monitor the performance of the bubble curtain and assess the level of impact to fisheries, Caltrans, in conjunction with the Federal Highways Administration ("FHWA"), shall prepare and implement a fisheries and hydroacoustic monitoring program. The monitoring program shall include the following components: (1) underwater sound measurements at various distances and depths from pile driving operations; (2) observations of predation by gulls and other birds; and (3) experiments using fish in cages at different distances and depths from pile driving operations to evaluate fish mortality and injury rates. The fish cage experiments shall be designed to document near-term fish mortalities and the likelihood of delayed mortality of differing sizes and species of fish that have swim bladders.

Caltrans shall submit the above-described monitoring program to the Department and NMFS for review and approval at least ninety days prior to the initiation of pile driving.

Data collected from the monitoring program shall be made

available to the Department on a real-time basis. An interim report shall be provided to the Department by December 31, 2002, and a final report shall be provided to the Department by June 1, 2004.

d. To avoid attracting fish with work lights during night-time pile driving operations, pile driving shall be limited to daylight hours to the extent practicable and the use of artificial lights shall be minimized. If needed, illumination for any pile driving operations shall be directed away from the water.

e. Caltrans shall provide $4 million for the purpose of monitoring construction-related impacts and restoring the habitat in tributaries to central and south San Francisco Bay of anadromous salmonids listed under CESA and/or ESA, including the covered species ("salmonids" or "salmonid") in accordance with the following conditions:

(i) Caltrans shall make available a portion of the $4 million, not to exceed $500,000, prior to the initiation of project construction activities, which shall be used to fund the monitoring of fisheries impacts, sound pressure levels, and other environmental conditions associated with pile driving after project construction activities commence.

(ii) The remainder of the $4 million ("restoration funding") shall be used for off-site, out-of-kind mitigation to offset project-related injury and mortality of salmonids.

(iii) The restoration funding shall be used solely for salmonid restoration projects in tributaries to central and south San Francisco Bay.

(iv) Prior to December 31, 2003, Caltrans shall deposit the restoration funding into an escrow account. Expenditures from the account shall be made at the discretion of the Department and NMFS in consultation with Caltrans and FHWA.

f. Caltrans shall provide additional mitigation at off-site locations to offset the direct impacts of the project by establishing an escrow account of $10.5 million to be used as follows: 1) a minimum of $2.5 million to the East Bay Regional Park District to restore,

enhance, and/or create new aquatic habitat and transitional uplands at the Eastshore State Park and within central San Francisco Bay at the following sites or other suitable locations: Radio Beach Area, Brickyard Cove Area, Albany Beach Area, and Hoffman Marsh; 2) up to $8 million to acquire approximately 3,200 acres of diked historic baylands at Skaggs Island in Sonoma County, demolish structures and facilities on the site, and take other actions necessary to restore the site to tidal marsh. If any of the $10.5 million described above has not been fully expended by the time the project is completed, Caltrans shall consult with the Department and other interested state and federal permitting agencies to identify other projects that can be funded with the remaining monies that will offset the project's adverse impacts on fish and wildlife resources.

g. Caltrans proposes to restore up to 1.73 acres of barge access channel to its pre-construction bathymetry and replant the channel with eelgrass. Stockpiled dredged material and sand will be used to restore the appropriate contours of the channel and the area will be replanted using eelgrass from an adjacent donor site. Caltrans will monitor the replanted eelgrass to evaluate its success. This mitigation proposal is contingent on approval by the Bay Conservation and Development Commission to change its policy governing the use of dredged material for in-bay habitat restoration.

h. For the duration of construction activities, the permittee shall conduct compliance inspections at least once every week to ensure compliance with all measures specified in this permit to avoid the take of the covered species and to minimize and mitigate project impacts on the covered species and other fish and wildlife resources, especially those associated with pile driving activities ("avoidance, minimization, and mitigation measures" or "measures").

i. Every month for the duration of construction activities, the permittee shall provide the Department with a written compliance report. The compliance report shall document Caltrans's compliance with, and effectiveness of, all avoidance, minimization, and mitigation measures, including, but not limited to the bubble curtain. After the pile driving is complete, Caltrans shall submit a monitoring report to the Department on a quarterly basis.

Beginning in 2002 and continuing for the duration of the project, the permittee shall provide the Department a status report by July 1 of every year. Each status report shall include, at a minimum, the following information: 1) a general description of the project's status, including actual or projected completion dates, if known; 2) the current status of each avoidance, minimization, and mitigation measure; and 3) an assessment of the effectiveness of each completed or partially completed avoidance, minimization, and mitigation measure.

k. No later than 45 days after completion of the project, including completion of all avoidance, minimization, and mitigation measures, the permittee shall provide the Department with a final mitigation report. The final mitigation report shall be prepared by a knowledgeable, experienced biologist and shall include, at a minimum, the following information: 1) a report showing when each of the measures was implemented; 2) all available information about project-related incidental take of covered species; 3) information about other project impacts on covered and non-covered species; 4) project construction dates; 5) an assessment of the effectiveness of the avoidance, minimization, and mitigation measures included in this permit on the covered species, especially the bubble curtain; and 6) recommendations on how such measures might be changed to more effectively avoid, minimize, and mitigate the impacts of similar future projects on the covered and non-covered species.

The permittee shall provide Department representatives access to the project site and mitigation areas under its control, and shall otherwise fully cooperate with Department efforts to verify Caltrans's compliance with, or the effectiveness of, all avoidance, minimization, and mitigation measures.

m. Notwithstanding this permit's expiration date, the permittee's obligations under this permit shall not end until the Department accepts the permittee's final mitigation report as satisfactory and complete.

4. This permit may be amended without the concurrence of the permittee if the Department determines that continuing the project the existing conditions of this permit could jeopardize the continued existence of a covered species or a CESA-listed non-covered species or there is a

change in biological conditions that necessitates amending the permit to ensure that impacts to the covered species are minimized and fully mitigated.

5. The Department may issue the permittee a written stop work order to suspend any activity covered by this permit for an initial period of up to 25 days to prevent a violation of this permit or the illegal take of a listed species. The permittee shall comply with the stop work order immediately upon its receipt. The Department may extend a stop work order for a period not to exceed 25 additional days upon written notice to the permittee. The Department shall commence the process to formally suspend this permit pursuant to section 783.7 of title 14 of the California Code of Regulations within five working days of issuing a stop work order or an extended stop work order.

Compliance With Other Laws

This permit authorizes the incidental take only of the covered species after Caltrans begins the project. This permit does not by itself entitle Caltrans to proceed with the project. Caltrans is responsible for complying with all other applicable federal, state, and local laws in order to proceed with the project.

Notices

All written notices, reports, and other communications that are required under, or related to, this permit shall be delivered to the Department by first class mail at the following addresses, unless the Department instructs Caltrans otherwise:

Original to: Mr. Robert W. Floerke
Regional Manager, Region 3
P.O. Box 47
Yountville, CA 94599

Copy to: Office of the General Counsel
Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

CESA Findings

With respect to CESA and the issuance of this permit, the Department finds that based on the administrative record, all of the following conditions have been met:

1. The take of any covered species will be incidental to an otherwise lawful activity (i.e., Caltrans's completion of the project).

2. Where various measures are available to meet the minimization and mitigation requirements under CESA, the measures required will maintain Caltrans's project objectives to the greatest extent possible.

3. All required minimization and mitigation measures can be successfully implemented.

4. This permit is consistent with regulations adopted pursuant to sections 2112 and 2114 of the Fish and Game Code.

5. Caltrans has ensured that there will be adequate funding to implement the minimization and mitigation measures required by this permit, and to monitor its compliance with, and the effectiveness of, those measures.

6. Based on the best scientific and other information reasonably available, the Department has determined that the issuance of this permit will not jeopardize the continued existence of the covered species. Further, this permit takes into account the capability of the covered species to survive and reproduce and any adverse impacts the project could have on those capabilities in light of the following: a) known population trends; b) known threats to the covered species; and c) reasonably foreseeable impacts on the covered species from other related projects and activities. This finding is based, in part, on the Department's express authority to amend this permit as necessary to avoid jeopardizing the continued existence of the covered species.

Attachments

The following attachments are made part of this permit by reference:

Attachment 1: "Bubble Curtain Background and Specifications"

Attachment 2: "Department of Fish and Game Monitoring and Reporting Program"

THIS PERMIT IS ISSUED BY THE CALIFORNIA DEPARTMENT OF FISH AND GAME ON Nov. 19, 2001.

By:

Robert Floerke, Regional Manager
Central Coast Region

Approved as to legal form:

Michael R. Valentine, General Counsel

ACKNOWLEDGMENT

The undersigned as a duly authorized representative of the permittee acknowledges receipt of this permit and, by signing the permit, accepts and agrees to comply with all of its terms and conditions.

By: _____ Date: 11/21/01

Name: H.P. HONSLEY

Title: CHIEF DEPUTY

Attachment 1

Bubble Curtain Background and Specifications

The underwater sound pressure waves that have the potential to affect salmonids originate with the contact of the hammer with the top of the steel pile. The impact of the hammer on the top of the pile causes a wave to travel down the pile and causes the pile to resonate radially and longitudinally like a gigantic bell. Most of the acoustic energy is a result of the outward expansion and inward contraction of the walls of the steel pipe pile as the compression wave moves down the pile from the hammer to the end of the pile buried in the bay bottom. Water is virtually incompressible and the outward movement of the pipe pile wall by a fraction of an inch sends an underwater pressure wave propagating outward from the pile in all directions. The molecular elasticity of the steel pipe pulls the pile walls back inward with the water following the inward movement of the pipe wall, resulting in the propagation of an under-pressure wave. The steel pipe pile resonates sending out a succession of waves even as it is pushed several inches deeper into the bay bottom.

There is very little literature on the effects of underwater shock waves generated by pile driving on aquatic life. There are a few referenced publications, but most of the information is contained in "gray literature" publications produced for government agencies that are project specific. The monitoring methods have not been standardized and measurements tend to be sporadic (Keevin *et al.*, 1999).

Structural damage to the fish inner ear by intense sound has been examined by Enger (1981) and Hastings *et al.* (1995, 1996) with scanning electron microscopy. Hastings *et al.* (1996) found destruction of sensory cells in the inner ears of oscars (*Astronotus ocellatus*) four days after being exposed to continuous sound for one hour at 180 dB re:1 ìPa and 300 Hz. Hastings (1995) also reported that 13 out of 34 goldfish exposed for two hours to sound pressure levels ranging from 192 to 204 dB re:1 ìPa at either 250 or 500 Hz experienced equilibrium problems that included swimming backwards and/or upside down and wobbling from side to side. These fish recovered within one day suggesting that the damage was not permanent. This fish behavior could have been caused by post-traumatic vertigo (i.e., lack of balance and dizziness caused by a problem in the inner ear) similar to that experienced by humans after a severe blow to the body or head.

Fish can also die when exposed to lower sound pressure levels if exposed for longer periods of time. Hastings (1995) found death rates of 50 percent and 56 percent for gouramis (*Trichogaster sp.*) when exposed to continuous sounds at 192 dB re:1 ìPa at 400 Hz and 198 dB re:1 ìPa at 150 Hz, respectively, and of 25 percent for goldfish (*Carassius auratus*) when exposed to sounds of 204 dB re:1 ìPa at 250 Hz for two hours or less. Hastings (1995) also reported that acoustic

"stunning," a potentially lethal effect resulting in a physiological shutdown of body functions, immobilized gourami within eight to thirty minutes of exposure to the aforementioned sounds.

Loud sounds can have detrimental effects on fish by causing stress, increasing risk of mortality by reducing predator avoidance capability, and interfering with communication necessary for navigation and reproduction. Scholik and Yan (2001) reported temporary threshold shifts for fathead minnows (*Pimephales promelas*) exposed to 24 hours of white noise with a bandwidth of 300 - 4000 Hz and overall sound pressure level of only 142 dB re:1 ìPa. Their results indicated that the effects could last longer than 14 days. Even if threshold shifts do not occur, loud sounds can mask the ability of aquatic animals to hear their environment. Based on the sound pressures and exposure times for sensory hair cell damage reported by Hastings (1995) and Hastings *et al.* (1996), and an assumption of deposition of equivalent acoustic energy in the inner ear over time, fish could experience damage to the inner ear if they remained in the direct vicinity (at 200-210 dB re:1 ìPa peak sound pressure) of the pile driving activity for more than a few minutes. Thus, even with an air bubble curtain in place, some fish with swim bladders will most likely be affected in this manner during construction of the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project ("project").

Pile driving may result in "agitation" of salmonids indicated by a change in swimming behavior (Shin, 1995). Salmon and steelhead may exhibit a startle response to the first few strikes of a pile. The startle response is a quick burst of swimming that may be involved in avoidance of predators (Popper, 1997). A fish that exhibits a startle response is not in any way injured, but it is exhibiting behavior that suggests it perceives a stimulus indicating potential danger in its immediate environment. Fish do not exhibit a startle response every time they experience a strong hydro-acoustic stimulus. The startle response is likely to extinguish after a few pile strikes.

The following examples of pile driving projects provide some additional insight to the potential effects of the project on listed salmonids:

At the Hong Kong Airport Fuel Transfer Facility project an air bubble ring with a diameter of 50 meters ("m") was placed around the pile-driving operation. The pile driver was a six metric ton diesel hammer at 90 kilojoules ("kJ"). Hammer strikes resulted in underwater pulses of sound about 40 milliseconds in duration. The effective source level (inferred by extrapolating from the longer-distance measurements) was 238 dB re: 1 ìPa at one meter without bubbles and 234 dB with bubbles. On average, the bubble screen diminished the sound pressures by 4 dB. The contractor did not measure peak pressures. It was also observed that low and high frequency sounds were not attenuated by the air bubble curtain. The peak pressure of sound anticipated to occur during the proposed project

(268 dB re: 1 ìPa at one meter) far exceeds the level observed for the Hong Kong project.

At the Canada Place Cruise Ship Terminal in Vancouver, B.C., open-ended steel pipe piles 36 inches in diameter with 0.75-inch wall thickness were driven, as were 24-inch diameter closed-ended steel pipe piles with 0.75-inch wall thickness (Longmuir and Lively, 2001). An air bubble curtain was developed to protect fish. It was kept as close to the pile as practical, allowing for battered (slanted) piles to be driven. The authors stated that a proper bubble curtain can reduce underwater sound overpressures from pile driving by at least 85 percent (16.5 dB) and that their bubble curtain in Vancouver reduced underwater overpressures during pile driving from more than 22 psi to less than 3 psi (a reduction of more than 17 dB). They referred to the Canada Department of Fisheries and Oceans's criterion for fish safety of not exceeding an explosion blast peak pressure of 14.5 psi (220 dB re: 1 ìPa). The Vancouver study found that, perhaps due to the repetitive nature of pile driving, the peak pressure should be less than 4.5 psi (210 dB re: 1 ìPa) to protect small fish. This is documented by Rasmussen (1967), who found that 3-6 month old salmon were killed at levels exceeding 2.7 psi (204 dB re: 1 ìPa).

To assess the environmental and technical factors involved in driving very large piles proposed for the project, a Pile Installation Demonstration Project ("PIDP") was undertaken in late 2000 in which three eight-foot diameter steel pipe pilings were driven into the San Francisco Bay (Illingworth and Rodkin, 2001). The underwater sound measurements were not comprehensive, but important data came from two measurements at hydrophone depth of 6 m, without a sound attenuation system in place. Using a pile-driver energy of 900 kJ, peak pressure of 207 dB re: 1 ìPa at a distance of 103 m and 191 dB at distance of 358 m were measured. Applying the spreading-loss model for received levels, the corresponding equation is:

RL (dB re: 1 ìPa) = 266.5 - 29.6•log(R) for R in m.

The attenuation loss rate was almost 30 dB per tenfold change in distance, close to the 28 dB per tenfold change in distance observed at the Hong Kong refueling facility discussed above.

The maximum pile-driver energy available for the proposed project is 1700 kJ. Applying the scaling suggested above, the peak pressure would be expected to have been 20•log(1700/900)0.33 = 1.8 dB more at the higher energy level, or almost 209 dB at distance of 103 m. Thus, when the energy is 1700 kJ, the constant term will be 268.5 dB in the equation for received level.

At the Baldwin Bridge piers in Connecticut, underwater acoustic measurements from the demolition pounding of a "hoe ram" were recorded by Dolat (1997). The

ram struck the pier approximately four times per second creating loud pulsed sine waves with each blow. Four strikes per second was equivalent to a continuous 170 dB re: 1ìPa. Based on these estimates of the peak sound pressure levels, the report concluded that fish less than 30 m away could experience permanent auditory system damage, temporary and possibly permanent loss of equilibrium or complete incapacitation. The report included a brief discussion of previously unreported studies that show that beyond a brief startle response associated with the first few acoustic exposures, fish do not move away from areas of very loud noises and can be expected to remain in the area unless they are carried away by the river currents.

In Puget Sound, pile driving operations have been reported to disrupt juvenile salmon behavior (Feist *et al.,* 1992). Although no underwater sound measurements are available from that study, comparisons between juvenile salmon schooling behavior in areas subjected to pile driving/construction and other areas where there was no pile driving/construction indicate that there were fewer schools of fish in the pile-driving areas than in the non-pile driving areas. The results are not conclusive but there is a suggestion that pile-driving operations may result in a disruption in the normal migratory behavior of the salmon in that study, although the mechanisms salmon may use for avoiding the area are not understood at this time.

Based on the effectiveness of the air bubble curtain used during the Canada Place project and results from the PIDP, Greene (2001) estimates that fish beyond 44 m from the pile driving operation in the project will generally survive, assuming a 10 dB reduction in sound pressure levels from the bubble curtain. However, Greene (2001) assumes that immediate mortality of fish is limited to levels of 210 dB and greater. Rassmusen (1967) suggests immediate mortality of juvenile salmonids may occur at sound pressure levels exceeding 204 dB. In consideration of this uncertainty, the National Marine Fisheries Service ("NMFS") estimates fish beyond 69 m (204 dB re: 1 ìPa) will generally survive during the large hammer pile driving with an air bubble curtain in the project, assuming a 10 dB reduction in sound pressure levels. Outside the radius of 69 m, up to possibly 440 m (180 dB re: 1 ìPa), fish are likely to be injured and result in some level of delayed mortality. Still further out from the pile driving activity, up to possibly 4,400 m (150 dB re: 1 ìPa), fish may exhibit temporary abnormal behavior indicative of stress or exhibit a startle response, but not sustain substantial harm or injury.

Listed salmonids exposed to high sound pressure levels within 69 m of the pile during the operation of large hammers at the East Span Project could be subject to immediate mortality from barotrauma. Barotrauma is pathologies associated with exposure to drastic changes in pressure. These include hemorrhage and rupture of internal organs, including the swim bladder and kidneys in fish. Death can be instantaneous, occur within minutes after exposure, or occur several days

later. Bubble expansion in blood vessels can cause hemorrhaging

Gisiner (1998) reports swim bladders of fish can perforate and hemorrhage when exposed to blast and high-energy impulse noise underwater. Inside the 69 m radius of an active pile driving operation, a very strong shock wave or high pressure/low pressure cycle may result in a rupture of the swim bladder. If the swim bladder bursts and the air escapes from the body cavity or is forced out of the pneumatic duct, the fish may sink to the bottom. If the swim bladder bursts but the air stays inside the body cavity, the fish is likely to stay afloat but have some difficulty in maneuvering or maintaining orientation in the water column. Barotrauma, including rupture of the swim bladder of several species of fish, was observed during the PIDP.

Immediately beyond the 69 m radius from a pile driving event, fish are expected to experience trauma in many organs including the inner ear, eyes, blood, nervous system, kidney, and liver. As the underwater sound pressure wave generated by a pile strike passes through a fish, the swim bladder will be rapidly squeezed due to the high pressure and then rapidly expand as the underpressure component of the wave passes through the fish. At relatively low sound pressure levels, only a fraction of 1 psi above the ambient sound pressure level in the environment, the swim bladder will rhythmically expand and contract with no adverse effect. The swim bladder routinely expands and contracts as salmonids swim near the surface or swim in deeper water near the bottom. At high sound pressure levels of pile driving, the swim bladder may repeatedly expand and contract, hammering the internal organs that cannot move away since they are bound by the vertebral column above and the abdominal muscles and skin that hold the internal organs in place below the swim bladder (Gaspin, 1975). This pneumatic pounding may result in the rupture of capillaries in the internal organs as indicated by observed blood in the abdominal cavity, and maceration of the kidney tissues. The pneumatic duct, which connects the swim bladder with the esophagus, may not make a significant difference in the vulnerability of the salmonids since it is so small relative to the volume of the swim bladder (Gaspin, 1975).

The effects discussed above will be directly dependant on the resulting sound pressure levels experienced by an individual fish during pile driving at the project. The sound pressure levels and the degree of effect depends on many factors including:

size and force of the hammer strike;

2 distance from the pile;

3 depth of the water around the pile

4. depth of the fish in the water column;

5. amount of air in the water;

6. texture of the surface of the water (size and number of waves on the water surface);

7. bottom substrate composition and texture;

8. size of the fish;

9. species of fish;

   presence of a swim bladder;

   physical condition of the fish; and

   effectiveness of bubble curtain sound/pressure attenuation technology.

Water depths in the project area are relatively shallow, less than 5 m, for approximately two-thirds of the large piles. In shallow water, much of the acoustic energy can be absorbed by the bottom and reflected off the surface back down to the bottom and even backwards towards the pile. Thus, the rate of attenuation is much higher in shallower water and the expected area of adverse effects is expected to be reduced.

The project is located in an area of strong tidal currents, and tidal currents are expected to influence the level of adverse affect to listed species. Adult and juvenile salmonids are likely to take advantage of tidal currents to travel through San Francisco Bay on their migration routes. The large volume of tidal exchange at the project construction site is expected to assist with the transport of listed salmonids both to and away from areas of high sound pressure levels during pile driving.

Tidal currents will also influence the performance of the bubble curtain sound attenuation system. Bubble curtains work best in areas not influenced by currents, because moving water will carry the upward-traveling air bubbles away from the pile. If the pile is not completely encapsulated by air bubbles, high sound pressure waves are likely to travel into San Francisco Bay through areas thin or devoid of air bubbles.

Depending on the effectiveness of the sound attenuation system proposed for the project, it is reasonable to assume a potentially large area of impact from sound generated from pile driving. However, there are both temporal and spatial parameters to consider as well. Spatial parameters include known migratory

pathways within the action area and San Francisco Bay for the various listed ESUs. For the three listed ESUs originating from the Central Valley (Central Valley steelhead, Central Valley spring-run chinook salmon, Sacramento River winter-run chinook salmon), it is believed that adult fish generally remain on the north side after entering the bay through the Golden Gate, migrating rapidly around Angel Island and through San Pablo Bay towards the Delta and their natal Central Valley streams. Although adult salmon have been recorded feeding near YBI in the summer, these numbers are probably small. For juvenile salmonid smolts originating from Central Valley streams, it is generally thought that they, too, utilize the north side of the Bay as their primary migration corridor. It is also the consensus of California salmon researchers that juvenile salmonids migrate relatively quickly through San Francisco Bay en route to productive feeding areas off the Pacific coast.

Central California Coast coho salmon utilize two streams in Marin County (one empties into Richardson Bay, the other into north San Francisco Bay) and neither adults nor juveniles (emigrating as one year-olds) are expected to be near the pile driving area during their migration between the ocean and natal streams.

Cofferdams may be used by the contractors to dewater some pile installation sites. If cofferdams are installed, sediment will be excavated and the cofferdam dewatered. The steel pipe piles would be driven after dewatering into the Alameda geologic formation. It is anticipated that the layer of air and the coffer dam itself surrounding the pile will effectively attenuate sound pressure waves to safe levels for aquatic organisms in the Bay including listed salmonids. Cofferdams are likely to be used in shallowest areas at the Oakland Touchdown which will avoid adverse effects during the driving of these piles.

To attenuate the effects of sound pressure waves on fish, a bubble curtain system will be required for driving of all permanent in-water piles. A continuous stream of air bubbles will enclose all permanent in-water piles/pile groups during the pile driving process, unless other equally effective methods such as cofferdams are used, or as otherwise directed by Caltrans, in consultation with the Department and NMFS, for the purpose of collecting performance data. Contractor specifications will stipulate the positioning, configuration, operation and removal of the bubble curtain system. The bubble curtain system will consist of air compressors, air supply lines, distribution manifolds, and aeration pipelines.

The aeration pipe will be perforated pipe configured into concentric rings spaced no more than five vertical meters apart at all tide conditions. The lowest aeration pipeline layer will be designed to ensure contact with the mud line without sinking into bay mud. The bubble curtain system will be constructed on a frame designed to keep the aeration pipelines stable (horizontal) and to provide enough ballast to counteract any inherent buoyancy of the system during operation. When emplaced, the bubble curtain system must be configured such that the

aeration pipelines completely enclose the pile/pile group at a minimum distance of two meters. Each aeration pipeline will have four adjacent rows of approximately 1.6 mm diameter air holes spaced approximately 20 mm apart. The bubble curtain system will provide a bubble flux of three cubic meters per minute, per linear meter (32 cubic feet per minute, per linear foot) of pipeline in each concentric ring. Valves and gauges to measure air pressure and flow rates will be installed in the main air supply lines and at critical branch locations and shall be accurate to +/- 2 percent. All gauges shall be installed to be accessible to Caltrans inspectors. The contractor will keep a log and graphic plot of all gauge readings, with data logged during every 30 minutes of operation. If the reading of any gauge drops below 10 percent of normal operation, pile driving will stop until the defect is repaired to the satisfaction of Caltrans's Engineer.

The contractor must submit a bubble curtain system design and supporting calculations for Caltrans's review within two months of receiving notice to proceed on the project. Caltrans will comment on the system within one month and the contractor shall respond within two weeks of Caltrans's comments. The contractor will be required to demonstrate the operation of the bubble curtain system during the re-strike of the PIDP piles. The contractor will ensure that bubble "drift" at maximum tidal flux or current does not compromise the integrity of the continuous bubble curtain. The pile-driving barge will also be isolated so that noise from the pile installation is not transmitted through the barge into the water-column.

Attachment 2

DEPARTMENT OF FISH AND GAME
MITIGATION MONITORING AND REPORTING PROGRAM

CALIFORNIA INCIDENTAL TAKE PERMIT NO. 2081-2001-021-03

PERMITTEE: California Department of Transportation

PROJECT: California Department of Transportation San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

PURPOSE OF THE MMRP

The purpose of the Mitigation Monitoring and Reporting Program ("MMRP") is to ensure that the measures required by the Department of Fish and Game ("Department") to minimize and mitigate impacts on the covered species associated with the above-referenced project are properly implemented, thereby ensuring compliance with section 2081(b) of the Fish and Game Code.

OBLIGATIONS OF PERMITTEE

The minimization and mitigation measures listed in the table shall be implemented within the time periods indicated. The permittee shall be solely responsible for monitoring compliance with all minimization and mitigation measures and for reporting to the Department on its progress in implementing those measures in accordance with the permit and MMRP.

VERIFICATION OF COMPLIANCE AND EFFECTIVENESS

The Department may verify, at its sole discretion, the permittee's compliance with any minimization or mitigation measures and/or independently assess the effectiveness of those measures.

TABLE OF MINIMIZATION AND MITIGATION MEASURES

The below "Table of Minimization and Mitigation Measures," which is part of the MMRP, summarizes some of the minimization and mitigation measures required by the Department under the above-referenced incidental take permit ("permit"). The table serves only as a tool to be used by Caltrans and the Department to monitor and report on the minimization and mitigation measures required under the permit. The table does not include every minimization and mitigation measure required under the permit, or necessarily fully describe those measures that are listed in the table. Such omissions or discrepancies shall not be construed as relieving the permittee of complying with

those minimization and mitigation measures required under the permit that are not included or fully described in the table. The permittee shall comply with every avoidance, minimization, and mitigation measure required under the permit.

The following items are included in the table for each minimization and mitigation measure: "Mitigation Measure"; "Source"; "Implementation Schedule"; "Responsible Party"; and "Status/Date/Initials." The "Mitigation Measure" column summarizes the specified minimization or mitigation requirement under the permit. The "Source" column identifies the document that requires the minimization or mitigation measure, which, in this case, is the permit. The "Implementation Schedule" column lists the date or project phase by which the responsible party must implement the minimization or mitigation measure. The "Responsible Party" column identifies the party responsible for implementing the minimization or mitigation measure. The "Status/Date/Initials" column must be completed by the permittee during the preparation of each status report and the final mitigation report, and must identify the implementation status of each minimization and mitigation measure; the date the permittee determined the status; and the initials of the individual determining the status.

TABLE OF MINIMIZATION AND MITIGATION MEASURES

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
1	Permittee shall fully implement and adhere to the conditions in the "Bubble Curtain Background and Specification" (Attachment 1).	Permittee	During construction	Permittee	
2	Install and maintain an effective air bubble sound attenuation curtain around all large steel piles (i.e., 5.9 - 8.2 feet in diameter) during pile driving activities, unless other equally effective methods (e.g., cofferdams) are used, or as otherwise directed by the Department and the National Marine Fisheries Service ("NMFS") for the purpose of collecting performance data. "Effective" for purposes of this permit shall mean a continuous stream of air bubbles enclosing all permanent in-water piles and/or pile groups from the bottom of San Francisco Bay to its water surface. Airflow to the bubble curtain system shall be sufficient to provide a bubble flux of three cubic meters of air per minute per linear meter of pipeline in each concentric ring.	Permit	During construction	Permittee	
3	To monitor the performance of the bubble curtain and assess the level of impact to fisheries, Caltrans, in conjunction with the Federal Highways Administration ("FHWA"), shall prepare and implement a fisheries and hydroacoustic monitoring program. The monitoring program shall include the following components: (1) underwater sound measurements at various distances and depths from pile driving operations; (2) observations of predation by gulls and other birds; and (3) experiments using fish in cages at different distances and depths from pile driving operations to evaluate fish mortality and injury rates. The fish cage experiments shall be designed to document near-term fish mortalities and the likelihood of delayed mortality of differing sizes and species of fish that have swim bladders. Caltrans shall submit the above-described monitoring program to the Department and NMFS for review and approval at least ninety days prior to the initiation of pile driving. Data collected from the monitoring program shall be made available to the Department on a real-time basis. An interim report shall be provided to the Department by December 31, 2002, and a final report shall be provided to the Department by June 1, 2004.	Permit	During construction Interim report due by December 31, 2002 Final report due by June 1, 2004	Permittee	
4	Pile driving shall be restricted to daylight hours to the extent practicable and the use of artificial lights shall be minimized.	Permit	During pile driving	Permittee	

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
5	Caltrans shall provide $4 million for the purpose of monitoring construction-related impacts and restoring the habitat in tributaries to central and south San Francisco Bay of anadromous salmonids listed under CESA and/or ESA, including the covered species ("salmonids"). Caltrans shall make available a portion of the $4 million, not to exceed $500,000, prior to the initiation of project construction activities, which shall be used to fund the monitoring of fisheries impacts, sound pressure levels, and other environmental conditions associated with pile driving after project construction activities commence.	Permit	Prior to initiation of project construction activities	Permittee	
6	The remainder of the $4 million ("restoration funding") shall be used for off-site, out-of-kind mitigation to offset project-related injury and mortality of salmonids.	Permit	December 31, 2004	Permittee	
7	Prior to December 31, 2003, Caltrans shall deposit the restoration funding into an escrow account. Expenditures from the account shall be made at the discretion of the Department and NMFS in consultation with Caltrans and FHWA.	Permit	December 31, 2003	Permittee	
8	Caltrans shall provide additional mitigation at off-site locations to offset the direct impacts of the project by establishing an escrow account of $10.5 million to be used as follows: 1) a minimum of $2.5 million to the East Bay Regional Park District ("EBRPD") to restore, enhance, and/or create new aquatic habitat and transitional uplands at the Eastshore State Park and within central San Francisco Bay at the following sites or other suitable locations: Radio Beach Area, Brickyard Cove Area, Albany Beach Area, and Hoffman Marsh; 2) up to $8 million to acquire approximately 3,200 acres of diked historic baylands at Skaggs Island in Sonoma County, demolish structures and facilities on the site, and take other actions necessary to restore the site to tidal marsh. If any of the $10.5 million described above has not been fully expended by the time the project is completed, Caltrans shall consult with the Department and other interested state and federal permitting agencies to identify other projects that can be funded with the remaining monies that will offset the project's adverse impacts on fish and wildlife resources.	Permit	February 28, 2002	Permittee	
9	Caltrans proposes to restore up to 1.73 acres of barge access channel to its pre-construction bathymetry and replant the channel with eelgrass. Stockpiled dredged material and sand will be used to restore the appropriate contours of the channel and the area will be replanted using eelgrass from an adjacent donor site. Caltrans will monitor the replanted eelgrass to evaluate its success. This mitigation proposal is contingent on approval by the Bay Conservation and Development Commission to change its policy governing the use of dredged material for in-bay habitat restoration.	Permit	Post-construction	Permittee	
10	For the duration of construction activities, the permittee shall conduct compliance inspections at least once every week to ensure compliance with all measures specified in this permit to avoid the take of the covered species and to minimize and mitigate project impacts on the covered species and other fish and wildlife resources, especially those associated with pile driving activities ("avoidance, minimization, and mitigation measures" or "measures").	Permit	Weekly	Permittee	

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
11	Every month for the duration of construction activities, the permittee shall provide the Department with a written compliance report. The compliance report shall document Caltrans's compliance with, and effectiveness of, all avoidance, minimization, and mitigation measures, including, but not limited to the bubble curtain. After the pile driving is complete, Caltrans shall submit a monitoring report to the Department on a quarterly basis.	Permit	Monthly during pile driving, quarterly thereafter	Permittee	
12	Beginning in 2002 and continuing for the duration of the project, the permittee shall provide the Department a status report by July 1 of every year. Each status report shall include, at a minimum, the following information: 1) a general description of the project's status, including actual or projected completion dates, if known; 2) the current status of each avoidance, minimization, and mitigation measure; and 3) an assessment of the effectiveness of each completed or partially completed avoidance, minimization, and mitigation measure.	Permit	Annually	Permittee	
13	No later than 45 days after completion of the project, including completion of all avoidance, minimization, and mitigation measures, the permittee shall provide the Department with a final mitigation report. The final mitigation report shall be prepared by a knowledgeable, experienced biologist and shall include, at a minimum, the following information: 1) a report showing when each of the measures was implemented; 2) all available information about project-related incidental take of covered species; 3) information about other project impacts on covered and non-covered species; 4) project construction dates; 5) an assessment of the effectiveness of the avoidance, minimization, and mitigation measures included in this permit on the covered species, especially the bubble curtain; and 6) recommendations on how such measures might be changed to more effectively avoid, minimize, and mitigate the impacts of similar future projects on the covered and non-covered species.	Permit	At project completion	Permittee	

CALIFORNIA DEPARTMENT OF FISH AND GAME
MARINE REGION
20 LOWER RAGSDALE DRIVE
MONTEREY, CALIFORNIA 93940

AMENDMENT NO. 2
(A Major Amendment)
California Endangered Species Act
Incidental Take Permit No. 2081-2001-021-03
California Department of Transportation
San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (SFOBB Project)
in San Francisco and Alameda Counties

INTRODUCTION

On November 26, 2001, the California Department of Fish and Game (DFG) issued Incidental Take Permit No. 2081-2001-021-03 (ITP) to the California Department of Transportation (Caltrans, Permittee) authorizing take as defined by state law of Sacramento River winter and spring run Chinook (*Oncorhynchus tshawytscha*), and Central Coast Coho Salmon (*Oncorhynchus kisutch*) (collectively, the Covered Species) associated with and incidental to the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project located in San Francisco and Alameda Counties, California (Project). The Project as described in the ITP issued by DFG includes replacing the existing east span (East Span) of the San Francisco Bay Bridge (Bay Bridge) with a new East Span and thereafter removing the existing East Span. In issuing the ITP, DFG found, among other things, that Permittee's compliance with the Conditions of Approval of the ITP would fully mitigate Project impacts of the taking on the Covered Species and that issuance of the ITP would not jeopardize the continued existence of the Covered Species.

Since the issuance of the original ITP, DFG has issued one amendment termed Amendment No. 1. Issued on October 14, 2009, Amendment No. 1 modified the original ITP by adding Longfin Smelt (*Spirinchus thaleichthys*; LFS) to the list of Covered Species; extending the date for Project completion from October 31, 2009 to June 30, 2018; and amending the conditions related to pile driving. Amendment No.1 erroneously stated that, "Marine based (in-water) activities are expected to be completed in 2009…". In a letter to DFG dated July 25, 2011, Permittee clarified that in-water activities will continue through the completion of the Project in 2018.

On January 5, 2012, Permittee submitted a request to DFG for a major amendment to the existing ITP for the Project. The amendment application includes a request to correct the in-water activity date from October 31, 2009 to June 30, 2018; to further describe certain Project related activities related to the dismantling of the existing east

span and to replace an existing minimization measure related to sound attenuation. These additions do not significantly modify the nature and scope of the Project, however the additional details provided by Permittee regarding the removal of the existing East Span allow the existing Project description to be refined. This amendment clarifies that Project activities include the need for two temporary trestles and falsework to assist in the removal of the existing East Span. The trestles will be located on the south side of the existing East Span and at both the Yerba Buena Island (YBI) and Oakland ends of the span, while the falsework will occur throughout the existing East Span. The construction of these trestles and falsework will include an additional 2,540 temporary piles. These methods are necessary due to construction and on-location habitat limitations.

Permittee requests the replacement of a minimization measure in the existing ITP that requires the use of an air bubble sound attenuation curtain during pile driving with a measure that shortens the magnitude and duration of pile driving activities. Specifically, for the Oakland access trestle, Caltrans is requesting unattenuated impact hammering on a limited basis for safety testing of the piles placed with a vibratory hammer. As this practice will occur on an extremely limited basis, Caltrans has requested attenuation requirements be waived due to the cost and loss of construction time for placing attenuation equipment for the maximum 2 minutes of impact driving per day. For the YBI temporary access trestle, Caltrans has requested the use of unattenuated impact driven H-piles due to the rocky substrate in the area. Permittee found that, due to the uneven terrain, the bubble curtain was not having sufficient contact with the bottom to properly attenuate noise in the area.

This Major Amendment No. 2 (Amendment) makes the following changes to the existing ITP:

1. This Amendment corrects the date for completion of in-water activities from October 31, 2009 to June 30, 2018;

2. This Amendment provides for refined construction methodologies for removal of the existing East Span including the construction of falsework and temporary trestles at YBI and Oakland; and

3. This Amendment provides for the limited use of unattenuated pile driving in excess of the threshold criteria for hydroacoustic noise for the construction of the temporary trestles at YBI and Oakland.

As set forth below, these changes will significantly modify the minimization measures previously authorized by DFG in the ITP and Amendment No. 1. (Cal. Code Regs., tit. 14, § 783.6, subd. (c)(5).)

AMENDMENT

The ITP as amended by Minor Amendment No. 1, is amended as follows (amended language in ***bold italics***; deleted language in ~~strikethrough~~):

1. The section titled Status of Project Implementation, page 2 of Amendment No. 1 shall be amended to read:

   Status of Project Implementation: Marine based activities which could affect the Covered Species include dredging, filling, and pile driving. ~~There is one remaining pile driving activity to install~~ **The demolition of the existing East Span will include an additional** ~~22, 36-inch~~ **2,540** piles for ~~a~~ temporary access trestle**s and falsework. With the exception of pile proof testing activities**, this pile driving will be restricted to the period between June 1st and November 30th to avoid the peak migration period for salmonids. The newly listed LFS are vulnerable to similar activities of the Project as are the three original Covered Species. Marine based (in-water) activities **for the construction of the new East Span and dismantling of the existing East Span** are expected to ~~be completed in 2009; however; other Project activities will~~ continue through **June 30,** 2018. While unlikely, the risk of an accidental toxic spill resulting in mortality **of Covered Species also** exists. ~~, and~~ **T**herefore**,** Caltrans has requested the Amendment extend the take authorization through the completion of the Project.

2. ITP Condition of Approval 3, subcondition (a), as amended by Amendment No. 1, as well as the corresponding measure in the Mitigation and Reporting Program (MMRP) for the ITP, shall be amended to read:

   a. Install and maintain an effective air bubble sound attenuation curtain around all piles during pile driving activities, unless other equally effective methods (e.g., cofferdams) are used, or the threshold for injury to fish (206 dB peak, 183 dB accumulated sound exposure level) will not be exceeded. "Effective **air bubble sound attenuation curtain**" for purposes of this permit shall mean a continuous stream of air bubbles enclosing all permanent and temporary in-water piles and/or pile groups driven in waters ~~deeper than five meters from the bottom~~ of San Francisco Bay ~~to its water surface~~. Airflow to the bubble curtain system shall be sufficient to provide a bubble flux of two to three cubic meters of air per minute per linear meter of pipeline in each

concentric ring. **Exceptions to meeting the threshold criteria and attenuation measures include:**

(i) Pile proof testing may occur without attenuation as long as measures to minimize adverse outcomes for Covered Species are also met. These minimization measures include: no more than two piles per day may be proof tested without attenuation, and proofing activities shall not exceed more than one minute of proofing and 20 blows per pile per day.

(ii) H-pile impact driving may occur without attenuation only for the YBI access trestle as long as measures to minimize adverse outcomes for Covered Species are also met. These minimization measures include: all piles must be driven during daylight hours and in less than five meters of water, piles must be driven as close to daily periods of low water (low tide, MLLW) as practicable, and pile driving activities are restricted to the period between June 1 and November 30 to avoid peak migration for salmonids.

All terms and conditions of the ITP as amended by Minor Amendment No. 1 and MMRP that are not expressly amended herein remain in effect and must be implemented and adhered to by the Permittee.

FINDINGS

Issuance of this Amendment will increase the amount of take of the Covered Species compared to the Project as originally approved; however, by implementing the avoidance measures for the timing of the construction and limiting the amount of piles placed per day, and with the mitigation measures included in the original ITP, it is not expected that this Amendment will increase Project impacts on these species (i.e., "impacts of taking" as used in Fish and Game Code section 2081, subd. (b)(2)).

Discussion: This Amendment includes piles driven for the temporary YBI and Oakland trestles and falsework needed for dismantling the existing East Span. During Project implementation, Caltrans has reduced its level of take to below the level originally estimated and analyzed in the ITP through a reduction in the amount of required dredging, as well as successful hydroacoustic monitoring and sound attenuation practices during previous pile driving activities. Caltrans either has also already completed, or is in the process of completing, all of the habitat enhancements and restoration required under the original ITP. Therefore, even with the impacts from

limited unattenuated pile driving, the increase in the originally authorized level of take is expected to be fully mitigated.

Issuance of this Amendment does not affect DFG's previous determination that issuance of the ITP meets and is otherwise consistent with the permitting criteria set forth in Fish and Game Code section 2081, subdivisions (b) and (c).

Discussion: DFG issued the Project ITP in November 2001 based on findings that issuance of the ITP was consistent with the relevant permitting criteria set forth in the Fish and Game Code. DFG found, among other things, that the impacts of the authorized taking would be minimized and fully mitigated and that the Project would not jeopardize the continued existence of the Covered Species. Those findings are unchanged with respect to this Major Amendment because the ITP as amended: (1) will not significantly increase the amount of take or the severity of other impacts of the taking on the Covered Species, (2) will replace the avoidance and minimization measures set forth in the ITP with new avoidance and minimization measures appropriate for this stage of the Project, and (3) requires no additional mitigation above and beyond what was already agreed to in the existing ITP.

The Amendment acknowledges that Caltrans will need to construct temporary structures to assist with the removal of the existing East Span, and that Caltrans has documented to DFG's satisfaction: (1) that the originally analyzed and authorized level of take is higher than the level that has actually occurred to date; and (2) that Caltrans has and will continue to implement minimization measures that are effective in minimizing take of Covered Species. Permittee's continued adherence to and implementation of the avoidance, minimization and mitigation measures set forth in the ITP, as amended, and the MMRP will, among other things, minimize and fully mitigate the authorized impacts of the taking on the Covered Species.

None of the factors that would trigger the need for subsequent or supplemental environmental analysis of the Project under Public Resources Code section 21166 or California Code of Regulations, Title 14, sections 15162 and 15163, exist as a result of this Amendment.

Discussion: Caltrans, as lead agency for the Project under CEQA, determined that the Project met the criteria for a statutory exemption from CEQA pursuant to Public Resources Code section 21080, subdivision (b)(4). In issuing the ITP and this amendment, DFG, as a responsible agency, independently determined that the Project was statutorily exempt from CEQA.

DFG finds that this Amendment is a Major Amendment, as defined in California Code of Regulations, Title 14, section 783.6, subdivision (c)(5).

Discussion: This Major Amendment authorizes Project activities to occur without some of the previously required minimization measures, while requiring new avoidance and minimization measures appropriate for this stage of the Project. As described above, Permittee provided information to clarify the Project description. Specifically, the Permittee provided more detail regarding the methods needed for this stage of the Project. The information necessitated modifications to the avoidance and minimization measures outlined in the original ITP and Minor Amendment No. 1. This Amendment modifies the ITP to allow limited unattenuated pile driving for the purposes of constructing two temporary trestles and falsework. As described above, these changes will result in increased take of Covered Species, however the amount of take is not expected to exceed the amount originally authorized.. Therefore, impacts are expected to be fully mitigated by adherence to the mitigation measures specified in the ITP. DFG finds that this Amendment will significantly modify the scope or nature of the permitted Project or activity, or the minimization, mitigation, or monitoring measures in the ITP. DFG has determined that the change to the ITP constitutes a Major Amendment as defined in California Code of Regulations, title 14, section 783.6, subdivision (c)(5).

All terms and conditions of the ITP and MMRP as previously issued by DFG that are not expressly amended herein shall remain in effect, and the Permittee shall implement and adhere to all such terms and conditions.

The authorization provided by this Amendment is not valid until Permittee signs and dates the acknowledgement below, and returns one of the duplicate originals of this Amendment by registered first class mail to DFG at:

Department of Fish and Game
Habitat Conservation Planning Branch
Attention: CESA Permitting Program
1416 Ninth Street, Suite 1260
Sacramento, California 95814

APPROVED BY THE CALIFORNIA DEPARTMENT OF FISH AND GAME

on February 23, 2012 Marija Vojkovich

Marija Vojkovich
Regional Manager
Marine Region

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94103-1398

Regulatory Division

NOV 16 2011

SUBJECT: Permit No. 23013S

Time Extension

Mr. Tony Anziano
California Department of Transportation
345 Burma Road
Oakland, California 94607

Dear Anziano:

This letter is in response to your request dated 27 May, 2011, for a time extension of permit No. 23013S. Your project was authorized on December 4, 2001, under Individual Permit 23013S, pursuant to Section 404 of the Clean Water Act (33 U.S.C. Section 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. §403), to replace the East Span of the San Francisco-Oakland Bay Bridge and demolish the existing span in San Francisco Bay between Yerba Buena Island and the City of Oakland in San Francisco and Alameda Counties.

You are hereby granted Department of the Army authorization to extend to January 1, 2022 the completion date specified in General Condition No. 1 of Department of the Army Permit Number 23013S. If the work authorized is not completed on or before January 1, 2022 this authorization, if not previously revoked or specifically extended, shall automatically expire. Except for General Condition No. 1, all conditions of the original permit remain in full force and effect.

Should you have any questions regarding this matter, please contact Bob Smith of our Regulatory Division at (415) 503-6792 or by email: robert.f.smith@ usace.army.mil. Please address all correspondence to the Regulatory Division and refer to the File Number at the head of this letter.

Sincerely,

Torrey A. DiCiro P.E., PMP
Lieutenant Colonel
Commanding

U.S. ARMY
CORPS OF ENGINEER (ACOE) PERMIT

December 2001

FOR THE

San Francisco-Oakland Bay Bridge East Span
Seismic Safety Project

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

DEC 0 4 2001

Regulatory Branch

SUBJECT: File Number 23013S

Mr. H. Paul Hensley
California Department of Transportation
Toll Bridge Program
111 Grand Avenue (P.O. Box 23660)
Oakland, California 94623-0660

Dear Mr. Helsley:

Enclosed is your signed copy of a Department of the Army permit (Enclosure 1) to replace the East Span of the San Francisco-Oakland Bay Bridge on Interstate 80 Between Yerba Buena Island and the City of Oakland in San Francisco and Alameda Counties.

Please complete the appropriate parts of "Notice to Permittee" form (Enclosure 2), and return it to this office. You are responsible for ensuring that the contractor and workers executing the activity authorized herein are knowledgeable with the terms and conditions of this authorization.

Should you have any questions regarding this matter, please call Bob Smith of our Regulatory Branch at 415-977-8450. Please address all correspondence to the Regulatory Branch and refer to the file number at the head of this letter.

Sincerely,

Timothy S. O'Rourke
Lieutenant Colonel, Corps of Engineers
District Engineer

Enclosures

Copy Furnished (w/encl 1 only):

US EPA, San Francisco, CA

US FWS, Sacramento, CA
US NMFS, Santa Rosa, CA
CA RWQCB, Oakland, CA
CA DFG, Yountville, CA
CA BCDC, San Francisco, CA

NOTICE TO PERMITTEE

Please use the forms below to report the dates when you start and finish the work authorized by the enclosed permit. Also if you suspend work for an extended period of time, use the forms below to report the dates you suspended and resumed work. The second copy is for your records. If you find that you cannot complete the work within the time granted by the permit, please apply for a time extension at least one month before your permit expires. If you materially change the plan or scope of the work, it will be necessary for you to submit new drawings and a request for a modification of your permit.
(cut out as needed) ----------

Date:_____

NOTICE OF COMPLETION OF WORK under Department of the Army permit No. -023013-0S
TO: District Engineer, US Army Corps of Engineers, Regulatory Branch, 333 Market Street, 8th Floor, San Francisco, CA 94105-2197

In compliance with the conditions of the permit dated November 30, 2001 to replace the East Span of the San Francisco-Oakland Bay Bridge this is to notify you that the work was completed on _____.

Permittee: California Department of Transportation H. Paul Hensley
Address: Toll Bridge Program 111 Grand Avenue (P.O. Box 23660) Oakland, CA 94623-0660

Date:_____

NOTICE OF RESUMPTION OF WORK under Department of the Army permit No. -023013-0S
TO: District Engineer, US Army Corps of Engineers, Regulatory Branch, 333 Market Street, 8th Floor, San Francisco, CA 94105-2197

In compliance with the conditions of the permit dated November 30, 2001 to replace the East Span of the San Francisco-Oakland Bay Bridge this is to notify you that work was resumed on _____.

Permittee: California Department of Transportation H. Paul Hensley
Address: Toll Bridge Program 111 Grand Avenue (P.O. Box 23660) 10 Oakland, CA 94623-0660

Date:_____

NOTICE OF SUSPENSION OF WORK under Department of the Army permit No. -023013-0S
TO: District Engineer, US Army Corps of Engineers, Regulatory Branch, 333 Market Street, 8th Floor, San Francisco, CA 94105-2197

In compliance with the conditions of the permit dated November 30, 2001 to replace the East Span of the San Francisco-Oakland Bay Bridge this is to notify you that work was suspended on _____.

Permittee: California Department of Transportation H. Paul Hensley
Address: Toll Bridge Program 111 Grand Avenue (P.O. Box 23660) Oakland, CA 94623-0660

Date:_____

NOTICE OF COMMENCEMENT OF WORK under Department of the Army permit No. -023013-0S
TO: District Engineer, US Army Corps of Engineers, Regulatory Branch, 333 Market Street, 8th Floor, San Francisco, CA 94105-2197

In compliance with the conditions of the permit dated November 30, 2001 to replace the East Span of the San Francisco-Oakland Bay Bridge this is to notify you that work was commenced on _____.

Permittee: California Department of Transportation H. Paul Hensley
Address: Toll Bridge Program 111 Grand Avenue (P.O. Box 23660) Oakland, CA 94623-0660

NOTICE TO PERMITTEE

Please use the forms below to report the dates when you start and finish the work authorized by the enclosed permit. Also if you suspend work for an extended period of time, use the forms below to report the dates you suspended and resumed work. The second copy is for your records. If you find that you cannot complete the work within the time granted by the permit, please apply for a time extension at least one month before your permit expires. If you materially change the plan or scope of the work, it will be necessary for you to submit new drawings and a request for a modification of your permit.
(cut out as needed) ----------

Date:_____

NOTICE OF COMPLETION OF WORK under Department of the Army permit No. -023013-0S
TO: District Engineer, US Army Corps of Engineers, Regulatory Branch, 333 Market Street, 8th Floor, San Francisco, CA 94105-2197

In compliance with the conditions of the permit dated November 30, 2001 to replace the East Span of the San Francisco-Oakland Bay Bridge this is to notify you that the work was completed on _____.

Permittee: California Department of Transportation H. Paul Hensley
Address: Toll Bridge Program 111 Grand Avenue (P.O. Box 23660) Oakland, CA 94623-0660

Date:_____

NOTICE OF RESUMPTION OF WORK under Department of the Army permit No. -023013-0S
TO: District Engineer, US Army Corps of Engineers, Regulatory Branch, 333 Market Street, 8th Floor, San Francisco, CA 94105-2197

In compliance with the conditions of the permit dated November 30, 2001 to replace the East Span of the San Francisco-Oakland Bay Bridge this is to notify you that work was resumed on _____.

Permittee: California Department of Transportation H. Paul Hensley
Address: Toll Bridge Program 111 Grand Avenue (P.O. Box 23660) 10 Oakland, CA 94623-0660

Date:_____

NOTICE OF SUSPENSION OF WORK under Department of the Army permit No. -023013-0S
TO: District Engineer, US Army Corps of Engineers, Regulatory Branch, 333 Market Street, 8th Floor, San Francisco, CA 94105-2197

In compliance with the conditions of the permit dated November 30, 2001 to replace the East Span of the San Francisco-Oakland Bay Bridge this is to notify you that work was suspended on _____.

Permittee: California Department of Transportation H. Paul Hensley
Address: Toll Bridge Program 111 Grand Avenue (P.O. Box 23660) Oakland, CA 94623-0660

Date:_____

NOTICE OF COMMENCEMENT OF WORK under Department of the Army permit No. -023013-0S
TO: District Engineer, US Army Corps of Engineers, Regulatory Branch, 333 Market Street, 8th Floor, San Francisco, CA 94105-2197

In compliance with the conditions of the permit dated November 30, 2001 to replace the East Span of the San Francisco-Oakland Bay Bridge this is to notify you that work was commenced on _____.

Permittee: California Department of Transportation H. Paul Hensley
Address: Toll Bridge Program 111 Grand Avenue (P.O. Box 23660) Oakland, CA 94623-0660

DEPARTMENT OF THE ARMY PERMIT

Permittee: **California Department of Transportation, District 4**

Permit No.: **23013S**

Issuing Office: **San Francisco District**

NOTE. The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

You are hereby authorized to: Dredge approximately 217,000 cubic yards (cy) for a construction access channel & approximately 191,000 cy for a demolition access channel; Discharge approximately 617,000 cy of dredged material in accordance with Dredge Material Management Office recommendations (Material from the upper 3.66 meters (12 feet) of Piers E1 through E6, and E15 through E18 shall be disposed of at an appropriate upland facility); Construct a barge dock in Clipper Cove on Yerba Buena Island; Discharge approximately 1.67 acres of fill to construct pile caps E3 to E16; Discharge approximately 0.60 acre of fill to construct pile caps E-17 to E 23; Construct 1,970 linear feet of geotube at the Oakland Touchdown; Fill approximately 2.63 acres of the Bay at the Oakland touchdown; Discharge fill to modify and/or construct seven outfalls at the Oakland touchdown & four outfalls at Yerba Buena Island. Work shall be carried out in accordance with the attached plans and drawings labeled: "San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, IN COUNTIES OF: San Francisco and Alameda, APPLICATION BY: Caltrans District 4, Date: November 2000" in 13 sheets.

Project Location:

The project is located in San Francisco Bay between the City of San Francisco and the City of Oakland.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on **January 1, 2012**. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space

provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

7. You understand and agree that, if future operations by the United States require the removal, relocation, or other alteration of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, you will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused therby, without expenses to the United States. No claim shall be made against the United States on account of any such removal or alteration.

Special Conditions:

1. The permittee shall comply with the terms and conditions of the Biological Opinions issued by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service pursuant to Section 7 of the Endangered Species Act.

2. Mitigation shall be carried out in accordance with the "Conceptual Mitigation Plan for Special Aquatic Sites" prepared by Caltrans , dated November 2001 and subsequent Corps approved revisions.

3. Caltrans shall provide the Corps with plans and drawings of the proposed Clipper Cove barge dock and the drainage outfalls to be located on Yerba Buena Island and at the Oakland touchdown prior to construction.

(continued on page 4)

Further Information:

Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

(X) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work

c. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

12/04/01
(Date)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below

12/04/01
(District Engineer) Timothy S. O'Rourke
LTC, EN
(Date)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(Transferee) (Date)

4. In order to reduce dredging impacts to coho salmon, chinook salmon, and steelhead the permittee shall comply with the terms and conditions of Biological Opinion, No. 151422-SWR99-SR-190, issued by the National Marine Fisheries Service on October 30, 2001.

5. In order to reduce impacts to Pacific herring, no dredging shall occur during the peak of the spawning season (December 1 to March 1) or as determined by the California department of Fish and Game.

6. Caltrans shall develop and implement an eelgrass research plan including, but not limited to

a. Surveying potential areas of eelgrass beds in San Francisco Bay to understand their distribution and densities

b. Developing the methodologies needed to effectively restore, enhance, or create new eelgrass beds.

c. Designing appropriate studies, such as limitimg factors analysis, to define critical parameters for successful eelgrass establichment.

d. Designing and locating site-specific eelgrass establishment pilot for future implementation and testing

e. Preparing a report and guidelines for implementing eelgrass replacement activities, suitable for use throughout San Francisco Bay.

DREDGING SPECIAL CONDITIONS

1. Your use of the permitted activity must not interfere with the public's right to free navigation on all navigable waters of the United States.

2. You must have a copy of this permit available on the vessel used for the authorized transportation and disposal of dredged material.

3. You must advise this office in writing, at least two weeks before you start maintenance dredging activities under the authorization of this permit.

4. You must install and maintain, at your expense, any safety lights and signals prescribed by the United States Coast Guard (USCG), through regulations or otherwise on your authorized facilities. The USCG may be reached at theaddress and telephone numbers listed below.

5. Toprovide notification to the maritime community of activities affecting navigation, the permittee shall provide in writing to the addresses below the following information at least two weeks before commencing work:

a. Name and telephone number of the project manager.
b. Size and placement of any floating construction equipment.
c. Radio telephone frequencies and call signs of any marine equipment.
d. Work start and completion dates.

Commander (oan)
11th Coast Guard District
Coast Guard Island, Bldg 50-6
Alameda, California 94501-5100
POC:
Operations Officer
Aids to Navigation Section
PH: 510-437-2969
FAX: 510-437-5836

Commander (mso)
11th Coast Guard District
Coast Guard Island, Bldg 50-6
Alameda, California 94501-5100
POC:
Captain of the Port
Waterways Section
PH: 510-437-2770
FAX: 510-437-3702

6. The Coast Guard Captain of the Port of San Francisco Bay may require modifications to marine construction equipment deployment or mooring systems to safeguard navigation while work is in progress.

7. All vessels operated for disposal of dredged material are required to participate in the Coast Guard's Vessel Traffic Control Service (VTS). Five minutes before each departure, the permittee shall notify the VTS by radio, via Channel 14, of the following: The name of vessel: time of departure from dredge site; and time of departure from disposal site.

8. When utilizing the Alcatraz Disposal Site (SF-11), the permittee shall dispose of all dredged material within a circular area of radius 1000 feet with center located at latitude 37°49'17"N; longitude 122°25'23"W. The specific location within the disposal area will be determined by the District Engineer upon receipt of the Dredging Operation Plan.

9. The permittee shall submit the following reports for review and comment to:

U.S. Army Corps of Engineers, San Francisco District
Chief, Operations and Readiness Division
ATTN: Regulatory Branch, Suite 812
333 Market Street
San Francisco, California 94105-2197,

a. Dredge Material Analysis: Submit, for approval, no earlier than 60 days prior to proposed commencement of any authorized successive dredging episodes, dredge material analysis (Chemical and Physical), sampling and testing information. **Please include the Corps permit number and dredge episode number with this submittal.** Also submit Regional Water Quality Control Board water quality certification or waiver for disposal of the material. For each dredging episode, the permittee shall obtain the approval of the District Engineer for formulating specific sediment testing procedures for the Dredge Material Analysis.

The testing protocol for disposal site SF-11 will be in accordance with the testing guidelines as published in the Corps and U.S. Environmental Protection Agency publication entitled, "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual" (The Inland Testing Manual or ITM), dated February 1998, and subsequent amendments thereto.

The testing protocol for disposal at SF-DODS will be in accordance with the testing guidelines as published in the Corps and U.S. Environmental Protection Agency publication entitled," Evaluation of Dredged Material Proposed for Ocean Disposal" (The Green Book), dated February 1991, and subsequent amendments thereto.

b. Dredging Operation Plan: Submit, for approval by this office, no earlier than 60 calendar days and no later than 20 calendar days before the proposed commencement of dredging, a plan which includes the following: **Corps permit number, dredge episode number,** a copy of the dredging contract or description of the work under which the contractor will do the permitted work; name and telephone numbers of the dredging contractor's representative on site; dredging start and completion dates; names of vessel; dump scow numbers or identification; bin or barge capacities; identification of work as either maintenance dredging or new dredging; discussion of proposed dredging procedures, as governed under Special Condition No. 10, with detailed drawings or specifications of the grid or centrifugal pump system; quantity of material to be removed; dredging design depth and typical cross section including overdepth; and date of last dredging episode and design depth. The dredging Operational Plan shall also provide the following information:

1) The controls being established to insure that dredging operations occur within the limits defined by the channel dimensions and typical channel section. The horizontal and vertical positioning systems being utilized must be indicated as noted in No.9.b.3) below.

2) The controls being established to insure that disposal of the dredged material at the disposal site is at the assigned location and depth. The horizontal and vertical positioning systems being utilized must be indicated as noted in No.9.b.3) below.

3) Method of determining electronic positioning of dredge or dump scow during entire dredging operation at dredge site, disposal site and en route to and from disposal site.

Please note that failure to provide all of the above information may result in delays to your project. When your dredge operation plan has been approved, you will receive a written authorization to commence with your project.

c. Before Dredging Survey: Submit no earlier than 60 calendar days and no later than 20 calendar days before commencement of dredging, a survey with accuracy to one-tenth foot that delineates the following: areas to be dredged with overdepth allowances; existing depths; estimated quantities to be dredged for the project; and estimated quantities for overdepth. **All surveys shall be signed by the permittee to certify their accuracy. Please include the Corps permit number and dredge episode number.**

Please note that failure to provide all the above information may result in delays to your project.

d. Solid Debris Management Plan: Submit no earlier than 60 calendar days and no later than 20 calendar days before commencement of work, a plan which describes measures to ensure that solid debris generated during any authorized demolition or construction operation is retained and properly disposed of in areas not under Corps jurisdiction. At a minimum, the plan shall include the following: source and expected type of debris; debris retrieval method; **Corps permit number and dredge episode number;** disposal method and site; schedule of disposal operations; and debris containment method to be used, if floatable debris is involved.

Please note that failure to provide all the above information may result in delays to your project.

e. Disposal Site Verification Log (DSVL): Submit on a weekly basis by noon Monday, the log which enumerates work accomplished during the preceding week to:

U.S. Army Corps of Engineers, San Francisco District
Chief Operations and Readiness Division
ATTN: Mr. David Dwinell, DMMO, Suite 809
333 Market Street
San Francisco, California 94105-2197

or FAX (415) 977-8495, or e-mail to david.l.dwinell@usace.army.mil. **Please include the Corps permit number and dredge episode number.** The log will be provided when the Corps approves the Dredge Operation Plan and authorizes the commencement of the dredging. The DSVL form may also be downloaded from http://www.spn.usace.army.mil/conops/forms/dsvsl.pdf

f. Overflow requirements:

1. No overflow or decant water shall be discharged from the barge, with the exception of spillage incidental to clamshell dredge operations.

2. During transportation from the dredging site to the disposal site, no material shall be permitted to overflow, leak or spill from barge, bins or dump scows.

3. During dredging operations, overflow shall be limited to a maximum of 15 minutes for hopper dredge only. Adjustments to the dredging operation may be required to insure that once overflow commences, it will not exceed the 15 minute limit.

4. In approved sand dredging, overflow will not exceed 15 minutes or the economic load, whichever occurs first.

g. Post Dredging Survey: Submit, within 15 days of the last disposal activity (last is defined as that activity after which no further activity occurs for 15 calendar days), a survey with accuracy to one-tenth foot which delineates the areas dredged and the dredged depths. **Also, include the Corps permit number, dredge episode number, dates of dredging commencement and completion, actual quantities dredged for the project, and actual quantities of overdepth.** The permittee shall substantiate the total quantity dredged by including calculations used to determine the volume difference (in cubic yards) between the Before and Post Dredging Surveys and explain any variation in quantities greater than 15% beyond estimated quantities. **All surveys shall be accomplished by a licensed surveyor and signed by the permittee to certify their accuracy.** A copy of the post dredge survey should be sent to the National Ocean Service for chart updating:

NOAA/National Ocean Service
Nautical Data Branch
N/CS26, SSMC3, Room 7230
1315 East-West Highway
Silver Spring, Maryland 20910-3282.

10. The permittee shall ensure that all dredged material is slurried prior to disposal to prevent any accumulation or build up of material at the disposal site. All dredged material shall be slurried in one of the following manners:

a. Dredged material will be either pumped with a centrifugal pump prior to leaving the dredge site for the disposal site; or,

b. If the material is clamshell dredged, passed through a debris grid, with a maximum opening size of 12 inches by 12 inches that will cover the entire loading area of the dump scow. Everything that does not pass through the grid will be considered solid debris and shall be disposed of in areas outside of Corps jurisdiction. All such material shall be promptly removed from the grid at the end of each 8 hour shift or sooner.

11. **The permittee or dredge contractor shall inform this office when a dredge episode actually commences, is suspended (suspension is when the dredge contractor leaves the dredge site for more than 48 hours for reasons other than equipment maintenance), is restarted, and the actual date of completion. Each notification should include the Corps permit number and dredge episode number.** The information can be sent, to the attention Mr. Jim Delorey, in writing to the address below; or Faxed to (415) 977-8495; e-mailed to jamcs.r.delorey@usace.army.mil or via telephone message at (415) 977-8441.

USACE, San Francisco District
Chief, Operations and Readiness Division
ATTN: Regulatory Branch, Suite 812
333 Market Street
San Francisco, California 94105-2197

12. The permittee, as directed by the District Engineer under authority pursuant to the policies and procedures of 33 CFR 325.7, may be required to modify disposal schedules and monthly disposal quantities for particular dredging episodes.

13. The permittee shall allow the dredging area and equipment to be inspected by the Corps staff upon request.

14. Transportation of dredged material to the SF-DODS shall only be allowed when weather and sea state conditions will not interfere with safe transportation and will not create risk of spillage, leak or other loss of dredged material in transit to the SF-DODS. No disposal vessel trips shall be initiated when the National Weather Service has issued a gale warning for local waters during the time period necessary to complete dumping operations, or when wave heights are 16 feet or greater. The permittee must consult the most current version of the SMMP Implementation Manual for additional restrictions and/ or clarifications regarding other sea state parameters, including, but not limited to wave period.

15. All vessels used for dredged material transportation and disposal must be loaded to no more than 80 percent by volume of the vessel. Before any disposal vessel departs for the SF-DODS, an independent quality control inspector must certify in writing that the vessel meets the conditions and requirements of a certification checklist that contains all of the substantive elements found in the example contained in the most current SMMP Implementation Manual. "Independent" means not an employee of the permittee or dredging contractor.

16. Disposal vessels in transit to and from the SF-DODS should remain at least three nautical miles from the Farallon Islands whenever possible. Closer approaches should occur only in situations where the designated vessel traffic lane enters the area encompassed by the 3-mile limit, and where safety may be compromised by staying outside of the 3-mile limit. In no case may disposal vessels leave the designated vessel traffic lane.

17. When dredged material is discharged within the SF-DODS, no portion of the vessel from which the materials are to be released (e.g. hopper dredge or towed barge) can be further than 1,960 feet (600 meters) from the center of the target area at latitude 37°39'N; longitude 123°29'W.

18. No more than one disposal vessel may be present within the permissible dumping target area referred to in 17 at any time.

19. Disposal vessels shall use an appropriate navigation system capable of indicating the position of the vessel carrying dredged material (for example, a hopper dredge vessel or towed barge) with a minimum accuracy and precision of 100 feet during all disposal operations. The system must also indicate the opening and closing of the doors of the vessel carrying the dredged material. If the positioning system fails, all disposal operations must cease until the navigational capabilities are restored. The back-up navigation system, with all the capabilities listed in this condition, must be in place on the vessel carrying the dredged material.'

20. The permittee shall **maintain daily records** (using the attached Scow Certification Checklist form) of the amount of material dredged and loaded into barges for disposal, the times that disposal vessel(s) depart for, arrive at and return from the SF-DODS, the exact locations and times of disposal, and the volumes of material disposed at the SF-DODS during each vessel trip. The permittee shall further record wind and sea state observations **at hourly intervals during transit.**

21. For each disposal vessel trip, the permittee shall maintain a computer printout from a Global Positioning System or other acceptable navigation system showing transit routes and disposal coordinates, including the time and position of the disposal vessel when dumping was commenced and completed.

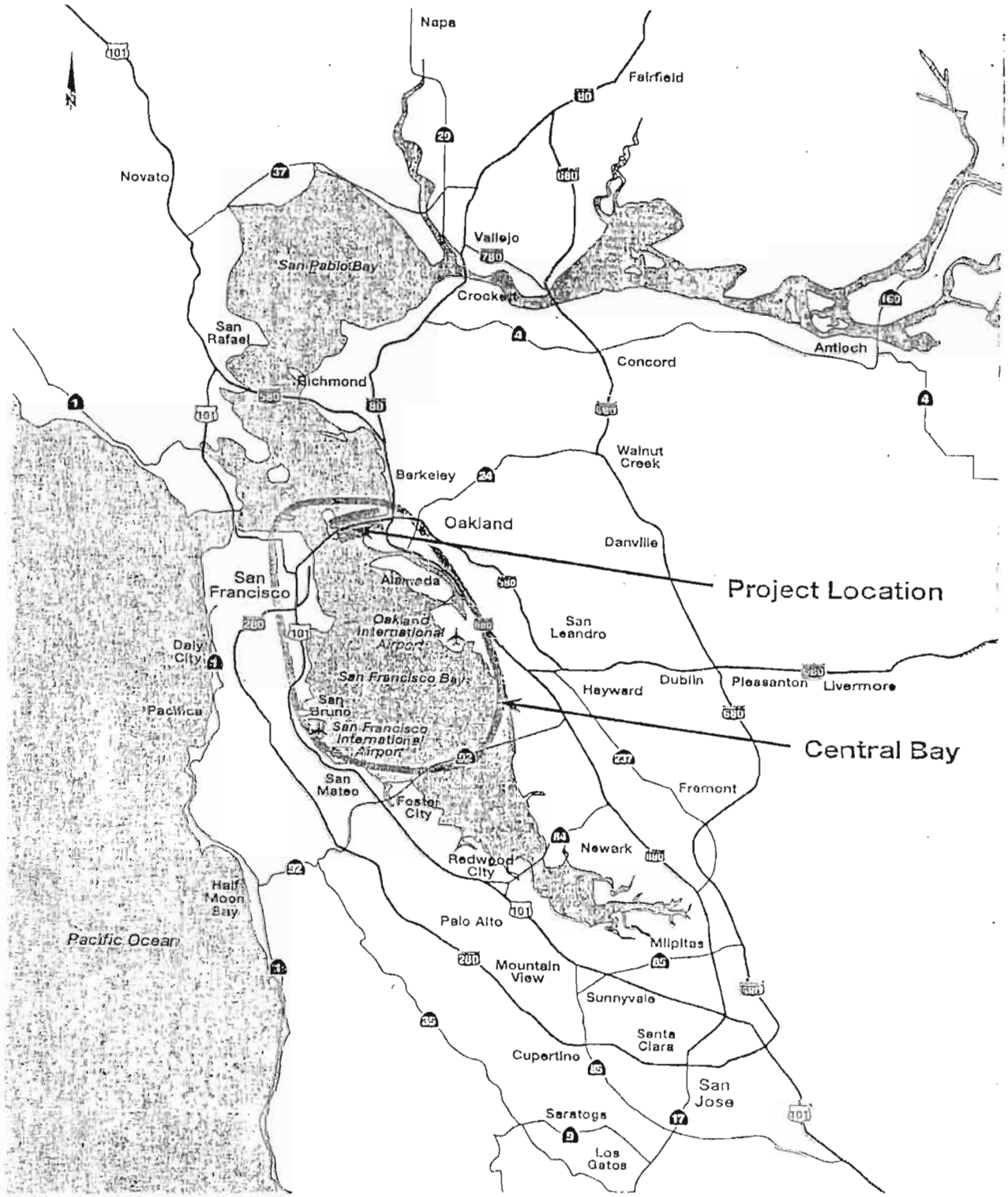
22. An independent quality control inspector (as defined in 15) shall observe all dredging and disposal operations. The inspector shall verify the information required in conditions 20 and 21. The inspector shall promptly inform permittees of any inaccuracies or discrepancies concerning this information and shall prepare summary reports, which summarize all such inaccuracies and discrepancies **at a minimum on a quarterly basis, and at project completion.**

23. The permittee shall report any anticipated or actual permit violations to the District engineer and the Regional

Administrator **within 24 hours** of discovering such violation. If any anticipated or actual permit violations occur within the Gulf of the Farallones or the Monterey Bay National marine Sanctuaries, the permittee must also report any such violation to the respective Sanctuary Manager within 24 hours. In addition, the permittee shall prepare and submit reports, certified accurate by the independent quality control inspector, **on a weekly basis by noon Monday**, to the District Engineer and the Regional Administrator setting forth the information required by conditions 20 and 21.

24. Permittees must make arrangements for independent observers to be present on disposal vessels for the purpose of conducting shipboard surveys of seabirds and marine mammals. Observers shall employ standardized monitoring protocols, as referenced in the most current SMMP Implementation Manual. At a minimum, permittees shall ensure that independent observers are present on at least one disposal trip during each calendar month that disposal occurs, and on average at least once every 25 vessel trips to the SF-DODS.

25. At the completion of short-term dredging projects, at least annually for ongoing projects, and at any other time or interval requested by the District Engineer or Regional Administrator, permittees shall prepare and submit to the District Engineer and Regional Administrator a report that includes complete records of all dredging, transport and disposal activities, such as navigation logs, disposal coordinates, scow certification checklists, and other information required by permit conditions. Electronic data submittals may be required to conform to a format specified by the agencies. Permittees shall include a report indicating whether any dredged material was dredged outside the areas authorized for dredging or was dredged deeper than authorized for dredging by their permits.



PURPOSE:
Provide a seismically upgraded vehicular connection between YBI and Oakland for future users

DATUM: Mean Sea Level NAD 83

ADJACENT PROPERTY OWNERS:
See Block 11

Figure 1

PROJECT LOCATION

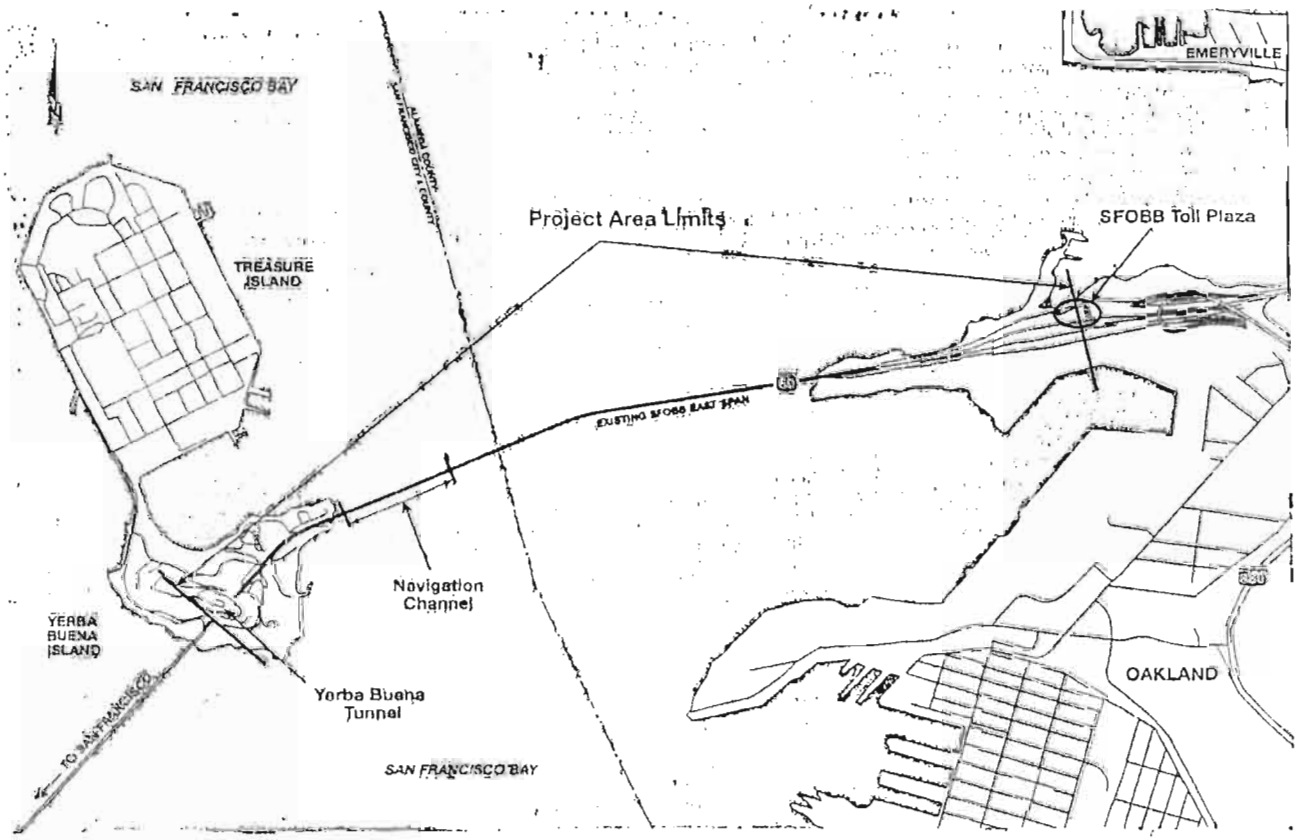
Caltrans District 4
District 4
111 Grand Avenue
Oakland, California 94612

San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

IN COUNTIES OF: San Francisco and Alameda

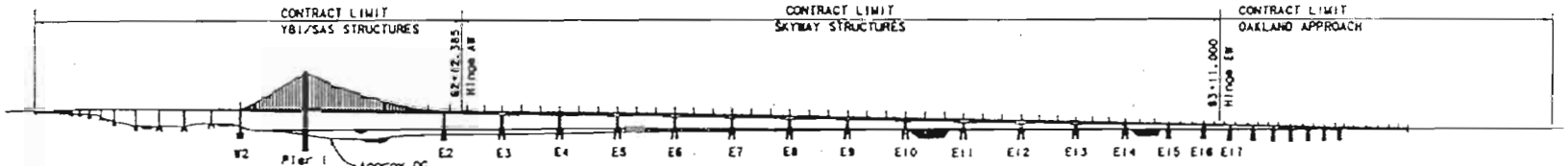
APPLICATION BY: Caltrans District 4

DATE: November 2000

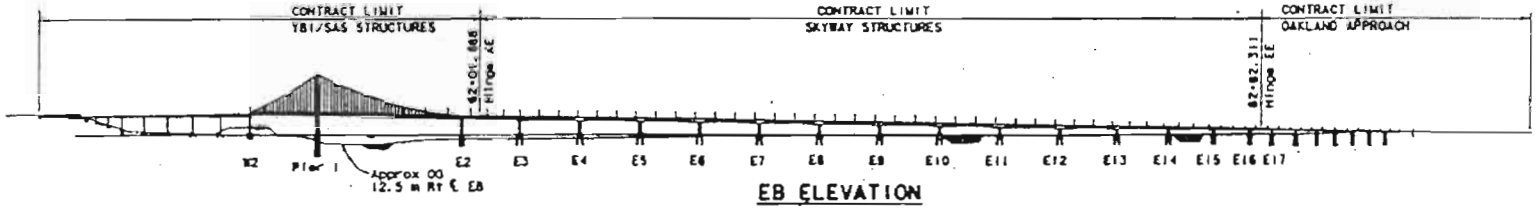


PURPOSE: Provide a seismically upgraded vehicular connection between YBI and Oakland for future users **DATUM:** Mean Sea Level NAD 83 **ADJACENT PROPERTY OWNERS:** See Block 11	Figure 2 **PROJECT AREA LIMITS** Caltrans District 4 District 4 111 Grand Avenue Oakland, California 94612	**San Francisco-Oakland Bay Bridge East Span Seismic Safety Project** IN COUNTIES OF: San Francisco and Alameda APPLICATION BY: Caltrans District 4 DATE: November 2000

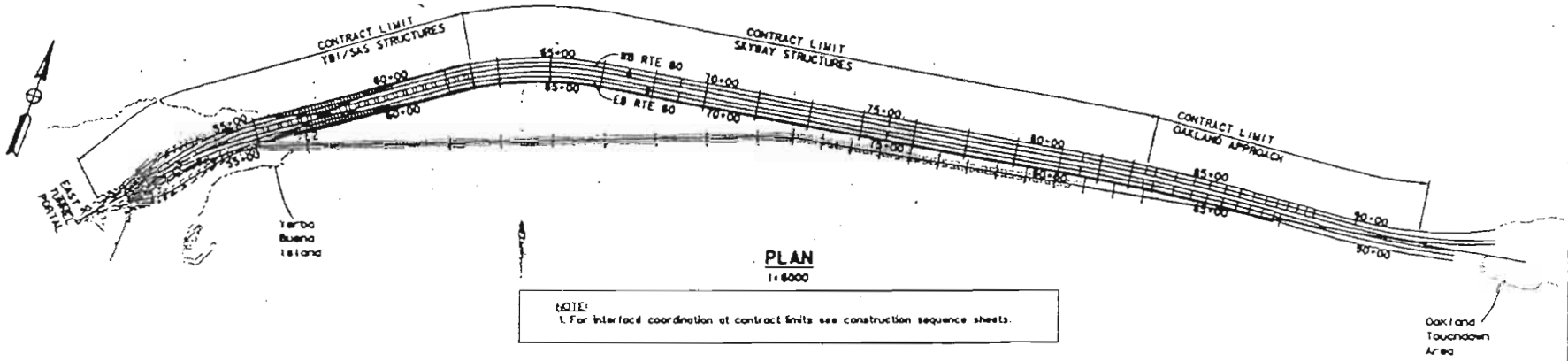
Mean Low Water Line = -0.875m
Mean High Water Line = +0.82m



WB ELEVATION
1:6000



EB ELEVATION
1:6000



PLAN
1:6000

NOTE:
1. For interface coordination at contract limits see construction sequence sheets.

SAN FRANCISCO-OAKLAND BAY BRIDGE EAST SPAN SEISMIC SAFETY PROJECT

Caltrans

No Scale

New Bridge General Plan

Proposed
San Francisco-Oakland Bay Bridge
East Span Replacement

Name of Applicant - Caltrans

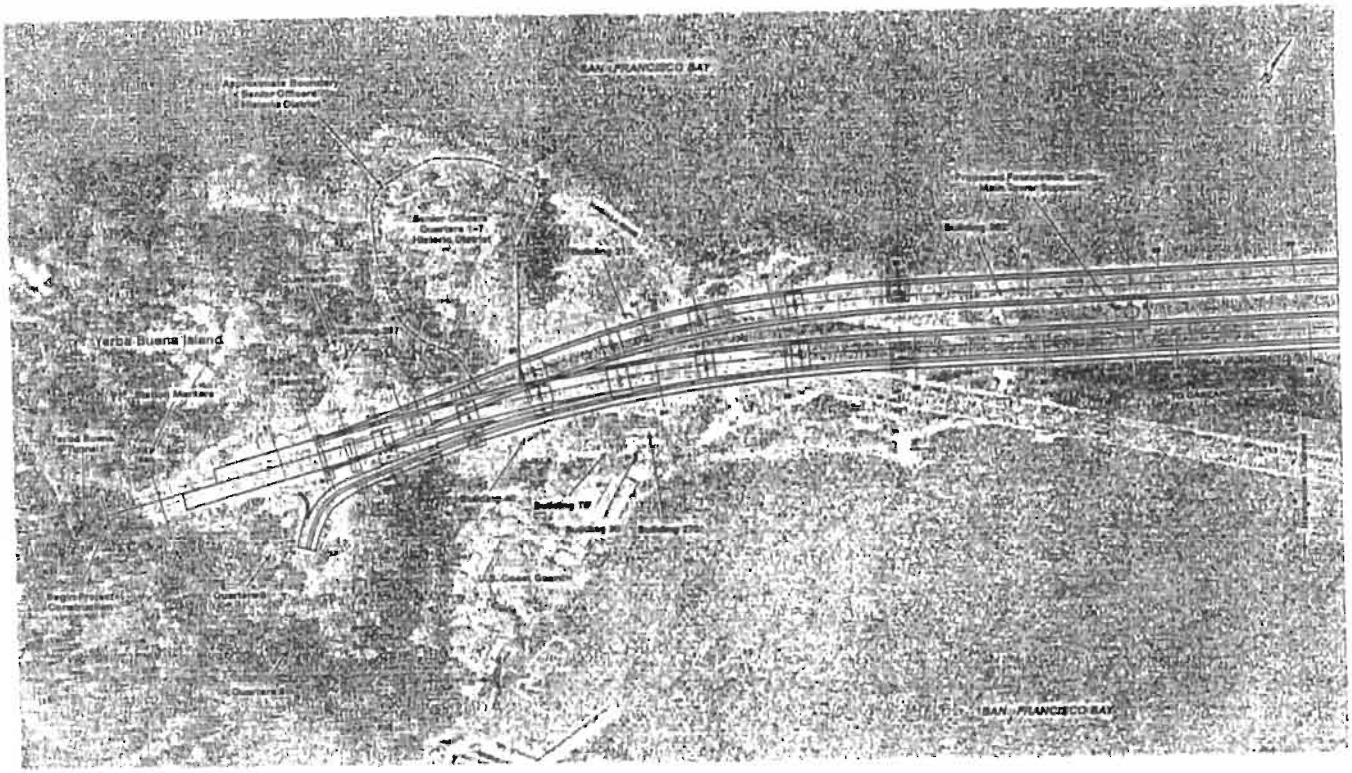
Waterway - San Francisco Bay

SF PM 7.6-8.7, Alam. PM 0.0-1.3
SF KP 12.2-14.3, Alam. KP 0.0-2.1

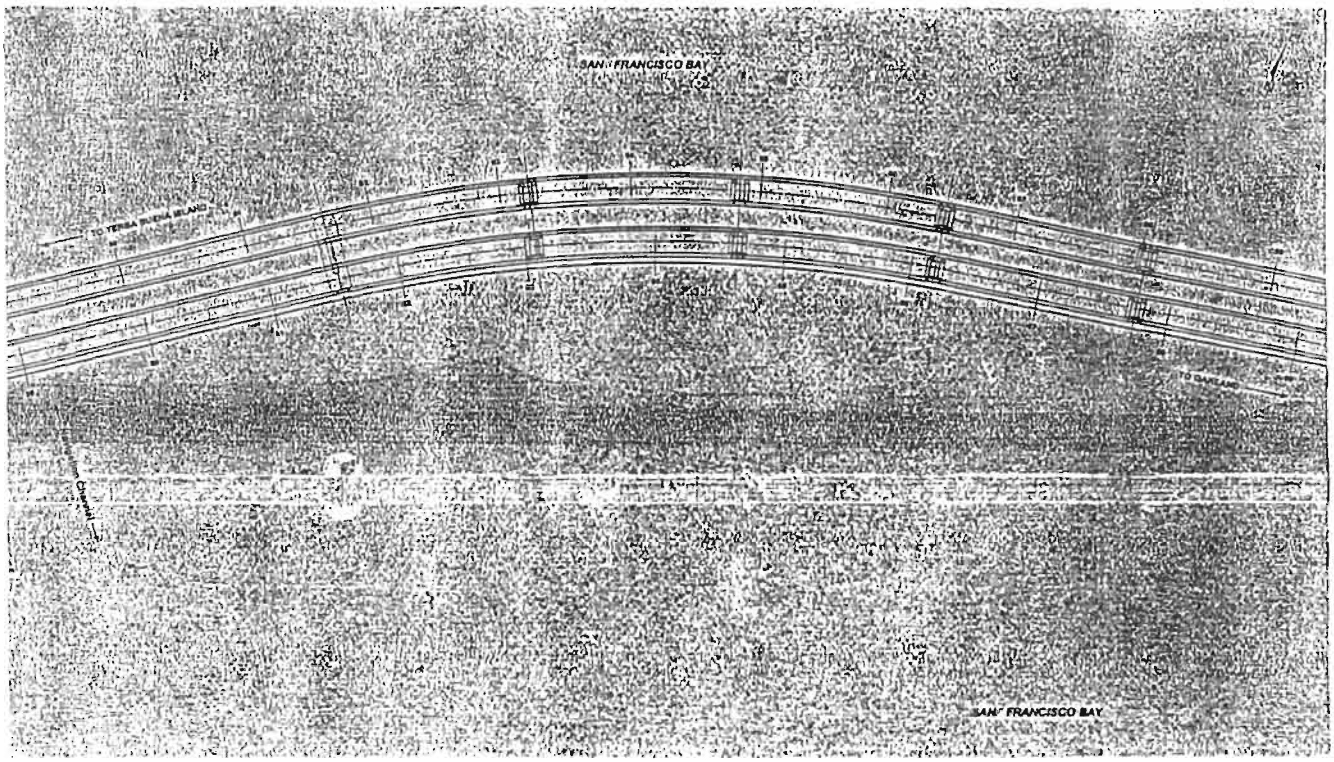
Location - San Francisco, San Francisco County, CA
Oakland, Alameda County, CA

May 2001

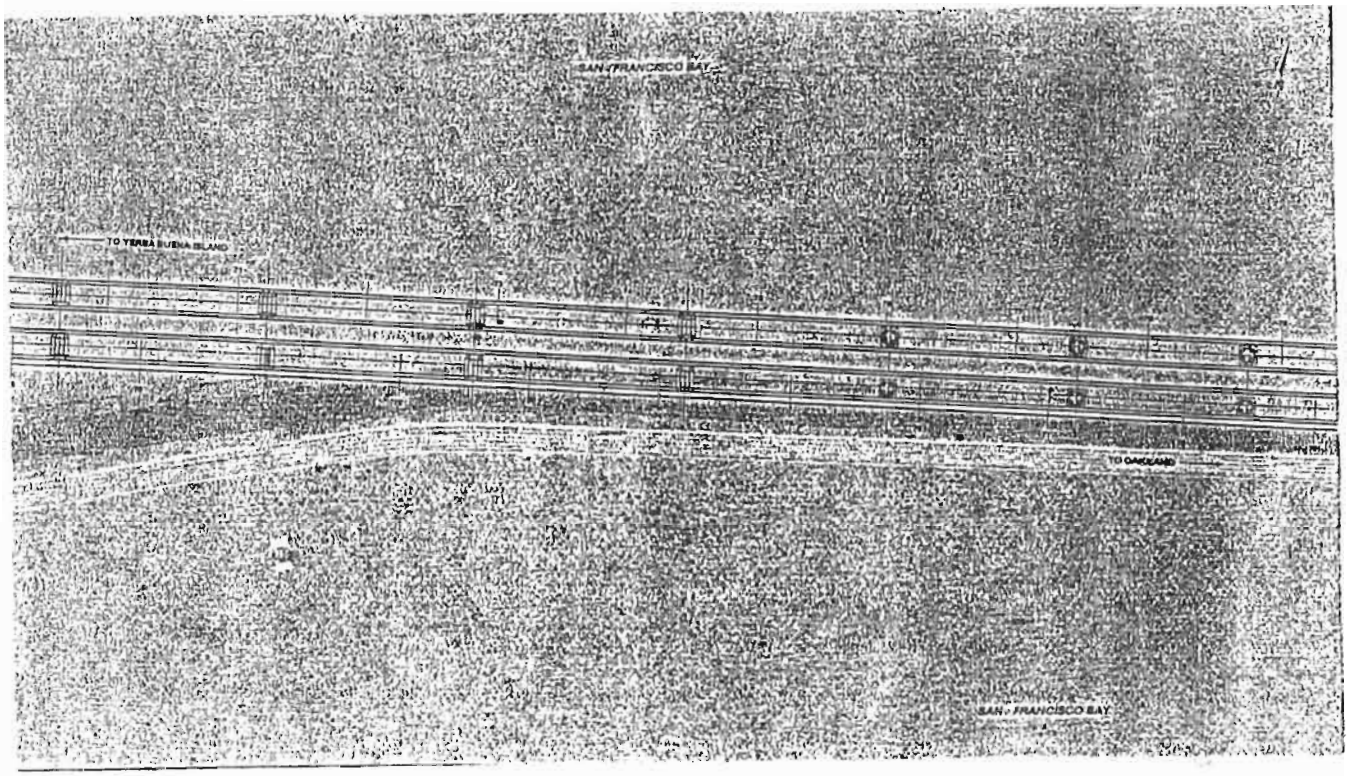
FIGURE 3



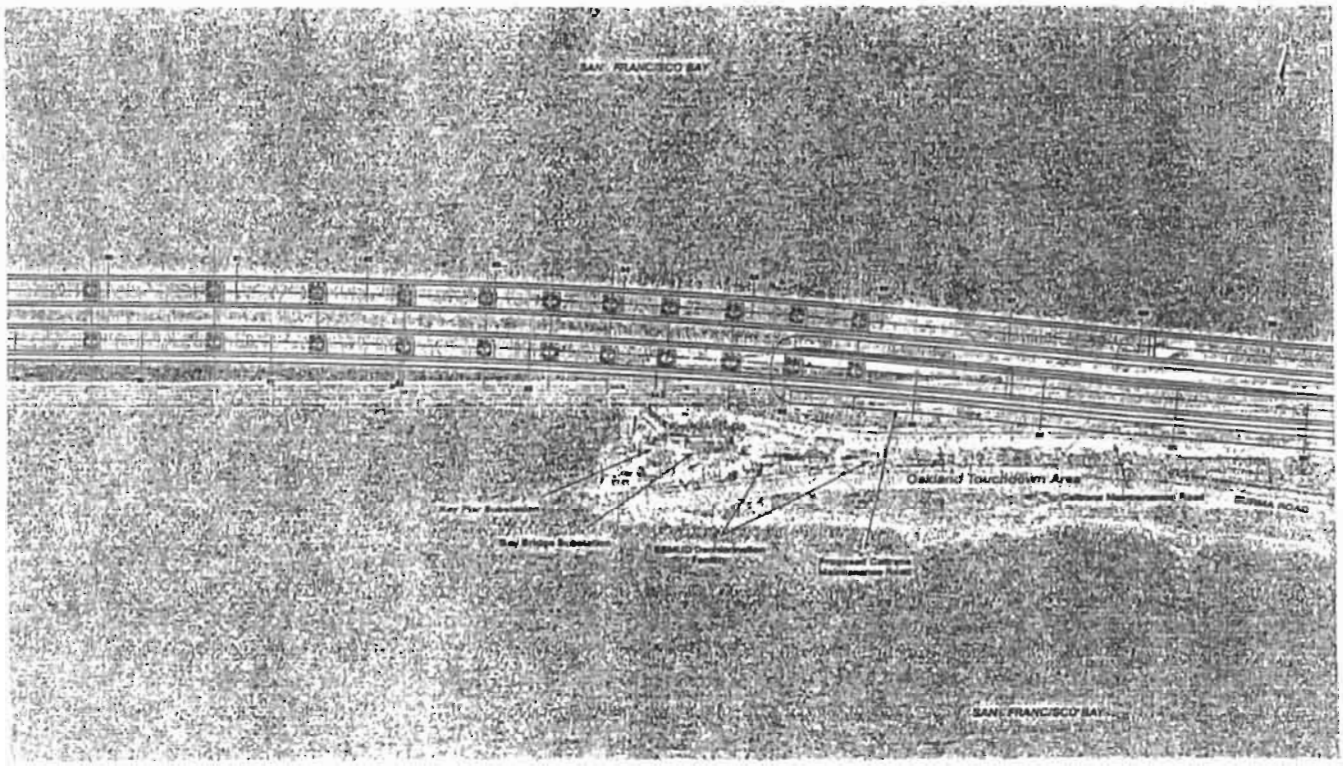
PURPOSE: Provide a seismically upgraded vehicular connection between YBI and Oakland for future users **DATUM:** Mean Sea Level NAD 83 **ADJACENT PROPERTY OWNERS:** See Block 11	Figure 4-1 **CONCEPTUAL N-6 ALIGNMENT** Caltrans District 4 District 4 111 Grand Avenue Oakland, California 94612	**San Francisco-Oakland Bay Bridge East Span Seismic Safety Project** IN COUNTIES OF: San Francisco and Alameda APPLICATION BY: Caltrans District 4 DATE: November 2000



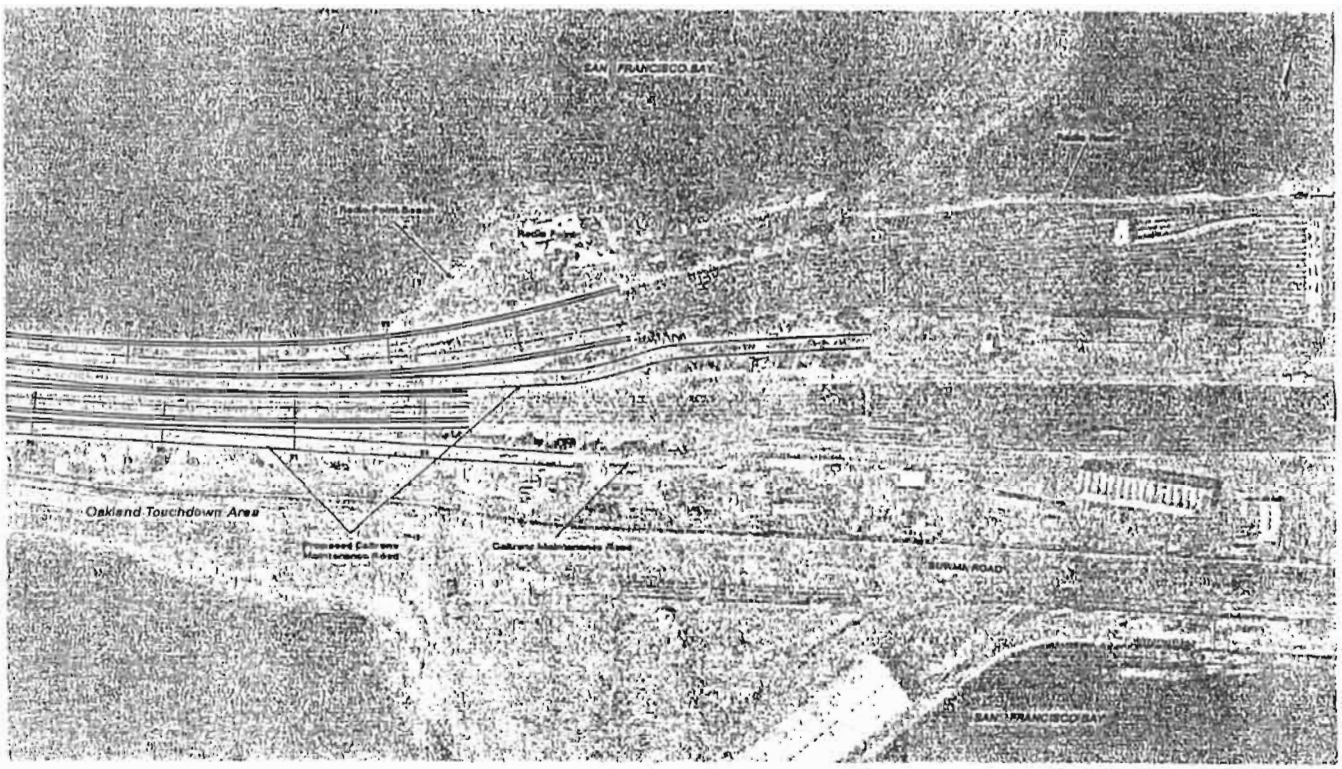
PURPOSE: Provide a seismically upgraded vehicular connection between YBI and Oakland for future users **DATUM:** Mean Sea Level NAD 83 **ADJACENT PROPERTY OWNERS:** See Block 11	Figure 4-2 CONCEPTUAL N-6 ALIGNMENT Caltrans District 4 District 4 111 Grand Avenue Oakland, California 94612	**San Francisco-Oakland Bay Bridge East Span Seismic Safety Project** IN COUNTIES OF: San Francisco and Alameda APPLICATION BY: Caltrans District 4 DATE: November 2000



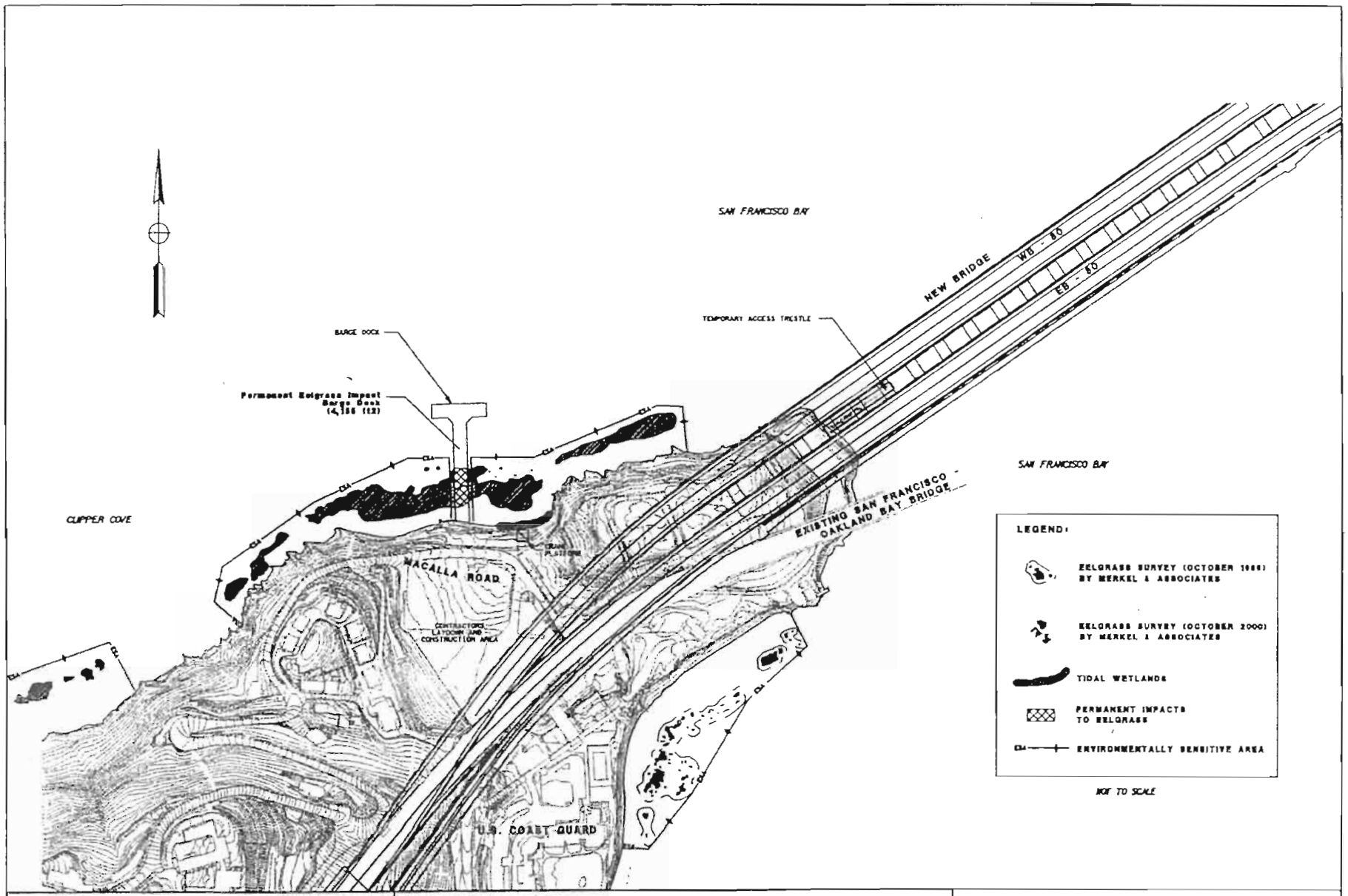
PURPOSE: Provide a seismically upgraded vehicular connection between YBI and Oakland for future users **DATUM:** Mean Sea Level NAD 83 **ADJACENT PROPERTY OWNERS:** See Block 11	Figure 4-3 CONCEPTUAL N-6 ALIGNMENT Caltrans District 4 District 4 111 Grand Avenue Oakland, California 94612	**San Francisco-Oakland Bay Bridge East Span Seismic Safety Project** IN COUNTIES OF: San Francisco and Alameda APPLICATION BY: Caltrans District 4 DATE: November 2000



PURPOSE: Provide a seismically upgraded vehicular connection between YBI and Oakland for future users **DATUM:** Mean Sea Level NAD 83 **ADJACENT PROPERTY OWNERS:** See Block 11	Figure 4-4 **CONCEPTUAL N-6 ALIGNMENT** Caltrans District 4 District 4 111 Grand Avenue Oakland, California 94612	**San Francisco-Oakland Bay Bridge East Span Seismic Safety Project** IN COUNTIES OF: San Francisco and Alameda APPLICATION BY: Caltrans District 4 DATE: November 2000



PURPOSE: Provide a seismically upgraded vehicular connection between YBI and Oakland for future users **DATUM:** Mean Sea Level NAD 83 **ADJACENT PROPERTY OWNERS:** See Block 11	Figure 4-5 CONCEPTUAL N-6 ALIGNMENT Caltrans District 4 District 4 111 Grand Avenue Oakland, California 94612	**San Francisco-Oakland Bay Bridge East Span Seismic Safety Project** IN COUNTIES OF: San Francisco and Alameda APPLICATION BY: Caltrans District 4 DATE: November 2000



PURPOSE:
Provide a seismically upgraded vehicular connection between YBI and Oakland for future users

DATUM: Mean Sea Level NAD 83

ADJACENT PROPERTY OWNERS:
See Block 11

IMPACTS ANALYSIS SPECIAL AQUATIC SITES
YERBA BUENA ISLAND

Caltrans District 4
111 Grand Avenue
Oakland, California 94612

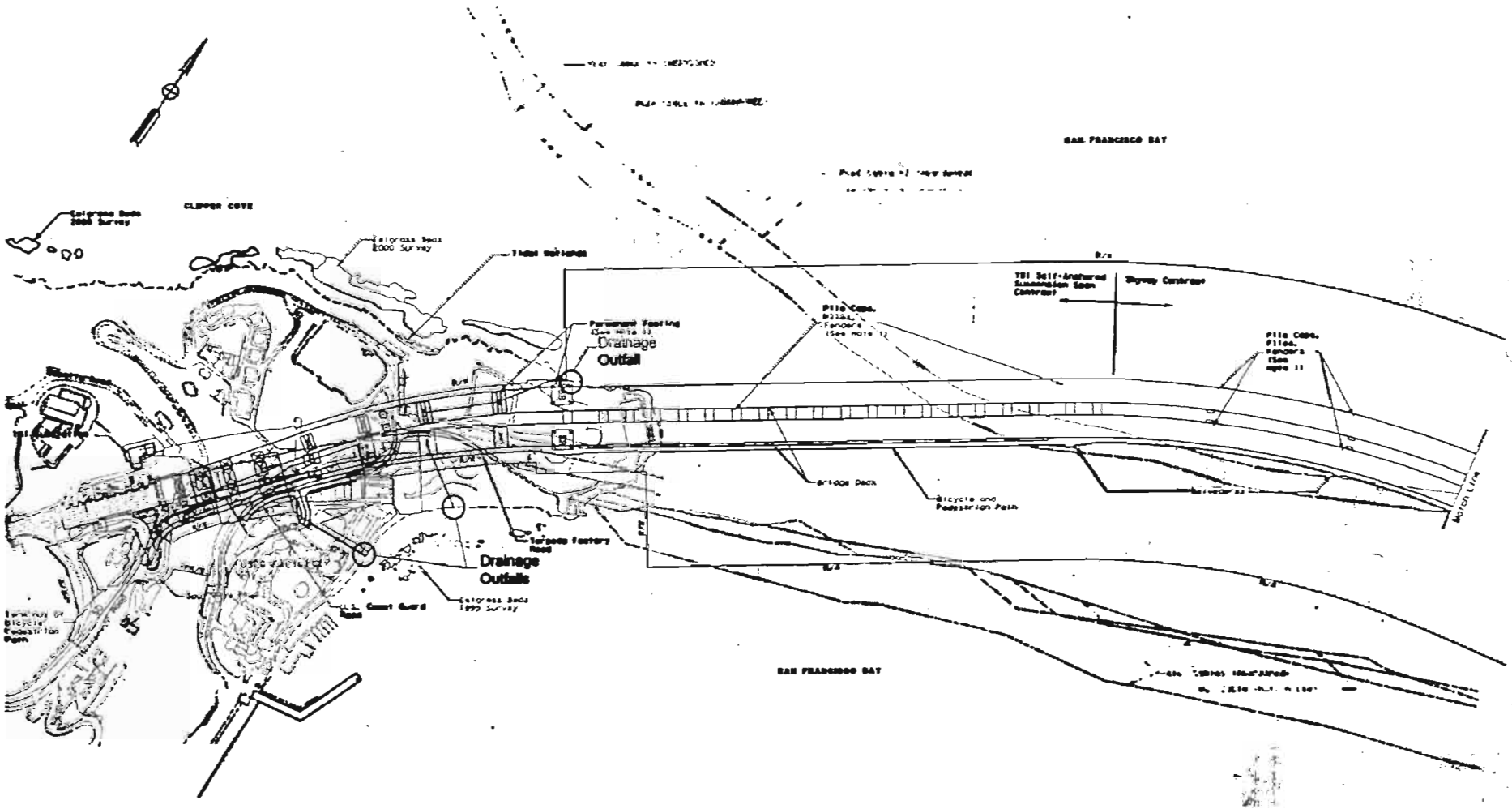
San Francisco - Oakland Bay Bridge East Span Seismic Safety Project

IN COUNTIES OF: San Francisco and Alameda

APPLICATION BY: Caltrans District 4

DATE: October 2001

Figure 5



General Notes:

1. See Contract Drawings for Construction Details.
2. This plan is not to scale. See Contract Plans for scaled drawings.
3. Drainage Facilities are subject to change.
4. Outlet design is not completed. Outlet pipes are likely to be supported by concrete. Outlets are likely to be placed below the high tide line (HTL).

Legend:

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

PURPOSE:
Provide a seismically upgraded vehicular connection between YBI and Oakland for future users

DATUM: Mean Sea Level NAD 83

ADJACENT PROPERTY OWNERS:
See Block 11

SITE PLAN
PROPOSED DRAINAGE IMPROVEMENTS
YBI/SELF-ANCHORED SUSPENSION SPAN CONTRACT
Caltrans District 4
111 Grand Avenue
Oakland, California 94612

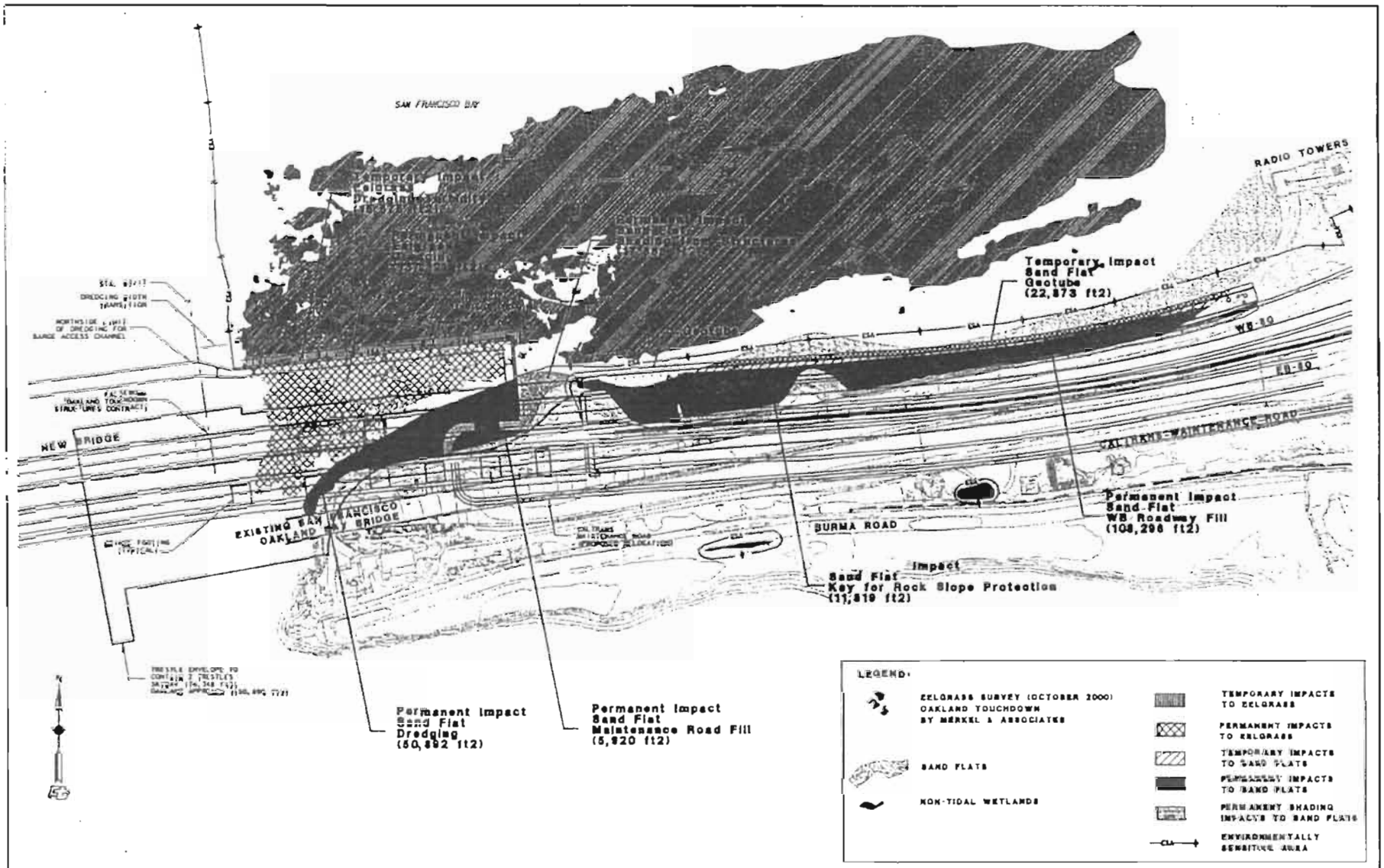
San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

IN COUNTIES OF: San Francisco and Alameda

APPLICATION BY: Caltrans District 4

DATE: October 2001

Figure 6



PURPOSE:
Provide a seismically upgraded vehicular connection between YBI and Oakland for future users

DATUM: Mean Sea Level NAD 83

ADJACENT PROPERTY OWNERS:
See Block 11

IMPACTS ANALYSIS SPECIAL AQUATIC SITES
OAKLAND TOUCHDOWN

Caltrans District 4
111 Grand Avenue
Oakland, California 94612

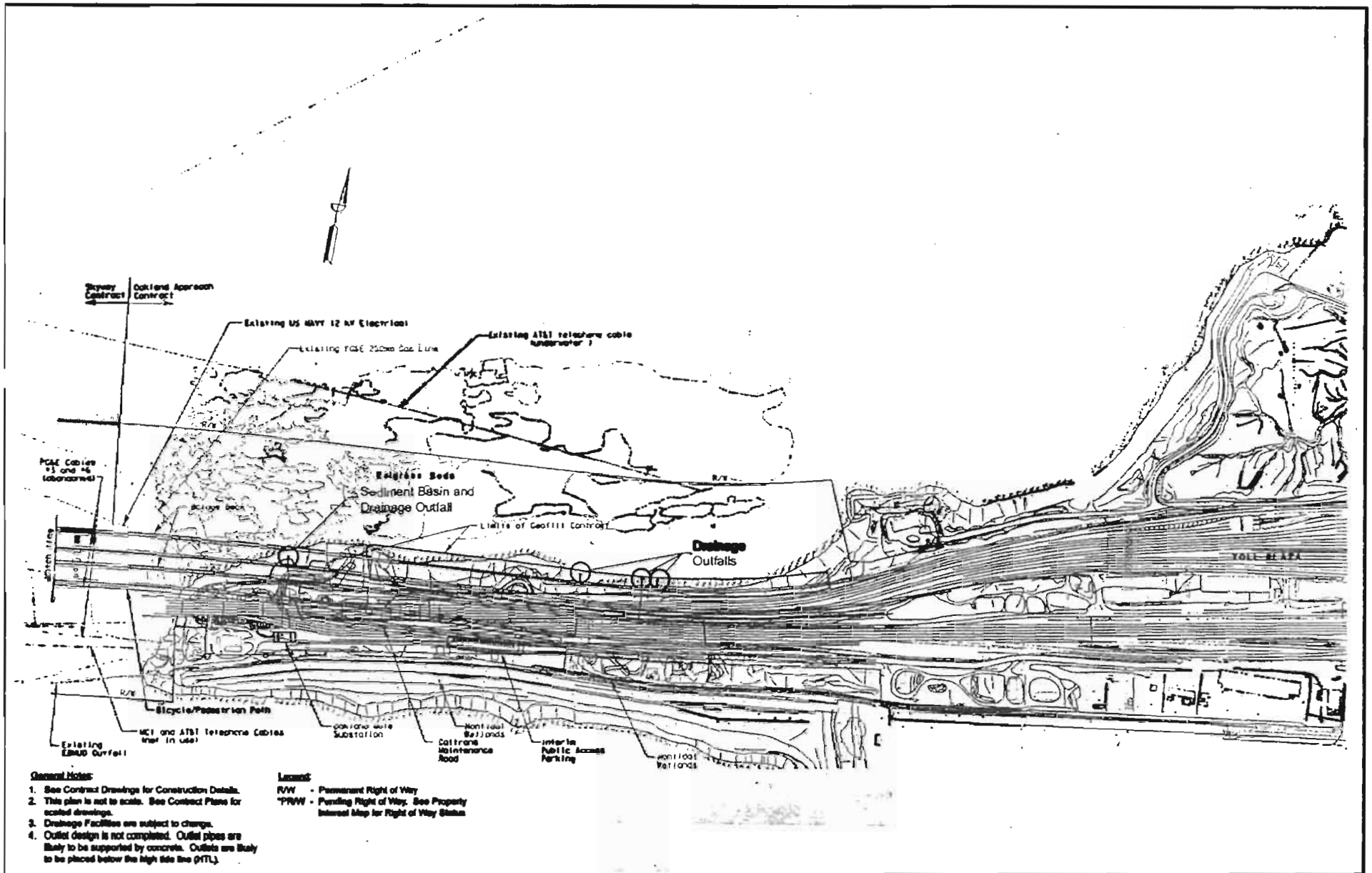
San Francisco - Oakland Bay Bridge East Span Seismic Safety Project

IN COUNTIES OF: San Francisco and Alameda

APPLICATION BY: Caltrans District 4

DATE: October 2001

Figure 7



General Notes:

1. See Contract Drawings for Construction Details.
2. This plan is not to scale. See Contract Plans for scaled drawings.
3. Drainage Facilities are subject to change.
4. Outlet design is not completed. Outlet pipes are likely to be supported by concrete. Outlets are likely to be placed below the high tide line (HTL).

Legend:

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

PURPOSE:
Provide a seismically upgraded vehicular connection between YBI and Oakland for future users

DATUM: Mean Sea Level NAD 83

ADJACENT PROPERTY OWNERS:
See Block 11

SITE PLAN
PROPOSED DRAINAGE IMPROVEMENTS
OAKLAND APPROACH AND GEOFILL CONTRACTS
Caltrans District 4
111 Grand Avenue
Oakland, California 94612

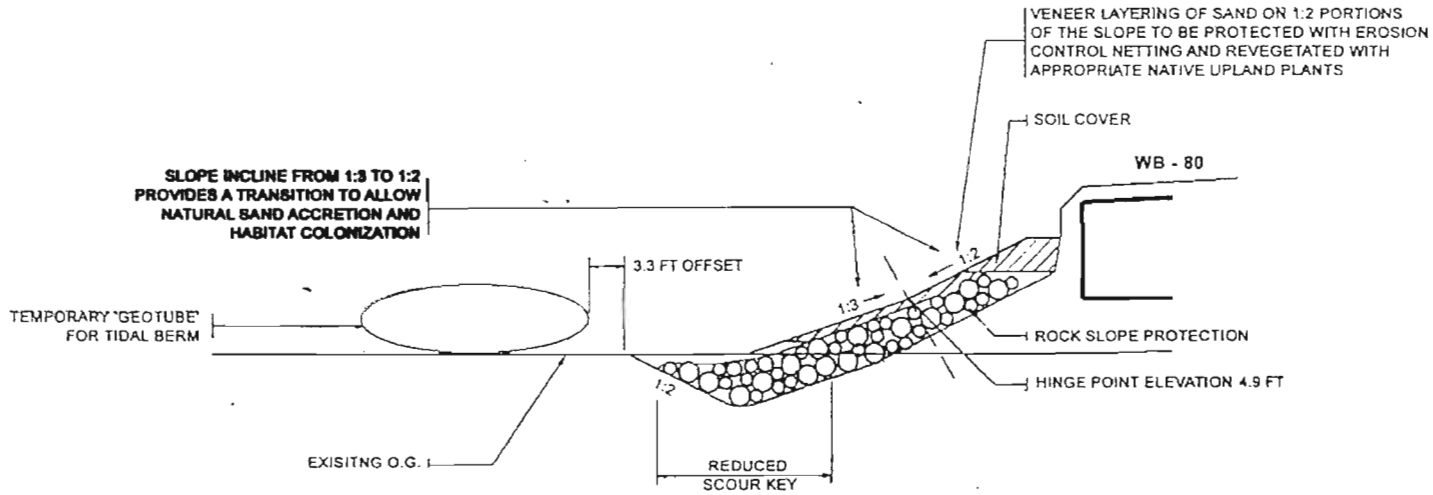
San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

IN COUNTIES OF: San Francisco and Alameda

APPLICATION BY: Caltrans District 4

DATE: October 2001

Figure 8



PROPOSED SLOPE TREATMENT

PURPOSE:
Provide a seismically upgraded vehicular connection between YBI and Oakland for future users

DATUM: Mean Sea Level NAD 83

ADJACENT PROPERTY OWNERS:
See Block 11

PROPOSED SLOPE TREATMENT
OAKLAND TOUCHDOWN AREA

Caltrans District 4
111 Grand Avenue
Oakland, California 94612

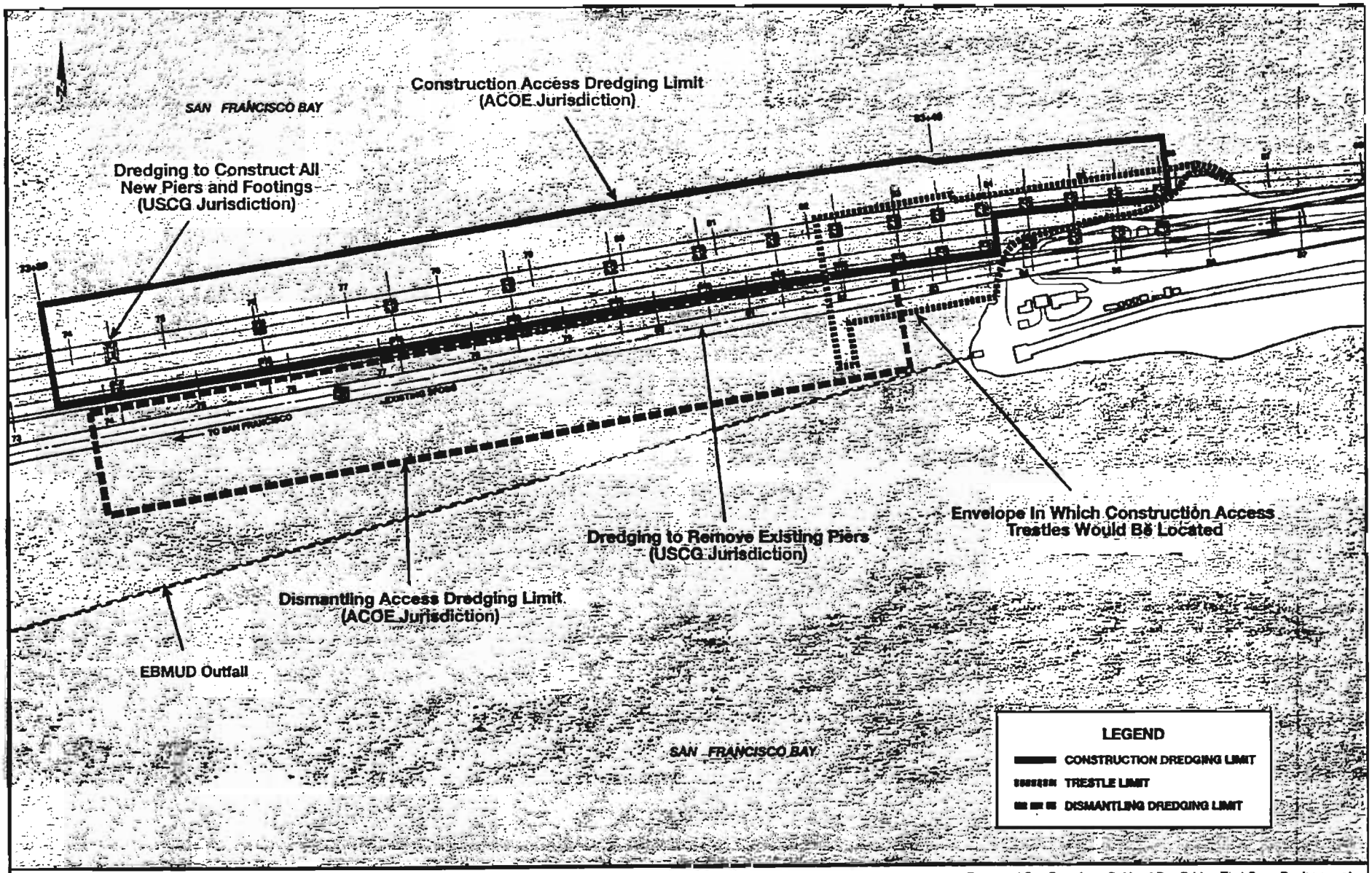
San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

IN COUNTIES OF: San Francisco and Alameda

APPLICATION BY: Caltrans District 4

DATE: December 2000

Figure 9



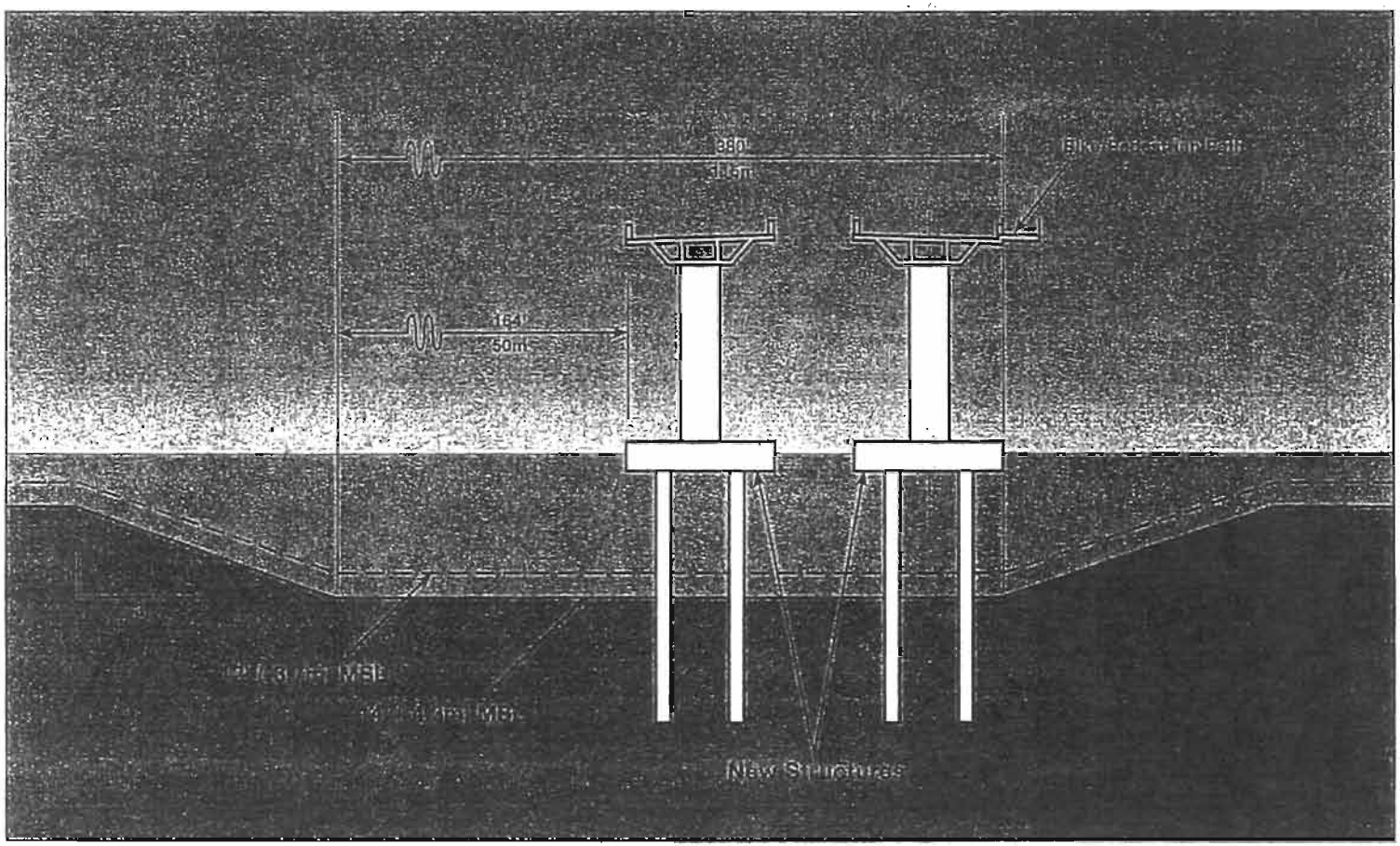
SFOBB EAST SPAN
SEISMIC SAFETY
PROJECT

Dredging Limits for Construction and Dismantling Access

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

Proposed San Francisco-Oakland Bay Bridge East Span Replacement
Name of Applicant - Caltrans
Waterway - San Francisco Bay
SF PM 7.8-8.7, Alam. PM 0.0-1.3
SF KP 12.2-14.3, Alam. KP 0.0-2.1
Location - San Francisco, San Francisco County, CA
Oakland, Alameda County, CA
October 2001

Figure 10



View: Looking East, North Side of Replacement Alternative N-6

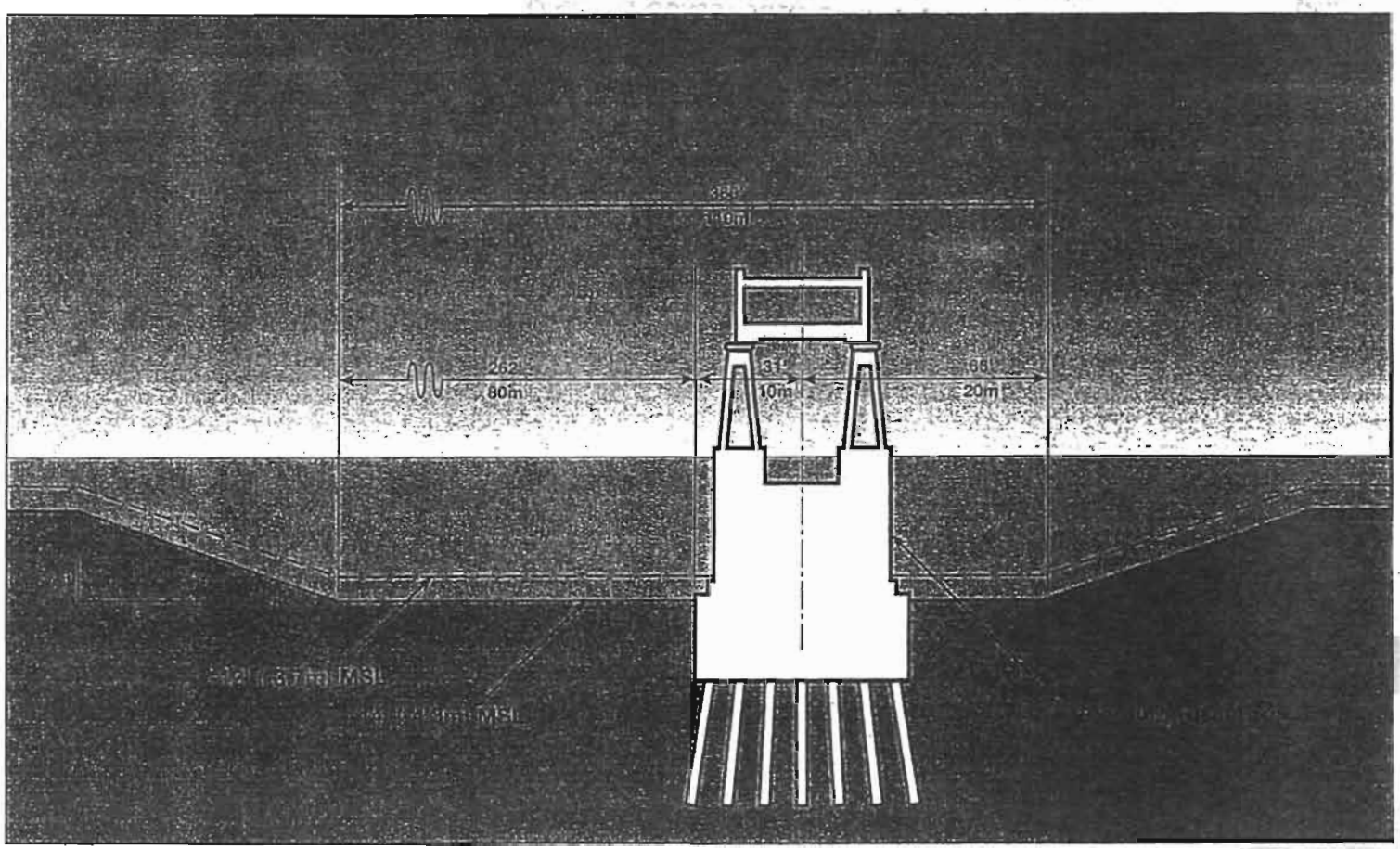
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Dredged Construction Channel
Cross-Section

NOT TO SCALE

Proposed San Francisco-Oakland Bay Bridge East Span Replacement
Name of Applicant - Caltrans
Waterway - San Francisco Bay
SF PM 7.6-8.7, Alam. PM 0.0-1.3
SF KP 12.2-14.3, Alam. KP 0.0-2.1
Location - San Francisco, San Francisco County, CA
Oakland, Alameda County, CA
May 2001

Figure 11



View: Looking West, South Side of Existing SFOBB

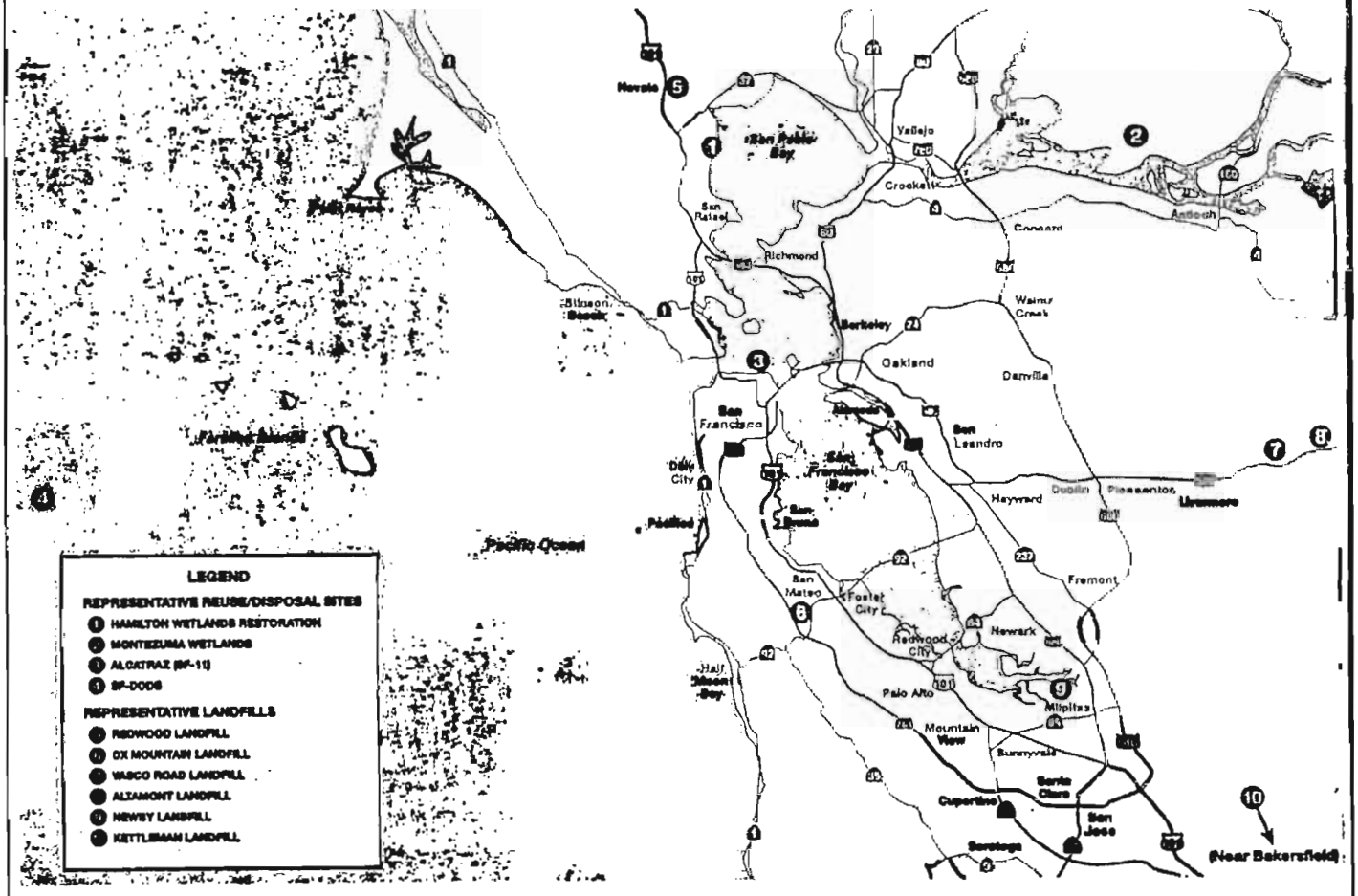
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Dredged Dismantling Channel
Cross-Section

NOT TO SCALE

Proposed San Francisco-Oakland Bay Bridge East Span Replacement
Name of Applicant - Caltrans
Waterway - San Francisco Bay
SF PM 7.8-8.7, Alam. PM 0.0-1.3
SF KP 12.2-14.3, Alam. KP 0.0-2.1
Location - San Francisco, San Francisco County, CA
Oakland, Alameda County, CA
May 2001

Figure 12



PURPOSE: Provide a seismically upgraded vehicular connection between YBI and Oakland for future users **DATUM:** Mean Sea Level NAD 83 **ADJACENT PROPERTY OWNERS:** See Block 11	Figure 13 **REUSE/DISPOSAL SITES** Caltrans District 4 District 4 111 Grand Avenue Oakland, California 94612	**San Francisco-Oakland Bay Bridge East Span Seismic Safety Project** IN COUNTIES OF: San Francisco and Alameda APPLICATION BY: Caltrans District 4 DATE: November 2000

SCOW CERTIFICATION CHECKLIST

Checklist Item	Record Data *To be filled out and signed within 1 hour of departure time in No.3.*	Initials	
		Contr-ector	Insp-ector
1. Ocean Disposal Trip Number:			
2. Departure date to SF DODS:			
3. Departure time to SF DODS:			
4. Departure location (dredge, berth, etc.):			
5. Scow name:			
6. 80% Scow bin capacity [Cubic Meters]:			
7. Tug name:			
8. Tug Captain's name:			
9. Area/Reach/Berth:			
10. Bin Cubic Meters hauled:			
11. Does the smoothed dredged material load line (including water) exceed the 80% bin capacity line[1]:	Yes ☐ No ☐		
12. Scow fore draft avg./aft draft avg.:			
13. Average draft[2]:			
14. A-B Line (not to be exceeded):			
15. Bin freeboard of material and/or water surface[3]:			
16. NWS Coastal Marine Forecast[4] Pigeon Point to Pt. Arena (out to 60 nm) (report wind, swell, and RMS wave heights[5]) Use forecasted wave data to cover the transit route and for the anticipated duration of the transit to SF-DODS (or not less than 12 hrs.) Write-in appropriate forecast periods (ie. Today, Tonight, Tomorrow)	Date/Time of Report: _____ Swell wave height: Wind wave height: RMS wave height: _____ Swell wave height: Wind wave height: RMS wave height: _____ Swell wave height: Wind wave height: RMS wave height: Comments:		
17. NMS Off-shore Waters Forecast[4] California Coast 60 nm - 250 nm offshore Pt. Arena to Pt. Conception Write-in appropriate forecast periods	Date/Time of Report: _____ Seas: Winds: _____ Seas: Winds: _____ Seas: Winds:		
18. NWS Buoy Report[6] *SF Buoy (46026):*	Time of Report: Wave height: Wave period:		

SCOW CERTIFICATION CHECKLIST

Checklist Item	Record Data *To be filled out and signed within 1 hour of departure time in No.3.*	Initials	
		Contr-actor	Insp-ector
19. NWS Buoy Report[4] *Point Arena Buoy (46014):*	Time of Report: Wave height: Wave period:		
20. Based on the wave period at SF Buoy of Item 18, and the RMS wave heights[5] of Item 16 above, check-off items 20A through 20D Yes or No: Waves and Periods: A. 3 meters or less, any period:	Yes ☐ No ☐		
B. Greater than 3 meters and less than 5 meters, with a period of 9 sec. or more:	Yes ☐ No ☐		
C. Greater than 3 meters and less than 5 meters, with a period less than 9 sec.:	Yes ☐ No ☐		
D. Greater than 5 meters with any period:	Yes ☐ No ☐		
21. Scow DDLS functioning:	Yes ☐ No ☐		
22. EPS functioning on tug:	Yes ☐ No ☐		
23. Comments:			
24. Contractor's Signature:	Print Name:	Time/Date:	
25. Inspector's Signature:	Print Name:	Time/Date:	
26. The decision to proceed to the ocean disposal site, based upon all available data including the recordings and calculations on this form, is also subject to the professional judgement of the Tug Captain as to the safety of the crew and vessel. Tug Captain's Signature:	Print Name:	Time/Date:	

[1]If scow haul of dredged material and water, as verified by observation of the bin material & waterline, exceeds the 80% bin limit line as painted in the bin, then scow is not within specifications.

[2]If average draft exceeds the A-B Line limit (Item No. 14), then scow is not within specifications.

[3]Scows must be loaded to avoid risk of spillage under the expected sea state conditions. Federal law prohibits any spillage of material during transit to the SF-DODS - violations may result in fines and prosecution.

[4]Use the most recent NWS Coastal Marine Forecast and Offshore Waters Forecast. Contractor may use either radio (VHF WX) data, Navtex printout or internet data, but once a primary source is selected for the duration of the project and approved, an alternate method may only be used as a approved backup when the approved primary source is unavailable. Inspectors are required to retain hardcopy Navtex output of NWS forecasts for end-of-year reporting. If internet data is utilized, the following websites are authorized: Coastal Marine Forecast (http://nimbo.wrh.noaa.gov/Monterey/SFOCWFSFO.html), Offshore 60 NM Forecast (http://nimbo.wrh.noaa.gov/Monterey/NFDOFFPZ6).

[5] RMS wave height is the calculated RMS sum of the predicted swell and wind wave heights, which is equal to the square root of the sum of the squares of the swell wave and wind wave heights as follows: $\sqrt{((\text{Swell Wave}_{ht})^2 + (\text{Wind Wave}_{ht})^2)}$. If a range of predicted swell wave height and/or wind wave height is given, use the average of the given range to calculate the RMS wave height, so long as the maximum value of any range does not exceed 5 meters.

[6]Use most recent NWS buoy report radio broadcast (VHF WX) data.

STATE OF CALIFORNIA GRAY DAVIS, Governor

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION
50 California Street, Suite 2600
SAN FRANCISCO, CALIFORNIA 94111
PHONE: (415) 352-3600
http://www.bcdc.ca.gov

Permittees' Copy

PERMIT NO. 8-01

November 20, 2001

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

ATTENTION: H. P. Hensley

Ladies and Gentlemen:

On November 1, 2001, the San Francisco Bay Conservation and Development Commission, by a vote of 20 affirmative, 0 negative, and 0 abstentions, approved the resolution pursuant to which this permit is hereby issued:

I. Authorization

A. Subject to the conditions stated below, the permittee, the California Department of Transportation, District 4 (Caltrans), is granted permission to replace the East Span of the San Francisco-Oakland Bay Bridge with a new self-anchored, single-tower, steel suspension bridge and concrete skyway in the City of Oakland, Alameda County, and in the City and County of San Francisco. Authorized work includes:

In the Bay:

1. **Dredging.** Dredge a total of approximately 616,721 cubic yards of material over approximately 99 acres of the Bay to construct portions of a new 2.18-mile-long replacement bridge for the East Span of the San Francisco-Oakland Bay Bridge (SFOBB) and to remove the existing East Span including:

   a. **Construction Barge Access Channel.** Dredge approximately 216,230 cubic yards of material for a barge access channel to construct the new bridge in shallow water areas and dispose of the material at the federally-approved deep ocean disposal site (DODS) outside the Commission's jurisdiction;

   b. **Construction Dredging.** Dredge approximately 187,087 cubic yards of material to construct footing piles and pile caps for the new bridge and dispose of the dredged material at the federally-approved SF-11 Alcatraz disposal site within the Commission's jurisdiction, except the upper twelve feet of Piers E1-E6 (Sediment Sampling and Analysis Plan (SAP) testing locations: N1 and N2) and Piers E15-E18 (SAP testing locations: SFOBB N5) which, because of elevated contaminant levels, would be disposed at an approved upland disposal site outside the Commission's jurisdiction;

   c. **Demolition Barge Access Channel.** Dredge approximately 190,680 cubic yards of material for a barge access channel to remove the existing East Span and dispose of the material at an approved upland disposal site for wetland reuse, such as Hamilton

or Montezuma, within the Commission's jurisdiction, or at an approved deep-ocean disposal site outside the Commission's jurisdiction; and

d. **Demolition Dredging.** Dredge approximately 22,724 cubic yards of material to remove the existing bridge piles, tower foundations and associated fender piles and dispose of the material at the federally-approved SF-11 disposal site within the Commission's jurisdiction.

2. **Temporary Bay Fill.** Place, use and, at project completion, remove a total of approximately 62,911 cubic yards of temporary Bay fill covering approximately 14.14 acres of Bay surface area to construct portions of a new 2.18-mile-long replacement bridge for the East Span of the SFOBB including:

   a. **Yerba Buena Island Transition/Suspension Span.** Place, use, maintain and, at project completion, remove: (1) approximately 81 cubic yards of temporary, pile supported fill covering approximately 0.40 acres for a barge access dock at Clipper Cove to facilitate delivery of construction materials, equipment and personnel to the project site; (2) approximately 60 cubic yards of temporary, pile-supported fill covering approximately 0.13 acres for portions of a construction access trestle to serve as a construction platform and small boat dock and to facilitate moving of construction materials, equipment, and personnel at the east end of YBI; (3) approximately 1.60 acres of temporary, high-level suspended fill to construct portions of "falsework" to support bridge segments until adjoining structures are completed; (4) approximately 2,776 cubic yards of temporary submerged fill for "falsework" piers; and (5) approximately 12,072 cubic yards of temporary, submerged fill to construct portions of two cofferdams;

   b. **Skyway.** Place, use, maintain and, at project completion, remove: (1) approximately 199 cubic yards of temporary, pile-supported fill covering approximately 1.73 acres for a construction access trestle to serve as a construction platform and small boat dock and to facilitate moving construction materials, equipment and personnel; (2) 6.17 acres of temporary, high-level suspended fill for "falsework" to support bridge segments until adjoining structures are completed; (3) 592 cubic yards of temporary, submerged fill for "falsework" piers; and (4) 26,928 cubic yards of temporary, submerged fill for 28 cofferdams;

   c. **Oakland Touchdown Structures and Approaches.** Place, use, maintain and, at project completion, remove (1) approximately 508 cubic yards of pile-supported fill covering approximately 3.46 acres for portions of a construction access trestle to serve as a construction platform and small boat dock and to facilitate moving construction materials, equipment and personnel; (2) approximately 0.48 acres of temporary, low and high-level suspended fill for "falsework" to support bridge segments until adjoining structures are completed (this "falsework" would fall within the footprint of the construction access trestle and therefore would not contribute to the overall area of temporary fill); (3) approximately 695 cubic yards of temporary, submerged fill for portions of "falsework" piers; and (4) approximately 1,500 cubic yards of temporary, submerged fill for seven cofferdams;

   d. **Geofill.** Place, use, maintain and, at project completion, remove: (1) approximately16,667 cubic yards of temporary, solid fill covering approximately 0.65 acres for portions of a 1,970-linear-foot-long tidal berm in areas north of the Oakland Touchdown. The temporary "geotube" structure, which is a large diameter, water

permeable geotextile fabric, would enclose dredged and/or excavated material and protect the work area from tidal and wave action while installing wick drains and placing fill for the westbound roadway; and (2) approximately 833 cubic yards of solid fill covering approximately 0.10 acres for a temporary tidal berm northwest of the Oakland Touchdown to facilitate relocation of the Caltrans maintenance road (the area of the temporary tidal berm would fall within the footprint of the maintenance road and the shadow of the elevated eastbound roadway, both of which are accounted for as permanent Bay fill).

3. **Permanent Bay Fill.** Place and use a total of approximately 103,253 cubic yards of permanent Bay fill covering approximately 45.53 acres of Bay surface area to construct portions of a new 2.18-mile-long replacement bridge for the East Span of the SFOBB:

   a. **YBI Transition/Suspension Span.** Place, use and maintain: (1) approximately 16,786 cubic yards of permanent, submerged fill for footing piles and pile caps; (2) approximately 2,502 cubic yards of permanent, submerged fill for pier fenders; (3) approximately 8.01 acres of permanent, high-level suspended fill for portions of a self-anchored, asymmetrical suspension bridge and cast-in-place, pre-stressed concrete bridge approaches, electrical service platforms, lighting and safety barriers; (4) approximately 0.65 acres of permanent, high-level suspended fill for portions of a bicycle and pedestrian path, one belvedere (view platforms) and safety railings; and (5) repair, retrofit, replace and/or relocate existing drainage outfalls, drainage facilities and utilities and install new outfalls as approved by the Regional Water Quality Control Board (RWQCB);

   b. **Skyway.** Place, use and maintain: (1) approximately 32,819 cubic yards of permanent, submerged fill for footing piles and pile caps; (2) approximately 4,210 cubic yards of permanent, submerged fill for pier fenders; (3) approximately 27.36 acres of permanent, high-level suspended fill for a pre-cast or cast-in place, post tensioned concrete skyway bridges, electrical service platforms, lighting and safety barriers; and (4) approximately 2.97 acres of permanent, high-level suspended fill for a bicycle and pedestrian path, five belvederes and safety railings;

   c. **Oakland Touchdown Structures and Approaches.** Place, use and maintain: (1) approximately 1,354 cubic yards of permanent, submerged fill for footing piles and footing pile caps; (2) approximately 10 cubic yards and 2.79 acres of permanent, low and high-level suspended fill for portions of a cast-in-place, pre-stressed, concrete box-girder bridge, electrical service platforms, lighting and safety barriers; (3) approximately 0.15 acres of permanent, low and high-level suspended fill for portions of a bicycle and pedestrian path and safety railings; (4) repair, retrofit, replace and/or relocate existing drainage outfalls, drainage facilities and utilities and install new outfalls as approved by the RWQCB; and (5) pavement, retaining structures, and safety barriers on Bay fill for the westbound roadway and relocate the Caltrans maintenance road; and

   d. **Maintenance Road and Shoreline Protection.** Place, use and maintain a total of approximately 67,284 cubic yards of fill to be comprised of: (1) approximately 44,272 cubic yards of permanent, engineered, solid and earthen fill covering approximately 3.31 acres for the westbound roadway. The new touchdown perimeter would be created by excavating to an elevation of approximately minus 2.6 feet NGVD and backfilling with clean fill material to match the elevations of the Oakland

Approach. Vertical wick drains would be placed to purge water during consolidation of the surcharge material and to provide a drainage path for pore water during a seismic event. All water that drains from the substrate through the wick drains and vertical drains would flow through gravel blankets into the Bay; (2) approximately 1,300 cubic yards of engineered solid and earthen fill covering approximately 0.29 acres to relocate the Caltrans maintenance road; (3) approximately 21,712 cubic yards of engineered rock slope protection to be used as shoreline protection and as upland transition habitat; and (4) repair, retrofit, replace and/or relocate existing drainage outfalls, drainage facilities and utilities.

4. **On-Site Restoration.** Restore on-site, north of the Oakland Touchdown area, approximately 3.07 acres of sand flats and eelgrass beds temporarily impacted by activities associated with constructing portions of a new 2.18 mile-long replacement bridge for the East Span of the SFOBB including:

   a. **Harvest/Replant Eelgrass.** Harvest approximately 0.54 acres of eelgrass from the footprint of the barge access channel prior to dredging and plant test plots in adjacent eelgrass beds north of the Oakland Touchdown area;

   b. **Restore Sand Flats.** Restore approximately 0.80 acres of sand flats north of the Oakland Touchdown area that would be affected by the placement of a temporary tidal berm and/or mud boils to their pre-construction elevations and substrate;

   c. **Upland Transition.** Construct and maintain rock slope protection (rip-rap) at the Oakland Touchdown area along the new westbound roadway and create slope gradients of 1(V):3(H) at the toe of the slope which will transition to a 1(V):2(H) gradient at mid-slope, cap rock slope protection areas with soil above the limits of tidal action and plant with native plant species that will help to create upland transition areas and roosting habitat for shorebirds; and

   d. **Shorebird Roosting Habitat.** Construct approximately 500 square feet of permanent, pile-supported decks for shorebird roosting habitat north of the Oakland Touchdown area.

5. **Demolition of Existing Span.** Remove the existing SFOBB East Span to approximately minus 1.5 feet below the existing mud line and dispose or recycle the bridge debris at an approved location outside the Commission's jurisdiction including:

   a. Remove, dispose and/or recycle approximately 12.5 acres of mostly high-level suspended fill comprised of painted steel, concrete, and other materials for the bridge deck and superstructure;

   b. Remove, dispose and/or recycle approximately 74,144 cubic yards of submerged fill comprised of concrete and other materials for the bridge piers and footing piles; and

   c. Remove and dispose approximately 4,685 cubic yards of solid fill for pier fenders comprised of treated wood and other materials.

6. **Repair, Replace and Maintain Improvements.** Repair, replace and maintain on an in-kind basis only, all improvements authorized in the Bay to the plans and specifications approved by or on behalf of the Commission.

Within the 100-foot shoreline band:

1. **Temporary Shoreline Band Structures.** Place, use, maintain and, at project completion, remove a total of approximately 0.73 acres of temporary structures to construct portions of a new 2.18 mile-long replacement bridge for the East Span of the SFOBB including:

   a. **YBI Transition/Suspension Span.** Place, use, maintain and, at project completion, remove: (1) approximately 65 square feet for portions of a temporary, pile-supported construction access trestle to serve as a construction platform and small boat dock to facilitate moving construction materials, equipment, and personnel; (2) approximately 0.13 acres of temporary, high-level suspended structures for portions of "falsework" to support bridge segments until adjoining structures are completed; (3) 420 square feet for temporary "falsework" piers; (4) 248 square feet for portions of temporary cofferdams; (5) 0.09 acres for a temporary construction staging area; (6) 0.16 acres to temporarily relocate a portion of the USCG Road; and (7) 0.15 acres to temporarily relocate a portion of the Torpedo Factory Road;

   b. **Oakland Touchdown Structures and Approaches.** Construct, use, maintain and, at project completion, remove: (1) approximately 0.16 acres for portions of temporary "falsework" piers; (2) approximately 344 square feet for portions of cofferdams; and (3) temporary construction staging areas, at Pier 7 and Berth 9 at the Port of Oakland and the former Oakland Army Base; and

   c. **Geofill.** Construct, use, maintain and, at project completion, remove: (1) approximately 527 square feet for portions of an approximately 1,970-foot-long, geotube to temporarily protect the work area from tidal and wave action and to facilitate installation of wick drains and the placement of fill for the westbound roadway.

2. **Permanent Shoreline Band Structures.** Place, use and maintain a total of approximately 8.17 acres of new, permanent structures for portions of a new 2.18 mile-long replacement bridge for the East Span of the SFOBB including:

   a. **YBI Transition/Suspension Span.** Construct, use and maintain: (1) approximately 452 square feet for permanent, support piers, footing piles and footing pile caps; (2) approximately 1.01 acres of permanent, high-level, suspended structures for the self-anchored, asymmetrical suspension bridge and cast-in-place, pre-stressed concrete bridge approaches, electrical service platforms, lighting and safety barriers; (3) approximately 0.10 acres of permanent, high-level suspended structures for portions of a bicycle and pedestrian path and safety railings; and (4) repair, retrofit, replace and/or relocate, existing drainage outfalls, drainage facilities and utilities and install new outfalls as approved by the RWQCB;

   b. **Oakland Touchdown Structures and Approaches.** Construct, use and maintain: (1) approximately 334 square feet of permanent support piers, footing piles and pile caps; (2) approximately 1.31 acres of permanent low and high-level suspended structures for portions of a cast-in-place, pre-stressed, concrete box-girder bridge, electrical service platforms, lighting and safety barriers; (3) approximately 0.19 acres of permanent, low and high-level suspended structures for portions of a bicycle and pedestrian path and safety railings; (4) approximately 2.46 acres of pavement for the at-grade westbound roadway and approximately 0.61 of pavement for the at-grade eastbound roadway; (5) repair, retrofit, replace and/or relocate, existing drainage

outfalls, drainage facilities and utilities and install new outfalls as approved by the RWQCB; (6) approximately 0.84 acres of pavement for the at-grade Caltrans maintenance road; and (7) place pavement, retaining structures, and safety barriers on the fill for the westbound roadway and relocate the Caltrans maintenance road; and

3. **Off-Bridge Treatment of Stormwater.** Collect and treat stormwater runoff from approximately 155 acres (six catchment groups) of existing Caltrans right-of-way at the Oakland Touchdown in the City of Oakland to Powell Street in the City of Emeryville by installing and maintaining best management practices (BMP's) including, but not limited to, biofilters, gross solids removal devices, bio-retention systems, wet ponds, and associated drainage system piping improvements, pump stations, and conveyance features.

4. **On-Site Restoration.** Restore and repair, in-kind and as needed, areas disturbed by construction activities including, but not limited to, natural features such as landscaping, shoreline slopes, beaches, and constructed features such as buildings, utilities, roadways and other structures.

5. **Repair, Replace and Maintain Improvements.** Repair, replace and maintain on an in-kind basis only, all authorized improvements to the plans and specifications approved by or on behalf of the Commission.

B. This authority is generally pursuant to and limited by the application filed on October 17, 2001, including all accompanying and subsequent correspondence and exhibits, but subject to the modifications required by conditions hereto.

C. Work authorized herein must commence prior to January 1, 2003, or this permit will lapse and become null and void. All work must also be diligently prosecuted to completion, and must be completed by January 1, 2010, unless an extension of time is granted by amendment of the permit.

D. The project authorized herein will result in approximately 45.53 acres of new Bay fill, of which approximately 41.93 acres is high level, suspended fill that will have minimal impacts on Bay resources. The net increase in Bay fill after removing the existing bridge will be approximately 33 acres. However, because the new support footings and pilings will be significantly smaller than the existing bridge footings, the project will result in a net increase of 173,806 cubic yards in the Bay's volume. The project includes a number of mitigation measures to offset the impacts of the solid and pile-supported fill, as well as the impacts of construction activity. These mitigation measures include, among other things: (a) removing the 1936 East Span, (b) restoring the approximately 1.73-acre barge access channel used to construct the replacement bridge to its pre-construction bathymetry, if Commission policy is changed to allow such restoration; and (c) providing $10.5 million to implement a wetlands restoration program that is still being developed, but which may be applied toward the restoration of approximately 3,298 acres of habitat at Skaggs Island in Sonoma County and toward the restoration, enhancement or creation new aquatic, wetland, or wetland transitional habitat as part of the East Bay State Park in the Central Bay. In addition, the project will provide approximately 9.6 acres of new public access including a 15.5-foot-wide pedestrian and bicycle lane across the new structure, a total of six belvederes, an interim parking lot at the Oakland Touchdown and a path terminus at YBI.

II. Special Conditions

The authorization made herein shall be subject to the following special conditions, in addition to the standard conditions in Part IV:

A. Specific Plans and Plan Review

1. **Plan Review.** Work authorized herein may be completed under multiple construction contracts. No work shall commence under an individual construction contract until final precise grading, drainage, mobilization, staging, site, engineering, architectural, landscaping, public access and shoreline clean-up plans and other relevant criteria, specifications, and plan information for that portion of the work, for each specific contract, have been submitted to, reviewed, and approved in writing by or on behalf of the Commission. The specific drawings and information required will be determined by the Commission staff. To save time, preliminary drawings should be submitted and approved prior to final drawings. No changes to the design of the project shall be made without the prior written approval by or on behalf of the Commission.

   a. **Grading, Drainage, Mobilization, Staging, Site, Architectural, Landscaping, and Public Access Plans.** Site, architectural, landscaping and public access plans shall include and clearly label the mean high tide line, or, in areas with marsh vegetation, the line 5.0 feet above mean sea level, the line 100 feet inland of the mean high tide line or the 5.0 feet above mean sea level, property lines, the boundaries of all areas to be reserved for public access purposes and open space, details showing the location, types, dimensions, and materials to be used for all structures, irrigation, landscaping, drainage, erosion control, seating, parking, signs, lighting, fences, paths, trash containers, utilities and other proposed improvements;

   b. **Engineering Plans.** Engineering plans shall include a complete set of contract drawings and specifications and design criteria. The design criteria shall be appropriate to the nature of the project, the use of any structures, soil and foundation conditions at the site, and potential earthquake-induced forces. Final plans shall be signed by the professionals of record and be accompanied by:

      (1) Evidence that the project design complies with all applicable Caltrans design standards and all other applicable codes; and

      (2) Evidence that an independent or in-house peer review panel has reviewed the project (except that such evidence may be waived by the staff, upon consultation with the Chair of the Engineering Criteria Review Board (ECRB), if peer review is determined not to be necessary).

2. **Plan Requirements.** Plans submitted shall be accompanied by a letter requesting plan approval, identifying the type of plans submitted, the portion of the project involved, and indicating whether the plans are final or preliminary. Approval or disapproval shall be based upon:

   a. Completeness and accuracy of the plans in showing the features required above, particularly the mean high tide line or the line 5.0 feet above mean sea level, property lines, and the line 100-feet inland of the mean high tide line or the +5.0 contour line mean sea level, and any other criteria required by this authorization;

   b. Consistency of the plans with the terms and conditions of this authorization;

c. The provision of the amount and quality of public access to and along the shoreline and in and through the project to the shoreline required by this authorization;

d. Consistency with legal instruments reserving public access and open space areas;

e. Assuring that any fill in the Bay does not exceed this authorization and will consist of appropriate shoreline protection materials as determined by or on behalf of the Commission;

f. Consistency of the plans with the recommendations of the Design Review Board, as applicable;

g. Consistency of the plans with the recommendations of the Engineering Criteria Review Board; and

h. Assuring that appropriate provisions have been incorporated for safety in case of a seismic event.

Plans submitted for review shall be reviewed by or on behalf of the Commission as soon as possible, and shall be completed within 45 days after receipt of the plans to be reviewed.

3. **Conformity with Final Approved Plans.** All work, improvements, and uses shall substantially conform to the final approved plans. Prior to any public use of the facilities authorized herein, the appropriate design professional(s) of record shall certify in writing that, through personal knowledge, the work covered by the authorization has been performed in accordance with the approved design criteria and in substantial conformance with the approved plans. No noticeable changes shall be made thereafter to any final plans or to the exterior of any outside fixture, railing lighting, landscaping, signage, parking area, public access amenities, or shoreline protection work without first obtaining written approval of the change(s) by or on behalf of the Commission.

4. **Discrepancies between Approved Plans and Special Conditions.** In case of any discrepancy between final approved plans and special conditions of this authorization or legal instruments approved pursuant to this authorization, the special conditions or the legal instrument shall prevail. The permittee is responsible for assuring that all plans accurately and fully reflect the special conditions of this authorization and any legal instruments submitted pursuant to this authorization.

B. **Public Access**

1. **Area.** The permittee shall make the following areas available exclusively to the public for unrestricted public access for walking, bicycling, sitting, viewing, and other related purposes. If the permittee wishes to use the public access area for other than public access purposes, it must obtain prior written approval by or on behalf of the Commission.

   a. **Oakland Touchdown.** The approximately 4.2-acre area at the Oakland Touchdown shown on Exhibit A shall be incorporated into the East Bay Regional Park District's Gateway Park to the extent the permittee is legally able to do so. Provision of this land for use as part of the "Gateway Park" shall be subject to Caltrans' existing and future operational and maintenance needs, as may be approved by or on behalf of the Commission, such as providing stormwater BMPs to treat stormwater runoff, providing continuous access to serve, install and maintain existing, and necessary

future utilities and providing access to maintain the new East Span and at-grade roadways. New utilities and stormwater facilities shall be designed to be consistent with recreation and public access uses in the area.

b. **YBI Connector and Terminus.** The 2,153-square-foot area (0.05-acre) connector and terminus at YBI connecting the bridge trail with public streets on YBI.

2. **Guarantee.** Prior to the dismantling of the existing East Span, but in no case later than December 31, 2009, the permittee shall, by instrument or instruments acceptable to counsel for the Commission, dedicate to a public agency or otherwise guarantee such rights for the public for so long as the improvements authorized herein remain in place to the new approximately 4.5-acre public access area at the Oakland Touchdown and at YBI to be comprised of: (1) a 4.2-acre parcel, within the existing bridge approach, to improve public access and treat storm-water runoff as part of the proposed Gateway Park including an approximately 0.37 acre area to be used as a temporary parking lot and crosswalk that will eventually become part of the proposed Gateway Park; (2) an approximately 0.25 acre public access path connecting the parking lot to the bicycle/pedestrian path on the replacement bridge; and (3) an approximately 2,153-square-foot (0.05-acre) area to be used as a public access path terminus and connector at YBI. The instrument(s) shall create rights in favor of the public which shall commence no later than after completion of construction of any public access improvements required by this authorization and prior to the use of the replacement bridge authorized herein. Such instrument(s) shall be in a form that meets recordation requirements of either Alameda or San Francisco County, as applicable, and shall include a legal description of the property being restricted for public access and a map that clearly shows and labels the mean high tide line or the +5.0 foot contour line above mean sea level in marshlands, and other appropriate landmarks and topographic features of the site, such as location and elevation of the top bank of any levees, any significant elevation changes, and the location of the nearest public street and adjacent public access areas. Approval or disapproval of the instrument(s) shall occur within 30 days after submittal for approval and shall be based on the following:

   a. Sufficiency of the instrument to create legally enforceable rights and duties to provide the public access area required by this authorization;

   b. Inclusion of an exhibit to the instrument that clearly shows the area to be reserved with a legally sufficient description of the boundaries of such area; and

   c. Sufficiency of the instrument to create legal rights in favor of the public for public access that will run with the land and be binding on any subsequent purchasers, licensees, and users.

3. **Recordation of the Instrument(s).** Within 30 days after approval of the instrument(s), the permittee shall record the instrument(s) in each relevant County and shall provide evidence of recording to the Commission. No changes shall be made to the instrument(s) after approval without the express written consent by or on behalf of the Commission.

4. **Improvements Within the Total Public Access Area.**

   a. **Oakland Touchdown.** Within one year of opening the replacement bridge to vehicular traffic, Caltrans shall develop the approximately 4.2-acre area that is currently occupied by eastbound traffic lanes for joint use to treat stormwater runoff

from adjacent roadways and as an integral part of Gateway Park adjacent to the Oakland Touchdown. This area shall include the following improvements:

(1) **Parking Lot.** An approximately 43-stall, all-weather (crushed rock, gravel or paved) temporary parking lot, which shall be paved and made permanent if desired to be retained, or completely removed if no longer needed, as determined by or on behalf of the Commission, in consultation with the East Bay Regional Park District;

(2) **Pathway.** A 15.5-foot-wide paved path connecting the bicycle/pedestrian path on the new East Span with the parking lot and the Caltrans maintenance road;

(3) **Crosswalk.** A crosswalk providing safe access across the Caltrans maintenance road between the parking lot and the eastern terminus of the bicycle/pedestrian path;

(4) **Landscaping.** Irrigation and native, drought tolerant landscaping within the approximately 4.2-acre public access area, around the parking lot, in the stormwater retention basins to the extent feasible, and adjacent to the public access path and other public access areas, in accordance with a plan submitted to, reviewed by, and approved by or on behalf of the Commission in accord with Special Condition II-A. The plan and program shall contain the following: (a) a topographic map of the site in one-foot contours (all elevations shall be relative to National Geodetic Vertical Datum (NGVD)); (b) proposed plant species along the contour lines according to their expected zone of growth (for the stormwater BMPs only); (c) a safe, attractive, and obvious path system connecting the public access on the bridge with public access to the nearest public thoroughfare (the Caltrans maintenance road or Burma Road) as required by Special Condition II-B-9 and BCDC Permit No. 11-93; (d) a management program for water and vegetation in the stormwater BMPs that integrates treating stormwater runoff with providing habitat and attractive public access landscaping; and (e) a schedule indicating when planting will occur. The permittee may maintain any BMP's including those that are vegetated, to ensure effective and efficient conveyance and treatment of stormwater runoff in accord with a plan approved pursuant to Special Condition II-A; and

(5) **Public Access Signs.** No fewer than six public access and, where appropriate, Bay Trail signs, one at the entrance of the temporary parking, one at the beginning of the public access path entrance located at the temporary parking lot, one located near the public access path adjoining the bridge at the Oakland Touchdown, and one along the Caltrans maintenance road accessing the parking lot, and one for each traffic direction located on Burma Road directing the public to the bicycle and pedestrian path and parking lot. The number, type, and locations of the signs shall be approved by or on behalf of the Commission pursuant to Special Condition II-A above.

b. **YBI Connector and Terminus.** This approximate 2,153-square-foot (0.05 acres) public access area will be designed to provide both a terminus for the bicycle/pedestrian path on the new East Span and for its eventual connection to public trails on YBI. This area shall include the following improvements:

(1) **YBI Path Terminus.** A pedestrian and bicycle terminus at YBI to be used as the western-most end of the public access path across the new East Span, including a 15.5-foot-wide paved and separated bicycle/pedestrian path;

(2) **Landscaping.** Irrigation and native and drought resistant landscaping adjacent to the public access path and terminus; and

(3) **Public Signs.** No fewer than three public access and, where appropriate, Bay Trail signs, one located at the entrance to the YBI path terminus, one at the entrance of the public access path entrance located near the YBI path terminus and connector, one located near the public access path adjoining the bridge at the YBI path connector ramp directing the public to the bicycle and pedestrian path. The number, type, and locations of the signs shall be approved by or on behalf of the commission pursuant to Special Condition II-A above.

c. **New East Span.** The new East Span shall be designed to provide six (6) viewing platforms (belvederes) adjacent to the 15.5-foot-wide pedestrian and bicycle path located on the new bridge. This span shall include the following improvements:

(1) A total of five (5), approximately 158-square-foot belvederes, each with a total of approximately 16 to 24 linear feet of light-weight seating elements, located along the Skyway portion of the new bridge; and

(2) One (1) approximately 263-square-foot belvedere with a total of approximately 24 to 36 linear feet of light-weight seating elements, located on the suspension portion of the new bridge.

5. **Maintenance.** The areas and improvements within all of the new public access areas required or authorized herein, including the YBI terminus, the Oakland Touchdown, and the belvederes and path on the new East Span, totaling approximately 9.6 acres, shall be maintained by and at the expense of the permittee or its assignee for so long as the improvements authorized herein remain in place. In addition, to ensure the fill authorized for the bicycle and pedestrian pathway is retained for such use, such pathway shall also be maintained by and at the expense of the permittee or its assignee for so long as the fill authorized herein remains in place. Such maintenance shall include, but is not limited to, repairs to all path surfaces, replacement of any trees or other plant materials that die or become unkempt, repairs or replacement as needed of any public access amenities such as pathways, signs, benches, trash containers and lights; periodic cleanup of litter and other materials deposited within the access areas, removal of any encroachments into the access areas, removal of graffiti; and assuring that the public access and Bay Trail signs remain in place and visible. Within 60 days after notification by staff, the permittee shall correct any maintenance deficiency noted in a staff inspection of the site.

6. **Assignment.** The permittee may transfer maintenance responsibility to a public agency or another party acceptable to the Commission at such time as the property transfers to a new party in interest but only provided that the transferee agrees in writing, acceptable to counsel for the Commission, to be bound by all terms and conditions of this permit.

7. **Reasonable Rules and Restrictions.** Caltrans may impose reasonable rules and restrictions for the use of the public access areas required pursuant to Special Condition II-B-2 above to correct particular problems that may arise. Other such limitations, rules, and restrictions shall have first been approved by or on behalf of the Commission upon a finding that the proposed rules would not significantly affect the public nature of the

area, would not unduly interfere with reasonable public use of the public access areas, and would tend to correct a specific problem that Caltrans has both identified and substantiated. Rules may include restricting hours of use and delineating appropriate behavior.

8. **Handicapped Accessible.** All public access facilities authorized or required herein shall be designed and built so that they are handicapped accessible.

9. **Public Access Connections.** Within one year of the commencement of construction on any future public access areas and shoreline paths on the adjacent shoreline properties at either end of the new East Span, the permittee shall complete installation of shoreline paths to connect the new shoreline paths and public access areas on the adjacent properties to the paths and public access areas required herein. The permittee shall reasonably coordinate design, construction, and maintenance with the owners and/or project sponsors of the adjacent properties to connect the public access areas and shoreline paths required herein with any future public access areas and shoreline paths proposed on the adjacent properties to create a continuous public access area. The exact type and locations of the connector paths shall be approved by or on behalf of the Commission pursuant to Special Condition II-A.

C. **Bridge Railings.** The new concrete safety barriers along vehicular travel lanes on the new East Span shall not exceed 32 inches in height. The new bridge railing along the Bay side of the new pedestrian/bicycle path shall not exceed 55 inches in height. Bridge railings shall be designed to provide motorists with the maximum feasible views of the Bay. The design of the bridge railings must be reviewed by or on behalf of the Commission to ensure this objective is achieved and shall not be installed until the design is approved in writing.

D. **Dredging.**

1. **Water Quality Approvals.** At least 45 days prior to the commencement of any dredging episode authorized herein, the permittee shall submit to the Executive Director the water quality certification and waste discharge requirements, and/or any other required approvals from the California Regional Water Quality Control Board, San Francisco Bay Region, for that episode. Failure to obtain such certification prior to the commencement of the dredging episode shall terminate the Commission's authorization for that dredging episode. The Executive Director may, upon review of the Regional Board approval, either: (1) approve the dredging episode(s) as consistent with this authorization; or (2) amend the Commission approval to modify existing or include additional conditions related to water quality. If the Executive Director amends the permit to change or add permit conditions, this permit shall become null and void unless the permittee agrees to amend this authorization in a manner specified by or on behalf of the Commission.

2. **Nine-Year Permit for Dredging.** The approximately 616,721 cubic yards or less of dredging authorized by this permit shall be completed within nine years of the date of issuance. No further dredging is authorized by this permit.

3. **Dredging Report**

   a. **Prior Notice of Episode.** The permittee shall notify the staff by telephone or in writing at least seven (7) days prior to undertaking any dredging episode. The permittee shall permit the Commission staff or representatives of other state or federal agencies to come aboard the dredge or barge associated with the dredging or dis-

posal episode and observe the operation to ensure that the dredging or disposal activity is consistent with the dredging report required herein and the other terms and conditions of this permit.

b. **Dredging Report.** Within thirty (30) days of completion of each dredging episode of the dredging authorized by this permit, the permittee shall submit to the Commission a report which contains: (1) a bathymetric map showing (a) the location of all areas authorized to be dredged and the authorized depth based on Mean Lower Low Water (MLLW); and (b) the actual areas, and the depth dredged based on MLLW, and any dredging that occurred outside the area authorized to be dredged or below the authorized depths; (2) a vicinity map showing the disposal site; and (3) the actual volume of the material dredged and disposed. The Commission reserves the right to have such report inspected by a reliable third party familiar with bathymetric mapping in order to verify the contents of the report. If a third party selected by or on behalf of the Commission indicates that the report is inaccurate, the Commission reserves the right to require the permittee to submit a revised report that meets the requirements of this condition. If the Commission determines that the contents of the dredging report indicate that work has occurred beyond that authorized by the permit, such violation may result in the initiation of enforcement action by or on behalf of the Commission.

c. **Dredging Updates.** Every ninety (90) days after the start of dredging operations, the permittee shall submit to the Executive Director updates of the dredging operation plan which describe the dredging activities that occurred within the previous reporting period, including: (1) the location of all areas authorized to be dredged and to what depth based on Mean Lower Low Water (MLLW); (2) the actual areas dredged and to what depth based on MLLW, and any dredging that occurred outside the area authorized to be dredged or below authorized depths; (3) a vicinity map showing the disposal sites; (4) the actual volume of the material dredged and disposed; and (5) the volume of the material disposed of in the Bay. In addition, the updates of the dredging operation plan required herein shall include a plan, as described in Special Condition II-D-3, for the proposed dredging activities to occur during the next reporting period.

d. **Final Dredging Reports.** Within thirty (30) days of completion of each dredging episode of the new dredging authorized by this permit, the permittee shall submit to the Commission a report which contains a bathymetric map showing: (1) the location of all areas authorized to be dredged and to what depth based on Mean Lower Low Water (MLLW); (2) the actual areas dredged and to what depth based on MLLW, and any dredging that occurred outside the area authorized to be dredged or below authorized depths; (3) a vicinity map showing the disposal sites; (4) the actual volume of the material dredged and disposed; and (5) the volume of the material disposed of in the Bay. The Commission reserves the right to have such a report inspected by a reliable third party familiar with bathymetric mapping in order to verify the contents of the report. If a third party selected by or on behalf of the Commission indicates that the report is inaccurate, the Commission reserves the right to require the permittee to submit a revised report that meets the requirements of this condition. If the Commission determines that the contents of the dredging

report indicate that work has occurred beyond that authorized by the permit, such violation may result in the initiation of an enforcement action against the permittee by or on behalf of the Commission.

4. **Herring.** To protect important fisheries or migrating anadromous fish species, approval of any dredging activities between December 1 and March 1 of any year shall be made by or on behalf of the Commission only upon the finding that: (1) a dredging or disposal operation which was begun prior to December 1 of any year could not be completed by the December 1 deadline due to unforeseen delays; (2) a professional biologist, or other individual sufficiently competent to identify herring spawning activity, is at the project site during all dredging operations; and (3) if herring spawning is detected at or within 200 meters of the dredging operations by the permittee's on-site biologist or qualified staff person, Department of Fish and Game personnel, or the Commission staff, all dredging will cease within eight hours of notification of the project engineer for a minimum of 14 days or until it can be determined that the herring hatch has been completed and larval herring concentrations have left the site. To facilitate rapid and efficient communication under these circumstances, the permittee shall provide the Commission staff and Department of Fish and Game personnel with all necessary telephone, FAX, and pager numbers of the Resident Engineer. Dredging may be resumed thereafter at the sole discretion of the permittee and the Commission staff, but shall be terminated no later than December 31 of that year, or if further spawning takes place at the site.

5. **Barge Overflow Sampling and Testing.** Results of any effluent water quality or other testing required by the San Francisco Bay Regional Water Quality Control Board shall be submitted in writing to the Commission's office at the same time that such testing is submitted to the Regional Board.

6. **In-Bay Disposal.** At least 45 days prior to the commencement of any disposal episode authorized herein, the permittee shall submit a written statement to the Executive Director that contains all of the following: (1) the dates within which the dredging and disposal episode is proposed; (2) the total volume of material proposed to be dredged and location of the proposed disposal in the Bay; (3) an explanation as to why ocean or upland disposal of the material is infeasible; (4) an explanation as to how the proposed disposal is consistent with the U.S. Army Corps of Engineers' management of the disposal site so as to maintain adequate site capacity; and (5) results of chemical and biological testing of material proposed for disposal. The authorization for the dredging and disposal episode shall become effective only when either: (1) the Executive Director informs the permittee in writing that he or she has determined that the episode is consistent with the authorization provided herein, that there is no feasible upland alternative available for the dredged material, that sufficient capacity exists at the disposal site consistent with the long-term management of the disposal site, and that the material is suitable for in-Bay disposal; or (2) the Executive Director does not respond to the permittee's written statement within 30 days of its receipt. If the Executive Director either: (1) determines that ocean or upland disposal of the material is feasible; (2) determines that the material is unsuitable for in-Bay disposal; or (3) is informed by the U.S. Army Corps of Engineers that the proposed disposal would unacceptably reduce disposal site capacity, then such determination shall terminate the Commission's authorization for in-Bay disposal as part of that dredging episode.

7. **Upland Disposal of Material Unsuitable for Aquatic Disposal.** Any dredged material that is determined to be unsuitable for aquatic disposal or for use in marsh restoration at Hamilton or Montezuma or similar site by the Dredged Materials Management Office and the Regional Water Quality Control Board shall be disposed of in an appropriate manner at an upland location outside the Commission's jurisdiction. Prior to the disposal of any such material, the permittee shall submit to the Commission documentation which contains the proposed date and location for the disposal of this material. After the disposal, the permittee shall submit evidence that the material was disposed in an appropriate manner.

8. **Upland Reuse of Dredged Material.** The permittee shall make every effort to dispose as much dredged material as possible that is suitable for such use at upland reuse sites, or at marsh restoration sites such as Hamilton or Montezuma.

9. **Seasonal Limitations.** No dredging or disposal work inconsistent with the time and location limits contained in Tables F-1 and F-2 of Appendix F, "In-Bay Disposal and Dredging" of the *Long-Term Management Strategy (LTMS) Management Plan* may be conducted without the written approval of the Executive Director, provided that such approval may only be issued after (1) BCDC consults with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish and Game or any combination thereof, as determined by the Executive Director; and (2) any required consultation with the appropriate resource agencies pursuant to state or federal endangered species acts has been completed. Such approval, if granted, shall not affect the permittee's obligation to comply with all applicable federal and state laws.

10. **Dredged Material Management Office (DMMO).** Prior to the commencement of dredging and disposal of dredged material for removal of the existing bridge the permittee shall:

    a. Submit a sediment analysis plan to the DMMO for its review;

    b. Adequately characterize the sediment to be dredged and disposed; and

    c. Submit to the DMMO for its review the test results and findings of the material to be dredged and disposed so that a subsequent suitability determination can be made.

E. **Riprap**

1. **Riprap Material.** Riprap material shall be either quarry rock or specially cast or carefully selected concrete pieces free of reinforcing steel and other extraneous material and conforming to quality requirements for specific gravity, absorption, and durability specified by the California Department of Transportation or the U. S. Army Corps of Engineers. The material shall be generally spheroid-shaped. The overall thickness of the slope protection shall be no more than three feet measured perpendicular to the slope. Use of small concrete rubble, concrete pieces with exposed rebar, large and odd shaped pieces of concrete, and asphalt concrete as riprap is prohibited. The permittee may salvage and re-use existing riprap as part of the shoreline protection work at the Oakland Touchdown.

2. **Riprap Placement.** Riprap material shall be placed so that a permanent shoreline with a minimum amount of fill is established by means of an engineered slope not steeper than two (horizontal) to one (vertical). The slope shall be created by the placement of a filter

layer protected by riprap material of sufficient size to withstand wind and wave generated forces at the site.

3. **Riprap Plans**

   a. **Design.** Professionals knowledgeable of the Commission's concerns, such as civil engineers experienced in coastal processes, should participate in the design of the shoreline protection improvements authorized herein.

   b. **Plan Review.** No work whatsoever shall be commenced on the shoreline protection improvements authorized herein until final riprap plans have been submitted to, reviewed, and approved in writing by or on behalf of the Commission pursuant to Special Condition II-A. The plans shall consist of appropriate diagrams and cross-sections that: (1) show and clearly label the mean high tide line, or a line five feet above Mean Sea Level in marshland, property lines, grading limits, and details showing the location, types, and dimensions of all materials to be used; (2) indicate the source of all materials to be used; and (3) indicate who designed the proposed shoreline protection improvements and their background in coastal engineering and familiarity with the Commission's concerns. Approval or disapproval of the plans shall be based upon: (1) completeness and accuracy of the plans in showing the features required above; (2) consistency of the plans with the terms and conditions of this permit; (3) assuring that the proposed fill material does not exceed this permit; (4) the appropriateness of the types of fill material and their proposed manner of placement; and (5) the preparation of the plans by professionals knowledgeable of the Commission's concerns, such as civil engineers experienced in coastal processes. All improvements constructed pursuant to this permit shall conform to the final approved plans. No changes shall be made thereafter to any final plans or to the constructed shoreline protection improvements without first obtaining written approval of the change(s) by or on behalf of the Commission.

4. **Maintenance.** The shoreline protection improvements authorized herein shall be regularly maintained by, and at the expense of the permittee, any assignee, lessee, sublessee, or other successor in interest to the project. Maintenance shall include, but not be limited to, collecting any riprap materials that become dislodged and repositioning them in appropriate locations within the riprap covered areas, replacing in-kind riprap material that is lost, repairing the required filter fabric as needed, and removing debris that collects on top of the riprap. Within 30 days after notification by the staff of the Commission, the permittee or any successor or assignee shall correct any maintenance deficiency noted by the staff.

F. **Mitigation for Fill Impacts.** The permittee shall fully complete the following mitigation measures to minimize Bay fill and offset the adverse impacts of the project authorized herein on Bay-related resources and endangered species:

1. **Removal of the Existing East Span of the SFOBB.** Within two years of opening the eastbound roadway of the new East Span to vehicular traffic, the permittee shall completely remove the existing East Span of the SFOBB covering approximately 12.5 acres of high-level suspended fill for the bridge deck, trusses and girders and approximately 78,829 cubic yards of solid fill of the support piers and footings and pier fenders. All material from the existing East Span shall be removed and disposed at an authorized location outside of the Commission's jurisdiction. The permittee shall

remove all pilings, support piers and footings to at least 1.5 feet below the existing mudline, and shall restore the affected areas to the original or existing contours and approximate soil composition. Prior to removal of the existing East Span, the permittee shall prepare and submit a removal plan to be approved by or on behalf of the Commission to ensure that the removal plan does not adversely impact Bay-related resources, endangered species, navigation and public health and safety and that sufficient safeguards are included to protect human safety and capture all demolition debris and related substances.

2. **Removal of Temporary Structures.** Within one year of opening the eastbound roadway of the new East Span to vehicular traffic, the permittee shall remove approximately 62,911 cubic yards of pile-supported fill covering approximately 14.14 acres of Bay surface area for the temporary access trestles, cofferdams, and "falsework", and the 17,500 cubic yards of solid fill for the temporary geotube, and shall dispose of all material at authorized locations outside the Commission's jurisdiction. All temporary pilings shall be removed to at least 1.5 feet below the existing mudline.

3. **Marsh and Upland Plant Protection During Construction.** The work authorized by this permit shall be performed in a manner that will prevent, avoid, or minimize to the extent possible any significant adverse impact on any tidal marsh, other sensitive wetland resources, and existing native upland vegetation. If any unforeseen adverse impacts occur to any such areas as a result of the activities authorized herein, the permittee shall restore the area to its previous condition, including returning the disturbed area to its original elevation and soil composition and, if the area does not revegetate to its former condition within one year, the permittee shall seed all disturbed areas with appropriate vegetation consistent with plans approved by or on behalf of the Commission. The permittee shall employ mitigation measures to minimize impacts to wetland areas, such as: (1) minimizing all traffic in marsh, mudflat and sandflat areas; (2) fencing environmentally sensitive areas during construction to prevent intrusion into such areas; and (3) carefully removing, storing, and replacing wetland vegetation that has been removed or "peeled back" from construction areas as soon as possible following construction.

4. **Revegetation at the Oakland Touchdown.** Within one year of removing the existing East Span, the permittee shall revegetate the approximately 4.2-acres area at the Oakland Touchdown required under Special Condition II-B, and all shoreline areas impacted by the project, to the extent that such areas fall within the Commission's jurisdiction. The permittee shall coordinate its design of all landscape plans with local city agencies and any other government entity that have an interest in the project and shall strive to use native, drought tolerant landscaping that is appropriate to the micro-climatic conditions of the Central Bay. The permittee shall also work with the East Bay Regional Park District, the Oakland Army Base Reuse Authority, the Port of Oakland, the City of Oakland, the Regional Water Quality Control Board, and all other interested agencies to develop a plan for the treatment of the approximately 4.2-acre area. The plans for revegetation of disturbed areas and the disposition of the approximately 4.2-acre area shall be approved by or on behalf of the Commission pursuant to Special Condition II-A.

5. **On-site Eelgrass Bed and Sand Flat Restoration.** Prior to dredging the barge access channel, the permittee shall harvest all eelgrass (approximately 0.54 acres) found in the barge access channel footprint and transplant them to adjacent areas currently

supporting stands of eelgrass. As part of this effort, the permittee shall, in consultation with the Department of Fish and Game and the National Marine Fisheries Service, develop an experimental transplanting program to determine critical factors to the success of transplanting, growing, and sustaining eelgrass. Such a program shall be approved by or on behalf of the Commission, pursuant to Special Condition II-A, and shall include an annual monitoring report for a period of fifteen years that identifies any adverse conditions affecting the success of the transplanting program, any corrective action taken to address these adverse conditions, the relative success of transplants under a variety of conditions as compared to nearby reference sites, successful procedures that promote the establishment and long-term success of eelgrass, coordination with the Port of Oakland's Middle Harbor Eelgrass program, etc. Should the Commission's policy on fill for wildlife areas be revised at any time prior to opening the eastbound roadway of the new East Span to vehicular traffic, the permittee shall, after seeking and receiving approval for amending this authorization, restore the bathymetry and soil composition of the barge access channel area to its original condition prior to construction, and transplant eel grass to the restored channel. In addition, all sand flats temporarily affected at the project site shall be fully restored to their pre-construction conditions and soil conditions existing prior to disturbance or fill placement. A geotextile fabric shall be placed prior to any fill placement for the geotube to facilitate its removal and site restoration.

6. **Coordination with Appropriate Wildlife Agencies to Minimize Impacts to Birds.** Prior to any construction authorized herein, the permittee shall submit for review and concurrence by or on behalf of the Commission evidence, such as a contract and/or agreement with the U.S. Fish and Wildlife Service, the U.C. Santa Cruz Predatory Bird Research Group and/or the Point Reyes Bird Observatory, that will ensure compliance with the terms of the Biological Opinion issued by the U.S. Fish and Wildlife Service with respect to the California least tern and the brown pelican.

   In addition, prior to any construction activities authorized herein, the permittee shall submit for review and concurrence by or on behalf of the Commission, evidence that a plan designed to minimize adverse impacts, such as monitoring procedures approved by the California Department of Fish and Game, in consultation with the Point Reyes Bird Observatory, to the double-crested cormorant *(Phalacrocorax auritus)* colony which exists on the support beams and scaffolding underneath the existing bridge and other migratory bird nesting and breeding on the structure is in place. Such evidence shall include the name and phone number of the individual(s) at the California Department of Fish and Game and the Point Reyes Bird Observatory, and the parties responsible for ensuring that the monitoring procedures are followed.

7. **Creation of Bird Roosting Habitat.** Prior to opening the eastbound roadway of the new East Span to vehicular traffic, the permittee shall develop and implement a plan, in consultation with the California Department of Fish and Game and the U.S. Fish and Wildlife Service and local Audubon chapters, and approved by or on behalf of the Commission pursuant to Special Condition II-A, to create approximately 500 square feet of shorebird roosting habitat in the Emeryville Crescent and at other suitable areas near the Oakland Touchdown. The shorebird roosting plan shall include provisions for monitoring and submitting reports to the Commission of shorebird use of the created roosting habitat (monthly bird counts at appropriate tidal stages between September and April for a three-year period), for maintaining sites free of vegetation and, for pile-

supported structures, securely anchored, and for removing such habitat if it deteriorates sufficiently to create a potential safety or navigation problem, as determined by the Executive Director. Such shorebird roosting habitat may consist of pilings, pile-supported or floating docks, unvegetated beach and riprap areas, etc.

8. **Coordination with Appropriate Wildlife Agencies to Minimize Impacts to Eelgrass Beds.** Prior to any construction authorized herein, the permittee shall submit for review and concurrence by or on behalf of the Commission, pursuant to Special Condition II-A, a plan designed to minimize adverse impacts to the existing eelgrass *(Zostera marina)* beds that has been reviewed and approved by the National Marine Fisheries Service, the California Department of Fish and Game, and/or the U.S. Fish and Wildlife Service. The approved plan shall include pre- and post-monitoring surveys of the existing eelgrass beds, silt curtains and operational limitations to minimize turbidity in eelgrass beds and an experimental transplanting and relocation program if determined necessary by the wildlife agencies. Such evidence shall include the name and phone number of the individual(s) at the National Marine Fisheries Service, the California Department of Fish and Game or the U.S. Fish and Wildlife Service responsible for reviewing and approving the plan and the parties responsible for ensuring that the plan is adhered to. Any monitoring reports prepared pursuant to the approved plan shall be sent to the Commission, as well as the final report which assesses the results of the eelgrass mitigation measures.

9. **Coordination with Appropriate Wildlife Agencies to Minimize Impacts to Fish During Pile-Driving.** Prior to any construction authorized herein, the permittee shall submit for review and concurrence by or on behalf of the Commission, pursuant to Special Condition II-A, a plan that has been reviewed and approved by the National Marine Fisheries Service, the California Department of Fish and Game, and/or the U.S. Fish and Wildlife Service designed to minimize the adverse impacts to fish during pile-driving activities. Caltrans shall adhere to the conditions of the Biological Opinion for this project, which requires that funds totalling $4 million will be placed into an escrow account and expenditures from the account will be made at the discretion of National Marine Fisheries Services and Department of Fish and Game, in consultation with Caltrans and Federal Highway Administration, for the restoration of federal- and state- listed salmonid habitat in central and south Bay. This restoration fund will be used for off-site, out-of-kind mitigation to offset construction-related injury and mortality of listed salmonid. A portion of this fund, up to $500,000 shall be made available by Caltrans prior to the initiation of construction activities on the East Span Project for monitoring fisheries impacts, sound pressure levels, and other environmental conditions associated with pile driving. Additional mitigation for fish, developed in consultation with the National Marine Fisheries Service and the California Department of Fish and Game, shall be required if monitoring indicates that fish kills are occurring that are related to pile-driving activities. Within one month of expending funds for fish mitigation, Caltrans shall report in writing to the Commission on the mitigation measures to be implemented.

10. **Off-Site Mitigation Program.** Prior to any construction authorized herein, the permittee shall create a mitigation fund and deposit the sum of $10.5 million in an interest bearing account to be dispersed, in its entirety, including principal and interest, as approved by or on behalf of the Commission, after consultation with the California Department of

Fish and Game, Regional Water Quality Control Board, U.S. Army Corps of Engineers, U.S. EPA, U.S. Fish and Wildlife Service, and National Marine Fisheries Service, solely to restore Bay shallow water submerged land and wetland habitat.

Preference for using the funds set aside for mitigation shall be: (a) Skaggs Island, consisting of the removal of structures and hazardous materials contained therein to facilitate the transfer of the Navy-owned portion of the site (approximately 3,289 acres) to the U.S. Fish and Wildlife Service so as to restore it to tidal marsh; and (b) Eastshore State Park sites in the Central Bay, including but not limited to Radio Beach, Brickyard Cove, Albany Beach and Hoffman Marsh or a combination thereof. Up to $8 million will be made available to the Skaggs Island structure and hazardous materials removal project noted above and not less than $2.5 million will be made available to the Eastshore State Park habitat restoration projects noted above. Revisions to this allocation may only be approved by the Commission, after consultation with the agencies noted above.

A portion of this fund may be used to remove structures and hazardous materials contained therein at Skaggs Island only if: (1) the money is used to remove the structures and hazardous materials therein in a timely manner; (2) only that amount of funds needed to remove the structures and remediate hazardous materials therein is expended, with the remaining funds available for Central Bay habitat restoration; (3) removal and remediation facilitates the restoration of Skaggs Island to a tidal and seasonal wetlands as part of an approved restoration plan and schedule; and (4) the U.S. Fish and Wildlife Service obtains control of the property in question for tidal and seasonal habitat restoration and Bay wildlife enhancement. Removal of structures and hazardous materials may begin prior to preparation of the restoration plan and schedule.

The Eastshore State Park sites shall include, at a minimum, restoration of 5.0 acres of sand flats (a 1 to 1 replacement ratio of affected sandflat habitat) and 10.8 acres of eelgrass beds (a 3 to 1 replacement ratio of affected eelgrass habitat to achieve 3.6 acres of eelgrass) so as to offset the damage caused by the project. Eelgrass beds restored at the project site (i.e., within the barge access channel that currently support eelgrass if the Commission's policies regarding in-Bay use of dredged material for habitat restoration is amended) may be included in the overall eelgrass mitigation requirement. Revisions to this formula may be approved by or on behalf of the Commission, after consultation with the agencies listed above. Before the funds are dispersed to any proposed mitigation site, Caltrans shall, after consultation with the entity proposing to restore one of the mitigation sites described above, develop a mitigation plan that conforms to the requirements of Special Condition II-F-11 below.

If, however, the removal of buildings and hazardous material contained therein at Skaggs Island has not commenced by July 1, 2004, the earmarked funds shall be returned to the mitigation fund and Caltrans shall identify other potential mitigation site(s) for approval by or on behalf of the Commission, after consultation with the agencies noted above. If, the Skaggs Island wetland restoration project has not commenced by July 1, 2008, any funds remaining from the initial allocation shall be returned to the mitigation fund and Caltrans shall identify other potential mitigation site(s) for approval by or on behalf of the Commisssion, after consultation with the agencies noted above. If, however, the habitat restoration projects at Eastshore State Park have not commenced by July 1, 2004, the earmarked funds for those projects shall be returned to the mitigation fund and Caltrans shall identify other potential mitigation site(s) for approval by or on behalf of

the Commission, after consultation with the agencies noted above. Revisions to these time frames may be approved by or on behalf of the Commission, after consultation with the agencies listed above. Preference for reallocation of the returned funds will be given to projects involving sandflat and eelgrass restoration in Central San Francisco Bay, or projects that provide significant natural resource benefits to the entire Bay.

11. **Marsh Restoration Work and Plans.** Any project that receives money from the mitigation fund shall include a marsh restoration plan and program, to be approved by or behalf of the Commission, for the eventual restoration of the site, and shall contain the following:

    a. **Site Conditions and Modifications.** A topographic map of the site at one-foot contour intervals and a topographic map showing any proposed site modifications. All elevations shall be relative to National Geodetic Vertical Datum (NGVD). The map shall include typical cross-sections showing the proposed marsh plain elevations, any channels, and any high spots. The map shall show: (1) figures for the ratios of typical horizontal to vertical slopes for existing and proposed marsh surface, channels, and sloughs; (2) proposed plant species along the cross-sections according to their expected zone of growth; (3) the elevation of adjacent surrounding properties; and (4) figures for the estimated tidal range related to Mean Higher High Water, Mean High Water, Mean Lower Low Water, Mean Sea Level, the maximum predicted tide, and the 100-year tide. To promote natural sedimentation and colonization of the site, constructed elevations shall generally be six to twelve inches lower than target elevations.

    b. **Soil Information.** The program shall include a report identifying the type of soils found at the site, at a nearby reference site, and the soil type of any fill to be imported to the site. Information shall be provided on the quantitative soil measurements of soil texture and dry density for soils at the site, at the reference site, and for all imported soils. All imported soils must be within 10% of the range of values found at the reference marsh for soil qualities such as grain size, organic content, salinity, and pH.

    c. **Planting and Seeding Plan.** The restoration plan shall include a list of the vegetation proposed to be planted, an irrigation plan for watering upland and transitional plants until they are established, and a maintenance plan. Such plans shall include a program for eliminating non-native or invasive vegetation and preventing the establishment of non-native or invasive vegetation at the site.

    d. **Schedule.** The program shall include a schedule indicating when excavation, fill, and grading will occur, the time to be allowed for settlement, and the time when planting will occur. For Skaggs Island, the schedule should provide a time line for the actions needed before the site will be returned to tidal action, and the objectives and measures that can be implemented in the interim to enhance the site's natural resource functions.

    e. **Identification of a Suitable Reference Site.** The program shall identify nearby reference sites that shall be evaluated as part of the monitoring program and shall provide a reference for evaluating the progress of the restoration site.

f. **MOA/MOU.** The plan and program shall include all executed MOA's/MOU's and cost agreements that establish the responsibilities between the permittee, and any other government entity implementing the mitigation work for the permittee, including designing, constructing and monitoring any mitigation work.

g. **Monitoring.** Every year, starting October 1 of the year following the return of the site to tidal action for a fifteen-year period, or until those portions of the restoration site subject to tidal action are approximately 95% vegetated as compared with nearby reference marshes (or eelgrass beds), or for sandflats, until benthic sampling indicates similar biomass, whichever occurs first, the permittee shall report to the Commission on the effects of the project in restoring the target habitat (tidal marsh or transitional habitat or eelgrass beds or sandflats) at the restoration site. The report shall include measuring sedimentation rates, percentage of the site revegetated, plant survival, approximate percentage representation of different plant species, and a qualitative assessment of plant growth rates for the tidal restoration area, including adjacent transitional and upland habitats. Undesirable exotic plant species such as pepperweed (*Lepidium latifolium*), *Spartina alterniflora*, broom, or star thistle shall be reasonably controlled (coverage of less than 5 percent of their expected zone of growth) during the fifteen-year monitoring period. Should adverse conditions be identified during the fifteen-year monitoring period, the permittee shall take corrective action as specified by or on behalf of the Commission.

G. **Horizontal Control Points.** As shown on the plans required by Special Condition II-A, the permittee shall install a minimum of four permanent horizontal control points of the type and at specific locations at the East Span of the SFOBB site approved by or on behalf of the Commission. The permittee shall place these control points under the supervision of a registered civil engineer or land surveyor, and shall be accurately located and mapped in relation to each other, to the closest known existing control point or other acceptable fixed point in the project area, and to the limits of any proposed fill in the Bay. The permittee shall locate these control points to facilitate field checking, with simple equipment, of the limits of the fill authorized pursuant to this authorization. Such fill limits shall be dimensioned form these control points, or, if the scale of the drawing is adequate, it shall carry a note stating that the field dimensions may be scaled from the drawing and the accuracy of such scaling, e.g., "Field dimensions to an accuracy of +/- may be scaled from the drawing." The permittee shall clearly show these control point locations on all plans submitted pursuant to the Special Condition II-A.

H. **Temporary Construction Access.** Any fill placed for construction access and work platforms shall be pile-supported or floating only, and shall be approved by or on behalf of the Commission prior to their installation pursuant to Special Condition II-A. The permittee is strictly prohibited from using solid fill in the Bay for construction access and work platform purposes with the exception of the minimum amounts necessary of earthen fill to create the minimum necessary grade transitions from the land to pile-supported work platforms, install the geotube to construct the westbound roadway, and the tidal berm for the Caltrans maintenance road.

I. **Debris Removal.** All construction debris shall be removed to a location outside the jurisdiction of the Commission. In the event that any such material is placed in any area within the Commission's jurisdiction, the permittee, its assignees, or successors in interest, or the owner of the improvements, shall remove such material, at its expense, within ten days after it has been notified by the Executive Director of such placement.

J. **Hazardous Materials Removal and Remediation.** The permittee shall ensure that it performs any removal, remediation, encapsulation or disposal of hazardous or toxic materials, such as lead-based paint, consistent with the requirements of the U.S. Environmental Protection Agency and any applicable local, state and federal laws.

K. **Non-Point Source Pollution Control.** The permittee shall implement all appropriate and necessary best management practices (BMP's) to minimize the discharge of non-point source pollutants to the Bay during and after construction. The BMP's shall be consistent with applicable local, state and federal laws and any required waste discharge requirements, NPDES permits and stormwater pollution prevention plans and shall be shown on the plans required under Special Condition II-A.

L. **Construction and Maintenance** Operations. All construction operations and ongoing repair and maintenance activities shall be performed to prevent construction materials from falling into the Bay. In the event that such material escapes or is placed in an area subject to tidal action of the Bay, the permittee shall immediately retrieve and remove such material at its expense.

M. **Creosote Treated Wood.** No pilings or other wood structures that have been pressure treated with creosote shall be used in any area subject to tidal action in the Bay or any certain waterway, in any salt pond, or in any managed wetland within the Commission's jurisdiction as part of the project authorized herein.

N. **Placement and Use of the Construction Barges and Coordination with the U.S. Coast Guard.** Prior to the use of any barges in the Bay, the permittee shall first submit evidence that their use complies with the U.S. Coast Guard Checklist and the Dredging Operation Plan and updates required pursuant to Special Condition II-D.

O. **Mud Waves.** The permittee shall implement reasonable measures to prevent the creation of mud waves as a result of project construction. Should the project result in the formation of a mud wave, the permittee shall remove the mud wave and, after review and approval by or on behalf of the Commission pursuant to Special Condition II-A, implement measures to correct the conditions that led to mud wave formation.

P. **Notice to Contractor.** The permittee shall provide a copy of this permit to any contractor or person working in concert with the permittee to carry out the activities authorized herein and shall point out the special conditions contained herein.

Q. **Commission Jurisdiction Over Fill Area.** Notice is hereby given that, under the McAteer-Petris Act, the area of the approved project that is within the Commission's jurisdiction under Section 66610(a) remains within that jurisdiction even after fill or substantial change in use, authorized by the Commission, may have changed the character of the area; so that the permittee or the permittee's successors in interest will require further action by or on behalf of the Commission prior to any future change of use or work within areas filled pursuant to this authorization.

R. **Recording.** The permittee shall record this document or a notice specifically referring to this document with the City and County of San Francisco and Alameda County within 30 days after execution of the permit issued pursuant to this authorization and shall, within 30 days after recordation, provide evidence of recordation to the Commission.

S. **New Buildings.** To minimize intrusion in proposed public access and recreational areas, and to maximize visual access to the Bay, any new buildings proposed in the Oakland Touchdown area as part of this new East Span shall be designed and located to be compatible with existing buildings in the area, and to be clustered with them, to the maximum extent feasible.

T. **Maintenance Road Landscaping.** Landscaping for the maintenance road in the Oakland Touchdown, particularly where the road separates west and eastbound travel lanes, shall be submitted and approved in accord with Special Condition II-A. Such landscaping plan shall clearly denote the end of the bridge and the beginning of dry land, and serve as a gateway to the East Bay.

U. **Conformity with State Historic Preservation Requirements.** Caltrans shall fully comply with all requirements of the State Historic Preservation Office regarding the historical preservation and/or interpretation of the existing East Span of the Bay Bridge and any other existing buildings south of the bridge approach at the Oakland Touchdown

V. **Debris Removal for Demolition and Capping.** All construction debris from the demolition of the existing bridge that is determined to be inert, non-hazardous, and non-toxic may be deposited within the footings of the existing bridge up to but no higher than an elevation of minus 10-feet below the pre-construction mudline elevation. Any construction debris that is placed within footings of the existing bridge shall be fully contained and shall not leach into the existing water column. All construction debris from the demolition of the existing bridge that is determined to be hazardous, toxic, or deleterious to the environment shall be removed to a location outside the jurisdiction of the Commission. In the event that any such material is placed in any area within the Commission's jurisdiction, the permittee, its assignees, or successors in interest, or the owner of the improvements, shall remove such material, at its expense, within ten days after it has been notified by the Executive Director of such placement. After the disposal, the permittee shall submit evidence that the material was disposed in an appropriate manner.

III. Findings and Declarations

This permit is issued based on the Commission's findings and declaration that the authorized work is consistent with the McAteer-Petris Act, and the *San Francisco Bay Plan*, and the Commission's amended management program for the San Francisco Bay segment of the California coastal zone and that the project is statutorily exempt from the California Environmental Quality Act for the following reasons:

A. **Bay Fill.** Section 66605 of the McAteer-Petris Act states that further filling of San Francisco Bay should be authorized only when public benefits from fill clearly exceed public detriment from the loss of water areas and should be limited to water-oriented uses, including bridges. In addition, the Commission should authorize fill only when no alternative upland location is available, the fill is the minimum amount necessary, and the nature, location and extent of fill minimizes the harmful effects to the Bay. The project will replace the existing East Span of the Bay Bridge, constructed in 1936, with a replacement bridge that will meet current seismic design criteria.

1. **Public Benefits v. Public Detriment.** The major public benefit of this project is to seismically upgrade the East Span of the Bay Bridge. The replacement bridge will be designed as a lifeline structure (constructed to a higher standard to provide necessary post-disaster functionality), built to withstand a major earthquake, thereby improving public safety

and reducing economic disruption during a large earthquake. Failure of the bridge would not only lead to likely loss of life, but would severely disrupt emergency response efforts, and subsequent economic recovery of the Bay region. The new span will also greatly enhance views of the Bay from the bridge and will reduce congestion by providing ten-foot-wide shoulders on the inside and outside of the traveled way for each traffic direction, thereby providing safer access for disabled vehicles and bringing this Interstate highway current with AASHTO and other highway design and safety codes. The bridge replacement will also provide public access where none has previously existed and will include significant public benefits through the mitigation package.

2. **Use.** The McAteer-Petris Act and the *San Francisco Bay Plan* identify bridges as water-oriented use for which some fill can be authorized.

3. **Alternative Upland Location.** There is no practical alternative upland location for the replacement bridge as it provides a vital east-west link from Oakland to the West Span of the Bay Bridge and ultimately to the City of San Francisco. Retrofitting the existing bridge has already been found by the Commission to be an infeasible option because a retrofitted bridge, during a seismic event, would be more likely to fail than a new replacement bridge. In addition, a retrofitted bridge would have a more limited lifespan than a new bridge. Thus, a replacement bridge provides significant economic and safety benefits over retrofitting the existing East Span.

4. **Minimum Fill.** This project involves placing a total of approximately 103,253 cubic yards of permanent solid fill in the Bay which will cover approximately 45.5 acres of Bay surface area. Approximately 41.93 acres of this fill will be pile-supported or suspended high above the Bay. Such fill typically has relatively few impacts to Bay-related resources. Approximately 3.03 acres of the authorized fill will consist of solid or earth fill for westbound roadway and the Caltrans maintenance road. Caltrans will (1) remove the existing East Span, including all footings to 1.5 feet below the mudline; (2) remove temporary pilings associated with construction trestles and "falsework" to at least 1.5 feet below the mudline; and (3) remove any temporary cofferdams to at least 1.5 feet below the mudline. Because the existing East Span has a greater number of footings than the proposed new bridge, footings which are also larger than the proposed new bridge footings, the project will result in a net *increase* of 173,806 cubic yards in the Bay's volume.

   In an effort to reduce the fill associated with the new bridge, Caltrans evaluated a number of project alternatives and project modifications. For example, the existing Bay Bridge contains two roadways in a double deck structure with westbound traffic on the top deck and eastbound traffic on the lower deck. While involving less Bay fill, this configuration is not as seismically reliable as two parallel roadbeds. Moreover, a parallel roadbed configuration will give the bridge a more slender visual profile and will provide eastbound motorists with sweeping views of Oakland, Berkeley and the East Bay hills. Although a replacement structure with parallel roadways will approximately double the amount of the Bay covered by the bridge, the bulk of this coverage will be high above the Bay and cause limited environmental impacts.

An alignment built immediately south of the existing East Span could possibly result in less Bay fill, but would potentially reduce the amount of space available for future park uses south of the Bay Bridge toll plaza and would impact Coast Guard operations at YBI. Also, the new northern alignment provides better views for motorists.

A pile-supported, eastern touchdown would also result in less Bay fill compared to the proposed solid fill for the touchdown. However, the Engineering Design Advisory Panel (EDAP), which included all the members of the Commission's Engineering Criteria Review Board (ECRB) and the Design Review Board (DRB), concluded that in the event of a major earthquake, the solid fill option would provide a greater degree of safety over the pile-supported fill option. Additionally, the modes of failure of a pile-supported fill structure make it less easily and quickly repaired than solid fill, which even if it cracks or settles, may only require additional overlays to repair. A pile-supported fill structure may need to be torn down completely and rebuilt (or require a substantial retrofit in and near the Bay) depending on the damage that occurs.

Caltrans' evaluation of these and other alternatives was aided by EDAP. As various alternatives were being evaluated, the Commission was asked for guidance on some of the alternatives being considered. At the Commission meeting of June 18, 1998, the Commission was briefed and voted to support EDAP's recommendations that the replacement structure should be a single-tower, self-anchored suspension bridge joined to the East Bay shoreline by a causeway, and that a bicycle and pedestrian path should be provided along the south side of the new bridge. At the Commission meeting of November 4, 1999, the Commission was briefed and voted to support EDAP's recommendation that the Oakland Touchdown area should be built on solid fill rather than be pile-supported.

Some fill could possibly be eliminated by reducing the size of the maintenance road at the Oakland Touchdown, or by narrowing the space between the two parallel roadways as they land at the Oakland Touchdown. Caltrans proposed to use an approximately 48-foot-wide separation between the east and west-bound structures for the majority of the alignment. The structure separation narrows down to approximately 40 feet as it approaches the Oakland Touchdown and this alignment is maintained on the solid fill approach. Caltrans states that the American Association of Street and Highway Transportation Official's (AASHTO) criteria were used for this design separation width. Both the Commission's ECRB and DRB have recommended that a constant "clear distance" be maintained throughout the majority of the replacement bridge. A 40-foot-wide separation between the two roadways will allow construction of a maintenance road with two twelve-foot lanes, two shoulders and a median that will be designed to the minimum recommended criteria. Caltrans believes that the size of the maintenance road cannot be further reduced because: (1) the maintenance road will be located between the westbound and eastbound roadways and is critical for emergency and service vehicle access. The maintenance road will serve as the primary access route for emergency vehicles responding to accidents on the bridge as well as the primary circulation road for accessing the median toll facility from the current maintenance facility to the south of eastbound I-80 in the future. However, it is uncertain how effective the shoulders and medians will be for emergency purposes since conceptual landscaping plans indicate planting of these areas; (2) reducing the width of the maintenance road and its median and shoulders would be less than the minimum criteria specified by AASHTO's *Policy on Geometric Design of Highways and Streets* for a road of this intended purpose.

AASHTO design criteria are guidelines that are typically less restrictive with regard to driver comfort and safety than Caltrans' design guidelines, as embodied in the Caltrans *Highway Design Manual*. The design section widths specified above will provide the minimum space for the operation of emergency service vehicles while also providing sufficient room for passing disabled vehicles. This is an important design feature as the response time of emergency vehicles is key to realizing the intended use of the maintenance road and ensuring public safety; thus, it would be very undesirable for the maintenance road to be narrowed at this location; (3) given the restrictive geometric configuration at the westbound alignment where the minimum separation is present, reversing curves will be required to bring the westbound alignment closer to the maintenance road and eastbound alignment. Because reversing curves are required, the westbound roadway cannot be shifted by a uniform distance. Due to the short distance within which the reversing curves will occur, an alternative alignment will not be able to meet Caltran's minimum requirements for curve lengths and central angles; and (4) if the alignment were to be changed at the Oakland Touchdown to reduce Bay fill there would be additional costs associated with the redesign of this location and potential delays to the construction schedule.

Finally, there could be some potential to reduce the size and amount of the temporary fill to facilitate construction of the bridge. Caltrans will place a total of approximately 62,910 cubic yards of temporary fill in the Bay for temporary pile-supported structures such as docks, "falsework", access trestles and/or temporary cofferdams covering approximately 14.20-acres of Bay surface area. Of the temporary fill, approximately 0.8 acres of temporary solid fill may also be placed to protect and isolate construction areas. Caltrans has identified a likely construction scenario that the contractor may implement to construct the new bridge. This includes the use of a temporary barge dock at YBI and construction access trestles for the main span, the skyway, and the Oakland approach. According to Caltrans, "these structures would be designed using the minimum fill necessary that would allow for construction access, transportation and the use of large construction equipment, such as cranes and pile drivers, and safe working platforms for personnel." However, it is possible that the contractor may choose to utilize a different size, configuration and/or siting of docks and access trestles. The size of the falsework, falsework piers and cofferdams are a function of the bridge size itself. It is Caltrans' opinion that the temporary fill associated with these structures cannot be further minimized unless the diameter of the piles and pile caps and the cross-section of the bridge deck are also reduced, which would affect seismic safety and traffic capacity. The construction methodology for the Oakland Approach and the Skyway portion of the new bridge will allow the contractor with the lowest qualified bid some latitude between the pre-cast segmental alternative and the cast-in-place alternative only through a cost reduction incentive proposal.

Thus, while a double-deck bridge would result in less fill than two parallel spans. The East Span bridge replacement will: (a) improve public safety by replacing the 1936 span with a new structure that meets current seismic design and traffic safety standards and will provide a lifeline connection that will provide post-earthquake access to link major population centers, emergency relief routes, emergency supply and staging centers; (b) provide the minimum amount of permanent fill that will accommodate EDAP, DRB and ECRB recommendations for seismic safety; (c) provide the minimum amount of permanent fill to construct a maintenance road, that will meet current design codes, allow access to the median toll facility and facilitate emergency vehicle response to access the

bridge; (d) provide the minimum amount of temporary fill during the construction phase of this project; and (e) provide a net increase of 173,806 cubic yards in the Bay's volume through removal of existing bridge footings.

The Commission finds that Special Condition II-F included in this authorization is necessary to ensure that the Bay fill will not adversely impact Bay-related resources and endangered species. Therefore, as conditioned herein, the Commission finds the public benefits of the project outweigh the detriments caused by the Bay fill, and that the fill is consistent with Section 66605 of the McAteer-Petris Act in accordance with the Commission's laws and policies on the manner and purpose of placing fill in San Francisco Bay.

B. **Mitigation.** In part, the Bay Plan policies on mitigation state that mitigation for the unavoidable adverse environmental impacts of any Bay fill should be considered by the Commission in determining whether the public benefits of a fill project outweigh the public detriment from the loss of water areas due to the fill. Whenever mitigation is necessary, the mitigation program should assure: (a) that the benefits from the mitigation will be commensurate with the adverse impacts on Bay resources and consist of providing area and enhancement resulting in characteristics and values similar to the characters and values adversely affected; (b) that the mitigation will be at the project site or as close as possible; (c) that the mitigation measures will be carefully planned, reviewed and approved by or on behalf of the Commission, and subject to reasonable controls to ensure success, permanence and long-term maintenance; and (d) that the mitigation will, to the extent possible, be provided concurrently with those parts of the project causing adverse impacts.

Generally, the adverse impacts associated with bridge construction will include: (a) the disruption, displacement, excavation, and burying of existing benthic communities; (b) the creation of shade, which can affect water and soil temperature and influence an area's plant and animal communities; (c) the modification of existing hydraulic characteristics of the surroundings by altering shorelines, or the placement of bridge support structures in the Bay, which can result in the dampening of wave energy, the creation of eddies, the altering of water circulation thus potentially increasing the rate of sedimentation or erosion in adjacent areas; (d) the creation of barriers to animal use of an area and animal movement between areas; and (e) construction noise which can disrupt animal communication, stun, or kill nearby fish.

More specifically, the project will impact approximately 8.59 acres of shallow water habitat (less than 10 feet deep) including eelgrass beds and sandflats. State and federal resource agencies have identified a number of federally and state listed endangered species that are known to occur in the area, including the Winter and Spring-run Chinook Salmon, and the Steelhead Trout.

For the majority of bridge projects, the Commission has required mitigation for the adverse impacts of associated fill by requiring the permittee to: (a) enhance habitat values in existing degraded tidal marshes by excavating channels and improving tidal circulation. Such enhancement projects always involve improvements to significantly larger areas than that covered by a bridge; (b) contribute funds on a pro-rata basis to a mitigation bank where the amount of the contribution is directly related to the cost of acquiring, restoring, monitoring and maintaining an area as tidal wetland habitat; and/or (c) excavate an adjoining upland to create a tidal marsh equal or greater in size to the area of the Bay covered by the proposed bridge.

Caltrans will mitigate for the project's environmental impacts through a combination of mitigation measures. Some of these mitigation measures are designed to avoid and minimize potential impacts at the site. Some of these measures, such as placing dredged material and sand in subtidal areas to restore the bathymetry of the areas disturbed in dredging the barge access channel to construct the replacement bridge, are intended to support the reestablishment of eelgrass beds disturbed during construction. However, this mitigation measure appears to be inconsistent with the Commission's recently adopted dredging policies, which state that "to ensure protection of Bay habitats, the Commission should not authorize dredged material disposal projects in the Bay and certain waterways for habitat creation, enhancement or restoration, with the exception of a single pilot project at a site designated by the Commission and used in a manner consistent with the regulation designating the site, until: (1) the Bay Plan Marshes and Mudflats and Fish and Wildlife policies have been updated and any additional objective and scientific studies have been carried out to evaluate the advisability of disposal of dredged material in the Bay and certain waterways for habitat creation, enhancement and restoration. Those additional studies should address the following: (i) the Baywide need for in-Bay habitat creation, enhancement and restoration, in the context of maintaining appropriate amounts of all habitat types within the Bay, especially for support and recovery of endangered species; and (ii) the need to use dredged materials to improve Bay habitat, the appropriate characteristics of locations in the Bay for such projects, and the potential short-term and cumulative impacts of such projects; (2) the Commission has adopted additional Baywide policies governing disposal of dredged material in the Bay and certain waterways for the creation, enhancement and restoration of Bay habitat, which narratively establish the necessary biological, hydrological, physical and locational characteristics of candidate sites; and (3) the pilot project authorized under this section, if undertaken, is completed successfully." This authorization does not authorize the placement of fill to restore the bathymetry of the barge access channel, but does recognize the permittee may apply for an amendment to this authorization to allow such fill if the Commission's current policy is amended to permit such fill.

Some of the mitigation measures are intended to create habitat functions in areas where the project will otherwise provide limited resource values. In particular, Caltrans will slightly flatten the revetment slope and place earth fill among the rocks above the highest tides in the Oakland Touchdown Area in an effort to promote the establishment of an upland transitional habitat. Similar approaches have been tried with mixed results in the past.

Caltrans will create shorebird roosting habitat in an area where shorebirds are currently roosting on structures which are decaying and will eventually wash away.

Caltrans will also offset the project's adverse impacts and the unavoidable loss of habitat by contributing a total of $10.5 million toward the restoration of Skaggs Island and for the restoration of several potential sites in Eastshore State Park. A portion of this contribution is expected to fund the removal of contaminated buildings and allow the transfer of the approximately 3,298 acre Navy-owned portion of Skaggs Island to the United States Fish and Wildlife Service. Caltrans believes that restoring Skaggs Island will more than offset the habitat lost as result of constructing the new bridge. However, Caltrans' contribution will only be the first step in a series of steps that must occur before Skaggs Island is restored as habitat. Other steps that will need to take place before Skaggs Island can be restored to tidal action include: either acquiring an adjoining property so that the entire island can be restored, or maintaining a levee between the adjacent property and the Navy-owned portion to prevent the adjoining parcel from flooding with the return of tidal action to

the Navy-owned portion of Skaggs Island; developing a restoration program; and assessing other potential contamination on site. Such a process will likely take years before any significant wetland habitat is created at Skaggs Island, which appears to be inconsistent with the Commission's policy stating that mitigation should be provided concurrently with those parts of the project causing adverse impacts. Restoration of Skaggs Island will most likely result in the creation of a tidal brackish marsh and seasonal wetlands, a very different habitat than the eelgrass beds and sandflats that will be adversely impacted by this proposed project, and thus would normally be inconsistent with the Commission's mitigation policy stating that the benefits from the mitigation be commensurate with the adverse impacts on the Bay's resources. However, the restoration of Skaggs Island will undoubtedly create significant Bay resources on an ecosystem level that will benefit many Bay plants and animals including the endangered California clapper rail and the salt marsh harvest mouse.

This authorization is conditioned to allow up to $8.0 million to be used to remove structure and hazardous materials at Skaggs Island provided that: (1) the money is used to remove the structures and hazardous materials in a timely manner (i.e. within two and a half years); (2) that only that amount of funds needed to remove the structures and hazardous materials is expended, with the remaining funds available for Central Bay restoration; and (3) that removal facilitates the restoration of Skaggs Island to a tidal wetland as part of an approved restoration plan and schedule. Because of the significant benefits to the Bay that will result from restoring Skaggs Island, and as conditioned to assure that the money is used to jump start the restoration, the Commission finds that the Skaggs Island portion of the mitigation program is consistent with the Commission's mitigation policy.

The remaining mitigation funds will be used to restore wetland habitat in Central San Francisco Bay. This would provide habitat improvements to such areas including but not limited to Radio Beach, Brickyard Cove, Albany Beach or Hoffman Marsh in the proposed Eastshore State Park. Funds will be provided to the EBRPD to "restore, enhance, or create new aquatic habitat and transitional uplands within the central Bay." Mitigation in Central San Francisco Bay is more consistent with the Commission's and other resource agency policies. However, suitable restoration sites in Central San Francisco Bay are in short supply. Caltrans has spent several years investigating, and eventually, eliminating several potential Central Bay mitigation sites. The high cost of land and the existence of contamination at many of the sites make any sizable restoration in Central San Francisco Bay problematic. Still, it is Central San Francisco Bay that will be impacted by the project, and the relative scarcity of wetlands in the Central Bay makes any Central Bay wetland restoration highly desirable. While restoration in Central San Francisco Bay is likely to result in relatively small areas being restored to wetlands, because of the value of such wetlands to Central Bay resources, and because such restoration is consistent with the Commission's mitigation policies giving preference to mitigation occurring as close to the impacted sites as possible, the Commission finds that any effort to restore Central Bay sites as part of this project is highly desirable and consistent with the Commission's mitigation policies.

C. **Maximum Feasible Public Access.** Section 66602 of the McAteer-Petris Act states that existing public access to the shoreline and waters of the San Francisco Bay is inadequate and that maximum feasible public access, consistent with a proposed project, should be provided. In part, the Bay Plan policies on public access state that whenever public access to the Bay is provided as a condition of development, on fill or on the shoreline, the access should be permanently guaranteed, should be consistent with the project and the physical

environment, and should provide for the public's safety and convenience. In addition, public access should be designed and built to encourage diverse Bay-related activities and movement to and along the shoreline, should permit barrier free access for the physically handicapped to the maximum feasible extent, should include an ongoing maintenance program and should be identified with appropriate signs. In considering whether a project provides the maximum feasible public access, the Commission should consider physical and visual access to the Bay shoreline, as well as the appearance and design of shoreline structures.

1. **Physical Access.** Currently, there is no pedestrian or bicycle access on the bridge. There is also limited physical access to the Oakland Touchdown area. Fishermen use the beach on the north side of the Oakland Touchdown and public access is authorized at Radio Beach. However, areas within Caltrans existing right-of-way are signed no trespassing and public access is not authorized.

   To address the Commission's public access requirements, Caltrans will construct approximately 9.6 acres of new public access areas including: (1) a 2.18-mile-long, 15.5-foot-wide bicycle and pedestrian lane on the new bridge with six belvederes to provide viewing and resting opportunities for trail users, bicycle and pedestrian access that, when coupled with public access required as part of the Cypress project (BCDC Permit No. 11-93), will eventually connect the Oakland Touchdown with Emeryville; (2) a temporary public access parking lot near the Oakland Touchdown located south of the Eastbound lanes; and (3) a public access path terminus located on YBI. All of the proposed public access improvements will be accessible to the disabled and will be maintained and guaranteed for so long as the improvements authorized herein remain in place. BCDC Permit No. 11-93 (for the I-880/Cypress Freeway Replacement Project) required Caltrans to provide and maintain a bicycle and pedestrian pathway connecting the Cities of Emeryville and Oakland between Shellmound Street and Nelson Mandela Parkway, through the distribution structure for I-80, I-580, and I-880 to the Oakland Touchdown. Caltrans will connect the Class II bike path (a Class II bike lane is a striped bike lane on a roadway) to the interim parking lot located adjacent to the Caltrans maintenance road and these amenities will be connected to the Bay Trail. Permit No. 11-93 also required Caltrans to provide an approximately 5,000-square-foot overlook on the north side of the Oakland Touchdown area and an approximately 2,500-square-foot overlook on the south side of the touchdown, each with public amenities such as parking, restrooms, benches, a fish cleaning facility, trash cans, and native landscaping. However, the proposed East Span alignment will eliminate the area where many of these improvements would have been built. BCDC Permit No. 11-93 allows Caltrans to pay an in-lieu fee rather than construct the improvements, subject to BCDC approval. In addition EBRPD has plans to develop the Gateway Park on the south side of the bridge on former Oakland Army Base Reuse Authority property. Caltrans will pay an in-lieu fee of $1.1 million to compensate for the public access facilities required (two overlooks and associated amenities, the roadway leading to the overlook, and the parking area) by BCDC Permit No. 11-93, but which cannot be built because the proposed East Span will be located within the areas reserved for these improvements. Caltrans believes that these funds can provide the southern overlook required in Permit No. 11-93 and can support EBRPD's effort to develop Gateway Park at the Oakland Touchdown, or to support other public access in the City of Oakland.

This authorization also requires that Caltrans develop the land, for a stormwater retention basin and public park, directly south of the Oakland Touchdown that is currently occupied by the existing East Span, but will be made available when the East Span is moved to the north. Caltrans is concerned that there is a reversionary clause for this land that requires that the land revert to the Port Of Oakland when it is no longer needed for highway purposes. However, the Regional Water Quality Control Board has indicated that the Board will likely require that a portion of this land be used to treat stormwater runoff from the toll plaza as part of the Board's waste discharge requirements for the new East Span. The Commission finds that this land is also needed to mitigate the public access impacts of losing the areas north of the Oakland Touchdown for public access improvements required in BCDC Permit No. 11-93 for the Cypress improvements. This authorization requires that this land be developed for both required uses (stormwater BMPs, existing and future utilities, access for bridge and roadway maintenance and public access), through the use of thoughtful design and landscaping. This authorization requires that the land south of the touchdown shall be planned, developed and maintained for landscaping, open space, and recreational facilities, compatible with the "Gateway Park," to be approved by or on behalf of the Commission in consultation with the EBRPD, the Oakland Base Reuse Authority, the Port of Oakland and the City of Oakland. Only through such design can the Commission find that this portion of the public access program is consistent with the Commission's public access policies.

With respect to future public access connections to the West Span of the Bay Bridge and ultimately to the City of San Francisco, legislators provided that MTC could use bridge tolls under AB 2038 to design and construct a bicycle and pedestrian path on the West Span of the SFOBB for continuous access across the bridge. A Caltrans study determined that while it is feasible to construct a bicycle and pedestrian path on the West Span, it would cost between $160 million to $387 million, depending upon the alternative chosen. To date, no funding is available to continue the path across the West Span. However, this authorization is conditioned to require that Caltrans design the YBI terminus in such a manner to facilitate such a future connection, while serving as a terminus for the East Span bicycle/pedestrian path initially.

The DRB recommended that Caltrans provide more than the six belvederes that Caltrans proposed at 0.2 mile intervals along the bridge (beginning approximately 0.65 miles from the YBI terminus and the interim parking located at the Oakland Touchdown). The DRB felt that additional belvederes were necessary for the comfort and safety of trail users and that six belvederes would be too widely spaced to provide sufficient resting areas. Caltrans, however, believes that six belvederes are sufficient and that the project cannot support the cost of additional belvederes. Because of the project's significant cost overruns, and because of the high price tag for each belvedere, the Commission finds that although additional belvederes would be far preferable, the six required herein are a reasonable compromise between providing an important public access benefit and respecting the high cost of the public access improvements provided, particularly the bicycle/pedestrian path across the East Span and the belvederes.

The DRB also recommended that Caltrans provide seating at the belvederes. Caltrans contends that seating at the belvederes cannot be provided because of excessive loads associated with the addition of seating and lack of funding limitations. This authorization requires light-weight-benches at each of the belvederes, located near the

edge of the pedestrian path and facing the Bay, to provide seating opportunities for trail users. The Commission finds that such seating elements will be relatively low cost, can be safely incorporated into the belvedere design, and will provide an important public access amenity.

The DRB suggested that Caltrans consider different alternatives for separating cyclists from pedestrians along the path. Due to budgetary constraints, design considerations, and safety concerns, however, Caltrans chose to address this last concern through the use of "visual cues" such as different colored surfaces differentiating the pedestrian portion of the path from the bicycle lanes and lane lines rather than a safety barrier. Initially, no speed limit will be imposed on bicyclists and a safety review will be implemented at a later date to monitor the effectiveness of the proposed safety delineation on the bicycle and pedestrian path. Caltrans designed the bicycle and pedestrian path with input from the Bay Bridge Bicycle and Pedestrian Advisory Committee (BBBPAC). BBBPAC believed that a physical separation, such as a barrier, between pedestrians and bicyclists may cause more accidents than would be prevented. The Commission concurs that, at least initially, this is a reasonable approach for separating potentially conflicting uses, pending future review of problems that may occur.

Finally, Senate Bill 60 (SB 60) prohibits the Commission from requiring Caltrans to develop a public access pathway with the replacement of the East Span. However, subsequent legislation provided funding for the bicycle/pedestrian path across the East Span and such a path is specifically authorized herein. This authorization also requires that the path be maintained by the permittee in a clean and safe manner, and that the path connect to other required public access areas, or be designed to allow such connections in the future. The Commission finds that such requirements are consistent, with the Commission's public access policies, Assembly Bill 2038 (AB 2038) which allowed for funding the bicycle/pedestrian path across the bridge, and SB 60.

The Commission finds that, as conditioned, the physical public access program required and authorized herein is the maximum feasible consistent with the project.

2. **Visual Access.** Caltrans worked with the Commission's DRB to maximize visual access on the new structure. The items of particular concern to the DRB were the bridge barrier railing and the railings located along the pedestrian path.

The existing safety barriers on the existing East Span are solid steel and approximately 39.5 inches high (1-meter-high). As a result, they impair views to the Bay for many motorists. Caltrans proposed to use a modified Type 732 bridge barrier railing that would be 32 inches high. The lower height will improve views of the Bay for all motorists. The barriers will be smooth on both the inside and outside faces with no articulation. The majority of the proposed safety barrier will be concrete, except a portion of the skyway and the entire main span, which will be steel.

Several possible railings were evaluated for the bridge. Because this is a scenic roadway, where superb views of the Central Bay are possible, BCDC staff and the DRB recommended that Caltrans evaluate more transparent barriers, such as the California Type 80 safety barrier or an Alaska Barrier. Since some views through the bridge barriers will be impaired by the adjacent parallel superstructure or the elevated bicycle and pedestrian path, such transparent barrier railings would primarily provide clearer views along the north side of the westbound structure. However, Caltrans intends to locate utilities in the barriers, a common practice that would be less feasible in the more transparent barriers

because of the reduction in the space available for such utilities. In addition, Caltrans states that crash tests of these barriers had not been completed during the design phase of "see through" barriers on bridge decks like those proposed for the East Span. Since then, crash tests have been completed and both the California Type 80 and Alaska barrier have been approved for use by Caltrans. However, Caltrans contends that the need for accommodating utilities in the railing, and the need to avoid delays in constructing the project that would likely occur with design revisions, supports their proposal for a solid barrier. Because of the critical importance of this bridge to the Bay Area's health, safety, welfare and economy, and because of the importance of replacing the existing structure as soon as possible with a structure much less likely to fail in a major seismic event, the Commission reluctantly concurs.

The project will include a 55-inch railing height for the bicycle/pedestrian path. The DRB recommended lowering the path railing from 55 inches to 48 inches to expand views of the Bay, enhance public access and improve the pedestrian scale of the path. The DRB requested that Caltrans provide the Board with empirical data showing the lowest possible safety railing that would provide enough protection for pedestrians and bicyclists. More specifically, the DRB requested that Caltrans provide evidence that a 48-inch railing height would not provide the needed safety for the public.

Caltrans provided recommendations and guidelines from AASHTO and Caltrans' standards established to provide safe conditions for the public. AASHTO establishes nationwide policies and standards. AASHTO standards require that the minimum height of a railing on structures must be 54 inches. The 54-inch rail height was one of several standards adopted by Caltrans in 1978 as part of its development of the Planning and Design Criteria for Bikeways in California. Caltrans formed a committee, composed of engineers, bicyclists (League of American Wheelmen, California Association of Bicycling Organizations), public agencies and safety experts, to establish design standards to facilitate the development of bicycle facilities in California. This committee used its expertise to study and develop bicycle facility design guidelines. With respect to bridge railings, the committee developed an estimated center of gravity for an assumed large bicycle with a tall rider, added a safety factor to deal with high impact or broadside accidents, and concluded that 54 inches was an appropriate rail height to insure bicycle rider safety. To date, the work done by the committee remains the only study of the issue. As a result this authorization allows the rail adjacent to the bike path to be a maximum height of 55 inches. Unless other studies of the height of rails necessary to assure bicycle/pedestrian safety are completed within the time frame where revisions to the rail are possible, the Commission concurs that safety should be the primary concern of rail height. Thus, because the only extant study determined 54 inches was the appropriate, safe height, the Commission finds that such a height is consistent with its public access policies.

3. **Appearance and Design.** The Bay Plan's policies on appearance, design, and scenic views, which are largely advisory, state that "maximum efforts should be made to provide, enhance, or preserve views of the Bay and shoreline, especially from public areas." As a result of the East Span Replacement Project, there would be several significant visual changes along this corridor. The project would introduce a new suspension bridge and skyway bridge north of the existing bridge, and would remove the existing superstructure, towers and foundations following construction completion. Caltrans has incorporated the recommendations of the Commission to achieve design

consistency between the superstructure and the approach structures, to bring the design details of the towers down to the railings and other bridge elements, and to maximize motorist and pedestrian views from the bridge. The steel pedestrian railings will have bollards that are spaced approximately 33-feet-apart on the main span and approximately 26.2-feet-apart on the skyway with some variation. The bollard placement and design are integral to the cantilever beams that support the path. The railings will be further divided by angle posts spaced every 11 feet apart and square pickets spaced 4-inches apart. The DRB was concerned that the railing design did not share enough of the architectural vocabulary of the tower, piers and other bridge elements and Caltrans attempted to address the DRB's concerns to the extent practicable. Due to cost, maintenance, and structural constraints, Caltrans concluded that it could not accommodate all of the Board's recommendations.

Since Caltrans' last presentation to the DRB, there have been a number of design changes. These changes affect the appearance and design of the outer railings on the pedestrian and bicycle path. The railings have been re-designed to simplify the railing and to address concerns regarding the ability to clean and paint the interior surfaces of the posts. The bollard design has not changed in size, but has changed in its appearance due to engineering constraints associated with the expansion and contraction of the steel bike path segment. In addition, the design of the bollards has changed such that the top rail is continuous at one side of the bollard and the post design was modified to be square tube steel set at right angles to the bridge in response to previous EDAP direction to simplify the design. The original DRB design recommendation of the bollard was to unify the railing with the structure of the bike path and to provide a visual rhythm along the pathway. The aesthetic recommendations may be compromised by the fact that the proposed design of the bollard segment will appear asymmetrical.

The DRB also requested a more detailed description of the lighting and specifically asked for an explanation of the methods of lighting the main span and the reasons for varying the height of the light standards. Consistent with EDAP's recommendation, the replacement bridge will be illuminated exclusively (except for bollard lighting) with metal halide fixtures to produce a cool white light rather than the warm yellow tones of the low-pressure sodium lights found on a typical freeway. The roadway lighting will result in a constant level of light for the entire length of the bridge and from a distance there will be a rising line of white lights punctuated by the main tower.

The Commission would have preferred for Caltrans to return to the DRB, as the DRB requested, and discuss the changes to the project that had been made in response to the DRB's concerns, and the reasons other requested changes could not be made. However, because these are advisory policies that Caltrans largely attempted to meet within its budgetary constraints, and because Caltrans modified those portions of the design that will not have adverse effects on safety, maintenance and budget, the Commission finds that the project is generally consistent with Bay Plan policies on Public Access, Visual Access and Appearance and Design to the extent practicable.

4. **Transportation.** In part, the Bay Plan policies on transportation state that 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 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; and (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 have to be allowed in the Bay), the design of the route should, if feasible, accommodate future mass transit facilities and subsequent installation automatic power and guidance elements for vehicles.

The East Span replacement crossing will be a steel suspension bridge connected by a cast-in-place or pre-cast, post tensioned concrete "skyway" and cast-in-place prestressed approach structures. Approximately 45,572 cubic yards of fill covering approximately 3.6 acres of Bay surface area at the Oakland Approach will be part of the Bridge.

a. **New Bay Crossings.** The new East Span will be a pile-supported bridge, designed to minimize fill impacts, and thus, the Commission finds it to be consistent with this requirement of the Bay Plan's transportation policies.

b. **Adequate Navigational Clearance.** The USCG has determined that the replacement bridge will not impact marine traffic, and thus, the Commission finds it to be consistent with this requirement of the Bay Plan's transportation policies.

c. **Toll Plaza and ancillary features.** The existing toll plaza, which is mostly located outside of the Commission's jurisdiction, will not be affected by the replacement project, and thus, the Commission finds it to be consistent with this requirement of the Bay Plan's transportation policies

d. **Light Rail (LRT) and Heavy Rail on the Replacement Bridge.** With the cooperation of local and regional transportation agencies, Caltrans evaluated the constraints and opportunities for providing heavy and light rail transit (LRT) as part of the East Bay Bridge Replacement Project, . Caltrans has also considered the studies and recommendations given by various planning organizations, such as the MTC, and it has prepared its own studies to consider multi-modal transportation, HOV lanes and other transportation improvement strategies. Due to various constraints, which primarily are budgetary, and due to the nature of the costs to retrofit the West Bay Bridge, Caltrans determined that design allowances for heavy rail on the new structure is not a viable option at this time. However, the existing West Bay Bridge originally was designed for light rail transit traffic and the costs associated with retrofitting this bridge should be substantially less than for heavy rail. Caltrans has also designed loading on the East Span to accommodate future LRT. Heavier vehicles, such as high-speed rail or commuter heavy rail similar to BART, could also be accommodated but would require substantial modifications to the current design or a future retrofit to this proposed structure. Caltrans also estimated the cost and other requirements of accommodating rail transit across the proposed structure in both LRT and heavy rail configurations and made a determination that one travel lane and one shoulder in each direction would have to be converted, therefore reducing the capacity of the East Span to four vehicular lanes, and some structural modifications would be necessary. Since multi-modal strategies would reduce the number of mixed flow traffic lanes, the selected strategy would have to capture an amount of ridership that matches the loss in mixed-flow vehicular capacity on the SFOBB and its approaches. The accommodation of rail and five lanes of traffic would require significant modifications to the current design and is not within the current scope or budget of this project. Caltrans and other transit agencies have not identified any project funding to accommodate a future rail transit connection across a replacement

bridge other than the LRT provisions included in the East Span Replacement Project. The decision to implement any other rail accommodation option will be based on funding, on a selected strategy that would have to capture an amount of ridership that matches the loss in mixed-flow vehicular capacity, and on the time required to accomplish the necessary design and construction activities. Finally, a replacement structure is not a new route across the Bay, as used in the Bay Plan's transportation policies. In addition, SB 60 prohibits local and state permitting authorities from imposing any requirements that a mass transit facility be constructed on a replacement bridge for the East Span as a condition of any permit. For all these reasons, the Commission finds that additional transit facilities need not be provided on the new span in order for the East Span Replacement Project to be consistent with this portion of the Bay Plan's Transportation Policies.

e. **High Occupancy Vehicle (HOV) lanes on a New Span.** AC Transit had requested that Caltrans study an HOV lane on the SFOBB. Caltrans evaluated such a facility in October 1994. The "MTC SFOBB Rail Feasibility Study" identified preliminary estimates on the cost of SFOBB rail, structural modifications to the East and West Spans, and possible service operating scenarios. The study did not estimate potential ridership or identify environmental constraints.

Unfortunately, no funding currently exists or is likely in the immediate future, to support construction of an HOV lane on the new East Span. None of the previous planning studies identified an HOV lane on the SFOBB as a preferred strategy. It has not been included in the MTC's 1994 Regional Transportation Plan (RTP) or its 1996 and 1998 updates, including a 1999 amendment. The planning horizon for the RTP is 20 years. MTC could include the multi-modal strategies in future RTPs if the projects are consistent with local and regional objectives and strategies for congestion management, but the bridge will already be constructed by then. In addition, neither multi-modal option was included in a recently enacted statewide funding package for transportation improvements (Governor's Traffic Congestion Relief Program, July 2000). Finally, SB 60 prohibits local and state permitting authorities from imposing any requirements that a mass transit facility be constructed on a replacement bridge for the East Span as a condition of any permit.

Because no funding is available for HOV lanes on the East Span now or in the forseeable future, the Commission finds that the East Span Replace project is consistent with the Commission's transportation policies to the maximum practicable extent.

5. **Dredging.** In part, the Bay Plan policies on dredging state that dredging should be authorized when the Commission can find that: (a) the applicant has demonstrated that dredging is needed to serve a water-oriented use or other public purpose; (b) the materials to be dredged meet the water quality requirements of the RWQCB; and (c) important fisheries and Bay natural resources would be protected In addition, the disposal of dredged materials should be encouraged in non-tidal areas where the materials can be used beneficially, or in the ocean.

Caltrans will dredge a total of 616,721 cubic yards of material over a 99-acre area to construct the new bridge and remove the existing bridge. The replacement bridge is a water-oriented use under the McAteer-Petris Act and the *San Francisco Bay Plan* and is necessary to meet current seismic and traffic safety requirements. Some dredging will

be required for the temporary access trestles and cofferdams. Caltrans performed testing and analysis of the dredge sediments under the requirements of the Dredge Materials Management Office. Caltrans completed the Investigation Report (Amended Sampling and Analysis Plan) in June of 2000. Although the report concludes that the materials will be appropriate for disposal at the approved DODS and SF-11 disposal sites, Caltrans will dispose some of the materials at an approved upland site consistent with the RWQCB's 401 permit. Caltrans received its 401 permit from the RWQCB on October 17, 2001, the day before the Commission's public hearing on the project. Caltrans will retain some excavated material from dismantling dredging for reuse in restoring the construction barge access channel near the Oakland Touchdown, if the Commission authorizes such disposal.

The USACE is currently processing Caltrans' Section 401 (Clean Water Act) permit. In conjunction with its 401 permit, Caltrans has concluded its consultation with the USFWS but has not concluded its formal consultation with the U. S. National Marine Fisheries Service (NMFS). Caltrans is currently working with NMFS to establish, in accordance with Section 7 of the Endangered Species Act, appropriate mitigation to address potential fish kills due to pile driving operations. NMFS is also very concerned about the project's potential impacts to existing eelgrass beds, which are important fishery habitat. In addition, NMFS is critical of the mitigation proposed for eelgrass habitat and believes the mitigation program should specifically provide for in-kind offset to these impacts.

Special Condition II-F-9 requires Caltrans to continue to coordinate with appropriate wildlife agencies to minimize impacts to fish during construction activity and to provide additional mitigation if monitoring indicates that fish kills are occurring that are related to pile-driving activities. In addition, Special Condition II-D-4 requires that dredging should not occur between December 1 and March 1 of any year to avoid potential disturbance of herring spawning in the area. The project, in consultation with the National marine Fisheries Service and the California Department of Fish and Game, also includes a number of mitigation measures, such as using a bubble curtain to reduce fish kills from pile-driving activity, and creating a mitigation fund for salmonids. For all these reasons, the Commission finds that the project is consistent with the Bay Plan's requirements that dredging and construction activities be conducted in such a manner as to protect important Bay fisheries.

Caltrans will dispose approximately a third of the dredged material at SF-11 (Alcatraz), a third at the federally-approved deep ocean disposal site, and a third at either Hamilton or Montezuma Wetland Restoration sites, if those sites are available, and to deep ocean if they are not. Disposal of dredged materials associated with dismantling the existing bridge will be reconsidered in a few years when the Hamilton or Montezuma sites may be ready to receive materials. Disposal of the dredged materials at landfills for use as daily cover will be avoided as it would generate multiple trips to these sites with smaller volumes of dredged materials, resulting in significantly higher costs and traffic and air quality impacts.

In addition, Special Condition II-F-8 requiring that Caltrans make every effort to dispose as much dredged material as possible that is suitable for such use at upland reuse sites. Because disposal of dredged material will occur at upland sites wherever and

whenever possible, or at the Ocean disposal site, the Commission finds that the disposal of dredged materials generated by the project is consistent with the Commission's Long Term Management Plan for Dredged Material.

Finally, while using dredged materials to fill the barge access channel at project completion and planting the channel with eelgrass is currently inconsistent with the Commission's dredging policy, this authorization specifically recognizes that Caltrans may amend this permit to allow such use of dredged material should the Commission amend it's dredging policy to allow such use.

6. **Consistency with YBI Park Priority Use Designation.** Yerba Buena Island (YBI) is designated as a park priority use area in Bay Plan Map No. 4. It is important to recognize that the existing bridge extends over and has footings and piers within the park priority use area. Because the new bridge would replace the existing double deck bridge with two parallel spans, each slightly wider (because of shoulders and the public access path) than the existing span, the new bridge would cover a greater portion of the park priority use area on YBI.

   Because this authorization requires Caltrans to provide a trail terminus for the bicycle/pedestrian bridge on the East Span, because the existing span over the island will be removed and the new span will not cause an appreciably larger impact on the Island, and because the bridge will cover as little of YBI as possible because of the Commission's minimum fill requirements, the Commission finds that the East Span Replacement Project is consistent with the park priority use designation for YBI.

D. **Review Boards**

1. **Engineering Criteria Review Board.** The ECRB evaluated the proposed engineering criteria for the project on June 13, 2000 and concluded that Caltrans' design criteria for seismic safety were adequate.

2. **Design Review Board.** The Commission's Design Review Board evaluated the proposed project at its September 11, 2000 and November 6, 2000 meetings. The Board supported the bike trail and the proposed belvederes, but felt there should be more belvederes than the six proposed, that seating should be provided at the belvederes, and that Caltrans should consider various alternatives to minimize potential conflicts between bicyclists and pedestrians on the bridge. The Board also requested more information to support Caltrans' contention that a lower railing (48 inches high instead of the proposed 55 inches) would be unsafe along the Bridge path, and that more transparent bridge railings along the roadway were infeasible. The Board requested that Caltrans develop more detailed information about how the bridge path would connect to paths in Oakland and Emeryville. The Board also made a number of recommendations regarding the bridge appearance, recommending that Caltrans explore low cost means of making the bridge white and suggesting changes to the bridge lighting. The Board asked that the project come back to the Board so the Board could make a final recommendation. Caltrans made some modifications to the bridge in response to the Board's comments, but decided that many of the Board's comments would be too costly to implement within the budget. Thus, the project was never taken back to the Board and the Board has not reviewed the latest project revisions.

E. **Environmental Review.** According to Caltrans, pursuant to the California Streets and Highways Code Section 180.2 and the California Environmental Quality Act (CEQA) Section 21080, the East Bay Bridge replacement project is statutorily exempt from the requirement to prepare an environmental impact report. 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) of CEQA. Caltrans has concluded that the East Bay Bridge Replacement Project meets the definition of Section 180.2(b)--that it is a "specific action necessary to prevent or mitigate an emergency"--and, therefore, does not require any environmental review under CEQA.

   Nevertheless, pursuant to the National Environmental Protection Act and federal permitting requirements, Caltrans prepared an Environmental Impact Statement (EIS) for the proposed project. The U. S. Department of Transportation, Federal Highway Administration, and Caltrans, in cooperation with the USCG, published the Final EIS in May 8, 2001, and the approved the Record of Decision on July 11, 2001. The Final EIS identified several project impacts including the displacement of residential units, the loss of wetlands, new Bay fill, noise, use of historic structures and visual effects. The EIS also imposed several mitigation measures including habitat creation, historic recordation, and aesthetic design of the new bridge and roadway structures.

F. **Public Trust.** The approximately 45.53 acres of suspended, solid and pile supported fill for the bridge is for a water-oriented use and to improve public access as defined by Section 66605 of the McAteer-Petris Act. Fill for water-oriented uses and public access is consistent with the public trust. Thus, the Commission finds that the fill is consistent with the public trust.

G. **Conclusion.** For all of the above reasons, the benefits of the proposed project clearly exceed the detriment of the loss of water areas and the project will provide the maximum feasible public access to the Bay and its shoreline. Therefore, the project is consistent with the San Francisco Bay Plan, the McAteer-Petris Act, the Commission's Regulations, and the Commission's amended management program for the San Francisco Bay segment of the California coastal zone.

IV. Standard Conditions.

A. All required permissions from governmental bodies must be obtained before the commencement of work; these bodies include, but are not limited to, the U.S. Army Corps of Engineers, the State Lands Commission, the Regional Water Quality Control Board, and the city and/or county in which the work is to be performed, whenever any of these may be required. This permit does not relieve the permittee of any obligations imposed by the State or Federal law, either statutory or otherwise.

B. The attached Notice of Completion shall be returned to the Commission within thirty (30) days following the completion of work.

C. Work must be performed in the precise manner and the precise locations indicated in your applications as such may have been modified by the terms of the permit and any plans approved in writing by or on behalf of the Commission.

D. Work must be performed in a manner so as to minimize the muddying of waters, and if diking is involved, dikes shall be waterproof. If any seepage returns to the Bay, the permittee will be subject to the regulations of the Regional Water Quality Control Board in that region.

E. The rights, duties, and obligations contained in this permit are assignable. When the permittee transfers any interest in any property either on which the authorized activity will occur or which is necessary to the full compliance of one or more conditions to this permit, the permittee/transferor and the transferee shall execute and submit to the Commission a permit assignment form acceptable to the Executive Director. An assignment shall not be effective until the assignee executes and the Executive Director receives an acknowledgment that the assignee has read and understands the permit and agrees to be bound by the terms and conditions of the permit, and the assignee is accepted by the Executive Director as being reasonably capable of complying with the terms and conditions of the permit.

F. Unless otherwise provided in this permit, all the terms and conditions of this permit shall remain effective for so long as the permit remains in effect or for so long as any use or construction authorized by this permit exists, whichever is longer.

G. Unless otherwise provided in this permit, the terms and conditions of this permit shall bind all future owners and future possessors of any legal interest in the land and shall run with the land.

H. Unless otherwise provided in this permit, any work authorized herein shall be completed within the time limits specified in this permit, or, if no time limits are specified in the permit, within three years. If the work is not completed by the date specified in the permit, or, if no date is specified, within three years from the date of the permit, the permit shall become null and void. If a permit becomes null and void for a failure to comply with these time limitations, any fill placed in reliance on this permit shall be removed by the permittee or its assignee upon receiving written notification by or on behalf of the Commission to remove the fill.

I. Except as otherwise noted, violation of any of the terms of this permit shall be grounds for revocation. The Commission may revoke any permit for such violation after a public hearing held on reasonable notice to the permittee or its assignee if the permit has been effectively assigned. If the permit is revoked, the Commission may determine, if it deems appropriate, that all or part of any fill or structure placed pursuant to this permit shall be removed by the permittee or its assignee if the permit has been assigned.

J. This permit shall not take effect unless the permittee executes the original of this permit and returns it to the Commission within ten days after the date of the issuance of the permit. No work shall be done until the acknowledgment is duly executed and returned to the Commission.

K. Any area subject to the jurisdiction of the San Francisco Bay Conservation and Development Commission under either the McAteer-Petris Act or the Suisun Marsh Preservation Act at the time the permit is granted or thereafter shall remain subject to that jurisdiction notwithstanding the placement of any fill or the implementation of any substantial change in use authorized by this permit.

L. Any area not subject to the jurisdiction of the San Francisco Bay Conservation and Development Commission that becomes, as a result of any work or project authorized in this permit, subject to tidal action shall become subject to the Commission's "Bay" jurisdiction.

M. Unless the Commission directs otherwise, this permit shall become null and void if any term, standard condition, or special condition of this permit shall be found illegal or unenforceable through the application of statute, administrative ruling, or court determination. If this permit becomes null and void, any fill or structures placed in reliance on this permit shall be subject to removal by the permittee or its assignee if the permit has been assigned to the extent that the Commission determines that such removal is appropriate. Any uses authorized shall be terminated to the extent that the Commission determines that such uses should be terminated.

Executed at San Francisco, California, on behalf of the San Francisco Bay Conservation and Development Commission on the date first above written.

WILL TRAVIS
Executive Director
San Francisco Bay Conservation and
Development Commission

By: _____
STEVEN A. McADAM
Deputy Director

SAM/NN/ra
cc: U. S. Army Corps of Engineers, Attn.: Regulatory Functions Branch
San Francisco Bay Regional Water Quality Control Board,
Attn.: Certification Section
Environmental Protection Agency, Attn.: Mike Monroe, W-3-3
San Francisco Planning Department
Alameda County Planning Department

* *

Receipt acknowledged, contents understood and agreed to:

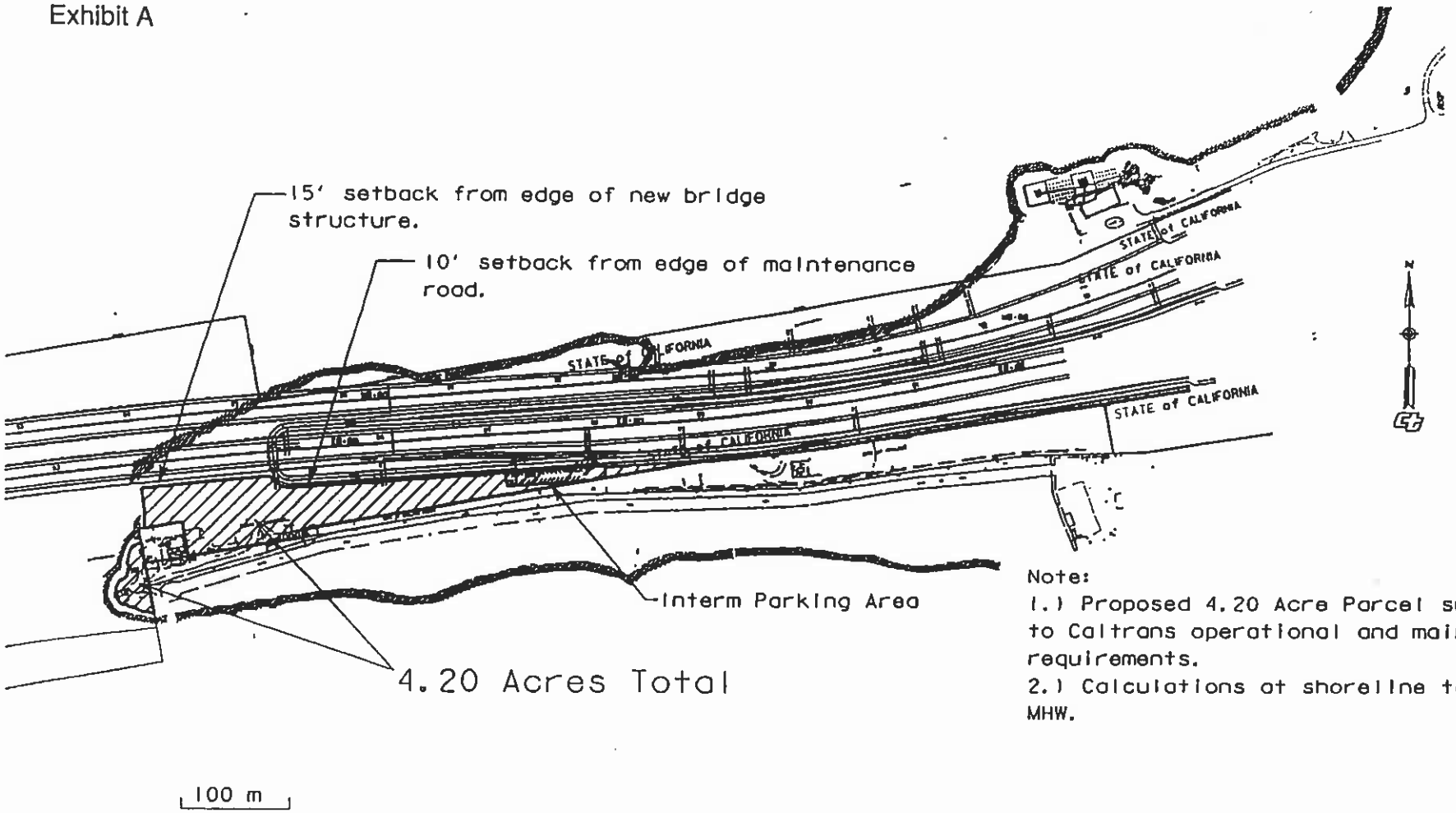
Executed at OAKLAND

_____
Permittee

On NOVEMBER 21, 2001 By: CHIEF DEPUTY

_____
Title

Exhibit A



Note:
1.) Proposed 4.20 Acre Parcel subject to Caltrans operational and maintenance requirements.
2.) Calculations at shoreline taken at MHW.

100 m

PROPOSED PUBLIC ACCESS PARCEL
at the OAKLAND TOUCHDOWN

10/29/01

Making San Francisco Bay Better

Permittee's Copy

PERMIT NO. 2001.008.32
(Formerly Permit No. 8-01,
Originally issued on November 20, 2001,
As Amended Through February 10, 2012)

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

ATTENTION: Jim Richards

Ladies and Gentlemen:

On November 1, 2001, the San Francisco Bay Conservation and Development Commission, by a vote of 20 affirmative, 0 negative, and 0 abstentions, approved the resolution pursuant to which the original permit had been issued. Moreover, on August 2, 2002, September 20, 2002, February 25, 2003, September 17, 2003, March 3, 2004, January 5, 2004, May 6, 2004, July 13, 2004, December 15, 2004, April 19, 2005, July 13, 2005, November 16, 2005, June 13, 2006, October 9, 2007, October 23, 2007, June 11, 2008, September 16, 2008, October 31, 2008, January 14, 2009, October 7, 2009, March 3, 2010, December 7, 2010, December 27, 2010, and June 30, 2011, the Executive Director of the San Francisco Bay Conservation and Development Commission approved Amendment Nos. One, Two, Three, Four, Five, Six, Seven, Eight, Nine, Ten, Eleven, Twelve, Thirteen, Fourteen, Fifteen, Seventeen, Eighteen, Twenty, Twenty-One, Twenty-Two, Twenty-Four, Twenty-Five, Twenty-Six, Twenty-Seven, Twenty-Eight, Twenty-Nine, and Thirty, respectively, pursuant to which this amended permit has been issued. ~~Additionally,~~ ~~o~~On June 15, 2006, the San Francisco Bay Conservation and Development Commission, by a vote of 17 affirmative, 0 negative and 1 abstention, approved Material Amendment No. Sixteen. Amendment No. Nineteen has been withdrawn. Amendment requests Nos. 23 and 31 are pending and have not yet been issued. Additionally, on February 2, 2012, the San Francisco Bay Conservation and Development Commission, by a vote of 19 affirmative, 0 negative, and 0 abstentions, approved the resolution pursuant to which the Material Amendment No. Thirty-Two is hereby issued.

Ladies and Gentlemen:

I. Authorization

A. Subject to the conditions stated below, the permittee, the California Department of Transportation, District 4 (Caltrans), is granted permission to replace the East Span of the San Francisco-Oakland Bay Bridge with a new self-anchored, single-tower, steel suspension bridge and concrete skyway in the City of Oakland, Alameda County, and in the City and County of San Francisco. Authorized work includes:

In the Bay:

1. **Dredging.** Dredge a total of approximately 616,721 cubic yards of material over approximately 99 acres of the Bay to construct portions of a new 2.18-mile-long replacement bridge for the East Span of the San Francisco-Oakland Bay Bridge (SFOBB) and to remove the existing East Span including:

a. **Construction Barge Access Channel (Episode No. 1).** Dredge approximately 216,230 cubic yards of material for a barge access channel to construct the new bridge in shallow water areas and dispose of the material at the federally-approved deep ocean disposal site (DODS) outside the Commission's jurisdiction (Completed);

b. **Construction Dredging (Episode No. 2).** Dredge approximately 187,087 cubic yards of material to construct footing piles and pile caps for the new bridge and dispose of the dredged material at the federally-approved SF-11 Alcatraz disposal site within the Commission's jurisdiction, except the upper twelve feet of Piers E1-E6 (Sediment Sampling and Analysis Plan (SAP) testing locations: N1 and N2) and Piers E15-E18 (SAP testing locations: SFOBB N5) which, because of elevated contaminant levels, will be disposed at an approved upland disposal site outside the Commission's jurisdiction (Completed);

c. **Demolition Barge Access Channel (Episode No. 3).** Dredge approximately 190,680 cubic yards of material for a barge access channel to remove the existing East Span and dispose of the material at an approved upland disposal site for wetland reuse, such as Hamilton or Montezuma, within the Commission's jurisdiction, or at the approved deep-ocean disposal site outside the Commission's jurisdiction;

d. **Demolition Dredging (Episode No. 4).** Dredge approximately 22,724 cubic yards of material to remove the existing bridge piles, tower foundations and associated fender piles and dispose of the material at the federally-approved SF-11 disposal site within the Commission's jurisdiction; and

e. **Experimental Eelgrass Transplant Program Dredging.** Beneficially use approximately 1,200 cubic yards of sand dredged pursuant to ~~another~~ BCDC permit and place the material at the Emeryville Flats to construct test plot plateaus at appropriate elevations for eelgrass (Amendment Nos. One, Two, Four, and Five).

2. **Temporary Bay Fill for the Construction of the New East Span.** Place, use and, at project completion, remove a total of approximately 55,669.2 cubic yards of temporary Bay fill covering approximately 14.81 acres of Bay surface area to construct portions of a new 2.18-mile-long replacement bridge for the East Span of the SFOBB including:

a. **Yerba Buena Island (YBI) Transition/Suspension Span.** Place, use, maintain and, at project completion, remove: (1) approximately 81 cubic yards of temporary, pile supported fill covering approximately 0.40 acres for a barge access dock at Clipper Cove to facilitate delivery of construction materials, equipment and personnel to the project site; (2) approximately 60 cubic yards of temporary, pile-supported fill covering approximately 0.13 acres for portions of a construction access trestle to serve as a construction platform and small boat dock and to facilitate moving construction materials, equipment, and personnel at the east end of YBI; (3) approximately 1.60 acres of temporary, high-level suspended fill to construct portions of falsework to support bridge segments until adjoining structures are completed; (4) approximately 2,776 cubic yards of temporary submerged fill for falsework piers; (5) approximately 4,512 cubic yards of temporary, submerged fill covering approximately 13,734 square feet of Bay bottom to install a coffercell system and the associated temporary silt

curtains required pursuant to special conditions of this amended permit ~~II-A~~ (Amendment No. Twenty); and (6) approximately 1.23 cubic yards of temporary pilings to support a temporary pile-supported trestle, covering approximately 4,069 square feet (0.09 acre) of the Bay for up to 7 years to provide a marine trestle at Coast Guard Cove on the southeast side of YBI for offloading the prefabricated east tie-intruss for the detour while the Self-Anchored Suspension Span is constructed (Amendment Nos. Six and Eleven); (7) as part of the thermal cooling operation at Clipper Cove, temporarily (~~for~~ up to seven years) install three floating rafts supported by floating drums that will cover approximately 192 square feet of Bay surface area and attach three, 12-inch-in-diameter pipes (occupying 77 cubic yards of Bay volume) to the rafts that will withdraw Bay water to be used in the concrete cooling and curing process for the east- and west-bound bridge piers (Amendment No. Seven); and (8) install a temporary access trestle at the eastern end of Yerba Buena Island, connecting Yerba Buena Island to the main tower of the Self-Anchored Suspension Span (SAS), Tower 1 (T1) to provide pedestrian, vehicle, and equipment access that will include the following: (a) 22, 36-inch-in-diameter steel pipe piles that will result in the placement 84.78 square feet of Bay fill and will displace 216.2 cubic yards of Bay volume; (b) an access trestle resulting in 6,098.4 (0.14 acre) square feet of pile-supported fill; and (c) a metal footbridge that will connect the trestle to the T1 marine foundation resulting in 6,338.18 (0.14 acre) of temporary pile supported fill (Amendment No. Twenty-Five).

b. **Skyway.** Place, use, maintain and, at project completion, remove: (1) approximately 199 cubic yards of temporary, pile-supported fill covering approximately 1.73 acres for a construction access trestle to serve as a construction platform and small boat dock and to facilitate moving construction materials, equipment and personnel; (2) 6.17 acres of temporary, high-level suspended fill for falsework to support bridge segments until adjoining structures are completed; (3) 592 cubic yards of temporary, submerged fill for falsework piers; and (4) 26,928 cubic yards of temporary, submerged fill for 28 cofferdams;

c. **Oakland Touchdown Structures and Approaches.** Place, use, maintain and, at project completion: (1) remove approximately 508 cubic yards of pile-supported fill covering approximately 3.46 acres for portions of a construction access trestle to serve as a construction platform and small boat dock and to facilitate moving construction materials, equipment and personnel; (2) remove approximately 0.48 acres of temporary, low and high-level suspended fill for falsework to support bridge segments until adjoining structures are completed (this falsework will fall within the footprint of the construction access trestle and therefore will not contribute to the overall area of temporary fill); (3) remove approximately 695 cubic yards of temporary, submerged fill for portions of falsework piers; (4) remove approximately 1,500 cubic yards of temporary, submerged fill for seven coffer-dams; (5) remove a 565-square-foot trestle loading ramp at the end of Berth 7 in the Port of Oakland's Outer Harbor supported by six, 24-inch-in-diameter piles occupying 24.8 cubic yards of Bay volume (Amendment No. Eight); and (6) store a 175-square-foot, hollow rock screed that will be used to level rock material within coffercells and will displace 4.6 cubic yards of Bay volume at Port of Oakland's Berth 7 (Amendment No. Eight).

d. **Geofill.** Place, use, maintain and, at project completion, remove: (1) approximately 16,667 cubic yards of temporary, solid fill covering approximately 0.65 acres for portions of a 1,970-linear-foot-long tidal berm in areas north of the Oakland Touchdown. The temporary "geotube" structure, which is a large diameter, water permeable geotextile fabric, will enclose dredged and/or excavated material and protect the work area from tidal and wave action while installing wick drains and placing fill for the westbound roadway; and (2) approximately 833 cubic yards of solid fill covering approximately 0.10 acres for a temporary tidal berm northwest of the Oakland Touchdown to facilitate relocation of the Caltrans maintenance road (the area of the temporary tidal berm will fall within the footprint of the maintenance road and the shadow of the elevated eastbound roadway, both of which are accounted for as permanent Bay fill).

e. **Post-Construction Stormwater Treatment Measures.** As part of the overall stormwater treatment system that will collect and treat stormwater runoff from approximately 143.3 acres (five catchment groups) of existing Caltrans right-of-way from the Oakland Touchdown in the City of Oakland to Temescal Creek in the City of Emeryville along the northside of Highway 80, excavate approximately 7,997 square feet of tidal marsh vegetation and revegetate the area upon completing excavation activities; and (2) install and remove, upon the completion of installation of stormwater treatment measures, 1,866 linear feet of environmentally sensitive area/exclusionary fencing to protect clapper rail and the salt marsh harvest mouse from the intrusion of construction equipment and personnel into sensitive habitat area (Amendment No. Fifteen). In addition, project activities will temporarily impact approximately 1,742 square feet (approximately 0.04 acre) along Radio Road (Amendment No. Eighteen).

3. **Permanent Bay Fill.** Place and use a total of approximately 104,453 cubic yards of permanent Bay fill covering approximately 46.05 acres of Bay surface area to construct portions of a new 2.18-mile-long replacement bridge for the East Span of the SFOBB (Amendment Nos. One, Two, Three, Four and Five):

a. **YBI Transition/Suspension Span.** Place, use and maintain: (1) approximately 16,786 cubic yards of permanent, submerged fill for footing piles and pile caps; (2) approximately 2,502 cubic yards of permanent, submerged fill for pier fenders; (3) approximately 8.01 acres of permanent, high-level suspended fill for portions of a self-anchored, asymmetrical suspension bridge and cast-in-place, pre-stressed concrete bridge approaches, electrical service platforms, lighting and safety barriers; (4) approximately 0.65 acres of permanent, high-level suspended fill for portions of a bicycle and pedestrian path, one belvedere (view platforms) and safety railings; and (5) repair, retrofit, replace and/or relocate existing drainage outfalls, drainage facilities and utilities and install new outfalls as approved by the Regional Water Quality Control Board (RWQCB);

b. **Skyway.** Place, use and maintain: (1) approximately 32,819 cubic yards of permanent, submerged fill for footing piles and pile caps; (2) approximately 4,210 cubic yards of permanent, submerged fill for pier fenders; (3) approximately 27.36 acres of permanent, high-level suspended fill for a pre-cast or cast-in place, post tensioned concrete skyway bridges, electrical service platforms,

lighting and safety barriers; and (4) approximately 2.97 acres of permanent, high-level suspended fill for a bicycle and pedestrian path, five belvederes and safety railings;

c. **Oakland Touchdown Structures and Approaches.** Place, use and maintain: (1) approximately 1,354 cubic yards of permanent, submerged fill for footing piles and footing pile caps; (2) approximately 10 cubic yards and 2.79 acres of permanent, low and high-level suspended fill for portions of a cast-in-place, pre-stressed, concrete box-girder bridge, electrical service platforms, lighting and safety barriers; (3) approximately 0.15 acres of permanent, low and high-level suspended fill for portions of a bicycle and pedestrian path and safety railings; (4) repair, retrofit, replace and/or relocate existing drainage outfalls, drainage facilities and utilities and install new outfalls as approved by the RWQCB; and (5) pavement, retaining structures, and safety barriers on Bay fill for the westbound roadway and relocate the Caltrans maintenance road;

d. **Maintenance Road and Shoreline Protection.** Place, use and maintain a total of approximately 67,284 cubic yards of fill to be comprised of: (1) approximately 44,272 cubic yards of permanent, engineered, solid and earthen fill covering approximately 3.31 acres for the westbound roadway. The new touchdown perimeter ~~would~~ will be created by excavating to an elevation of approximately minus 2.6 feet NGVD and backfilling with clean fill material to match the elevations of the Oakland Approach. Vertical wick drains will be placed to purge water during consolidation of the surcharge material and to provide a drainage path for pore water during a seismic event. All water that drains from the substrate through the wick drains and vertical drains will flow through gravel blankets into the Bay; (2) approximately 1,300 cubic yards of engineered solid and earthen fill covering approximately 0.29 acres to relocate the Caltrans maintenance road; (3) approximately 21,712 cubic yards of engineered rock slope protection to be used as shoreline protection; and (4) repair, retrofit, replace and/or relocate existing drainage outfalls, drainage facilities and utilities; and

e. **Post-Construction Stormwater Treatment Measures.** As part of the overall stormwater treatment system that will collect and treat stormwater runoff from approximately 143.3 acres (five catchment groups) of existing Caltrans right-of-way from the Oakland Touchdown in the City of Oakland to Temescal Creek in the City of Emeryville along the northside of Highway 80, place, use and maintain: (1) a 172-square-foot bypass structure; (2) an 11-square-foot-portion of a maintenance vehicle pullout (MVP)/pump station/electrical cabinet cluster; and (3) 75.37 cubic yards of rock riprap covering 1,366 square feet of area. All items shall be installed as required by the RWQCB (Amendment No. Fifteen).

4. **On-Site Restoration.** Restore on-site, north of the Oakland Touchdown area, approximately 3.07 acres of sand flats and eelgrass beds temporarily impacted by activities associated with constructing portions of a new 2.18 mile-long replacement bridge for the East Span of the SFOBB including:

   a. **Harvest/Replant Eelgrass.** Harvest approximately 0.55 acres of eelgrass from the footprint of the barge access channel prior to dredging and plant test plots in adjacent eelgrass beds north of the Oakland Touchdown area and at Albany Beach and/or Brickyard Cove in Berkeley located within the Eastshore State

Park. Place for beneficial use approximately 1,200 cubic yards of sand fill over an approximately 0.52-acre area in the Emeryville Flats to raise bathymetry and create approximately six test plot plateaus for the experimental eelgrass transplant program (Amendment Nos. One, Two, Four, Five);

b. **Restore Sand Flats.** Restore approximately 0.80 acres of sand flats north of the Oakland Touchdown area that will be affected by the placement of a temporary tidal berm and/or mud boils to their pre-construction elevations and substrate;

c. **Upland Transition.** Construct and maintain rock slope protection (rip-rap) at the Oakland Touchdown area along the new westbound roadway and create slope gradients of 1(V):3(H) at the toe of the slope which will transition to a 1(V):2(H) gradient at mid-slope;

d. **Shorebird Roosting Habitat.** Construct shorebird roosting habitat north of the Oakland Touchdown area by placing 734 cubic yards of 1-ton rock approximately 200 feet offshore of the Oakland Touchdown to a height of 6.5 feet NGVD. The roosting island will result in a footprint of 4,047 square feet area of Bay fill and will provide 500 square feet of shorebird roosting habitat above Mean Sea Level (Amendment No. Twelve); and

e. **Surface Sediments.** Place approximately 10,000 cubic yards of sediments, deemed appropriate for the reestablishment of eelgrass pursuant to special conditions of this amended permit ~~II A, below~~, following removal of the temporary marine access trestle at Coast Guard Cove on the southeast side of YBI and restore the area to appropriate elevations to support the reestablishment of eelgrass (Amendment No. Six).

5. **Demolition of the Existing East Span.** Remove the existing SFOBB East Span to approximately minus 1.5 feet below the existing mud line and dispose or recycle the bridge debris at an approved location outside the Commission's jurisdiction including:

a. Remove, dispose and/or recycle approximately 12.5 acres of mostly high-level suspended fill comprised of painted steel, concrete, and other materials for the bridge deck and superstructure;

b. Remove, dispose and/or recycle approximately 74,144 cubic yards of submerged fill comprised of concrete and other materials for the bridge piers and footing piles; and

c. Remove and dispose approximately 4,685 cubic yards of solid fill for pier fenders comprised of treated wood and other materials.

6. **Temporary Fill for Dismantling the Existing East Span (Material Amendment No. Thirty-Two).** Place, temporarily use, maintain in-kind, and, at project completion, remove:

a. **The YBI Access Trestle.** An approximately 7,000-square-foot (0.16 acres), temporary, pile-supported trestle on the southeast side of YBI to facilitate hauling materials resulting from dismantling of the cantilever superstructure and to mobilize equipment and personnel (Material Amendment No. Thirty-Two);

b. **The Oakland Trestle.** An approximately 96,000-square-foot (2.2 acres), temporary, pile-supported trestle at the southwest side of the East Span extending from the City of Oakland shoreline (potentially as far as Pier E9 of the existing East Span) with "fingers" extending underneath the East Span to facilitate dismantling of the superstructure (Material Amendment No. Thirty-Two); and

c. **Trestle Piles and Temporary Supports.** Place up to 7,461 cubic yards of solid fill associated with 2,540, twenty-four-inch-in-diameter temporary support piles, or up to 9,704 cubic yards of solid fill associated with 1,560, thirty-six-inch-in-diameter temporary support piles including: (i) up to 100 H-piles for the YBI Access Trestle; (ii) up to 700 piles for the Oakland Trestle; and (iii) up to 1,590 piles over a maximum area of approximately 6,323 square feet (0.15 acres) for falsework to support bridge segments until adjoining structures are dismantled; and install up to 150 piles for spuds, fenders, mooring, access and other dismantling activities over a maximum area of approximately 1,065 square feet area (0.02 acres) (Material Amendment No. Thirty-Two).

~~6~~ 7. **Repair, Replace and Maintain Improvements.** Repair, replace and maintain on an in-kind basis only, all improvements authorized in the Bay to the plans and specifications approved by or on behalf of the Commission.

~~7~~ 8. **Off-Site Restoration.** Conduct a three year-long pilot eelgrass restoration study within the Eastshore State Park, at the North Basin, in the City of Berkeley. The study will include the following activities: (a) place an earth reinforcement mattress and engineering fabric over an approximately 48,500-square-foot area of the Bay floor to aid in displacing the weight of the fill material and to provide a stable surface for construction equipment; (b) place 3,900 cubic yards of appropriate fill material (e.g., coarse sand) over the approximately 48,500-square-foot area to establish an eelgrass plateau; (c) add transients that are parallel to the shore; (d) plant the plateau with donor eelgrass plugs obtained at nearby locations; and (e) monitor the pilot site through Summer 2008 (Amendment No. Twelve).

Within the 100-foot shoreline band:

1. **Temporary Shoreline Band Structures.** Place, use, maintain and, at project completion, remove a total of approximately 2.03 acres of temporary structures to construct portions of a new 2.18 mile-long replacement bridge for the East Span of the SFOBB including:

   a. **YBI Transition/Suspension Span.** Place, use, maintain and, at project completion, remove: (1) approximately 65 square feet for portions of a temporary, pile-supported construction access trestle to serve as a construction platform and small boat dock to facilitate moving construction materials, equipment, and personnel; (2) approximately 1.40 acres (the original permit authorized 0.13 acres) and Amendment No. 14 authorized an additional 1.27 acres of falsework) of temporary, high-level suspended structures for portions of falsework to support bridge segments until adjoining structures are completed; (3) 420 square feet for temporary falsework piers; (4) 7,793 square feet of armor rock as part of constructing a temporary coffercell system (Amendment No. Twenty); (5) 0.09 acres for a temporary construction staging area 0.02 acres of which is associated with the U.S. Coast Guard (USCG) employee shuttle turn-around on YBI (Amendment No. Eleven); (6) 0.16 acres to temporarily relocate a portion of the USCG Road; (7) 0.15 acres to temporarily relocate a portion of the Torpedo

Factory Road; (8) approximately 0.75 acre of a temporary, land-based skid rail structure that will allow the temporary east tie-intruss to be moved from a barge utilizing the access trestle to the falsework below the existing bridge, and may be also be used for dismantling of the existing bridge (Amendment No. Six); (9) as part of the thermal cooling operation at Clipper Cove, connect the pipes placed on rafts on the Bay with two, twelve-inch-diameter pipes that will run along 100 feet of the shoreline (Amendment No. Seven); (10) construct a 222-square-foot wooden staircase on the slope adjacent to the Torpedo Building on YBI to provide access to the work area at Pier T1 (Amendment No. Eleven); (11) place, use and maintain temporary equipment associated with construction of the east span replacement, such as but not limited to lighting, generators, storage boxes, etc., on Yerba Buena Island, and remove all such equipment from the Commission's jurisdiction upon completion of the replacement span (Amendment No. Fifteen); (12) approximately 16,445 square feet (0.38 acres) consisting of 12,240 square feet of low level, pile supported fill and 4,196 square feet of solid fill for two access ramps to construct a crane runway platform just east of Coast Guard Cove on the southeast side of YBI that will support the construction of the temporary East Tie-In decks of the South-South Detour (SSD) bridge, the temporary skid rail structure and perform the Roll Out/Roll In operation. A section of the existing East Span bridge decks east of Pier E-1 will be disconnected from the existing bridge and rolled-out along a temporary skid rail structure to temporary towers on the north-side of the existing East Span. The new temporary East Tie-In bridge decks will then be rolled-in along the skid rail structure. This work is tentatively scheduled to take place during the Labor Day 2009 weekend when the SFOBB will be closed to perform the Roll-out/Roll-In operation (Amendment No. Twenty-Two); and (13) ~~As~~ part of the temporary construction access trestle at the eastern end of Yerba Buena Island, connecting Yerba Buena Island to the main tower of the Self-Anchored Suspension Span (SAS), Tower (T1), install a 64-square-foot timber sill and a 250-square-foot earthen access ramp that will provide access to the temporary trestle (Amendment No. Twenty-Five).

b. **Oakland Touchdown Structures and Approaches.** Construct, use, maintain and, at project completion, remove: (1) approximately 0.16 acres for portions of temporary falsework piers; (2) approximately 344 square feet for portions of cofferdams; and (3) temporary construction staging areas, at Pier 7 and Berth 9 at the Port of Oakland and the former Oakland Army Base;

c. **Geofill.** Construct, use, maintain and, at project completion, remove: (1) approximately 527 square feet for portions of an approximately 1,970-foot-long, geotube to temporarily protect the work area from tidal and wave action and to facilitate installation of wick drains and the placement of fill for the westbound roadway; and

d. **Post-Construction Stormwater Treatment.** As part of the overall stormwater treatment system that will collect and treat stormwater runoff from approximately 143.3 acres (five catchment groups) of existing Caltrans right-of-way from the Oakland Touchdown in the City of Oakland to Temescal Creek in the City of Emeryville along the northside of Highway 80, install, use, maintain and remove, at project completion, to a location outside of the Commission's jurisdiction: (1) approximately 1,568 linear feet of 32-inch-high K-rail for the

health and safety of the traveling public and construction workers; and (2) approximately 7,915 linear feet of environmentally sensitive area/ exclusionary fencing to protect clapper rail and the salt marsh harvest mouse from the instruction of construction equipment and personnel into sensitive habitat (Amendment No. Fifteen).

e. **Wildlife Exclusion Fence.** Until February 1, 2012, install, use, and maintain approximately 2,800 feet of three-foot-high, black polyvinyl temporary fencing along the southern boundary of the Oakland-Emeryville Wildlife Priority Land Use Area (San Francisco Bay Plan), to minimize movement of Canadian geese onto the I-80 roadway between Temescal Creek and 500 feet west of the HOV on-ramp at the SFOBB toll plaza (Amendment No. Twenty-Four).

2. **Permanent Shoreline Band Structures.** Place, use and maintain a total of approximately 8.17 acres of new, permanent structures for portions of a new 2.18 mile-long replacement bridge for the East Span of the SFOBB including:

a. **YBI Transition/Suspension Span.** Construct, use and maintain: (1) approximately 452 square feet for permanent support piers, footing piles and footing pile caps; (2) approximately 1.01 acres of permanent high-level, suspended structures for the self-anchored, asymmetrical suspension bridge and cast-in-place, pre-stressed concrete bridge approaches, electrical service platforms, lighting and safety barriers; (3) approximately 0.10 acres of permanent high-level suspended structures for portions of a bicycle and pedestrian path and safety railings; and (4) repair, retrofit, replace and/or relocate, existing drainage outfalls, drainage facilities and utilities and install new outfalls as approved by the RWQCB; and

b. **Oakland Touchdown Structures and Approaches.** Construct, use and maintain: (1) approximately 334 square feet of permanent support piers, footing piles and pile caps; (2) approximately 1.31 acres of permanent low and high-level suspended structures for portions of a cast-in-place, pre-stressed, concrete box-girder bridge, electrical service platforms, lighting and safety barriers; (3) approximately 0.19 acres of permanent low and high-level suspended structures for portions of a bicycle and pedestrian path and safety railings; (4) approximately 2.46 acres of pavement for the at-grade westbound roadway and approximately 0.61 of pavement for the at-grade eastbound roadway; (5) repair, retrofit, replace and/or relocate, existing drainage outfalls, drainage facilities and utilities and install new outfalls as approved by the RWQCB; (6) approximately 0.84 acres of pavement for the at-grade Caltrans maintenance road; and (7) place pavement, retaining structures, and safety barriers on the fill for the westbound roadway and relocate the Caltrans maintenance road.

c. **Future Site of Gateway Park.** Construct, use and maintain an approximately 3,668-square-foot portion of a bus turn-around located southeast of a temporary 43-stall, public access parking lot in accord with the plan entitled, "Gateway Park, Bus Turn Around", prepared by Caltrans and received in BCDC's office on March 3, 2010 (Amendment No. Twenty-Seven).

d. **Repairs to Burma Road.** To maintain access during the construction and use of the Oakland Touchdown Detour (OTD), repave and temporarily use (until December 31, 2014), a 0.5 mile long, 34- to 38-foot-wide segment of Burma Road of which a 0.125 mile section is located within the Commission's 100-foot shoreline band; and install a temporary 6-foot-high, 0.5 mile chain link fence,

(0.125 mile is located within the Commission's shoreline band) 3 to 6 feet south of the southern edge of Burma Road, and remove the fence by December 31, 2014 (Amendment No. Twenty-Nine).

3. **Post-Construction Stormwater Treatment.** As part of the overall stormwater treatment system that will collect and treat stormwater runoff from approximately 143.3 acres (five catchment groups) of existing Caltrans right-of-way from the Oakland Touchdown in the City of Oakland to Temescal Creek in the City of Emeryville along the northside of Highway 80, install, use and maintain: (a) approximately 9,095 linear feet of 24-inch-diameter drainage pipe that will be placed below grade by trenching and pipe jacking and associated drop inlets and manholes totaling 132 square feet; (b) four pump stations and four electrical cabinets at four maintenance vehicle pullout out areas all totaling approximately 10,721 square feet; (c) existing utilities; and (d) approximately two new outfalls covering 10,851 square feet and one drainage basin. Project activities will temporarily impact approximately 91,912 square feet (approximately 2.11 acres) of upland transition habitat located in a wildlife priority use area (Bay Plan Map No. 4) (Amendment No. Fifteen authorizes approximately 26,834 square feet (0.62 acre) of these temporary impacts within the wildlife priority use area. Amendment No. Eighteen authorizes an additional approximately 64,904 square feet (1.49 acres) of these temporary impacts and permanent impacts to 3,897 square feet (0.09 acre) of upland transition habitat also located in a wildlife priority use area.

   In addition, project activities will temporarily impact approximately 17,424 square feet (approximately 0.40 acre) of area that was required as mitigation under BCDC Permit No. 1993.011.00 for the Cypress (Amendment No. Fifteen authorizes approximately 3,101 square feet (0.07 acres) of these temporary impacts and Amendment No. Eighteen authorizes approximately 14,375 square feet (0.33 acre) of these temporary impacts) within the Cypress Mitigation area and permanently impact 1,539 square feet (0.04 acre) of area that was required as mitigation under BCDC Permit No. 1993.011.00. Further, the project activities will temporarily impact approximately 131 square feet (0.003 acre) of upland transition habitat within the 100-foot shoreline band but outside the wildlife priority use area and the area required as mitigation under BCDC Permit No. 1993.011.00 (Amendment Nos. Fifteen and Eighteen).

4. **On-Site Restoration.** Restore and repair, in-kind and, as needed, areas disturbed by construction activities including, but not limited to, natural features such as landscaping, shoreline slopes, beaches, and constructed features such as buildings, utilities, roadways and other structures.

5. **Repair, Replace and Maintain Improvements.** Repair, replace and maintain on an in-kind basis only, all authorized improvements to the plans and specifications approved by or on behalf of the Commission.

B. This amended authority is generally pursuant to and limited by the application filed on October 17, 2001 and Caltran's letters dated March 7, 2002, requesting Amendment No. One; the letter dated April 10, 2002, requesting Amendment No. Two; the letter dated May 28, 2002, requesting Amendment No Three; the letter dated June 25, 2002, requesting Amendment No. Four; the letter dated September 10, 2002, requesting Amendment No. Five; the letter dated July 8, 2003, requesting Amendment No. Six; the letters dated November 24, 2003, and January 16, 2004, requesting Amendment

No Seven; the letter dated October 15, 2003, requesting Amendment No. Eight; the letter dated February 24, 2004, requesting Amendment No. Nine; the letters dated April 22, 2004 and June 3, 2004, requesting Amendment No. Ten; the letters dated October 8, 2004 and October 22, 2004, requesting Amendment No. Eleven; the emails dated March 17, 2005, March 22, 2005 requesting Amendment No. Twelve; the letter dated May 31, 2005 requesting Amendment No. Thirteen; the letter dated October 13, 2005, requesting Amendment No. Fourteen; the letter dated March 8, 2006, requesting Amendment No. Fifteen; the letter dated May 12, 2006, requesting Amendment No. Sixteen; the letter dated June 11, 2007, requesting Amendment No. Seventeen, the letter dated September 6, 2007, requesting Amendment No. Eighteen; the letter dated February 22, 2008, requesting Amendment No. Nineteen (withdrawn by the letter dated September 3, 2008); the letter dated April 16, 2008, requesting Amendment No. Twenty; the letter dated June 16, 2008, requesting Amendment No. Twenty-One; the letter dated September 11, 2008, requesting Amendment No. 22 (erroneously labeled Amendment No. Nineteen); the letter dated September 18, 2008 requesting Amendment No. Twenty-Three (time-extension, ~~never~~ not yet filed as complete); the letter dated December 15, 2008 requesting Amendment No. Twenty-Four; the letter dated July 8, 2009, requesting Amendment No. Twenty-Five; the letter dated October 1, 2009, requesting Amendment No. Twenty-Six; the letter dated January 5, 2010, requesting Amendment No. Twenty-Seven; the letter dated March 10, 2010, requesting Amendment No. Twenty-Eight; the letter dated December 1, 2010, requesting Amendment No. Twenty-Nine; ~~and~~ the letter dated May 24, 2011 requesting Amendment No. Thirty; and the letter dated October 19, 2011, requesting Material Amendment No. Thirty-Two including all accompanying and subsequently submitted correspondence and exhibits~~, but subject to the modifications required by conditions hereto.~~ and all conditions of this amended permit. Requests for Amendment Nos. 23 and 31 are pending and have not yet been issued.

C. The original work authorized herein must commence prior to January 1, 2003, or this amended permit will lapse and become null and void. All work must also be diligently prosecuted to completion, and must be completed by January 1, 2014, unless an extension of time is granted by a further amendment of this amended permit. The post-construction stormwater treatment system authorized under Amendment No. Fifteen shall commence no later than December 31, 2006, unless an extension of time is granted by further amendment of this amended permit. Such work shall also be diligently pursued to completion and completed within two years of commencement or by December 31, 2008, whichever is earlier, unless an extension of time is granted by further amendment of this amended permit. The coffer-cell system on the east side of YBI authorized under Amendment No. Twenty shall be pursued to completion and completed by November 30, 2008, unless an extension of time is granted by further amendment of this amended permit. Amendment No. Twenty-Two authorized a time extension, until August 1, 2010, to commence ~~building~~ demolition at Skaggs Island (a part of the approved project's mitigation) and, until July 1, 2012, to begin wetland restoration activities at Skaggs Island, a requirement contained in Special Condition II-F-10-a of this amended permit and thus, did not result in changes to the overall construction time frame for the SFOBB ~~contained in Section I-B~~. Amendment No. Twenty-Four authorized the installation of a temporary wildlife fence along the I-80 adjacent to the Emeryville Crescent and thus, did not result in changes to the overall construction time frame for the SFOBB contained in Section I-B. Work authorized under Amendment No. Twenty-Five (construction of the temporary access trestle to SAS T1 at the eastern end of Yerba Buena Island) shall commence prior to July 1, 2010, or this

amended permit will lapse and become null and void. Such work must also be diligently pursued to completion and completed by December 1, 2010, unless an extension of time is granted by further amendment of this amended permit. Work authorized under Amendment No. Twenty-Six involves revising language contained under Special Condition II-F-10 regarding the use of money set aside for eelgrass mitigation and does not result in changes to the construction commencement and completion dates contained herein. The bus turn-around authorized under Amendment No. Twenty-Seven shall be constructed and completed within one year of the opening of the replacement bridge to vehicular traffic. Amendment No. Twenty-Seven extends the date for the permittee to guarantee required public access improvements at the Oakland touchdown and Yerba Buena Island. Amendment No. Twenty-Eight extends the removal date for a crane platform that was previously authorized and does not result in revisions to the overall construction commencement and completion dates required herein. The maintenance road improvements and fence relocation along Burma Road authorized under Amendment No. ~~29~~ Twenty-Nine shall commence no later than December 31, 2011, or the authorization for the Burma Road improvements and fence relocation will lapse and become null and void. Such work must also be diligently pursued to completion and completed by March 1, 2012 unless an extension of time is granted by further amendment of this amended permit. The construction of the temporary trestles and falsework associated with demolition of the East Span authorized under Material Amendment No. Thirty-Two shall commence no later than December 31, 2013, or the authorization for these temporary structures will lapse and become null and void. Such work must also be diligently pursued to completion and completed by March 1, 2020 unless an extension of time is granted by further amendment of this amended permit.

D. The project authorized herein will result in approximately 46.05 acres of new Bay fill for the bridge and bridge approaches, of which approximately 41.93 acres is high level, suspended fill that will have minimal impacts on Bay resources. The net increase in Bay fill after removing the existing bridge will be approximately 33 acres. However, because the new support footings and pilings will be significantly smaller than the existing bridge footings, the project will result in a net ~~increase~~ decrease of 173,806 cubic yards in the Bay's volume. The project includes a number of mitigation measures to offset the impacts of the solid and pile-supported fill, as well as the impacts of construction activity. These mitigation measures include, among other things: (a) removing the 1936 East Span, (b) restoring the approximately 1.73-acre barge access channel used to construct the replacement bridge to its pre-construction bathymetry, if Commission policy is changed to allow such restoration; and (c) providing no more than $10.5 million to implement a wetlands restoration program that is ~~still~~ being developed, but which may be applied toward the restoration of approximately 3,298 acres of habitat at Skaggs Island in Sonoma County and providing the maximum amount of these remaining funds as possible, but no less than $2.5 million, toward the restoration, enhancement or creation of new aquatic, wetland, or wetland transitional habitat.

Additional fill associated with mitigation activities to offset fill authorized herein will result from the project. The fill consists of placing material over an approximately 48,500-square-foot area to establish eelgrass plateaus at the North Basin for the eelgrass pilot project and placing rock and fabric over a 4,047-square-foot area to create 500 square feet of shorebird roosting habitat above Mean Sea Level (Amendment No. Twelve). The project authorized by Material Amendment No. Thirty-Two will result in the temporary placement of approximately 108,431to 110,388 square feet (2.49

to 2.53 acres) of temporary pile-supported Bay fill for two temporary demolition trestles and the temporary supports for falsework, all of which will be removed upon completion of the project (Material Amendment No. Thirty-Two).

In addition, the project will provide approximately 9.6 acres of new public access, 5.05 acres of which is not required by this amended permit, including a 15.5-foot-wide pedestrian and bicycle lane across the new structure, and a total of six belvederes. Public access required by this permit includes a 0.05-acre terminus at the YBI end of the pedestrian and bicycle trail across the bridge, 4.5 acres of public access at the Oakland Touchdown that includes a 0.86-acre interim parking lot within the permittee's 4.2-acre parcel that will be incorporated into an area known as Gateway Park, and a 0.166-acre trail connecting the bridge trail to a 0.134-acre landing area (Amendment No. Thirty).

II. Special Conditions

The amended authorization made herein shall be subject to the following special conditions, in addition to the standard conditions in Part IV:

A. Specific Plans and Plan Review

1. **Plan Review.** Work authorized herein may be completed under multiple construction contracts. No work shall commence under an individual construction contract until final precise grading, drainage, mobilization, staging, site, engineering, architectural, landscaping, public access and shoreline clean-up plans and other relevant criteria, specifications, and plan information for that portion of the work, for each specific contract, have been submitted to, reviewed, and approved in writing by or on behalf of the Commission for work within the Commission's jurisdiction or for required public access either within or outside the Commission's jurisdiction (Amendment No. Three). The specific drawings and information required will be determined by the Commission staff. To save time, preliminary drawings should be submitted and approved prior to final drawings. No changes to the design of the project shall be made without the prior written approval by or on behalf of the Commission.

2. **Grading, Drainage, Mobilization, Staging, Site, Architectural, Landscaping, and Public Access Plans.** Site, architectural, landscaping and public access plans shall include and clearly label the mean high tide line, or, in areas with marsh vegetation, the line 5.0 feet above mean sea level, the line 100 feet inland of the mean high tide line or the 5.0 feet above mean sea level, property lines, the boundaries of all areas to be reserved for public access purposes and open space, details showing the location, types, dimensions, and materials to be used for all structures, irrigation, landscaping, drainage, erosion control, seating, parking, signs, lighting, fences, paths, trash containers, utilities and other proposed improvements;

   a. **Engineering Plans.** Engineering plans shall include a complete set of contract drawings and specifications and design criteria. The design criteria shall be appropriate to the nature of the project, the use of any structures, soil and foundation conditions at the site, and potential earthquake-induced forces. Final plans shall be signed by the professionals of record and be accompanied by:

      (1) Evidence that the project design complies with all applicable Caltrans design standards and all other applicable codes; and

(2) Evidence that an independent or in-house peer review panel has reviewed the project (except that such evidence may be waived by the staff, upon consultation with the Chair of the Engineering Criteria Review Board (ECRB), if peer review is determined not to be necessary).

3. **Final Plans for the Temporary Trestles for the Dismantling Work.** The final plans submitted shall generally conform with the plans entitled "San Francisco-Oakland Bay Bridge East Span Seismic Safety Project – Existing East Span Dismantling", prepared by Caltrans and submitted to the Commission as part of the application for Material Amendment No. 32. Final plans for both the YBI and Oakland temporary trestles shall be prepared and submitted for Commission staff review as described below. No changes to the design of the project shall be made without the prior written approval of the Commission staff.

~~3~~ 4. **Plan Requirements.** Plans submitted shall be accompanied by a letter requesting plan approval, identifying the type of plans submitted, the portion of the project involved, and indicating whether the plans are final or preliminary. Approval or disapproval shall be based upon:

a. Completeness and accuracy of the plans in showing the features required above, particularly the mean high tide line or the line 5.0 feet above mean sea level, property lines, and the line 100 feet inland of the mean high tide line or the +5.0 contour line mean sea level, and any other criteria required by this authorization;

b. Consistency of the plans with the terms and conditions of this authorization;

c. The provision of the amount and quality of public access to and along the shoreline and in and through the project to the shoreline required by this authorization;

d. Consistency with legal instruments reserving public access and open space areas;

e. Assuring that any fill in the Bay does not exceed this authorization and will consist of appropriate shoreline protection materials as determined by or on behalf of the Commission;

f. Consistency of the plans with the recommendations of the Design Review Board, as applicable;

g. Consistency of the plans with the recommendations of the Engineering Criteria Review Board; and

h. Assuring that appropriate provisions have been incorporated for safety in case of a seismic event.

Plans submitted for review shall be reviewed by or on behalf of the Commission as soon as possible, and shall be completed within 45 days after receipt of the plans to be reviewed.

~~4~~ 5. **Conformity with Final Approved Plans.** All work, improvements, and uses shall substantially conform to the final approved plans. Prior to any public use of the facilities authorized herein, the appropriate design professional(s) of record shall certify in writing that, through personal knowledge, the work covered by the authorization has been performed in accordance with the approved design criteria

and in substantial conformance with the approved plans. No noticeable changes shall be made thereafter to any final plans or to the exterior of any outside fixture, railing lighting, landscaping, signage, parking area, public access amenities, or shoreline protection work without first obtaining written approval of the change(s) by or on behalf of the Commission.

~~5~~ 6. **Discrepancies between Approved Plans and Special Conditions.** In case of any discrepancy between final approved plans and special conditions of this authorization or legal instruments approved pursuant to this authorization, the special conditions or the legal instrument shall prevail. The permittee is responsible for assuring that all plans accurately and fully reflect the special conditions of this authorization and any legal instruments submitted pursuant to this authorization.

B. **Public Access**

1. **Area.** The permittee shall make the following areas, totaling 4.55 acres, available exclusively to the public for unrestricted public access for walking, bicycling, sitting, viewing, and other related purposes, as revised by Amendment No. Thirty and shown on Exhibit A. If the permittee wishes to use the public access area for other than public access purposes, it must obtain prior written approval by or on behalf of the Commission.

   a. **Oakland Touchdown.** The permittee shall provide 4.5 acres of public access at the Oakland Touchdown consisting of: (1) a 4.2-acre parcel located south of the new bridge touchdown that shall become part of the East Bay Regional Park District's Gateway Park and an 0.86-acre (37,470-square-foot) area public access parking lot; and (2) a 0.3-acre area that shall include a 0.166-acre (7,064-square-foot) trail connecting the bridge trail to a 0.134-acre (5,837-sqaure-foot) public access landing. Use of the 4.2 acres for Gateway Park shall be subject to Caltrans' existing and future operational and maintenance needs, as may be approved by or on behalf of the Commission, such as providing stormwater. Best Management Practices (BMPs) to treat stormwater runoff, providing continuous access to serve and install and maintain, and necessary future utilities, and providing access to maintain the new East Span and at-grade roadways. New utilities and stormwater facilities shall be designed to be consistent with recreation and public access uses in the area.

   b. **YBI Connector and Terminus.** A 2,153-square-foot area (0.05-acre) connector and terminus at YBI connecting the bridge trail with public streets on YBI.

2. **Guarantee.** Prior to completing the dismantling of the existing East Span, but in no case later than August 13, 2015 (Amendment No. Twenty-Seven), the permittee shall, by instrument or instruments acceptable to counsel for the Commission, dedicate to a public agency or otherwise guarantee such rights for the public for so long as the improvements authorized herein remain in place, the approximately 4.5 acre public access area at the Oakland Touchdown and the 0.05-acre trail landing at YBI. The instrument(s) shall create rights in favor of the public, which shall commence no later than after completion of construction of any public access improvements required by this authorization and prior to the use of the replacement bridge authorized herein. Such instrument(s) shall be in a form that meets recordation requirements of either Alameda or San Francisco County, as applicable, and shall include a legal description of the property being restricted for

public access and a map that clearly shows and labels the mean high tide line or the +5.0 foot contour line above mean sea level in marshlands, and other appropriate landmarks and topographic features of the site, such as location and elevation of the top bank of any levees, any significant elevation changes, and the location of the nearest public street and adjacent public access areas. Approval or disapproval of the instrument(s) shall occur within 30 days after submittal for approval and shall be based on the following:

a. Sufficiency of the instrument to create legally enforceable rights and duties to provide the public access area required by this authorization;

b. Inclusion of an exhibit to the instrument that clearly shows the area to be reserved with a legally sufficient description of the boundaries of such area; and

c. Sufficiency of the instrument to create legal rights in favor of the public for public access that will run with the land and be binding on any subsequent purchasers, licensees, and users.

3. **Recordation of the Instrument(s).** Within 30 days after approval of the instrument(s), the permittee shall record the instrument(s) in each relevant County and shall provide evidence of recording to the Commission. No changes shall be made to the instrument(s) after approval without the express written consent by or on behalf of the Commission.

4. **Improvements Within the Total Public Access Area**

a. **Oakland Touchdown.** Within one year of opening the replacement bridge to vehicular traffic, Caltrans shall obtain approval for final construction plans pursuant to Special Condition II.A and complete the following public access improvements and comply with the following:

(1) **Parking Lot.** An approximately 43-stall, 0.86 acre paved parking lot that includes 0.182 acres of sidewalk and landscaping, and a vehicle turn-around. These improvements may be made permanent if desired to be retained as part of Gateway Park, or may be completely removed if no longer needed, as determined by or on behalf of the Commission, in consultation with the East Bay Regional Park District;

(2) **Bridge Connector Path and Landing.** A 15.5-foot-wide, 466-foot-long paved trail and a 0.134-acre landing with a seating area, connecting the new bridge trail with the parking lot and the trail system leading to Emeryville and Oakland, as required by BCDC Permit No. 1993.011.08. For ADA compliance and to delineate the pathway to Emeryville from the rest of the landing, a three-foot-wide row of truncated domes shall be installed across the landing adjacent to the east-bound trail. Placement of bollards shall be limited to the parking lot entrances. If the temporary parking lot is removed or altered in the future, the landing area may be redesigned to better serve the needs of Gateway Park and the cyclists and pedestrians using the east/west trail system, as determined and approved in writing by or on behalf of the Commission;

(3) **Use of the Maintenance Road.** The permittee shall limit vehicular access to the maintenance road entrances by installing keyed gates or bollards at all vehicle entrance points, to which only Caltrans-authorized entities may have

access. Gates or bollards shall not be located on the public access pathway itself without written approval by or on behalf of the Commission, and the public access trail shall be designed so as to maintain a continuous, open and inviting bicycle and pedestrian facility. All vehicles authorized to use the maintenance road shall yield to public access users at all times.

(4) **Maintenance Road Impacts on Public Access.** If vehicle traffic or other activities not related to public access purposes are found to have a significant adverse impact on the safety or quality of the public access trail, as determined by the Commission's Executive Director, the permittee shall propose a plan for revising the signage, striping, or design of the public access and maintenance road interface to resolve the conflict. A permanent redesign shall be installed within 12 months after staff notifies the permittee in writing of the nature of the problem and the extent of needed changes. If staff determines that temporary measures are reasonable and feasible, the permittee shall install such measures within 30 days of being notified. The design changes shall be approved pursuant to Special Condition II.A.

(5) **Landscaping.** Irrigation and native, drought tolerant landscaping within the approximately 4.2-acre public access area, around the parking lot, in the stormwater retention basins to the extent feasible, and adjacent to the public access path, and other public access areas, in accordance with a plan submitted to, reviewed by, and approved by or on behalf of the Commission in accord with Special Condition II-A. The plan and program shall contain the following: (a) a topographic map of the site in half meter or one-foot contours and a conversion into imperial units if metric units are used (Amendment No. Three) (all elevations shall be relative to National Geodetic Vertical Datum (NGVD)); (b) proposed plant species along the contour lines according to their expected zone of growth (for the stormwater Best Management Practices (BMPs) only); (c) a safe, attractive, and obvious path system connecting the public access on the bridge with public access to the nearest public thoroughfare (the Caltrans maintenance road or Burma Road) as required by Special Condition II-B-9 and by BCDC Permit No. 1993.011.00; (d) a management program for water and vegetation in the stormwater BMPs that integrates treating stormwater runoff with providing habitat and attractive public access landscaping; and (e) a schedule indicating when planting will occur. The permittee may maintain any BMP's including those that are vegetated, to ensure effective and efficient conveyance and treatment of stormwater runoff in accord with a plan approved pursuant to Special Condition II-A; and

(6) **Public Access Signs.** The number and location of public access signage, including Bay Trail signs, shall be prepared in a signage plan to be submitted and approved by or on behalf of the Commission. The appropriate number, location and appearance of the public access signs shall be based on the interim and final design of the public access areas and shall be consistent with the Commission's policies as well as Bay Trail policies (Amendment No. Three). The number, type, and locations of the signs shall be approved by or on behalf of the Commission pursuant to Special Condition II-A above.

b. **YBI Connector and Terminus.** The approximate 2,153-square-foot (0.05 acres) public access area will be designed to provide both a terminus for the bicycle/pedestrian path on the new East Span and for its eventual connection to public trails on YBI. This area shall include the following improvements:

(1) **YBI Path Terminus.** A pedestrian and bicycle terminus at YBI to be used as the western-most end of the public access path across the new East Span, including a 15.5-foot-wide paved and separated bicycle/pedestrian path;

(2) **Landscaping.** Irrigation and native and drought resistant landscaping adjacent to the public access path and terminus; and

(3) **Public Signs.** No fewer than three public access and, where appropriate, Bay Trail signs, one located at the entrance to the YBI path terminus, one at the entrance of the public access path entrance located near the YBI path terminus and connector, one located near the public access path adjoining the bridge at the YBI path connector ramp directing the public to the bicycle and pedestrian path. The number, type, and locations of the signs shall be approved by or on behalf of the commission pursuant to Special Condition II-A above.

c. **New East Span.** The new East Span shall be designed to provide six (6) viewing platforms (belvederes) adjacent to the 15.5-foot-wide pedestrian and bicycle path located on the new bridge. This span shall include the following improvements:

(1) A total of five (5), approximately 158-square-foot belvederes, each with a total of approximately 16 to 24 linear feet of light-weight seating elements, located along the Skyway portion of the new bridge; and

(2) One (1) approximately 263-square-foot belvedere with a total of approximately 24 to 36 linear feet of light-weight seating elements, located on the suspension portion of the new bridge.

5. **Maintenance.** The areas and improvements within all of the new public access areas required or authorized herein, including the YBI terminus, the Oakland Touchdown, and the belvederes and path on the new East Span, totaling approximately 9.6 acres, shall be maintained by and at the expense of the permittee or its assignee for so long as the improvements authorized herein remain in place. In addition, to ensure the fill authorized for the bicycle and pedestrian pathway is retained for such use, such pathway shall also be maintained by and at the expense of the permittee or its assignee for so long as the fill authorized herein remains in place. Such maintenance shall include, but is not limited to, repairs to all path surfaces, replacement of any trees or other plant materials that die or become unkempt, repairs or replacement as needed of any public access amenities such as pathways, signs, benches, trash containers and lights; periodic cleanup of litter and other materials deposited within the access areas, removal of any encroachments into the access areas, removal of graffiti; and assuring that the public access and Bay Trail signs remain in place and visible. Within 60 days after notification by staff, the permittee shall correct any maintenance deficiency noted in a staff inspection of the site.

6. **Assignment.** The permittee may transfer maintenance responsibility to a public agency or another party acceptable to the Commission at such time as the property transfers to a new party in interest but only provided that the transferee agrees in writing, acceptable to counsel for the Commission, to be bound by all terms and conditions of this permit.

7. **Reasonable Rules and Restrictions.** The permittee may impose reasonable rules and restrictions for the use of the public access areas required pursuant to Special Condition II-B-2 above to correct particular problems that may arise. Other such limitations, rules, and restrictions shall have first been approved by or on behalf of the Commission upon a finding that the proposed rules would not significantly affect the public nature of the area, would not unduly interfere with reasonable public use of the public access areas, and would tend to correct a specific problem that Caltrans has both identified and substantiated.

8. **Handicapped Accessible.** All public access facilities authorized or required herein shall be designed and built so that they are handicapped accessible.

9. **Public Access Connections.** Within one year of the commencement of construction on any future public access areas and shoreline paths on the adjacent shoreline properties at either end of the new East Span, the permittee shall complete installation of shoreline paths to connect the new shoreline paths and public access areas on the adjacent properties to the paths and public access areas required herein. The permittee shall reasonably coordinate design, construction, and maintenance with the owners and/or project sponsors of the adjacent properties to connect the public access areas and shoreline paths required herein with any future public access areas and shoreline paths proposed on the adjacent properties to create a continuous public access area. The exact type and locations of the connector paths shall be approved by or on behalf of the Commission pursuant to Special Condition II-A.

C. **Bridge Railings.** The new concrete safety barriers along vehicular travel lanes on the new East Span shall not exceed 32 inches in height. The new bridge railing along the Bay side of the new pedestrian/bicycle path shall not exceed 55 inches in height. Bridge railings shall be designed to provide motorists with the maximum feasible views of the Bay. The design of the bridge railings must be reviewed by or on behalf of the Commission to ensure this objective is achieved and shall not be installed until the design is approved in writing.

D. **Dredging**

1. **Water Quality Approvals.** At least 45 days prior to the commencement of any dredging episode authorized herein, the permittee shall submit to the Executive Director the water quality certification and waste discharge requirements, and/or any other required approvals from the California Regional Water Quality Control Board, San Francisco Bay Region, for that episode. Failure to obtain such certification prior to the commencement of the dredging episode shall terminate the Commission's authorization for that dredging episode. The Executive Director may, upon review of the Regional Board approval, either: (a) approve the dredging episode(s) as consistent with this authorization; or (b) amend the Commission approval to modify existing or include additional conditions related to water

quality. If the Executive Director amends the permit to change or add permit conditions, this permit shall become null and void unless the permittee agrees to amend this authorization in a manner specified by or on behalf of the Commission.

2. **~~Nine-Year~~ Eight Year Permit for the Remaining Dredging Work Associated with the Dismantling of the Existing East Span.** At the time of issuance of Material Amendment No. Thirty, the permittee has completed the dredging work associated with the construction of the new East Span, as authorized under Authorization Sections I-A(1)(a) and I-A(1)(b). The approximately ~~616,721~~ 213,404 cubic yards or less of remaining dredging, for the creation of a temporary demolition barge access channel and the removal of the marine foundations of the existing East Span, as authorized by Authorization Sections I-A(1)(c) and I-A(1)(d) of this permit shall be completed within ~~nine~~ eight years of the date of issuance of Material Amendment No. Thirty-Two or by March 1, 2020 whichever is earlier. No further dredging is authorized by this permit (Material Amendment No. Thirty-Two).

3. **Dredging Report**

   a. **Prior Notice of Episode.** The permittee shall notify the staff by telephone or in writing at least seven (7) days prior to undertaking any dredging episode. The permittee shall permit the Commission staff or representatives of other state or federal agencies to come aboard the dredge or barge associated with the dredging or disposal episode and observe the operation to ensure that the dredging or disposal activity is consistent with the dredging report required herein and the other terms and conditions of this amended permit.

   b. **Dredging Report.** Within thirty (30) days of completion of each dredging episode of the dredging authorized by this permit, the permittee shall submit to the Commission a report which contains: (1) a bathymetric map showing (a) the location of all areas authorized to be dredged and the authorized depth based on Mean Lower Low Water (MLLW); and (b) the actual areas, and the depth dredged based on MLLW, and any dredging that occurred outside the area authorized to be dredged or below the authorized depths; (2) a vicinity map showing the disposal site; and (3) the actual volume of the material dredged and disposed. The Commis-sion reserves the right to have such report inspected by a reliable third party familiar with bathymetric mapping in order to verify the contents of the report. If a third party selected by or on behalf of the Commission indicates that the report is inaccurate, the Commission reserves the right to require the permittee to submit a revised report that meets the requirements of this condition. If the Commission determines that the contents of the dredging report indicate that work has occurred beyond that authorized by the permit, such violation may result in the initiation of enforcement action by or on behalf of the Commission.

   c. **Dredging Updates.** Every ninety (90) days after the start of dredging operations, the permittee shall submit to the Executive Director updates of the dredging operation plan which describe the dredging activities that occurred within the previous reporting period, including: (1) the location of all areas authorized to be dredged and to what depth based on Mean Lower Low Water (MLLW); (2) the actual areas dredged and to what depth based on MLLW, and any dredging that occurred outside the area authorized to be dredged or below authorized depths; (3) a vicinity map showing the disposal sites; (4) the actual

volume of the material dredged and disposed; and (5) the volume of the material disposed of in the Bay. In addition, the updates of the dredging operation plan required herein shall include a plan, as described in Special Condition II-D-3, for the proposed dredging activities to occur during the next reporting period.

d. **Final Dredging Reports.** Within thirty (30) days of completion of each dredging episode of the new dredging authorized by this permit, the permittee shall submit to the Commission a report which contains a bathymetric map showing: (1) the location of all areas authorized to be dredged and to what depth based on Mean Lower Low Water (MLLW); (2) the actual areas dredged and to what depth based on MLLW, and any dredging that occurred outside the area authorized to be dredged or below authorized depths; (3) a vicinity map showing the disposal sites; (4) the actual volume of the material dredged and disposed; and (5) the volume of the material disposed of in the Bay. The Commission reserves the right to have such a report inspected by a reliable third party familiar with bathymetric mapping in order to verify the contents of the report. If a third party selected by or on behalf of the Commission indicates that the report is inaccurate, the Commission reserves the right to require the permittee to submit a revised report that meets the requirements of this condition. If the Commission determines that the contents of the dredging report indicate that work has occurred beyond that authorized by the permit, such violation may result in the initiation of an enforcement action against the permittee by or on behalf of the Commission.

4. **Herring.** To protect important fisheries or migrating anadromous fish species, approval of any dredging activities between December 1 and March 31 of any year shall be made by or on behalf of the Commission only upon the finding that: (a) a dredging or disposal operation which was begun prior to December 1 of any year could not be completed by the December 1 deadline due to unforeseen delays; (b) a professional biologist, or other individual sufficiently competent to identify herring spawning activity, is at the project site during all dredging operations; and (c) if herring spawning is detected at or within 200 meters of the dredging operations by the permittee's on-site biologist or qualified staff person, Department of Fish and Game personnel, or the Commission staff, all dredging within 200 meters of the herring spawn (Amendment No. Three) will cease within eight hours of notification of the project engineer for a minimum of 14 days or until it can be determined that the herring hatch has been completed and larval herring concentrations have left the site. To facilitate rapid and efficient communication under these circumstances, the permittee shall provide the Commission staff and Department of Fish and Game personnel with all necessary telephone, FAX, and pager numbers of the Resident Engineer. Dredging may be resumed thereafter at the sole discretion of the permittee and the Commission staff, but shall be terminated no later than December 31 of that year, or if further spawning takes place at the site.

5. **Barge Overflow Sampling and Testing.** Results of any effluent water quality or other testing required by the San Francisco Bay Regional Water Quality Control Board shall be submitted in writing to the Commission's office at the same time that such testing is submitted to the Regional Board.

6. **In-Bay Disposal.** At least 45 days prior to the commencement of any disposal episode authorized herein, the permittee shall submit a written statement to the Executive Director that contains all of the following: (a) the dates within which the dredging and disposal episode is proposed; (b) the total volume of material proposed to be dredged and location of the proposed disposal in the Bay; (c) an explanation as to why ocean or upland disposal of the material is infeasible; (d) an explanation as to how the proposed disposal is consistent with the U. S. Army Corps of Engineers' management of the disposal site so as to maintain adequate site capacity; and (e) results of chemical and biological testing of material proposed for disposal. The authorization for the dredging and disposal episode shall become effective only when either: (a) the Executive Director informs the permittee in writing that he or she has determined that the episode is consistent with the authorization provided herein, that there is no feasible upland alternative available for the dredged material, that sufficient capacity exists at the disposal site consistent with the long-term management of the disposal site, and that the material is suitable for in-Bay disposal; or (b) the Executive Director does not respond to the permittee's written statement within 30 days of its receipt. If the Executive Director either: (a) determines that ocean or upland disposal of the material is feasible; (b) determines that the material is unsuitable for in-Bay disposal; or (c) is informed by the U. S. Army Corps of Engineers that the proposed disposal would unacceptably reduce disposal site capacity, then such determination shall terminate the Commission's authorization for in-Bay disposal as part of that dredging episode.

7. **Eelgrass Test Plateaus Program.** The permittee may beneficially use sand dredged pursuant to an existing BCDC permit and place minor amounts of sand fill, not to exceed approximately 1,200 cubic yards, to create plateaus at suitable locations and elevations for the planting and establishment of eelgrass at the Emeryville Flats. Dredged sand material shall be tested and determined to be suitable prior to placement in the Bay. The permittee shall provide to the Commission monitoring reports pursuant to Special Condition II-F-5 (Amendment Nos. One, Two, Four, and Five).

8. **Upland Disposal of Material Unsuitable for Aquatic Disposal.** Any dredged material that is determined to be unsuitable for aquatic disposal or for use in marsh restoration at Hamilton or Montezuma or similar site by the Dredged Materials Management Office and the Regional Water Quality Control Board shall be disposed of in an appropriate manner at an upland location outside the Commission's jurisdiction. Prior to the disposal of any such material, the permittee shall submit to the Commission documentation which contains the proposed date and location for the disposal of this material. After the disposal, the permittee shall submit evidence that the material was disposed in an appropriate manner.

9. **Upland Reuse of Dredged Material.** The permittee shall make every effort to dispose as much dredged material as possible that is suitable for such use at upland reuse sites, or at marsh restoration sites, such as Hamilton or Montezuma.

10. **Seasonal Limitations.** No dredging or disposal work inconsistent with the time and location limits contained in Tables F-1 and F-2 of Appendix F, "In-Bay Disposal and Dredging" of the *Long-Term Management Strategy (LTMS) Management Plan* may be conducted without the written approval of the Executive Director, provided that such approval may only be issued after (1) BCDC consults with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish and Game or any combination thereof, as determined by the Executive Director; and (2) any required consultation with the appropriate resource agencies pursuant to state or federal endangered species acts has been completed. Such approval, if granted, shall not affect the permittee's obligation to comply with all applicable federal and state laws.

11. **Dredged Material Management Office (DMMO).** Prior to the commencement of dredging and disposal of dredged material for removal of the existing bridge the permittee shall:

    a. Submit a sediment analysis plan to the DMMO for its review;

    b. Adequately characterize the sediment to be dredged and disposed; and

    c. Submit to the DMMO for its review the test results and findings of the material to be dredged and disposed so that a subsequent suitability determination can be made.

E. **Riprap**

1. **Riprap Material.** Riprap material shall be either quarry rock or specially cast or carefully selected concrete pieces free of reinforcing steel and other extraneous material and conforming to quality requirements for specific gravity, absorption, and durability specified by the California Department of Transportation or the U. S. Army Corps of Engineers. The material shall be generally spheroid-shaped. The overall thickness of the slope protection shall be no more than three feet measured perpendicular to the slope. Use of small concrete rubble, concrete pieces with exposed rebar, large and odd shaped pieces of concrete, and asphalt concrete as riprap is prohibited. The permittee may salvage and re-use existing riprap as part of the shoreline protection work at the Oakland Touchdown.

2. **Riprap Placement.** Riprap material shall be placed so that a permanent shoreline with a minimum amount of fill is established by means of an engineered slope not steeper than two (horizontal) to one (vertical). The slope shall be created by the placement of a filter layer protected by riprap material of sufficient size to withstand wind and wave generated forces at the site.

3. **Riprap Plans**

    a. **Design.** Professionals knowledgeable of the Commission's concerns, such as civil engineers experienced in coastal processes, should participate in the design of the shoreline protection improvements authorized herein.

b. **Plan Review.** No work whatsoever shall be commenced on the shoreline protection improvements authorized herein until final riprap plans have been submitted to, reviewed, and approved in writing by or on behalf of the Commission pursuant to Special Condition II-A. The plans shall consist of appropriate diagrams and cross-sections that: (1) show and clearly label the mean high tide line, or a line five feet above Mean Sea Level in marshland, property lines, grading limits, and details showing the location, types, and dimensions of all materials to be used; (2) indicate the source of all materials to be used; and (3) indicate who designed the proposed shoreline protection improvements and their background in coastal engineering and familiarity with the Commission's concerns. Approval or disapproval of the plans shall be based upon: (1) completeness and accuracy of the plans in showing the features required above; (2) consistency of the plans with the terms and conditions of this permit; (3) assuring that the proposed fill material does not exceed this permit; (4) the appropriateness of the types of fill material and their proposed manner of placement; and (5) the preparation of the plans by professionals knowledgeable of the Commission's concerns, such as civil engineers experienced in coastal processes. All improvements constructed pursuant to this permit shall conform to the final approved plans. No changes shall be made thereafter to any final plans or to the constructed shoreline protection improvements without first obtaining written approval of the change(s) by or on behalf of the Commission.

4. **Maintenance.** The shoreline protection improvements authorized herein shall be regularly maintained by, and at the expense of the permittee, any assignee, lessee, sublessee, or other successor in interest to the project. Maintenance shall include, but not be limited to, collecting any riprap materials that become dislodged and repositioning them in appropriate locations within the riprap covered areas, replacing in-kind riprap material that is lost, repairing the required filter fabric as needed, and removing debris that collects on top of the riprap. Within 30 days after notification by the staff of the Commission, the permittee or any successor or assignee shall correct any maintenance deficiency noted by the staff.

F. **Mitigation for Fill Impacts.** The permittee shall fully complete the following mitigation measures to minimize Bay fill and offset the adverse impacts of the project authorized herein on Bay-related resources and endangered species:

1. **Removal of the Existing East Span of the SFOBB.** Within ~~two~~ seven years or by March 1, 2020 of opening the eastbound roadway of the new East Span to vehicular traffic, the permittee shall completely remove the existing East Span of the SFOBB covering approximately 12.5 acres of high-level suspended fill for the bridge deck, trusses and girders and approximately 78,829 cubic yards of solid fill of the support piers and footings and pier fenders. All material from the existing East Span shall be removed and disposed at an authorized location outside of the Commission's jurisdiction. The permittee shall remove all pilings, support piers and footings to at least 1.5 feet below the existing mudline. Prior to removal of the existing East Span, the permittee shall prepare and submit a removal plan to be approved by or on behalf of the Commission to ensure that the removal plan does not adversely impact Bay-related resources, endangered species, navigation and public health and safety and that sufficient safeguards are included to protect human safety and capture all demolition debris and related substances.

2. **Removal of Temporary Structures Associated with the Construction of the New East Span.** Within one year of opening the eastbound roadway of the new East Span to vehicular traffic, the permittee shall remove approximately 55,669 cubic yards of pile-supported fill covering approximately 14.81 acres (Amendment Nos. Six, Eight, Eleven, Twenty, Twenty-Two and Twenty-Five) of Bay surface area for the temporary access trestles, cofferdams, and falsework, and the 17,500 cubic yards of solid fill for the temporary geotube, which is temporary fill associated with the construction of the new East Span, and shall dispose of all material at authorized locations outside the Commission's jurisdiction. All temporary pilings shall be removed to at least 1.5 feet below the existing mudline.

3. **Marsh and Upland Plant Protection During Construction.** The work authorized by this amended permit shall be performed in a manner that will prevent, avoid, or minimize to the extent possible any significant adverse impact on any tidal marsh, other sensitive wetland resources, and existing native upland vegetation. If any unforeseen adverse impacts occur to any such areas as a result of the activities authorized herein, the permittee shall restore the area to its previous condition, including returning the disturbed area to its original elevation and soil composition and, if the area does not revegetate to its former condition within one year, the permittee shall seed all disturbed areas with appropriate vegetation consistent with plans approved by or on behalf of the Commission. The permittee shall employ mitigation measures to minimize impacts to wetland areas, such as: (1) minimizing all traffic in marsh, mudflat and sandflat areas; (2) fencing environmentally sensitive areas during construction to prevent intrusion into such areas; and (3) carefully removing, storing, and replacing wetland vegetation that has been removed or "peeled back" from construction areas as soon as possible following construction.

4. **Revegetation at the Oakland Touchdown.** Within one year of removing the existing East Span, the permittee shall revegetate the approximately 4.2-acre area at the Oakland Touchdown, required under Special Condition II-B and all shoreline areas impacted by the project, to the extent that such areas fall within the Commission's jurisdiction. The permittee shall coordinate its design of all landscape plans with local city agencies and any other government entity that have an interest in the project and shall strive to use native, drought tolerant landscaping that is appropriate to the micro-climatic conditions of the Central Bay. The permittee shall also work with the East Bay Regional Park District, the Oakland Army Base Reuse Authority, the Port of Oakland, the City of Oakland, the Regional Water Quality Control Board, and all other interested agencies to develop a plan for the treatment of the approximately 4.2-acre area, which East Bay Regional Park District will develop and manage as a portion of Gateway Park. The plans for revegetation of disturbed areas and the disposition of the approximately 4.2-acre area shall be approved by or on behalf of the Commission pursuant to Special Condition II-A.

5. **On-site Eelgrass Bed and Sand Flat Restoration.** Prior to dredging the barge access channel that currently supports eelgrass, the permittee shall harvest eelgrass from approximately 0.55 acres of the barge access channel footprint and transplant to adjacent areas currently supporting stands of eelgrass at the Emeryville Flats and at Albany Beach and/or Brickyard Cove within the Eastshore State Park, or to areas where test plot plateaus have been constructed at elevations suitable for the establishment of eelgrass at the Emeryville Flats. As part of this effort, the permittee

shall, in consultation with the Department of Fish and Game and the National Marine Fisheries Service, develop an experimental transplanting program to determine critical factors to the success of transplanting, growing, and sustaining eelgrass. Such a program shall be approved by or on behalf of the Commission, pursuant to Special Condition II-A, and shall include an annual monitoring report for a period of fifteen years that identifies any adverse conditions affecting the success of the transplanting program, any corrective action taken to address these adverse conditions, the relative success of transplants under a variety of conditions as compared to nearby reference sites, successful procedures that promote the establishment and long-term success of eelgrass, coordination with the Port of Oakland's Middle Harbor Eelgrass program, etc. In addition, a separate monitoring program and reporting process shall be established for the portion of the experimental eelgrass transplant program involving the creation of test plot plateaus. The monitoring shall be conducted at intervals of 4, 8, 12, 24 and 48 weeks following the creation of the test plateaus (Amendment No. Nine). On June 18, 2002 the Commission adopted *San Francisco Bay Plan Amendment 1-01* which allows (Amendment Nos. One, Two and Four) amendment of this authorization to restore the bathymetry and soil composition of the barge access channel area to its original condition prior to construction, and transplant eelgrass to the restored channel. In addition, all sand flats temporarily affected at the project site shall be fully restored to their pre-construction conditions and soil conditions existing prior to disturbance or fill placement. A geotextile fabric shall be placed prior to any fill placement for the geotube to facilitate its removal and site restoration.

6. **Coordination with Appropriate Wildlife Agencies to Minimize Impacts to Birds.** Prior to any construction authorized herein proposed in areas that the U. S. Fish and Wildlife Service has determined may impact listed bird species, the permittee shall submit for review and concurrence by or on behalf of the Commission evidence, such as a contract and/or agreement with the U. S. Fish and Wildlife Service, the UC. Santa Cruz Predatory Bird Research Group and/or the Point Reyes Bird Observatory, that will ensure compliance with the terms of the Biological Opinion issued by the U.S. Fish and Wildlife Service with respect to the California least tern and the brown pelican.

   In addition, prior to any construction activities authorized herein proposed in areas that the California Department of Fish and Game has determined may impact listed bird species, the permittee shall submit for review and concurrence by or on behalf of the Commission, evidence that a plan designed to minimize adverse impacts, such as monitoring procedures approved by the California Department of Fish and Game, in consultation with the Point Reyes Bird Observatory, to the double-crested cormorant *(Phalacrocorax auritus)* colony which exists on the support beams and scaffolding underneath the existing bridge and other migratory bird nesting and breeding on the structure is in place. Such evidence shall include the name and phone number of the individual(s) at the California Department of Fish and Game and the Point Reyes Bird Observatory, and the parties responsible for ensuring that the monitoring procedures are followed.

7. **Creation of Bird Roosting Habitat.** Prior to opening the eastbound roadway of the new East Span to vehicular traffic, the permittee shall develop and implement a plan, in consultation with the California Department of Fish and Game and the U.S. Fish and Wildlife Service and local Audubon chapters, and approved by or on behalf of the Commission pursuant to Special Condition II-A, to create approximately 500 square feet of shorebird roosting habitat in the Emeryville Crescent and at other suitable areas near the Oakland Touchdown. The shorebird roosting plan shall include provisions for monitoring and submitting reports to the Commission of shorebird use of the created roosting habitat (monthly bird counts at appropriate tidal stages between September and April for a three-year period), for maintaining sites free of vegetation and, for removing such habitat if it deteriorates sufficiently to create a potential safety or navigation problem, as determined by the Executive Director. Such shorebird roosting habitat may consist of pilings, pile-supported or floating docks, unvegetated beach and riprap areas, etc.

8. **Coordination with Appropriate Wildlife Agencies to Minimize Impacts to Eelgrass Beds.** Prior to any construction authorized within areas that contain eelgrass beds to be transplanted, the permittee shall submit for review and concurrence by or on behalf of the Commission, pursuant to Special Condition II-A, a plan designed to minimize adverse impacts to the existing eelgrass *(Zostera marina)* beds that has been reviewed and approved by the National Marine Fisheries Service, the California Department of Fish and Game, and/or the U. S. Fish and Wildlife Service. The approved plan shall include pre- and post-monitoring surveys of the existing eelgrass beds, silt curtains and operational limitations to minimize turbidity in eelgrass beds and an experimental transplanting and relocation program if determined necessary by the wildlife agencies. Such evidence shall include the name and phone number of the individual(s) at the National Marine Fisheries Service, the California Department of Fish and Game or the U. S. Fish and Wildlife Service responsible for reviewing and approving the plan and the parties responsible for ensuring that the plan is adhered to. Any monitoring reports prepared pursuant to the approved plan shall be sent to the Commission, as well as the final report which assesses the results of the eelgrass mitigation measures.

9. **Coordination with Appropriate Wildlife Agencies to Minimize Impacts to Fish During Pile-Driving.** Prior to any construction activities in the Bay associated with the pile driving authorized herein, the permittee shall submit for review and concurrence by or on behalf of the Commission, pursuant to Special Condition II-A, a plan that has been reviewed and approved by the National Marine Fisheries Service, the California Department of Fish and Game, and/or the U. S. Fish and Wildlife Service designed to minimize the adverse impacts to fish during pile-driving activities. Caltrans shall adhere to the conditions of the Biological Opinion for this project, which requires that funds totaling $4 million will be placed into an escrow account and expenditures from the account will be made at the discretion of National Marine Fisheries Services and Department of Fish and Game, in consultation with Caltrans and Federal Highway Administration, for the restoration of federal- and state- listed salmonid habitat in central and south Bay. This restoration fund will be used for off-site, out-of-kind mitigation to offset construction-related injury and mortality of listed salmonid. A portion of this fund, up to $500,000, shall be made available by Caltrans, prior to the initiation of construction activities associated with pile driving on the East Span Project for monitoring fisheries impacts, sound pressure levels, and other environmental conditions associated with these activities.

Additional mitigation for fish, developed in consultation with the National Marine Fisheries Service and the California Department of Fish and Game, shall be required if monitoring indicates that fish kills are occurring that are related to pile-driving activities. Within one month of expending funds for fish mitigation, Caltrans shall report in writing to the Commission on the mitigation measures to be implemented.

10. **Off-Site Mitigation Program.** Prior to August 31, 2002, the permittee shall create a mitigation fund and deposit the sum of $10.5 million in an interest-bearing account to be dispersed, in its entirety, including principal and interest, as approved by or on behalf of the Commission, after consultation with the California Department of Fish and Game, Regional Water Quality Control Board, U. S. Army Corps of Engineers, U. S. EPA, U. S. Fish and Wildlife Service, and National Marine Fisheries Service, solely to restore Bay shallow water submerged land and wetland habitat. The initial sum of $10.5 million dollars that is required for off-site mitigation is to offset the impacts of the project authorized in the original permit. Any additional temporary or permanent impacts resulting from new work associated with the East Span Replacement Project of the San Francisco-Oakland Bay Bridge and that were not initially authorized, may require additional mitigation or monies for mitigation as determined by the Commission (Amendment Nos. One, Two and Four).

    Preference for using the funds set aside for mitigation shall be: (a) Skaggs Island, consisting of the removal of structures and hazardous materials contained therein to facilitate the transfer of the Navy-owned portion of the site (approximately 3,289 acres) to the State or to the U.S. Fish and Wildlife Service so as to restore it to tidal marsh; and (b) Eastshore State Park sites in the Central Bay, including but not limited to Radio Beach, Brickyard Cove, Albany Beach and Hoffman Marsh or a combination thereof. The mitigation funds required above shall be dispersed in the following manner:

    a. **Skaggs Island.** A total of $8 million will be made available to efforts at Skaggs Island such that $6 million of the funds, plus accrued interest, shall be used to remove structures and hazardous materials and $2 million shall be used for work associated with and needed to implement the restoration and long-term management of Skaggs Island (Amendment Nos. One, Two and Four). Revisions to this allocation may only be approved by the Commission, after consultation with the agencies noted above.

        A portion of the fund specified above ($6 million) may be used to remove structures and hazardous materials on Skaggs Island only if: (1) the money is used to remove the structures and hazardous materials therein in a timely manner; (2) $6 million of the funds, plus accrued interest, is used to remove structures and hazardous materials and $2 million is used for work associated with and needed to implement the restoration and long-term management of Skaggs Island (any remaining funds of the $6 million allocated for site clean-up that is not spent cleaning up the site shall be added to the $2 million to be used for work associated with and needed to implement the restoration and long-term management of Skaggs Island including site planning, design and

environmental review) and (3) removal and remediation facilitates the restoration of Skaggs Island to tidal and seasonal wetlands as part of an approved restoration plan and schedule.

The $6 million may be provided to the U. S. Navy or a public agency approved by or on behalf of the Commission prior to the transfer of the property to the State or the U. S. Fish and Wildlife Service only if sufficient evidence has been submitted to the Commission that transfer documents to the State or the U.S. Fish and Wildlife Service have been executed by the Navy and placed into escrow and that there are sufficient funds to complete the remediation project.

If, however, the removal of buildings and hazardous material contained therein at Skaggs Island has not commenced by August 1, 2010, the earmarked funds shall be returned to the mitigation fund and Caltrans shall identify other potential mitigation site(s) for approval by or on behalf of the Commission, after consultation with the agencies noted above (Amendment No. Seventeen). If, the Skaggs Island wetland restoration project has not commenced by July 1, 2012, any funds remaining from the initial allocation shall be returned to the mitigation fund and Caltrans shall identify other potential mitigation site(s) for approval by or on behalf of the Commission, after consultation with the agencies noted above. Revisions to these timeframes may be approved by or on behalf of the Commission, after consultation with the agencies listed above. Preference for reallocation of the returned funds will be given to projects involving sandflat and eelgrass restoration in Central San Francisco Bay, including at Eastshore State Park, or projects that provide significant natural resource benefits to the entire Bay.

b. **Eastshore State Park.** A total of $2.5 million was made available for Eastshore State Park habitat restoration projects at locations noted above. Revisions to this allocation were to be approved by the Commission, after consultation with the agencies noted above. Approximately $1.0 million was used to design and implement a pilot project for creating an eelgrass bed in the City of Berkeley's North Basin. This project demonstrated that the site was not appropriate for a full-scale restoration project. All remaining funds of the $2.5 million allocation (approximately $1.5 million) shall be transferred to the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) as described below.

In the original authorization, the Eastshore State Park sites included, at a minimum, restoration of 5.0 acres of sand flats (a 1 to 1 replacement ratio of affected sandflat habitat) and 10.8 acres of eelgrass beds (a 3 to 1 replacement ratio of affected eelgrass habitat to achieve 3.6 acres of eelgrass) so as to offset the damage caused by the project authorized herein.

Eelgrass beds restored at the project site (i.e., within the barge access channel that currently support eelgrass if the Commission's policies regarding in-Bay use of dredged material for habitat restoration is amended) may be included in the overall eelgrass mitigation requirement. Revisions to this formula may be approved by or on behalf of the Commission, after consultation with the agencies listed above. Before the funds are dispersed to any proposed

mitigation site, Caltrans shall, after consultation with the entity proposing to restore one of the mitigation sites described above, develop a mitigation plan that conforms to the requirements of Special Condition II-F-11 below.

If, however, the habitat restoration projects at Eastshore State Park have not commenced by July 1, 2005, the earmarked funds for those projects shall be returned to the mitigation fund and Caltrans shall identify other potential mitigation site(s) for approval by or on behalf of the Commission, after consultation with the agencies noted above. Revisions to the timeframe may be approved by or on behalf of the Commission, after consultation with the agencies listed above. Preference for reallocation of the returned funds will be given to projects involving sandflat and eelgrass restoration in Central San Francisco Bay, or projects that provide significant natural resource benefits to the entire Bay.

In an attempt to inform the proposed full-scale 15.8-acre eelgrass restoration effort at the North Basin, located within the Eastshore State Park, in the City of Berkeley, the permittee conducted a three year-long pilot eelgrass study, in general accord with the work plan entitled, "North Basin Mitigation Pilot Program Work Plan", dated February 1, 2005, and transmitted with the e-mail from Melissa Barrow of Caltrans, dated March 17, 2005, requesting Amendment No. Twelve to BCDC Permit No. 8-01. The pilot project involved placing approximately 3,900 cubic yards of fill material creating approximately 54,000 square feet of plateaus at elevations expected to support eelgrass. The plateaus were monitored through summer 2008 pursuant to the monitoring protocol described in the work plan and in the permittee's request for Amendment No. 17 dated June 11, 2007, and results of the monitoring were used in assessing the feasibility of implementing the full-scale eelgrass restoration project at the site (Amendment Nos. Twelve and Seventeen).

Because eelgrass establishment was intermittent at the end of the monitoring period at the North Basin pilot site, the Commission modified this special condition to allow use of the funds in other ways that would promote eelgrass restoration in the Bay. Specifically, by March 1, 2011, Caltrans shall transfer all remaining funds, approximately $1.5 million, to the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS). The remaining funds shall be used for a Bay-wide comprehensive eelgrass restoration program, with an emphasis on East Bay restoration, where possible. Prior to the transfer of funds, NMFS and BCDC shall enter into a Memorandum of Agreement (MOA) that will provide the framework and mechanism for obtaining approval from the Commission and/or its staff, in consultation with relevant resource agencies and stakeholders, for the expenditure of the funds on individual projects (Amendment No. Twenty-Six).

11. **Marsh Restoration Work and Plans.** Any project that receives money from the mitigation fund shall include a marsh restoration plan and program, to be approved by or behalf of the Commission, for the eventual restoration of the site, and shall contain the following:

a. **Site Conditions and Modifications.** A topographic map of the site at one-foot contour intervals and a topographic map showing any proposed site modifications. All elevations shall be relative to National Geodetic Vertical Datum (NGVD). The map shall include typical cross-sections showing the proposed marsh plain elevations, any channels, and any high spots. The map shall show: (1) figures for the ratios of typical horizontal to vertical slopes for existing and proposed marsh surface, channels, and sloughs; (2) proposed plant species along the cross-sections according to their expected zone of growth; (3) the elevation of adjacent surrounding properties; and (4) figures for the estimated tidal range related to Mean Higher High Water, Mean High Water, Mean Lower Low Water, Mean Sea Level, the maximum predicted tide, and the 100-year tide. To promote natural sedimentation and colonization of the site, constructed elevations shall generally be six to twelve inches lower than target elevations.

b. **Soil Information.** The program shall include a report identifying the type of soils found at the site, at a nearby reference site, and the soil type of any fill to be imported to the site. Information shall be provided on the quantitative soil measurements of soil texture and dry density for soils at the site, at the reference site, and for all imported soils. All imported soils must be within 10% of the range of values found at the reference marsh for soil qualities such as grain size, organic content, salinity, and pH.

c. **Planting and Seeding Plan.** The restoration plan shall include a list of the vegetation proposed to be planted, an irrigation plan for watering upland and transitional plants until they are established, and a maintenance plan. Such plans shall include a program for eliminating non-native or invasive vegetation and preventing the establishment of non-native or invasive vegetation at the site.

d. **Schedule.** The program shall include a schedule indicating when excavation, fill, and grading will occur, the time to be allowed for settlement, and the time when planting will occur. For Skaggs Island, the schedule should provide a time-line for the actions needed before the site will be returned to tidal action, and the objectives and measures that can be implemented in the interim to enhance the site's natural resource functions.

e. **Identification of a Suitable Reference Site.** The program shall identify nearby reference sites that shall be evaluated as part of the monitoring program and shall provide a reference for evaluating the progress of the restoration site.

f. **MOA/MOU.** The plan and program shall include all executed MOA's/MOU's and cost agreements that establish the responsibilities between the permittee, and any other government entity implementing the mitigation work for the permittee, including designing, constructing and monitoring any mitigation work.

g. **Monitoring.** Every year, starting October 1 of the year following the return of the site to tidal action for a fifteen-year period, or until those portions of the restoration site subject to tidal action are approximately 95% vegetated as compared with nearby reference marshes (or eelgrass beds), or for sandflats, until benthic sampling indicates similar biomass, whichever occurs first, the permittee shall report to the Commission on the effects of the project in

restoring the target habitat (tidal marsh or transitional habitat or eelgrass beds or sandflats) at the restoration site. The report shall include measuring sedimentation rates, percentage of the site revegetated, plant survival, approximate percentage representation of different plant species, and a qualitative assessment of plant growth rates for the tidal restoration area, including adjacent transitional and upland habitats. Undesirable exotic plant species such as pepperweed (*Lepidium latifolium*), *Spartina alterniflora*, broom, or star thistle shall be reasonably controlled (coverage of less than 5 percent of their expected zone of growth) during the fifteen-year monitoring period. Should adverse conditions be identified during the fifteen-year monitoring period, the permittee shall take corrective action as specified by or on behalf of the Commission.

G. **Horizontal Control Points.** As shown on the plans required by Special Condition II-A, the permittee shall install a minimum of four permanent horizontal control points of the type and at specific locations at the East Span of the San Francisco-Oakland Bay Bridge (SFOBB) site approved by or on behalf of the Commission. The permittee shall place these control points under the supervision of a registered civil engineer or land surveyor, and shall be accurately located and mapped in relation to each other, to the closest known existing control point or other acceptable fixed point in the project area, and to the limits of any proposed fill in the Bay. The permittee shall locate these control points to facilitate field checking, with simple equipment, of the limits of the fill authorized pursuant to this authorization. Such fill limits shall be dimensioned form these control points, or, if the scale of the drawing is adequate, it shall carry a note stating that the field dimensions may be scaled from the drawing and the accuracy of such scaling, e.g., "Field dimensions to an accuracy of +/- may be scaled from the drawing." The permittee shall clearly show these control point locations on all plans submitted pursuant to the Special Condition II-A.

H. **Temporary Construction <u>and Demolition</u> Access.** Except for the coffercell system authorized for use at the temporary towers "C" on the east side of Yerba Buena Island as authorized by Amendment No. Twenty, any fill placed for construction <u>and/or demolition</u> access and work platforms shall be pile-supported or floating only, and shall be approved by or on behalf of the Commission prior to their installation pursuant to Special Condition II-A. The permittee is strictly prohibited from using solid fill in the Bay for construction <u>and/or demolition</u> access and work platform purposes with the exception of the minimum amounts necessary of earthen fill to create the minimum necessary grade transitions from the land to pile-supported work platforms, and install the geotube to construct the westbound roadway, and the tidal berm for the Caltrans maintenance road. Amendment No. Twenty-Two authorizes the construction of a crane runway platform supported by piles and two access ramps composed of solid fill for installing a detour bypass structure within the Commission's 100-foot shoreline band on the southeast side of Yerba Buena Island north of Coast Guard Cove. Filter fabric shall be installed under crane pads and shall overlap as necessary to cover the entire crane runway platform surface to control sedimentation and ensure that water quality is not adversely affected by construction activities. A 12-foot oil pan shall be suspended under the crane to provide secondary containment. All construction work associated with the crane runway platform shall be land-based, occur above mean high tide, and be conducted at low tide to eliminate the potential of any sediment run-off into the Bay from construction activities, and minimize the potential for sound energy wave impacts

to fish and other marine organisms during pile driving. The crane runway platform and access ramps shall be completely removed by July 31, 2010 (Amendment No. Twenty-Eight).

I. **Debris Removal.** All construction debris shall be removed to a location outside the jurisdiction of the Commission. In the event that any such material is placed in any area within the Commission's jurisdiction, the permittee, its assignees, or successors in interest, or the owner of the improvements, shall remove such material, at its expense, within ten days after it has been notified by the Executive Director of such placement.

J. **Hazardous Materials Removal and Remediation.** The permittee shall ensure that it performs any removal, remediation, encapsulation or disposal of hazardous or toxic materials, such as lead-based paint, consistent with the requirements of the U. S. Environmental Protection Agency and any applicable local, state and federal laws.

K. **Non-Point Source Pollution Control.** The permittee shall implement all appropriate and necessary best management practices (BMP's) to minimize the discharge of non-point source pollutants to the Bay during and after construction. The BMP's shall be consistent with applicable local, state and federal laws and any required waste discharge requirements, National Pollutant Discharge Elimination System (NPDES) permits and stormwater pollution prevention plans and shall be shown on the plans required under Special Condition II-A.

L. **Construction and Maintenance Operations.** All construction operations and ongoing repair and maintenance activities shall be performed to prevent construction materials from falling into the Bay. In the event that such material escapes or is placed in an area subject to tidal action of the Bay, the permittee shall immediately retrieve and remove such material at its expense.

M. **Creosote Treated Wood.** No pilings or other wood structures that have been pressure treated with creosote shall be used in any area subject to tidal action in the Bay or any certain waterway, in any salt pond, or in any managed wetland within the Commission's jurisdiction as part of the project authorized herein.

N. **Placement and Use of the Construction Barges and Coordination with the U.S. Coast Guard.** Prior to the use of any barges in the Bay, the permittee shall first submit evidence that their use complies with the U.S. Coast Guard Checklist and the Dredging Operation Plan and updates required pursuant to Special Condition II-D.

O. **Mud Waves.** The permittee shall implement reasonable measures to prevent the creation of mud waves as a result of project construction. Should the project result in the formation of a mud wave, the permittee shall remove the mud wave and, after review and approval by or on behalf of the Commission pursuant to Special Condition II-A, implement measures to correct the conditions that led to mud wave formation.

~~P. **Notice to Contractor.** The permittee shall provide a copy of this permit to any contractor or person working in concert with the permittee to carry out the activities authorized herein and shall point out the special conditions contained herein.~~

P. **Certification of Contractor Review.** Prior to commencing any grading, demolition, or construction, the general contractor or contractors in charge of that portion of the work shall submit written certification that s/he has reviewed and understands the requirements of the permit and the final BCDC-approved plans, particularly as they pertain to any public access or open space required herein, or environmentally sensitive areas (Material Amendment No. Thirty-Two).

Q. **Commission Jurisdiction Over Fill Area.** Notice is hereby given that, under the McAteer-Petris Act, the area of the approved project that is within the Commission's jurisdiction under Section 66610(a) remains within that jurisdiction even after fill or substantial change in use, authorized by the Commission, may have changed the character of the area; so that the permittee or the permittee's successors in interest will require further action by or on behalf of the Commission prior to any future change of use or work within areas filled pursuant to this authorization.

R. **Recording.** The permittee shall record this document or a notice specifically referring to this document with the City and County of San Francisco and Alameda County within 30 days after execution of the permit issued pursuant to this authorization and shall, within 30 days after recordation, provide evidence of recordation to the Commission.

S. **New Buildings.** To minimize intrusion in proposed public access and recreational areas, and to maximize visual access to the Bay, any new buildings proposed in the Oakland Touchdown area as part of this new East Span shall be designed and located to be compatible with existing buildings in the area, and to be clustered with them, to the maximum extent feasible.

T. **Maintenance Road Landscaping.** Landscaping for the maintenance road in the Oakland Touchdown, particularly where the road separates west and eastbound travel lanes, shall be submitted and approved in accord with Special Condition II-A. Such landscaping plan shall clearly denote the end of the bridge and the beginning of dry land, and serve as a gateway to the East Bay.

U. **Conformity with State Historic Preservation Requirements.** The permittee shall fully comply with all requirements of the State Historic Preservation Office regarding the historical preservation and/or interpretation of the existing East Span of the Bay Bridge and any other existing buildings south of the bridge approach at the Oakland Touchdown

V. **Debris Removal for Demolition and Capping.** All construction debris from the demolition of the existing bridge that is determined to be inert, non-hazardous, and non-toxic may be deposited within the footings of the existing bridge up to but no higher than an elevation of minus 10-feet below the pre-construction mudline elevation. Any construction debris that is placed within footings of the existing bridge shall be fully contained and shall not leach into the existing water column. All construction debris from the demolition of the existing bridge that is determined to be hazardous, toxic, or deleterious to the environment shall be removed to a location outside the jurisdiction of the Commission. In the event that any such material is placed in any area within the Commission's jurisdiction, the permittee, its assignees, or successors in interest, or the owner of the improvements, shall remove such material, at its expense, within ten days

after it has been notified by the Executive Director of such placement. After the disposal, the permittee shall submit evidence that the material was disposed in an appropriate manner.

W. **Post-construction Stormwater Treatment.** By December 31, 2008, the permittee shall install post construction stormwater treatment facilities as required by the Regional Water Quality Control Board and subject to the following (Amendment Nos. Fifteen and Eighteen):

1. **Plan Review.** All post construction stormwater treatment measures shall be reviewed and approved by or on behalf of the Commission pursuant to Special Condition II-A.

2. **Environmentally Sensitive Area Fencing.** Environmentally sensitive areas (ESA's) shall be delineated in the field with fencing to protect the California clapper rail, the salt marsh harvest mouse and other sensitive wildlife habitat, and to prevent construction activity from occurring outside of the construction zones. The environmentally sensitive area fencing shall be installed pursuant to the plans entitled, "Attachment E, ESA, Mouse and Goose Fence Maps, SFOBB Stormwater Project," Sheets 1 through 4, and the plan entitled, "Construction Details, Temporary Mouse Fence," all prepared by Caltrans and received in the Commission's office on April 19, 2006.

3. **Mitigation**

   a. **Temporary Impacts:**

      (1) All areas temporarily affected by installation of stormwater treatment facilities that are located in the Bay and within the 100-foot shoreline band including those areas located within the wildlife priority land use area and the Cypress Mitigation Area (BCDC Permit No. 1993.011.00) shall be restored to pre-project conditions, and where appropriate re-vegetated with a native plant palette consistent with the Emeryville Crescent. The actual area of temporary impacts is delineated in the permittee's submittal entitled, "Attachment A, East Bay Bridge Storm Water Basin Project Impacts, Map 1-5 August 2007," submitted with the request for Amendment No. Eighteen. Prior to replanting, any cypress trees damaged by construction shall be pruned under the direction of a licensed arborist, as needed, to promote health and improve appearance. Also, all gravel installed for construction access purposes shall be removed and, thereafter, all soil in the construction zone shall be cultivated to a depth of six to twelve inches and receive two inches of soil amendment. The replanting project shall provide transitional and upland habitat contiguous with the existing vegetation. All replanting shall conform to the planting plans approved by this amended permit, submitted as Attachment D to the request for Amendment No. Eighteen on September 6, 2007.

      (2) To compensate for the temporal loss of 2.55 acres of habitat (0.69 acres by Amendment No. Fifteen and 1.86 acres after-the-fact by Amendment No. Eighteen) that will result from the installation of the stormwater treatment facilities in the wildlife priority use area, Cypress Mitigation Area (BCDC Permit No. 1993.011.00), the 100-foot shoreline band, and additional in Bay impacts, the permittee shall provide, by no later than October 15,

2008, an in-lieu fee to the Commission or directly to the California State Coastal Conservancy, if the Commission staff so directs, in the total amount of $893,813 ($109,900 by Amendment No. Fifteen and $783,913 by Amendment No. Eighteen). The in-lieu fee shall be used by the East Bay Regional Park District (EBRPD), California State Parks or the California State Coastal Conservancy to improve upland habitat in the Eastshore State Park preferably along the Emeryville Crescent, subject to approval by or on behalf of the Commission.

b. **Permanent Impacts.** The permittee shall mitigate for permanent impacts from installation of stormwater treatment facilities located in the wildlife priority land use area and areas outside the wildlife priority land use area that were required for mitigation under BCDC Permit No. 1993.011.00 (a total of a 3:1 ratio for a 0.39 acre area). Compensation shall be provided by no later than October 15, 2008, in the form of an in-lieu fee to the Commission or to the California State Coastal Conservancy if the Commission staff so directs in the amount of $75,810. The in-lieu feel may be used by the East Bay Regional Park District, California State Parks and/or the California Coastal Conservancy to improve upland habitat in the Eastshore State Park preferably along the Emeryville Crescent, subject to approval by or on behalf of the Commission.

4. **Mitigation Monitoring within the Wildlife Priority Land Use Area and the Cypress Mitigation Area.** The permittee shall monitor all revegetated areas in the Bay and within the wildlife priority land use area and the Cypress Mitigation Area every other year for a total of three monitoring events to determine success. An annual monitoring report shall be submitted to the Commission, every other year beginning December 31, 2008, for the duration of the five-year monitoring period. Within 90 days of the issuance of Amendment No. Eighteen, the permittee shall submit a monitoring plan for staff review and approval. The plan shall describe methods for determining habitat quality and whether the following success criteria are met: (a) replanted areas must achieve 60% cover by native plant species, except for the "failed areas" of the Cypress Mitigation that will be replanted (see Permit No. 1993.011.06) and the grass seeded areas under the dense cover of Monterey Cypress trees; (b) pampas grass, fennel, broom, and ice plant must be eradicated from replanted areas for the duration of monitoring; (c) Asian mustard, pepperweed, velvet grass and bermuda grass must cumulatively not exceed 5% of cover for the duration of the monitoring; and (d) unsuccessful areas with little or no cover must be identified and adaptive measures to promote vegetation success determined. If the success criteria are not met by the fifth-year monitoring report, the permittee shall propose corrective actions and obtain approval of the measures by or on behalf of the Commission.

5. **Amendment to BCDC Permit No. 1993.011.00.** Within two months of executing Amendment No. 15 to BCDC Permit No. 8-01 or by September 1, 2006, whichever is earlier, the permittee shall submit a "fileable" amendment request to the Commission to amend BCDC Permit No. 1993.011.00. The amendment request shall address the impacts of the post-construction stormwater treatment measures to the wildlife priority use area and the Cypress Mitigation Area.

6. **Revised Open Space Instrument BCDC Permit No. 1993.011.00.** By no later than September 30, 2008, the permittee shall revise and record the open space agreement required under BCDC Permit No. 1993.011.00. The revisions shall account for any

new permanent improvements, such as maintenance vehicle pullout areas, that will fall within those portions of the wildlife priority land use area that were dedicated for open space.

X. **Installation and Removal of Utility Vaults Associated with Relocation of the U.S. Navy Submarine Cable Authorized Under Amendment No. Two to BCDC Consistency Determination No. CN 4-89 (Amendment No. Fifteen)**

1. **Removal of Utility Vault.** Within one year of dismantling the existing span of the San Francisco/Oakland East Span of the Bay Bridge or by July 1, 2013, whichever is earlier, the permittee shall submit and receive Commission approval of plans to remove an existing 80-square-foot utility vault on the Oakland Mole.

2. **New Vault** (associated with U.S. Navy Cable relocation). The plans described above shall include landscaping to screen the new vault authorized under Amendment No. Two to Consistency Determination No. 4-98 from future park uses, if deemed appropriate by the Commission, in consultation with the East Bay Regional Park District.

Y. **Removal of Filter Fabric.** The coffercell system authorized herein shall utilize the placement of a filter layer and silt curtains. This filter layer shall serve to demarcate the limit of temporary fill in addition to serving its technical purpose. All filter fabric, silt curtains and material used for the installation of the coffercell system on the east side of Yerba Buena Island shall be removed by November 30, 2008. The shoreline area affected by the construction of the coffercell system shall be returned to its pre-existing conditions by this date. The footprint area of the temporary tower foundations will be returned to its pre-existing conditions when the temporary towers are removed upon completion of the Self-Anchored Suspension Span (Amendment No. Twenty).

Z. **Installation and Removal of temporary wildlife exclusion fence adjacent to the Oakland-Emeryville Wildlife Priority Land Use Area (Amendment No. Twenty-Four)**

1. On a three-year-trial basis or until February 1, 2012, whichever is sooner, the permittee may use the three-foot-high polyvinyl fencing to restrict the movement of Canadian geese onto I-80 as precisely described in its September 18, 2008 letter requesting Amendment No. Twenty-Four. The installation of this fence must be complete by no later than February 1, 2009, in compliance with state and federal resource agency reviews of potential impacts to special status species.

2. By no later than February 1, 2009, the permittee shall entirely remove all components of the existing temporary fencing, located bayward of the new temporary fence alignment.

3. If vehicle crash-recovery or other events cause damage to any portion(s) of the new temporary fence, the permittee shall, within 30 days of notification from Commission staff, repair the fence and submit evidence (photographs) that the fence has been restored it to its original condition.

4. By no later than February 1, 2012, the permittee shall entirely remove all components of the new temporary fence from the Commission's jurisdiction, unless prior to that date the permittee has obtained authorization by or on behalf of the Commission that this fence, or some other fence, may be erected permanently, based on the following criteria: (a) the permittee can demonstrate that the fence design and location is effective for the stated purpose and is necessary; (b) the BCDC staff concurs that the design has no aesthetic impacts, including those related to fence damage and durability; (c) prior to July 1, 2011, the permittee submits a proposal for a permanent fence and receives a favorable recommendation from the Design Review Board, consistent with the requirements for visual access in BCDC Permit No. 1993.011.00, Special Condition II-D.

AA. **Minimizing Impacts of Pile-Driving on Aquatic Species During Construction of the Temporary Access Trestle and Incidental Take Permit (Amendment No. Twenty-Five).**

1. The following measures shall be employed during pile driving activities to minimize impacts to aquatic species:

   (1) A bubble-curtain shall be employed during construction of the temporary access trestle authorized under Amendment No. Twenty-Five for 18 of the 22 piles, which will be located off-shore;

   (2) All pile-driving activities shall be restricted to June 1st through November 30th of any given year;

   (3) Pile-driving activities shall be restricted to daylight hours; and

   (4) Hydroacoustic and bird predation monitoring shall be conducted during pile driving activities pursuant to the "Final Hydroacoustic Monitoring Plan for Driving of Temporary Piles for the Self-Anchored Suspension Bridge" (May 2008).

2. **Incidental Take Permit (ITP).** No work shall commence until the permittee provides the Commission with an approved California Department of Fish and Game Incidental Take Permit for construction of the temporary trestle. The permittee shall incorporate all required mitigation measures in the ITP into its construction practices and amend this BCDC authorization if necessary to include authorization of these mitigation measures.

BB. **Minimizing Impacts of Pile-Driving During Construction of the YBI and Oakland Trestles and the Temporary Supports for Dismantling the East Span (Material Amendment No. Thirty-Two).**

1. **Final Biological Opinion for the NOAA National Marine Fisheries Service (NFMS).** No work shall commence until the permittee provides a copy of a final Biological Opinion (BO) from the NOAA National Marine Fisheries Service (NMFS) for the work associated with Material Amendment No. Thirty-Two. Should the final BO require changes to the authorized improvements or special conditions, prior to commencement of work authorized herein in Amendment No. Thirty-Two, the permittee shall apply for and receive Commission authorization for any required changes.

2. **Mitigation Measures During Pile-Driving.** To ensure that pile-driving activities will not adversely impact fish within the project area, the permittee shall incorporate all required mitigation measures specified by the final BO issued by NMFS, including the following:

   (a) Steel pipe pile sizes will be limited to 0.91 meter (36 inches) in diameter or smaller.

   (b) Pile driving will occur only during daylight hours from one hour after sunrise to one hour before sunset during the peak seasonal salmonid and green sturgeon migration periods (December 1 to May 31). Pile driving operations occurring outside the peak seasonal salmonid and green sturgeon migration period (June 1 to November 30) shall direct illumination away from the water.

   (c) All pipe piles will be installed with a vibratory hammer. The vibratory hammer will be used to drive the majority of the total pile lengths. The remainder of the pile may be impact-driven with the use of a marine pile driving energy attenuator (*i.e.*, air bubble curtain system), or other equally effective sound attenuation method.

   (d) In the event a pipe pile is entirely installed with a vibratory hammer, it will be subject to final "proofing" with an impact hammer (a limited number of blows with an impact hammer intended to test integrity and seating of the pile).

   (e) Use of a marine pile driving energy attenuator (*e.g.*, bubble curtain) will be required during impact driving of all pipe piles, with the exception of pile proofing.

   (f) A maximum of 10% of the piles installed completely with a vibratory hammer may be proofed with an impact hammer, without the use of a marine pile driving energy attenuator.

   (g) Proofing of piles will be limited to a maximum of two piles per day, for less than 1 minute per pile, administering a maximum of twenty blows per pile.

   (h) Impact pile driving (with the exception of pile proofing) will be restricted to the period between June 1 and November 30 to avoid the peak migration period for salmonids and spawning adult green sturgeon.

   (i) When construction activity occurs within 1,000 meters (3,200 feet) of an eelgrass bed or sand flat, measures will be taken to ensure, to the extent practical, that turbidity generated by these activities does not exceed 50 Nephelometric Turbidity Units (NTU) or result in incremental increase greater than 10% of the background NTU at a distance greater than 30 meters (100 feet) from the activity (Amendment No. Thirty-Two).

3. **Monitoring During Pile-Driving.** The permittee shall submit a final NMFS- and RWQCB-approved hydro-acoustic monitoring and reporting program to the Commission prior to starting impact pile driving. This program shall provide daily summaries and monthly reports on hydroacoustic monitoring results, data on the total number and frequency of impact hammer strikes per day, observations of bird predation and behavior, and evaluate fish mortality and injury rates as determined through visual observations and collections during pile driving events. The program shall document the extent of the underwater sound footprint during pile driving activities, including the number, location, distances, and depths of

hydrophones and associated monitoring equipment. If underwater sound exceeds levels safe to fish (as established by NMFS), NMFS and the Commission must be contacted within 24 hours before continuing to drive additional piles.

4. **Incidental Take Permit (ITP).** No work shall commence until the permittee provides the Commission with an approved California Department of Fish and Game Incidental Take Permit for the construction of the temporary trestles and support piles. The permittee shall incorporate all required project revisions or mitigation measures identified in the ITP into its construction practices and amend the subject amended permit, if necessary, to include authorization of these mitigation measures (Material Amendment No. Thirty-Two).

5. **Eelgrass Monitoring.** The permittee shall conduct annual, project-wide eelgrass surveys at both YBI and Oakland, during the growing season, in all years in which in-water work occurs. Surveys shall be consistent with prior eelgrass surveys performed for this project from 1999 to 2007, and annual reports shall be provided to the Commission by April 1 of the following calendar year (Material Amendment No. Thirty-Two).

CC. **Best Management Practices to Protect Water Quality During Demolition (Material Amendment No. Thirty-Two).** No work shall commence until the permittee provides a final set of construction Best Management Practices to contain debris from bridge dismantling that have been approved by the RWQCB. Measures should include containing lead paint and asbestos and demolition debris and preventing these materials from entering the Bay. The permittee shall also perform turbidity monitoring during activities with the potential to produce turbidity and suspended sediment (as outlined in the Water Quality Self-Monitoring Program required by RWQCB Order No. R2-2002-0011), and ensure, to the extent practical, that turbidity generated by construction activities does not exceed thresholds that could adversely impact eelgrass, as established by the RWQCB (Material Amendment No. Thirty-Two).

III. Findings and Declarations

This amended permit is issued on the basis of the Commission's findings and declarations that the work authorized herein is consistent with the McAteer-Petris Act, the *San Francisco Bay Plan* (Bay Plan), the California Environmental Quality Act, and the Commission's amended coastal zone management program for San Francisco Bay for the following reasons:

A. **Bay Fill.** Section 66605 of the McAteer-Petris Act states that further filling of San Francisco Bay should be authorized only when public benefits from fill clearly exceed public detriment from the loss of water areas and should be limited to water-oriented uses, including bridges. In addition, the Commission should authorize fill only when no alternative upland location is available, the fill is the minimum amount necessary, and the nature, location and extent of fill minimizes the harmful effects to the Bay. The project will replace the existing East Span of the Bay Bridge, constructed in 1936, with a replacement bridge that will meet current seismic design criteria.

1. **Public Benefits v. Public Detriment.** The major public benefit of this project is to seismically upgrade the East Span of the Bay Bridge. The replacement bridge will be designed as a lifeline structure (constructed to a higher standard to provide necessary post-disaster functionality), built to withstand a major earthquake, thereby improving public safety and reducing economic disruption during a large earthquake. Failure of the bridge would not only lead to likely loss of life, but

would severely disrupt emergency response efforts, and subsequent economic recovery of the Bay region. The new span will also greatly enhance views of the Bay from the bridge and will reduce congestion by providing ten-foot-wide shoulders on the inside and outside of the traveled way for each traffic direction, thereby providing safer access for disabled vehicles and making this Interstate highway current with AASHTO and other highway design and safety codes. The bridge replacement will also provide public access where none has previously existed and will include significant public benefits through the mitigation package.

2. **Use.** The McAteer-Petris Act and the *San Francisco Bay Plan* identify bridges as water-oriented use for which some fill can be authorized.

3. **Alternative Upland Location.** There is no practical alternative upland location for the replacement bridge as it provides a vital east-west link from Oakland to the West Span of the Bay Bridge and ultimately to the City of San Francisco. Retrofitting the existing bridge has already been found by the Commission to be an infeasible option because a retrofitted bridge, during a seismic event, would be more likely to fail than a new replacement bridge. In addition, a retrofitted bridge would have a more limited lifespan than a new bridge. Thus, a replacement bridge provides significant economic and safety benefits over retrofitting the existing East Span.

4. **Minimum Fill.** This project involves placing a total of approximately 104,453 cubic yards of permanent solid fill in the Bay which will cover approximately 46.05 acres of Bay surface area. Approximately 41.93 acres of this fill will be pile-supported or suspended high above the Bay. Such fill typically has relatively few impacts to Bay-related resources. Approximately 3.03 acres of the authorized fill will consist of solid or earth fill for the westbound roadway and the Caltrans maintenance road and, in addition, approximately 0.52 acres of sand fill for beneficial use will be placed to create test plot plateaus in the Emeryville Flats for the experimental eelgrass transplant program. Caltrans will: (a) remove the existing East Span, including all footings to 1.5 feet below the mudline; (b) remove temporary pilings associated with construction trestles and falsework to at least 1.5 feet below the mudline; (c) remove any temporary cofferdams to at least 1.5 feet below the mudline; and (d) by November 30, 2008, remove all rock and items associated with the temporary coffercell systems. Because the existing East Span has a greater number of footings than the new bridge, footings which are also larger than the new bridge footings, the project will result in a net increase of 173,806 cubic yards in the Bay's volume.

   In an effort to reduce the fill associated with the new bridge, Caltrans evaluated a number of project alternatives and project modifications. For example, the existing Bay Bridge contains two roadways in a double deck structure with westbound traffic on the top deck and eastbound traffic on the lower deck. While resulting in less Bay fill, this configuration is not as seismically reliable as two parallel roadbeds. Moreover, a parallel roadbed configuration will give the bridge a more slender visual profile and will provide eastbound motorists with sweeping views of Oakland, Berkeley and the East Bay hills. Although a replacement structure with parallel roadways will approximately double the amount of the Bay covered by the bridge, the bulk of this coverage will be high above the Bay and cause limited environmental impacts.

An alignment built immediately south of the existing East Span could possibly result in less Bay fill, but would potentially reduce the amount of space available for future park uses south of the Bay Bridge toll plaza and would impact Coast Guard operations at YBI. Also, the new northern alignment provides better views for motorists.

A pile-supported, eastern touchdown would also result in less Bay fill compared to the solid fill for the touchdown. However, the Engineering Design Advisory Panel (EDAP), which included all the members of the Commission's Engineering Criteria Review Board (ECRB) and the Design Review Board (DRB), concluded that in the event of a major earthquake, the solid fill option would provide a greater degree of safety over the pile-supported fill option. Additionally, the modes of failure of a pile-supported fill structure make it less easily and quickly repaired than solid fill, which even if it cracks or settles, may only require additional overlays to repair. A pile-supported fill structure may need to be torn down completely and rebuilt (or require a substantial retrofit in and near the Bay) depending on the damage that occurs.

Caltrans' evaluation of these and other alternatives was aided by EDAP. As various alternatives were being evaluated, the Commission was asked for guidance on some of the alternatives being considered. At the Commission meeting of June 18, 1998, the Commission was briefed and voted to support EDAP's recommendations that the replacement structure should be a single-tower, self-anchored suspension bridge joined to the East Bay shoreline by a causeway, and that a bicycle and pedestrian path should be provided along the south side of the new bridge. At the Commission meeting of November 4, 1999, the Commission was briefed and voted to support EDAP's recommendation that the Oakland Touchdown area should be built on solid fill rather than be pile-supported.

Some fill could possibly be eliminated by reducing the size of the maintenance road at the Oakland Touchdown, or by narrowing the space between the two parallel roadways as they land at the Oakland Touchdown. Caltrans originally proposed to use an approximately 48-foot-wide separation between the east and westbound structures for the majority of the alignment. The structure separation narrows down to approximately 40 feet as it approaches the Oakland Touchdown and this alignment is maintained on the solid fill approach. Caltrans stated that the American Association of Street and Highway Transportation Official's (AASHTO) criteria were used for this design separation width. Both the Commission's ECRB and DRB recommended that a constant "clear distance" be maintained throughout the majority of the replacement bridge. A 40-foot-wide separation between the two roadways will allow construction of a maintenance road with two twelve-foot lanes, two shoulders and a median that will be designed to the minimum recommended criteria. Caltrans believes that the size of the maintenance road cannot be further reduced because: (a) the maintenance road will be located between the westbound and eastbound roadways and is critical for emergency and service vehicle access. The maintenance road will serve as the primary access route for emergency vehicles responding to accidents on the bridge as well as the primary circulation road for accessing the median toll facility from the current maintenance facility to the south of eastbound I-80 in the future. However, it is uncertain how effective the shoulders and medians will be for emergency purposes since conceptual landscaping plans indicate planting of these areas; (b) reducing the width of the maintenance road and

its median and shoulders would be less than the minimum criteria specified by AASHTO's *Policy on Geometric Design of Highways and Streets* for a road of this intended purpose. AASHTO design criteria are guidelines that are typically less restrictive with regard to driver comfort and safety than Caltrans' design guidelines, as embodied in the Caltrans *Highway Design Manual*. The design section widths specified above will provide the minimum space for the operation of emergency service vehicles while also providing sufficient room for passing disabled vehicles. This is an important design feature as the response time of emergency vehicles is key to realizing the intended use of the maintenance road and ensuring public safety; thus, it would be very undesirable for the maintenance road to be narrowed at this location; (c) given the restrictive geometric configuration at the westbound alignment where the minimum separation is present, reversing curves will be required to bring the westbound alignment closer to the maintenance road and eastbound alignment. Because reversing curves are required, the westbound roadway cannot be shifted by a uniform distance. Due to the short distance within which the reversing curves will occur, an alternative alignment will not be able to meet Caltran's minimum requirements for curve lengths and central angles; and (d) if the alignment were to be changed at the Oakland Touchdown to reduce Bay fill, there would be additional costs associated with the redesign of this location and potential delays to the construction schedule.

Finally, there could be some potential to reduce the size, amount or the impacts of the temporary fill to facilitate construction of the bridge. Caltrans will place a total of approximately 55,453 cubic yards (Amendment Nos. Six, Eight, Eleven, and Twenty) of temporary fill in the Bay for temporary pile-supported structures such as docks, falsework, access trestles and/or temporary cofferdams and coffercell systems covering approximately 14.53 acres (Amendment Nos. Six, Eight, Eleven, and Twenty) of Bay surface area. Of the temporary fill, approximately 0.8 acres of temporary solid fill may also be placed to protect and isolate construction areas. Caltrans has identified a likely construction scenario that the contractor may implement to construct the new bridge. This includes the use of a temporary barge dock at YBI and construction access trestles for the main span, the skyway, and the Oakland approach. According to Caltrans, "these structures would be designed using the minimum fill necessary that would allow for construction access, transportation and the use of large construction equipment, such as cranes and pile drivers, and safe working platforms for personnel." However, it is possible that the contractor may choose to utilize a different size, configuration and/or siting of docks and access trestles. The size of the falsework, falsework piers, cofferdams and coffercell systems are a function of the bridge size itself. It is Caltrans' opinion that the temporary fill associated with these structures cannot be further minimized unless the diameter of the piles and pile caps and the cross-section of the bridge deck are also reduced, which would affect seismic safety and traffic capacity. The construction methodology for the Oakland Approach and the Skyway portion of the new bridge will allow the contractor with the lowest qualified bid some latitude between the pre-cast segmental alternative and the cast-in-place alternative only through a cost reduction incentive proposal.

Thus, while a double-deck bridge would result in less fill than two parallel spans. The East Span bridge replacement will: (a) improve public safety by replacing the 1936 span with a new structure that meets current seismic design and traffic safety standards and will provide a lifeline connection that will provide post-earthquake

access to link major population centers, emergency relief routes, emergency supply and staging centers; (b) provide the minimum amount of permanent fill that will accommodate EDAP, DRB and ECRB recommendations for seismic safety; (c) provide the minimum amount of permanent fill to construct a maintenance road, that will meet current design codes, allow access to the median toll facility and facilitate emergency vehicle response to access the bridge; (d) provide the minimum amount of temporary fill during the construction phase of this project; and (e) provide a net increase of 173,806 cubic yards in the Bay's volume through removal of existing bridge footings.

The Commission finds that Special Condition II-F included in this authorization is necessary to ensure that the Bay fill will not adversely impact Bay-related resources and endangered species. Therefore, as conditioned herein, the Commission finds the public benefits of the project outweigh the detriments caused by the Bay fill, and that the fill is consistent with Section 66605 of the McAteer-Petris Act in accordance with the Commission's laws and policies on the manner and purpose of placing fill in San Francisco Bay.

B. **Mitigation.** In part, the Bay Plan policies on mitigation state that mitigation for the unavoidable adverse environmental impacts of any Bay fill should be considered by the Commission in determining whether the public benefits of a fill project outweigh the public detriment from the loss of water areas due to the fill. Whenever mitigation is necessary, the mitigation program should assure: (1) that the benefits from the mitigation will be commensurate with the adverse impacts on Bay resources and consist of providing area and enhancement resulting in characteristics and values similar to the characters and values adversely affected; (2) that the mitigation will be at the project site or as close as possible; (3) that the mitigation measures will be carefully planned, reviewed and approved by or on behalf of the Commission, and subject to reasonable controls to ensure success, permanence and long-term maintenance; and (4) that the mitigation will, to the extent possible, be provided concurrently with those parts of the project causing adverse impacts.

Generally, the adverse impacts associated with bridge construction will include: (1) the disruption, displacement, excavation, and burying of existing benthic communities; (2) the creation of shade, which can affect water and soil temperature and influence an area's plant and animal communities; (3) the modification of existing hydraulic characteristics of the surroundings by altering shorelines, or the placement of bridge support structures in the Bay, which can result in the dampening of wave energy, the creation of eddies, the altering of water circulation thus potentially increasing the rate of sedimentation or erosion in adjacent areas; (4) the creation of barriers to animal use of an area and animal movement between areas; and (5) construction noise which can disrupt animal communication, stun, or kill nearby fish.

More specifically, the project will impact approximately 8.59 acres of shallow water habitat (less than 10 feet deep) including eelgrass beds and sandflats. State and federal resource agencies have identified a number of federally and state listed endangered species that are known to occur in the area, including the Winter and Spring-run Chinook Salmon, and the Steelhead Trout.

For the majority of bridge projects, the Commission has required mitigation for the adverse impacts of associated fill by requiring the permittee to: (1) enhance habitat values in existing degraded tidal marshes by excavating channels and improving tidal

circulation. Such enhancement projects always involve improvements to significantly larger areas than that covered by a bridge; (2) contribute funds on a pro-rata basis to a mitigation bank where the amount of the contribution is directly related to the cost of acquiring, restoring, monitoring and maintaining an area as tidal wetland habitat; and/or (3) excavate an adjoining upland to create a tidal marsh equal or greater in size to the area of the Bay covered by the proposed bridge.

Caltrans will mitigate for the project's environmental impacts through a combination of mitigation measures. Some of these mitigation measures are designed to avoid and minimize potential impacts at the site. Some of these measures, such as placing dredged material and sand in subtidal areas to restore the bathymetry of the areas disturbed in dredging the barge access channel to construct the replacement bridge, are intended to support the reestablishment of eelgrass beds in areas disturbed during construction. When the permit was originally authorized this mitigation measure was inconsistent with the Commission's former Bay Plan dredging policies, which stated that "to ensure protection of Bay habitats, the Commission should not authorize dredged material disposal projects in the Bay and certain waterways for habitat creation, enhancement or restoration, with the exception of a single pilot project at a site designated by the Commission and used in a manner consistent with the regulation designating the site, until: (1) the Bay Plan Marshes and Mudflats and Fish and Wildlife policies have been updated and any additional objective and scientific studies have been carried out to evaluate the advisability of disposal of dredged material in the Bay and certain waterways for habitat creation, enhancement and restoration. Those additional studies should address the following: (a) the Baywide need for in-Bay habitat creation, enhancement and restoration, in the context of maintaining appropriate amounts of all habitat types within the Bay, especially for support and recovery of endangered species; and (b) the need to use dredged materials to improve Bay habitat, the appropriate characteristics of locations in the Bay for such projects, and the potential short-term and cumulative impacts of such projects; (2) the Commission has adopted additional Baywide policies governing disposal of dredged material in the Bay and certain waterways for the creation, enhancement and restoration of Bay habitat, which narratively establish the necessary biological, hydrological, physical and locational characteristics of candidate sites; and (3) the pilot project authorized under this section, if undertaken, is completed successfully." However, this Bay Plan language has subsequently been amended. The current dredging policies state that "[a] project that uses dredged material to create, restore, or enhance Bay or certain waterway natural resources should be approved only if...[t]he project would use only clean material suitable for aquatic disposal and the Commission has solicited the advice of the San Francisco Bay Regional Water Quality Board, the Dredged Material Management Office and other appropriate agencies on the suitability of the dredged material....To ensure protection of the Bay habitats, the Commission should not authorize dredged material disposal projects in the Bay and certain waterways for habitat creation, enhancement or restoration, except for projects using a minor amount of dredged material...." Thus, placing minor amounts of dredged material to restore the bathymetry of the barge access channel and to create test plot plateaus for eelgrass transplants is now consistent with the Bay Plan. On June 25, 2002, and September 10, 2002, the permittee requested an amendment to this authorization to allow such minor fill for test plot plateaus as a first step toward restoring the barge access channel to its pre-project condition (Amendment Nos. One, Two, Four, and Five).

Some of the mitigation measures are intended to create habitat functions in areas where the project will otherwise provide limited resource values. In particular, Caltrans will create shorebird roosting habitat in an area where shorebirds are currently roosting on structures which are decaying and will eventually wash away.

Caltrans will also offset the project's adverse impacts and the unavoidable loss of habitat by contributing a total of $10.5 million toward the restoration of Skaggs Island and for the restoration of several potential sites in Eastshore State Park (Amendment No. Twenty-Six raises the language specific to restoration in Eastshore State Park, see Section III-U). A portion of this contribution is expected to fund the removal of contaminated buildings and allow the transfer of the approximately 3,298-acre Navy-owned portion of Skaggs Island to the United States Fish and Wildlife Service (USFWS). Caltrans believes that restoring Skaggs Island will more than offset the habitat lost as a result of constructing the new bridge. However, Caltrans' contribution will only be the first step in a series of steps that must occur before Skaggs Island is restored as habitat. Other steps that will need to take place before Skaggs Island can be restored to tidal action include: either acquiring an adjoining property so that the entire island can be restored, or maintaining a levee between the adjacent property and the Navy-owned portion to prevent the adjoining parcel from flooding with the return of tidal action to the Navy-owned portion of Skaggs Island; developing a restoration program; and assessing other potential contamination on-site. Such a process will likely take years before any significant wetland habitat is created at Skaggs Island, which appears to be inconsistent with the Commission's policy stating that mitigation should be provided concurrently with those parts of the project causing adverse impacts. Restoration of Skaggs Island will most likely result in the creation of a tidal brackish marsh and seasonal wetlands, a very different habitat than the eelgrass beds and sandflats that will be adversely impacted by this proposed project, and thus would normally be inconsistent with the Commission's mitigation policy stating that the benefits from the mitigation be commensurate with the adverse impacts on the Bay's resources. However, the restoration of Skaggs Island will undoubtedly create significant Bay resources on an ecosystem level that will benefit many Bay plants and animals including the endangered California clapper rail and the salt marsh harvest mouse.

This amended authorization is conditioned to allow up to $8.0 million to be used to remove structure and hazardous materials at Skaggs Island provided that: (1) the money is used to remove the structures and hazardous materials in a timely manner (i.e., within two and a half years); (2) that only that amount of funds needed to remove the structures and hazardous materials is expended, with the remaining funds available for Central Bay restoration; and (3) that removal facilitates the restoration of Skaggs Island to a tidal wetland as part of an approved restoration plan and schedule. Because of the significant benefits to the Bay that will result from restoring Skaggs Island, and as conditioned to assure that the money is used to jump-start the restoration, the Commission finds that the Skaggs Island portion of the mitigation program is consistent with the Commission's mitigation policy.

Pursuant to Amendment No. Sixteen of this amended permit, Caltrans was required to provide $8.0 million dollars to be used for the removal of hazardous materials and infrastructure at Skaggs Island by August 1, 2007, in an effort to facilitate the transfer of the Navy-owned portion of the approximately 3,289-acre site to the State or to the U. S. Fish and Wildlife Service for tidal marsh restoration. According to Caltrans, revised estimates of clean-up costs and liability issues have delayed the transfer and sub-

sequent clean-up of Skaggs Island, which has resulted in numerous time extensions to this amended permit as requested by Caltrans and granted by the Commission pursuant to Amendment Nos. Ten, Thirteen, Fifteen, and Sixteen, as discussed further below. To resolve the impasse between the Navy and the USFWS, the California Wildlife Conservation Board has been negotiating to obtain the property from the Navy. However, prior to the State's acceptance of the property, all contamination was to be cleaned up to comply with requirements specified by the Department of Toxic Substances Control. The USFWS began preparing a scope of work and cost estimate for the clean-up activities, which, according to Caltrans, would facilitate the commencement of removal and cleanup activities at Skaggs Island by August 1, 2008. Consequently, the permittee requested a fifth time extension to comply with Special Condition II-F-10 of this amended permit that allows it to commence removal and clean-up activities at Skaggs Island by August 1, 2008, pursuant to revised Special Condition II-F-10. On July 1, 2008, Caltrans requested a sixth time extension of two years based on a stalemate regarding the transfer of the Skaggs Island property. However, Congresswoman Lynn Woolsey (6th District, D-Petaluma) facilitated discussions between the USFWS and the Navy that resulted in agreement between the parties to a Memorandum of Understanding (MOU.) Congresswoman Lynn Woolsey subsequently introduced legislation (HR 5658) on April 17, 2008, to require the Secretary of the Navy and the Secretary of the Interior to negotiate a MOU that stipulates conditions of the transfer of Skaggs Island to the USFWS for inclusion in the National Wildlife Refuge System. The bill would also authorize the Navy to accept donations, including contributions from the State of California and other entities, to cover the costs of demolishing and removing the structures on the property and to facilitate future environmental restoration of Skaggs Island. Caltrans stated that these recent developments moved the parties closer to the goals described by the requirements of the BCDC Permit No. 8-01. Therefore, Caltrans requested a two-year time extension to August 1, 2010, for commencing the building demolition and a two-year time extension to July 1, 2012, for beginning wetland restoration activities (Amendment Twenty-One). The amendment request was listed with the Commission to provide it and the public notice of the proposed extension, and an opportunity to express any concerns with another time extension for using a portion of the mitigation funds toward the restoration of Skaggs Island. The Commission agreed to the extension of time request. The extension of the time requirements contained in Special Condition II-F-10 does not result in a material amendment to the originally authorized project contained in this amended authorization, consistent with Commission Regulation Section 10800 and is consistent with Government Code Section 66600 through 66661 and the Bay Plan for which the Executive Director may issue an amendment to an existing permit pursuant to Government Code Section 66632(f) and Regulation Section 10711 (Amendment No. Seventeen and Twenty-One).

The remaining mitigation funds will be used to restore wetland habitat in Central San Francisco Bay. This will provide habitat improvements to such areas including but not limited to Radio Beach, Brickyard Cove, Albany Beach or Hoffman Marsh in the proposed Eastshore State Park. Funds will be provided to the East Bay Regional Parks District (EBRPD) to "restore, enhance, or create new aquatic habitat and transitional uplands within the central Bay." Mitigation in Central San Francisco Bay is more consistent with the Commission's and other resource agency policies. However, suitable restoration sites in Central San Francisco Bay are in short supply. Caltrans has spent several years investigating, and eventually, eliminating several potential Central

Bay mitigation sites. The high cost of land and the existence of contamination at many of the sites make any sizable restoration in Central San Francisco Bay problematic. Still, it is Central San Francisco Bay that will be impacted by the project, and the relative scarcity of wetlands in the Central Bay makes any Central Bay wetland restoration highly desirable. While restoration in Central San Francisco Bay is likely to result in relatively small areas being restored to wetlands, because of the value of such wetlands to Central Bay resources, and because such restoration is consistent with the Commission's mitigation policies giving preference to mitigation occurring as close to the impacted sites as possible, the Commission finds that any effort to restore Central Bay sites as part of this project is highly desirable and consistent with the Commission's mitigation policies.

In its letter dated April 10, 2002 requesting Amendment No. Two, Caltrans requested that this permit be clarified to reflect that under the terms of the amended permit, Caltrans be responsible for contributing no more than $10.5 million for all off-site mitigation required of the project. The Commission anticipated that up to $8 million dollars of the mitigation money would be applied to demolishing structures and contaminated materials at Skaggs Island to facilitate transfer of the government-owned portion of Skaggs Island to the USFWS so that it could be restored for wildlife habitat. However, Commissioners also supported a minimum of $2.5 million be set aside for Central Bay mitigation projects, with any funds left over from the Skaggs Island remediation being applied to the approved Central Bay mitigation projects. In addition, the mitigation approved by the Commission was only for those impacts identified at the time Caltrans applied for the original permit. Since issuance of the original permit, a number of changes have been made in project construction leading to impacts not anticipated when the permit was first authorized. To date, while the additional impacts have exceeded those originally anticipated, in the Commission's opinion, the additional impacts have been fully mitigated by the project's original mitigation program. However, should a project change lead to significant additional impacts, or if the Commission determines that the cumulative effect of a number of small project changes has exceeded the impacts that the Commission determined were fully mitigated in the original authorization, the Commission may require additional mitigation (Amendment Nos. One, Two, Three and Four).

C. **Maximum Feasible Public Access.** Section 66602 of the McAteer-Petris Act states that existing public access to the shoreline and waters of the San Francisco Bay is inadequate and that maximum feasible public access, consistent with a proposed project, should be provided. In part, the Bay Plan policies on public access state that whenever public access to the Bay is provided as a condition of development, on fill or on the shoreline, the access should be permanently guaranteed, should be consistent with the project and the physical environment, and should provide for the public's safety and convenience. In addition, public access should be designed and built to encourage diverse Bay-related activities and movement to and along the shoreline, should permit barrier free access for the physically handicapped to the maximum feasible extent, should include an ongoing maintenance program and should be identified with appropriate signs. In considering whether a project provides the maximum feasible public access, the Commission should consider physical and visual access to the Bay shoreline, as well as the appearance and design of shoreline structures.

1. **Physical Access.** Currently, there is no pedestrian or bicycle access on the bridge. There is also limited physical access to the Oakland Touchdown area. Fishermen use the beach on the north side of the Oakland Touchdown and public access is authorized at Radio Beach. However, areas within Caltrans existing right-of-way are signed no trespassing and public access is not authorized.

   To address the Commission's public access requirements, Caltrans will construct approximately 9.6 acres of new public access areas including: (a) a 2.18-mile-long, 15.5-foot-wide bicycle and pedestrian lane on the new bridge with six belvederes to provide viewing and resting opportunities for trail users, bicycle and pedestrian access that, when coupled with public access required as part of the Cypress project (BCDC Permit No. 1993.011.00), will eventually connect the Oakland Touchdown with Emeryville; (b) a 4.2-acre parcel within the existing bridge approach to improve public access and treat storm water runoff as part of the proposed Gateway Park, including a temporary public access parking lot near the Oakland Touchdown located south of the Eastbound lanes; and (c) a public access path terminus located on Yerba Buena Island (YBI). All of the public access improvements will be accessible to the disabled and will be maintained and guaranteed for so long as the improvements authorized herein remain in place. Because the new East Span alignment and the 4.2-acre parcel for Gateway Park will eliminate the area where some of the improvements required by Permit No. 1993.011.00 would have been constructed, Permit No. 1993.011.00 was amended to require Caltrans to provide $1.1 million to compensate for the loss of two overlooks at the north and south side of the bridge, associated roadways, parking lot, and landscaping. The $1.1 million in-lieu fee will be distributed by the California Coastal Commission to support EBRPD's effort to develop Gateway Park at the Oakland Touchdown, or to support other public access in the City of Oakland.

   This amended authorization also requires that Caltrans develop the land, for a stormwater retention basin and public park, directly south of the Oakland Touchdown that is currently occupied by the existing East Span, but will be made available when the East Span is moved to the north. When the East Span is realigned to the north and the existing bridge is removed, this land will be made available primarily for the construction of a new park but other uses will be authorized such as: (a) treatment of stormwater runoff; (b) existing and future utilities; and (c) access to maintain the new East Span which may involve some at-grade roadway. All such uses that serve the bridge replacement project (Amendment No. Three). Caltrans is concerned that there is a reversionary clause for this land that requires that the land revert to the Port Of Oakland when it is no longer needed for highway purposes. However, the Regional Water Quality Control Board has indicated that it will likely require that a portion of this land be used to treat stormwater runoff from the toll plaza as part of the Board's waste discharge requirements for the new East Span. The Commission finds that this land is also needed to mitigate the public access impacts of losing the areas north of the Oakland Touchdown for public access improvements required in BCDC Permit No. 1993.011.00 for the Cypress improvements. This amended authorization requires that this land be developed for both required uses (stormwater BMPs, existing and future utilities, access for bridge and roadway maintenance and public access), through the use of thoughtful design and landscaping. This authorization requires that the land south of the touchdown shall be planned, developed and

maintained for landscaping, open space, and recreational facilities, compatible with the "Gateway Park," to be approved by or on behalf of the Commission in consultation with the EBRPD, the Oakland Base Reuse Authority, the Port of Oakland and the City of Oakland. Only through such design can the Commission find that this portion of the public access program is consistent with the Commission's public access policies.

With respect to future public access connections to the West Span of the Bay Bridge and ultimately to the City of San Francisco, legislators provided that the Metropolitan Transportation Commission (MTC) could use bridge tolls under AB 2038 to design and construct a bicycle and pedestrian path on the West Span of the SFOBB for continuous access across the bridge. A Caltrans study determined that while it is feasible to construct a bicycle and pedestrian path on the West Span, it would cost between $160 million to $387 million, depending upon the alternative chosen. To date, no funding is available to continue the path across the West Span. However, this authorization is conditioned to require that Caltrans design the YBI terminus in such a manner to facilitate such a future connection, while serving as a terminus for the East Span bicycle/pedestrian path initially.

The DRB recommended that Caltrans provide more than the six belvederes that Caltrans originally proposed at 0.2 mile intervals along the bridge (beginning approximately 0.65 miles from the YBI terminus and the interim parking located at the Oakland Touchdown). The DRB felt that additional belvederes were necessary for the comfort and safety of trail users and that six belvederes would be too widely spaced to provide sufficient resting areas. Caltrans, however, believes that six belvederes are sufficient and that the project cannot support the cost of additional belvederes. Because of the project's significant cost overruns, and because of the high price tag for each belvedere, the Commission finds that although additional belvederes would be far preferable, the six required herein are a reasonable compromise between providing an important public access benefit and respecting the high cost of the public access improvements provided, particularly the bicycle/pedestrian path across the East Span and the belvederes.

The DRB also recommended that Caltrans provide seating at the belvederes. Caltrans contends that seating at the belvederes cannot be provided because of excessive loads associated with the addition of seating and lack of funding limitations. This authorization requires lightweight-benches at each of the belvederes, located near the edge of the pedestrian path and facing the Bay, to provide seating opportunities for trail users. The Commission finds that such seating elements will be relatively low cost, can be safely incorporated into the belvedere design, and will provide an important public access amenity.

The DRB suggested that Caltrans consider different alternatives for separating cyclists from pedestrians along the path. Due to budgetary constraints, design considerations, and safety concerns, however, Caltrans chose to address this last concern through the use of "visual cues" such as different colored surfaces differentiating the pedestrian portion of the path from the bicycle lanes and lane lines rather than a safety barrier. Initially, no speed limit will be imposed on bicyclists and a safety review will be implemented at a later date to monitor the effectiveness of the proposed safety delineation on the bicycle and pedestrian path. Caltrans designed the bicycle and pedestrian path with input from the Bay Bridge Bicycle and Pedestrian Advisory Committee (BBBPAC). BBBPAC believed that a physical

separation, such as a barrier, between pedestrians and bicyclists may cause more accidents than would be prevented. The Commission concurs that, at least initially, this is a reasonable approach for separating potentially conflicting uses, pending future review of problems that may occur.

Finally, Senate Bill 60 (SB 60) prohibits the Commission from requiring Caltrans to develop a public access pathway with the replacement of the East Span. However, subsequent legislation provided funding for the bicycle/pedestrian path across the East Span and such a path is specifically authorized herein. This authorization also requires that the path be maintained by the permittee in a clean and safe manner, and that the path connect to other required public access areas, or be designed to allow such connections in the future. The Commission finds that such requirements are consistent, with the Commission's public access policies, Assembly Bill 2038 (AB 2038) which allowed funding for the bicycle/pedestrian path across the bridge, and Senate Bill 60 (SB 60). The Commission finds that, as conditioned, the physical public access program required and authorized herein is the maximum feasible consistent with the project.

2. **Visual Access.** Caltrans worked with the Commission's DRB to maximize visual access on the new structure. The items of particular concern to the DRB were the bridge barrier railing and the railings located along the pedestrian path.

   The existing safety barriers on the existing East Span are solid steel and approximately 39.5 inches high (1-meter-high). As a result, they impair views to the Bay for many motorists. Caltrans proposed to use a modified Type 732 bridge barrier railing that would be 32 inches high. The lower height will improve views of the Bay for all motorists. The barriers will be smooth on both the inside and outside faces with no articulation. The majority of the proposed safety barrier will be concrete, except a portion of the skyway and the entire main span, which will be steel.

   Several possible railings were evaluated for the bridge. Because this is a scenic roadway, where superb views of the Central Bay are possible, BCDC staff and the DRB recommended that Caltrans evaluate more transparent barriers, such as the California Type 80 safety barrier or an Alaska Barrier. Since some views through the bridge barriers will be impaired by the adjacent parallel superstructure or the elevated bicycle and pedestrian path, such transparent barrier railings would primarily provide clearer views along the north side of the westbound structure. However, Caltrans intends to locate utilities in the barriers, a common practice that would be less feasible in the more transparent barriers because of the reduction in the space available for such utilities. In addition, Caltrans states that crash tests of these barriers had not been completed during the design phase of "see through" barriers on bridge decks like those proposed for the East Span. Since then, crash tests have been completed and both the California Type 80 and Alaska barrier have been approved for use by Caltrans. However, Caltrans contended that the need for accommodating utilities in the railing, and the need to avoid delays in constructing the project that would likely have occurred with design revisions, supported its proposal for a solid barrier. Because of the critical importance of this bridge to the Bay Area's health, safety, welfare and economy, and because of the importance of replacing the existing structure as soon as possible with a structure much less likely to fail in a major seismic event, the Commission reluctantly concurred.

The project will include a 55-inch railing height for the bicycle/pedestrian path. The DRB recommended lowering the path railing from 55 inches to 48 inches to expand views of the Bay, enhance public access and improve the pedestrian scale of the path. The DRB requested that Caltrans provide it with empirical data showing the lowest possible safety railing that would provide enough protection for pedestrians and bicyclists. More specifically, the DRB requested that Caltrans provide evidence that a 48-inch railing height would not provide the needed safety for the public.

Caltrans provided recommendations and guidelines from AASHTO and Caltrans' standards established to provide safe conditions for the public. AASHTO establishes nationwide policies and standards. AASHTO standards require that the minimum height of a railing on structures must be 54 inches. The 54-inch rail height was one of several standards adopted by Caltrans in 1978 as part of its development of the Planning and Design Criteria for Bikeways in California. Caltrans formed a committee, composed of engineers, bicyclists (League of American Wheelmen, California Association of Bicycling Organizations), public agencies and safety experts, to establish design standards to facilitate the development of bicycle facilities in California. This committee used its expertise to study and develop bicycle facility design guidelines. With respect to bridge railings, the committee developed an estimated center of gravity for an assumed large bicycle with a tall rider, added a safety factor to deal with high impact or broadside accidents, and concluded that 54 inches was an appropriate rail height to insure bicycle rider safety. To date, the work done by the committee remains the only study of the issue. As a result this authorization allows the rail adjacent to the bike path to be a maximum height of 55 inches. Unless other studies of the height of rails necessary to assure bicycle/pedestrian safety are completed within the time frame where revisions to the rail are possible, the Commission concurs that safety should be the primary concern of rail height. Thus, because the only extant study determined 54 inches was the appropriate, safe height, the Commission finds that such a height is consistent with its public access policies.

3. **Appearance and Design**. The Bay Plan's policies on appearance, design, and scenic views, which are largely advisory, states that "maximum efforts should be made to provide, enhance, or preserve views of the Bay and shoreline, especially from public areas." As a result of the East Span Replacement Project, there will be several significant visual changes along this corridor. The project will introduce a new suspension bridge and skyway bridge north of the existing bridge, and will remove the existing superstructure, towers and foundations following construction completion. Caltrans has incorporated the recommendations of the Commission to achieve design consistency between the superstructure and the approach structures, to bring the design details of the towers down to the railings and other bridge elements, and to maximize motorist and pedestrian views from the bridge. The steel pedestrian railings will have bollards that are spaced approximately 33-feet-apart on the main span and approximately 26.2-feet-apart on the skyway with some variation. The bollard placement and design are integral to the cantilever beams that support the path. The railings will be further divided by angle posts spaced every 11 feet apart and square pickets spaced 4-inches apart. The DRB was concerned that the railing design did not share enough of the architectural vocabulary of the tower, piers and other bridge elements and Caltrans attempted to address the

DRB's concerns to the extent practicable. Due to cost, maintenance, and structural constraints, Caltrans concluded that it could not accommodate all of the Board's recommendations.

Since Caltrans' last presentation to the DRB, there have been a number of design changes. These changes affect the appearance and design of the outer railings on the pedestrian and bicycle path. The railings have been re-designed to simplify the railing and to address concerns regarding the ability to clean and paint the interior surfaces of the posts. The bollard design has not changed in size, but has changed in its appearance due to engineering constraints associated with the expansion and contraction of the steel bike path segment. In addition, the design of the bollards has changed such that the top rail is continuous at one side of the bollard and the post design was modified to be square tube steel set at right angles to the bridge in response to previous EDAP direction to simplify the design. The original DRB design recommendation of the bollard was to unify the railing with the structure of the bike path and to provide a visual rhythm along the pathway. The aesthetic recommendations may be compromised by the fact that the proposed design of the bollard segment will appear asymmetrical.

The DRB also requested a more detailed description of the lighting and specifically asked for an explanation of the methods of lighting the main span and the reasons for varying the height of the light standards. Consistent with EDAP's recommendation, the replacement bridge will be illuminated exclusively (except for bollard lighting) with metal halide fixtures to produce a cool white light rather than the warm yellow tones of the low-pressure sodium lights found on a typical freeway. The roadway lighting will result in a constant level of light for the entire length of the bridge and from a distance there will be a rising line of white lights punctuated by the main tower.

The Commission would have preferred for Caltrans to return to the DRB, as the DRB requested, and discuss the changes to the project that had been made in response to the DRB's concerns, and the reasons other requested changes could not be made. However, because these are advisory policies that Caltrans largely attempted to meet within its budgetary constraints, and because Caltrans modified those portions of the design that will not have adverse effects on safety, maintenance and budget, the Commission finds that the project is generally consistent with Bay Plan policies on Public Access, Visual Access and Appearance and Design to the extent practicable.

4. **Transportation.** In part, the Bay Plan policies on transportation state that "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 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; and (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 have to be allowed in the Bay), the design of the route should, if feasible, accommodate future mass transit facilities and subsequent installation automatic power and guidance elements for vehicles."

The East Span replacement crossing will be a steel suspension bridge connected by a cast-in-place or pre-cast, post tensioned concrete "skyway" and cast-in-place prestressed approach structures. Approximately 45,572 cubic yards of fill covering approximately 3.6 acres of Bay surface area at the Oakland Approach will be part of the Bridge.

a. **New Bay Crossings.** The new East Span will be a pile-supported bridge, designed to minimize fill impacts, and thus, the Commission finds it to be consistent with this requirement of the Bay Plan's transportation policies.

b. **Adequate Navigational Clearance.** The U.S. Coast Guard (USCG) has determined that the replacement bridge will not impact marine traffic, and thus, the Commission finds it to be consistent with this requirement of the Bay Plan's transportation policies.

c. **Toll Plaza and Ancillary Features.** The existing toll plaza, which is mostly located outside of the Commission's jurisdiction, will not be affected by the replacement project, and thus, the Commission finds it to be consistent with this requirement of the Bay Plan's transportation policies.

d. **Light Rail (LRT) and Heavy Rail on the Replacement Bridge.** With the cooperation of local and regional transportation agencies, Caltrans evaluated the constraints and opportunities for providing heavy and light rail transit (LRT) as part of the East Bay Bridge Replacement Project. Caltrans has also considered the studies and recommendations given by various planning organizations, such as the MTC, and it has prepared its own studies to consider multi-modal transportation, HOV lanes and other transportation improvement strategies. Due to various constraints, which primarily are budgetary, and due to the nature of the costs to retrofit the West Bay Bridge, Caltrans determined that design allowances for heavy rail on the new structure are not a viable option at this time. However, the existing West Bay Bridge originally was designed for light rail transit traffic and the costs associated with retrofitting this bridge should be substantially less than for heavy rail. Caltrans has also designed loading on the East Span to accommodate future LRT. Heavier vehicles, such as high-speed rail or commuter heavy rail similar to BART, could also be accommodated but would require substantial modifications to the current design or a future retrofit to this structure. Caltrans also estimated the cost and other requirements of accommodating rail transit across the structure in both LRT and heavy rail configurations and made a determination that one travel lane and one shoulder in each direction would have to be converted, therefore reducing the capacity of the East Span to four vehicular lanes, and some structural modifications would be necessary. Since multi-modal strategies would reduce the number of mixed flow traffic lanes, the selected strategy would have to capture an amount of ridership that matches the loss in mixed-flow vehicular capacity on the SFOBB and its approaches. The accommodation of rail and five lanes of traffic would require significant modifications to the current design and is not within the current scope or budget of this project. Caltrans and other transit agencies have not identified any project funding to accommodate a future rail transit connection across a replacement bridge other than the LRT provisions included in the East Span Replacement Project. The decision to implement any other rail accommodation option will be based on funding, on a selected strategy that would have to capture an amount of ridership that matches the loss in mixed-

flow vehicular capacity, and on the time required to accomplish the necessary design and construction activities. Finally, a replacement structure is not a new route across the Bay, as used in the Bay Plan's transportation policies. In addition, SB 60 prohibits local and state permitting authorities from imposing any requirements that a mass transit facility be constructed on a replacement bridge for the East Span as a condition of any permit. For all these reasons, the Commission finds that additional transit facilities need not be provided on the new span in order for the East Span Replacement Project to be consistent with this portion of the Bay Plan's Transportation Policies.

e. **High Occupancy Vehicle (HOV) Lanes on a New Span.** AC Transit had requested that Caltrans study an HOV lane on the SFOBB. Caltrans evaluated such a facility in October 1994. The "MTC SFOBB Rail Feasibility Study" identified preliminary estimates on the cost of SFOBB rail, structural modifications to the East and West Spans, and possible service operating scenarios. The study did not estimate potential ridership or identify environmental constraints.

   Unfortunately, no funding currently exists or is likely in the immediate future, to support construction of an HOV lane on the new East Span. None of the previous planning studies identified an HOV lane on the SFOBB as a preferred strategy. It has not been included in the MTC's 1994 Regional Transportation Plan (RTP) or its 1996 and 1998 updates, including a 1999 amendment. The planning horizon for the RTP is 20 years. MTC could include the multi-modal strategies in future RTPs if the projects are consistent with local and regional objectives and strategies for congestion management, but the bridge will already be constructed by then. In addition, neither multi-modal option was included in a recently enacted statewide funding package for transportation improvements (Governor's Traffic Congestion Relief Program, July 2000). Finally, SB 60 prohibits local and state permitting authorities from imposing any requirements that a mass transit facility be constructed on a replacement bridge for the East Span as a condition of any permit.

   Because no funding is available for HOV lanes on the East Span now or in the foreseeable future, the Commission finds that the East Span Replace project is consistent with the Commission's transportation policies to the maximum practicable extent.

5. **Dredging.** In part, the Bay Plan policies on dredging state in part that dredging should be authorized when the Commission can find that: "(a) the applicant has demonstrated that dredging is needed to serve a water-oriented use or other public purpose; (b) the materials to be dredged meet the water quality requirements of the RWQCB; and (c) important fisheries and Bay natural resources would be protected." In addition, the policies state that the disposal of dredged materials should be encouraged in non-tidal areas where the materials can be used beneficially, or in the ocean.

   Caltrans will dredge a total of 616,721 (Amendment No. Six) cubic yards of material over a 99-acre area to construct the new bridge and remove the existing bridge. The replacement bridge is a water-oriented use under the McAteer-Petris Act and the *San Francisco Bay Plan* and is necessary to meet current seismic and traffic safety requirements. Some dredging will be required for the temporary access trestles and cofferdams. Caltrans performed testing and analysis of the dredge sediments under

the requirements of the Dredge Materials Management Office. Caltrans completed the Investigation Report (Amended Sampling and Analysis Plan) in June of 2000. Although the report concludes that the materials will be appropriate for disposal at the approved Deep Ocean Disposal Site (DODS) and SF-11 disposal site, Caltrans will dispose some of the materials at an approved upland site consistent with the RWQCB's Section 401 permit. Caltrans received its 401 permit from the RWQCB on October 17, 2001, the day before the Commission's public hearing on the project. Caltrans will retain some excavated material from dismantling dredging for reuse in restoring the construction barge access channel near the Oakland Touchdown, if the Commission authorizes such disposal.

The U. S. Army Corps of Engineers (USACE) is currently processing Caltrans' Section 401 (Clean Water Act) permit. In conjunction with its 401 permit, Caltrans has concluded its consultation with the USFWS but has not concluded its formal consultation with the U. S. National Marine Fisheries Service (NMFS). Caltrans is currently working with NMFS to establish, in accordance with Section 7 of the Endangered Species Act, appropriate mitigation to address potential fish kills due to pile driving operations. NMFS is also very concerned about the project's potential impacts to existing eelgrass beds, which are important fishery habitat. In addition, NMFS is critical of the mitigation for eelgrass habitat and believes the mitigation program should specifically provide for in-kind offset to these impacts.

Special Condition II-F-9 requires Caltrans to continue to coordinate with appropriate wildlife agencies to minimize impacts to fish during construction activity and to provide additional mitigation if monitoring indicates that fish kills are occurring that are related to pile-driving activities. In addition, Special Condition II-D-4 requires that dredging should not occur between December 1 and March 3 of any year to avoid potential disturbance of herring spawning in the area. The project, in consultation with the National Marine Fisheries Service and the California Department of Fish and Game, also includes a number of mitigation measures, such as using a bubble curtain to reduce fish kills from pile-driving activity, and creating a mitigation fund for salmonids. For all these reasons, the Commission finds that the project is consistent with the Bay Plan's requirements that dredging and construction activities be conducted in such a manner as to protect important Bay fisheries.

Caltrans will dispose approximately a third of the dredged material at SF-11 (Alcatraz), a third at the federally-approved deep ocean disposal site, and a third at either Hamilton or Montezuma Wetland Restoration sites, if those sites are available, and to deep ocean if they are not. Disposal of dredged materials associated with dismantling the existing bridge will be reconsidered in a few years when the Hamilton or Montezuma sites may be ready to receive materials. Disposal of the dredged materials at landfills for use as daily cover will be avoided as it would generate multiple trips to these sites with smaller volumes of dredged materials, resulting in significantly higher costs and traffic and air quality impacts.

In addition, Special Condition II-F-8 requiring that Caltrans make every effort to dispose as much dredged material as possible that is suitable for such use at upland reuse sites. Because disposal of dredged material will occur at upland sites wherever and whenever possible, or at the Ocean disposal site, the Commission finds that the disposal of dredged materials generated by the project is consistent with the Commission's Long Term Management Plan for Dredged Material.

Finally, while using dredged materials to fill the barge access channel at project completion and planting the channel with eelgrass is currently inconsistent with the Commission's dredging policy, this authorization specifically recognizes that Caltrans may amend this permit to allow such use of dredged material should the Commission amend its dredging policy to allow such use.

6. **Consistency with YBI Park Priority Use Designation.** Yerba Buena Island (YBI) is designated as a park priority use area in Bay Plan Map No. 4. It is important to recognize that the existing bridge extends over and has footings and piers within the park priority use area. Because the new bridge would replace the existing double deck bridge with two parallel spans, each slightly wider (because of shoulders and the public access path) than the existing span, the new bridge would cover a greater portion of the park priority use area on YBI.

   Because this authorization requires Caltrans to provide a trail terminus for the bicycle/pedestrian bridge on the East Span, because the existing span over the island will be removed and the new span will not cause an appreciably larger impact on the Island, and because the bridge will cover as little of YBI as possible because of the Commission's minimum fill requirements, the Commission finds that the East Span Replacement Project is consistent with the park priority use designation for YBI.

D. **Amendment No. Six.** Amendment No. Six authorized the installation and use of a temporary, double-decked, south-south detour at Yerba Buena Island (YBI). Originally, Caltrans proposed to use a north-south, single-decked structure that would be used to route traffic on to YBI during replacement span construction activities. However, Caltrans developed an alternative to the north-south detour that would accelerate the overall construction schedule for the replacement span by 1 to 1.5 years. This alternative, the south-south detour, is a double-decked bypass structure that will connect the existing East Span on the south side of YBI between the E-1 bridge pier on the new bridge and the YBI tunnel. The bypass will carry five lanes of traffic in each direction. A portion of the detour, the east tie-in truss, will likely be fabricated off-site and brought in by barge, assembled on-site and lifted into position. A temporary marine access trestle will be required in the Bay on the east side of YBI at Coast Guard Cove to off-load the prefabricated east tie-in of the detour. The trestle authorized in Amendment No. Six required one hundred and sixty, two-foot-in-diameter piles to support the temporary marine access trestle. The trestle was to result in approximately 108,000 square feet (2.47 acres) of pile-supported fill that was to be in place for approximately 7 years. In addition, Caltrans needed to dredge up to 10,000 cubic yards of material to enable barge access to the trestle. The south-south detour also required the construction of a temporary, land-based skid rail structure that was to cover 0.75 acres within the Commission's 100-foot-shoreline band. The skid rail structure was designed to allow the east tie-in truss to be moved from a barge using the access trestle to the falsework below the existing bridge and also may have been used to dismantle the existing bridge.

   Installation of the temporary access trestle authorized under Amendment No. Six was to impact up to 8,276 square feet (0.19 acre) of eelgrass habitat according to the October 1999 survey at Coast Guard Cove due to dredging and shading from the access trestle. As mentioned above, the trestle authorized under Amendment No. Six was to be in place for up to seven years to accommodate the installation of the east tie-in and dismantling of the existing span. Caltrans states that recovery of the eelgrass beds

would take about two years after the original elevations and sunlight are restored. Impacts to the eelgrass beds resulting from the marine access trestle were discussed among the resource agencies at the Interagency Biological Mitigation Group on March 31, 2003. Representatives of the resource agencies agreed that if eelgrass restoration efforts associated with the project were successful elsewhere and since the marine trestle impacts will be temporary, that additional eelgrass mitigation will not be necessary.

Since authorizing the marine access trestle under Amendment No. Six, Caltrans has redesigned the trestle. The new trestle will result in 4,069 square feet of pile-supported fill, much less fill than that associated with the trestle authorized under Amendment No. Six. The redesigned trestle will also be located just east of the area previously designated for the trestle and no dredging will be needed. Relocating the trestle to this area will also avoid impacts to 8,276 square feet of eelgrass habitat. Modifications to the fill and dredging estimates as well as deletion of language regarding eelgrass impacts associated with the originally authorized trestle were made under Amendment No. Eleven to this authorization.

As such, the activities authorized in Amendment No. Six consist of the dredging of up to 10,000 cubic yards of material, consistent with Regulation Section 10602(b) (subsequently deleted in Amendment No. Eleven) and the installation of the skid rail structure involves the placement of inert, inorganic materials (subsequently significantly downsized in Amendment No. Eleven) within the Commission's 100-foot shoreline band that does not have an affect on present or future maximum feasible public access to the Bay or Bay resources consistent with Regulation Section 10602(a)(1). Therefore, these improvements are considered "minor repairs or improvements" for which the Executive Director may issue an amendment to an existing permit, pursuant to Government Code Section 66632(f) and Regulation Section 10622(a).

The installation and temporary use of the marine access trestle authorized under Amendment No. Six, and modified under Amendment No. Eleven does not constitute a material alteration of the originally authorized project pursuant to Commission Regulation Section 10800 and is consistent with Government Code Section 66600 through 66661 and the Bay Plan because the trestle will result in a small fraction of the amount of temporary pile-supported fill that was originally authorized in the permit and will be one of many construction trestles that are necessary to construct the project. The size of the trestle is the minimum necessary to safely and effectively accommodate personnel during installation of the detour and will also be used to demolish portions of the existing span. There is no alternative upland location for the trestle because it is necessary for bridge construction and bridges are designated as water-oriented uses in the San Francisco Bay Plan. Lastly, construction of the trestle is necessary to install the double-decked, south-south detour. Installation of the south-south detour will allow the original span to be removed a year and a half earlier than originally proposed uncovering of 12.5 acres of fill ahead of schedule. As such, the installation of the marine access trestle is not a material alteration of the original project for which the Executive Direction may issue a permit pursuant to Government Code Section 66632(f) and Regulation Section 10622(a).

E. **Amendment No. Seven.** Amendment No. Seven authorizes the installation of temporary pipes and floating rafts that will be part of a thermal cooling operation in Clipper Cove, off of Yerba Buena Island. The thermal cooling operation will involve withdrawing water from the Bay and using the water to cool and cure concrete that will be poured

for the east- and west-bound bridge piers. Prior to discharging the water back into the Bay, the water will be cooled and aerated. The operation will require the installation of three, twelve-inch-in-diameter pipes that will displace 77 cubic yards of Bay water. The pipes will be attached to three floating rafts that will cover 192 square feet of Bay surface area and the pipes will run along 100 feet of the shoreline. The thermal cooling elements are temporary and are anticipated to be in place for approximately seven years, at which time they will be removed from the Bay and placed at a location outside the Commission's jurisdiction. Fish screens at a size consistent with the recommendations of NOAA Fisheries will be placed on the intake pipes to prevent the entrainment of fish species into the cooling pipes.

Additionally, Amendment No. Seven authorizes the deletion of language from Section I-A-3-d and I-A-4-c (in shoreline band) of this amended permit that authorized Caltrans to cap the rock rip rap shoreline with soil above the limits of tidal action and plant the area with native plant species in an effort to provide upland transition habitat and roosting habitat for shorebirds. Since issuance of the BCDC permit for the project, Caltrans has engaged the services of the U.S. Army Corps of Engineers (Corps) to review the feasibility of the preliminary design for rock slope protection and to perform a wave run-up analysis for the area protected by the proposed revetment. The Corps presented a number of recommendations to Caltrans as a result of their analysis. Among the recommendations was that no vegetation should be placed over the upper part of the revetment due to a potential increase in the effective roughness coefficient, that could result in higher run-up elevations and crest heights. While vegetation of this area was part of Caltrans' overall approach to mitigating impacts of the project, the Commission staff is not requiring additional mitigation to off-set the loss of the transitional habitat. However if it is found that through future permit amendments and project revisions that the mitigation initially required in the permit is not adequate to fully mitigate the impacts of the project, then the Commission staff will likely require additional mitigation to adequately offset the impacts of this loss in transition habitat. The items authorized in Amendment No. Seven involve an activity similar to and with no greater adverse impact on the Bay than the placement of 1,000 square feet of new Bay fill for a single boat dock pursuant to Commission Regulation Sections 10601(e)(3) and 10601(a)(1), respectively, and the placement of inert, inorganic fill that does not have an affect on present or future maximum feasible public access to the Bay or Bay resources, pursuant to Regulation Section 10601(b)(1) and are thus considered "minor repairs or improvements" for which the Executive Director may issue an amendment to an existing permit pursuant to Regulation Section 10822 and Government Code Section 66632(f).

F. **Amendment No. Eight.** Amendment No. Eight authorizes the placement of two temporary structures that will be used to facilitate construction of the bridge replacement span. These structures include a 175-square-foot rock screed (a leveling device) that will be used to consolidate rock material that was placed within coffercells and a 565-square-foot barge loading ramp that will allow drive on and drive off access to material barges that store construction equipment. Both structures will be placed at Berth 7 which is located in a periodically maintained Port of Oakland channel and will be removed upon project completion. As such, the installation of the structures authorized in Amendment No. Eight is similar in activity and impact on the Bay pursuant to Regulation Section 10601(e)(3), to the construction of a new single boat

dock, no larger than 1,000 square feet pursuant to Regulation Section 10601(a)(1) and is considered a "minor repair or improvement" for which the Executive Director may issue an amendment to a permit pursuant to Regulation Section 10822.

G. **Amendment No. Nine.** Amendment No. Nine involves deletion of a portion of the eelgrass plateau monitoring requirement from Special Condition II-F-5 of this authorization. Under previous amendments to this authorization, Caltrans placed 1,200 cubic yards of sand at the Emeryville Flats in an attempt to create six test plot plateaus at an appropriate bathymetry to support eelgrass. Eelgrass from the barge access channel was transplanted to the test plot plateaus which were monitored for the first year following transplant activities. Results from the first year of monitoring indicated that the test plot plateaus had eroded and the eelgrass transplanted to the plots had not survived. The lack of success of the transplant program at the test plots is attributed to the constant high tidal energy that exists at the Emeryville Shoal which exposes the area to a considerable amount of erosion and sediment loss. The losses at the test plots were further intensified by the greater exposure of the plots to this tidal energy compared to the surrounding bay floor topography. Since eelgrass no longer exists at the test plots requiring monitoring of the plots for eelgrass viability is not reasonable; therefore language has been deleted from Special Condition II-F-5 which required Caltrans to monitor the test plots biannually until eelgrass was transplanted back to the barge access channel. Deletion of the monitoring requirement does not constitute a material alteration of the originally authorized project pursuant to Commission Regulation Section 10800 and is consistent with Government Code Section 66600 through 66661 and the San Francisco Bay Plan for which the Executive Director may issue an amendment to a permit pursuant to Government Code Section 66632(f) and Regulation Section 10711.

H. **Amendment No. Ten.** Amendment No. Ten extended two mitigation compliance dates contained within this authorization. Caltrans states that it was unable to meet a July 1, 2004 deadline for commencing building and hazardous material removal at Skaggs Island contained in Special Condition II-F-10 of this permit due to delays associated with transferring the land from the U. S. Navy to the U. S. Fish and Wildlife Service. Therefore the commencement date for removal of building and hazardous materials at Skaggs Island was extended to July 1, 2005.

The restoration required in Central San Francisco Bay also encountered delays. Although a mitigation location has been selected and a draft work plan prepared and submitted to the agencies and several meetings held to discuss the mitigation, Caltrans stated that it was unable to comply with the July 1, 2004 deadline regarding the commencement of a habitat restoration project at the Eastshore State Park because a few outstanding issues remain unresolved. Thus, the commencement date for restoration has been extended one year, to July 1, 2005. Caltrans attributes the delay in commencing restoration activities to difficulties in obtaining written agreements from various resource agencies that the creation of eelgrass beds to mitigate bridge impacts and its subsequent potential use by special-status species would not conflict with future recreational activities, a requirement of the State Department of Parks and Recreation for using the site for habitat mitigation purposes. It is anticipated that the issues holding up both elements of the mitigation program will be resolved in the coming year. Extending the commencement dates contained in Special Condition II-F-10 of this authorization do not constitute a material alteration of the originally authorized project pursuant to Commission Regulation Section 10800 and is consistent with Government

Code Section 66600 through 66661 and the San Francisco Bay Plan for which the Executive Director may issue an amendment to a permit pursuant to Government Code Section 66632(f) and Regulation Section 10622(a).

I. **Amendment No. Eleven.** Amendment No. Eleven to the amended permit involves the construction of a 222-square-foot wooden staircase on the slope adjacent to the Torpedo Building on YBI. The staircase is needed to provide safe access to the work area at Pier T1 and will be removed upon the completion of construction of the east span of the Bay Bridge. Additionally, this amendment clarifies that 0.02 acres of a construction staging area on YBI will be used as an employee shuttle turnaround. Lastly, Amendment No. Eleven involves modifying the fill estimates and special conditions associated with the marine trestle that was authorized under Amendment No. Six as the trestle has been significantly redesigned and downsized. The originally authorized trestle would have resulted in the placement of 2.47 acres of pile-supported fill and was thought to be needed to offload equipment that would be used to construct the south-south detour at YBI. Since authorizing Amendment No. Six, Caltrans has found an alternative design to the trestle. This redesigned trestle will involve the placement of much less fill (2.38 acres) than the trestle authorized under Amendment No. Six. In addition, the redesigned trestle will be relocated to the east of the location originally proposed for the trestle, thus not requiring dredging nor impacting eelgrass habitat. To reflect the location and fill quantities associated with the redesigned trestle, modifications to the authorization section as well as special conditions were made under Amendment No. Eleven. As such, the activities authorized under Amendment No. Eleven involve the placement of inert, inorganic materials within the 100-foot shoreline band with no effect on present or future maximum feasible public access to the Bay or Bay resources pursuant to Regulation Section 10601(b)(1) and significant reductions to the amount of fill authorized for the temporary trestle. Thus, these activities authorized under Amendment No. Eleven are considered "minor repairs or improvements" for which the Executive Director may issue an amendment to an existing permit pursuant to Regulation Section 10822 and Government Code Section 66632(f). Additionally, the modifications made to this authorization as a result of the shuttle turnaround and the redesigned trestle do not constitute a material alteration of the original project authorized herein for which the Executive Director may issue an amendment to a permit pursuant to Government Code Section 66632(f) and Regulation Section 10622(a).

J. **Amendment Nos. Twelve and Seventeen.** Amendment No. Twelve to the permit authorizes the placement of fill at two locations to partially satisfy the mitigation requirements of the original permit. First, language in the authorization has been revised to more accurately reflect the amount of fill that will be placed to create bird roosting habitat, as required in Special Condition II-F-7, above. The permittee studied shorebird roosting sites in the vicinity of the Oakland Touchdown and results indicated that the birds preferred rocky areas, such as the rip rapped shoreline. Based on this study the permittee will install a rock island approximately 200 feet offshore. Construction of the island will involve placing 734 cubic yards of rock in the Bay, creating a base that has a footprint of approximately 4,047 square feet. The island will provide 500 square feet of roosting habitat above Mean Sea Level.

Amendment No. Twelve also authorizes an eelgrass pilot project at the North Basin in the City of Berkeley. The pilot project will involve the placement of approximately 3,900 cubic yards of material to provide approximately 54,000 square feet of plantable surface

area. The plateaus will be monitored for one year. Depending on the results of the pilot project, the full-scale eelgrass restoration project (15.8 acres) will either be constructed at the North Basin, or another suitable site identified for the full-scale effort.

Amendment No. Seventeen modifies the requirements of Amendment No. Twelve. Caltrans completed a one-year monitoring effort of the pilot eelgrass transplant site in July 2006. The study was conducted in accordance with the "North Basin Mitigation Pilot Program Work Plan" dated February 1, 2005, as described by Melissa Barrow of Caltrans in an e-mail transmitted to BCDC on March 17, 2005. The one-year pilot project activities included the placement of an earth reinforcement mattress and engineering fabric over an approximately 54,000-square-foot area, which was then covered with approximately 3,900 cubic yards of material to create plateaus at elevations expected to support eelgrass. Subsequently, the plateaus were planted with eelgrass obtained from nearby locations and monitored for a one-year period.

During the initial one-year pilot project period, the transplanted eelgrass remained relatively stable following early losses that occurred during July and August 2005. However, between August 2005 and January 2006, eelgrass was lost from the site and, by April 2006, there was minimal evidence of any remaining eelgrass at the pilot site. In the winter of 2005-2006, eelgrass declined at many areas in the northern San Francisco Bay, which may have been due to decreased salinity levels present during that winter for extended periods of time, rather than site conditions.

By July 2006, eelgrass rebounded at a portion of the site where tidal elevations are believed to be most suitable for eelgrass growth. In September 2006, eelgrass was not observed in areas where it had been seen in July 2006; rather, it was sparsely distributed at the southern portion of the site, which fell within the planting perimeters.

Early findings show that stable intertidal sandflats can be created at the North Basin, but it is unclear if eelgrass can consistently colonize the pilot site. The pattern of presence, disappearance, and reemergence of eelgrass at the pilot site, confounded by regional variability, has made it difficult to evaluate the true potential of the site to sustain an eelgrass population over an extended period of time. The observation of eelgrass along the southern site boundary is encouraging, although it is not known whether colonization at this area of the pilot site resulted from seedling recruitment or vegetative re-growth such as that observed in the central portion of the site in July 2006.

According to Caltrans, it could take up to two years for large-scale sites to adequately support eelgrass; secondly, a very poor site generally does not sustain persistent reemergence once eelgrass is lost. The pilot restoration study is important for understanding eelgrass restoration and particularly to support a larger restoration program comprised of eelgrass and sandflats at the North Basin. Caltrans has stated that, "[w]hile the year long monitoring effort provided valuable insights, [we] propose an additional year of scaled-down monitoring to provide further information regarding prediction of long-trend changes, suitability conditions and potential design requirements for a larger restoration effort. This information is necessary to determine whether the larger restoration effort should proceed in the future."

Further, the revised monitoring effort will include the following elements: (a) an exploration of site deformation and potential littoral movement by monitoring the existing three perpendicular transects and adding transects that are parallel to the shore to detect any lateral site migration; (b) the measurement of depositional sediment depths along the transects to better understand the gains and losses of the fine

sediments and the accretion/erosion rates in order to predict long-term changes at the site based on short-term erosion and accretion patterns; and (c) the completion of an additional pilot eelgrass transplant at the site. Generally, the revised monitoring plan will be performed at low tides and provide qualitative assessments rather than quantitative distribution monitoring, and focus on persistence, vegetative re-growth, seedling recruitment, and distribution across the site, while the monitoring results will provide additional information regarding site suitability conditions and potential design requirements for a larger restoration effort. Pilot project monitoring will occur through the summer of 2008, pursuant to the revised Special Condition II.F.10.b of this amended permit. The revision of the time requirements contained in Special Condition II.F.10.b does not result in a material amendment to the originally authorized project contained in this amended authorization, consistent with Commission Regulation Section 10800 and is consistent with Government Code Section 66600 through 66661 and the Bay Plan for which the Executive Director may issue an amendment to an existing permit pursuant to Government Code Section 66632(f) and Regulation Section 10711 (Amendment No. Seventeen).

The activities authorized in Amendment No. Twelve do not constitute a material alteration of the originally authorized project pursuant to Commission Regulation Section 10800 and is consistent with Government Code Sections 66600 through 66661 and the San Francisco Bay Plan for which the Executive Director may issue an amendment to a permit pursuant to Government Code Section 66632(f) and Regulation Section 10622(a).

K. **Amendment No. Thirteen.** Amendment No. Thirteen to the amended permit involved extending the commencement date from July 1, 2005 to July 1, 2006, to begin removal of buildings and hazardous materials on Skaggs Island, an element of the required offsite mitigation program required by Special Condition II-F-10. Under this special condition, Caltrans was required to create a mitigation fund and deposit funds in the amount of $10.5 million, of which up to $8 million of the fund is required to be made available to the Skaggs Island structure and hazardous materials removal project to mitigate for the project's adverse impacts and unavoidable loss of habitat. Caltrans stated that compliance with the deadline contained in the authorization had not occurred due to delays associated with the transfer of the land from the U.S. Navy to the U.S. Fish and Wildlife Service. This was the second time Caltrans had received an extension to the commencement date contained in Special Condition II-F-10. Extending the commencement date contained in Special Condition II-F-10 of this amended authorization did not constitute a material alteration of the originally authorized project pursuant to Commission Regulation Section 10800 and is consistent with Government Code Section 66600 through 66661 and the San Francisco Bay Plan for which the Executive Director may issue an amendment to a permit pursuant to Government Code Section 66632(f) and Regulation Section 10622(a).

L. **Amendment No. Fourteen.** Amendment No. Fourteen authorizes the placement of an additional approximately 1.27 acres (55,320 square feet) of temporary falsework within the 100-foot shoreline band, along the east side of Yerba Buena Island. The falsework is necessary to complete construction of the YBI Transition Structures and the self-anchored suspension span (SAS). Additionally, Amendment No. Fourteen corrects a typographical error to the herring dredging window required in Special Condition II-D-4. Specifically, the window has been corrected so that it extends to March 31 rather than March 3. As such, the placement of an additional approximately 1.27 acres of

temporary falsework involves the placement of minor amounts of inert, inorganic material within the 100-foot shoreline band that will not have an impact on present or future public access to the Bay or Bay resources consistent with Regulation Section 10601(b)(1) and is thus considered a "minor repair or improvement" for which the Executive Director may issue an amendment to an existing permit, pursuant to Government Code Section 66632(f) and Regulation Section 110622(a).

M. **Amendment Nos. Fifteen and Amendment Eighteen.** Amendment No. Fifteen modifies the amended permit as follows: (1) it authorizes a one-month extension, to August 1, 2006, to commence the removal of hazardous materials and buildings on Skaggs Island (Special Condition II-F-10); (2) on Yerba Buena Island (YBI), it authorizes the placement, use, maintenance and removal, upon the completion of the East Span, temporary facilities (e.g., lighting, generators, storage boxes, etc.) associated with construction of the East Span; (3) it adds Special Condition II-W regarding the relocation of the U.S. Navy electrical cable (authorized under Amendment No. Two to Consistency Determination No. 4-89) and the installation of a new utility vault and the removal of an existing utility vault, both on the Oakland Mole; and (4) it authorizes the construction of post-construction stormwater treatment measures within the 100-foot shoreline band and the Bay. Each of these activities is discussed in more detail below.

1. **Skaggs Island Time Extension.** Amendment No. Fifteen authorizes a one and half month extension to the permittee's requirement regarding hazardous materials and buildings removal on Skaggs Island. Due to unforeseen delays associated with transferring the Skaggs Island property from the U. S. Navy to the U. S. Fish and Wildlife Service, the permittee had previously requested a total of three time extensions to the time requirements associated with the permittee's requirements for habitat mitigation contained in Special Condition II-F-10. An agreement apparently had been reached between the Navy and the U.S. Fish and Wildlife Service regarding the transfer and clean-up of the property. This agreement resulted in additional changes to Special Condition II-F-10 contained in this amended authorization; these changes necessitated a public hearing and vote before the Commission on June 15, 2006. To ensure that adequate time was available to bring the additional changes to the Commission, to process the changes to the amended permit that resulted from the Commission's proceedings on the item and ensure that the permittee remains in compliance with Special Condition II-F-10, the permittee was granted an additional one-and a-half months, to August 1, 2006, to the time requirements contained in the special condition. The extension of the time requirements contained in Special Condition II-F-10 does not result in a material alteration to the originally authorized project contained in this amended authorization, consistent with Commission Regulation Section 10800 and is consistent with Government Code Section 66600 through 66661 and the San Francisco Bay Plan for which the Executive Director may issue an amendment to an existing permit pursuant to Government Code Section 66632(f) and Regulation Section 10622(a).

2. **Temporary Facilities Associated with Construction on YBI.** Amendment No. Fifteen authorizes the placement, use, maintenance and removal of equipment (e.g., lighting, generators, etc.) on YBI that is needed for construction activities. All equipment will be removed from the Commission's jurisdiction following completion of construction activities for the East Span Replacement Project. As such, the temporary placement of construction equipment within the Commission's

100-foot shoreline band involves the placements of small amounts of inert, inorganic material that will not have an effect on present or future maximum feasible public access to the Bay or Bay resources, consistent with Regulation Section 10601(b)(1), and is considered a "minor repair or improvement" for which the Executive Director may issue an amendment to an existing permit pursuant to Government Code Section 66632(f) and Regulation Section 10622(a).

3. **Relocation of the U.S. Navy Cable and Associated Utility Vaults.** Due to the location of the Oakland Touchdown Structure, an existing U.S. Navy electrical cable that runs from the Oakland Mole, beneath the Bay to Treasure Island will need to be relocated as part of the East Span Replacement Project. Since the cable is owned by the U.S. Navy and will be located outside of Caltran's existing and new right-of-way for the bridge span, the work associated with relocation of the electrical cable was authorized under an amendment to an existing consistency determination (CN 4-89) that was issued to the U.S. Navy for the installation of the original cable. Installation of the cable involves the demolition of an existing and a new below-ground utility vault at the Oakland Mole. To ensure that the existing utility vault is removed and the new vault is constructed in a manner that will not impact future public access on the Oakland Mole ("Gateway Park"), Special Condition II-X has been included in this authorization. The inclusion of Special Condition II-X does not result in a material alteration to the originally authorized project contained in this amended authorization, consistent with Commission Regulation Section 10800 and is consistent with Government Code Section 66600 through 66661 and the San Francisco Bay Plan for which the Executive Director may issue an amendment to an existing permit pursuant to Government Code Section 666329f) and Regulation Section 10622(a).

4. **Post-Construction Stormwater Treatment Measures.** Amendment No. Fifteen also authorizes the installation of post-construction stormwater treatment measures. Portions of stormwater treatment facilities will be located in a wildlife priority land use area and within areas outside the wildlife priority land use area that were required by the Commission to mitigate impacts to the wildlife priority land use area associated with BCDC Permit No. 1993.011.00. When the Commission originally authorized and required the post-construction stormwater treatment measures as part of the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project, the permittee only had a conceptual plan that identified the general locations and types of associated improvements with the stormwater treatment project. Since that time, the permittee has completed the design of the improvements and has more accurately identified the extent of the project scope that will be located in the Commission's Bay and shoreline band jurisdictions, as well as those elements of the project that will be located in the wildlife priority land use area and the Cypress Mitigation Area.

   The Emeryville Crescent is designated in Resolution 16 and shown in the *San Francisco Bay Plan* (Bay Plan Map No. 4) as a wildlife priority land use area. The findings of BCDC Permit No. 1993.011.00, which authorized the I-80 Westbound Operational Improvements and the Westbound High Occupancy Vehicle Lane (HOVL) Flyover, state that the Emeryville Crescent has significant aquatic and wildlife values. The findings also state that the area is ecologically important for a number of wildlife species. Of particular importance are the limited upland areas because of their important habitat functions including: (1) refugia for birds and

mammals during periods of high water; (2) buffering against human encroachment and disturbance; and (3) good nesting habitat for some wildlife species that utilize both upland and wetland habitats (Bodega Bay Institute 1978, Jones and Stokes et al. 1979).

In approving BCDC Permit No. 1993.011.00, the Commission found that portions of the existing I-80 westbound travel lanes located adjacent to the Emeryville Crescent between Powell Street and the West Grand Avenue overcrossing, and areas within the 100-foot shoreline band, were part of the Emeryville-Oakland wildlife refuge priority land use area. The Commission also found that in approving Resolution No. 16, it established the inland boundaries of all priority land use areas as the upland areas between the Bay shoreline and the 100-foot shoreline band, unless otherwise specified, including the Emeryville-Oakland wildlife refuge priority land use area. However, the Commission did not determine on a site specific basis whether the 100-foot-shoreline band area was an appropriate or desirable boundary given pre-existing land uses, but uniformly established the inland boundary to be coterminous with the Commission's permit jurisdiction. The Commission also found that because the freeway uses pre-date the Commission's jurisdiction and the wildlife priority land use designation, and that these uses co-existed with the wildlife uses along the Emeryville Crescent, that the 100-foot-shoreline band was not an appropriate inland designation for the Emeryville-Oakland wildlife priority land use area, and that the inland boundary should be established consistent with pre-existing and proposed freeway uses. Although the Commission recognized that the inland boundary of the wildlife priority land use area designated in Resolution No. 16 is not appropriate given the pre-existing freeway uses, the Commission recognized the significance of the wildlife priority land use areas that are already not improved with freeway uses.

Because there is such limited upland within areas of the site designated as a wildlife priority land use area, and because the upland areas are bounded by freeways and roadways, the Commission found that there is no feasible alternative for creating new upland within the wildlife priority land use area, except by placing additional fill within wetland habitat and the Bay. This would be in direct conflict with the legislative intent of Section 66602 of the McAteer-Petris Act, which directs the Commission to establish and preserve water-oriented priority land uses to minimize and prevent future filling of the Bay.

Special Condition II-E-1 of BCDC Permit No. 1993.011.00 required Caltrans to permanently restrict the area between the freeway improvements and its right-of-way, leasehold or ownership as open space to remain in its natural state. This land area is required to provide habitat values equal to or greater than the upland areas lost as a result of the HOV lane and overpass structure, and the upland areas must be contiguous with or within the existing wildlife priority land use area boundaries.

The Commission noted that it does not generally authorize uses within priority use areas that are inconsistent with the designated priority use. However, in the case of the HOVL flyover, the roadway use existed when the wildlife priority land use area was first created and has remained in existence at this site since that time. The Commission found that the changes authorized by the Commission to the existing freeway use within the priority land use area can be accommodated provided that the net wildlife habitat benefits afforded by the project area are greater than any detriment accruing from the project.

In this case, the post-construction stormwater treatment measures, while part of the highway system, would provide a significant environmental benefit to the Emeryville Crescent by collecting and treating stormwater runoff from an approximately 143.3-acre area. Importantly, this includes the impervious surfaces of portions of I-80 and the Bay Bridge Toll Plaza. Currently, stormwater from these areas is discharged directly into the Bay along the Crescent with no treatment.

The stormwater treatment measures that will be installed as part of Amendment No. 15 include a collection system, bioretention systems (which promote contaminant removal by filtration through vegetation and soil media, as well as adsorption with biological processes) and detention basins (designed to remove sediments by gravity settling). The collection system will be installed along the perimeter of the Emeryville Crescent adjacent to the existing highway. Once stormwater is collected through drop inlets, it will be conveyed to holding areas via pumps, treated and then discharged. The majority of the stormwater conveyance system will be installed below grade by trenching and pipe jacking resulting in temporary disturbances to native upland habitat. In addition, there will be a total of four pump stations, electrical cabinets and associated maintenance vehicle pullout areas throughout the entire length of the Stormwater Project. Two of these will be located in the wildlife priority land use area.

The stormwater project will result in a total of approximately 7,178 square feet (0.16 acre) of permanent improvements (stormwater pipes, pumps, etc.,) and approximately 119,354 square feet (2.74 acre) of temporary improvements in the Bay (a tidal marsh) and within the shoreline band (for temporary vehicular barriers, wildlife exclusion fences, vehicular access, etc.) Of this, there will be a total of 1,742 square feet (0.04 acre) of permanent improvements and approximately 10,018 square feet (0.23 acre) of temporary improvements in the Bay (a tidal marsh). Amendment No. Fifteen authorized approximately 8,276 (0.19 acre) and Amendment No. Eighteen authorizes approximately 1,742 square feet (0.04 acre) of Bay impacts. A total of 3,897 square feet of upland habitat located within the wildlife priority use area will be permanently impacted, and approximately 91,912 square feet (2.11 acre) of upland habitat transition habitat located within the priority use area will be temporarily impacted. (Amendment No. Fifteen authorizes 0.62 acre of these impacts and Amendment No. Eight authorizes an addition 1.49 acres of shoreline band impacts after-the-fact.) The stormwater project will also permanently impact 1,539 square feet (0.04 acre) and temporarily impact approximately 17,424 square feet (0.40 acre) of mitigation area located outside the wildlife priority land use area but that was required as mitigation under BCDC Permit No. 1993.011.00. (Amendment No. Fifteen authorizes 0.07 acre of these impacts and Amendment No. Eighteen authorizes an additional 0.33 acres after-the-fact.) In addition, the stormwater treatment project will temporarily impact approximately 131 square feet (0.003 acre) of upland transition habitat outside the wildlife priority use area and the area required for mitigation under BCDC Permit No. 1993.011.00 (Amendment No. Eighteen).

As is similar to subsequent amendments to the originally authorized project that resulted in additional fill in the Bay not contemplated in the earlier stages of the project, the permittee will not mitigate the temporary and permanent fill impacts that will result from Amendment No. Fifteen. While mitigation for the project was intended to offset those project impacts identified at the time Caltrans received

approval of the original project; to date, the Commission believes that the additional impacts have been fully mitigated by the project's original mitigation program. However, should a project change lead to significant additional impacts, or if the Commission determines that the cumulative effect of a number of small project changes has exceeded the impacts that the Commission determined were fully mitigated in the original authorization, then the Commission may require additional mitigation.

To offset the permanent impacts to the wildlife priority land use area, and areas outside the wildlife priority land use area that were required for mitigation under BCDC Permit No. 1993.011.00, Special Condition II-W has been included in this authorization. Under this special condition, the permittee is required to mitigate the permanent loss of upland habitat at a 3:1 ratio. Compensation will be provided in the form of an in-lieu fee in the amount of $75,807. In addition, temporary impacts to the wildlife priority-use area will be mitigated by restoring the area to pre-project conditions and the permittee is also required to provide an in-lieu fee in the amount of $893,813. (Amendment No. Fifteen required $109,900 for 0.69 acres of temporary impacts; Amendment No. Eighteen requires an additional $783,913 to offset 1.86 acres of additional impacts.)

The total $969,619 in-lieu fee may be used by the East Bay Regional Park District, the California Department of Parks and Recreation or the California State Coastal Conservancy to improve upland habitat in the Eastshore State Park, preferably along the Emeryville Crescent, as determined by or on behalf of the Commission.

Amendment No. Eighteen modifies Amendment No. Fifteen by authorizing the 1.86 acres of additional temporary impacts, after-the-fact. The permittee began construction of the stormwater project in May 2006. In January of 2007, staff determined that the ESA (environmentally sensitive area) fencing had been installed in a location bayward of the alignment approved in Amendment No. Fifteen, pursuant to the reference in Condition II-W-2 to "Attachment E, ESA, Mouse and Goose Fence Map, SFOBB Stormwater Project", submitted April 19, 2006. The as-built location of the ESA fence and the total area of additional impacts was re-mapped by the permittee and submitted with Amendment No. Eighteen as Attachment A, on September 6, 2007. The amendment request, with its supplemental information, dated October 4, 2007, and October 10, 2007, proposes an upgrading of the requirements for restoring the construction site to its pre-project condition. This includes the requirement to prune Cypress trees that were damaged by construction activities, the standards for replanting, and the success criteria that will be used for monitoring. Amendment No. Eighteen includes the approval of the permittee's planting plan, submitted as Attachment D to the request, that will ensure that the restoration is consistent with the habitat improvements of the Cypress Mitigation, as required by BCDC Permit No. 1993.011.00.

To compensate for the temporal loss of an additional 1.86 acres of habitat, the permittee will pay an additional mitigation that is based on a formula closer to the one used for permanent impacts than that used for temporary impacts. The new formula uses a restoration rate of $140,057 per acre and a 3:1 mitigation ratio. Thus, $783,913 will be paid to compensate for the loss of the 1.86 acres. This formula was

negotiated in May, 2007 for the Cypress Mitigation "failed areas", which remain a part of the wildlife priority land use area but are unsuitable for high quality wildlife habitat. The "failed areas" mitigation fee was approved by BCDC Permit No. 1993.011.00, Amendment No. Six.

This mitigation rate is appropriate because the permittee's construction activities removed a significant portion of the wildlife refugia and buffer area vegetation that was improved by the Cypress Mitigation in 1999, and which only recently had reached maturity. To compensate for this loss during the period of years in which the vegetation recovers, it is reasonable that the permittee fund a significant amount of habitat improvement projects in the vicinity of the Emeryville Crescent. East Bay Regional Park District staff compared cost estimates from their current project at Eastshore State Park and determined that the $140,057 per acre rate is accurate. The permittee believes that the compensation is appropriate.

Thus, the permittee will pay a total in-lieu fee of $893,813 for the total 2.55 acres of temporary impacts. Combined with the $75,807 fee for permanent impacts, the permittee will pay $969,619 for habitat improvements at Eastshore State Park, and provide the funds to the Commission or to the Coastal Conservancy within one year of the issuance of Amendment No. Eighteen.

As such, Amendment No. 15 and Amendment No. 18 authorize the placement of additional improvements for water conveyance structures, maintenance vehicle pullouts, pump stations and electrical facilities that involve the placement of minor amounts of inert, inorganic material within the 100-foot shoreline band that will not have an impact on present or future public access to the Bay or Bay resources or a priority use area, consistent with Regulation 10601(b)(1), and is thus considered a "minor repair or improvement" for which the Executive Director may issue an amendment to an existing permit, pursuant to Government Code Section 66632(f) and Regulation Section 10711. Additionally, Amendment No. 15 authorizes the placement of approximately 1,742 square feet (0.04 acre) of additional permanent Bay fill for existing and new outfall pipes and bypass structures that involve the placement of outfall pipes approved by the Regional Water Quality Control Board consistent with Regulation Section 10601(a)(4) and is thus considered a "minor repair or improvement" for which the Executive Director may issue an amendment to an existing permit, pursuant to Government Code Section 66632(f) and Regulation Section 10711.

N. **Material Amendment No. Sixteen.** In part, the Bay Plan policies on mitigation state that mitigation for the unavoidable adverse environmental impacts of any Bay fill should be considered by the Commission in determining whether the public benefits of a fill project outweigh the public detriment from the loss of water areas due to the fill. Whenever mitigation is necessary, the mitigation program should assure: (a) that the benefits from the mitigation will be commensurate with the adverse impacts on Bay resources and consist of providing area and enhancement resulting in characteristics and values similar to the characters and values adversely affected; (b) that the mitigation will be at the project site or as close as possible; (c) that the mitigation measures will be carefully planned, reviewed and approved by or on behalf of the Commission, and subject to reasonable controls to ensure success, permanence and long-term maintenance; and (d) that the mitigation will, to the extent possible, be provided concurrently with those parts of the project causing adverse impacts.

In authorizing the original project, the Commission found that the various mitigation measures proposed by Caltrans will offset the impacts to approximately 8.59 acres of shallow water habitat, including eelgrass and sandflats. Of the several mitigation measures, the off-site mitigation consist of Caltrans contributing a total of $10.5 million towards restoration at Skaggs Island and the restoration of several potential sites in the Eastshore State Park.

While Caltrans had tried diligently to comply with its obligations under Special Condition II-F-10, unforeseen delays regarding the transfer of Skaggs Island from the U.S. Navy to the U.S. Fish and Wildlife Service led Caltrans to request and subsequently receive a total of three time extensions to the July 1, 2004 deadline for commencement of removal of the structures and hazardous materials that was contained in the original authorization for the project. The amended permit herein authorizes a fourth time extension, to August 1, 2007, to commence removal of structures and hazardous materials on Skaggs Island.

To resolve the impasse between the Navy and the U.S. Fish and Wildlife Service, the California Wildlife Conservation Board has been negotiating to obtain the property from the Navy. However, prior to the State's acceptance of the property, any contamination must be cleaned up pursuant to the specifications of the California Department of Toxic Substances Control. Thus, the BCDC permit condition contained in the original authorization (Special Condition II-F-10) was modified to allow the use of the $6 million in mitigation funds by the Navy for clean up on the Island. To ensure that the site will be ultimately transferred to the State, Special Condition II-F-10 contains language that requires that signed transfer documents to the State from the Navy for the property be placed in escrow prior to the Navy's receipt of the $6 million in mitigation funds.

Special Condition II-F-10 was also modified such that $6 million of the $8 million in mitigation funds will be used for structure and hazardous material removal on Skaggs Island and $2 million will be set aside for the long-term restoration and management of the Island. With these modifications all of the $8 million required in the original authorization would go towards Skaggs Island, rather than any remaining funds of the initial $8 million allocation going toward habitat restoration at Eastshore State Park. While the $8 million allocation will entirely go towards the cleanup and restoration of Skaggs Island, the condition still requires that $2.5 million be used for habitat restoration at Eastshore State Park. A portion of this $2.5 million allocation has been used to create a pilot eelgrass restoration project at the North Basin, a site located within the Eastshore State Park in the City of Berkeley. If the deadline for commencement and completion of work at Skaggs Island are not met, the permit still requires the funds to be returned and used for other habitat restoration in the Central Bay.

Special Condition II-F-10 requires the Commission to consult with the California Department of Fish and Game (CDFG), the State Water Resources Control Board (RWQCB), the U.S. Army Corps of Engineers (Corps), the U.S. Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration, Fisheries Division (NOAA Fisheries) regarding disbursement of the mitigation funds. On May 25, 2006, the staff transmitted a letter to these agencies requesting advice regarding the proposed changes to BCDC

Permit No. 8-01. At the time the staff recommendation was prepared, the staff had received advice from the CDFG, the EPA and the NOAA Fisheries. All of these agencies expressed support for the modifications to Special Condition II-F-10 contained herein.

The Commission finds that the modifications to the language contained in Special Condition II-F-10 would be consistent with the Bay Plan policies on mitigation because the modifications will allow for additional time to clean-up the site and allow for the transfer of the property from the Navy to the Sate and ultimately the USFWS which are all necessary steps for the eventual restoration of the site to tidal action.

O. **Amendment No. Seventeen.** As described in Section III-B of this amended permit, Amendment No. Seventeen is granted to Caltrans to allow it to commence the removal and clean-up activities at Skaggs Island by August 1, 2008, pursuant to revised Special Condition II.F.10. The extension of the time requirements contained in Special Condition II.F.10 does not result in a material amendment to the originally authorized project contained in this amended authorization, consistent with Commission Regulation Section 10800 and is consistent with Government Code Section 66600 through 66661 and the Bay Plan for which the Executive Director may issue an amendment to an existing permit pursuant to Government Code Section 66632(f) and Regulation Section 10622(a).

P. **Amendment No. Twenty.** Amendment No. Twenty authorizes Caltrans to install a coffercell system in-lieu of two previously authorized cofferdams at temporary towers "C" on the east side of Yerba Buena Island to facilitate the construction of temporary falsework-towers, which will support the construction of the permanent bridge structure and provide construction access to Pile Caps C1, C2, C3, and C4. The coffercell system, however, is preferred over the cofferdams because of the close proximity of the work to a designated Environmentally Sensitive Area (ESA) and the Torpedo Building (Building 262), which is a historic building. Conducting construction activities within this small access area is difficult. The permittee contends and the Commission concurs that the coffercell is a more environmentally sensitive solution and is preferable to the pile driving activities associated with cofferdams, the noise impacts of which could potentially threaten aquatic species.

A coffercell system consists of two types of rock (Caltrans Lite Class rock and 3" -6" crush rock) and gravel in bags (coffercells). Armored rock will be placed on units below Mean High Water. The remainder of the rock approximately 7,793 square feet will be above the Mean High Water line. Existing riprap along the shoreline of Yerba Buena Island will be removed prior to the coffercell system installation. The temporary coffercell system will remain in place approximately four months and be removed and the shoreline area returned to its existing conditions no later than November 30, 2008.

Authorization Section I-A-2a(5) of this amended permit authorized 12,072 cubic yards of temporary submerged fill to install two cofferdams. Constructing a coffercell system in place of cofferdams reduces the amount of volumetric Bay fill from 12,072 to 4,512 cubic yards. The coffercell system also reduces noise levels that could potentially impact Bay habitat, fish and wildlife that are associated with driving the pilings for the cofferdam alternative. However, this change also increases the total area of fill footprint by 0.49 acres over the amount authorized in previous amendments (Amendment Nos. Six, Eight, and Eleven).

This amount exceeds the 10,000 square feet of fill that the Executive Director can administratively authorized under Regulation Section 10601(a)(1)(B). However, the fill is not permanent fill but will only be in place for four months to facilitate construction of a temporary tower to support falsework for constructing the new east span of the Bay Bridge. This fill will be fully removed after this four month period, and the permittee contends this will be less disruptive to Bay fish and wildlife habitat than the sound pressure levels generated by driving the piles associated with the cofferdam construction previously authorized, and is necessary to avoid impacting both an environmentally sensitive area and a historic building. For these reasons, the project involves a similar activity, as defined by Regulation Section 10601e(3) with no greater adverse impact on the Bay than placing protective works covering 10,000 square feet of Bay, as defined by Commission Regulation Section 10601(a)(1)(B) and, thus is a "minor repair or improvement" for which the Executive Director may issue (1) a permit, pursuant to Government Code Section 66632 (f) and Regulation Section 10622(a), and (2) an amendment to a permit, pursuant to Regulation Section 10822.

Q. **Amendment No. Twenty-One.** The transfer of Skaggs Island from the Navy to USFWS has been delayed several times and the Commission and staff have issued time extensions to Caltrans to accommodate these delays. Congresswoman Lynn Woolsey facilitated discussions between the USFWS and the Navy that resulted in agreement between the parties to a Memorandum of Understanding (MOU). Congresswoman Woolsey subsequently introduced legislation (HR 5658) on April 17, 2008, which passed the House on May 22, 2008, and was at this time in the Senate, and would require the Secretary of the Navy and the Secretary of the Interior to negotiate a MOU that stipulates conditions of the transfer of Skaggs Island to the USFWS for inclusion in the National Wildlife Refuge System. This bill would also authorize the Navy to accept donations, including contributions from the State of California and other entities, to cover the costs of demolishing and removing structure on the property and to facilitate future environmental restoration of Skaggs Island. Caltrans stated that these recent developments moved the parties closer to the goals described by the requirements of the amended permit.

This amendment grants Caltrans a time extension request of two years to August 1, 2010, for commencing the building demolition and two years to July 1, 2012, for beginning wetland restoration activities. As described in Section III-B of this amended permit, Amendment No. Twenty-One is granted to Caltrans to allow it to commence the removal and clean-up activities at Skaggs Island by August 1, 2010, pursuant to revised Special Condition II-F-10. The extension of the time requirements contained in Special Condition II.F.10 does not result in a material amendment to the originally authorized project contained in this amended authorization, consistent with Commission Regulation Section 10800 and is consistent with Government Code Section 66600 through 66661 and the Bay Plan for which the Executive Director may issue an amendment to an existing permit pursuant to Government Code Section 66632(f) and Regulation Section 10622(a).

R. **Amendment No. Twenty-Two.** Construction of the SFOBB East Span Project requires the construction and use of a temporary double-deck bypass structure at YBI, the so-called the South-South Detour (SSD) bypass. The SSD bypass structure will connect to the existing East Span at the existing E-1 bridge pier on the east side of YBI. The bypass structure would be used to divert traffic off a section of the existing East span between E-1 and the YBI tunnel. To complete construction of the new SFOBB East Span and tie

into the YBI tunnel, the portion of the existing East Span between Pier E-1 and the YBI tunnel will need to be dismantled. The section of the SSD bypass structure bridge decks that will connect into the existing East Span at E-1 is referred to as the East Tie-in. The East Tie-In bridge decks will be fabricated on-site and supported by two temporary towers on the southside of the existing East Span on YBI. The connection of the East Tie-In to the existing East Span will utilize a Roll-Out/Roll-In concept. A section of the existing East span bridge decks east of Pier E-1 will be disconnected from the existing bridge and rolled-out along a temporary skid rail structure to temporary towers on the north-side of the existing East Span. The new temporary East Tie-In bridge decks will then be rolled-in along the skid rail structure. The Roll-Out/Roll-In operation is tentatively scheduled to take place during the Labor Day 2009 weekend during traffic closures of the existing SFOBB.

Amendment No. Twenty-Two authorizes Caltrans to construct a temporary crane runway platform on the southeast side of Yerba Buena Island north of Coast Guard Cove. The platform will support two large cranes and a temporary tower skid rail structure required to construct the East Tie-In bridge decks and to perform the Roll Out/Roll-In operation. Approximately 16,445 square feet and all of the piles, a total of 110 piles, will be located within the 100-foot shoreline band. Although eelgrass beds were identified in October 1999, 2003, 2004 and 2005 surveys to occur naturally in the waters adjacent to the proposed construction area at Coast Guard Cove, the nearest eelgrass is located approximately 65.6 feet south of the west end of the crane runway platform. The project footprint is outside of the eelgrass beds; all construction and work shall be land-based, occur above mean high tide level and be conducted at low tide. There shall be no docking or marine access. Filter fabric shall be installed under crane pads and shall overlap as necessary to cover the entire crane runway platform surface. A 12-foot oil pan shall be suspended under the crane to provide secondary containment. The crane runway platform and access ramps shall be completely removed out of the shoreline band by April 30, 2010.

The construction and operation of the crane runway platform are unlikely to adversely affect eelgrass beds and the Bay in general. The work authorized under Amendment No. Twenty-Two, involves the placement of inert, inorganic materials within the 100-foot shoreline band with no effect on present or future maximum feasible public access to the Bay or Bay resources, as defined by Regulation Section 10601(b)(1). Further, these activities, as conditioned by Special Condition II-H of this amended permit and the modifications made as a result of the crane runway platform do not constitute a material alteration of the original project authorized herein for which the Executive Director may issue an amendment to an existing permit pursuant to Regulation Section 10822 and Government Code Section 66632(f).

S. **Amendment No. Twenty-Four.** To minimize potential entrance of Canadian geese onto the I-80 roadway adjacent to the Emeryville Crescent, the permittee will temporarily install 2,800 feet of three-foot-high polyvinyl fence at the edge of the roadway. The fence is being authorized for a three-year trial period, in which time the permittee will collect data about the fence's performance with regard to effectiveness, necessity, durability, maintenance, and visual impacts.

The permittee's biological consultant has stated that the location and the height of the exclusion fence will minimize the accurance of geese and goslings entering lanes of traffic, as has occurred in the past. The alignment of the fence will be generally along the toll plaza approach (the southern boundary of the Oakland-Emeryville Wildlife

Priority Land Use Area. It will be installed approximately three feet from the paved shoulder of the roadway, but at several points it will be six feet from the pavement. Because the fence is located within this unpaved strip next to the freeway that functions as a crash-recovery zone, the fencing will be made of flexible materials that rebound if struck by vehicles. Frequent repairs of the fence, however, may still be necessary to maintain both its appearance and function. Therefore, Special Condition II-Z-3 requires the permittee to restore the original condition of the fence within 30 days of notification by staff. In the permittee's email of December 16, 2008, Caltrans agreed to the three-year trial period not only to evaluate whether the fence keeps wildlife off the freeway, but also to evaluate the effectiveness of the fence design for safety and maintenance considerations that would make this design alternative unacceptable and infeasible.

The permittee believes that the materials and transparency of the fence will minimize visual impacts. Although staff agrees that the fencing is generally transparent, it has pointed out that the fence's location makes it subject to the requirements of BCDC Permit No. 1993.011.00 for preserving visual access to the Bay. Special Condition II-D of Permit No. 1993.011.00 requires that any proposed fencing or other barriers along this section of the freeway, which is identified as a scenic roadway in Bay Plan Map 4, must be reviewed by the Design Review Board and approved only if it minimizes view impacts and is consistent with the Commission's policies. Therefore, Amendment No. Twenty-Four specifies that authorization of any permanent fence at this location shall be based on: (1) data collected during the three-year trial period; (2) evidence that it is necessary and can achieve the stated purpose; (3) a determination that the fence does not create any visual blight due to maintenance problems; and (4) the Design Review Board's concurrence that the fence is consistent with the requirements and findings of Permit No. 1993.011.00.

This amendment to the permit, authorizing the installation of a temporary, wildlife exclusion fence in the SFOBB toll plaza approach, is issued pursuant to Regulation Section 10820 upon the same criteria provided for the issuance of administrative permits. It involves placement of small amounts of inert fill in the shoreline band that does not have a significant adverse effect on present or possible future maximum feasible public access to the Bay consistent with the project, on present or possible future use for a designated priority water-related use, and on the environment, and is a minor improvement for which the Executive Director may issue an amendment to a permit pursuant to Regulation Section 10601(b)(1) and Government Code Section 66632(f).

T. **Amendment No. Twenty-Five.** Amendment No. Twenty-Five authorizes the construction of a temporary access trestle that will be located at the eastern end of Yerba Buena Island to connect the island to the main tower of the SAS (Self-Anchored Suspension Span) Tower 1 (T1). The temporary trestle will provide pedestrian, vehicle and equipment access between Yerba Buena Island and T1 during construction activities. The trestle is critical for construction of the T1 Tower because it will not only provide for construction access to the tower, but will also provide for emergency response and evacuation access. Currently, the only access to the T1 foundation is via ladders on the side of the foundation. As the work at the tower is considered to be occurring in a "confined space", there is an increase incidence of safety risk. The trestle will assist emergency personnel in responding to and evacuating the T1 construction area should an emergency occur. Additionally, the trestle will allow for grouting activities to occur from the trestle, rather than from barges on the Bay, minimizing the risk of accidental

discharge of grout into the Bay. The temporary access trestle will result in the temporary placement of a total of 84.78 square feet of solid fill due to the placement of piles and 12,436.58 square feet (0.28 acre) of pile-supported fill from the trestle and metal footbridge. The trestle will not be a permanent structure and will be removed at the completion of the SAS contract or by 2019, whichever is earlier. Additionally, the trestle may be used during demolition and removal of the original east span.

Construction of the trestle will not result in impacts to eelgrass. The closest documented eelgrass beds are approximately 492 feet to the southwest of the eelgrass beds at Coast Guard Cove and approximately 820 feet to the west of the eelgrass bed at Clipper Cove. The construction activities associated with the trestle are far enough from the beds, so that impacts are not anticipated.

The majority of the fill placed as a result of the trestle will be pile-supported and, although will be in place for up to 9 years, is considered temporary. Additionally, several components that were to be constructed as part of the overall span replacement project and were to result in impacts to the Bay and Bay resources have either not been constructed or have been dismantled ahead of schedule. Thus the overall mitigation plan that was developed for the entire span replacement project will adequately mitigate the temporary impacts associated with the trestle authorized under Amendment No. Twenty-Five. For these reasons mitigation for the fill associated with construction of the trestle is not required at this time.

The installation and temporary use of the trestle authorized under Amendment No. Twenty-Five does not constitute a material alteration of the originally authorized project, pursuant to Commission Regulation Section 10800 and is consistent with Government Code Section 66600 through 6661 because the trestle will result in a small fraction of the amount of temporary pile-supported fill that was originally authorized in the permit and is one of many trestles that is necessary to construct the project. The size of the trestle is the minimum necessary to safely and effectively accommodate personnel during installation of the SAS Tower. There is no alternative upland location for the trestle as it is necessary to safely construct the new bridge and bridges are a designated water-oriented use in the San Francisco Bay Plan. Lastly, the trestle is necessary to construct the T1 Tower, one of the remaining components of the Bay Bridge Replacement Project. With completion of the T1 Tower, the new span will be closer to being opened and thus demolition of the old span can commence which will result in the uncovering of 12.5 areas of Bay fill. As such, the installation of the trestle is not a material alteration of the originally authorized project for which the Executive Director may issue a permit pursuant to Government Code Section 66632(f) and Regulation Section 10622(a).

Several conditions have been included in this amended authorization to ensure that the project is constructed in a manner that is consistent with the San Francisco Bay Plan and the McAteer-Petris Act. Special Conditions II-AA-1 through II-AA-4 pertain to minimizing impacts associated with pile driving. Construction of the trestle requires the installation of 22, 36-inch-in-diameter pilings. To minimize impacts to aquatic species associated with sound pressure levels from pile driving, Special Condition II-AA-1 requires the use of a bubble curtain during the driving of the 18 pilings that are located in the Bay. The remaining 4 pilings are located close to the shore and will be driven during low tide thus it is anticipated that sound pressure levels will be so low that a bubble curtain is not necessary. Additionally, Special Condition II-AA-2 restricts pile driving to June 1 through November 30 of any given year, Special Condition

II-AA-3 restricts pile driving to day light hours and Special Condition II-AA-4 requires that aquatic and biological monitoring occur during pile driving activities. It is believed that all of these conditions will minimize impacts to aquatic species during pile driving, consist with the Bay Plan policies of Fish, Wildlife and Other Aquatic Species. Finally, authorization of Amendment No. Twenty-Five requires that before commencing construction of the temporary access trestle, Caltrans must provide an Incidental Take Permit (ITP) from the California Department of Fish and Game and incorporate any required mitigation measures in that ITP into construction practices for the temporary trestle installation.

U. **Amendment No. Twenty-Six.** In accordance with Special Condition II-F-10-b, Caltrans embarked on a pilot eelgrass habitat creation study at the North Basin site, located within the Eastshore State Park, in the City of Berkeley (authorized under Amendment Nos. Twelve and Seventeen). While the pilot study yielded considerable insights into the design and construction requirements for eelgrass restoration, eelgrass establishment at the pilot site was intermittent, creating uncertainty as to the appropriateness of the North Basin site for a full-scale restoration project. Thus, it was determined through an interagency and stakeholder process that using the remaining funds to build the full-scale restoration project at the site was not the best use of the remaining funds set aside for eelgrass restoration. In addition, because the remaining potential eelgrass restoration sites within the Eastshore State Park were even less ideal for restoration than the North Basin site, it was determined that the most appropriate use of the funds would be to transfer the remaining $1.5 million to NMFS to be used for a Bay-wide comprehensive eelgrass restoration project, with an emphasis on restoration within the East Bay. Thus, Special Condition II-F-10-b has been revised to require Caltrans to transfer all remaining funds to NMFS to be used on the comprehensive restoration project. In addition, the Special Condition has been revised to ensure that NMFS and BCDC have an appropriate framework and mechanism for determining where and how the funds will be used. The revisions to Special Condition II-F-10-b do not result in a material alteration of the originally authorized project for which the Executive Director may issue an amendment to a permit pursuant to Regulation Section 10622(a) and Government Code Section 66632(f).

V. **Amendment Nos. Twenty-Seven and Twenty-Eight.** Amendment No. Twenty-Seven authorizes an extension of time, until August 31, 2015, to guarantee the public access improvements required in Special Condition II-B-2. Caltrans continues to prepare, solicit public and agency input on and plan for the final design of the public access improvements required in the amended permit consisting of an approximately 4.5-acre Gateway Park parcel including a temporary parking lot and a public access path that will connect land access to access on the new bridge span as well as a public path terminus and connector at Yerba Buena Island. This process, as well as delays in the construction and opening of the new bridge span, is taking longer than originally expected and thus, an extension to the time requirement contained in Special Condition II-B-2 is necessary. Additionally, Amendment No. Twenty-Seven authorizes the construction of a bus turn-around at the Gateway Park site. The bus turn-around is needed to prevent traffic congestion on Burma Road and will provide buses with an adequate turning radius once they have entered Burma Road. Approximately 3,668 square feet of the bus turn around will be constructed within the Commission's 100-foot shoreline band and will improve public access at the site by preventing traffic back-ups on Burma Road leading to the site. The project authorized under Amendment No. Twenty-Seven, therefore would involve the placement of small amounts of inert,

inorganic material with no effect on present or future maximum feasible public access to the Bay or Bay resources, as defined in Regulation Section 10601(b)(1) and thus is a "minor repair or improvement", for which the Executive Director may issue an amendment to a permit, pursuant to Government Code Section 66632(f) and Regulation Section 10822.

Amendment No. Twenty-Eight extends the date contained in Special Condition II-H pertaining to the removal of a temporary crane platform that was needed to support two large cranes used during construction of the East Tie-In bridge decks, and the temporary tower skid rail structure, and to perform the Labor-Day weekend 2009 Roll-Out/Roll-In operation. Originally, the amended permit required the crane platform to be removed by April 30, 2010. However, the platform was needed to dismantle the temporary tower skid rail structure that was used during the Roll-Out/Roll-In operation. Caltrans anticipates that dismantling of the skid rail and the platform will occur by July 31, 2010, thus the time frame contained in Special Condition H has been extended to reflect the additional time needed to remove the platform. As such, the project authorized under Amendment No. Twenty-Eight will not result in a material alteration of the originally authorized project, consistent with Regulation Section 10800, for which the Executive Director may issue an amendment to a permit consistent with Regulation Section 10822 and Government Code Section 66632(f).

W. **Amendment No. Twenty Nine.** Amendment No. Twenty-Nine authorizes the paving and use of a portion of Burma Road and the temporary installation of a chain link fence. The paving and fence installation are necessary to accelerate construction of the Oakland Touchdown Detour (OTD) that will allow for the simultaneous opening of the new east- and west-bound SFOBB bridges. While work directly associated with the OTD detour is located outside of the Commission's jurisdiction, construction of the detour will temporarily eliminate access along a portion of an existing access road. Construction of the improvements authorized under Amendment No. Twenty-Nine will allow Caltrans, construction personnel, as well as third parties with facilities near the western end of the maintenance road continued access to their respective projects and facilities while the detour is in place. The project involves that placement and extraction inert, inorganic material with no effect on present or future maximum feasible public access and Bay resources, consistent with Regulation Section 10601(b)(1) and is thus considered a "minor repair or improvement" for which the Executive Director may issue an amendment to a permit consistent with Regulation Section 10800 and Government Code Section 66632(f).

X. **Amendment No. Thirty.** Amendment No. Thirty modifies the public access design at the Oakland Touchdown by: (1) increasing the size of the interim public access parking lot within the Gateway Park parcel from 0.37 acres to 0.86 acres and adding sidewalks, landscaping, and a vehicle turn-around; (2) increasing from 0.25 acres to 0.30 acres the improvements required by Special Condition II.B.4.a that connect the bridge trail to the parking lot; (3) removing the maintenance road crosswalk; (4) reducing the area of the bridge connector trail to 0.166 acres; (5) adding a 0.134-acre, chevron-shaped public access landing that includes seating and landscaping; and (6) adding Special Conditions II.B.4.a.(3) and II.B.4.a.(4) requiring the permittee to control and limit vehicle uses of the maintenance road and, if vehicle traffic impacts to public access are identified in the future, requiring the permittee to modify the signaling, signage, or design of the interface.

The connector trail at the Oakland Touchdown links the bicycle/pedestrian path on the new East Span with the parking lot at Gateway Park and with the permittee's trail heading toward Emeryville (see BCDC Permit No. 1993.011.00). Caltrans decided to replace a portion of the 15.5-foot-wide connector trail and the maintenance road crosswalk with a 0.134-acre (5,387-square-foot) elevated landing to enhance the enjoyment of cyclists and pedestrians and to improve safety at this intersection. Compared with the previously required connector path and crosswalk, the chevron-shaped landing provides a large open area for public access users to pause at the touchdown or freely move between the parking lot, the bridge, and the trail to Emeryville. The landing will be constructed with colorized concrete and elevated approximately six inches above the maintenance road to create a high-visibility intersection for vehicles, which must yield to public access users at all times before crossing. Cyclists and pedestrians on the bridge trail will be directed toward the trail extension leading to Emeryville by the landing's staging and seating area on the north side and by a three-foot-wide buffer area on the south side, which will be surfaced with high-visibility yellow "truncated domes."

Amendment No. Thirty increases the public access benefits of the project by authorizing enhancements of the public access parking lot, replacing a portion of the connector trail at the Oakland Touchdown with a public access landing, and adding special conditions to improve safety at these locations. These changes will result in a project that continues to provide the maximum feasible public access consistent with the project and will not materially alter the project authorized by the permit. Thus, they are similar to a minor repair or improvement for which the Executive Director may issue an amendment to a permit, pursuant to Government Code Section 66632(f) and Regulation Sections 10822 and 10601(e)(3).

Y. **Amendment No. Thirty-Two.** The amended permit authorizes and requires the permittee to remove the existing East Span as part of the San Francisco-Oakland Bay Bridge Seismic Safety Project (SFOBB Project). When the new bridge was originally authorized, the permittee envisioned removing the East Span by dredging a temporary barge channel and deploying machinery via barge to dismantle the bridge and collect demolition debris, and using other methods of dismantling the superstructure from above. Although, the permittee anticipated constructing temporary trestles and falsework, the original permit did not authorize the placement of such temporary fill for the demolition work. The permittee has since refined the approach for dismantling the bridge and determined that it may be infeasible to demolish the bridge solely using barges, and that temporary trestles and falsework will likely be needed to demolish the bridge and contain demolition debris. Material Amendment No. Thirty-Two authorizes construction of two temporary trestles south of and parallel to the existing East Span, one extending from the southeast shoreline at YBI and one extending from the City of Oakland shoreline, and installation of temporary support piles for falsework, barge mooring, access, and other dismantling activities. This demolition approach will likely involve constructing the YBI trestle and a combination of the temporary barge channel authorized in the original permit and a smaller section of the Oakland trestle authorized in Amendment No. Thirty-Two.

1. **Temporary Bay Fill.** The Commission may allow fill only when it meets certain fill requirements identified in Section 66605 of the McAteer-Petris Act, which states, in part, that: (a) fill "should be limited to water-oriented uses (such as bridges)" or for "minor fill for improving shoreline appearance and public access"; (b) fill in the Bay

should be approved only when "no alternative upland location" is available; (c) fill should be "the minimum amount necessary to achieve the purpose of the fill"; (d) "the nature, location, and extent of any fill should be such that it will minimize harmful effects to the Bay area, such as, the reduction or impairment of the volume, surface area or circulation of water, water quality, fertility of marshes or fish or wildlife resources, or other conditions impacting the environment..."; and (e) "fill should be authorized when the applicant has such valid title to the properties in question that he or she may fill them in the manner and for the uses to be approved."

a. **Water-Oriented Use.** All of the Bay fill will be temporary and for the purpose of aiding the permittee in safely and efficiently removing the East Span and, therefore, is fill for a water-oriented-use.

b. **Alternative Upland Location.** All fill in the Bay is for removing an existing bridge between YBI and the City of Oakland shorelines and, thus, there is no alternative upland location for the project.

c. **Minimum Amount Necessary.** The permittee determined that it may be infeasible to remove the East Span solely through the use of barges (as originally envisioned) since they may not provide sufficient stability and necessitate more dredging, which could lead to increased impacts to marine organisms. Dismantling the East Span will be logistically complex. Therefore, the permittee calculated the minimum fill needed for trestles if it is determined that removing the bridge using barges is not the most cost effective, efficient, or safe method of dismantling. In addition, the temporary trestles and support piles will be staged and not all of the piles that may be needed will be in the Bay at the same time. Further, all fill will be removed upon project completion and the project will not result in any increase in Bay fill. Therefore, the temporary fill is the minimum amount necessary.

d. **Effects on Bay Resources.** Because, the fill is pile-supported and temporary, it will not have permanent adverse impacts on Bay surface area or circulation, although there may be temporary adverse impacts. For this reason, the temporary trestles and support piles will be constructed in a manner that minimizes adverse impacts to fish and other aquatic life (See the finding below on Water Quality, and Fish, Other Aquatic Organisms, and Wildlife).

e. **Valid Title.** The temporary fill will be placed on lands owned by the State Lands Commission, The City and County of San Francisco, and The City of Oakland, Alameda County, however, Caltrans has a permanent easement for the right-of-way on which the SFOBB is located.

The Commission finds the project, as conditioned, is consistent with its law and policies regarding Bay fill.

2. **Natural Resources Policies**

a. **Fish, Other Aquatic Organisms and Wildlife.** The Bay Plan policies on fish, other aquatic organisms and wildlife state, in part, that "the Commission should consult with the California Department of Fish and Game and the U.S. Fish and Wildlife Service or the NOAA National Marine Fisheries Service whenever a

proposed project may adversely affect an endangered or threatened plant, fish, other aquatic organism or wildlife species...and give appropriate consideration of (their) recommendations in order to avoid possible adverse impacts of a proposed project on fish, other aquatic organisms and wildlife habitat."

The permittee will possibly need to conduct a significant amount of pile-driving in the Bay to construct the temporary trestles and support piles. While the final number of piles to be installed has not been determined, under the "worse case" scenario the permittee will install up to 2,450, twenty-four-inch-in-diameter piles and/or 1,560 thirty-six-inch-in-diameter piles. Pile-driving can affect listed and special status fish species by generating sound pressure waves and noise. In addition, the project may cause localized increases in turbidity during pile removal and in cutting piles below the mudline.

The total number of piles authorized herein is 2,450. However, this is a "worse case" estimate, and fewer piles are expected to be installed. In addition, a combination of the two sizes of piles authorized in Amendment No. Thirty-Two will be installed. If larger diameter piles are used, a significantly fewer number of total piles will be installed.

When the SFOBB Project was originally authorized in 2001, NOAA National Marine Fisheries Service (NMFS) issued a Biological Opinion for the entire project on October 30, 2001 and found that the project was not likely to jeopardize the continued existence of listed anadromous salmonids or result in the destruction or adverse modification of designated critical habitat. The U.S. Fish and Wildlife Service (USFWS) issued a biological opinion on October 29, 2001, for potential impacts to the California least tern and California brown pelicans, and an amended opinion on March 10, 2005, for potential impacts to salt marsh harvest mice, California clapper rail, and California brown pelicans. Lastly, the California Department of Fish and Game (CDFG) issued an Incidental Take Permit (ITP) on November 26, 2001, and an amended ITP on October 14, 2009.

The permittee worked closely with the resource agencies to develop mitigation measures to ensure that the demolition of the East Span of the Bay Bridge will minimize potential adverse impacts to fish and other aquatic organisms. Measures include: limiting the size of piles and duration of impact pile driving to the greatest extent feasible; installing pipe piles with a vibratory hammer to the greatest extent possible; limiting pile-driving with an impact hammer (with the exception of pile proofing) to the period between June 1 and November 30 to avoid the peak migration period for salmonids and spawning adult green sturgeon; using a marine pile driving energy attenuator (e.g., bubble curtain) during impact pile-driving to minimize the effects of sound on fish; and developing a plan (to be approved by NMFS and the RWQCB prior to project construction) to ensure that sound levels from pile-driving will not exceed levels that are harmful to fish as identified by the Fisheries Hydroacoustic Working Group (FHWG). When a pile is installed with a vibratory hammer, it needs to have a final proofing with an impact hammer, which involves hitting the pile with a limited number of blows with an impact hammer to test integrity and to seat the pile. The proofing episodes last for less than a minute but, nonetheless, have greater sound impacts than a vibratory hammer. The permittee stated that it is too costly and logistically difficult to deploy a sound

every pile that needs proofing. Consequently, the permittee worked with NMFS to develop several mitigation measures to address the potential impacts of proofing while still enabling the project to be completed, including: allowing proofing without an attenuator system on a percentage of the total piles; limiting the number of piles that are proofed each day to no more than two; and limiting the total number of pile-driver blows associated with the proofing to no more than twenty blows per pile per day. Special Conditions II-BB(2) and II-BB(3) incorporate these measures to ensure that the pile-driving activities will not adversely impact fish.

Eelgrass beds have been documented within the SFOBB Project area in Clipper Cove and Coast Guard Cove at YBI, and north of the Oakland touchdown. These areas are considered special aquatic habitats, which are known to expand and contract over time. As a part of the SFOBB Project, surveys of eelgrass within the project area were performed in 1999, 2000, 2001, 2002, 2003, 2004, 2005 and 2007, and documented no eelgrass directly in the areas where the YBI and Oakland Trestles and Oakland shoreline falsework will be constructed. Based on this information, the permittee does not anticipate that installation of the temporary fill in the vicinity of YBI or the Oakland touchdown will have impacts on eelgrass. The permittee will perform annual eelgrass surveys within the project area to further ensure that no adverse impacts occur. In addition, the permittee will monitor turbidity levels when working within 3,200 feet of an eelgrass bed or sandflat to ensure that levels do not exceed 50 Nephelometric Turbidity Units (NTU's), a sufficient increase in turbidity that could impact the habitat. Special Condition II-BB(5) is included to incorporate these measures designed to prevent adverse impacts to nearby eelgrass beds.

NMFS completed a Draft Biological Opinion (BO) to address potential impacts of the dismantling activities, and concluded that the above-mentioned mitigation measures should be sufficient to reduce project impacts on listed salmonids and green sturgeon. NMFS' final BO is expected to be issued by March 1, 2012 and could include additional mitigation measures.

Commission staff consulted with the CDFG. Although, the CDFG has yet to issue its amended Incidental Take Permit (ITP) for the East Span demolition project, it has informed the Commission staff that the types of activities proposed for this project are generally similar to those described in the original ITP, and that the permittee and CDFG are updating mitigation measures (for the amended ITP) to address CDFG's concerns. The amended ITP will be issued prior to project commencement. Special Condition II-BB(4) ensures that project commencement is contingent upon the permittee's submittal of the final ITP to the Commission staff.

The permittee will not re-initiate consultation with the U.S. Fish and Wildlife Service since the project will not have the potential to adversely affect listed species or habitat under the USFWS's jurisdiction. The permittee communicated its findings to the USFWS, and the USFWS did not indicate that further consultation is necessary. Special Condition II-BB ensures that the permittee: obtain a final approved BO from NMFS and final ITP from DFG prior to commencing work; implement required final mitigation measures to ensure that

the project will not adversely impact fish or other aquatic species; and return to the Commission to amend this authorization if final actions of the resource agencies result in changes to the amended authorization or special conditions.

As part of the original authorization for the construction of the new East Span of the Bay Bridge, the permittee established a $15.5 million mitigation program for incidental take and impacts to protected species and habitats. As construction proceeded, the permittee modified its construction activities to reduce the amount of dredging and impacts to sensitive habitats, such as eelgrass and sand flats. The SFOBB Project was expected to impact 3.6 acres of eelgrass and 5.0 acres of sand flat habitats. However, actual impacts to sensitive habitats were reduced and are expected to total approximately 1.5 acres to eelgrass and 3.0 acres to sand flats at project completion. The permittee also reduced the amount of dredged material removed by approximately 30% percent of the projected volume. The permittee has also not dredged the temporary barge access channel near the Oakland Touchdown, authorized by the original permit, which would have directly impacted eelgrass. Thus, the mitigation program included herein carried out by the permittee anticipated impacts far in excess of those that actually occurred.

The Commission finds the project, as conditioned, is consistent with its law and policies regarding Bay fill.

3. **Water Quality Policies.** The Bay Plan policies on water quality state, in part, that "Bay water pollution should be prevented to the greatest extent feasible. The Bay's tidal marshes, tidal flats, and water surface area and volume should be conserved and, whenever possible, restored and increased to protect and improve water quality." The policies also state that "[w]ater quality in all parts of the Bay should be maintained at a level that will support and promote the beneficial uses of the Bay as identified in the San Francisco Bay Regional Water Quality Control Board's (RWQCB) Basin Plan and should be protected from all harmful or potentially harmful pollutants." The policies, recommendations, decisions, advice, and authority of the State Water Resources Control Board and the Regional Board should be the basis for carrying out the Commission's water quality responsibilities."

The permittee anticipates the East Span dismantling activities will have minimal water quality impacts. A Final Environmental Impact Statement (FEIS), issued in 2001 for the entire SFOBB Project, evaluated potential impacts to water quality from the installation of temporary piles and trestles for both construction and dismantling activities. The permittee also prepared a technical memorandum on water quality as part of its reevaluation of the FEIS under the National Environmental Protection Act (NEPA). This document provides an update to the FEIS and identifies several possible impacts to water quality from the project. Major water quality concerns associated with removing the superstructure arise if any of the superstructure were to fall into the Bay (such as steel, rebar, concrete, etc.), if paint associated with the bridge or its deck were to come into contact with the water (historically, the bridge was painted with paints containing heavy metals, e.g., lead and part of the bridge deck is composed of reinforced concrete cement, which could impact the pH of water. Petroleum hydrocarbons can also be bound in

asphalt or trapped in recesses of the bridge structure, which could be released during dismantling). In terms of in-water work, the removal and/or cutting below the mudline of temporary piles may result in localized increases in turbidity.

The Regional Water Quality Control Board (RWQCB) issued a Water Quality Certification and Order for the entire SFOBB Project on October 17, 2001 and a follow-up order containing Waste Discharge Requirements (WDR) on Jan 3, 2002. Both authorizations evaluated potential effects from pile-driving associated with permanent and temporary fill (permanent bridge footings, temporary coffer dams, construction trestles and supports) associated with the construction of the new East Span. The RWQCB determined that the dismantling of the East Span could also be authorized under existing orders (R2-2002-0011 and 01-120). In addition, to ensure that the project will not impact water quality, the permittee is required to submit a Stormwater Pollution Prevention Plan (SWPPP), turbidity control plan, and fisheries and hydroacoustic monitoring plans, per the requirements of RWQCB Orders prior to commencing any pile-driving activities. These plans will outline the methods used to address the potential impacts described above. In addition, the permittee is working with the RWQCB to ensure that final Best Management Practices (BMPs) required by RWQCB Order 01-120 contain appropriate minimization and avoidance measures for water quality impacts associated with the dismantling of the East Span. Such BMPs include: Using screens, netting, tarps, and other catchment systems to contain and prevent dismantling debris from falling into the Bay; using containerized mechanical grinders when removing paint or asphalt to contain contaminants; removing larger sections of a bridge at a time to minimize impacts to water quality; using specific types of clean-up equipment (such as vacuums or manual cleaning) for collection of loose debris; and performing turbidity monitoring. A final list of BMPs will be prepared and be submitted to the RWQCB for its approval and to the Commission prior to commencement of the dismantling work. Special Condition II-CC requires that the final BMPs required by the RWQCB be incorporated into the permittee's demolition work and into this amended authorization, if necessary, to protect water quality.

The Commission finds the project, as conditioned, is consistent with its law and policies regarding Bay fill.

~~Y.~~ Z. **Review Boards**

1. **Engineering Criteria Review Board.** The Engineering Criteria Review Board (ECRB) evaluated the engineering criteria for the original project on June 13, 2000 and concluded that Caltrans' design criteria for seismic safety were adequate. The ECRB did not review the work associated with Material Amendment No. Thirty-Two, as the project authorized herein does not involve permanent Bay fill.

2. **Design Review Board.** The Commission's Design Review Board (Board) evaluated the project at its September 11, 2000 and November 6, 2000 meetings. The Board supported the bike trail and the belvederes, but felt there should be more belvederes than the six proposed, that seating should be provided at the belvederes, and that Caltrans should consider various alternatives to minimize potential conflicts between bicyclists and pedestrians on the bridge. The Board also requested more information to support Caltrans' contention that a lower railing (48 inches high instead of the proposed 55 inches) would be unsafe along the Bridge path, and that more transparent bridge railings along the roadway were infeasible. The Board

requested that Caltrans develop more detailed information about how the bridge path would connect to paths in Oakland and Emeryville. The Board also made a number of recommendations regarding the bridge appearance, recommending that Caltrans explore low cost means of making the bridge white and suggesting changes to the bridge lighting. The Board asked that the project come back to the Board so the Board could make a final recommendation. Caltrans made some modifications to the bridge in response to the Board's comments, but decided that many of the Board's comments would be too costly to implement within the budget. Thus, the project was never taken back to the Board and the Board has not reviewed the latest project revisions. The Board did not review the project associated with Material Amendment No. Thirty-Two because the project does not involve additional public access improvements.

~~Y.~~ AA. **Environmental Review.** According to Caltrans, pursuant to the California Streets and Highways Code Section 180.2 and the California Environmental Quality Act (CEQA) Section 21080, the East Bay Bridge replacement project is statutorily exempt from the requirement to prepare an environmental impact report. 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) of CEQA. Caltrans has concluded that the East Bay Bridge Replacement Project meets the definition of Section 180.2(b)—that it is a "specific action necessary to prevent or mitigate an emergency"—and, therefore, does not require any environmental review under CEQA.

Nevertheless, pursuant to the National Environmental Protection Act and federal permitting requirements, Caltrans prepared an Environmental Impact Statement (EIS) for the project. The U. S. Department of Transportation, Federal Highway Administration, and Caltrans, in cooperation with the USCG, published the Final EIS in May 8, 2001, and the approved the Record of Decision on July 11, 2001. The Final EIS identified several project impacts including the displacement of residential units, the loss of wetlands, new Bay fill, noise, use of historic structures and visual effects. The EIS also imposed several mitigation measures including habitat creation, historic recordation, and aesthetic design of the new bridge and roadway structures.

The permittee is required under the Federal Highway Administration (FHWA) guidelines for the NEPA process to reevaluate its EIS and determine whether the revised dismantling approach and temporary fill associated with Material Amendment No. Thirty-Two could result in significant environmental impacts not evaluated in the original FEIS, and to evaluate the project authorized herein in Material Amendment No. 32 in light of any new regulatory requirements or special status or endangered species concerns. As part of its reevaluation process, the permittee prepared a number of technical memoranda on various subjects evaluated under NEPA, such as water quality and natural resources. These technical memoranda were provided to Commission staff in January 2012. Because the original FEIS evaluated potential impacts for pile-driving activities associated with both permanent and temporary fill for the construction of the new span, which is similar to the activities associated with

the East Span demolition project, the technical memoranda did not identify potential new impacts not previously mitigated. For this reason, the permittee determined that the original environmental determination is valid.

~~AA.~~ BB. **Public Trust.** The approximately 46.05 acres of suspended, solid and pile supported fill for the new bridge and the fill associated with the East Span demolition is for a water-oriented use, and the new Bridge will improve public access as defined by Section 66605 of the McAteer-Petris Act. Fill for water-oriented uses and public access is consistent with the public trust. Thus, the Commission finds that the fill is consistent with the public trust.

~~BB.~~ CC. **Conclusion.** For all of the above reasons, the benefits of the project clearly exceed the detriment of the loss of water areas and the project will provide the maximum feasible public access to the Bay and its shoreline. Therefore, the project is consistent with the *San Francisco Bay Plan*, the McAteer-Petris Act, the Commission's Regulations, and the Commission's amended management program for the San Francisco Bay segment of the California coastal zone.

IV. Standard Conditions

A. **Permit Execution**. This amended permit shall not take effect unless the permittee executes the original of this amended permit and returns it to the Commission within ten days after the date of the issuance of the amended permit. No work shall be done until the acknowledgment is duly executed and returned to the Commission.

B. **Notice of Completion**. The attached Notice of Completion and Declaration of Compliance form shall be returned to the Commission within 30 days following completion of the work.

C. **Permit Assignment**. The rights, duties, and obligations contained in this amended permit are assignable. When the permittee transfers any interest in any property either on which the activity is authorized to occur or which is necessary to achieve full compliance of one or more conditions to this amended permit, the permittee/transferor and the transferee shall execute and submit to the Commission a permit assignment form acceptable to the Executive Director. An assignment shall not be effective until the assignee executes and the Executive Director receives an acknowledgment that the assignee has read and understands the amended permit and agrees to be bound by the terms and conditions of the amended permit, and the assignee is accepted by the Executive Director as being reasonably capable of complying with the terms and conditions of the amended permit.

D. **Permit Runs With the Land**. Unless otherwise provided in this amended permit, the terms and conditions of this amended permit shall bind all future owners and future possessors of any legal interest in the land and shall run with the land.

E. **Other Government Approvals**. All required permissions from governmental bodies must be obtained before the commencement of work; these bodies include, but are not limited to, the U. S. Army Corps of Engineers, the State Lands Commission, the Regional Water Quality Control Board, and the city or county in which the work is to be performed, whenever any of these may be required. This amended permit does not relieve the permittee of any obligations imposed by State or Federal law, either statutory or otherwise.

F. **Built Project must be Consistent with Application**. Work must be performed in the precise manner and at the precise locations indicated in your application, as such may have been modified by the terms of the amended permit and any plans approved in writing by or on behalf of the Commission.

G. **Life of Authorization**. Unless otherwise provided in this amended permit, all the terms and conditions of this amended permit shall remain effective for so long as the permit remains in effect or for so long as any use or construction authorized by this amended permit exists, whichever is longer.

H. **Commission Jurisdiction**. Any area subject to the jurisdiction of the San Francisco Bay Conservation and Development Commission under either the McAteer-Petris Act or the Suisun Marsh Preservation Act at the time the amended permit is granted or thereafter shall remain subject to that jurisdiction notwithstanding the placement of any fill or the implementation of any substantial change in use authorized by this amended permit. Any area not subject to the jurisdiction of the San Francisco Bay Conservation and Development Commission that becomes, as a result of any work or project authorized in this amended permit, subject to tidal action shall become subject to the Commission's "bay" jurisdiction.

I. **Changes to the Commission's Jurisdiction as a Result of Natural Processes**. This amended permit reflects the location of the shoreline of San Francisco Bay when the permit was issued. Over time, erosion, avulsion, accretion, subsidence, relative sea level change, and other factors may change the location of the shoreline, which may, in turn, change the extent of the Commission's regulatory jurisdiction. Therefore, the issuance of this amended permit does not guarantee that the Commission's jurisdiction will not change in the future.

J. **Violation of Permit May Lead to Permit Revocation**. Except as otherwise noted, violation of any of the terms of this amended permit shall be grounds for revocation. The Commission may revoke any permit for such violation after a public hearing held on reasonable notice to the permittee or its assignee if the amended permit has been effectively assigned. If the amended permit is revoked, the Commission may determine, if it deems appropriate, that all or part of any fill or structure placed pursuant to this amended permit shall be removed by the permittee or its assignee if the amended permit has been assigned.

K. **Should Permit Conditions Be Found to be Illegal or Unenforceable**. Unless the Commission directs otherwise, this permit shall become null and void if any term, standard condition, or special condition of this amended permit shall be found illegal or unenforceable through the application of statute, administrative ruling, or court determination. If this amended permit becomes null and void, any fill or structures placed in reliance on this permit shall be subject to removal by the permittee or its assignee if the amended permit has been assigned to the extent that the Commission determines that such removal is appropriate. Any uses authorized shall be terminated to the extent that the Commission determines that such uses should be terminated.

L. **Permission to Conduct Site Visit**. The permittee shall grant permission to any member of the Commission's staff to conduct a site visit at the subject property during and after construction to verify that the project is being and has been constructed in compliance with the authorization and conditions contained herein. Site visits may occur during business hours without prior notice and after business hours with 24-hour notice.

Executed at San Francisco, California, on behalf of the San Francisco Bay Conservation and Development Commission on the date first above written.

STEVE GOLDBECK
Acting Executive Director
San Francisco Bay Conservation and
Development Commission

By: _____
TIM EICHENBERG
Chief Counsel
San Francisco Bay Conservation and
Development Commission

TE/MD/ra
Enc.
cc: U. S. Army Corps of Engineers, Attn: Regulatory Functions Branch
San Francisco Bay Regional Water Quality Control Board,
Attn: Certification Section
U.S. Environmental Protection Agency
U. S. Fish and Wildlife Service

* *

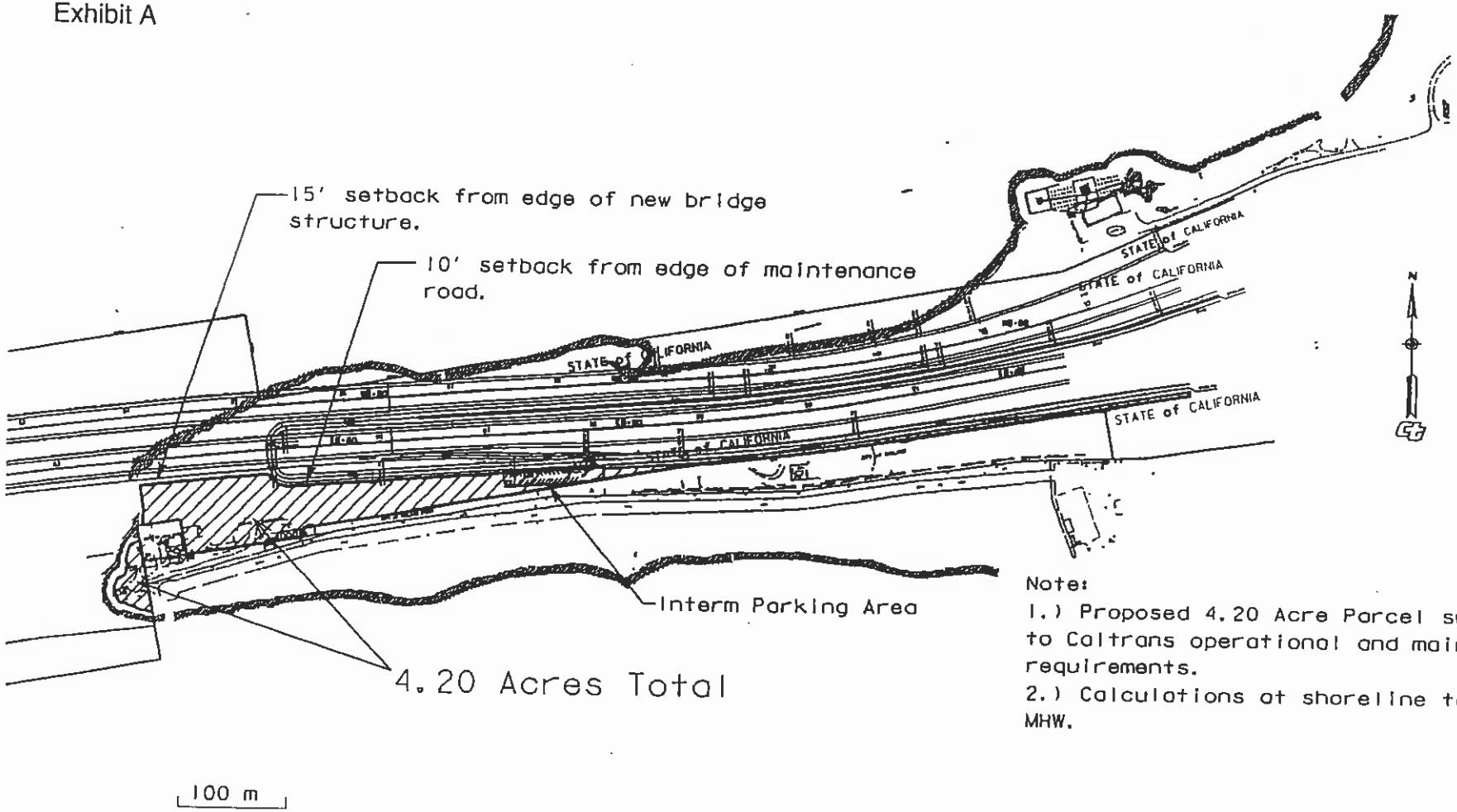
Receipt acknowledged, contents understood and agreed to: CALIFORNIA DEPARTMENT OF TRANSPORTATION
Applicant

Executed at 111 GRAND AVENUE
OAKLAND, CA

On FEBRUARY 16, 2012

By: _____
DDD, ENVIRONMENTAL
PLANNING & ENGINEERING

Exhibit A



Note:
1.) Proposed 4.20 Acre Parcel subject to Caltrans operational and maintenance requirements.
2.) Calculations at shoreline taken at MHW.

PROPOSED PUBLIC ACCESS PARCEL
at the OAKLAND TOUCHDOWN

10/29/01

U.S. Department of Transportation
United States Coast Guard

Commander (oan-2)
Eleventh Coast Guard District

Bldg. 50-6, Coast Guard Island
Alameda, CA 94501-5100
Staff Symbol: (oan-2)
Phone: (510) 437-3514
FAX: (510) 437-5836

16590
San Francisco Bay (8.9)
Ser: 540-01
December 19, 2001

Mr. H. P. Hensley
California Department of Transportation
P. O. Box 23660
Oakland, CA 94623-0660

Dear Mr. Hensley:

Your application dated May 16, 2001 for Coast Guard approval of the location and plans of a proposed bridge replacement across San Francisco Bay, mile 8.9, between Oakland and Yerba Buena Island has been approved by the Commandant, U. S. Coast Guard. The instrument of approval, Bridge Permit (3-01-11), dated December 11, 2001, is provided as enclosure (1). Strict compliance with all terms of the permit is required.

Please review the conditions of the permit, particularly the time restrictions on commencement and completion. If you are unable to meet these time limits, you must request an extension of time at least 30 days in advance of the expiration date of your permit. This request can be made to our office at the address provided above.

This office must be kept informed concerning the status of the project. Please advise us of any pre-construction conferences, and furnish the date of construction at least 30 days prior to commencement to allow proper review and approval of the proposed method of construction. Progress reports will be established, giving a brief description of scheduled work, and showing the percentage of the project completed. The Coast Guard may conduct periodic inspections to ensure the work is not unreasonably interfering with navigation.

Upon completion of the project, submit written certification that the proposed structure has been built in accordance with the approved plans and that all conditions of the permit have been fulfilled. A bridge completion report form is provided as enclosure (2). When available, please provide 8 x 10-inch photographs, showing the completed structure as it would be seen by the mariner from both upstream and downstream.

Enclosure (3) is the approved navigational lighting and vertical clearance gauge plan, with text and drawings, for the proposed bridge. The lighting plan is prescribed in accordance with Title 33, Code of Federal Regulations, Part 118 (33 CFR 118). The prescribed navigational lighting is required to be installed and maintained on the portions of the bridge as they are constructed, to ensure the safety of navigation. Please note there are two plans, one prior to removal of the existing San Francisco-Oakland Bay Bridge East Span, and one following the removal.

16590
December 19, 2001

Condition 5 of the permit discusses clearance gauges. Guidance under 33 CFR 118.160 is available on the internet at http://www.access.gpo.gov/nara/cfr/index.html. We have determined the visibility/safety distance requirement for the largest vessels approaching this bridge will be greater than 2,000 feet. Therefore the 36-inch high, Series "E" numerals with 10-ft. spacing are required. Please submit drawings of the proposed gauge installation for our review and approval, prior to installation.

You may contact Mr. Jerry Olmes, Project Manager, at (510) 437-3515 to acknowledge receipt of this permit.

Sincerely,

DAVID H. SULOUFF
Chief, Bridge Section
Eleventh Coast Guard District
By direction of the District Commander

Encl: (1) Permit
(2) Completion Report Form
(3) Prescribed navigational lighting and clearance gauges

Copy: CG Marine Safety Office San Francisco Bay (w/lighting plan)
CG Group San Francisco (w/lighting plan)
Federal Highway Administration, Sacramento (w/o encl.)

U.S. Department of Transportation
United States Coast Guard

BRIDGE PERMIT

DEC 11 2001

(3-01-11)

WHEREAS by Title V of an act of Congress approved August 2, 1946, entitled "General Bridge Act of 1946," as amended (33 U.S.C. 525-533), the consent of Congress was granted for the construction, maintenance and operation of bridges and approaches thereto over the navigable waters of the United States;

AND WHEREAS the Secretary of Transportation has delegated the authority of Section 502(b) of that act to the Commandant, U. S. Coast Guard, by Section 1.46(c) of Title 49, Code of Federal Regulations;

AND WHEREAS before construction is commenced, the Commandant must approve the location and plans of any such bridge and may impose any specific conditions relating to the construction, maintenance and operation of the structure deemed necessary in the interest of public navigation, such conditions to have the force of law;

AND WHEREAS the - **STATE OF CALIFORNIA** - has submitted for approval the location and plans of a bridge to be constructed across the San Francisco Bay between Oakland and San Francisco, California,

NOW THEREFORE, This is to certify that the location and plan sheet 1 (of 3) dated June 2001, sheet 2 dated Jan 2001 and Sheet 3 revised 7 June 2001 are hereby approved by the Commandant, subject to the following conditions:

1. No deviation from the approved plans may be made either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Commandant.

2. The construction of falsework, cofferdams or other obstructions, if required, shall be in accordance with plans submitted to and approved by the Commander, Eleventh Coast Guard District, prior to construction of the bridge. All work shall be so conducted that the free navigation of the waterway is not unreasonably interfered with and the present navigable depths are not impaired. Timely notice of any and all events that may affect navigation shall be given to the District Commander during construction of the bridge. The channel or channels through the structure shall be promptly cleared of all obstructions placed therein or caused by the construction of the bridge to the satisfaction of the District Commander, when in the judgment of the District Commander the construction work has reached a point where such action should be taken, but in no case later than 180 days after the bridge has been opened to traffic.

ENCLOSURE(1)

3. Issuance of this permit does not relieve the permittee of the obligation or responsibility for compliance with the provisions of any other law or regulation as may be under the jurisdiction of the U. S. Army Corps of Engineers, San Francisco District; U. S. Department of the Interior, Fish And Wildlife Service; U. S. Department of Commerce, National Marine Fisheries Service; State of California: State Historic Preservation Officer; San Francisco Bay Conservation and Development Commission, or any other federal, state or local authority having cognizance of any aspect of the location, construction or maintenance of said bridge.

4. The location of, and materials to be used in construction of, the pier protection fender system as shown on the approved plan sheet 3 (of 3) revised 7 June 2001 shall be submitted to the District Commander for approval prior to commencing construction of such system.

5. Clearance gauges shall be installed and maintained in a good and legible condition by and at the expense of the owner of the bridge when so required by the District Commander. The type of gauges and the locations in which they are to be installed will be submitted to the District Commander for approval.

6. The permittee shall coordinate the methods and schedule of construction of this bridge with the Commander, Eleventh Coast Guard District, for the purpose of keeping project impacts on U. S. Coast Guard operations and facilities to a minimum. Coast Guard operational, logistical support and facility needs, including but not limited to delivery of fuel and other supplies, vehicular and pedestrian access, shuttle transportation services, construction of access roads, relocation of existing buildings, and construction of new facilities, maintenance of utilities, maintenance of and stabilization of existing slopes, will be to the satisfaction of the District Commander. Any violations of this condition renders this bridge permit null and void.

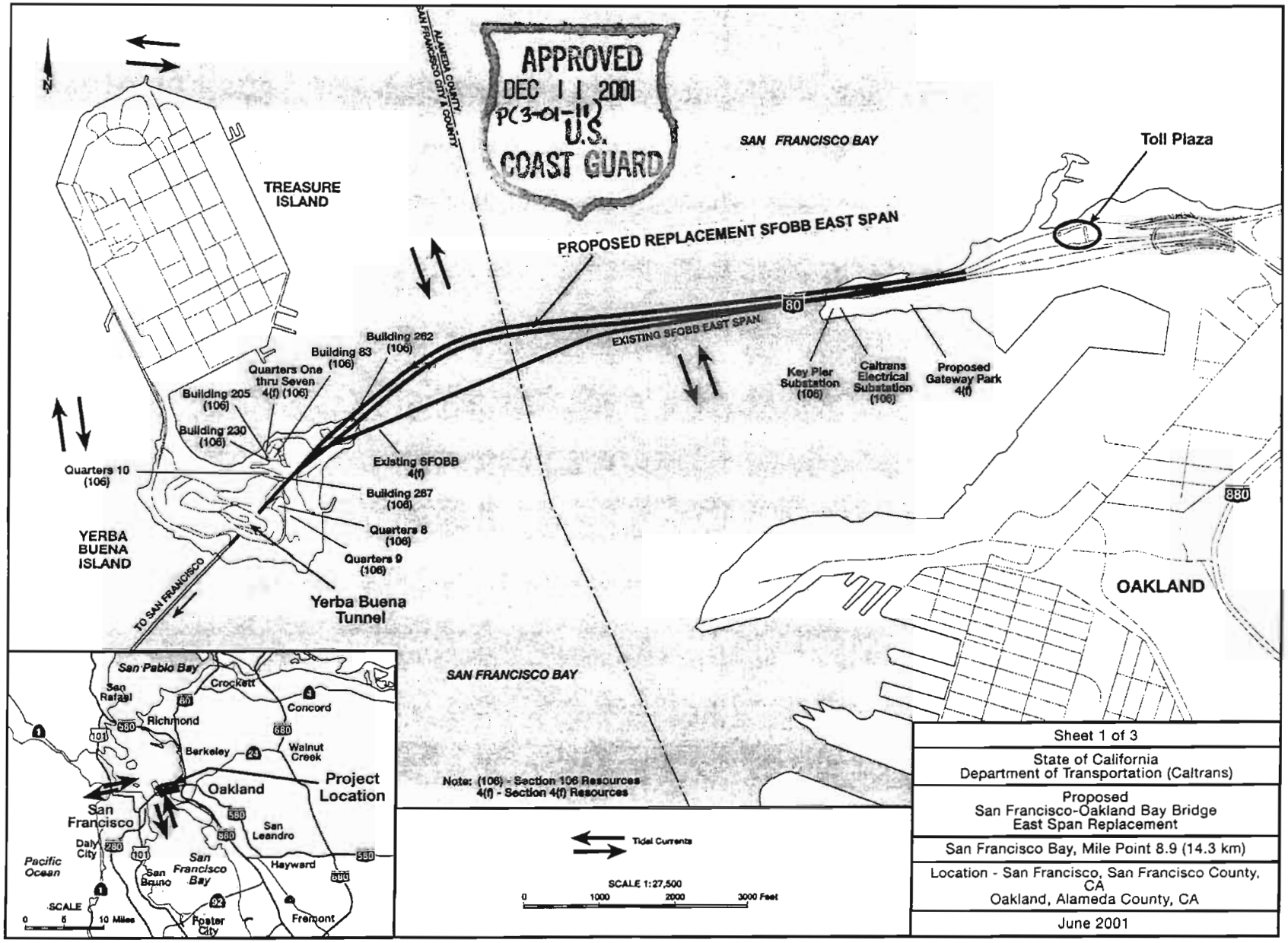
7. All parts of the existing to-be-replaced San Francisco - Oakland Bay Bridge across the San Francisco Bay, mile 8.9, not utilized in the new bridge shall be removed, by and at the expense of the owner of the bridge, down to or below 1.5 feet below the mud line of the waterway measured at time of removal, and the waterway cleared to the satisfaction of the District Commander. A period of three years subsequent to the opening to traffic of the new bridge, mile 8.9, will be allowed for such removal and clearance. The proposed method and schedule for demolition and removal of the bridge shall be submitted to the District Commander for approval prior to commencing such removal.

8. When the proposed bridge is no longer used for transportation purposes, it shall be removed in its entirety or to an elevation deemed appropriate by the District Commander and the waterway cleared to the satisfaction of the District Commander. Such removal and clearance shall be completed by and at the expense of the owner of the bridge upon due notice from the District Commander.

Continuation Sheet **Bridge across the San Francisco Bay Between Oakland and San Francisco, California**

9. The approval hereby granted shall cease and be null and void unless construction of the bridge is commenced within three years and completed within eight years after the date of this permit.

N. E. MPRAS
Chief, Office of Bridge Administration
U. S. Coast Guard
By direction of the Commandant



Sheet 1 of 3

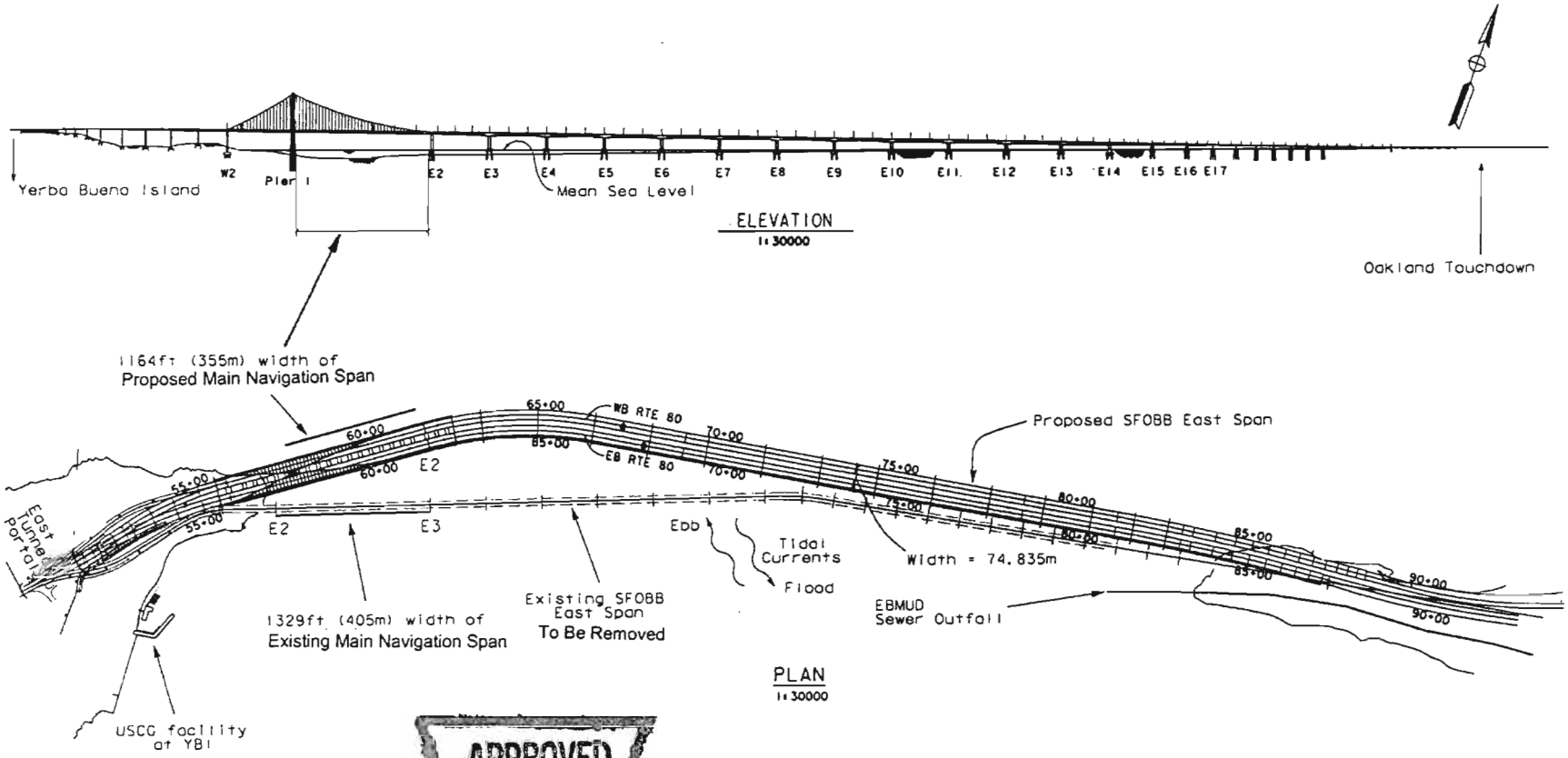
State of California
Department of Transportation (Caltrans)

Proposed
San Francisco-Oakland Bay Bridge
East Span Replacement

San Francisco Bay, Mile Point 8.9 (14.3 km)

Location - San Francisco, San Francisco County, CA
Oakland, Alameda County, CA

June 2001



APPROVED
DEC 11 2001
P(3-01-11)
U.S.
COAST GUARD

Proposed Span
Length = 11,524.8ft (3513.67m)
Width = 245.5ft (74.8m)

Existing Span
Length = 10,196.4ft (3107.9m)
Width = 63.3ft (19.3m)

Length of proposed span is based on the following limits:

BB - Yerba Buena Island
(Where new bridge meets existing bridge)

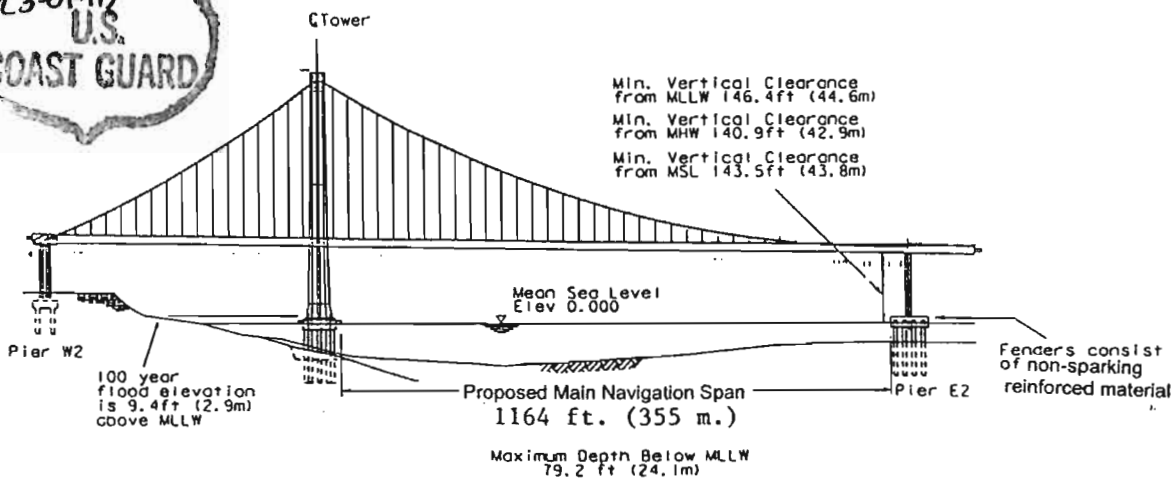
EB - Oakland Touchdown Area
(Where the road leaves grade)

0 500 1000 1500 2000 2500 Feet
SCALE

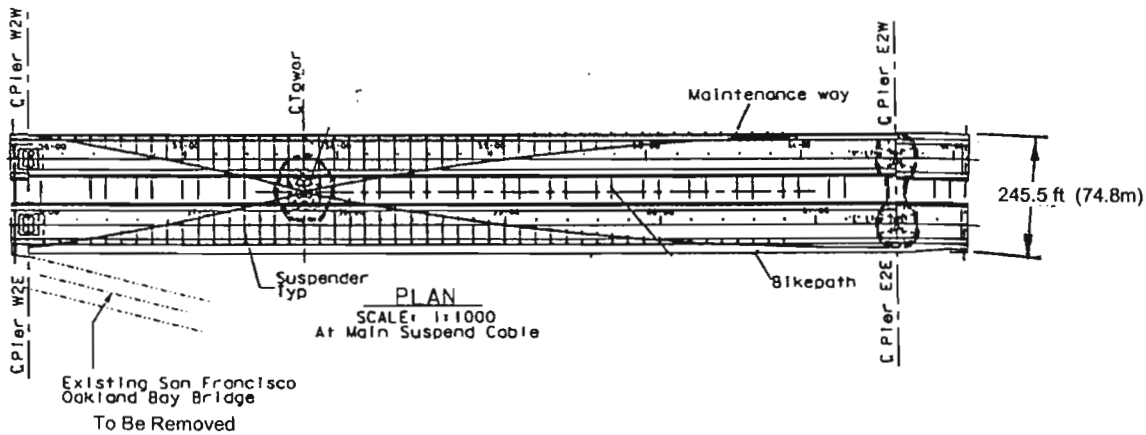
Sheet 2 of 3
State of California Department of Transportation (Caltrans)
Proposed San Francisco - Oakland Bay Bridge East Span Replacement
San Francisco Bay, Mile Point 8.9 (14.3 km)
Location - San Francisco, San Francisco County, CA Oakland, Alameda County, CA
Jan 2001

APPROVED
DEC 11 2001
PL3-01-11
U.S.
COAST GUARD

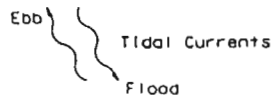
NAVIGATION OPENING



ELEVATION
SCALE: 1:1000

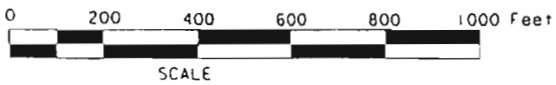


PLAN
SCALE: 1:1000
At Main Suspend Cable



Note:
Datum is NGVD 29 = 0.00ft (0.00m)

Revised by U. S. Coast Guard
June 7, 2001



Sheet 3 of 3
State of California Department of Transportation (Caltrans)
Proposed San Francisco - Oakland Bay Bridge East Span Replacement
San Francisco Bay, Mile Point 8.9 (14.3 km)
Location - San Francisco, San Francisco County, CA Oakland, Alameda County, CA
Jan 2001

RECORD OF DECISION

PROPOSED SAN FRANCISCO - OAKLAND BAY BRIDGE REPLACEMENT EAST OF YERBA BUENA ISLAND ACROSS THE SAN FRANCISCO BAY, MILE 8.9, BETWEEN SAN FRANCISCO AND OAKLAND, CALIFORNIA P(3-01-11)

I. DESCRIPTION OF THE PROPOSED PROJECT

The State of California Department of Transportation (CALTRANS) proposes to construct a replacement high-level, fixed highway bridge, east of Yerba Buena Island (YBI), across the San Francisco Bay, mile 8.9, on U. S. Interstate Highway 80, connecting Oakland and San Francisco. The 11,526-foot project extends from the east end of the YBI tunnel to west of the bridge toll plaza on the Oakland Touchdown. The purpose of this project is to provide a seismically protected structure which can withstand earthquake damage and be used as a lifeline transportation corridor for evacuation and emergency services following another major earthquake in the Bay area. The existing double-decked, five-lane, high-level fixed bridge is not capable of withstanding another major earthquake and will be removed.

The Federal Highway Administration (FHWA) is the lead federal agency for satisfying requirements of the National Environmental Policy Act (NEPA). A Draft Environmental Impact Statement/Statutory Exemption (DEIS/SE) for the proposed project was approved by the FHWA on September 21, 1998. A Supplemental Section 4(f) Draft Evaluation was prepared by the FHWA in June 1999, and the Final EIS/SE/Final Section 4(f) Evaluation was approved by the FHWA on April 17, 2001. The Final EIS/SE/Final Section 4(f) Evaluation was filed with the EPA on May 18, 2001. No changes have been made since the Final EIS/SE/Final Section 4(f) Evaluation was approved by FHWA.

The Coast Guard was a cooperating agency in preparing the environmental document. Action by the Coast Guard consists of issuance or denial of a bridge permit for the proposed bridge project. Coast Guard NEPA responsibility is to assess the navigational and environmental impacts of construction, maintenance and operation of the proposed fixed bridge.

II. DECISION

The Commander, Eleventh Coast Guard District, has recommended, and the Commandant, U. S. Coast Guard, has decided to approve the location and plans for the proposed bridge project. This decision is considered to be in the best public interest for satisfying project objectives with the least impacts on navigation and on the environment.

III. ALTERNATIVES CONSIDERED

Alternatives initially considered were four alignments north of the existing structure, and three alignments south of the existing structure. There were several design alternatives within these

basic alignment alternatives. Traffic projections were not included because traffic flows will continue to be limited by the tunnel on YBI. These alternatives were rejected for a variety of reasons, including adverse geologic conditions, inability to meet AASHTO design standards, less than optimal roadway geometry, constructability issues for temporary detours, conflicts with the East Bay Municipal Utilities District sewer outfall, and limitations on panoramic views. Subsequently, five additional alternatives were considered: no-build; a high-level, fixed bridge on three different alignments (S-4), (N-2) and (N-6) with the same touchdown points; and the Retrofit Existing Structure Alternative. The no-build alternative would have the least adverse impact on the environment.

The preferred Replacement Alternative N-6 would avoid land from the Oakland Army Base on the Oakland Touchdown to be reutilized for the proposed Gateway Park, and meets the established needs of the project. The U. S. Environmental Protection Agency and U. S. Army Corps of Engineers concur Alternative N-6 is the Least Environmentally Damaging Practical Alternative (LEDPA), required by Section 404 of the Clean Water Act.

An expanded description of the various alternatives and recommended (preferred) alternative, including the basis for the decision, is included in the summary of the FEIS/SE/Final Section 4(f) Evaluation. After considering responses to the Coast Guard public notices, the impacts associated with each alternative and the present and future transportation needs, I have determined that the proposed project's impacts of the selected (preferred) alternative cannot be avoided, and all planning and mitigation to minimize these impacts have been accomplished.

PREFERRED ALTERNATIVE

The proposed bridge would result in the construction of two parallel, five-lane, high-level, fixed highway decks on a single set of piers. The proposed bridge would have sufficient clearance to ensure no adverse impact on the navigable waterway.

The preferred alternative, proposed design, for a self-anchored, suspension bridge, would provide the following clearances in the navigation span:

Horizontal as measured between fenders, normal to axis of channel	1,164 ft. (355 m)
Minimum vertical clearance above MHW Elev. 2.6' (0.8 m) [1929 NGVD]	140.9 ft. (42.9 m)
Minimum vertical clearance above MLLW Elev.-2.9'(-0.8m)[1929 NGVD]	146.4 ft. (44.6m)

IV. BASIS FOR DECISION

After an independent review of the FHWA FEIS/SE/Final Section 4(f) Evaluation, approved April 17, 2001, by the FHWA, I have determined that the environmental document adequately identifies and assesses the impacts of the proposed bridge project across the San Francisco Bay, mile 8.9, east of YBI, between Oakland and San Francisco, California, including the building

relocations. The Commander, Eleventh Coast Guard District, adopted the FEIS/SE/Final Section 4(f) Evaluation on December 4, 2001.

The FEIS/SE/Final Section 4(f) Evaluation contains an adequate detailed statement of the following: project description and purpose, probable impacts of the project, alternatives, unavoidable adverse environmental effects, short-term impacts versus long-term benefits, irreversible and irretrievable commitment of resources and measures to minimize environmental harm. The proposal conforms with the State of California's air quality implementation plan and with the national ambient air quality standards.

V. MITIGATION

The San Francisco Bay provides habitat for anadromous salmonids, the endangered California least tern and California brown pelican. Eelgrass beds, which provide wetland-spawning habitat for the Pacific herring, a commercial fish species, are located within the project area and are protected under the Magnuson-Stevens Fishery Conservation and Management Act. Sand flats providing roosting and feeding habitat for the common loon, long billed curlew and elegant tern, as migratory birds protected under the Migratory Bird Treaty Act, are also located within the project area. Section 7 consultations will ensure mitigation to reduce impacts to these species and habitats. Wetlands mitigation would include on-site eelgrass bed and sand flat restoration, funding for off-site wetlands mitigation, marsh restoration plans, and monitoring. The National Marine Fisheries Service and Fish and Wildlife Service Biological Opinions endorse proposed on-site mitigation including bubble curtains to reduce fish mortality, and off-site measures including upland disposal of potentially contaminated sediments to improve long-term species benefits. All reasonable efforts will be made to minimize negative impacts to fish and wildlife resources.

A Memorandum of Agreement (MOA), executed by the Advisory Council on Historic Properties, addresses mitigation efforts to historic properties, including salvage, permanent interpretive exhibits and display of exhibit materials, a museum exhibit, oral history, and documentary videos. It also addresses development of a comprehensive treatment plan for archaeological resources.

Mitigation efforts to minimize harm to 4(f) properties would include monitoring of historic structures during construction, restoration of historic grounds after construction, restoration of any inadvertent damage to historic structures to the Secretary of the Interior's standards, and the various mitigation efforts to historic properties outlined in the MOA.

To address the adverse effects of the project upon archaeological site CA-SFR-04, Caltrans prepared a draft report entitled Research Design and Treatment Plan for Archaeological Site CA-SFR-04/H, Yerba Buena Island, San Francisco, California, dated October 2001, pursuant to Section 106 of the National Historic Preservation Act, 16 U.S.C. §470f. Because a portion of Site CA-SFR-04/H (midden deposit) is located on Coast Guard property, the Coast Guard intends to issue a permit for excavation and removal of the midden deposit, pursuant to the Archaeological Resources Protection Act, 16 U.S.C. §470cc. (ARPA).

The proposed alignment would involve relocation of Building 213 (fire engine storage) for construction of the temporary detours. The project would also involve removal and replacement of three vacant buildings and one storage building. There would be no socioeconomic impacts to these properties. Relocation assistance would be consonant with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646). There would be no displacement or relocations of residents, and the project will not affect minority or low-income populations under Environmental Justice requirements.

The proposed project will involve potential impacts to the U. S. Coast Guard Group San Francisco facilities and operations. The permittee will consult with the Coast Guard to develop feasible and reasonable measures to reduce construction related noise levels in the vicinity of Coast Guard facilities. Coast Guard properties will be monitored for construction related damage including the use of vibration measuring devices on buildings. Additional mitigation includes shuttle transit during bus stop staircase displacement, 24/7 emergency access during access road realignment, and slope restoration and restabilization following construction. On-going negotiations are underway between appropriate Coast Guard commands and the California Department of Transportation to address specific methods regarding the mitigation recommendations.

Minimization, avoidance, or elimination of adverse impacts was a primary consideration throughout the project planning. All efforts have been made to minimize impacts on the environment and on navigation.

VI. CONCLUSION

Based upon an independent Coast Guard review of all pertinent factors, including navigation and the human environment, I conclude that the proposed replacement of the San Francisco - Oakland Bay Bridge, east of Yerba Buena Island, will meet the reasonable needs of navigation with no unmitigated, significant adverse impacts on the quality of the human environment.

Date: DEC 11 2001

N. E. MPRAS
Chief, Office of Bridge Administration
U. S. Coast Guard
By direction of the Commandant

COAST GUARD COMPLETION REPORT

16591
San Francisco Bay (8.9)

From: _____ DATE: _____

To: Commander, 11th Coast Guard District
Bldg 50-6
Coast Guard Island
Alameda, CA 94501-5100

Our bridge project is completed and the following information is submitted for your records as requested by your letter dated _____:

1. Construction of the substructure started on _____,
and substructure construction was finished on _____.

2. Construction of the superstructure started on _____,
and superstructure construction was finished on _____.

3. The new bridge section was opened for use on _____.

4. The bridge provides _____feet horizontal waterway clearance in _____ navigable channel(s).

5. The bridge provides _____feet vertical clearance above Mean Lower Low Water and the bridge also provides _____feet vertical clearance above Mean High Water.

6. All parts of the former bridge at this location not incorporated in the new bridge have been removed to the mud line.

7. The bridge is owned by: the bridge is operated/maintained by:

_____	_____
_____	_____
_____	_____
_____	_____
tel:_____	tel:_____

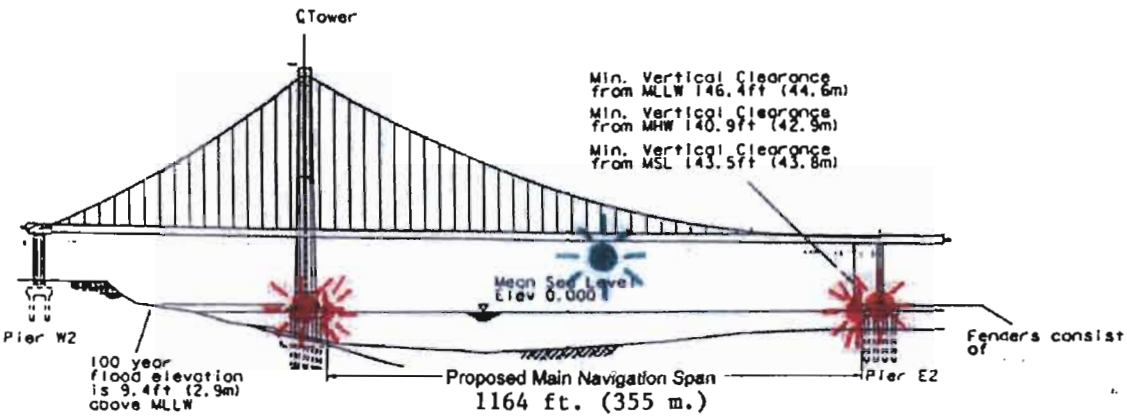
8. I certify that the bridge has been built in accordance with the approved permit plans (or USCG authorized modifications to such plans) and all requested modifications have been fulfilled. Photographs of the bridge are enclosed.

_____
Signature

_____
Printed name and title

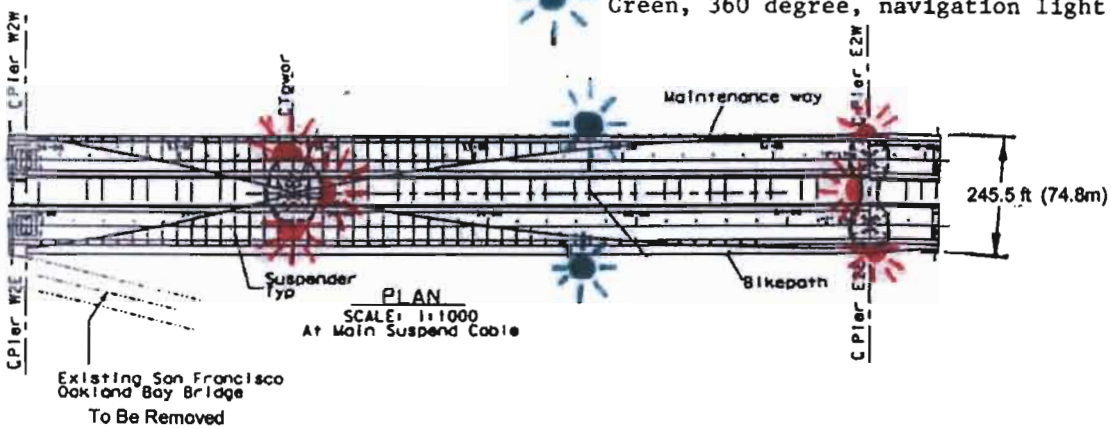
ENCLOSURE(2)

NAVIGATION OPENING



Red, 180 degree, navigation light

Green, 360 degree, navigation light



PLAN
SCALE: 1:1000
At Main Suspend Cable

Navigational Lights and/or Other Signals, approved as shown, pursuant to 33 CFR 118.

Date: 12/19/01

Signature: D. H. Sulouff

DAVID H. SULOUFF
Chief, Bridge Section
11th Coast Guard District
By direction of District Commander

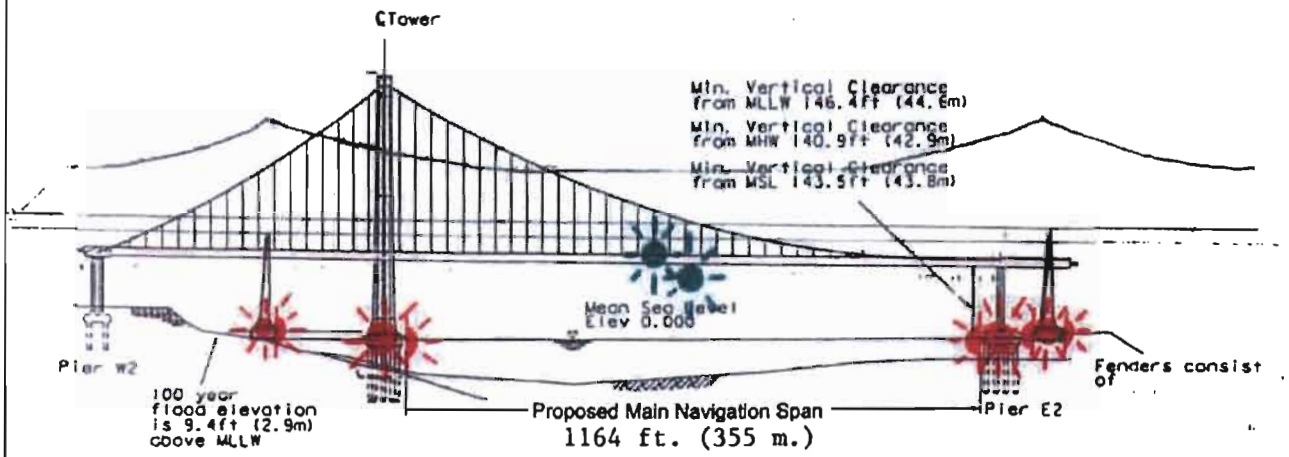
Note:
Datum is NGVD 29 = 0.00ft (0.00m)

0 200 400 600 800 1000 Feet
SCALE

Proposed San Francisco - Oakland Bay Bridge East Span Replacement
San Francisco Bay, Mile Point 8.9 (14.3 km)
Location - San Francisco, San Francisco County, CA Oakland, Alameda County, CA
Jan 2001

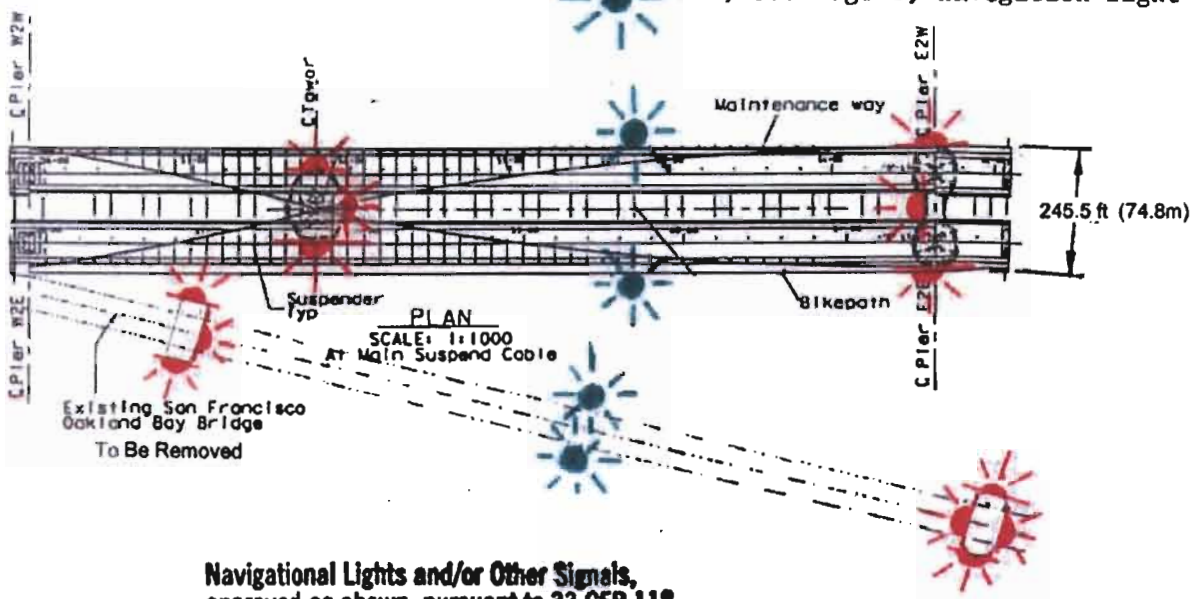
ENCLOSURE(3)

NAVIGATION OPENING



Red, 180 degree, navigation light

Green, 360 degree, navigation light



Navigational Lights and/or Other Signals, approved as shown, pursuant to 33 CFR 118.

Note:
Datum is NGVD29.

Date: 12/19/01

Signature: [signature]

DAVID H. SOLDUFF
Chief, Bridge Section
11th Coast Guard District
By direction of District Commander

0 200 400 600 800 1000 Feet
SCALE

Proposed
San Francisco - Oakland Bay Bridge
East Span Replacement

San Francisco Bay, Mile Point 8.9 (14.3 km)

Location - San Francisco, San Francisco County, CA
Oakland, Alameda County, CA

Jan 2001

Navigation Lighting Plan
San Francisco – Oakland Bay Bridge
San Francisco Bay, Mile 8.9
Between Yerba Buena Island and Oakland

The center of the main navigation channel span of the bridge shall be marked by a range of two green lights. Each green light shall show through a horizontal arc of 360 degrees and shall be securely mounted just below the outermost edges of the bridge span structure, so as to be visible from an approaching vessel.

The upstream and downstream ends of the left and right main navigation channel pier protection system shall be lighted with red lights. Each light shall show through a horizontal arc of 180 degrees, and shall be securely fastened at the end of the protection structure as low as practicable but not lower than 2 feet above navigable high water, to show 90 degrees on either side of a line parallel to the axis of the channel, so as to be visible from an approaching vessel.

The channelward faces of the left and right main navigation channel pier protection system shall be lighted with single red lights. Each light shall show through a horizontal arc of 180 degrees, and shall be securely fastened to the top of the protection structure, centered under the main navigation opening, to show 90 degrees on either side of a line perpendicular to the axis of the channel, so as to be visible from an approaching vessel.

The prescribed navigational lighting must be securely attached to the structure and of sufficient candlepower as to be visible against the background lighting at a distance of at least 2,000 yards, 90 percent of the nights of the year.

Vertical clearance gauges shall be installed on the north end of the west channel pier protection and on the south end of the east channel pier protection, so as to be visible by approaching vessels, and to show the clearance available for navigation between the water surface and the lowest hittable part of the channel span, measured to the bottom of the foot marks. The numerals for the gauges shall be black in color, on a white background. The numerals shall measure 36 inches in height and be spaced every 10 feet. The bottom of the bottom most numerals of both gauges shall indicate the least clear height measured at the east channel pier, and shall be located 1.5 feet below mean sea level (NGVD 29) (MSL). The bottom of the topmost numerals of both gauges shall show the least clear height measured at the east channel pier, and shall be located 8.5 feet above MSL.

The bridge owner is responsible for initial installation and continued maintenance of each navigation aid in good repair and legible condition.

U.S. Department of Homeland Security
United States Coast Guard

Commander
Eleventh District

U.S. Coast Guard Island,
Building 50-2
Alameda, CA 94501-5100
Staff Symbol: (dpw)
Phone: (510) 437-3514
Fax: (510) 437-5836

16591
San Francisco Bay (8.9)
November 28, 2011

California Department of Transportation
Attn: Steven Hulsebus
P. O. Box 23660
Oakland, CA 94623-0660

Dear Mr. Hulsebus:

Your application of October 20, 2008, revised January 12, 2011, for Coast Guard approval for an extension of time to complete the replacement eastern span of the San Francisco/Oakland Bay Bridge, mile 8.9, San Francisco Bay, between the cities of Oakland, Alameda County and San Francisco, San Francisco County, California has been approved by the Commandant, U.S. Coast Guard. The instrument of approval, Bridge Permit Amendment (3a-01-11), dated November 18, 2011, is enclosed. Strict compliance with all terms of the permit is required.

Please review the time conditions of the permit. If you are unable to meet the time limit, you must request an extension of time at least 30 days in advance of the expiration of your permit. This request can be made to our office at the address listed above.

This office must be kept informed concerning the status of the project. Progress reports will be required, giving a brief description of the work accomplished. The Coast Guard will conduct periodic inspections to ensure that the work is not unreasonably interfering with navigation.

Upon completion of the entire project, submit written confirmation that the new structure has been built in accordance with the approved plans, and that all conditions of the permit have been fulfilled. A bridge completion report form is enclosed. When available, please provide 8" X 10" glossy black and white photographs, showing the completed structure, as would be seen by the mariner, from both upstream and downstream.

You may contact Mr. Carl Hausner, Project Manager, by telephone at (510) 437-3515 to provide updates or to discuss this project.

Sincerely,

David H. Sulouff
Chief, Bridge Section
Eleventh Coast Guard District
By direction of the District Commander

Encl 1 P(3a-01-11)
Encl 2 Project Completion Report

U.S. Department of Homeland Security
United States Coast Guard

BRIDGE PERMIT
AMENDMENT
(3a-01-11)

1 9 NOV 2011

WHEREAS by a permit issued on 11 December 2001, the Commandant of the Coast Guard approved the location and plans of a bridge to be constructed by the State of California across the San Francisco Bay between Oakland and San Francisco, California, under authority of the General Bridge Act of 1946, as amended;

AND WHEREAS condition 7 of that permit requires that the existing, to-be-replaced, bridge be removed no later than three years subsequent to the opening to traffic of the new bridge, and condition 9 fixed the time for completing construction of the bridge at 11 December 2009 and the - **STATE OF CALIFORNIA** - now requests that the time for removal of the existing, to-be-replaced, bridge be extended and requests that the time for completing construction of the bridge be extended;

NOW THEREFORE, This is to certify that said requests are hereby approved. In granting this approval, all conditions to which the original permit was subject remain in force with conditions 7 and 9 modified as follows:

7. All parts of the existing to-be-replaced San Francisco - Oakland Bay Bridge across the San Francisco Bay, mile 8.9, not utilized in the new span shall be removed, by and at the expense of the owner of the bridge, down to or below 1.5 feet below the mud line of the waterway measured at time of removal, and the waterway cleared to the satisfaction of the District Commander. A period of six years subsequent of the opening to traffic of the new bridge, mile 8.9, will be allowed for such removal and clearance. The propose method and schedule for demolition and removal of the bridge shall be submitted to the District Commander for approval prior to commencing such removal.

9. The approval hereby granted shall cease and be null and void unless construction of the bridge is completed by 31 December 2013.

Hala Elgaaly

HALA ELGAALY, P.E.
Administrator, Bridge Program
U. S. Coast Guard
By direction of the Commandant

Completion Report Information

Upon completion of the bridge, complete and return this information to:

Commander (dpw)
Eleventh Coast Guard District
Coast Guard Island, BLDG 50-2
Alameda, CA 94501-5100

Name & Location of Bridge: Replacement Eastern Span San Francisco/Oakland Bay Bridge, Mile 8.9, San Francisco Bay

Owner: California Department of Transportation
Address:_____
City, State, ZIP:_____

Type of Project: Replacement

Date commenced: _____, Date Completed: _____

Horizontal navigational clearance, pier face to pier face, measured normal to the axis of the channel, between Pier T-1(Tower) and Pier E-2: _____ feet _____ meters.

Vertical navigational clearance measured to the lowest hittable part of the bridge (which includes installed vortex wind generators), above Datum, Mean High Water at Pier T-1 Tower: _____ feet _____ meters, at pier E-2: _____ feet _____ meters, and center span of T-1 and E-2_____ feet _____ meters.

Vertical navigational clearance measured to the lowest hittable part of the bridge (which includes maintenance travelers), above Datum, Mean High Water at Pier T-1 Tower: _____ feet _____ meters, at pier E-2: _____ feet _____ meters, and center span of T-1 and E-2_____ feet _____ meters.

Vertical Clearance Gauges: Not required by the USCG.
Navigational Lighting: Required by the USCG.
Pier Protection/ Fendering System: Required by the USCG.
Photographs, 8 X 10 inch, glossy, black & white ( ) included, ( ) to be provided later.
Bridge to be replaced: Eastern Span San Francisco/Oakland Bay Bridge.
Date bridge open to transportation: _____

I certify the above bridge has been built in accordance with Coast Guard Bridge Permit Amendment No. 3a-01-11, and all conditions of the permit have been fulfilled.

Signature: _____, Date: _____

Title: _____

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, CA 95825-1846

IN REPLY REFER TO:
1-1-02-F-0002

October 29, 2001

Mr. Michael G. Ritchie,
Division Administrator
Federal Highways Administration
980 Ninth Street, Suite 400
Sacramento, California 95814-2724

Subject: Formal Endangered Species Consultation for the Proposed San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, Alameda County, California (FHWA Reference # HDA-CA; 04-SF-80; P37151)

Dear Mr. Ritchie:

This is in response to your request (October 11, 2001) for formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (East Span Project), Alameda County, California. This request for initiation of formal consultation was received by the Service on October 11, 2001. This document represents the Service's biological opinion on the effects of the action on the California least tern (*Sterna antillarum browni*)(least tern) and California brown pelican (*Pelecanus occidentalis californicus*) (brown pelican), in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act).

After review of the species list for the project areas (Enclosure A), we have determined the only species under jurisdiction of the Service that may occur in the proposed action area are the endangered least tern and endangered brown pelican. No critical habitat has been designated for the least tern and brown pelican; therefore, none will be adversely modified or destroyed by the East Span Project.

This Biological Opinion is based on information provided: (1) in the *Draft Endangered Species Act- Section 7 Consultation Section in Support of the Biological Opinion for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project*, U.S. National Marine Fisheries Service (NMFS), October, 2001; (2) in the document, *San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Underwater Sound Pressure Attenuation Alternatives Considered and Rejected*, Caltrans, dated October 2001; (3) in the document, *Proposed Construction Impact Avoidance and Minimization Measures Regarding the Interaction Between Fish and the Sounds*

from Plie Driving While Building the New San Francisco-Oakland Bay Bridge, prepared by Charles R. Greene, Jr., PhD (Greeneridge Sciences, Inc.), September 30, 2001; (4) in the document, *Effects of the Proposed Actions Regarding the Interaction Between Fish and the Sounds from Plie Driving While Building the New San Francisco-Oakland Bay Bridge*, prepared by Mardi C. Hastings, PE PhD (Ohio State University, Columbus, OH), September 30, 2001; (5) in the document, *The Effects on Fish and Other Marine Animals of High-Level Underwater Sound*, prepared by AWH Turnpenny, BSc PhD MIFM C Biol FI Biol, K P Thatcher *BSc*, R Wood, BSc PhD, and J R Nedwell, BSc PhD MIOA MSUT (Subacoustech Ltd), October 1994; (6) in the *San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Pile Installation Demonstration Project Fisheries Impact Assessment*, prepared by Robert Abbott, PhD, Strategic Environmental, Michael W. Davis, Parsons Brickeroff, and Steven Hulsebus, Caltrans District 4, August 2001; (7) *Volume I, Biological Assessment for the Berths 55-58 and Oakland Harbor Navigation Improvement (-50') Projects* prepared by Entrix, Inc. and dated December 9, 1997, and revised on April 24, 1998; (8) *Volume II, Biological Assessment for the Berths 55-58 and Oakland Harbor Navigation Improvement (-50') Projects* prepared by Entrix, Inc., dated December 9, 1997, and revised in April 1998; (9) the *Draft Fish and Wildlife Coordination Act Report for the Oakland Harbor 50-foot Navigation Project* prepared by the Service and dated March 1998; (10) in the *Endangered Species Formal Consultation for the Proposed Oakland Harbor Minus 50-foot Navigation Improvement and Vision 2000 Projects, City of Oakland, Alameda County, California,* reference # 1-1-98-F-43, prepared by the Service, June 1999; (11) in the document, *Least Tern Foraging Ecology at Three Major California Breeding Colonies*, provided in Western Birds, Volumne 14, Number 2, 1983, authored by Jonathan L. Atwood and Dennis E. Minsky; (12) in the *Characteristics of California Least Tern Nesting Sites Associated With Breeding Success or Failure, With Special Reference to the Site at the Naval Air Station, Alameda* report prepared by Dr. Carolee Caffrey and dated August 26, 1995, (Caffrey Report); (13) in the proceedings for *A Scientific Symposium: Alameda Naval Air Station's Natural Resources and Base Closure on March 12, 1994* prepared by the Golden Gate Audubon Society (Symposium Proceedings); (14) in the Service's Biological Opinion issued on June 26, 1997, for the disposal of the U.S. Navy's former FISCO facility (Service file number 1-1-97-F-85); (15) information in Service files; and (16) additional oral, electronic, and written communications between the Service and Caltrans and/or their consultants. A complete administrative record of this consultation is on file in the Service's Sacramento Fish and Wildlife Office (SFWO).

CONSULTATION HISTORY

On July 21, 1999, the Service received the FHWA/Caltrans[1] Environmental Impact Statement/ Environmental Impact Report for the East Span Project.

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[1] FHWA and Caltrans are jointly implementing planning and construction activities associated with the East Span Project. Caltrans has been, and will continue to, act as an applicant with FHWA for associated project-related consultation under the Act. While some items identified as FHWA/Caltrans in this opinion may have been or are being undertaken separately by FHWA or Caltrans, they are identified as joint activities as a result of Caltrans' applicant status under the Act.

On October 11, 2001, FHWA/Caltrans initiated formal Section 7 consultation under the Act with the Service.

BIOLOGICAL OPINION

Description of Proposed Action

This Biological Opinion addresses activities proposed by FHWA/Caltrans to assure seismic safety for the East Span Project. It was determined the existing East Span of the San Francisco-Oakland Bay Bridge must be replaced or retrofitted because: (1) it is not expected to withstand a maximum credible earthquake (MCE)[2] on the San Andreas or Hayward faults; (2) it does not meet lifeline criteria for providing emergency relief access following an MCE; and (3) it does not meet current operational and safety design standards. Associated actions include new bridge construction, dismantling of the existing bridge, and proposed impact avoidance, minimization, and compensatory measures. Project construction will occur over a seven-year period, including five years to construct the new bridge and two years to remove the existing East Span. FHWA/Caltrans intends to open bids on the Skyway contract on November 14, 2001, and award that contract shortly thereafter.

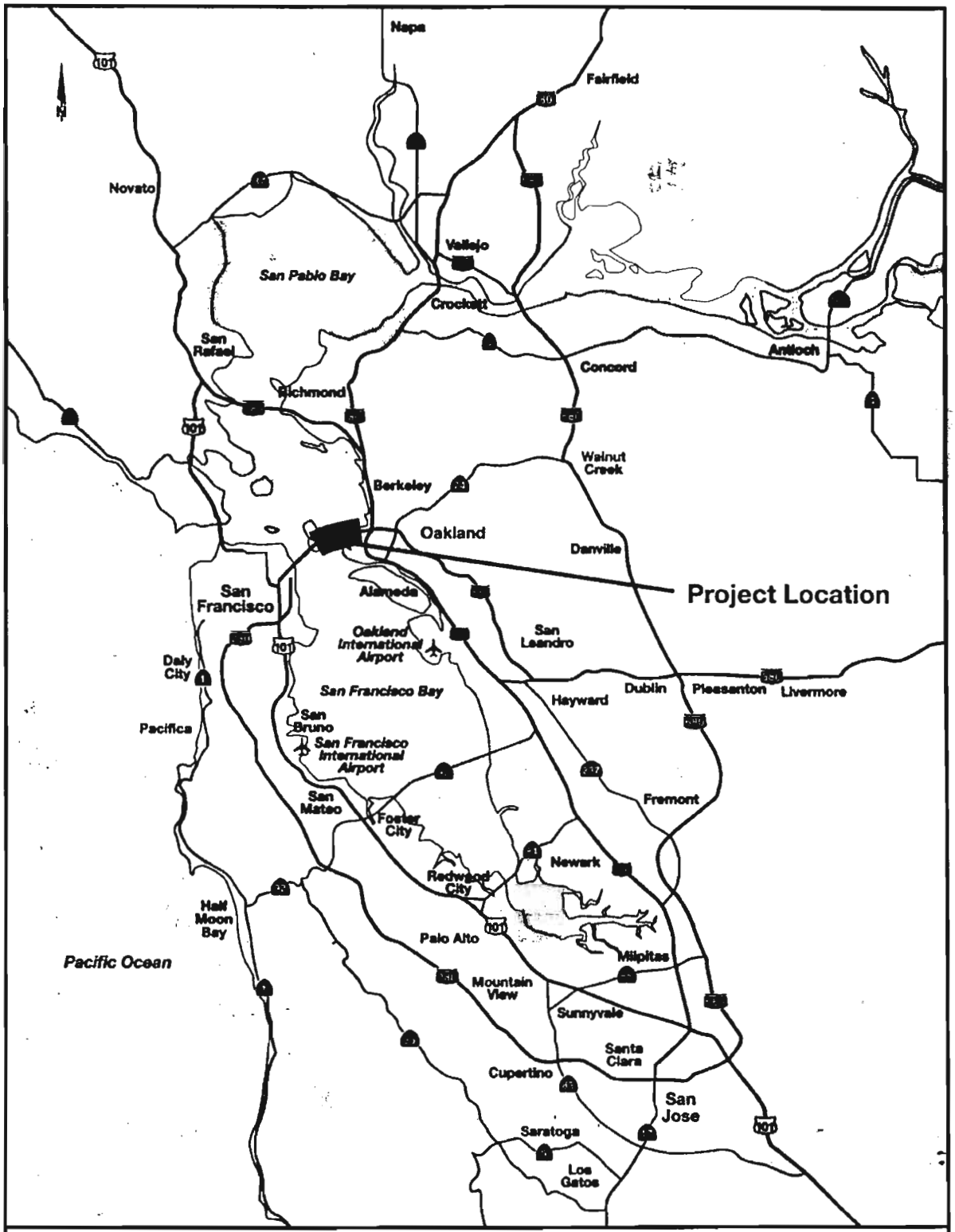
The project would require the use of large-scale equipment and involve labor-intensive activities. Materials and equipment would arrive to the site by land and water and dredging of approximately 615,000 cubic yards of Bay mud and soil will be required.

Location

The East Span Project site is located in San Francisco Bay, between Yerba Buena Island (YBI) and Oakland (Figure 1). The **project construction limits** are shown in Figure 2 and begin at latitude N37-48-35.47 and longitude W122-21-57.65 (defined by U.S. Reservation Monument #102 (Granite) near the midpoint of the YBI tunnel) and end at latitude N37-49-14.71 and longitude W122-19-48.74 (defined by National Geodetic Survey or N.G.S. point [Mole] near the Pacific Gas & Electric [PG&E] substation on the Oakland side). The in-Bay portion of the East Span Project site includes the area around the bridge piers and the area necessary to accommodate construction-related equipment such as work barges and cranes.

---

[2] An MCE is the largest earthquake reasonably capable of occurring, based on current geological knowledge. FHWA/Caltrans has projected the MCE for the San Francisco-Oakland Bay Bridge East Span as an earthquake of magnitude 8 (Richter scale) on the San Andreas fault or 7.25 on the Hayward fault.



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

SCALE
0 5 10 15 Miles

Project Location

Figure 1

For the purposes of this consultation, the **consultation project limit**[3] encompasses central, north, and south San Francisco Bay, bounded by the towns of Napa and Sonoma; the Golden Gate Bridge; Hwy 880, Alameda County; and Moffett Field NAS, Santa Clara County.

New Bridge Construction

The new bridge will be constructed north of the existing East Span and will be approximately 2.18 miles long (3.5 kilometers long) and approximately 230 feet wide (70 meters wide), including a 50-foot (15.3-meter) minimum space between the east and westbound bridge decks. The East Span Project would also replace the eastbound on-ramp on YBI. The existing ramp would be dismantled to construct the new bridge. The ramp would be rebuilt and would meet current design and safety standards.

The new structures and roadway consist of a viaduct from the YBI tunnel to a self-anchored suspension span (SAS), the SAS or main span, a skyway from the SAS to the Oakland approach, and a geotechnical approach embankment and roadway at the Oakland Touchdown. The structures would be supported by 33 piers over water and 33 bents set on YBI and the Oakland Touchdown area (Figure 3). The construction schedule would be determined after contract award by the selected construction contractors.

Main Tower

The main tower would be set offshore from YBI at a water depth of 59 feet (18 meters). Bedrock at the main tower location is sloping. The contractor may choose to create a bench for the main tower by mechanically breaking or excavating rock to create a level surface. Bay bottom sediments at the main tower would be removed by dredging, holes would be drilled into bedrock, hollow steel pipe piles (8.2 feet [2.5 meters] in diameter) would be driven or socketed into the holes, and a pre-fabricated steel box (with concrete cover) pile cap would be floated into position and sunk onto the piles, sealed around them, and pumped dry. A large hammer at low energy would likely be used for socketing of the large piles. The piles would be filled with concrete and welded to the pile cap, which would be filled with reinforcing steel and concrete, and covered with a top slab. Precast concrete fenders would be brought to the site and attached to the pile cap. The slab would provide the surface on which four pre-fabricated steel tower legs would be erected. The legs would be raised by cranes and bolted together. Steel link beams would be bolted between the legs along their length. Temporary support piers will be placed in the Bay, one to the west and two to the east of the permanent main tower during its construction. Steel pipe piles, likely 24 to 36 inches (61 to 91centimeters) in diameter, would be used to support the temporary piers. Depending on methods selected by the contractor, cofferdams may be used

---

[3] **Consultation project limits** were set taking into consideration the area where least terns and brown pelicans are known to be found around the Bay and the area signifying limits of potential project-related on-site and offsite mitigation measures.

during construction of the main tower foundation; however, it is unlikely due to water depths and the geology at this location.

All removed sediment would be placed on a barge for transport and disposed per Dredged Materials Management Office (DMMO) recommendations.

A temporary pile-supported dock for barges would be constructed near Clipper Cove on the north side of YBI for construction related activities such as delivery of materials. Piles for the dock would likely be 18, 24, or 36 inches (46, 61, or 91 centimeters) in diameter and fabricated of steel, concrete, or timber.

Pier E2 Construction

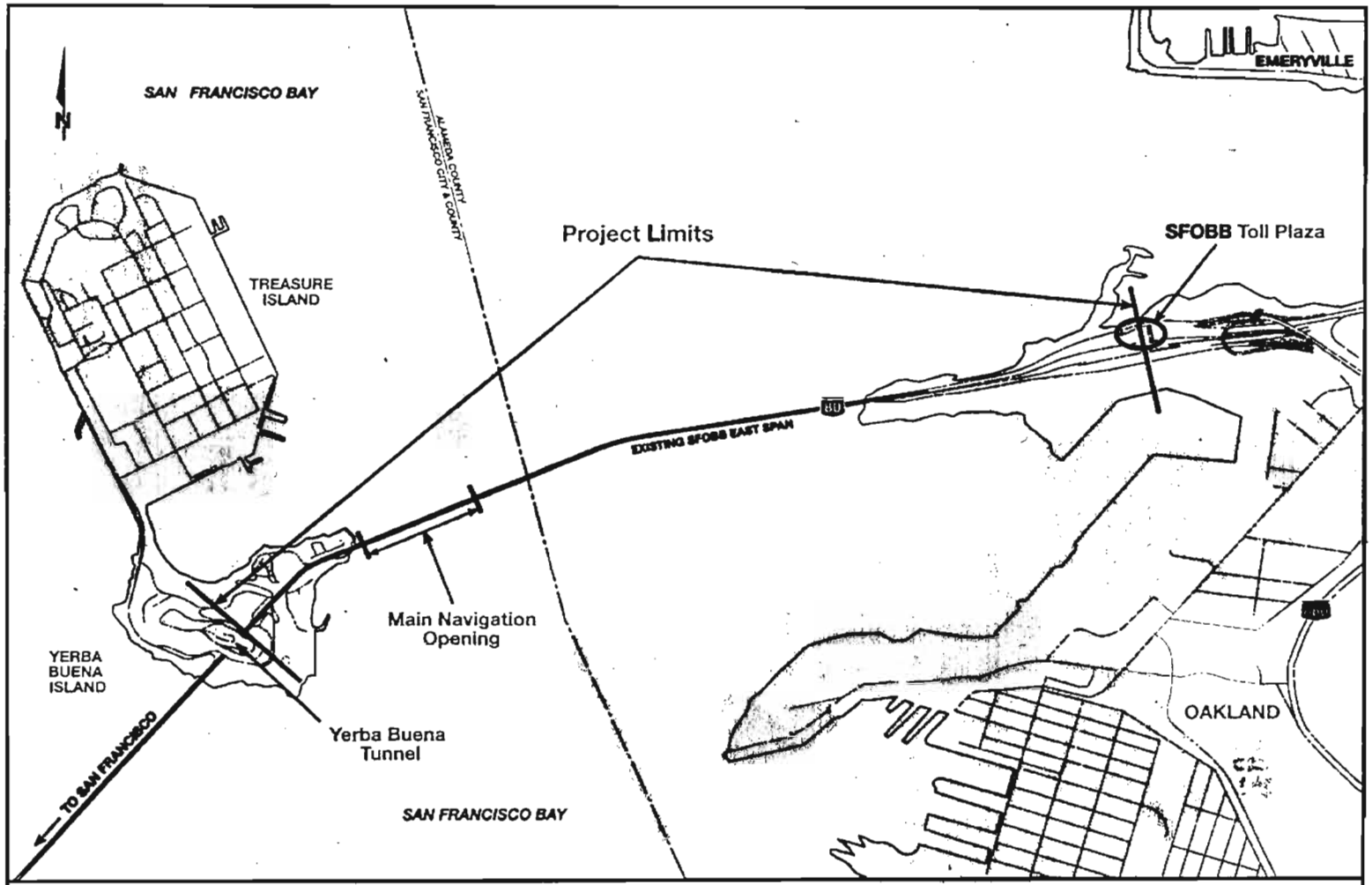
Hollow steel pipe piles would be driven into bearing strata and a pre-fabricated steel box (with concrete cover) pile cap would be floated into position and sunk onto the piles, sealed around them, and pumped dry. The piles would be filled halfway with concrete and welded to the pile cap, which would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

Skyway

The skyway would be a segmentally constructed prestressed, concrete box-girder. A temporary access trestle may be utilized to build portions of the skyway and allow for the delivery of materials, equipment, and work crews. It is expected that the trestle would be used in conjunction with the barges in areas of shallow water. The trestle for the skyway would be approximately 75,350 square feet (7,000 square meters). Barges may support the heavier equipment. Piles would support the trestle. Piles would likely be 18, 24, or 36 inches in diameter (46, 61, or 91 centimeters) and fabricated of steel, concrete, or timber. Temporary support piers will be placed in the Bay, at either end of the skyway, for support during its construction. Steel pipe piles, likely 24 to 36 inches (61 to 91 centimeters) in diameter, would be used to support the temporary piers.

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

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

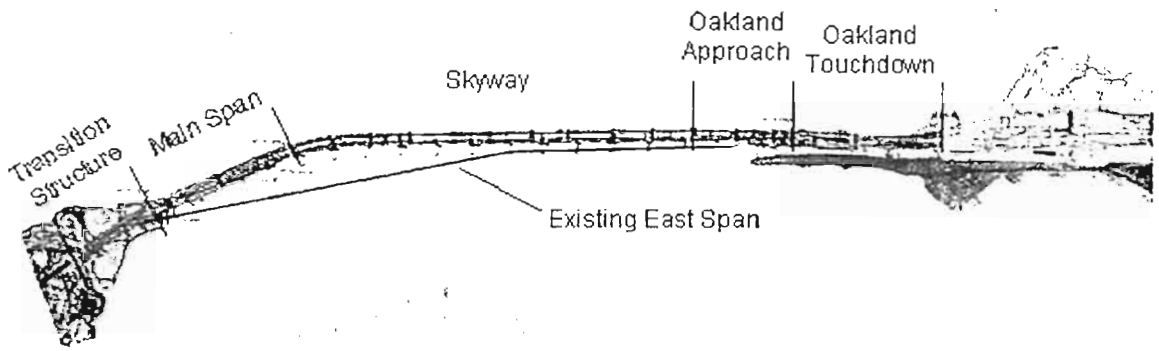


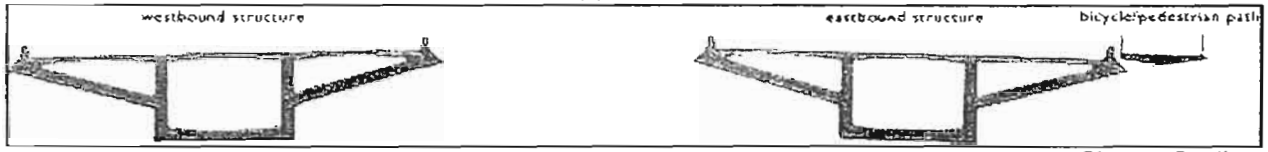
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:27,800
0 500 1000 2000 Feet

Project Limits

Figure 2





Skyway Section

- Located on an alignment north of the existing bridge
- Approximately 2.2 miles long, 2% slope
- Two side by side structures
- Bridge is composed of transition structure, main span, skyway, Oakland approach and Oakland touchdown
- Unified design from end to end
- Bicycle and pedestrian path located on south side of bridge

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

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

Oakland Approach Structures

The Oakland approach structures would include a cast-in-place, prestressed, concrete box-girder supported by a cast-in-place, reinforced, concrete substructure. Falsework for the structures would be supported by temporary piles. A temporary access trestle would be utilized to facilitate construction and would be approximately 150,700 square feet (14,000 square meters). Piles would support the trestle. Piles would likely be 18, 24, or 36 inches (46, 61, or 91 centimeters) in diameter and fabricated of steel, concrete, or timber.

Construction in-Bay would include dredging for barge access, building a temporary access trestle, driving piles, and placing engineered fill in areas of shallow water near the Oakland Touchdown. At the Oakland Touchdown area, a portion of the new westbound roadway and the relocated maintenance road would encroach into the Bay, requiring use of engineered fill and surcharge in the Bay and upland areas. For construction of the westbound roadway, 1,970 linear feet of geotube[4] (approximately 0.5 acre) would be placed in the tidal area north of the Oakland Touchdown. Within the area protected by the geotube (approximately 2.63 acres), the existing soils would be excavated to an elevation of approximately -2.6 feet. Wick drains and vertical drains would be installed and evenly distributed throughout the excavated area to facilitate consolidation of underlying Bay mud and prevent liquefaction of overlaying sand. The drain would be covered with a layer of gravel upon which clean fill material would be placed. The weight of the surcharge material on the underlying Bay mud would force out the pore water in the substrate up through the wick drains. Runoff from the surface of the fill would drain to existing and temporary drainage features and would be subject to Storm Water Pollution Prevention requirements and standards. Best management practices that would be used include, but are not limited to, temporary slope drains, erosion control blankets, and fiber rolls. When the substrate has been drained and compacted by the weight of the surcharge material, a portion of the surcharge would be removed and the road surface would be constructed upon the remaining fill. The excess surcharge material would be removed to an upland site for reuse.

All sediments resulting from pile driving and dredging would be removed, placed on a barge for transport, and disposed.

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[4] The geotube is constructed of sand contained within a geotextile fabic.

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

Pile Driving

Current plans anticipate driving a total of 259 in-Bay large diameter steel pipe piles. Of these, 189 piles will be 8.2 feet (2.5 meters) in diameter and 70 piles will be 5.9 feet (1.8 meters) in diameter. These large piles will support the skyway and main span sections of the replacement bridge; they will be driven to depths ranging from about -256 feet to about -358 feet (-66 meters to about-108 meters), with most being driven to about –312 feet (-95 meters). The smaller diameter piles will support the Oakland Touchdown structures; they will be driven to tip elevations ranging from about -135 feet to about –213 feet (-41 meters to about -65 meters). In-Bay pile driving of these large diameter steel piles may require hammer energy levels up to 1,700 kJ.

The three large steel piles used in the Pile Installation Demonstration Project (PIDP) each required approximately five hours total driving time to reach the specified tip elevation. Based on this experience, it is expected that the 259 in-Bay piles could require about 1,300 hours of total pile driving time. However, the contractor will be allowed to drive simultaneously at multiple locations. Furthermore, it is possible that all three contractors (the contractor for the SAS-YBI portion, the contractor for the skyway, and the contractor for the Oakland approach structures) would drive piles simultaneously. Pile driving will be allowed only from 7:00 AM to 8:00 PM, seven days a week. Pile driving that is underway at 8 PM will continue until driving of that pile segment is complete.

Between approximately 2,060 and 1,030 smaller diameter (18-24 inches in diameter) temporary piles, fabricated of steel, concrete, or timber, would be driven into the bottom of the Bay to support trestles, falsework and pile driving templates (Table 1). Placement of these smaller piles is expected to require little hammer energy, probably on the order of less than 100 kJ. However, depending on the size of the pile, the equipment available at the time of construction, and the geology, up to 200 kJ may be required. This is an order of magnitude energy less than that necessary to drive the large diameter piles. Hammers of this size are commonly used for marine and near-shore construction around the Bay.

Table 1. Summary of Small Diameter Pile Quantities			
Location	**Maximum**	**Median**	**Minimum**
Skyway Trestle	600	400	300
Oakland Trestle	1200	800	600
YBI Dock	180	120	90
SAS Trestle	80	60	40
TOTAL	2,060	1,360	1,030

When they are no longer needed, temporary piles will be retrieved or cut off 1.5 feet (0.46 meters) below the mudline.

The depths of water from where in-Bay pile driving will occur range from 59 feet (18 meters) [piles for the self-anchored suspension span (SAS) tower] to 1 foot (0.3 meter) (footings located along the north shore of the Oakland Touchdown).

Dredging

Dredging would be required for barge access, foundation construction, and pile cap construction because near the Oakland shore the water depths are shallower than the draft of a standard barge. A barge access channel would be dredged on the north side of the replacement bridge in the vicinity of the Oakland Touchdown area. The anticipated maximum draft for the barges is 10 feet (3 meters), but to ensure adequate clearance over potential irregularities in channel depth, barge listing during heavy lifting, and to allow for some potential resettlement of materials in the channel after dredging, the channels would be dredged to a depth of 12 feet (3.6 meters) adjacent to the Oakland Touchdown and 14 feet (4.3 meters) for the rest of the channel.

Updated dredge volume estimates, areas to be dredged and material classifications are contained in letters from FHWA/Caltrans (June 19, 2001 and August 15, 2001) to the Dredged Material Management Office (DMMO) and from the Federal Highway Administration (June 12, 2001) to the National Marine Fisheries Service (NMFS).

Dredging Activities

Dredging and excavation are required to facilitate both construction of the new bridge and dismantling of the existing bridge. Details of dredging operations are contained in the documents and letters cited above. Overall, the proposed actions would:

Excavate within the shallow areas of the east shoreline of the Bay, i.e., less than 14 feet (4.3 meters) below mean sea level (MSL) in National Geodetic Vertical Datum (NGVD), to allow in-water access to the project area;

- Excavate and remove materials necessary for installation of piers, footings, and foundations for the new bridge;

- Excavate a barge access channel near the Oakland Touchdown for dismantling equipment; and

- Excavate or remove existing East Span piers, footings, and foundations during dismantling.

Dredging techniques vary considerably in the types of equipment and methods employed Dredging techniques are expected to be either hydraulic or mechanical.

- Hydraulic methods, using cutterheads, dustpans, hoppers, hydraulic pipelines, and plain suction equipment, involve the removal of loosely compacted materials through suction techniques. Loosely compacted materials that can be removed by hydraulic methods would typically be fine-grained sediments that have not yet naturally settled, or have been loosened and entrained in the water column by mechanical or hydraulic means. Hydraulic dredging typically minimizes disturbance and resuspension of sediments, but involves entrainment of high volumes of water.

- Mechanical dredging typically involves the removal of more compact materials by equipment such as clamshell (open and closed bucket), dipper, or ladder dredges. These techniques involve removing sediments by dislodging and excavating the material, and then raising it to the surface and discharging it into a barge or scow.

Description of Soil Materials

The major geologic formations which underlie Bay waters in the project area include Young Bay Mud, Merritt Sands, Yerba Buena Mud (Old Bay Mud), the upper and lower Alameda Formations, and Franciscan Bedrock. The depth of the Young Bay Mud ranges from 6 to 50 feet (1.8 to 15 meters) along the project alignment. These Young Bay Muds consist primarily of clay, with some silt, sand, and shell fragments. Merritt Sands underlie the Young Bay Mud along much of the alignment.

Sediments encountered during dredging of the construction access and dismantling access channels are expected to consist entirely of Young Bay Muds. Sediment removal during pier construction is expected to encounter all sediment types. Some bedrock would also be removed during pier construction.

Only finer grained materials (mud and sand) would be suitable for aquatic disposal. rock, coarse gravel, or materials such as concrete, steel and other construction debris would not be suitable for aquatic disposal and would be taken to the appropriate upland locations for disposal or recycling.

Sediment sampling and analysis have been conducted since the Dredged Materials Management Plan (DMMP) was circulated. The results of this analysis have been reviewed by the DMMO. In

its letter of October 31, 2000 (in Appendix G of the FEIS), the DMMO indicated the volumes of dredged materials that would be "Suitable for Unconfined Aquatic Disposal" (SUAD) and "Not Suitable for Unconfined Aquatic Disposal" (NUAD). The vast majority of material from the project alignment has been found to be SUAD.

Dredging Quantities

The initial construction of the barge access channel, on the north side of the existing structure, will generate 216,230 cubic yards (165,320 cubic meters) of dredged material to be disposed at the San Francisco-Deep Ocean Disposal Site (SF-DODS). Dredging of the access channel is expected to take four to six months.

Construction of the East Span piers and footings would result in the dredging and disposal of up to 187,087 cubic yards (143,038 cubic meters) of material. This material would be dredged in small quantities over four years as each pier is constructed. Because of the small monthly volumes to be generated over the four-year period, FHWA/Caltrans plans to dispose of this material at the Alcatraz disposal site (SF-11). All material dredged from within the piles would be disposed at SF-11 with the exception of the upper 12 feet (3.66 meters) of Piers E1–E6 and E15–E18, as recommended by the DMMO; this material would be disposed of at appropriate upland facilities.

Once the construction of the East Span is completed and put into service the dismantling of the existing bridge structure would begin and would require an access channel constructed just south of the existing structure. This would generate up to 190,680 cubic yards (145,785 cubic meters) of dredged material. This material is classified as SUAD (June 19, 2001 letter from FHWA/Caltrans to the DMMO).

Dredged materials generated for construction of the dismantling access channel would be beneficially reused at the Hamilton wetlands restoration site, assuming the site is operational, can accept the materials, and reuse is practicable. If the above conditions are not met, the material would be disposed at SF-DODS. Dredged material generated by removal of the existing East Span piers is proposed for disposal at the SF-11 site. Additional sampling will be undertaken and a supplemental Sampling and Analysis Plan (SAP) will be submitted to the DMMO prior to this dredging operation (see Caltrans letter dated June 19, 2001).

Current project dredging volume estimates are depicted in Table 2

Table 2. Summary of Dredging Quantities

Activity	Dredging for Barge Access Channel to Construct New Bridge	Dredging to Construct New Piers and Footings	Dredging for Barge Access Channel to Dismantle Existing Bridge	Dredging to Remove Existing Bridge Piers	Total Dredged Volume
Volume	216,230 yards^3 (165,320 meters^3)	187,087 yards^3 (143,038 meters^3)	190,680 yards^3 (145,785 meters^3)	22,724 yards^3 (17,374 meters^3)	616,721 yards^3 (471,517 meters^3)

Disposal Areas

Expanded information about these sites is located in the project DMMP and in the August 1993 FEIS for Designation of a Deep Water Ocean Dredge Material Disposal Site off San Francisco, California.

Deep Ocean Disposal (SF-DODS). The SF-DODS is located on the continental shelf, approximately 50 nautical miles (91 kilometers) west of the Golden Gate, at a depth of approximately 760 feet (230 meters). This site is approximately 55 nautical miles (102 kilometers) from the proposed dredging location. This site was designated in 1994 under Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA). It can accept up to 4.8 million cubic yards (3.7 million cubic meters) per year, and has the capacity to accept all SUAD material from the proposed dredging activities for the East Span Project assuming physical criteria such as sediment grain size are met. Disposal at this site would significantly reduce impacts to listed species found within San Francisco Bay.

Alcatraz (SF-11). The SF-11 site is the closest disposal site to the East Span Project area, four to six miles (6.5 to 10 kilometers) away. The site can accept a total of 400,000 cubic yards (305,810 cubic meters) per month between October and April and 300,000 cubic yards (299,357 cubic meters) per month between May and September. This site has the physical capacity to accept most of the material generated on the East Span Project, depending upon the exact timing of dredging.

Hamilton Wetlands Restoration. The former Hamilton Army Airfield is located near the City of Novato in Marin County, approximately 18 miles (29 kilometers) from the East Span Project. The site was historically within the tidal zone of San Pablo Bay. In the 1930s, portions of the area were diked and used as a military base and airfield until the 1970s when the base was closed. The site is currently being prepared for transfer and reuse under the Base Realignment and Closure Act of 1988. A wetlands restoration project has been proposed to restore a mix of seasonal and tidal wetlands on up to 900 acres (360 hectares) of land, which

were previously used as the airstrip for the base and an adjacent antenna field to the north (State Lands Commission parcel). The site is not yet ready to accept dredged material and consultation under section 7 of the Act has not yet been completed.

Dismantling of the Existing Bridge

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

- YBI viaduct;
- YBI 288-foot (88-meter) steel truss approach spans;
- Oakland approach structures;
- YBI temporary detours;
- Cantilever truss spans;
- 504-foot (154-meter) steel truss spans; and
- 288-foot (88-meter) steel truss spans.

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

Dredging

Some areas near the Oakland Touchdown are too shallow to accommodate barges to dismantle the existing bridge; thus, a barge access channel would need to be dredged. The suitability of sediments in the barge access channel for dismantling the existing bridge would be evaluated prior to disposal per DMMO's recommendation.

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

Dismantling of the Superstructure

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

Dismantling of the Substructure

Substructure elements could be lifted from their bases in one piece or piece-by-piece. Dismantling of concrete foundations would require reducing the reinforced concrete to pieces small enough to be hauled away, which could be done by mechanical means such as saw cutting, flame cutting, mechanical splitting, or pulverizing and hydro-cutting. The hollow interiors of the piles remaining below the mudline could also be used as receptacles for pieces of concrete as the pier above is dismantled. This method would substantially reduce the quantity of material requiring transport and disposal and would lower dismantling costs. The piles remaining below the mudline could be capped or would gradually fill in through siltation. Any reinforcing steel would be cut off to be flush with the face of the concrete that remains below the mudline.

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

Proposed Impact Avoidance, Minimization, and Compensatory Measures

FHWA/Caltrans has proposed a variety of **biological conservation measures** to offset potential impacts to listed species and biological resources as a result of the proposed project. Project impacts would occur as a result of barotraumatic exposure caused by piles driving operations, impacts as a result of dredge and disposal operations, and possible increases in predation as a result of project-related equipment.

Barotrauma Mitigation

The pathologies associated with exposure to drastic changes in pressure, like that experienced when high-level underwater sound is produced from large-scale underwater pile driving operations, are collectively known as barotraumas.

Bubble Curtain

A bubble curtain system, or other marine pile driving energy attenuator approved by the Service and the National Marine Fisheries Service (NMFS)[5], has been incorporated into the East Span Project to **minimize** impacts. Operation of a bubble curtain will be required for driving of all large diameter permanent in-water piles. A continuous stream of air bubbles will enclose all permanent in-water piles/pile groups during the pile driving process[6]. Pile driving will be allowed only from 7:00 AM to 8:00 PM, seven days a week. Pile driving underway at 8 PM may continue until driving of that segment is complete.

Contractor specifications will stipulate the positioning, configuration, operation and removal of the bubble curtain system. The bubble curtain system will consist of air compressors, air supply lines, distribution manifolds, and aeration pipelines.

The aeration pipe will be perforated pipe configured into concentric rings spaced no more than five (5) vertical meters apart at all tide conditions. The lowest aeration pipeline layer will be designed to ensure contact with the mud line without sinking into Bay mud.

The bubble curtain system will be constructed on a frame designed to keep the aeration pipelines stable (horizontal) and to provide enough ballast to counteract any inherent buoyancy of the system during operation. When emplaced, the bubble curtain system must be configured such that the aeration pipelines completely enclose the pile/pile group at a minimum distance of two (2) meters.

Each aeration pipeline will have four adjacent rows of approximately 1.6 mm diameter air holes spaced approximately 20 mm apart.

Airflow to the bubble curtain system will be sufficient to provide a minimum bubble flux of three cubic meters per minute, per linear meter of pipeline in each concentric ring (16 cubic feet per minute, per linear foot).

Valves and gauges to measure air pressure and flow rates will be installed in the main air supply lines and at critical branch locations and shall be accurate to +/- 2%. All gauges shall be installed to be accessible to FHWA/Caltrans inspectors. The contractor will keep a log and graphic plot of all gauge readings, with data logged during every 30 minutes of operation. If the reading of any gauge drops below 10% of normal operation, pile driving will stop until the defect is repaired to the satisfaction of the FHWA/Caltrans' Engineer.

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[5] Associated with NMFS formal consultation for the East Span Project

[6] Unless other equally effective methods such as cofferdams are used, or as otherwise directed by FHWA/Caltrans for the purpose of collecting performance data.

The contractor must submit a bubble curtain system design and supporting calculations for FHWA/Caltrans' review within two (2) months of receiving notice to proceed on the project FHWA/Caltrans will comment on the system within one (1) month and the contractor shall respond within two (2) weeks of FHWA/Caltrans comments.

The contractor will be required to demonstrate the operation of the bubble curtain system during the re-strike of the Pile Installation Demonstration Project piles. The contractor will ensure that bubble "drift" at maximum tidal flux or current does not compromise the integrity of the continuous bubble curtain.

The pile-driving barge will also be isolated so that noise from the pile installation is not transmitted through the barge into the water-column.

Habitat-related Mitigation

Caltrans conducted an extensive review of potential mitigation sites in the central San Francisco Bay to identify areas suitable for creating and/or restoring eelgrass (*Zostera marina*) beds, intertidal sand flats, mudflats and tidal marsh. Most of the sites were not feasible because they were either too small or were not available for mitigation purposes. Only one site within the Central Bay, the Breuner property, was large enough to meet the mitigation requirements of the project. However, several significant constraints precluded Caltrans from utilizing the site.

Potential mitigation sites immediately adjacent to the project area and the Emeryville Crescent were rejected because the sites were too small or not available for the required mitigation. These sites included: *Radio Point* - located immediately north of the Bay Bridge Toll Plaza, *West Grand Avenue* - located north of the new West Grand Avenue overpass just east of the Bay Bridge Toll Plaza, and *Oakland Touchdown* – located at the existing Bay Bridge touches land in Oakland.

Several potential sites north of the project area within the Eastshore State Park were also investigated; however, the park planning process, which will include extensive public participation, may not be completed until 2002. This timeline is not in accordance with the plans for the East Span Project; therefore these sites were eliminated from consideration as potential mitigation sites. These sites included: *Brickyard Cove* - located south of University Avenue, and west of the frontage road on the west side of Interstate 80 in the City of Berkeley, *Berkeley Meadows/Virginia Street* - located north of University Avenue and west of the frontage road on the west side of Interstate 80 in the City of Berkeley. In addition, the *City of Albany's former landfills at Buchanan Marsh and Albany Bulb and Beach* - were considered; however, these sites are too small to meet FHWA/Caltrans' mitigation needs. Moreover, the City of Albany has received funds from the State of California to restore Albany Bulb and Albany Beach, precluding the use of these sites by FHWA/Caltrans for mitigation purposes.

Two potential mitigation sites were identified in the City of Richmond: the *Liquid Gold property* and the *Breuner* property. The Liquid Gold/Hoffman site is too small to meet FHWA/Caltrans' mitigation needs. The Breuner site is sufficiently large and was initially identified by Caltrans as a preferred mitigation site. Caltrans developed conceptual mitigation scenarios for the site. However, several significant constraints precluded Caltrans from utilizing the site for mitigation, including property access, hazardous materials testing, potential long-term Section 7 Endangered Species Consultation, sole source contracts, acquisition of property interest, and public access. Additional information on these issues is presented in FHWA/Caltrans' Department of the Army Section 404 permit application.

To compensate for the project's impacts, FHWA/Caltrans plans to implement measures that would restore and enhance habitat values affected by project construction activities in the following manner.

Special Aquatic Sites

Eelgrass. To mitigate temporary impacts to eelgrass beds, FHWA/Caltrans would implement a turbidity control program. The program would include measuring turbidity and light attenuation at the project boundary to compare with ambient conditions within the eelgrass beds. These measures would be used to monitor additional sediment transport caused by dredging and other construction activities within the project boundaries. Contract specifications require that depth-averaged turbidity measured at established locations along the project boundary in eelgrass beds shall not exceed 10% percent above ambient levels in any period of monitoring, day or night. Light transmittance may not be reduced by 10% percent or greater for an accumulated period longer than 8 hours in a given week during the months of January, February, March, October, November, December and 16 hours in a given week during the months of April, May, June, July, August, and September. If measured turbidity or light attenuation exceed the established limits, as determined by monitoring, appropriate control measures shall be implemented by the Contractor or the construction activity would be suspended to reduce turbidity and light attenuation to within the described limits.

To offset the placement of permanent and temporary fill in San Francisco Bay and impacts to eelgrass beds, FHWA/Caltrans proposes on-site restoration of eelgrass beds. In addition, FHWA/Caltrans proposes offsite, out-of-kind mitigation measures to at least compensate any lost habitat values.

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

Creation of eelgrass habitat is still experimental in the Bay, and the success rate for such projects varies depending on what method is used (Merkel & Associates 1998). The Richmond Harbor Training Jetty Eelgrass Transplant Program, which was completed in 1985, was among the first transplant programs in the Bay Area. Eelgrass was transplanted to a site that was not manipulated. The survival of the plants was mixed, depending on the location and age of the donor material. The eelgrass in the control and transplant areas did not expand their range in the spring and summer of the transplant year. Based on the experience of this project, Merkel concluded that in the Bay sites specifically manipulated for eelgrass transplantation may be more successful (Merkel & Associates 1998 and Fredette et. al. 1988). Although much research on eelgrass restoration has occurred in southern California, the habitat in the San Francisco Bay is sufficiently different that available data from southern California is not readily transferable.

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

FHWA/Caltrans' proposed on-site mitigation includes:

- Harvesting approximately 0.55 acres (0.22 hectares) of eelgrass from the footprint of the barge access channel prior to dredging, planting test plots in adjacent eelgrass beds and monitoring to evaluate performance;

- Restoring to its pre-construction bathymetry up to approximately 1.73 acres (0.70 hectares) of the barge access channel. Stockpiled dredged material and excavated sand would be used to facilitate eelgrass colonization and the area would be replanted with eelgrass from an adjacent donor site [Note: this aspect of Caltrans' proposal cannot be implemented without a change in BDCD policy]. FHWA/Caltrans will monitor replanted eelgrass to evaluate its performance.

Construction controls and Environmentally Sensitive Areas with fencing, buoys or similar devices would be included in the project plans, specifications, and estimates to avoid impacts as much as possible. FHWA/Caltrans would monitor for turbidity due to dredging, pile driving, barge maneuvering, and mud boils. A turbidity control program, which may possibly include limitations on barge and tug boat maneuvering would be required. Post-construction surveys to evaluate impacts of turbidity on eelgrass would also be implemented. If additional eelgrass beds have been affected during construction, FHWA/Caltrans would consult with the permitting agencies to determine if additional mitigation is warranted.

Intertidal Sand Flats. To minimize impacts to intertidal sand flats at the Oakland Touchdown area, FHWA/Caltrans would place geotextile fabric and plywood onto the intertidal sand flats before placing a geotube. The geotube would act as a tidal berm rather than using engineered fill and would reduce the potential for mud boils. That portion of the intertidal sand flats affected by the temporary placement of a geotube and mud boils would be restored to pre-existing conditions following construction as described in the East Span Project EIS.

In addition to offsite mitigation explained below, FHWA/Caltrans' proposes on-site mitigation including:

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

- Implementation of measures on-site to replace and/or restore shorebird roosting habitat and cormorant habitat;

- Construction of rock slope protection to allow sand to accrete over the rock areas subject to tidal action. Slope gradients would be 1(V):3(H) at the toe of the slope and transition to a 1(V):2(H) gradient at mid-slope, and

- The capping of rock slope protection areas with soil above the limits of tidal action to provide a medium to support growth of native upland plants and provide more natural upland transition than the existing abrupt slope.

Offsite Mitigation. In addition to on-site mitigation, FHWA/Caltrans shall provide $10,500,000 to fund mitigation at offsite locations to restore, enhance, or create new aquatic habitat and transitional uplands within the San Francisco Bay area. FHWA/Caltrans would continue consultation with State and Federal resource and regulatory agencies on the parameters of the restoration fund and mitigation opportunities. The relevant agencies would include: San Francisco Bay Conservation and Development Commission, Regional Water Quality Control Board, California Department of Fish and Game, US Army Corps of Engineers, US Environmental Protection Agency, US Fish and Wildlife Service, and National Marine Fisheries Service. FHWA/Caltrans proposes to provide mitigation for the project's direct impacts using the $10,500,000 at offsite locations. Potential locations include the following:

- FHWA/Caltrans proposes to provide funding to the East Bay Regional Park District (EBRPD) to restore, enhance or create new aquatic habitat and transitional uplands at the Eastshore State Park and within Central San Francisco Bay. Potential mitigation sites include:

a. Radio Beach Area-potential shoreline restoration including intertidal habitat and upland transition zones;
b. Brickyard Cove Area-potential shoreline restoration including intertidal habitat, the removal of riprap and upland transition zones;
c. Albany Beach Area-potential beach restoration/nourishment including the removal of parking areas; and,
d. Hoffman Marsh Area-potential tidal marsh restoration including the removal of fill and improving tidal action and water circulation.

Caltrans proposes to provide funding to the Service to acquire, cleanup contaminants, and initiate restoration of approximately 3,298 acres of diked historic baylands at Skaggs Island, Sonoma County. This effort will focus on maximizing benefits to the ecosystem in of the San Pablo Bay.

FHWA/Caltrans proposes that any restoration funds provided to the Service for offsite mitigation purposes be disbursed using the following parameters:

the Service must be fully responsible for designing, constructing, monitoring and managing the habitat creation and/or restoration;

the Service must be responsible for obtaining all necessary local, State and Federal permits and completing any required environmental compliance including endangered species consultation;

The habitat creation and/or restoration must be consistent with the recommendations of the Baylands Ecosystem Habitat Goals and should include eelgrass and intertidal sand flat habitat to the extent practicable;

The habitat creation and/or restoration should be planned and designed to be self-sustaining over time to the extent possible;

The acquisition and restoration funds should be used for replacing the functions and values of aquatic habitat and not to finance non-mitigation programs (e.g., education projects or research); and

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

Timing of Mitigation

The first phase of mitigation, which involves harvesting and transplanting eelgrass, would occur prior to dredging for the Oakland Approach Structures Contract. The remaining

on-site eelgrass mitigation cannot be fully implemented until project completion, which would take approximately seven years. Intertidal sand flat mitigation could begin once the Geofill Contract has been completed and the rock slope protection installed at the Oakland Touchdown. Establishment of the acquisition and restoration fund could be implemented prior to construction of the Skyway Contract. Implementation of off-site restoration activities depends on several factors, including Federal or State agencies obtaining site control, preparation of appropriate plans, conducting environmental review, and obtaining necessary regulatory permits.

Species-specific Mitigation

American Peregrine Falcon. FHWA/Caltrans and the Service developed mitigation approaches to avoid impacts to the American peregrine falcon. Mitigation includes continuation of the monitoring and release efforts by Santa Cruz Predatory Bird Research Group. If construction activities disturb nesting activities, the monitors would collect the eggs and/or capture and release any chicks present to a natural off-site location. These measures would apply even though the falcon has been delisted because this species is protected under the Migratory Bird Treaty Act and the California Endangered Species Act.

Double-crested Cormorant and Western Gull. FHWA/Caltrans would monitor the double-crested cormorant colony during breeding season and prevent the birds from nesting on the existing bridge where potential impacts by construction activities could occur. 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 water when the nests are not actively occupied. If the nests are completed and the birds have laid eggs, the nests would not be disturbed. Similar measures would be used to prevent western gulls from nesting. Cormorant nesting platforms will be installed on the new east spans, and it is expected that the cormorants will colonize this replacement habitat..

Black-crowned Night Heron, Allen's Hummingbird, White-tailed Kite, Bank Swallow, and Bewick's Wren. Prior to the removal of vegetation and trees during construction of any build alternative on YBI, a biological monitor would survey for nests. Any vegetation or trees with nests or those adjacent to areas with nests would not be removed until the nesting period is complete. Alternatively, to the extent feasible, vegetation and trees that need to be removed could be removed prior to the nesting season (after surveys have been conducted), so as to not affect the construction schedule. Nesting for these species usually occurs between January and July.

Shorebirds. Mitigation for the temporary loss of shorebird roosting habitat as a result of any build alternative would include enhancement or creation of upland refugia as part of the creation of the tidal marsh ecosystem mentioned above. On-site shorebird roosting habitat will also be constructed.

California Least Tern. If, through monitoring, it is determined project construction activities result in a taking of the least tern, actions will be taken, as a result of negotiations with the Service and other agencies, to provide additional predator and vegetation controls at the least tern nesting colony at the Naval Air Station (NAS) at Alameda. Additionally, in alignment with the *California Least Tern Recovery Plan* (USFWS, 1977), FHWA/Caltrans will participate in processes to establish additional California least tern nesting areas at appropriate locations around the Bay to help stabilize and increase the least tern population.

California Brown Pelican. If, through monitoring, it is determined project construction activities result in a taking of the brown pelican, FHWA/Caltrans will work with the Service to evaluate methods to remove further project-related impacts to the species.

Harbor Seal, California Sea Lion, and Gray Whale. Prior to commencement of any pile driving, a preliminary 500-meter (1,640-foot) radius safety zone for pinnipeds (harbor seals and California sea lions) will be established around the pile driving site. The safety zone is intended to include all areas where the underwater sound pressure levels are anticipated to equal or exceed 190 dB re 1 μPa RMS (impulse). Once pile driving begins, sound pressure levels will be recorded at the 500-meter (1,640-foot) contour. The safety zone radius for pinnipeds will then be enlarged or reduced, depending on the actual recorded sound pressure levels. A 180-dB re 1 μPa RMS (impulse) safety zone for gray whales will be established for pile driving occurring during the gray whale migration season from December through May.

Observers on boats will survey the safety zone to ensure that no marine mammals are seen within the zone before pile driving of a pile segment begins. If marine mammals are found within the safety zone, pile driving of the segment will be delayed until they move out of the area. If a marine mammal is seen above water and then dives below, the contractor will wait 15 minutes and if no marine mammals are observed in that time it will be assumed that the animal has moved beyond the safety zone

Winter-run, Fall-run, and Spring-run Chinook Salmon, Steelhead, Green Sturgeon, and Longfin Smelt. FHWA/Caltrans would implement a turbidity control program to avoid and minimize impacts to critical habitat for chinook salmon and other fish. A bubble curtain system has been incorporated into the project to avoid and minimize impacts from peak underwater sound pressure levels to listed species. The bubble curtain will be operated during driving of all large diameter (2.5 meter and 1.8 meter) permanent in-water piles, unless other equally effective methods such as cofferdams are used, or as otherwise directed for the purpose of gathering baseline sound pressure level data or other bubble curtain performance data. The bubble curtain system will produce a continuous stream of bubbles that will be required by contractor specification to enclose each pile or pile group during the pile driving process, including at maximum tidal flux and current.

Pacific Herring. Construction activities that occur during the peak herring spawning season, generally January to March, would be monitored by a qualified biologist to watch for the presence of spawning herring. If the biologist (or CDFG) observes spawning in the project area, in-water construction activities such as pile driving and dredging would be suspended within 200 meters (660 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. In addition, the use of a turbidity control program would reduce the impacts of turbidity on the herring spawn. The bubble curtain system, described above, will also avoid and minimize peak underwater sound pressure level impacts to Pacific herring.

Storm Water Run-off Mitigation

FHWA/Caltrans proposes to permanently capture and treat storm water runoff from a portion of the new bridge, the metering lights and toll plaza area, and east to the Powell Street interchange in Emeryville. An area totaling approximately 155 acres is proposed for capture and treatment. This treatment would improve the quality of water draining into the Emeryville Crescent and Central San Francisco Bay, and thus would enhance wildlife habitat. In addition, the replacement bridge will benefit water quality by removal of the existing bridge, a source of lead-based point.

Biological Monitoring

A monitor will be placed to observe construction areas where project-related pile driving and dredging activities are underway in an effort to avoid and minimize impacts to federally listed species, including:

Pile Driving Impacts

Project-related pile driving impacts will be monitored as follows:

- An observer, approved by the Service, will be placed to monitor the driving of the 259 in-Bay large diameter steel pipe piles. These pile driving operations will be monitored continuously for associated impacts to least terns or brown pelicans from April 1st to October 1st each year of project-related pile driving operations. Any impacts to least terns and brown pelicans will be reported to the Service immediately and a report provided annually.

- FHWA/Caltrans will coordinate with other ongoing efforts to monitor least tern nestling survival at the colony at NAS Alameda. Utilization of existing data collection efforts will be maximized.

Habitat-related Impacts

Project-related habitat mitigation activities, including compliance with any performance criteria, will be monitored either directly by FHWA/Caltrans or by a third party that assumes that responsibility. Success in achieving mitigation for project-related impacts will be reported to the Service.

Project Reporting Commitments

FHWA/Caltrans, or a third party accepting the responsibility, will submit to the Service the following documents, reports, or plans prior to beginning on-site construction activities, or prior to implementation of activities to adequately mitigate the project's impacts. Because of project phasing, some plans may be submitted separately, over time, prior to the beginning of construction for the project's different contracts.

- On-site Mitigation Plan;
- Off-site Mitigation Proposal;
- Final Implementation Plan and Schedule;
- Mitigation-related Project Plans; and
- Restoration Fund Allocation and Reporting Plan

If requested, FHWA/Caltrans will provide copies of the following to the Service that are required for the project-related RWQCB permit process:

- Dredging Operations Plan
- Storm Water Management Plan
- Storm Water Pollution Prevention Plan
- Construction Phasing Schedule

Not later than one year following the bid opening for the Skyway work, FHWA/Caltrans will submit to the Service a plan that addresses the proposed on-site wetland mitigation elements. The plan shall include all appropriate detail for earthwork and plantings, as well as an implementation schedule, performance standards, and monitoring.

Not later than 60 days prior to the beginning of in-water construction activities, FHWA/Caltrans shall submit to, and/or work with the Service to complete, a final implementation plan describing the additional mitigation activities. The implementation plan shall include detailed descriptions of the proposed activities, including appropriate project plans, an implementation schedule, and reporting. The plan or subsequent report shall demonstrate that Caltrans has fully funded $10.5 million or has $10.5 million in funds available for offsite restoration activities. This plan or report will be completed by a third party by no later than 60 days prior to the beginning of construction.

The biological conservation measures as proposed above and in the project materials reviewed by the Service are considered part of the proposed actions evaluated by the Service in this Biological Opinion. Any change in these plans or their implementation

that might adversely affect listed species, either directly or indirectly, requires reinitiation of consultation with the Service, as set forth in the final paragraphs of this letter.

SPECIES ACCOUNTS/ENVIRONMENTAL BASELINE

Species Accounts

California Least Tern

The least tern was federally protected as endangered on October 13, 1970 (35 **FR** 16047). A detailed account of the taxonomy, ecology, and biology of the least tern is presented in the approved Recovery Plan for this species (Service 1980). Supplemental or updated information is provided in the Service's July 16, 1993, Biological Opinion on the Federal Aviation Administration's authorization for proposed facilities improvements at San Diego International Airport, California, which is hereby incorporated by reference.

Least terns typically arrive at NAS Alameda in mid to late April, but have arrived as early as April 6, and depart in mid to late August each year. During this time period, least tern adults mate and select nest sites; lay, incubate, and hatch eggs; and raise young to fledglings prior to migrating south for the rest of the year. Hatchlings are typically fed from June through mid-August. Since 1977, the majority of nesting activities have occurred in the 4-acre, fenced "traditional" colony site on the western end of NAS Alameda, but prior to 1987, least tern nesting also occurred in other areas within the proposed Refuge outside the traditional site area (L. Collins *in* Symposium Proceedings). Furthermore, least terns have moved their young to various locations within the buffer zone surrounding the main colony site during several breeding seasons (and on one occasion as far as about 4,000 feet northwest of the main colony site), apparently to avoid predator pressure at the main colony site. While at NAS Alameda during the breeding season, least terns forage for fish in the open water offshore of the western end of NAS Alameda, which contains extensive, generally productive foraging habitat areas. Foraging intensity has varied between different offshore areas, but has occurred in the Oakland Harbor, Seaplane Lagoon at NAS Alameda, and areas southeast, south, and west of the traditional least tern colony site. During the breeding season, least terns are central-place foragers, that is, they return regularly to a central place--the nest--from their foraging trips. Most foraging activity occurs within 2 miles of the nesting site (Atwood, 1983). Having foraging places near their nests is beneficial to the terns because it reduces the energy cost of flying to the feeding site and reduces the time needed to bring a load of fish back to the nest.

According to the 1995 Caffrey report, the least tern breeding site at NAS Alameda has played a significant role in recent increases in the number of least terns throughout California. The NAS Alameda site is consistently one of the most successful sites in California. Between 1987 and 1994, the NAS Alameda site supported 5 to 6 percent of

the statewide breeding population out of 35 to 40 sites each year, but produced an average of 10.6 percent of the total number of fledglings produced statewide in each of those years. In 1997, an estimated 244 pairs of least terns nested at the colony out of a total population of more than 4,000 nesting pairs at 37 breeding sites along the California and Baja California coasts. In 1997, an estimated 316 young fledged successfully at NAS Alameda; this represented 10.1 percent of the total number of fledglings produced throughout California that year. By consistently producing large numbers of fledglings each year, the colony has added large numbers of potential new breeding birds to the statewide population. Therefore, this site is considered to be one of the most important "source" populations in California serving to balance out losses at many "sink" locations throughout the State. Because of its importance for least terns, the Service plans to establish a National Wildlife Refuge (Refuge) on lands at NAS Alameda that will include the traditional 4-acre least tern colony site and surrounding buffer areas.

There are two other minor least tern breeding sites in the San Francisco Bay area, the Oakland Airport and PG&E Pittsburg power plant site. The Oakland Airport site has not been used in years and the Pacific Gas and Electric Pittsburg site supports only one to four pairs each year. Therefore, the NAS Alameda site currently represents the entire San Francisco Bay area population, and is the most northern of least tern breeding colonies by about 178 miles. Because of its northern location, the NAS Alameda site is relatively unaffected during El Niño years when many southern California sites experience pronounced breeding failure resulting from limited food availability. In the most recent previous El Niño year, 1992, the NAS Alameda site supported 6 percent of the statewide number of breeding pairs, but produced 16 percent of the total statewide number of fledglings.

The 1998 season was another El Niño year, one of the most severe recorded, and least tern breeding at NAS Alameda was less successful. Only 90 young were fledged, more than a 70 percent reduction from 1997. Observations of delayed breeding, reduced fish catch, and the highest non-predator mortality of young ever observed (about 50 percent) (L. Collins, pers. comm. 1999) suggest food limitation and associated problems as a cause. In 1999, the number of nesting pairs at NAS Alameda may have declined substantially (K. Sanchez, pers. comm. 1999).

California Brown Pelican

The brown pelican was protected as endangered on October 13, 1970 (35 **FR** 16047). A detailed account of the taxonomy, ecology, and biology of the brown pelican is presented in the approved Recovery Plan for this species (Service 1983). Supplemental or updated information is provided in the Service's September 17, 1996, Biological Opinion on the U.S. Bureau of Land Management's authorization for the construction of the proposed Bal'diyaka Interpretative Center in Coos Bay, Oregon, which is hereby incorporated by reference.

Brown pelicans can arrive in northern California, after their breeding season is completed, as early as April or May, but the majority of birds typically arrive in July and stay through September (D. Jaques-Strong *in* Symposium Proceedings). Breakwater Island, located in the offshore waters just south of the western end of NAS Alameda, supports the most significant loafing/night roost for brown pelicans in San Francisco Bay Typically, Breakwater Island supports more than 400 brown pelicans during the non-breeding season, but in July 1997, the island supported more than 1,000 brown pelicans. Open water around Breakwater Island and in other parts of San Francisco Bay, including areas around Oakland Harbor, provide foraging, loafing and roosting habitat for brown pelicans. According to the *Biological Assessment for the Berths 55-58 and Oakland Harbor Navigation Improvement Projects* prepared by Entrix, Inc. (December 9, 1997, revised April 24, 1998) 16 brown pelicans were recorded near the project site at Oakland Harbor during surveys performed in 1997.

Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and the ecosystem in the action area. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area (50 CFR §402.02).

Factors Affecting Environment Within the Action Area

The factors presenting risks to naturally-reproducing populations of least tern and brown pelican are numerous and varied. A number of documents have addressed the history of human activities, present environmental conditions, and factors contributing to the decline of least tern and brown pelican. For example, the Service has prepared or assisted in the preparation of numerous documents focusing on status and recovery of these species, including the *California Least Tern Recovery Plan*, *California Brown Pelican Recovery Plan*, (USFWS, 1983), Programmatic Environmental Impact Statement/Report for the CALFED Bay-Delta Program (July 2000), and the Programmatic Environmental Impact Statement for the Central Valley Project Improvement Act (October 1999). All provide excellent summaries of historical and recent environmental conditions in the coastal and San Francisco Bay areas of California. For the purposes of this document, a general description of the environmental baseline for the least tern and brown pelican listed under the Act is based on a summarization of these documents.

Coastal Areas

Human development along coastal areas has brought disturbance to the birds in their breeding, resting, and feeding habitats. Nesting colonies of least terns and brown pelicans are especially sensitive to human disturbance.

The least tern has been most affected by the construction of the Pacific Coast Highway early in the century. With it, previously undisturbed beach areas became accessible and soon children, dogs and cats were disrupting tern nesting (Chambers 1908, Edwards 1919, Massey 1974). The buildup of human use of the beaches displaced more and more colonies at the same time their Bay feeding areas were being developed, filled in, and polluted. By the 1940's, most terns were gone from the beaches of Orange and Los Angeles counties (Cogswell 1947), and they were considered sparse everywhere (Grinnell and Miller 1944). Continuing loss of both nesting and feeding habitat and high levels of human disturbance at remaining colonies have been responsible for the continued decline to the present (Craig 1971).

While the California Brown Pelican is still found in its original range, its breeding colonies in California, located in the Channel Islands National Park at West Anacapa Island and the Santa Barbara Islands, continue to decline. California brown pelicans were threatened with extinction in the 1970's due to the use of the pesticide DDT. This chemical gets into the food chain and affects the birds calcium metabolism, resulting in thin-shelled eggs that break during incubation. DDT use was banned in the U.S. in 1972, and the brown pelican is recovering from the chemical contamination. However, DDT is still manufactured for export and it's effects in the environment linger. Food availability is now the major cause of concern. The Pacific mackerel, Pacific sardine, and the northern anchovy are important food for the pelican, especially during the breeding season. By the early 1900's commercial over-harvesting of these fish had resulted in less food availability during this critical time.

San Francisco Bay

Profound alterations to the estuarine habitat of San Francisco Bay began with the discovery of gold in the middle of the 19th century. Dam construction, water diversion, hydraulic mining, and the diking and filling of tidal marshes soon followed, launching San Francisco Bay into the era of rapid urban development and coincident habitat degradation. In general, the human activities that have affected these avian species and their habitats within the action area consist of: (1) loss of adequate nesting habitat; (2) land use activities such as urban development and landfill that degrade and transform aquatic habitat; (3) pollution; (4) dam construction and water development activities that can affect water quantity, timing, and quality in San Francisco Bay; (5) introduction of non-native species; and (6) ecosystem restoration.

Loss of Nesting Habitat. Only three least tern nesting areas currently exist in the San Francisco Bay area: Oakland Airport, PG&E Pittsburg power plant, and NAS Alameda. The Oakland Airport site has not been used in years and the Pacific Gas and Electric Pittsburg site supports only one to four pairs each year. The site at NAS Alameda remains one of the most important "source" populations in California, with an estimated 244 pairs of least terns nesting in the colony.

Land Use Activities. Historically, the tidal marshes of San Francisco Bay were a highly productive estuarine environment providing sufficient fish prey species for the least tern and brown pelican. Land use activities since the 1850's associated with urban development, mining, and agriculture have significantly altered habitat quantity and quality in San Francisco Bay, and contributed to ecosystem degradation.

Urbanization has been a major influence on the land surrounding the estuary. In the past 150 years, the diking and filling of tidal marshes have decreased the surface area of San Francisco Bay by 37 percent. More than 500,000 acres of the estuary's historic tidal wetlands have been converted to farms, salt ponds, and urban uses. Less than 45,000 acres of the estuary's historic tidal marshes remain intact, a reduction of 92 percent (San Francisco Estuary Project 1992). Today, nearly 30 percent of the land in the nine counties surrounding San Francisco Bay is urbanized. The increase in urban land reflects the growth of the human population. There are now more than 7.5 million individuals living in the 12 Bay Area counties, making the region the fourth most populous metropolitan area in the United States. These changes have reduced the acreage of valuable farm land, wetlands, and riparian areas, and have increased pollutant loadings to the estuary. Installation of docks, shipping wharves, marinas, and miles of rock rip rap for shoreline protection has also contributed greatly to habitat degradation within the estuary.

Pollution. Industrial, municipal, and agricultural wastes have been discharged into the waters of San Francisco Bay with major historical point sources including wastes from fish and fruit/vegetable canneries, and municipal sewage. The large-scale pollution of the estuary was partially relieved by the passage of the Clean Water Act in 1972, resulting in the construction of sewage treatment plants in all cities. Non-point sources of pollution, such as urban and agricultural runoff, continue to degrade water quality.

Dam Construction and Water Development. Hydropower, flood control, and water supply dams of the Central Valley Project (CVP), State Water Project (SWP), and other municipal and private entities have affected water quantity, timing, and quality in San Francisco Bay. These altered streamflows and the resulting inflow to San Francisco Bay have effected the natural ecosystem. Depleted inflow to San Francisco Bay has contributed to higher water temperatures and lower dissolved oxygen levels. Additionally, the seasonal distribution of freshwater inflow differs from historical patterns. The magnitude and duration of peak flows during the winter and spring are significantly reduced by water impoundment in upstream reservoirs. During the summer and early fall, inflow to San Francisco Bay may be greater than historical levels due to deliveries of municipal and agricultural water supplies. Overall, present day water management practices in the Central Valley reduce natural flow variability by creating more uniform flows year-round that diminish natural channel forming, riparian vegetation growth, and food web functions.

Introduction of non-native species. As native fishes became depleted in the late 19th century, non-native species were brought in to the Bay and delta, including American shad, striped bass, common carp, and white catfish. As their populations boomed, those of native fishes declined further. Introduction of non-native species accelerated in the 20th century through deliberate introductions of fish and unintended introductions of competitive invertebrates through ballast water of ships. Establishment of non-native species was probably facilitated by altered hydrologic regimes and reduction in habitats for native species. The introduction and spread of non-native species in San Francisco Bay has affected native species, including listed avian species, by competing with them for food and habitat, and preying on native species.

Ecosystem Restoration. Preliminary, significant steps towards the largest ecological restoration project yet undertaken in the United States have occurred during the past five years and continue to proceed in California's Central Valley. The CALFED Program and the Central Valley Project Improvement Act's (CVPIA) Anadromous Fish Restoration Program (AFRP), in coordination with other Central Valley and Bay Area efforts, have implemented numerous habitat restoration actions. A few of these restoration projects, primarily land acquisition and wetland restoration, include actions within the San Francisco Bay area. Restoration of wetland areas typically involves flooding lands previously used for agriculture, thereby creating additional wetland areas that could serve as rearing habitat for fish prey species of the least tern and brown pelican, and could, if associated with other restoration actions, possibly provide nesting habitat for the least tern and other bird species.

EFFECTS OF THE ACTION

Endangered Species Act implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species or critical habitat...." Direct effects include those actions that are the direct result of the proposed action, and include interrelated actions (actions that are part of the larger proposed action and depend on the larger action for their justification) and interdependent actions (actions having no independent utility apart from the proposed action) that will be added to the environmental baseline. Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur (50 C.F.R. § 402.02).

The East Span Project could result in harassment, harm, injury, and death of the least tern and brown pelican. The proposed East Span Project:

a. Could result in death or injury of individuals of either species venturing too close to pile driving operations through subjection to high-level sound pressure waves;

b. Would directly impact feeding success for both species by temporarily and permanently impacting prey-fish species habitat, and temporarily reducing quality of open water foraging habitat;

c. Could impact overall the health of both species through resuspension of contaminants associated with dredging operations; and

d. Benefit both species, through ecosystem restoration and habitat enhancement.

Total direct permanent and temporary project impacts would occur within approximately 3.60 acres of eelgrass habitat and 4.99 acres of intertidal sand flat habitats. Eelgrass habitats are essential for prey-fish production for the least tern, and intertidal sand flats provide foraging and roosting areas. These impacts occur in areas known as special aquatic sites. The majority of project impacts will occur near the Oakland Touchdown area due to dredging for a temporary barge access channel, placement of fill to construct a new westbound roadway, relocation of Caltrans' existing maintenance road, and permanent shading from the new east and westbound roadways. Small impacts to eelgrass beds will occur adjacent to YBI to construct a temporary barge dock.

The project may temporarily impact special aquatic sites, including eelgrass and intertidal sand flats, and open waters of the Bay over the estimated seven years of bridge construction and demolition. Impacts may occur through the discharge of construction and demolition materials and debris, indirect impacts from equipment access and changes to erosion and sedimentation during project dredging and fill placement.

The project will directly impact the beneficial uses of waters of the State for estuarine habitat and preservation of rare and endangered species through construction stage impacts including pile driving. Pile driving was shown to kill fish during a pilot project for the new bridge. FHWA/Caltrans will contribute $10.5 million to habitat restoration and enhancement in the Bay and is working with the Service to develop a mitigation plan.

Project Pile Driving

Project-related Impacts on Least Tern and Brown Pelican

The pathologies associated with exposure to drastic changes in pressure are collectively known as barotraumas. These include hemorrhage and rupture of internal organs, including the swim bladder and kidneys in fish. Death can be instantaneous, occur within minutes after exposure, or occur several days later. Mammals are known to suffer cardiovascular barotraumas caused by expansion of gas bubbles in the pulmonary capillaries, coronary arteries, internal carotid artery, or the cerebral artery. Bubble expansion in blood vessels can cause an embolism or blockage leading to heart attack or stroke, or a rupture causing hemorrhage. Other tissues with gas-filled voids, such as

swim bladders, bowel, sinuses, and lung can perforate and hemorrhage when exposed to blast and high-energy impulse noise underwater (Gisiner, 1998). Barotrauma is believed to have contributed to the recent beaching and deaths of whales in the Bahamas (Malakoff, 2001).

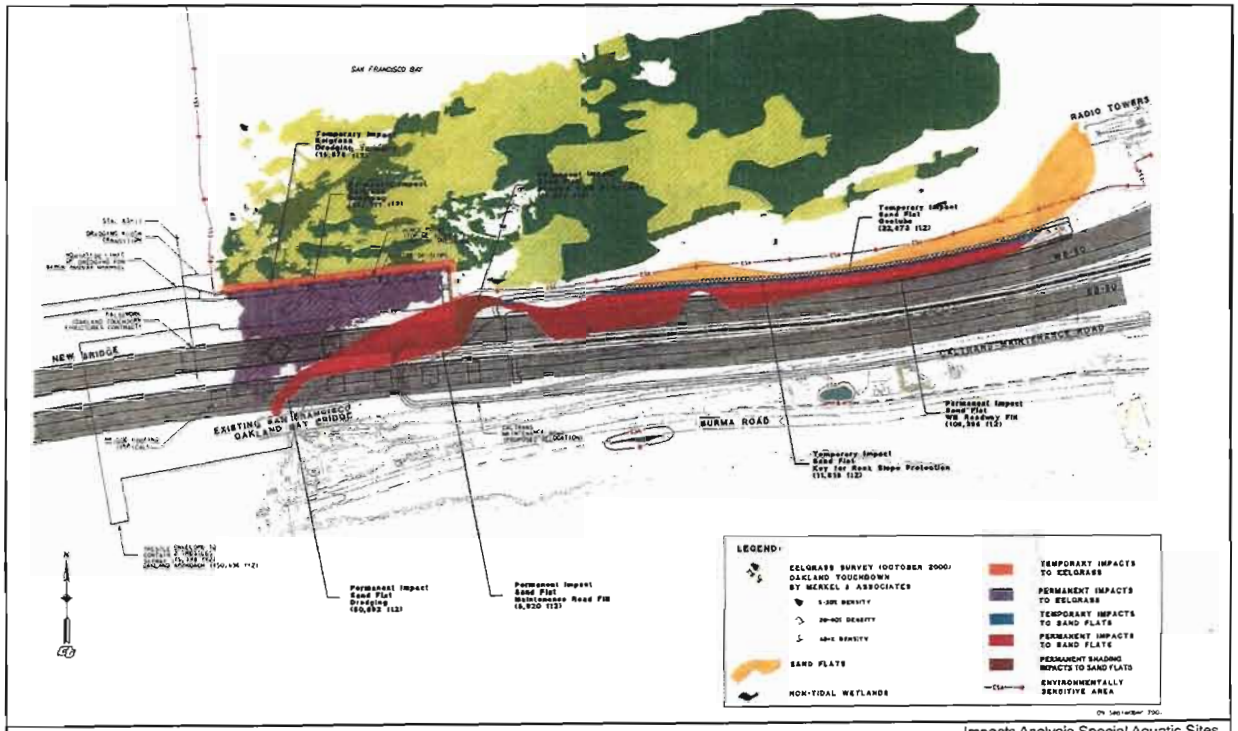
Avian species in the project area exposed to high sound pressure levels associated with project pile driving may experience mortality, slight degree of injury, stress, a startle response, or no effects whatsoever. The degree of effect depends on many factors including:

- Size and force of the hammer strike
- Distance from the pile
- Depth of the water around the pile
- Depth of the species in the water column
- Amount of air in the water
- The texture of the surface of the water (size and number of waves on the water surface)
- Bottom substrate composition and texture
- Size of species
- Type of species
- Physical condition of individual organism
- Effectiveness of the Bubble Curtain sound/pressure attenuation technology

In addition to the direct impacts of pile driving on adult least terns and brown pelicans, nestling least terns might be impacted at NAS Alameda as well. If auditory functions of adult least terns were impaired as a result of foraging near project-related pile driving, those individuals could have difficulty orienting to feed their young. Since colonial nesting seabirds, upon returning from foraging activities, typically orient to nestlings through audible cues, impacts to young least terns could occur as a result of a lack of appropriate parental feeding.

Project-related Minimization Measures

During a Pile Installation Demonstration Project in 2000, planned pile driving activities for the East Span Project were tested. Test results showed mortality in fish species in the Bay as a result of barotraumas. It also identified behavior modifications in associated marine-related bird life which prompted concern of the Service for the least tern and brown pelican. During this test period, various species of gulls spp., Brandt's cormorants and brown pelicans were seen to feed on moribund fish associated with pile driving operations. However, most were noted to feed at distances beyond that identified as an impact to fish species in related studies (at or beyond 300 meters). These interactions did, however, prompt evaluation of methods that could attenuate the effects of high sound pressure levels associated with project pile driving operations.



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Not to Scale

Impacts Analysis Special Aquatic Sites
Oakland Approach

Figure 4

Bubble curtains have been used for marine pile driving on only three known projects: The Hong Kong Aviation Fuel Transfer Facility, the Vancouver, British Columbia, Canada, Place Cruise Ship Terminal, and the San Francisco-Oakland Bay Bridge Pile Installation Demonstration Project (PIDP). Of these, the Vancouver project was the most successful in reducing underwater sound pressure levels during pile driving. The reported decibel reduction was greater than 17 dB (Greene 2001). A bubble curtain is planned as an integral part of East Span Project pile driving operations for large diameter piles. While the success of bubble curtains to reduce the impact of high-level sound on avian species is unknown, such devices have been shown to provide protection to fish species (Keevin et al 1997). It is assumed the "muffling" of high-level sounds provided by bubble curtains would also provide a similar benefit for avian species traveling underwater.
The planned bubble curtain should provide an attenuation of peak pressures of at least 10 dB (Greene 2001). Using the Canadian guideline of 4.5 psi (210 dB re. 1 μPa) as a safe level for fish, the estimated safe range (distance from source) for fish during pile driving on the East Span Project is 310 feet (95 meters) for the operation of the large hammer at 1700 kJ without a bubble curtain. The estimated safe range for fish is 144 feet (44 meters) if the same hammer is employed with a bubble curtain, assuming a 10dB reduction in sound pressure levels (Greene 2001). This safe range is also assumed for least terns and brown pelicans

As the acoustic pressure wave leaves the steel pipe pile and spreads throughout the water column, the pressure drops off according to the distance due to the spreading out of the acoustic energy. In deep water the rate of attenuation or transmission loss is as much as a halving of the pressure for each doubling of the distance. In shallow water where much of the acoustic energy can be absorbed by the bottom and reflected off the surface back down to the bottom and even backwards towards the pile, the rate of attenuation is much higher. The reduction in sound pressure levels near the surface is especially important in assessing the acoustic impacts on salmonids. The acoustic zone of impact for a source that extends from the surface to the bottom may be visualized as a large inverted bowl with the narrow end or bottom of the bowl near the water surface and the rim or wide part of the top of the bowl near the bottom of the Bay. This means that fish swimming near the surface must be closer to the pile than fish near the bottom to experience the same degree of impact. Because least terns and brown pelicans typically feed no more than 1 meter deep, this same level of impact is assumed.

The area of greatest risk to fish species is within approximately 10 meters (30 feet) of the pile. Here the sound pressure levels are great enough to kill most fish immediately. Fish further away have been shown to sustain injuries that render them more vulnerable to predators and thus may be considered delayed mortalities. Fish still further out from the pile may exhibit temporary abnormal behavior indicative of stress or exhibit a startle response but not sustain harm or an injury to an organ. These various distance or radiuses may be termed the Immediate Mortality Zone (IMZ), the Delayed Mortality Zone (DMZ)

and the Behavioral Modification Zone (BMZ). The radius of each zone is unknown but the use of the bubble curtain suggests a 50-85% reduction (10-15 dB) in the size of the zones and a corresponding protection of fish resources over the potential impact without the bubble curtain.

Summary

While impacts to least terns and brown pelicans, and their prey-fish species can occur as a result of pile driving operations, the following measures greatly minimize potential impacts

- placement and operation of a bubble curtain or other approved marine pile driving energy attenuator at sites associated with the driving of large diameter steel piles;
- temporary nature of pile driving operations;
- avoidance of prey species from pile driving areas; and
- avoidance of project areas due to above water, project-related sound and activity levels.

Loss and Reduction in the Quality of Foraging Habitat and Prey Species

Least Tern and Brown Pelican Prey Species

Collection of dropped fish, which is an indication of fish prey items selected by least terns, at NAS Alameda from 1981 to 1995 indicates northern anchovy (*Engraulis mordax*), San Francisco topsmelt (*Atherinops affinis affinis*), jacksmelt (*Atherinops californiensis*), and unidentified Atherinidae species comprised 85.4 percent of the total percentage of fish collected at the least tern colony. The brown pelican is highly reliant upon northern anchovies as a food source.

Northern anchovies mostly spawn in open waters of the Pacific Ocean, but eggs are abundant in San Francisco Bay from May through September (Herbold *et al.* 1992). Within San Francisco Bay, northern anchovies spawn in channels, but larvae mostly occur in shallow water areas (McGowan 1986). While anchovy larvae have been documented to tolerate lower water clarity than anchovy eggs, eggs were found to be most abundant in parts of San Francisco Bay with low concentrations of zooplankton and clearer water (Herbold *et al.* 1992). This information suggests that decreased water clarity associated with project-related dredging and disposal of dredged sediments could reduce the productivity and/or availability of northern anchovies, a principal fish prey item for least terns and brown pelicans in general.

Anchovy adults and juveniles typically enter San Francisco Bay in April and leave in the fall (Herbold *et al.* 1992). Large numbers of northern anchovies are present in central San Francisco Bay in May, June, and July (Figure 42 in Herbold *et al.* 1992). San Francisco topsmelt spawn in San Francisco Bay from April to October with peak spawning in May and June (Wang 1986). Jacksmelt adults enter bays and estuaries in late winter and early spring to spawn, and spawn in San Francisco Bay from October to early August (Wang 1986). Both San Francisco topsmelt and jacksmelt use submerged vegetation, including eelgrass, as a spawning substrate.

Project-related Impacts to Least Tern and Brown Pelican

The quality of foraging habitat for least tern and brown pelican will be affected by project-related dredging and disposal activities. Dredging practices associated with the East Span Project will result in minimal, site specific losses of prey species for the least tern and the brown pelican. Effects include entrainment of juvenile prey-fish species (Dutta and Sookachoff 1975, Boyd 1975, Armstrong *et al.* 1982, Tutty 1976) and behavioral (Sigler *et al.* 1984, Berg and Northcote 1985, Whitman *et al.* 1982, Gregory 1988) and sub-lethal impacts to prey species from exposure to increased turbidity (Sigler, 1988, Sigler *et al.* 1984, Kirn *et al.* 1986, Emmett *et al.* 1988, Servizi 1988); effects from redistribution and/or release of contaminants (explained further below), with increased potential for chronic or acute toxicity; increased prey mortality from predatory species benefitting from activities associated with dredged material disposal; and changes in the native sediment characteristics near disposal sites and shifts in sediment dynamics that may alter available food supply (Morton 1977).

The magnitude of effect from dredging will also vary with the life stage of the prey species. In general, adult fish will avoid areas of dredging and disposal of dredged material. However, juveniles may be less able to avoid or leave the affected areas, or may expose themselves to increased predation risk by moving out of an affected area. Increased turbidity will also impact feeding success of the birds by hampering visual cues necessary to spot fish prey from the air. However, because fish tend to avoid areas of high turbidity, impacts are expected to be minimal as they should move to clearer water.

Fish could become more abundant at the water surface because the sediment plume produced during dredging operations tends to be concentrated below 7 meters or about 23 feet MLLW based upon a one-day study of single clamshell dredge operating in Inner Harbor. However, increased turbidity associated with continuous dredging by multiple dredges, sediment overflow from barges, and disposal of dredged sediments could either individually or collectively reduce in-water visibility for least terns and brown pelicans at the water surface and at shallow depths, thus reducing their overall foraging effectiveness. These adverse effects could be most pronounced during the summers when least tern adults are feeding unfledged young with high energetic needs for growth and development. Further, sediment dispersed during dredging operations could cover

eelgrass and reduce light in eelgrass beds adjacent to the project site, thus reducing their productivity and suitability as fish spawning habitat.

The majority of the impacts to eelgrass would occur in the intertidal areas just to the north of the Oakland Touchdown as a result of dredging for a barge access channel (Figure 4). There would be relatively minor impacts to eelgrass beds at Clipper Cove from the construction of a temporary barge dock (Figure 5). Eelgrass beds are known to occur in shallow waters, less than 6.56 feet (2 meters) deep, within the project study area. Eelgrass beds were observed on the north side of the Oakland Touchdown extending to depths ranging from about 3.5 to 5 feet (1 to 1.5 meters). The eelgrass bed near the shore of the Oakland Touchdown appears to be young which suggests that the bed may be increasing in size and density. Eelgrass beds are highly productive habitats for numerous species of fish including Pacific herring, San Francisco topsmelt, and jacksmelt, which use eelgrass as spawning habitat.

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

Project-related Minimization Measures

To minimize impacts to least tern and brown pelican foraging habitat and associated prey species, FHWA/Caltrans' proposes the following measures:

On-site Minimization - Approximately 0.55 acres (0.22 hectares) of eelgrass will be harvested from the footprint of the barge access channel prior to dredging, planting test plots in adjacent eelgrass beds and monitoring to evaluate performance. After construction is complete, the barge access channel will be restored to its pre-construction bathymetry up to approximately 1.73 acres (0.70 hectares) and the area would be replanted with eelgrass from an adjacent donor site. Additionally, FHWA/Caltrans would minimize impacts to eelgrass beds by implementing a turbidity control program. The program would include measuring turbidity and light attenuation at the project boundary to compare with ambient conditions within the eelgrass beds. These measures would be used to monitor additional sediment transport caused by dredging and other construction activities within the project boundaries. If measured turbidity or light attenuation exceed the established limits, as determined by monitoring, appropriate control measures shall be implemented by the Contractor or the construction activity would be suspended to reduce turbidity and light attenuation to within the described limits.

Offsite. In addition to on-site mitigation, FHWA/Caltrans proposes to provide $10,500,000 to fund mitigation at offsite locations to restore, enhance, or create new aquatic habitat and transitional uplands within the San Francisco Bay area. Some of these restoration actions would provide benefits to various life stages of prey species for the least tern and brown pelican.

Project Area Proximity to Least Tern Nesting Colony at NAS Alameda

The least tern is opportunistic in its foraging habits, and efforts to precisely define "essential" feeding habitats or localities are difficult. Prior to post-fledgling dispersal from breeding colonies, most foraging activity occurs within 2 miles of the nesting sites (Atwood 1983). The project site is 2.7 to 3 miles away from the breeding colony at NAS Alameda and should be beyond the distance adult terns are willing to fly to forage and return with food for pre-fledgling young (Figure 6).

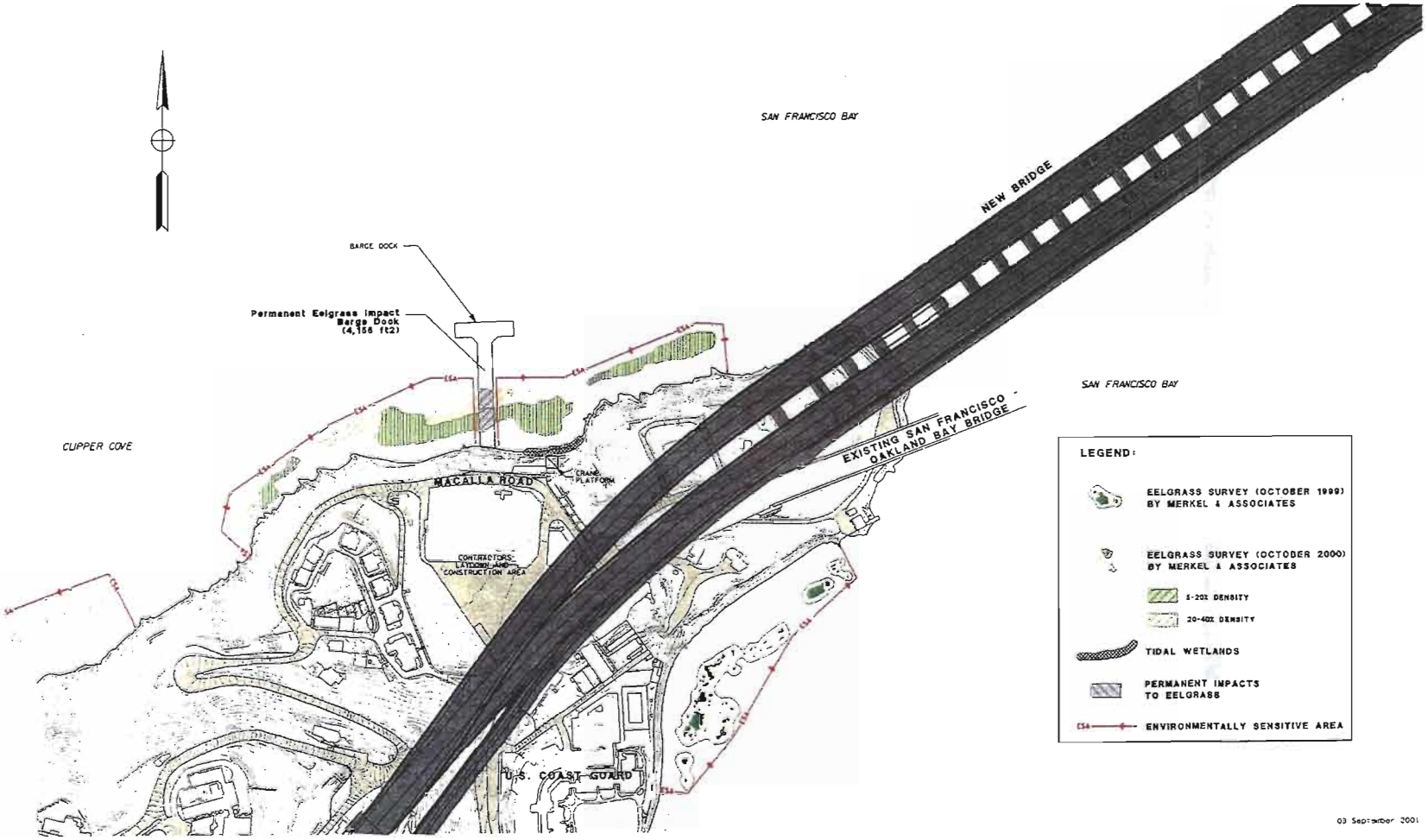
Significance In-relation to Feeding Habitat Area

The California least tern enters the Bay area in mid to late April each year and shortly thereafter begins mating and nesting activities. Prior to and after nesting, the species can forage throughout the Bay, and individuals have been seen at National Wildlife Refuges in the north Bay and salt ponds in the south Bay. Subsequent nesting, feeding ranges become much more limited and the species typically stays within a 2 mile radius of the nest site (Atwood 1983). At NAS Alameda, since approximately one half of that area would be over water, the typical least tern foraging habitat when nesting would closely approximate 4,000 acres. If the species ventured beyond the 2 mile area to include the project area (3 miles), the least tern foraging habitat would closely approximate up to 9,000 acres. Because of the size of the feeding area assumed to be available to least terns if they were to venture to the project site, the general project-related impact area (assumed less than 20 acres at one time), and the proximity of the NAS Alameda least tern colony to other eelgrass-related feeding areas (Figure 6), impacts on least tern feeding are assumed to be minimal.

The California brown pelican enters the Bay area as early as April each year and forages and rests until it leaves in September. Because the brown pelican has been known to forage throughout the Bay, an area of approximately 832,000 acres, the potential for project-related impacts on brown pelican feeding are assumed to be minimal.

Summary

While impacts to foraging habitat and prey-fish species for least terns and brown pelicans can occur as a result of project-related pile driving, dredging, and disposal operations, they likely will be greatly reduced due to the following:



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Not to Scale

Impacts Analysis Special Aquatic Sites
Yerba Buena Island

Figure 5

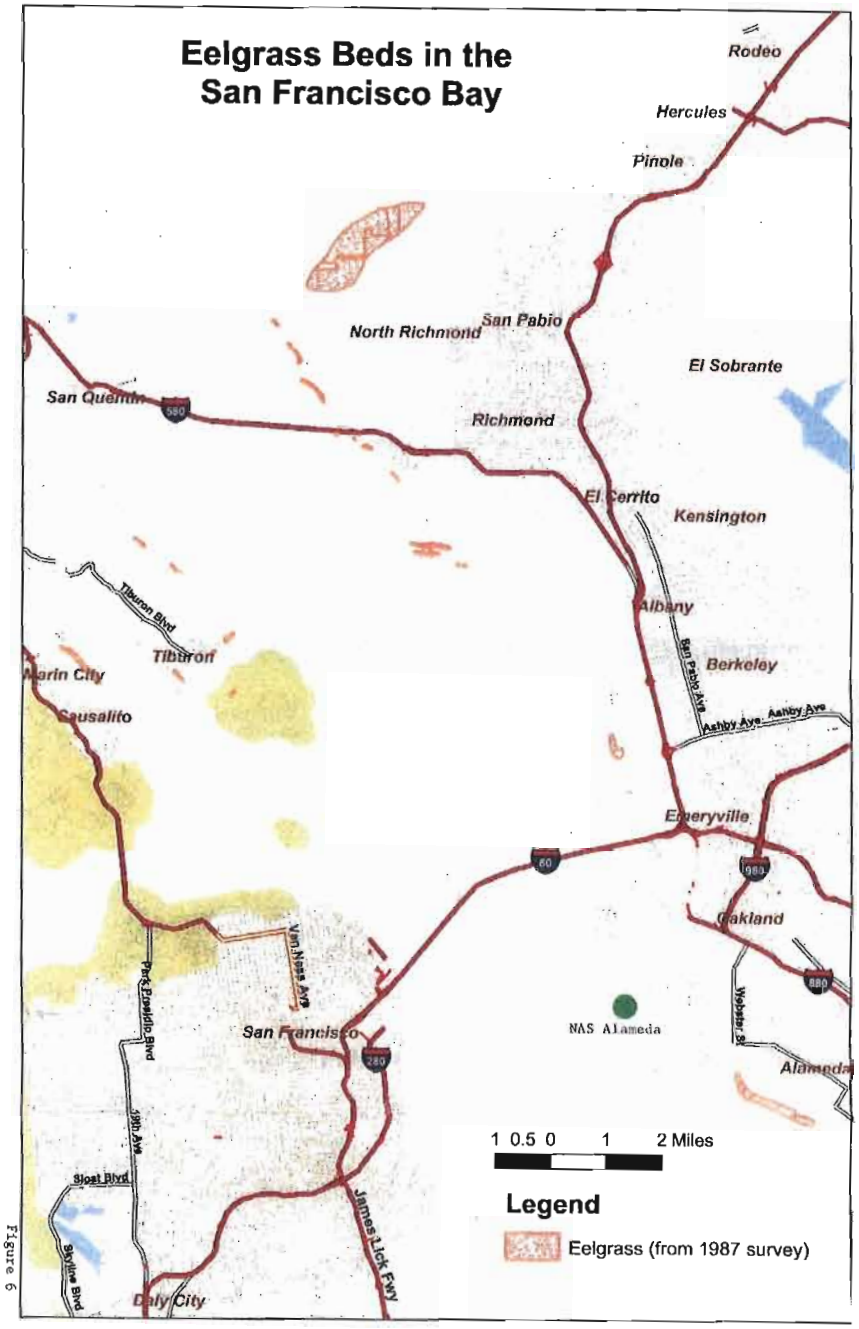

Eelgrass Beds in the
San Francisco Bay
Rodeo
Hercules
Pinole
San Pablo
North Richmond
El Sobrante
San Quentin
580
Richmond
El Cerrito
Kensington
Albany
Tiburon Blvd
Tiburon
Marin City
Berkeley
San Pablo Ave
Sausalito
Ashby Ave
Ashby Ave
Emeryville
80
980
Oakland
Van Ness Ave
Park Presidio Blvd
San Francisco
280
NAS Alameda
880
Webster St
Alameda
19th Ave
Sloat Blvd
Skyline Blvd
James Lick Fwy
Daly City
1 0.5 0 1 2 Miles
Legend
Eelgrass (from 1987 survey)

Figure 6

- the amount of dredging for the East Span Project is small and effects to prey species is anticipated to be correspondingly small;

- avoidance of prey species from project-related pile driving, dredging, and disposal areas;

- limited impact area in relation to known least tern nesting and feeding areas and brown pelican resting and feeding areas;

- transitory use of the project area as feeding habitat by least terns and brown pelicans; and

- temporary nature of pile driving, dredging, and disposal operations.

Water Quality-related Impacts

Project-related Impacts to Least Tern and Brown Pelican

The proposed East Span Project could increase contaminant-related adverse effects to least terns and brown pelicans in several ways. Topsmelt embryos and larvae can be affected by pollution (Singer *et al.* 1990, Anderson *et al.* 1991, Goodman *et al.* 1991, Hemmer *et al.* 1991), and jacksmelt also may be impacted by pollution. Egg shell thinning by brown pelicans has been attributed to high levels of DDT. Sediments within areas of the Bay are known to be contaminated with heavy metals, PCBs, PAHs, and DDT. Increased suspension of contaminated sediments could reduce productivity and the abundance of suitable fish prey for least terns and brown pelicans. Increased levels of petroleum-based pollutants could enter foraging areas with stormwater runoff from development of project areas and contaminate fish prey for least terns. Increased boat and ship activity associated with dredging operations also could increase the risk of spillage events in least tern and brown pelican foraging areas.

Contaminants

In the aquatic environment, most anthropogenic chemicals and waste materials including toxic organic and inorganic chemicals eventually accumulate in the sediment. Contaminated sediments may be directly toxic to aquatic life or can be a source of contaminants for bioaccumulation in the food chain (Ingersoll 1995). Fine sediments in the project dredging areas increase the likelihood of a problem with contaminants, because this fraction consists of particles with relatively large ratios of surface area to volume, which increase the sorptive capacity for contaminants..

Caltrans performed sampling, chemical analyses and acute toxicity bioassays of Bay sediments from the project area to determine the suitability of dredged material for disposal. Chemical analyses were performed for priority pollutant metals; total and

dissolved sulfides; Total Recoverable Petroleum Hydrocarbons (TRPH); phthalate esters; Polynuclear Aromatic Hydrocarbons (PAHs); pesticides; Polychlorinated Biphenyls (PCBs); mono-, di-, tri- and tetrabutyltin and Total Organic Carbon (TOC). Biological analyses were conducted for 96-hour L/SP bioassay, 10-day solid phase bioassay and 28-day bioaccumulation.

The results of these studies showed a general absence of significant contamination, with low or non-detectable concentrations of chemical contaminants of concern except at two groups of dredge sites (USACOE letter dated October 31, 2000).

Material from the upper 12 feet of testing locations SFOBB-N-2 and SFOBB-N-5 is not suitable for unconfined aquatic disposal because test results showed significant solid phase toxicity to Nephtys when compared to the reference sites. However, no amphipods exhibited significant toxicity in these samples. The DMMO agencies noted that it is unusual to find significant solid phase toxicity to Nephtys and a high survival in Ampelisca. They suggested that FHWA/Caltrans might want to consider higher resolution tests to confirm these results (Army Corps letter to Caltrans dated October 31, 2000). FHWA/Caltrans chose to accept the initial results and opt for upland disposal of this material.

Material from the upper 12 feet of Site SFOBB-N-1 is also unsuitable for unconfined aquatic disposal or to wetland surfaces due to excessive bioaccumulation of individual constituents of polynuclear aromatic hydrocarbons (PAHs).

Although the DMMO determined that the majority of dredged material from the project is suitable for unconfined aquatic disposal, contaminants are present. They include oil and grease, TRPH, chlorinated pesticides (DDD, DDE, and DDT[7]), metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc), organotins, and 12 PAHs. Concentrations appear unlikely to result in any acute toxicity to prey species as a result of the temporary resuspension of contaminated sediments during project dredging.

Ammonia and Dissolved Oxygen

Two common by-products produced in anaerobic sediments containing adequate concentrations of organic matter are ammonia and hydrogen sulfide, which are highly toxic and produced by anaerobic aquatic microorganisms. Dillon and Moore (1990) report that ammonia can exert toxicity at relatively low concentrations on fish and other

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[7] These are Persistent Organochlorine Compounds that are pesticides used historically for mosquito abatement and as insecticides; they are no longer commercially manufactured. DDT is gradually metabolized into DDE and DDD. Commercial DDT was a mixture of DDT, DDE and DDD. DDT: dichloro-diphenyl-trichloro-ethane; or (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane). DDE (1,1-dichloro-2,2-bis(chlorophenyl) ethylene); DDD: (1,1-dichloro-2,2-bis(p-chlorophenyl) ethane).

aquatic organisms. The release of ammonia during dredging and the disposal of dredged material could affect aquatic species as it is resuspended in the water column.

Many freshwater sediments, in areas where urban and industrial inputs of organic materials have occurred, contain elevated levels of ammonia. The un-ionized form of ammonia (NH3), which predominates at slightly alkaline conditions, has been shown to be the most toxic form for cold water fish (Burton and MacPherson 1995). Dillon and Moore (1990) conducted a literature review and found that concentrations of un-ionized ammonia reported to be acutely toxic to freshwater fish species range from 0.083 to 4.2 mg/l NH3, and results from chronic studies ranged from 0.0017 to 0.612 mg/l NH3. They cited a study (USACOE 1975) conducted at the SF-11 disposal site that reported ammonia concentrations of 0.05-0.15 mg/l pre-disposal and 0.05-0.3 mg/l post-disposal, both of which fall within the range of both acute and chronic effects to fish. As for the sensitivity of the various fish species tested, salmonids were the most sensitive of the fish species used in studies reviewed by Dillon and Moore (1990). They also found that the few studies conducted on the toxicity of ammonia to salt water species indicate that salt water species are, in general, more sensitive than freshwater species. Dillon and Moore (1990) concluded that the ammonia concentrations reported during a disposal event at the SF-11 site did not appear to represent any potential for toxicity when compared to the acute toxicity concentrations for saltwater organisms published by USEPA (1985), although they did not provide either a list of the organisms or their acute toxicity thresholds. In 2001, the California Regional Water Quality Control Board San Francisco Bay Region (CRWCQB) set a limit on the discharge of ammonia from a wastewater treatment plant in the Central Contra Costa Sanitary District that uses secondary treatment. A discharge cannot cause ambient concentrations of unionized ammonia above an annual median of 0.025 mg/l, as well as limiting the instantaneous maximum to 0.16 mg/l.

For the East Span Project it appears unlikely that acute, short-term effects due to increased levels of ammonia at either the dredge site or the disposal site will occur due to the open environment at the disposal site, and to a slightly lesser extent at the dredge site. Un-ionized form of ammonia has great potential for adversely affecting prey fish species, but the concentrations anticipated at the dredge and disposal sites are unlikely to directly effect prey fish species. Effects, in a similar pattern as is described for turbidity, may occur through behavior modification resulting from avoidance of the increased concentration levels of ammonia near both sites.

A reduction in dissolved oxygen during dredging and disposal of dredged material has also been raised as having possible effects on aquatic organisms. LaSalle (1988) reported that a maximum reduction in dissolved oxygen of about 0.2 mg/l occurs in the vicinity of the dredge. This level of reduction in dissolved oxygen levels during dredging and disposal is not expected to adversely affect least tern and brown pelican fish prey species in San Francisco Bay.

Benthic Resources

Oliver *et al.* (1977) noted two phases of succession in benthic communities after disturbance (such as dredging or burial by disposal of dredged material) In the first phase, opportunistic species, such as polychaetes move into a disturbed area. In the second phase, organisms surrounding the disturbed area re-colonize the affected site. Reilly *et al.* (1992) concluded that dredging-induced habitat alterations are minor compared to the large-scale disturbance of habitat in San Francisco Bay occurring from natural physical forces, such as seasonal and storm-generated waves, although these events would primarily occur in shallow water.

Disposal of dredged material at SF-DODS would cause short-term sediment plumes and impact benthic resources. However, the amounts to be disposed of at this site are well under the 4.8 million cubic yards (3.7 million cubic meters) allowed per year, and would thus not result in impacts inconsistent with the LTMS.

Disposal of dredged material at the SF-11 disposal site would generate similar sediment plumes to those described above. The SF-11 disposal site has been used for decades and has a low biological standing crop of invertebrates. There will be some short-term impact to invertebrate colonies as a result of dredging and disposal, however, rapid recolonization rates indicate that this would be of minimal impact to any fish prey species for least tern or brown pelican. Efforts to limit sediment plumes at the dumpsite would not be required.

Summary

While impacts to least terns and brown pelicans can occur as a result of project-induced modifications in water quality, they are felt to be very minimal due to the following:

- the amount of dredging for the East Span Project is small and effects to prey species, associated with interrelated contaminant issues, is anticipated to be correspondingly small;

- avoidance of prey-fish species from project-related pile driving, dredging, and disposal areas;

- limited impact area in relation to known least tern nesting and feeding areas and brown pelican resting and feeding areas;

- transitory use of the project area as feeding habitat by least terns and brown pelicans; and

- temporary nature of pile driving, dredging, and disposal operations.

Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." For the purposes of this consultation, the action area encompasses central, north, and south San Francisco Bay bounded by the towns of Napa and Sonoma; the Golden Gate Bridge; Hwy 880, Alameda County; and Moffett Field NAS, Santa Clara County.

Non-Federal actions that may affect the action area include voluntary State or private sponsored habitat restoration activities, agricultural practices, water withdrawals and diversions, increased population growth, mining activities, and urbanization. Habitat restoration projects may have short-term negative effects associated with in-water construction work, but these effects are temporary, localized, and the outcome is typically a benefit to these listed species. Farming activities within or adjacent to the action area may have negative effects on San Francisco Bay water quality due to runoff laden with agricultural chemicals. Future urban development and mining operations in the action area may adversely affect water quality and estuarine productivity. Future land conservation and habitat restoration activities expected in the action area, such as those planned by the ongoing CALFED and CVPIA processes, are anticipated to offset some of the adverse effects associated with these non-Federal actions.

The most serious cumulative effect on least terns in the Bay area is the degradation of the Oakland International Airport nesting site as a result of red fox predation over several years. The Service has approached the Port, which has operational responsibility for some activities at the Oakland Airport, about conducting predator management, vegetation removal, and other activities to enhance and sustain least tern nesting activities at the Oakland Airport. However, not all management activities have been fully developed and implemented to provide adequate protection for least terns nesting at the Oakland Airport. Long term loss of the Oakland nesting site would leave only one nesting site in the Bay at NAS Alameda. The current situation with only one viable nesting site in the Bay makes this endangered species highly vulnerable to stochastic extinction in the Bay.

The Service is not aware of any cumulative effects on brown pelicans in the action area.

Conclusion

After reviewing the current status of the least tern and brown pelican; the environmental baseline for the action area; the effects of the proposed action, including proposed conservation measures; and the cumulative effects, it is concluded that the action, as proposed, is not likely to jeopardize the continued existence of endangered California least tern and California brown pelican. No critical habitat has been designated for these species; therefore, none will be adversely modified or destroyed.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife 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. Harass is defined by the Service as actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Harm is defined by the Service to include significant habitat modification or degradation resulting in death or injury to listed species by significantly impairing behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take 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 incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary and must be implemented by the FHWA, or made binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA (1) fails to adhere to the terms and conditions of the incidental take statement, through enforceable terms added to the permit or grant document, as appropriate, or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

It is anticipated that take associated with construction and dismantling of the East Span Project will be in the form of mortality, injury and harassment through temporary and permanent habitat impacts and activities occurring during construction.

Habitat adjacent to both the dredge and disposal sites will be temporarily degraded due to localized turbidity produced by dredge and disposal activities. Foraging behavior of adult least tern and brown pelicans is likely to be disrupted by the plume of turbid water occurring during and immediately following dredging and disposal events. However, these impacts are not expected to result in take of these listed species. Post-breeding adult and fledgling aggregations of least terns are expected to move away from the project area and the NAS Alameda, as is typical for the species, to freshwater, estuarine, and protected shallow marine areas.

The Pile Installation Demonstration Project Immediate Mortality Zone for fish species was approximately 10-12 meters, using the 1700kJ hammer without sound attenuation (Caltrans 2001). Using the Canadian guideline of 4.5 psi (210 dB re: 1 Pa) as a safe level

for fish, the estimated safe range during large hammer pile driving with a bubble curtain on the East Span Project would be 144 feet (44 meters), assuming a 10 dB reduction in sound pressure levels (Greene 2001). Since limited information exists for bird species feeding underwater adjacent to such operations, in a worse-case scenario, it is assumed the estimated safe range during large hammer pile driving with a bubble curtain for least tern and brown pelican is the same. However, project-related pile driving impacts are not expected to result in take of these listed species, either as adult least terns and brown pelicans foraging near the project site, or as nestling least terns impacted by the loss or incapacitation of either or both parents.

We anticipate the proposed actions could result in harm of least terns throughout the life of the project. However, no direct loss of least tern nesting habitat is anticipated for the proposed action. The number of least tern adults that could be injured or killed can not be accurately estimated but is expected to be at most a very few individuals, given their transitory feeding nature, avoidance of human activity and noise, difficulty feeding in turbid water, and the placement and operation of the bubble curtain. We anticipate the proposed project would increase the probability or likelihood of harm to 2 least terns, resulting from adverse effects of project-related pile driving, dredging, and disposal operations. Additionally, we feel there is no risk of a population level effect.

As a result of project-related activities, about 20 acres (3.6 acres of eelgrass, 4.99 acres of intertidal sand flats, additional approx. 12 acres of dredge/disposal impacted areas) of least tern foraging habitat would be temporarily impacted at any one time during project-related operations. We anticipate the proposed East Span Project would increase the probability or likelihood of harassment to as many as 244 least tern breeding pairs and/or their eggs and/or chicks in any given year (estimated colony population at NAS Alameda).

This amount of incidental take could be greater in any given year if the number of breeding pairs at the colony site increases. It is difficult to quantify the incremental increase in mortality of least tern adults and/or their eggs and/or chicks from the proposed project, however, we anticipate that: (1) the fledgling-to-pair ratio in any given year would not be lower than 0.7, or (2) the average fledgling-to-pair ratio during any consecutive 3-year time span would not be lower than 1.1. Environmental conditions beyond agency control may affect the fledgling-to-pair ratio. For example, in the El Niño year of 1998, the ratio was 0.37. The Service will consider environmental conditions and the fledgling success of other nearby tern colonies (least terns and other species) when evaluating the responsibility of FHWA for any failure of the NAS Alameda least tern colony to meet these criteria.

We anticipate the proposed actions could result in harm of brown pelican throughout the life of the project, as well. The number of brown pelican adults that could be injured or killed can not be accurately estimated but is expected to be at most a very few individuals, given their transitory feeding nature, avoidance of human activity and noise,

difficulty feeding in turbid water, and the placement and operation of the bubble curtain. No direct loss of brown pelican nighttime roosting habitat is anticipated. While it is difficult to quantify the amount of incidental take associated with the proposed action, we anticipate harm to 2 brown pelicans could result from adverse effects of project-related pile driving, dredging, and disposal operations. Additionally, we feel there is no risk of a population level effect.

The same 20 acres identified of foraging habitat for least tern would be temporarily impacted for brown pelicans at any one time during project-related operations. Therefore, we anticipate the proposed East Span Project would increase the probability or likelihood of harassment to as many as 1,000 brown pelicans (maximum known roosting population at Breakwater Island just south of the western end of NAS Alameda, July 1997).

Effect of the Take

In the accompanying Biological Opinion, the Service has determined the anticipated level of take associated with the proposed action is not likely to jeopardize the continued existence of the endangered California least tern and endangered California brown pelican.

Reasonable and Prudent Measure

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of the least tern and brown pelican.

> The potential for harassment, harm, or mortality to least terns and brown pelicans shall be minimized.

Terms and Conditions

To be exempt from prohibitions of section 9 of the Act, FHWA must comply with the following terms and conditions. These terms and conditions are nondiscretionary, and implement the reasonable and prudent measure described above:

> FHWA shall ensure the project is implemented as proposed, including the proposed biological conservation measures, except for the following additions, modifications, or clarifications:

a. A Service-approved Monitoring Plan shall be developed for any project-related restoration project(s), including success criteria and contingency measures in the event success is not achieved.

b. The Service shall approve any mitigation actions to ensure that adequate compensation of habitat value is provided for listed species.

Consultation Reporting Requirements

The Service shall be notified within twenty-four (24) hours of the finding of any injured or dead least terns or their eggs, or brown pelicans, or any unanticipated damage to least tern and brown pelican habitat associated with the proposed projects. Notification must include the date, time, and precise location of the specimen/incident, and any other pertinent information. The Service contact person in this Office's Endangered Species Division is Jan Knight (telephone 916/414-6600). Any dead or injured specimens shall be reposited with the Service's Division of Law Enforcement, 2800 Cottage Way, Suite W-2605, Sacramento, California 95825-1846 (telephone 916/414-6660).

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities intended to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service proposes the following conservation recommendations:

1 Study foraging use by least terns in the newly created or restored habitats within the Bay area and determine its ecological significance to supporting the least tern.

2. Study eelgrass habitat in the Bay area to determine its ecological significance and potential for restoration.

3 Assess the functional value of newly created or restored habitat in the Bay area for least terns.

4. Identify potential sources of contamination that could adversely affect successful foraging by least terns in newly created or restored foraging habitats in the Bay area .

5 Identify public use activities along the perimeter and within open water areas of any newly created habitat if it provides foraging or roosting habitats for least terns.

6. Fully consider inclusion of restoration and enhancement measures at the 3,298 acre Skagg's Island parcel in San Pablo Bay for provision of offsite and out-of-kind project-related compensation. Skagg's Island restoration would help tidal circulation to this San Pablo Bay wetland system, result in increased populations of

estuarine fishes[8], and potentially improve long-term feeding conditions for both the least tern and brown pelican.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation and conference on the proposed action outlined in your October 11, 2001, request for formal consultation. As provided in 50 CFR section 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, as previously described; (2) new information reveals that the actions may affect listed species or critical habitat in a manner not considered in this opinion; (3) the agency action is substantially modified in a manner that causes an effect to listed species not considered in this opinion; or (4) a new species is listed or critical habitat is 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 any questions regarding this Biological Opinion, please contact Michael Hoover or Dan Buford at (916) 414-6600.

Sincerely,

for Cay C. Goude
Acting Field Supervisor

Enclosures

cc:
SFBNWRC, Newark, CA (M. Kolar)
EPA (Wetlands Section), San Francisco, CA
CDFG, Region III, Yountville, CA
CDFG, Environmental Services, Sacramento, CA
RWQCB, Oakland, CA
NMFS, Napa, CA
Caltrans, Sacramento, CA

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[8] Fishes associated with estuarine habitats historically provided food for nesting least terns and are known to be essential to current post-fledgling feeding after adult and young birds leave the nest.

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PERSONAL COMMUNICATIONS

Dr. Carolee Caffrey, Adjunct Assistant Professor, Department of Zoology, 430 Life Sciences West, Oklahoma State University, Still water, Oklahoma 74075

Ms. Laura Collins, Naval Air Station Least Tern Colony Site Monitor, 1517 Waals Street, Berkeley, California 94703

Ms. Kathy Hieb, California Department of Fish and Game, Stockton, California

Mr. Ken Sanchez, Sacramento Fish and Wildlife Office, U. S. Fish and Wildlife Service, Sacramento, California

Mr. John Turman, District Supervisor, U.S. Department of Agriculture Wildlife Services, San Diego, California

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

OCT 30 2001

In reply please refer to
151422-SWR99-SR-190:GRS

Michael G. Ritchie, Division Administrator
U.S. Department of Transportation
Federal Highway Administration, California Division
980 Ninth St., Suite 400
Sacramento, California 95814-2724

Dear Mr. Ritchie:

This document transmits the National Marine Fisheries Service's (NMFS) biological opinion regarding the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (East Span Project). In response to your September 12, 2001, letter requesting reinitiation of Section 7 consultation and Essential Fish Habitat consultation, NMFS has examined the effects of the East Span Project on threatened Central California Coast steelhead, threatened Central Valley steelhead, threatened Central Valley spring-run chinook, endangered Sacramento River winter-run chinook, threatened Central California Coast coho salmon and on designated critical habitat for these species, in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (ESA). This document also transmits NMFS' Essential Fish Habitat (EFH) Conservation Recommendations for Pacific Coast Salmon as required by the Magnunson-Stevens Fishery Conservation and Management Act (MSFCMA) as amended (16 U.S.C. 1801 et seq.).

It is our finding in the enclosed biological opinion that the East Span Project is not likely to jeopardize the continued existence of listed anadromous salmonids, or result in the destruction or adverse modification of designated critical habitat for these species. However, NMFS has determined that some adult and juvenile listed anadromous salmonids are likely to be killed and injured during construction activities. Sound pressure waves generated by the driving of large diameter steel piles are expected to result in the immediate mortality of fish in close proximity to the pile being driven. Application of a bubble curtain to attenuate sound is expected to restrict this area of direct mortality to a radius of approximately 69 meters and the proposed monitoring program will allow for confirmation of the bubble curtain's effectiveness. Additional adverse effects associated with project construction include injury, stress, and displacement during construction activities.

The enclosed biological opinion evaluates these potential impacts. Because NMFS anticipates that incidental take will occur, an Incidental Take Statement is attached to the biological opinion.

The Incidental Take Statement presents several nondiscretionary Reasonable and Prudent Measures necessary to avoid and minimize anticipated incidental take of listed anadromous salmonids.

Regarding EFH for Federally managed fish species, NMFS provided Federal Highways Administration (FHWA) with EFH Conservation Recommendations for the East Span Project on September 23, 1999. FHWA provided NMFS with a preliminary response to these Conservation Recommendations on October 13, 1999, and final response was provided on June 12, 2001. Based on FHWA's responses, NMFS continues to believe the project will have an adverse habitat impact. Therefore, this document transmits several revised EFH Conservation Recommendations. FHWA has a statutory requirement under section 305(b)(4)(B) of the MSFCMA to submit a detailed response in writing to NMFS that includes a description of measures proposed for avoiding, mitigating, or offsetting the impact of the activity on EFH, as required by section 305(b)(4)(B) of the MSFCMA and 50 CFR 600.920(j) within 30 days. If unable to complete a final response within this time limit, an interim written response should be provided to NMFS within 30 days. A detailed response should follow.

In closing, I would like to thank and commend staff with FHWA and the California Department of Transportation for their assistance and prompt response with information during this consultation.

If you have questions regarding this consultation or the enclosed draft biological opinion, please contact Mr. Gary Stern at (707) 575-6060 or Mr. Patrick Rutten at (707) 575-6059.

Sincerely,

for Rodney R. McInnis
Acting Regional Administrator

cc: Jim Lecky, NMFS Long Beach

With Enclosures:
Biological Opinion
Essential Fish Habitat Conservation Recommendations

Enclosure 1

Endangered Species Act
Section 7 Consultation

BIOLOGICAL OPINION

San Francisco-Oakland Bay Bridge
East Span Seismic Safety Project

Agency:	Federal Highway Administration, California Division – Sacramento
Consultation Conducted By:	National Marine Fisheries Service, Southwest Region, Santa Rosa, California
Date Issued:	
Refer to:	151422-SWR99-SR-190

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I. Consultation History

This document transmits the National Marine Fisheries Service's (NMFS) biological opinion for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (East Span Project). The U.S. Department of Transportation, Federal Highways Administration (FHWA) in coordination with the California Department of Transportation (Caltrans) proposes to construct a new bridge approximately 2.18 miles (3.5 kilometers) long, to the north of the existing East Span, because the existing bridge does not meet lifeline[1] criteria for providing emergency relief access following a maximum credible earthquake (MCE). An MCE is the largest earthquake reasonably capable of occurring based on current geological knowledge. NMFS has analyzed the effects of the proposed construction of the East Span Project on Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, Central California Coast steelhead, and Central California Coast coho salmon, and the critical habitat designated for these species, in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*).

This biological opinion is based primarily on information provided in the following documents:

- Natural Environment Study for the San Francisco - Oakland Bay Bridge, East Span Project. September 1998;
- Dredge Material Management Plan for the San Francisco - Oakland Bay Bridge, East Span Project. June 1999;
- Biological Assessment for the San Francisco - Oakland Bay Bridge, East Span Project. June 1999;
- Sediment Sampling and Analysis Report for the San Francisco - Oakland Bay Bridge, East Span Project. June 2000;
- Final Environmental Impact Statement/Statutory Exemption and Final Section 4(f) Evaluation for the San Francisco - Oakland Bay Bridge, East Span Project. May 8, 2001;
- Noise and Vibration Measurements associated with the Pile Installation Demonstration Project for the San Francisco - Oakland Bay Bridge, East Span Project. June 30, 2001;
- Fisheries Assessment, Pile Installation Demonstration Project for the San Francisco -

[1]Lifelines in this context are systems and facilities critical to emergency response and recovery after a natural disaster, including hospitals, fire control and policing, food distribution, communication, electric power, liquid fuel, natural gas, transportation (airports, highways, ports, rail, and transit), water and wastewater. In the case of the East Span, a lifeline connection would provide for post-earthquake relief access linking major population centers, emergency relief routes, emergency supply and staging centers, and intermodal links to major distribution centers. The East Span would be serviceable soon after a maximum credible earthquake.

Oakland Bay Bridge, East Span Project. August 2001;

- Updated biological assessment and additional materials to support the NMFS biological opinion provided to NMFS on October 4, 2001;

- US Army Corps of Engineers, Public Notice No. 23013S, dated October 12, 2001.

- FHWA letter of October 18, 2001, to NMFS with additional information regarding the proposed fisheries mitigation measures.

By letter dated August 26, 1997, NMFS provided Caltrans with a list of threatened or endangered species or critical habitat that may be affected by the East Span Project.

A draft biological assessment for the East Span Project was provided to NMFS for review in January 1999, and NMFS provided written comments on this draft by letter dated January 20, 1999.

On July 15, 1999, FHWA transmitted the project's biological assessment and Memorandum of Conceptual Mitigation for the East Span Project to NMFS. Appendix F of the biological assessment contains the Essential Fish Habitat Assessment in compliance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA).

By letter dated July 29, 1999, Caltrans requested NMFS' comments on the proposed Pile Installation Demonstration Project (PIDP) for the East Span Project. The PIDP was a scientific investigation involving the driving of three large piles as part of the geotechnical testing program for the East Span Project. Caltrans specifically requested NMFS comments on the need for section 7 consultation associated with the potential impacts of the PIDP.

On September 23, 1999, NMFS provided FHWA with a written determination that the East Span Project as presented in the biological assessment was not likely to adversely affect threatened or endangered anadromous salmonids or designated critical habitat. This determination was based primarily on the use of noise attenuation devices if pile driving occurs between January 1 and May 31.

On May 26, 2000, FHWA requested informal consultation on the implementation of the PIDP in central San Francisco Bay, east of Yerba Buena Island, in June or July 2000. By letter dated July 26, 2000, NMFS concurred with FHWA that the PIDP was not likely to adversely affect listed anadromous salmonids or their designated critical habitat.

On September 14, 2000, FHWA requested NMFS concurrence with conducting the PIDP during fall of 2000, because the demonstration project was not conducted as planned during the summer of 2000. By letter dated September 25, 2000, NMFS concurred with FHWA that the implementation of the PIDP during the fall of 2000 was not likely to adversely affect listed

anadromous salmonids or critical habitat.

On March 21, 2001, Caltrans requested NMFS provide an updated listed of threatened or endangered species that may be affected by the East Span Project. NMFS responded in writing to Caltrans on March 22, 2001 with an updated species list.

On August 8, 2001, NMFS provided written comments to FHWA regarding the draft Fisheries Impact Assessment for the PIDP. Based on the study results presented in the draft PIDP document and the companion report on noise and vibration measurements, NMFS questioned some of the document's findings and requested additional information in several areas.

On September 12, 2001, FHWA requested reinitiation of section 7 consultation for the East Span Project. Reinitiation was requested to address the elimination of seasonal restrictions on pile driving activities and the new information gathered during the PIDP regarding potential fisheries impacts.

An updated biological assessment and materials in support of the NMFS biological opinion were provided by FHWA and Caltrans on October 4, 2001.

Additional information regarding the proposed fisheries mitigation measures was provided by FHWA to NMFS by letter dated October 18, 2001.

Several meetings, telephone conference calls, and electronic mail communications were exchanged during September and October 2001 regarding the proposed fisheries mitigation measures, off-site mitigation opportunities, and assessment of potential impacts associated with sound pressure waves during pile installations.

A complete administrative record of this consultation is on file in the NMFS Santa Rosa Area Office, Santa Rosa, California (Administrative Record #151422SWR99SR190).

II. Description of the Proposed Action

The San Francisco-Oakland Bay Bridge is an important transportation component of the Bay Area that provides regional access between the San Francisco Peninsula and the East Bay. An average of 272,000 vehicles currently use the bridge each day. As part of Interstate 80, it is also a critical link in the interstate highway network. The existing East Span is not expected to withstand a maximum credible earthquake (MCE) on the San Andreas or Hayward fault. The existing East Span does not meet lifeline criteria for providing emergency relief access following an MCE and it does not meet all current operations and safety design standards.

The East Span Project site, including the area around the bridge piers and the area necessary to accommodate construction-related equipment such as work barges and cranes, is located in San

Francisco Bay, between Yerba Buena Island (YBI) and Oakland. The project limits, as defined by Caltrans, is the eastern portal of the YBI tunnel located in San Francisco as the western project limit and the eastern project limit is located approximately 400 meters (m) west of the Bay Bridge toll plaza on a spit of land referred to as the Oakland Touchdown area in the City of Oakland. The new bridge will be constructed north of the existing East Span and will be approximately 2.18 miles (3.5 kilometers) in length and 70 meters in width, including a 15.3-meter minimum space between the eastbound and westbound bridge decks.

A. Project Overview

Construction of the new bridge is to be divided among four separate contracts: (1) Self-Anchored Suspension/Yerba Buena Island (SAS/YBI) Main Span; (2) Skyway, (3) Oakland Approach Structures, and (4) Geofill at the Oakland Touchdown. A separate demolition contract will be used to remove the existing bridge. The East Span Project is expect to be completed within seven years. Construction is scheduled to begin in early 2002 and end in early 2009. The specific construction schedule will be determined by the contractor.

The project description presented below focuses on construction activities at or below the water line. Additional information can be found in the May 8, 2001 Final Environmental Impact Statement, Replacement Alternative N-6.

1. Self-Anchored Suspension Main Span

The main span between YBI and the Skyway will be a self-anchored suspension design. The main tower would be set offshore from YBI at a water depth of 18 meters. Bay bottom sediments at the main tower foundation will be removed by dredging to expose the sloping bedrock. Holes would be drilled into bedrock, hollow steel pipe piles 2.5 m in diameter inserted, and a pre-fabricated steel box with concrete cover will be sunk onto the piles. A large hammer at low energy would likely be used for socketing of the large piles. The piles would be filled with concrete and welded to the pile cap. Because the bedrock at the main tower location is sloping, the contractor may choose to create a bench by mechanically breaking or excavating rock to create a level surface. The contractor may use a cofferdam for construction of the main tower foundation, but this is unlikely due to water depths and the geology at this location.

A temporary pile-supported dock for barges would be constructed at YBI for construction-related activities such as delivery of materials. Piles for the dock would likely be 18, 24, or 36 inches (46, 61, or 91 centimeters) in diameter and fabricated of steel, concrete, or timber.
Pier E2 of the main span will be constructed with hollow steel pipes driven into the bay strata with a pre-fabricated steel box and concrete cover sunk onto the piles. The piles will be filled halfway with concrete and welded to the pile cap. All sediments within the piles resulting from pile driving would be removed, placed on a barge for transport, and disposed of.

2. Skyway

The skyway will be a segmentally constructed, prestressed concrete box-girder. A temporary access trestle may be utilized to build portions of the skyway and allow for the delivery of materials, equipment, and work crews. The trestle for the skyway would be approximately 7,000 square meters. Barges may support the heavier equipment. Steel, concrete, or timber piles of 18, 24, or 36 inches (46, 61, or 91 centimeters) in diameter will be used to support the trestle.

Construction of the permanent skyway piles and the pile caps would be similar to construction of Pier E2 on the main span. All sediments within the piles resulting from pile driving would be removed, placed on a barge for transport, and disposed of. Cofferdams may or may not be used by the contractor. If cofferdams are installed, sediment will be excavated and the cofferdam dewatered. The steel pipe piles would be driven, either before or after dewatering, to the Alameda geologic formation. A steel box pile cap would be lowered onto the piles and welded to them. If necessary, the piles would be emptied of bay sediments, then the piles and pile caps would be filled with reinforced concrete.

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

3. Oakland Approach Structures

The Oakland approach structures would include a cast-in-place, prestressed, concrete box-girder supported by a cast-in-place, reinforced, concrete substructure. Falsework for the structures would be supported by temporary piles. A temporary access trestle would be utilized to facilitate construction and would be approximately 14,000 square meters. Piles would support the trestle. Piles would likely be 18, 24, or 36 inches (46, 61, or 91 centimeters) in diameter and fabricated of steel, concrete, or timber.

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

4. Geofill at Oakland Touchdown

At the Oakland Touchdown area, a portion of the new westbound roadway and the relocated maintenance road would encroach into the Bay. Engineered fill and surcharge in the Bay and upland areas are proposed for this location. For construction of the westbound roadway, 1,970 linear feet of geotube (approximately 0.5 acre) would be placed in the tidal area north of the Oakland touchdown. A geotube is large diameter tube of permeable geotextile fabric in to which sand and water would be pumped. When the tube is filled, it will act as a tidal barrier to protect

the work area. Within the area protected by the geotube (approximately 2.63 acres) the existing soils will be excavated to an elevation of approximately 0.8 m below mean sea level (MSL). Wick drains and vertical drains will be installed to facilitate consolidation of the underlying Bay mud and prevent liquefaction of the overlying sand. The drains will be covered with a layer of gravel upon which clean fill material will be placed.

B. Pile Driving

Current plans anticipate driving a total of 259 in-bay large diameter steel pipe piles. Of these, 189 piles will be 2.5 meters in diameter and 70 piles will be 1.8 meters in diameter. A template, founded on temporary piles fabricated of steel, concrete, or timber approximately 18 to 24 inches (46 to 61 centimeters) in diameter, may be used by the contractor to assist in accurate driving of the large piles.

Each large diameter pile is expected to consist of two or more segments; the first segment will be driven to the water line, then the next segment(s) will be welded on and driven in succession until the pile is driven to its final or "tip" elevation. However, the contractor could choose to drive the piles in one piece. Some piles will be battered, meaning that they will be driven in at an angle, essentially splaying out from the pier to provide additional stability. The rest would be vertical piles. The larger piles which support the skyway and main span sections of the replacement bridge will be driven to depths ranging from about 66 to 108 meters below MSL. The smaller diameter piles which support the Oakland Touchdown structures will be driven to tip elevations ranging from about 41 to 65 meters below MSL.

The three large steel piles used in the November 2000 PIDP each required approximately five hours total driving time to reach the specified tip elevation. Based on this experience, it is expected that the 259 in-bay piles could require about 1,300 hours of total pile driving time. However, the contractor will be allowed to drive simultaneously at multiple locations. Furthermore, it is possible that all three contractors (the contractor for the SAS-YBI portion, the contractor for the skyway, and the contractor for the Oakland approach structures) would drive piles simultaneously. Pile driving will be allowed from 7:00 AM to 8:00 PM, seven days a week. Pile driving that is underway at 8:00 PM will continue until driving of that pile segment is complete.

In a typical pile driving scenario, the first pile segment would require about 1 hour of driving time. The next segment would then be welded to the driven segment. This process takes 2 to 3 days. After welding is complete, 3 to 4 hours would be required to drive the pile to tip elevation. The actual time will depend on local substrate conditions.

To construct all permanent structures, contractors will install piles to found temporary structures, supports, falsework, docks and construction trestles. These temporary structures, designed by the contractor, are required to facilitate construction and support the permanent structures until they are self-supporting. Since the temporary structures will be contractor designed, their exact nature

(size, type, number of piles, etc.) will not be known until construction begins. Conservative estimates have been developed by Caltrans, where it is possible to estimate the size of contractor-designed structural and support elements. While the number of piles placed to found the structures will be large, it is expected that they will be of a considerably smaller size than the permanent structures, since they are temporary and are not designed for traffic or seismic loading. When they are no longer needed, temporary piles will be retrieved or cut off 1.5 feet (0.46 meters) below the mudline. An estimate of the likely maximum, median, and minimum number of piles for each temporary project structure is presented below.

Location	Maximum no. of piles	Median no. of piles	Minimum no. of piles
Skyway Trestle	600	400	300
Oakland Trestle	1200	800	600
YBI Dock	180	120	90
SAS Trestle	80	60	40

In-bay pile driving of the large diameter steel piles may require hammer energy levels up to 1,700 kJ. Placement of smaller piles for support of trestles, falsework and pile driving templates is expected to require less hammer energy, probably on the order of 100 kJ or less. However, depending on the size of the pile, the equipment available at the time of construction, and the geology, up to 200 kJ may be required. This is an order of magnitude of energy less than that necessary to drive the large diameter piles. Hammers delivering up to 200 kJ of energy are commonly used for marine and near-shore construction around the bay.

To attenuate the effects of sound pressure waves on fish, a bubble curtain system will be required for driving of all permanent in-water piles. A continuous stream of air bubbles will enclose all permanent in-water piles/pile groups during the pile driving process.[2] Contractor specifications will stipulate the positioning, configuration, operation and removal of the bubble curtain system. The bubble curtain system will consist of air compressors, air supply lines, distribution manifolds, and aeration pipelines.

The aeration pipe will be perforated pipe configured into concentric rings spaced no more than five (5) vertical meters (m) apart at all tide conditions. The lowest aeration pipeline layer will be designed to ensure contact with the mud line without sinking into bay mud. The bubble curtain system will be constructed on a frame designed to keep the aeration pipelines stable (horizontal) and to provide enough ballast to counteract any inherent buoyancy of the system during operation. When installed, the bubble curtain system must be configured such that the aeration pipelines completely enclose the pile/pile group at a minimum distance of two (2) meters.

Each aeration pipeline will have four adjacent rows of approximately 1.6 mm diameter air holes

[2]Unless other equally effective methods such as cofferdams are used, or as otherwise directed by Caltrans for the purpose of collecting performance data.

spaced approximately 20 mm apart. The bubble curtain system will provide a bubble flux of three (3.0) cubic meters per minute, per linear meter (32 cubic feet per minute, per linear foot) of pipeline in each concentric ring. Valves and gauges to measure air pressure and flow rates will be installed in the main air supply lines and at critical branch locations and shall be accurate to +/- 2 percent. All gauges shall be installed to be accessible to Caltrans inspectors. The contractor will keep a log and graphic plot of all gauge readings, with data logged during every 30 minutes of operation. If the reading of any gauge drops below 10 percent of normal operation, pile driving will stop until the defect is repaired to the satisfaction of Caltrans' Engineer.

The contractor must submit a bubble curtain system design and supporting calculations for Caltrans' review within two (2) months of receiving notice to proceed on the project. Caltrans will comment on the system within one (1) month and the contractor shall respond within two (2) weeks of Caltrans comments. The contractor will be required to demonstrate the operation of the bubble curtain system during the re-strike of the PIDP piles. The contractor will ensure that bubble "drift" at maximum tidal flux or current does not compromise the integrity of the continuous bubble curtain. The pile-driving barge will also be isolated so that noise from the pile installation is not transmitted through the barge into the water-column.

To monitor the performance of the bubble curtain and assess the level of impact to fisheries, a number of investigations will be performed in the vicinity of pile driving operations. It is anticipated the fisheries monitoring program will be similar to the PIDP including (1) observations on predation by gulls and other birds, (2) examination of injured fish collected from the water, and (3) experiments using fish in cages at different distances. This fisheries program will be designed to document near-term fish mortalities and the likelihood of delayed mortality of differing sizes and species of fish that have swim bladders. In addition to the biological monitoring, measurements of sound pressure and other parameters will be monitored. The specific monitoring plan will be developed by FHWA and Caltrans for review and approval by NMFS and California Department of Fish and Game (DFG). It is estimated that fisheries monitoring will cost approximately $500,000.

C. Dredging

Near the Oakland shore, dredging is required for barge access, foundation construction, and pile cap construction. The barge access channel would be on the north side of the replacement bridge. The anticipated maximum draft for the barges is 10 feet (3 meters), but to ensure adequate clearance over potential irregularities in channel depth, barge listing during heavy lifting, and to allow for some potential resettlement of materials in the channel after dredging, the channels would be dredged to a depth of 12 feet (3.6 meters) adjacent to the Oakland Touchdown and 14 feet (4.3 meters) for the rest of the channel. Barge anchor lines would be moved into position from smaller boats as opposed to the primary barge(s) to prevent the dragging of anchors into position, and barge anchor lines would be kept taut as the tide and levels change in order to minimize contact between the lines and the bay bottom. It is anticipated that 216,230 cubic yards of material will be dredged to create the barge access channel. This material will be disposed of

at the deep ocean disposal site (SF-DODS), approximately 50 nautical miles west of the Golden Gate Bridge.

Additional dredging and excavation will be required for the installation of piers, footings and foundation for the new bridge. A hydraulic or mechanical dredge may be used. It is anticipated that 187,087 cubic yards of material will be dredged to construct new piers and footings. This material will be disposed of at the Alcatraz Island site (SF-11).

Dredging will also be required to create a barge access channel to dismantle the existing bridge and to remove piers from the existing bridge. It is anticipated that 190,680 cubic yards of material will be dredged to create the barge access channel for dismantling the existing bridge. This material will be disposed of at the deep ocean disposal site (SF-DODS), at an upland wetland reuse site, or at a landfill reuse site. For removal of the existing piers, it is anticipated that 22,724 cubic yards of material will be dredged. This material will be disposed of at the Alcatraz Island site (SF-11).

Additional information on East Span Project dredging, disposal, impacts and mitigation measures is presented in the Dredged Material Management Plan (DMMP), included as Appendix M of the FEIS. Updated dredge volume estimates, areas to be dredged and material classifications are contained in letters from Caltrans (June 19, 2001 and August 15, 2001) to the Dredge Materials Management Office (DMMO) and from FHWA (June 12, 2001) to NMFS.

D. Dismantling of the Existing Bridge

Once the construction of the East Span is completed and put into service, the dismantling of the existing bridge structure would begin. An access channel will be constructed just south of the existing structure through dredging. Dismantling activities would consist of seven major stages, which represent major components of the existing bridge and construction-related structures.

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

Substructure elements could be lifted from their bases in one piece or piece-by-piece. Dismantling of concrete foundations would require reducing the reinforced concrete to pieces small enough to be hauled away, which could be done by mechanical means such as saw cutting, flame cutting, mechanical splitting, or pulverizing and hydro-cutting. The hollow interiors of the

piles remaining below the mudline could also be used as receptacles for pieces of concrete as the pier above is dismantled. This method would substantially reduce the quantity of material requiring transport and disposal and would lower dismantling costs. The piles remaining below the mudline could be capped or would gradually fill in through siltation. Any reinforcing steel would be cut off to be flush with the face of the concrete that remains below the mudline. Removal of the piles to 1.5 feet (0.46 meter) below the mudline could be completed by an underwater dismantling method or by constructing cofferdams at each pier. The use of cofferdams at YBI would depend on methods selected by the contractor; however, their use is assumed for purposes of estimating dredged quantities generated by existing bridge removal.

E. Mitigation

To mitigate impacts to special aquatic sites in the intertidal areas just to the north of the Oakland Touchdown, both on-site and off-site mitigation is proposed. Caltrans initially proposed on-site mitigation through the creation of new eelgrass beds at the Oakland Touchdown area and at Clipper Cover on Yerba Buena Island. This would have been accomplished by placing sand-filled plateaus to raise elevations of the Bay bottom to a level suitable to support eelgrass and then planting the area with eelgrass from a donor site. However, the policies of some resource and bay planning agencies prevent the creation of new habitat in the Bay using fill material. Caltrans has dropped this proposal for the creation of new eelgrass beds at the Oakland Touchdown site.

Caltrans' current proposal for on-site mitigation is the restoration of eelgrass habitat. This approach is distinct from the creation of new eelgrass habitat in that it focuses on restoring areas that are historically known to have supported eelgrass habitat. The proposed restoration would maximize the potential for planting success by incorporating site manipulation, monitoring and data collection. The proposed on-site mitigation includes:

- Harvesting approximately 0.55 acres (0.22 hectares) of eelgrass from the footprint of the barge access channel prior to dredging, planting test plots in adjacent eelgrass beds and monitoring to evaluate performance;
- Restoring up to 1.73 acres (0.70 hectares) of the barge access channel to its pre-construction bathymetry. Dredged material and excavated sand would be used to facilitate eelgrass colonization and the area would be replanted with eelgrass from an adjacent donor site;
- Restoring approximately 1.70 acres (0.69 hectares) of sand flats that are temporarily affected by the placement of a geotube or mud boils from engineered fill;
- Constructing rock slope protection to allow sand to accrete over the rock areas subject to tidal action. Slope gradients would be 1(V):3(H) at the toe of the slope and transition to a 1(V):2(H) gradient at mid-slope; and
- Capping rock slope protection areas with soil above the limits of tidal action to provide a medium to support growth of native upland plants and provide a more natural upland transition than the existing abrupt slope provides.

Caltrans will provide additional mitigation for the Project's direct impacts at off-site locations. Caltrans will provide $10.5 million in funds to be divided between the following:

a. Provide 2.5 million in funding to the East Bay Regional Park District (EBRPD) to restore, enhance or create new aquatic habitat and transitional uplands at the Eastshore State Park and within Central San Francisco Bay. Potential mitigation sites include:

    - Radio Beach Area-potential shoreline restoration including intertidal habitat and upland transition zones;
    - Brickyard Cove Area-potential shoreline restoration including intertidal habitat, the removal of riprap and upland transition zones;
    - Albany Beach Area-potential beach restoration/nourishment including the removal of parking areas; and,
    - Hoffman Marsh Area – potential tidal marsh restoration including the removal of fill and improving tidal action and water circulation.

b. Provide 8 million in funding to the United States Fish and Wildlife Service (USFWS) to acquire, cleanup contaminants, and initiate restoration of approximately 3,000 acres of diked historic baylands at Skaggs Island, Sonoma County, to tidal wetlands.

When specific information become available for these off-site mitigation actions, project-level environmental review and permitting will occur. It is anticipated that separate section 7 consultations will occur with the appropriate Federal action agency concurrent with the project-level environmental review.

An additional fund of $4 million will be established by Caltrans for the restoration of federal- and State-listed salmonid habitat in the central and south Bay. This restoration fund will be utilized for off-site, out-of-kind mitigation to offset construction related injury and mortality of listed salmonids associated with the East Span Project. The restoration fund will be used solely for anadromous salmonid restoration projects in San Francisco Bay tributaries, and is expected to provide a positive benefit to steelhead. Prior to December 31, 2003, funds totaling $4 million will be placed into an escrow account by Caltrans and expenditures from the account will be made at the discretion of NMFS and DFG, in consultation with Caltrans and FHWA. A portion of this fund, not to exceed $500,000, will be made available by Caltrans prior to the initiation of construction activities on the East Span Project for monitoring fisheries impacts, sound pressure levels and other environmental conditions associated with pile driving. Funds not used for monitoring will be applied to the steelhead habitat restoration fund.

III. Status of the Species and Critical Habitat

This biological opinion analyzes the effects of the East Span Project on Central California Coast coho salmon, Central Valley spring-run chinook salmon, Sacramento River winter-run chinook salmon, Central Valley steelhead, Central California Coast steelhead and their designated critical habitats.

A. Listing Status

Central California Coast coho salmon (*Oncorhynchus kisutch*) are listed as threatened under the ESA (October 31, 1996, 61 FR 56138). This Evolutionarily Significant Unit[3] (ESU) consists of populations from Punta Gorda in northern California south to the San Lorenzo River in central California, as well as populations in tributaries to San Francisco Bay, excluding the Sacramento-San Joaquin River system. Designated critical habitat for Central California Coast coho salmon encompasses accessible reaches of all rivers (including estuarine areas and tributaries) between Punta Gorda and the San Lorenzo River (inclusive) in California, including two streams entering San Francisco Bay: Arroyo Corte Madera del Presidio and Corte Madera Creek. This critical habitat designation includes all waterways, substrate, and adjacent riparian zones. Excluded are: (1) areas above specific dams identified in the Federal Register notice; (2) areas above longstanding, natural impassable barriers (i.e., natural waterfalls in existence for at least several hundred years); and (3) Indian tribal lands (May 5, 1999, 64 FR 24049).

Central Valley spring-run chinook salmon (*O. tshawytscha*) are listed as threatened under the ESA (September 16, 1999, 64 FR 50394). This ESU consists of spring-run chinook salmon occurring in the Sacramento River Basin. Designated critical habitat for Central Valley spring-run chinook salmon includes all river reaches accessible to listed chinook salmon in the Sacramento River and its tributaries in California, except for reaches on tribal lands. Also included are river reaches and estuarine areas of the Sacramento-San Joaquin Delta, all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait, all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. This critical habitat designation includes all waterways, substrate, and adjacent riparian zones. Excluded are: (1) areas above specific dams identified in the Federal Register notice; (2) areas above longstanding, natural impassable barriers (i.e., natural waterfalls in existence for at least several hundred years); and (3) Indian tribal lands (February 16, 2000, 65 FR 7764).

Sacramento River winter-run chinook salmon (*O. tshawytscha*) are listed as endangered under the ESA (January 4, 1994, 59 FR 440). This ESU consists of the Sacramento River population in

[3] For purposes of conservation under the Endangered Species Act, an Evolutionarily Significant Unit (ESU) is a distinct population segment that is substantially reproductively isolated from other conspecific population units and represents an important component in the evolutionary legacy of the species (Waples 1991).

California's Central Valley. Designated critical habitat includes the Sacramento River from Keswick Dam in Shasta County (RM 302) to Chipps Island (RM 0) at the westward margin of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. This critical habitat designation includes the river water, river bottom, and the adjacent riparian zone. In areas westward from Chipps Island, including San Francisco Bay to the Golden Gate Bridge, it includes the estuarine water column, essential foraging habitat, and food resources used by the winter-run chinook salmon as part of their juvenile out-migration or adult spawning migration (June 16, 1993, 58 FR 33212).

Central Valley steelhead (*O. mykiss*) are listed as threatened under the ESA (March 19, 1998, 63 FR 13347). This ESU consists of steelhead populations in the Sacramento and San Joaquin River basins in California's Central Valley. Designated critical habitat for Central Valley steelhead includes all river reaches accessible to listed steelhead in the Sacramento and San Joaquin rivers and their tributaries in California, except for reaches on tribal lands. Also included are river reaches and estuarine areas of the Sacramento-San Joaquin Delta, all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait, all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. Excluded are: (1) areas above specific dams identified in the Federal Register notice; (2) areas above longstanding, natural impassable barriers (i.e., natural waterfalls in existence for at least several hundred years); (3) Indian tribal lands; and (4) areas of the San Joaquin River upstream of the Merced River confluence (February 16, 2000, 65 FR 7764). Central California Coast steelhead (*O. mykiss*) are listed as threatened under the ESA (August 18, 1997, 62 FR 43937). This ESU includes steelhead in coastal California streams from the Russian River to Aptos Creek, and the drainages of San Pablo and San Francisco Bays. Designated critical habitat for this species includes all river reaches and estuarine areas accessible to listed steelhead in coastal river basins from the Russian River to Aptos Creek, California (inclusive), and the drainages of San Francisco and San Pablo Bays. Also included are all waters of San Pablo Bay westward of the Carquinez Bridge and all waters of San Francisco Bay to the Golden Gate Bridge. Excluded are: (1) areas above specific dams identified in the Federal Register notice; (2) areas above longstanding, natural impassable barriers (i.e., natural waterfalls in existence for at least several hundred years); and (3) Indian tribal lands (February 16, 2000, 65 FR 7764).

Following are descriptions of the general life histories and population trends of listed species that may be directly or indirectly affected by the proposed action.

B. Coho Salmon

Coho salmon is a widespread species of Pacific salmon occurring in most major river basins

around the Pacific Rim from central California to Korea and northern Hokkaido, Japan. Recently published investigations have reported that a number of local populations of coho salmon in Washington, Oregon, Idaho and California have become extinct, and the abundance of many others is depressed (e.g. Brown and Moyle 1991, Nehlsen et al. 1991, Frissell 1993). There is a general geographic trend in the health of West Coast coho salmon stocks, with the southernmost and easternmost stocks in the worst condition. During this century, naturally-reproducing populations of coho salmon are believed to have been extirpated in nearly all Columbia River tributaries. These declines led to the listing of three of six West Coast ESUs by NMFS since 1996, and two others are candidates for listing.

1. General Life History

In contrast to the life history patterns of other Pacific salmonids, coho salmon exhibit a relatively simple three-year life cycle. Coho salmon are typically associated with small to moderately-sized coastal streams characterized by heavily forested watersheds; perennially-flowing reaches of cool, high-quality water; dense riparian canopy; deep pools with abundant overhead cover; instream cover consisting of large, stable woody debris and undercut banks; and gravel or cobble substrates. Most coho salmon enter rivers between September and January and spawn from November to January (Weitkamp *et al.* 1995; Hassler 1987). Coho salmon river entry timing is influenced by many factors, one of which appears to be river flow. In addition, many small California stream systems have their mouths blocked by sandbars for most of the year except winter. In these systems, coho salmon and other Pacific salmonid species are unable to enter the rivers until sufficiently strong freshets open passages through the bars (Weitkamp *et al.* 1995). Spawning is concentrated in riffles or in gravel deposits at the downstream end of pools with suitable water depth and velocity.

Coho salmon eggs incubate for approximately 35 to 50 days, and start emerging from the gravel two to three weeks after hatching (Hassler 1987). Following emergence, fry move into shallow areas near the stream banks. As coho salmon fry grow, they disperse upstream and downstream and establish and defend territories (Hassler 1987). During the summer, coho salmon fry prefer pools and riffles featuring adequate cover such as large woody debris, undercut banks, and overhanging vegetation. Juvenile coho salmon prefer to over-winter in large mainstem pools, backwater areas and secondary pools with large woody debris, and undercut bank areas (Hassler 1987; Heifetz *et al.* 1986). Juveniles primarily eat aquatic and terrestrial insects (Sandercock 1991). Coho salmon rear in fresh water for up to 15 months, then migrate to the sea as smolts between March and June (Weitkamp *et al.* 1995). During this migration, juvenile coho salmon undergo a physiological process, smoltification, which prepares them for living in the marine environment. After entering the ocean, the immature salmon initially remain in nearshore waters close to their parent stream. While living in the ocean, coho salmon remain closer to their river of origin than do chinook salmon (Weitkamp *et al.* 1995). Nevertheless, coho salmon have been captured several hundred to several thousand kilometers away from their natal stream (Hassler 1987). Coho salmon typically spend two growing seasons in the ocean before returning to their natal streams to spawn as three year-olds. Some precocious males, called "jacks," return to

spawn after only six months at sea.

2. Population Trends - Central California Coast Coho Salmon

A comprehensive review of estimates of historic abundance, decline and present status of coho salmon in California is provided by Brown *et al.* (1994). They estimated that coho salmon annual spawning population in California ranged between 200,000 and 500,000 fish in the 1940s, which declined to about 100,000 fish by the 1960s, followed by a further decline to about 31,000 fish by 1991, of which 57 percent were artificially propagated. The other 43 percent (13,240) were natural spawners, which included naturally produced, wild fish and naturalized (hatchery-influenced) fish. Brown *et al.* (1994) cautioned that this estimate could be overstated by 50 percent or more. Of the 13,240 natural spawners, only about 5,000 were naturally-produced, wild coho salmon without hatchery influence, and many of these were part of individual stream populations of less than 100 fish each. In summary, Brown *et al.* (1994) concluded that the California coho salmon population had declined more than 94 percent since the 1940s, with the greatest decline occurring since the 1960s.

NMFS' status review (Weitkamp *et al.* 1995) concluded that abundance data for the Central California Coast coho salmon ESU were very limited. Recent population estimates vary from approximately 600 to 5,500 adults (Brown *et al.* 1994). Brown *et al.* (1994) estimated average annual coho salmon spawning escapement for the period from the early 1980s through 1991 was 6,160 naturally spawning fish and 332 artificially propagated fish. Of the naturally-spawning coho salmon, 3,880 were from the tributaries in which supplementation occurs (Noyo River and several coastal streams south of San Francisco).

Of 186 streams in the range of the Central California Coast coho salmon ESU identified as having historic accounts of adult coho salmon, recent data exist for 133 streams. Of these 133 streams, 62 streams have recent records of occurrence of adult coho salmon and 71 streams no longer maintain coho salmon spawning runs (61 FR 56138). Adams *et al.* (1999) looked at historical presence-absence data drawn from four principle sources, in addition to their own data, and found that for the three-year period between 1995 to 1997 coho salmon were present in 51 percent (98 of 191) of the streams where they were historically present, and documented an additional 23 streams within the Central California Coast coho salmon ESU in which coho salmon were found for which there were no historical records.

Weitkamp *et al.* (1995) concluded that all coho salmon stocks south of Punta Gorda were depressed relative to past abundance, but that there were limited data to assess population numbers or trends. The main stocks in this region have been heavily influenced by hatcheries, and there are apparently few native coho salmon left. The apparent low escapements in these rivers and streams, in conjunction with heavy historical hatchery production, suggest that natural populations are not self-sustaining.

Designated critical habitat for Central California Coast coho salmon includes two streams that are tributary to San Francisco Bay. Those streams are Arroyo Corte Madera Del Presidio and Corte Madera Creek, both in Marin County. Leidy (1984) collected several juvenile coho salmon specimens in the lowermost reaches of both these streams in 1981.

C. Chinook Salmon

Chinook salmon historically ranged from the Ventura River in southern California north to Point Hope, Alaska, and in northeastern Asia from Hokkaido, Japan to the Anadyr River in Russia (Healey 1991). Based on the results of a comprehensive scientific review of chinook salmon on the entire West Coast, NMFS identified 17 ESUs of chinook salmon, from southern California to the Canadian border and east to the Rocky Mountains. Out of these 17 ESUs, nine have been listed by NMFS as threatened or endangered since 1990, and one remains a candidate for listing.

1. General Life History

Of the Pacific salmon, chinook salmon exhibit arguably the most diverse and complex life history strategies. Healey (1986) described 16 age categories for chinook salmon, consisting of seven total ages with three possible freshwater ages. Two generalized freshwater life-history types were described by Healey (1991): "stream-type" chinook salmon reside in freshwater for a year or more following emergence, whereas "ocean-type" chinook salmon migrate to the ocean within their first year.

Chinook salmon mature between two and six-plus years of age (Myers *et al.* 1998). Freshwater entry and spawning timing are generally thought to be related to local water temperature and flow regimes (Miller and Brannon 1982). Runs are designated on the basis of adult migration timing; however, distinct runs also differ in the degree of maturation at the time of river entry, thermal regime and flow characteristics of their spawning site, and actual time of spawning (Myers *et al.* 1998). Spring-run chinook salmon tend to enter freshwater as immature fish, migrate far upriver, and finally spawn in the late summer and early autumn. Fall-run chinook salmon enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of the rivers, and spawn within a few days or weeks of freshwater entry (Healey 1991).

Central Valley spring-run chinook salmon adults are estimated to leave the ocean and enter the Sacramento River from March to July (Myers *et al.* 1998). Spring-run chinook spawning typically occurs between late-August and early October with a peak in September. Spawning typically occurs in gravel beds that are located at the tails of holding pools (USFWS 1995). Eggs are deposited within the gravel where incubation, hatching, and subsequent emergence takes place. The upper preferred water temperature for spawning adult chinook salmon is 55° F (Chambers 1956) to 57° F (Reiser and Bjornn 1979). Length of time required for eggs to develop and hatch is dependent on water temperature and is quite variable. In Butte and Big Chico creeks, emergence of spring-run chinook typically occurs from November through

January. In Mill and Deer creeks, colder water temperatures delay emergence to January through March (CDFG 1998).

Post-emergent fry seek out shallow, nearshore areas with slow current and good cover, and begin feeding on small terrestrial and aquatic insects and aquatic crustaceans. In Deer and Mill creeks, juvenile spring-run chinook usually spend nine to10 months in their natal streams, although some may spend as long as 18 months in freshwater. Most "yearling" spring-run chinook move downstream in the first high flows of the winter from November through January (USFWS 1995; CDFG 1998). In Butte and Big Chico creeks, spring-run chinook juveniles typically exit their natal tributaries soon after emergence during December and January, while some remain throughout the summer and exit the following fall as yearlings. In the Sacramento River and other tributaries, juveniles may begin migrating downstream almost immediately following emergence from the gravel with emigration occurring from December through March (Moyle, *et al.* 1989; Vogel and Marine 1991). Fry and parr may spend time rearing within riverine and/or estuarine habitats including natal tributaries, the Sacramento River, non-natal tributaries to the Sacramento River, and the Delta.

Chinook salmon spend between one and four years in the ocean before returning to their natal streams to spawn (Myers *et al.* 1998). Fisher (1994) reported that 87 percent of returning spring-run adults are three year-olds based on observations of adult chinook trapped and examined at Red Bluff Diversion Dam between 1985 and 1991.

Adult Sacramento River winter-run chinook salmon leave the ocean and migrate through the Sacramento-San Joaquin Delta to the upper Sacramento River from December through June. Spawning generally occurs between mid-April and July, and occasionally into early August. The majority of winter-run chinook salmon spawning occurs upstream of Red Bluff Diversion Dam in the vicinity of Redding, California. The eggs are fertilized and buried in the river gravel where they incubate and hatch in approximately a two-month period. Emergence of the fry from the gravel begins during early July and continues through September. Fall and winter emigration behavior by juveniles varies with streamflow and hydrologic conditions. Most juveniles distribute themselves to rear in the Sacramento River through the fall and winter months. Some winter-run chinook salmon juveniles move downstream to rear in the lower Sacramento River and Delta during the late fall and winter. Smolting and ocean entry typically occurs between January and April.

2. Population Trends - Central Valley Spring-run Chinook Salmon

Historically, spring-run chinook salmon were predominant throughout the Central Valley, occupying the upper and middle reaches of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud, and Pit rivers, with smaller populations in most other tributaries with sufficient habitat for over-summering adults (Stone 1874; Rutter 1904; Clark 1929). The Central Valley drainage as a whole is estimated to have supported spring-run chinook salmon runs as large as 600,000 fish between the late 1880s and 1940s (CDFG 1998). Before the construction

of Friant Dam, nearly 50,000 adults were counted in the San Joaquin River (Fry 1961). Following the completion of Friant Dam, the native population from the San Joaquin River and its tributaries was extirpated. Spring-run chinook salmon no longer exist in the American River due to the existence and operation of Folsom Dam.

Natural spawning populations of Central Valley spring-run chinook salmon are currently restricted to accessible reaches in the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Feather River, Mill Creek, and Yuba River (CDFG 1998; USFWS, unpublished data). With the exception of Butte Creek and the Feather River, these populations are relatively small ranging from a few fish to several hundred. Butte Creek returns in 1998 and 1999 numbered approximately 20,000 and 3,600, respectively (CDFG, unpublished data). On the Feather River, significant numbers of spring-run chinook, as identified by run timing, return to the Feather River Hatchery. However, coded-wire-tag information from these hatchery returns indicates substantial introgression has occurred between fall-run and spring-run chinook populations in the Feather River due to hatchery practices. Additional historical and recent published chinook salmon abundance information are summarized in Myers *et al.* (1998).

3. Population Trends - Sacramento River Winter-run Chinook Salmon

Historically, winter run chinook salmon were abundant in the McCloud, Pit, and Little Sacramento rivers. Construction of Shasta Dam in the 1940s eliminated access to all of the historic spawning habitat for winter-run chinook salmon in the Sacramento River Basin. Since then, the ESU has been reduced to a single spawning population confined to the mainstem Sacramento River below Keswick Dam; although some adult winter-run chinook have been observed in recent years in Battle Creek, a tributary to the upper Sacramento River. The fact that this ESU is generally comprised of a single population with very limited spawning and rearing habitat increases its risk of extinction due to local catastrophe or poor environmental conditions. There are no other natural populations in the ESU to buffer it from natural fluctuations.

Quantitative estimates of run size are not available for the period prior to the completion of Red Bluff Diversion Dam in 1966. CDFG estimated spawning escapement of Sacramento River winter-run chinook salmon at 61,300 (60,000 mainstem, 1,000 in Battle Creek, and 300 in Mill Creek) in the early 1960s, but this estimate was based on "comparisons with better-studied streams" rather than actual surveys. During the first three years of operation of the counting facility at Red Bluff Diversion Dam (1967-1969), the spawning run of winter-run chinook salmon averaged 86,500 fish. From 1967 through the mid-1990's, the population declined at an average rate of 18 percent per year, or roughly 50 percent per generation. The population reached critically low levels during the drought of 1987-1992; the three-year average run size for period of 1989 to 1991 was 388 fish. However, the trend in the past five years indicates that the population may be recovering. The most recent three-year (1997-1999) average run size was 2,220 fish. Additional historical and recent published chinook salmon abundance information is summarized in Myers *et al.* (1998).

D. Steelhead

West coast steelhead are presently distributed across 15 degrees of latitude, from approximately 49°N at the U.S.-Canada border south to 34°N at the mouth of Malibu Creek, California. In some years steelhead may be found as far south as the Santa Margarita River in San Diego County. During the 1900's, over 23 indigenous, naturally-reproducing stocks of steelhead are believed to have been extirpated, and west coast stocks have experienced dramatic declines in abundance throughout their range (Busby *et al* 1996). Forty-three steelhead stocks have been identified by Nehlsen *et al* (1991) as being at moderate or high risk of extinction. Out of 15 ESUs, ten have been listed by NMFS as threatened or endangered since 1997, and one (the Oregon coast ESU) is a candidate for listing.

1. General Life History

Steelhead exhibit perhaps the most complex suite of life history traits of any species of Pacific salmonid. They can be anadromous or freshwater resident. Resident forms are usually called rainbow trout. Winter steelhead generally leave the ocean from August through April, and spawning occurs between December and May (Busby *et al.* 1996). Steelhead using San Francisco Bay tributaries belong to the winter race of steelhead, that are ocean-maturing, and begin their spawning migration in the fall and winter (Leidy 2000). The timing of upstream migration is generally correlated with higher flow events and associated lower water temperatures. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (Busby *et al.* 1996). However, it is rare for steelhead to spawn more than twice before dying; most that do so are females (Busby *et al.* 1996; Nickelson *et al.* 1992). Iteroparity is more common among southern steelhead populations than northern populations (Busby *et al.* 1996).

Steelhead spawn in cool, clear streams featuring suitable gravel size, depth, and current velocity. Intermittent streams may be used for spawning (Barnhart 1986; Everest 1973). The length of the incubation period for steelhead eggs is dependent on water temperature, dissolved oxygen concentration, and substrate composition. In late spring, following yolk sac absorption, alevins emerge from the gravel as fry and begin actively feeding in shallow water along perennial stream banks (Nickelson *et al.* 1992).

Summer rearing takes place primarily in higher velocity areas in pools, although young-of-the-year are also abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers (Nickelson *et al.* 1992). Juveniles feed on a wide variety of aquatic and terrestrial insects (Chapman and Bjornn 1969), and emerging fry are sometimes preyed upon by older juveniles. Juveniles live in freshwater from one to four years (usually two years in California; Barnhart 1986), then smolt and migrate to the sea from February through April. However, some steelhead smolts may

outmigrate during the fall and early winter months. While some emigrating juveniles move downstream at all hours of the day and night, the bulk of downstream fish movement in riverine conditions occurs during the night or at least in the early morning or late evening (Shapovalov and Taft 1954). California steelhead typically reside in marine waters for one to two years prior to returning to their natal stream to spawn as three- or four-year olds (Busby *et al.* 1996).

2. Population Trends - Central Valley Steelhead

Central Valley steelhead once ranged throughout most of the tributaries and headwaters of the Sacramento and San Joaquin basins prior to dam construction, water development, and watershed perturbations of the 19th and 20th centuries (McEwan and Jackson 1996; CALFED 2000). In the early 1960s, the California Fish and Wildlife Plan estimated a total run size of about 40,000 adults for the entire Central Valley including San Francisco Bay (CDFG 1965). The annual run size for this ESU in 1991-92 was probably less than 10,000 fish based on dam counts, hatchery returns and past spawning surveys (McEwan and Jackson 1996).

At present, all Central Valley steelhead are considered winter-run steelhead (McEwan and Jackson 1996), although there are indications that summer steelhead were present in the Sacramento River system prior to the commencement of large-scale dam construction in the 1940s (IEP Steelhead Project Work Team 1999). McEwan and Jackson (1996) reported that wild steelhead stocks appear to be mostly confined to upper Sacramento River tributaries such as Antelope, Deer, and Mill creeks and the Yuba River. However, naturally spawning populations are also known to occur in Butte Creek, and the upper Sacramento mainstem, Feather, American, Mokelumne, and Stanislaus rivers (CALFED 2000). It is possible that other small populations of naturally spawning steelhead exist in Central Valley streams, but are undetected due to lack of sufficient monitoring and research programs. The recent implementation of new fisheries monitoring efforts has found steelhead in streams previously thought not to contain a population, such as Auburn Ravine, Dry Creek, and the Stanislaus River (IEP Steelhead Project Work Team 1999).

3. Population Trends - Central California Coast Steelhead

Only two estimates of historic (pre-1960s) abundance specific to this ESU are available: an average of about 500 adults in Waddell Creek in the 1930s and early 1940s (Shapovalov and Taft 1954), and 20,000 steelhead in the San Lorenzo River before 1965 (Johnson 1964). In the mid-1960s, 94,000 adult steelhead were estimated to spawn in the rivers of this ESU, including 50,000 fish in the Russian River and 19,000 fish in the San Lorenzo River (CDFG 1965). Recent estimates indicate an abundance of about 7,000 fish in the Russian River (including naturally-produced steelhead) and about 500 fish in the San Lorenzo River. These estimates suggest that recent total abundance of steelhead in these two rivers is less than 15 percent of their abundance in the mid 1960s. Recent estimates for several other streams (Lagunitas Creek, Waddell Creek, Scott Creek, San Vincente Creek, Soquel Creek, and Aptos Creek) indicate individual run sizes of 500 fish or less. Steelhead in most tributaries to San Francisco and San

Pablo bays have been virtually extirpated (McEwan and Jackson 1996). Fair to good runs of steelhead still apparently occur in coastal Marin County tributaries. In a 1994 to 1997 survey of 30 San Francisco Bay watersheds, steelhead occurred in small numbers at 41 percent of the sites, including the Guadalupe River, San Lorenzo Creek, Corte Madera Creek, and Walnut Creek (Leidy 1997). Presence/absence data available since the proposed listing show that in a subset of streams sampled in the central California coast region, most contain steelhead (Adams *et al.* 1999). While there are several concerns with these data (e.g., uncertainty regarding origin of juveniles), NMFS believes it is generally a positive indicator that there is a relatively broad distribution of steelhead in smaller streams throughout the region.

Little information is available regarding the contribution of hatchery-produced fish to natural spawning of steelhead, and little information on present run sizes or trends for this ESU exists. However, given the substantial rates of declines for stocks where data do exist, the majority of natural production in this ESU is likely not self-sustaining (62 FR 43937).

Generally, life history characteristics and habitat requirements for Central California Coast steelhead are similar to those described for Central Valley steelhead. However, Central California Coast steelhead typically migrate shorter distances and spawn in smaller, rainfall-fed streams compared to the larger, snowmelt-fed spawning streams and rivers occupied by Central Valley steelhead. Adult Central California Coast steelhead spawn in tributaries to San Francisco, San Pablo, and Suisun Bays. Outmigrants may utilize tidal marsh areas, non-tidal freshwater marshes, and other shallow water areas in the bays as rearing areas for short periods prior to their emigration to the sea. Additional historical and recent published steelhead abundance are summarized in NMFS' west coast steelhead status review (Busby *et al.* 1996).

IV. Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and the ecosystem in the action area. The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the action area (50 CFR §402.02). For the purposes of this consultation, the action area is the San Francisco Bay between the Richmond-San Rafael Bridge in the north, the Golden Gate Bridge in the west, and the San Mateo Bridge in the south due to the direct and indirect effects of the project's pile driving and dredging/disposal activities.

A. Environmental Setting in the Action Area

San Francisco Bay is the largest estuary on the west coast of North America. Located about halfway up the California coast from the Mexican border, it is the natural exit point of 40 percent of California's freshwater outflow. California's two largest rivers, the Sacramento and San Joaquin, merge to form the estuary. They drain part of the Sierra Nevada and Cascade mountains and form a large and convoluted delta in the Central Valley. The freshwater runoff in the delta

flows seaward, mixing with ocean water through Suisun Bay, San Pablo Bay and lastly San Francisco Bay. San Francisco Bay empties into the Pacific Ocean through the Golden Gate. The northern portion of the action area, north of the Bay Bridge, is commonly termed the Central Bay. The Central Bay contains many of the bay's deepest areas as well as shallow shoals mainly along the eastern side. The southern portion of the action area, south of the Bay Bridge, includes part of the South Bay. The South Bay has a central channel that narrows southward as well as broad shoals on either side of the channel.

The climate is Mediterranean; most precipitation falls in winter and spring as rain throughout the Central Valley and as snow in the Sierra Nevada and Cascades. The freshwater outflow pattern is seasonal; highest outflow occurs in winter and spring. In summer, freshwater inflow to San Francisco Bay is controlled mainly by water released from Central Valley reservoirs.
Ocean conditions affect the estuary. The California Current system dominates California's nearshore ocean environment. Off northern and central California, surface waters are driven south by northwesterly winds in spring and summer and, as a result of Ekman transport of surface water, cold, nutrient-rich water is upwelled to the surface and transported offshore. This creates one of the most productive ocean regions in the world. Ocean temperature is a major factor determining the distribution of fish and invertebrates along the coast and consequently, the marine fauna of the estuary. San Francisco Bay is in a transitional zone containing both cold water species from the north and sub-tropical fauna from the south (Parrish et al. 1981). In addition to the longitudinal temperature gradient and seasonal variation due to upwelling, there are large inter-annual temperature differences during El Niño events.

B. Status of Steelhead, Chinook Salmon, and Coho Salmon in the Action Area

Examination of the migratory pathways of the various ESUs can provide some information regarding the occurrence and abundance of listed anadromous salmonids within the action area. Adult salmon and steelhead from all five listed ESUs travel through the action area in San Francisco Bay from the ocean to their natal streams to spawn. Juvenile salmon and steelhead use the action area in San Francisco Bay as a migration corridor to the ocean. Unlike salmon, some adult steelhead return to the ocean after spawning and these fish migrate seaward as adults through San Francisco Bay.

For Central Valley ESUs (Sacramento River winter-run chinook salmon, Central Valley spring-run chinook, Central Valley steelhead), the Golden Gate is the site of freshwater entry for all returning adults and the site of ocean entrance for all outmigrating smolts. However, fisheries studies conducted by NMFS (B. MacFarlane, pers. comm) and DFG (Baxter *et al.*, 1999) indicate that the primary migration corridor for these Central Valley fish is within the northern portion of the action area. Thus, the majority of Central Valley anadromous salmonids are unlikely to wander south into the immediate construction area of the East Span Project. The population status of Central Valley ESUs is discussed above under Status of Listed Species.

For coho salmon, the two tributaries to San Francisco Bay that currently support Central California Coast coho salmon are Arroyo Corte Madera del Presidio and Corte Madera creeks in Marin County. These two creeks flow to northern central San Francisco Bay on either side of the Tiburon Peninsula. Central California Coast coho salmon would most likely migrate to and from these creeks along the north side of the central Bay and their presence in the immediate East Span Project construction area is unlikely. Information regarding the population status of Central California Coast coho salmon is discussed above under Status of Listed Species.

Several tributary streams to San Francisco Bay currently support populations of Central California Coast steelhead. Within central San Francisco Bay, steelhead runs are believed to occur in Corte Madera Creek and its tributaries, Miller Creek, Novato Creek, and possibly Arroyo Corte Madera del Presidio Creek in Marin County. Within San Pablo Bay, steelhead are present in the Napa River, Petaluma River, and Sonoma Creek. Tributaries to Suisun Bay and adjacent drainages that support steelhead runs of unknown size include Green Valley and Suisun creeks in Solano County; and Walnut Creek and possibly Alhambra, Pinole, Wildcat, and San Pablo creeks in Contra Costa County. As with the Central Valley ESUs, the primary migration corridor for these fish is likely on the northern side of action area and the majority of fish are unlikely to wander south into the immediate construction area of the East Span Project. However, there are several streams in South San Francisco Bay which presently support steelhead including the Guadalupe River, Stevens Creek, San Francisquito Creek, Coyote and Upper Penitencia creeks, Alameda Creek, and possibly San Leandro Creek (Leidy 2000). Information regarding the population status of Central California Coast steelhead is discussed above under Status of Listed Species.

All adult and juvenile steelhead originating from south San Francisco Bay streams migrate under the Bay Bridge. Although no data is available to determine the migration routes of steelhead through central and south San Francisco Bay, some inferences can be made from the Bay's bathymetry and tidal current patterns, and chinook salmon distribution data. Of particular importance to the East Span Project is the proportion of the population that migrates to the west or east of YBI.

The DFG's San Francisco Bay study collected fish by beach seine and trawl throughout San Francisco Bay between 1980 and 1995 (Baxter *et al.* 1999). Too few steelhead were collected to draw any conclusions regarding their rearing and migration locations within San Francisco Bay, but juvenile chinook salmon collections do provide some information regarding their presence and periodicity. In or near the project's action area, DFG sampled 20 open water locations by midwater and otter trawls and another 16 stations sampled by beach seine. The results of this study indicate that juvenile chinook salmon are distributed on either side of YBI, although the data is so sparse that is would be difficult to calculate what percent use either side as a migration corridor. The data also shows that chinook salmon juveniles are distributed throughout the action area during the period between February and July, but may also be found as early as January and as late as September in the action area. During February and March, juvenile chinook salmon were primarily captured by beach seine in shallow water areas, and during April, May, and June juvenile chinook salmon were primarily captured by trawl in deep water areas (Baxter *et al.*

1999). Although these juvenile salmon are likely non-listed fall-run chinook salmon, the data do indicate that juvenile salmonids can be found throughout San Francisco Bay and the action area during their outmigration season. Since the migration patterns of chinook salmon smolts is very similar to that of steelhead smolts, the information does infer that juvenile steelhead are also likely to be distributed on both sides of YBI

The bathymetry of San Francisco Bay and the distribution of tidal currents also provides some information relevant to the distribution and migration patterns of steelhead. Based on the bathymetry of San Francisco Bay around YBI, Caltrans estimates that 80 percent or more of the water originating from south Bay tributaries passes to the west of YBI and approximately 20 percent passes under the East Span Project. Examination of the tidal currents indicates that surface water velocities at various tidal stages does not differ significantly from the west to east side of YBI; both sides can experience tidal currents exceeding 3 knots. This information suggests that between 20 and 30 percent of the steelhead run from south San Francisco Bay streams pass to the east of YBI and through the East Span Project construction area.

Preliminary analysis of data collected from juvenile chinook salmon during a 1997 survey conducted by the NMFS' Tiburon Laboratory provides some additional information regarding the life history of juvenile salmonids within San Francisco Bay (B. MacFarlane, NMFS, pers. comm., January 2001). Preliminary findings from this research indicate:

1) Juveniles spent about 40 days migrating through the estuary, with extended rearing in the bay and estuary not observed.
2) Little increase in mean length or weight was found while in the estuary, suggesting that feeding and rearing activities in the estuary replace energy spent reaching the ocean.
3) Juvenile chinook salmon condition declined in the estuary, but improved markedly in ocean fish.
4) Whole body and organ concentrations of metals, PCBs, PAHs, and pesticides showed a slight increase as the fish migrate from the delta through the bay, but body burden levels were well below published concentration levels that would be expected to cause chronic toxicity problems. These contaminant levels seemed to drop once fish left the bay and spent time in the ocean.
5) Unlike populations in the Pacific Northwest, chinook salmon from California's Central Valley show little estuarine dependency and transit rapidly to the ocean.

Leidy (2000) reported that emigrating adult and juvenile steelhead may forage in the open water of estuarine subtidal and riverine tidal wetland habitats within the San Francisco Bay estuary, though the importance of these areas as rearing habitat for yearlings and sub-yearlings is not well documented. In the DFG San Francisco Bay Study, only two juvenile steelhead were observed during the eight years of data collection and the origin (e.g., Central Valley or Central California Coast ESU) of these juveniles is unknown. No information exists on the length of time juvenile steelhead may use the bay before moving out into the ocean.

C. Factors Affecting Environment Within the Action Area

The factors presenting risks to naturally reproducing listed salmonid populations are numerous and varied. A number of documents have addressed the history of human activities, present environmental conditions, and factors contributing to the decline of salmon and steelhead species listed under the ESA. For example, NMFS has prepared range-wide status reviews for west coast chinook (Myers *et al.* 1998), west coast coho salmon (Weitkamp *et al.* 1995) and west coast steelhead (Busby *et al.* 1996). Additional information is available in Federal Register notices announcing ESA listing proposals and determinations for these species and their critical habitat (chinook salmon: June 16, 1993, 58 FR 33212; January 4, 1994, 59 FR 440; March 9, 1998, 63 FR 11481; September 16, 1999, 64 FR 50394; February 16, 2000, 65 FR 7764), (steelhead: August 9, 1996, 61 FR 41541; August 18, 1997, 62 FR 43937; March 19, 1998, 63 FR 13347; February 9, 1999, 64 FR 5740; February 16, 2000, 65 FR 7764), (coho salmon: July 25, 1995, 60 FR 38011; October 31, 1996, 61 FR 56211; January 9, 1997, 62 FR 1296; November 25, 1997, 62 FR 62741; May 5, 1999, 64 FR 24049). The July 2000 Programmatic Environmental Impact Statement/Report for the CALFED Bay-Delta Program (CALFED 2000) and the October 1999 Programmatic Environmental Impact Statement for the Central Valley Project Improvement Act (DOI 1999) provide excellent summaries of historical and recent environmental conditions for salmon and steelhead in the Central Valley, Delta, and San Francisco Bay. For the purposes of the proposed project, a general description of the environmental baseline for salmon and steelhead listed under the ESA is based on a summary of these documents.

Profound alterations to the estuarine habitat of San Francisco Bay began with the discovery of gold in the middle of the 19th century. Dam construction, water diversion, hydraulic mining, and the diking and filling of tidal marshes soon followed, launching San Francisco Bay into the era of rapid urban development and coincident habitat degradation. In general, the human activities that have affected these fish and their habitats within the action area consist of: (1) dam construction and water development activities that affect water quantity, timing, and quality in San Francisco Bay; (2) land use activities such as urban development and landfill that degrade and transform aquatic habitat; (3) hatchery operation and practices; (4) harvest activities; (5) pollution; (6) introduction of non-native species; and (7) ecosystem restoration.

1. Dam Construction and Water Development

Hydropower, flood control, and water supply dams of the Central Valley Project (CVP), State Water Project (SWP), and other municipal and private entities have affected water quantity, timing, and quality in San Francisco Bay. Altered streamflows and inflow to San Francisco Bay have affected the natural cycles by which juvenile and adult salmonids base their migrations. Depleted inflow to San Francisco Bay has contributed to higher water temperatures, lower dissolved oxygen levels, and decreased recruitment of gravel and large woody debris in streams. Additionally, the seasonal distribution of freshwater inflow differs from historical patterns. The magnitude and duration of peak flows during the winter and spring are significantly reduced by water impoundment in upstream reservoirs. During the summer and early fall, inflow to San

Francisco Bay may be greater than historical levels due to deliveries of municipal and agricultural water supplies.

2. Land-Use Activities

Historically, the tidal marshes of San Francisco Bay provided a highly productive estuarine environment for juvenile anadromous salmonids. During the course of their downstream migration, juvenile salmon and steelhead utilize the estuary for seasonal rearing, and as a migration corridor to the sea. Returning adult salmon and steelhead navigate their way through San Francisco Bay as they seek the upstream spawning grounds of their natal streams. Land use activities since the 1850s associated with urban development, mining, and agriculture have significantly altered fish habitat quantity and quality in San Francisco Bay, and contributed to salmonid stock declines.

Urbanization has been a major influence on the land surrounding the estuary. In the past 150 years, the diking and filling of tidal marshes have decreased the surface area of San Francisco Bay by 37 percent. More than 500,000 acres of the estuary's historic tidal wetlands have been converted to farms, salt ponds, and urban uses. Less than 45,000 acres of the estuary's historic tidal marshes remain intact, a reduction of 92 percent (San Francisco Estuary Project 1992). Today, nearly 30 percent of the land in the nine counties surrounding San Francisco Bay is urbanized. The increase in urban land reflects the growth of the human population. There are now more than 7.5 million individuals living in the Bay Area, making the region the fourth most populous metropolitan area in the United States. These changes have reduced the acreage of valuable farm land, wetlands, and riparian areas, and have increased pollutant loadings to the estuary. Installation of docks, shipping wharves, marinas, and miles of rock rip rap for shoreline protection has also contributed greatly to habitat degradation within the estuary.

3. Hatchery Operation and Practices

Hatchery production of chinook salmon and steelhead salmon occurs in Central Valley hatcheries and some outplanting of juveniles occurs in the vicinity of San Francisco Bay. The United Anglers Casa Grande High School Salmon Hatchery has released 1,000 to 7,000 chinook salmon smolts annually into the Petaluma River or San Pablo Bay since 1984 and an unknown number of steelhead yearlings have been released periodically to Adobe Creek or the Petaluma River since 1984. The egg source for both chinook and steelhead at Casa Grande Hatchery has frequently been Central Valley stocks from the Feather River and Nimbus (American River) hatcheries. Competition may occur between hatchery and native salmonid juveniles, and may lead to decreased survival and production of listed salmonids. Outplanting of smolts in San Pablo and San Francisco bays contributes to elevated straying levels for returning adult spawners. The effects of straying hatchery spawners have differing effects on listed salmonids depending on the size of the wild population.

4. Harvest

Historically, salmon and steelhead were abundant in many western coastal and interior streams of the United States and have supported substantial tribal, sport and commercial fisheries, contributing millions of dollars to numerous local economies. Overfishing in the early days of the European settlement led to the depletion of many stocks of salmon and steelhead even before extensive habitat degradation. More recently, overfishing in non-tribal fisheries is believed to have been a significant factor in the decline of salmon and steelhead. This included significant overfishing that occurred from the time marine survival turned poor for many stocks (ca. 1976) until the mid-1990s, when harvest was substantially curtailed. Since 1994, the retention of coho salmon has been prohibited in marine fisheries south of Cape Falcon, Oregon. Coho salmon are still impacted, however, as a result of hook-and-release mortality in chinook salmon-directed fisheries. Sport and commercial fishing restrictions ranging from severe curtailment to complete closures in recent years may be providing an increase in adult salmon and steelhead spawners in some streams, but trends cannot be established from the existing data.

5. Pollution

Industrial, municipal, and agricultural wastes have been discharged into the waters of San Francisco Bay with major historical point sources including wastes from fish, fruit and vegetable canneries, and municipal sewage. The large-scale pollution of the estuary was partially relieved by the passage of the Clean Water Act in 1972, resulting in the construction of sewage treatment plants in all cities. Non-point sources of pollution, such as urban and agricultural runoff, continue to degrade water quality today.

6. Introduction of Non-native Species

As native fishes became depleted in the late 19th century, non-native species were brought in to the bay and delta: American shad, striped bass, common carp, and white catfish. As their populations boomed, those of native fishes declined further. Introduction of non-native species accelerated in the 20th century through deliberate introductions of fish and unintended introductions of invertebrates through ballast water of ships. Establishment of non-native species was probably facilitated by altered hydrologic regimes and reduction in habitats for native species. The introduction and spread of non-native species in San Francisco Bay has affected native species, including listed salmonids, through competition for food and habitat, and predation on native species.

7. Ecosystem Restoration

Preliminary, significant steps towards the largest ecological restoration project yet undertaken in the United States have occurred during the past five years and continue to proceed in California's Central Valley. The CALFED Program and the Central Valley Project Improvement Act's (CVPIA) Anadromous Fish Restoration Program (AFRP), in coordination with other Central

Valley and Bay Area efforts, have implemented numerous habitat restoration actions that benefit Central Valley steelhead, Central Valley spring-run chinook salmon, Sacramento River winter-run chinook, and their designated critical habitat. A few of these restoration projects include restoration actions within the San Francisco Bay. These restoration actions are primarily land acquisition, wetland restoration, and restoration of fish passage. Restoration of wetland areas typically involves flooding lands previously used for agriculture, thereby creating additional wetland areas and rearing habitat for juvenile salmonids, other fish species, and birds.

On two important steelhead streams in south San Francisco Bay, the recent construction and operation of two new fish ladders have improved environmental baseline conditions for Central California Coast steelhead. On Coyote Creek a fish ladder was installed in 1999 on Coyote Steel Dam, approximately 10 miles downstream of Anderson Dam. Prior to the construction of this ladder, adult steelhead had very limited access to the reach upstream with the highest quality spawning and juvenile rearing habitat in Coyote Creek. On Guadalupe River a fish ladder was constructed at the Alamitos Drop Structure in 1999. The Alamitos fish ladder provides upstream passage over a 13-foot drop structure and allows steelhead access to high quality spawning and rearing habitat in the upper watershed. These fish ladders on both Coyote Creek and Guadalupe River provide returning adult steelhead with suitable passage conditions at structures where no fish passage facilities existed prior to 1999. Full access to significantly better habitat conditions upstream for spawning (i.e. clean gravels) and rearing (i.e. suitable flows and temperatures) is expected to improve reproductive success and survival of juvenile steelhead in south San Francisco Bay.

V. Effects of the Action

A. Evaluating Proposed Actions

The standards for determining jeopardy and destruction or adverse modification of critical habitat are set forth in section 7(a)(2) of the ESA and 50 CFR Part 402 (the consultation regulations). This analysis involves the following steps: (1) define the biological requirements of listed anadromous salmonids within the action area; (2) evaluate of the effects of past and ongoing human and natural factors leading to the current status of the species; (3) determine the effects of the proposed or continuing action on listed salmonids and designated critical habitat; and (4) determine whether the proposed action, in conjunction with the status of the species, environmental baseline, and cumulative effects, can be expected to reduce appreciably the likelihood of survival and recovery of the species or destroy or adversely modify their critical habitat.

B. Effects of Proposed Action

The East Span Project is expected to result in short-term adverse effects to listed species during construction. Specifically, pile driving activities and dredging/disposal are likely to adversely

affect listed anadromous salmonids and their designated critical habitat.

1. Pile Driving

The underwater sound pressure waves that have the potential to adversely affect listed anadromous salmonids originate with the contact of the hammer with the top of the steel pile. The impact of the hammer on the top of the pile causes a wave to travel down the pile and causes the pile to resonate radially and longitudinally like a gigantic bell. Most of the acoustic energy is a result of the outward expansion and inward contraction of the walls of the steel pipe pile as the compression wave moves down the pile from the hammer to the end of the pile buried in the bay bottom. Water is virtually incompressible and the outward movement of the pipe pile wall by a fraction of an inch sends an underwater pressure wave propagating outward from the pile in all directions. The molecular elasticity of the steel pipe pulls the pile walls back inward with the water following the inward movement of the pipe wall, resulting in the propagation of an under-pressure wave. The steel pipe pile resonates sending out a succession of waves even as it is pushed several inches deeper into the bay bottom.

a. Literature Review

There is very little literature on the effects of underwater shock waves generated by pile driving on aquatic life. There are a few refereed publications, but most of the information is contained in "gray literature" publications produced for government agencies that are project specific. The monitoring methods have not been standardized and measurements tend to be sporadic (Keevin *et al.* 1999). The following is a brief discussion on the effects of underwater shock waves on fish and the available literature on this subject.

Barotraumas are pathologies associated with exposure to drastic changes in pressure. These include hemorrhage and rupture of internal organs, including the swim bladder and kidneys in fish. Death can be instantaneous, occur within minutes after exposure, or occur several days later. Bubble expansion in blood vessels can cause hemorrhaging. Gisiner (1998) reports swim bladders of fish can perforate and hemorrhage when exposed to blast and high-energy impulse noise underwater. If the swim bladder bursts and the air escapes from the body cavity or is forced out of the pneumatic duct, the fish may sink to the bottom. If the swim bladder bursts but the air stays inside the body cavity, the fish is likely to stay afloat but have some difficulty in maneuvering or maintaining orientation in the water column.

Fish can also die when exposed to lower sound pressure levels if exposed for longer periods of time. Hastings (1995) found death rates of 50 percent and 56 percent for gouramis (*Trichogaster sp.*) when exposed to continuous sounds at 192 dB (re:1 μPa) at 400 Hz and 198 dB (re:1 μPa) at 150 Hz, respectively, and of 25 percent for goldfish (*Carassius auratus*) when exposed to sounds of 204 dB (re:1 μPa) at 250 Hz for two hours or less. Hastings (1995) also reported that acoustic "stunning," a potentially lethal effect resulting in a physiological shutdown of body functions, immobilized gourami within eight to thirty minutes of exposure to the aforementioned sounds.

Structural damage to the fish inner ear by intense sound has been examined by Enger (1981) and Hastings *et al.* (1995, 1996) with scanning electron microscopy. Hastings *et al.* (1996) found destruction of sensory cells in the inner ears of oscars (*Astronotus ocellatus*) four days after being exposed to continuous sound for one hour at 180 dB (re:1 μPa) at 300 Hz. Hastings (1995) also reported that 13 out of 34 goldfish exposed for two hours to sound pressure levels ranging from 192 to 204 dB (re:1 μPa) at either 250 or 500 Hz experienced equilibrium problems that included swimming backwards and/or upside down and wobbling from side to side. These fish recovered within one day suggesting that the damage was not permanent. This fish behavior could have been caused by post-traumatic vertigo (lack of balance and dizziness caused by a problem in the inner ear) similar to that experienced by humans after a severe blow to the body or head.

Loud sounds can have detrimental effects on fish by causing stress, increasing risk of mortality by reducing predator avoidance capability, and interfering with communication necessary for navigation and reproduction. Scholik and Yan (2001) reported temporary threshold shifts for fathead minnows (*Pimephales promelas*) exposed to 24 hours of white noise with a bandwidth of 300 – 4000 Hz and overall sound pressure level of only 142 dB (re:1 μPa). Their results indicated that the effects could last longer than 14 days. Even if threshold shifts do not occur, loud sounds can mask the ability of aquatic animals to hear their environment.

Pile driving may result in "agitation" of salmonids indicated by a change in swimming behavior (Shin 1995). Salmon and steelhead may exhibit a startle response to the first few strikes of a pile. The startle response is a quick burst of swimming that may be involved in avoidance of predators (Popper 1997). A fish that exhibits a startle response is not in any way injured, but it is exhibiting behavior that suggests it perceives a stimulus indicating potential danger in its immediate environment. Fish do not exhibit a startle response every time they experience a strong hydro-acoustic stimulus. The startle response is likely to extinguish after a few pile strikes.

A study in Puget Sound, Washington suggests that pile driving operations disrupt juvenile salmon behavior (Feist et. al. 1992). Though no underwater sound measurements are available from that study, comparisons between juvenile salmon schooling behavior in areas subjected to pile driving/construction and other areas where there was no pile driving/construction indicate that there were fewer schools of fish in the pile-driving areas than in the non-pile driving areas. The results are not conclusive but there is a suggestion that pile-driving operations may result in a disruption in the normal migratory behavior of the salmon in that study, though the mechanisms salmon may use for avoiding the area are not understood at this time.

b. Case Studies - Pile Driving Projects

The following examples of specific pile driving projects provide additional insight to the potential effects of the East Span Project on listed salmonids:

At the Hong Kong Airport Fuel Transfer Facility project an air bubble ring with a diameter of 50 m was placed around the pile-driving operation. The pile driver was a six metric ton diesel

hammer at 90 kilojoules (kJ). Hammer strikes resulted in underwater pulses of sound about 40 milliseconds in duration. The effective source level (inferred by extrapolating from the longer-distance measurements) was 238 dB re: 1 μPa at one meter without bubbles and 234 dB with bubbles. On average, the bubble screen diminished the sound pressures by 4 dB. The contractor did not measure peak pressures. It was also observed that low and high frequency sounds were not attenuated by the air bubble curtain. The peak pressure of sound anticipated to occur during the proposed East Span project (268 dB re: 1 μPa at one meter) far exceeds the level observed for the Hong Kong project.

At the Canada Place Cruise Ship Terminal in Vancouver, B.C., open-ended steel pipe piles 36 inches in diameter with 0.75-inch wall thickness were driven, as were 24-inch diameter closed-ended steel pipe piles with 0.75-inch wall thickness (Longmuir and Lively 2001). An air bubble curtain was developed to protect fish. It was kept as close to the pile as practical, allowing for battered (slanted) piles to be driven. The authors stated that a proper bubble curtain can reduce underwater sound overpressures from pile driving by at least 85 percent (16.5 dB) and that their bubble curtain in Vancouver reduced underwater overpressures during pile driving from more than 22 psi to less than 3 psi (a reduction of more than 17 dB). They referred to the Canada Department of Fisheries and Oceans' criterion for fish safety of not exceeding an explosion blast peak pressure of 14.5 psi (220 dB re: 1 μPa). The Canada Department of Fisheries and Oceans standard for fish safety is based on mortalities immediately after the explosion. The Vancouver study found that, perhaps due to the repetitive nature of pile driving, the peak pressure should be less than 4.5 psi (210 dB re: 1 μPa) to protect small fish. This standard is supported by Rasmussen (1967), who found that 3 to 6 month old salmon were killed by underwater explosions at levels exceeding 2.7 psi (204 dB re: 1 μPa).

To assess the environmental and technical factors involved in driving the very large piles proposed for the East Span Project, a Pile Installation Demonstration Project (PIDP) was undertaken in late 2000 in which three eight-foot diameter steel pipe pilings were driven into the San Francisco Bay (Illingworth and Rodkin 2001). The underwater sound measurements were not comprehensive, but important data came from two measurements at hydrophone depths of 1 and 6 m, without a sound attenuation system in place. Using a pile-driver energy of 900 kJ, peak pressure of 207 dB (re: 1 μPa) at a distance of 103 m and 191 dB at distance of 358 m were measured. Correcting for hammer size, excess attenuation of approximately 30 dB per tenfold increase in distance and applying the spreading loss formula (1), it was estimated that the pile driving source level (1 meter) was 268.5 dB (re 1 μPa) for the 1,700 kJ hammer (Greene 2001). Applying the spreading-loss model for received levels, the corresponding equation is:

$$RL\ (dB\ re:\ 1\ \mu Pa) = 266.5 - 29.6 \bullet \log(R)\ for\ R\ in\ m.$$ (Greene 2001)

The attenuation loss rate was almost 30 dB per tenfold change in distance, close to the 28 dB per tenfold change in distance observed at the Hong Kong refueling facility discussed above.
The maximum pile-driver energy available for the proposed project is 1,700 kJ. Applying the scaling suggested above, the peak pressure would be expected to have been

20•log(1,700/900)0.33 = 1.8 dB more at the higher energy level, or almost 209 dB at distance of 103 m. Thus, when the energy is 1,700 kJ, the constant term will be 268.5 dB in the equation for received level.

At the Baldwin Bridge piers in Connecticut, underwater acoustic measurements from the demolition pounding of a "hoe ram" were recorded by Dolat (1997). The ram struck the pier approximately four times per second creating loud pulsed sine waves with each blow. Four strikes per second was equivalent to a continuous 170 dB (re: 1μPa). Based on these estimates of the peak sound pressure levels, the report concluded that fish less than 30 m away could experience permanent auditory system damage, temporary and possibly permanent loss of equilibrium or complete incapacitation. The report included a brief discussion of previously unreported studies that show that beyond a brief startle response associated with the first few acoustic exposures, fish do not move away from areas of very loud noises and can be expected to remain in the area unless they are carried away by the river currents.

c. East Span Project

The results of the above pile driving projects and information available in the literature are helpful in assessment of the potential effects of pile driving associated with the East Span Project, but considerable uncertainty remains. Effects on an individual fish during pile driving at the East Span Project will be dependant on a number of variables associated with environmental conditions at the project site and variables associated with the specific construction schedule, including:

1. Size and force of the hammer strike
2. Distance from the pile
3. Depth of the water around the pile
4. Depth of the fish in the water column
5. Amount of air in the water
6. The texture of the surface of the water (size and number of waves on the water surface)
7. Bottom substrate composition and texture
8. Size of the fish
9. Species of fish
10. Presence of a swim bladder
11. Physical condition of the fish
12. Effectiveness of bubble curtain sound/pressure attenuation technology

The discussion below elaborates upon several of these areas of uncertainty and the potential range of effects to listed salmonids associated with pile driving at the East Span Project.

Uncertainty associated with the effectiveness of the proposed air bubble curtain is related to several factors. The size of the impact hammers proposed for use on the East Span Project is larger than any of the hammers used in the projects discussed above. The resulting sound pressure

levels generated are also expected to significantly exceed those measured in the examples above. Although the project's bubble curtain design was effective at the Canada Place Cruise Ship Terminal project, the sound pressure levels expected on the East Span Project are orders of magnitude greater and the performance of the bubble curtain under these conditions is unknown. The East Span Project is also located in an area of strong tidal currents. Experience has shown that bubble curtains work best in areas not influenced by currents, because moving water will carry the upward-traveling air bubbles away from the pile. If the pile is not completely encapsulated by air bubbles, high sound pressure waves are likely to travel further out into San Francisco Bay through areas thin or devoid of air bubbles.

Water depth at the pile driving site will influence the rate of sound attenuation and performance of the air bubble curtain. In shallow water, much of the acoustic energy is expected to be absorbed by the bottom and reflected off the surface back down to the bottom and even backwards towards the pile. Thus, the rate of attenuation is much higher in shallower water and the expected area of adverse effects is expected to be reduced. Approximately two-thirds of the large piles in the East Span Project are located in water depths less than 5 m. Sound attenuation is expected to occur at higher rates in the shallow water portion (< 5 m) of the East Span Project.

The specific construction schedule determined by the contractor will also greatly influence the level of potential impact on listed anadromous salmonids. If the contractor drives the deep water piles along the western third of the East Span (piers 2-7) during the summer and fall months, the expected impact on listed salmonids is likely to be significantly reduced. In deep water areas, sound pressure levels are expected to travel greater distances and these deeper channel areas are the likely migration corridors for both adult and juvenile Central California Coast steelhead traveling between natal streams in south San Francisco Bay and the Golden Gate. However, few juvenile or adult Central California Coast steelhead are likely be present in the action area between June 1 and November 30. Since the specific construction schedule and sequence of pile driving activities has not been established at this time, the vulnerability of listed salmonids to deep water pile driving is uncertain.

The actual number of impact hammers used will influence the extent of area affected by high sound pressure levels. It is possible that all three contractors (the contractor for Self-Anchored Suspension Main Span, the contractor for the Skyway, and the contractor for the Oakland approach structures) will drive piles simultaneously. Pile driving will be allowed from 7:00 AM to 8:00 PM, seven days a week and a pile that is underway at 8:00 PM will continue until driving of that pile segment is complete. During the winter months, pile driving conducted after dusk could overlap with the period when the majority of downstream fish movement occurs. Shapovalov and Taft (1954) report that emigrating juvenile steelhead move downstream at all hours of the day and night, but the bulk of downstream fish movement occurs during the night or at least in the early morning or late evening. Artificial lights that are used on the pile driving platforms after dark may also attract fish to the immediate vicinity of the operation and into the area of lethal sound pressure levels.

Although little information is available to determine how and where listed anadromous salmonids migrate through and utilize San Francisco Bay, general inferences can be made based on geography, bathymetry, and known behavior patterns of salmon and steelhead. For the three listed ESUs originating from the Central Valley (Central Valley steelhead, Central Valley spring-run chinook salmon, Sacramento River winter-run chinook salmon), it is believed that adult fish generally remain on the north side of San Francisco Bay after entering the estuary through the Golden Gate, migrating rapidly around Angel Island and through San Pablo Bay towards the Delta and their natal Central Valley streams. Although adult salmon have been recorded feeding near YBI in the summer, these numbers are probably small. For juvenile salmonid smolts originating from Central Valley streams, it is generally thought that they, too, utilize the north side of the Bay as their primary migration corridor. It is also the consensus of California salmon researchers that juvenile salmonids migrate relatively quickly through San Francisco Bay en route to productive feeding areas off the Pacific coast. Therefore, it is anticipated that only a small percentage of fish from the three Central Valley ESU's will be present in the East Span Project construction area and vulnerable to the adverse effects of high sound pressure levels.

Central California Coast coho salmon utilize two streams in Marin County (one empties into Richardson Bay, the other into north San Francisco Bay) and neither adults nor juveniles (emigrating as one year-olds) are expected to be near the East Span Project pile driving area during their migration between the ocean and natal streams.

The listed anadromous salmonids that are most likely to be present in the immediate construction area and exposed to harmful sound levels during pile driving are Central California Coast steelhead, which spawn in tributaries flowing into San Francisco Bay. Central California Coast steelhead traveling to and from south Bay streams must pass under the Bay Bridge. Considering the bathymetry of San Francisco Bay and the distribution of tidal currents, NMFS believes that it is likely that between 20 and 30 percent of the steelhead run from south San Francisco Bay streams pass to the east of YBI and through the East Span Project construction area, based on the division of flow around YBI. Caltrans estimates that only 5 percent of south San Francisco Bay's adult and juvenile steelhead migrate to the east of YBI. Caltrans' estimate is based on an estimate that 20 percent of the water originating from the south bay passes east of YBI and other factors related to smolt outmigration behavior (Deborah McKee, Caltrans; pers. comm; October, 2001).

Adult and juvenile salmonids are likely to take advantage of tidal currents to travel through San Francisco Bay on their migration routes. The large volume of tidal exchange at the East Span Project construction site is expected to assist with the transport of listed salmonids both to and away from areas of high sound pressure levels during pile driving. However, it is possible that an individual fish will make multiple passes through the construction area and be vulnerable more than once to harmful sound pressure levels during pile driving. The potential for multiple exposures depends on how the movements of salmonid smolts and adults are influenced by tidal currents, which is currently unknown.

The extent of area of impacted by high sound pressure levels during pile driving is strongly dependant upon the effectiveness of the proposed air bubble curtain. Based on the performance of the bubble curtain used at the Canada Place project in Vancouver and results from the PIDP, Greene (2001) estimates that fish beyond 44 m from the pile driving operation in the East Span Project will generally survive, assuming a 10 dB reduction in sound pressure levels from the bubble curtain. However, Greene (2001) assumes that immediate mortality of fish is limited to levels of 210 dB and greater. Rassmusen (1967) suggests immediate mortality of juvenile salmonids may occur at sound pressure levels exceeding 204 dB. In consideration of this uncertainty, NMFS estimates fish beyond 69 m (204 dB re: 1 μPa) will generally survive during the large hammer pile driving in the East Span Project, assuming a 10 dB reduction in sound pressure levels from the bubble curtain.

Assuming the bubble curtain reduces sound pressure levels by 10 dB, juvenile steelhead and salmon within 69 m (204 dB re: 1 μPa) of an active pile driving operation are likely to be killed instantaneously. A strong shock wave or high pressure/low pressure cycle in this zone is expected to rupture the fish's swim bladder and result in other trauma to many internal organs. If the bubble curtain does not reduce sound pressure levels by 10 dB, this zone of immediate mortality may extend up to 100 m from an active pile driving operation. Due to their size, adult salmon and steelhead can tolerate higher pressure levels (40-50 psi) (Hubbs and Rechnitzer 1952) and immediate mortality rates or adults are expected to be less than that experienced by juveniles.

Beyond 69 m (204 dB re: 1 μPa) and up to a distance of 440 m (180 dB re: 1 μPa) from an active pile driving operation, listed salmonids are likely to experience trauma in many organs including the inner ear, eyes, blood, nervous system, kidney, and liver. These injuries are expected to result in the delayed mortality of many of these fish. As the underwater sound pressure wave generated by a pile strike passes through a fish, the swim bladder will be rapidly squeezed due to the high pressure and then rapidly expand as the underpressure component of the wave passes through the fish. At relatively low sound pressure levels, only a fraction of 1 psi above the ambient sound pressure level in the environment, the swim bladder will rhythmically expand and contract with no adverse effect. The swim bladder routinely expands and contracts as salmonids swim near the surface or swim in deeper water near the bottom. At high sound pressure levels of pile driving, the swim bladder may repeatedly expand and contract, hammering the internal organs that cannot move away since they are bound by the vertebral column above and the abdominal muscles and skin that hold the internal organs in place below the swim bladder (Gaspin 1975). This pneumatic pounding may result in the rupture of capillaries in the internal organs as indicated by observed blood in the abdominal cavity, and maceration of the kidney tissues. The pneumatic duct, which connects the swim bladder with the esophagus, may not make a significant difference in the vulnerability of the salmonids since it is so small relative to the volume of the swim bladder (Gaspin 1975).

Damage to the inner ear of fish is also expected to occur within a distance of 440 m from an active pile driving operation. Based on the sound pressures and exposure times for sensory hair cell damage reported by Hastings (1995) and Hastings *et al.* (1996), and an assumption of deposition

of equivalent acoustic energy in the inner ear over time, damage to the inner ear will occur to individual fish that remain within the vicinity of high sound pressure levels (180 dB re: 1 μPa at 440 m) for more than a few minutes.

Between 440 m and 4,440 m from an active pile driving operation, sound pressure levels are predicted to attenuate from 180 dB (re: 1 :Pa) to approximately 150 dB (re: 1 :Pa), respectively. Within this area, listed salmonids may exhibit temporary abnormal behavior indicative of stress or exhibit a startle response, but not sustain permanent harm or injury. However, there is some uncertainty about the potential for injury to fish from sound pressure levels in this range, because Hastings has information that suggests damage to the inner ear may occur at levels greater than 150 dB (re: 1 :Pa) (M. Hastings pers. comm., October 2001). Hastings concludes that 150 dB (re: 1 FPa) is a safe upper limit for relatively short exposures (M. Hastings pers. comm., October 2001).

Determining the number of threatened Central California Coast steelhead that may be injured or killed by the East Span Project is difficult at best. The size of the steelhead run in south San Francisco Bay tributaries is not known, but has been estimated as 300 adult steelhead returning to spawn in Guadalupe River, Coyote Creek, and San Franciscquito Creek (J. Smith, pers. comm.) In lieu of estimating the number of individual steelhead adversely affected, estimates of the area of potential impact due to pile driving and a percentage of the population passing through this area of impact can be calculated. For the purposes of this analysis, the zone of potential impact is defined as the area where there may be injury or mortality to listed anadromous salmonids. Based on the research discussed above and the recommendations of Hastings (pers. comm., October 2001), the area of injury and mortality of juvenile anadromous salmonids is defined as the area with sound pressure levels exceeding 180 dB (re: 1 μPa). During the Baldwin Bridge project in 1997, NMFS established 180 dB s the threshold for harm to fish during pile driving operations (M. Ludwig, pers. comm., October 2001). For adult salmonids, the area of injury and mortality is defined as the area exceeding 200 dB (re 1 μPa), because adult fish can tolerate higher pressure levels (40-50 psi) (Hubbs and Rechnitzer 1952) than can juvenile fish. This represents an order of magnitude (20 dB) increase over levels that produce lethal effects for juveniles.

Using Greene's calculations (Greene 2001) the area of potential impact to juvenile anadromous salmonids with 10 dB of reduction at the air bubble curtain is expected to extend 440 meters from the pile (180 dB). For adult salmonids, the area of potential impact with a 10 dB reduction by the bubble curtain is expected to extend approximately 100 meters from the pile (200 dB). Taking into account tidal currents at the project site ranging from 3 knots in deep water to low velocities along shoreline areas, an average velocity of 1 knot (1,852 m/s) was selected. A one hour impact volume for each pile was summed based on the depth of water and then multiplied by the estimated total driving time of 5 hours per pile.

To calculate the percentage of the south San Francisco Bay steelhead population that would be impacted by sound levels greater than 180 dB (re: 1 μPa), the following assumptions were made: (1) twenty five percent of the fish migrate to the east side of YBI en route to and from the Golden

Gate; (2) pile driving will occur in areas greater than 5 m deep during the period between December and May; (3) pile driving will occur on average 3 hours per day; and (4) only one impact hammer will be operating. The 880 m diameter of the impact area corresponding to the 180 dB level is roughly one-third the distance between from YBI to the Oakland shoreline. With these assumptions, roughly 1 percent of the outmigrating juvenile population of steelhead originating from south San Francisco Bay tributaries will be injured or killed by sound pressure levels exceeding 180 dB (re: 1 μPa) during pile driving. If two impact hammers are used simultaneously during this period, this percentage could increase up to 2 percent. Additional uncertainties that could increase this percentage of injured and killed juvenile steelhead include: (1) more than 25% of the juvenile fish migrate along the east side of YBI; (2) the air bubble curtain does not achieve full 10 dB level of sound reduction; (3) tidal currents and swimming behavior of the fish result in multiple passes through the construction area; and (4) pile driving in deep water areas extends beyond one year into a second steelhead migration season. On the other hand, the level of impact upon the south San Francisco Bay steelhead could be significantly reduced if pile driving activities are limited to shallow water areas during the winter and spring migration season, the bubble curtain performs better than expected, or fewer than 25 percent of the run migrate along the east side of YBI.

A similar calculation for adult steelhead based on an impact area diameter of 200 m indicates less than 0.5 percent of the run in south San Francisco Bay tributaries will be killed or injured by high sound pressure levels during pile driving. As with the calculation for juvenile fish, several factors could increase this percentage including: (1) multiple hammers are used; (2) more than 25 percent of the adults migrate along the east side of YBI; (3) the air bubble curtain is less effective; (4) tidal currents and swimming behavior of the fish result in multiple passes through the construction area; and (5) pile driving in deep water areas extends beyond one year into a second steelhead migration season. Impacts would be reduced if pile driving activities are limited to shallow water areas during the winter migration season, the bubble curtain performs better than expected, or fewer than 25 percent of the run migrate along the east side of YBI.

It has been suggested that salmon and steelhead may avoid areas of high sound pressure levels and impacts may be reduced by their own behavioral response to the pile driving noise. Shin (1995) suggests that noise may result in "agitation" of salmonids indicated by a change in swimming behavior. However, observations to date suggest salmon and steelhead may exhibit a startle response to the first few strikes of a pile, but the fish do not exhibit a startle response every time they experience a strong hydro-acoustic stimulus. The startle response is likely to extinguish after a few pile strikes. Therefore, the noise associated with pile driving is not expected to delay or block adult or juvenile salmonids in the course of their migrations.

Coffer dams may be used by the contractors to dewater some pile installation sites. If cofferdams are installed, sediment will be excavated and the cofferdam dewatered. The steel pipe piles would be driven after dewatering into the Alameda geologic formation. It is anticipated that the layer of air and the coffer dam itself surrounding the pile will effectively attenuate sound pressure waves to safe levels for aquatic organisms in the Bay including listed salmonids. Coffer dams are likely

to be used in shallowest areas at the Oakland Touchdown which will avoid adverse effects during the driving of these piles. In a riverine environment, the installation of cofferdams can trap fish inside. Fish within an enclosed cofferdam will be stranded and likely killed during dewatering. Although remote in a large estuarine environment such as San Francisco Bay, there is a slight risk for stranding of juvenile listed anadromous salmonids inside a cofferdam at the East Span Project.

2. Dredging

The potential impacts of dredging associated with the East Span Project include both direct and indirect adverse effects. Potential direct effects are entrainment of juvenile fish (Dutta and Sookachoff 1975, Boyd 1975, Armstrong *et al.* 1982, Tutty 1976). Potential indirect effects include behavioral (Sigler *et al.* 1984, Berg and Northcote 1985, Whitman *et al.* 1982, Gregory 1988) and sub-lethal impacts from exposure to increased turbidity (Sigler 1988, Sigler *et al.* 1984, Kirn *et al.* 1986, Emmett *et al.* 1988, Servizi 1988); redistribution and/or release of contaminants, with increased potential for chronic or acute toxicity; mortality from predatory species that benefit from activities associated with dredged material disposal; changes in the native sediment characteristics near disposal sites; and shifts in sediment dynamics that may alter available food supply (Morton 1977).

a. Entrainment

Dredging techniques expected to be employed for this project can be categorized as either hydraulic or mechanical. Both methods may be used. Entrainment of listed salmonids (primarily juveniles) can occur when hydraulic dredging is used; mechanical dredging is unlikely to entrain fish. If the dredging draghead is in operation while above the surface of material being removed and fish are present, they may be unable to overcome the water velocities near the dredging draghead and be pulled into the hold of the ship. Dutta (1976) reported that salmon fry were entrained by suction dredging in the Fraser River. Braun (1974a, b), in testing mortality of entrained salmonids, found that 98.8 percent of entrained juveniles were killed. Boyd (1975) indicated that suction pipeline dredges operating in the Fraser River during fry migration took substantial numbers of juveniles. Further testing in 1980 by Arseneault (1981) resulted in entrainment of chum and pink salmon, but in low numbers relative to the total number of salmonids out-migrating (0.0001 to 0.0099 percent).

Dredging for barge access channels at the Oakland Touchdown and to dismantle the existing bridge could take four to six months each to complete. Water depths are expected to be approximately 4.3 m in depth or less adjacent to the Oakland Touchdown, where rearing and foraging juvenile chinook salmon may occur during the months of January through May (Baxter *et al.* 1999). However, NMFS expects that juvenile Central California Coast steelhead are less likely to be rearing or foraging in this shallow water habitat due to their age and size.

b. Turbidity

There is little direct information available to assess the effects of turbidity in San Francisco Bay on juvenile or adult salmonids. Review of the literature regarding the effects of turbidity associated with dredging operations on anadromous salmonids indicates turbidity may interfere with visual foraging, increase susceptibility to predation, and interfere with migratory behavior. Barges for holding, transport, and disposal of dredged material will be selected by the contractor, so their size and characteristics cannot be accurately estimated.

LaSalle (1988) described the physical characteristics of sediment dispersal during hopper dredging activities. In general, sediment concentrations at the bottom are up to 500 mg/l and 100-150 mg/l at the surface, given no overflow occurs. When overflow does occur, sediment concentrations in the upper water column may reach levels as high as 1000 mg/l. LaSalle (1988) cautioned that site specificity is a very important consideration.

The Port of Oakland evaluated turbidity plumes associated with clamshell dredging operations for its 50-foot port deepening project. The results indicated that increases in turbidity were localized, with the most concentrated portion of the plume located near the bottom and decreasing concentrations nearer the surface (Port of Oakland 1998). The lateral extent of a turbidity plume during dredging depends on the tide, currents, and wind conditions during the dredging activities. Depending on the body of water and the hydraulics of the system, sediment plumes can extend approximately several hundred to 1,000 m from the operation.

Because fish tend to avoid areas of high turbidity and return when concentrations of solids are lower, impacts are expected to be temporary. For the East Span Project, turbidity levels that may induce mortality are not expected to occur due to the open environment at both the dredge and disposal sites. However, turbidity may alter the behavior of both adult and juvenile fish. They are likely to avoid areas of increased turbidity at the dredge site and disposal events near Alcatraz Island. This alteration of behavior may adversely affect juvenile feeding, increase the susceptibility of juveniles to predation, and interfere with migratory behavior.

c. Contaminants

In the aquatic environment, most anthropogenic chemicals and waste materials, including toxic organic and inorganic chemicals, eventually accumulate in the sediment. Contaminated sediments may be directly toxic to aquatic life or can be a source of contaminants for bioaccumulation in the food chain (Ingersoll 1995). Fine sediments in the project dredging areas increase the likelihood of a problem with contaminants, because this fraction consists of particles with relatively large ratios of surface area to volume, which increase the sorptive capacity for contaminants.

Dillon and Moore (1990) reported that major pollutant sources for San Francisco Bay include the freshwater flow from the Sacramento-San Joaquin River systems, over 50 waste treatment plants, and about 200 industries which are permitted to discharge directly into the bay (citing Luoma and

Phillips 1988). Environmental contaminants discharged into aqueous systems tend to associate with particulate material in the water column and with consolidated bedded sediments. Caltrans performed sampling, chemical analyses and acute toxicity bioassays of bay sediments from the project area to determine the suitability of dredged material for disposal. Chemical analyses were performed for priority pollutant metals; total and dissolved sulfides; total recoverable petroleum hydrocarbons (TRPH); phthalate esters; polynuclear aromatic hydrocarbons (PAHs); pesticides; polychlorinated biphenyls (PCBs); mono-, di-, tri- and tetrabutyltin and total organic carbon (TOC). Biological analyses were conducted for 96-hour L/SP bioassay, 10-day solid phase bioassay and 28-day bioaccumulation. The results of these studies showed a general absence of significant contamination, with low or non-detectable concentrations of chemical contaminants of concern except at two groups of dredge sites (USACOE letter dated October 31, 2000).

Material from the upper 12 feet of testing locations SFOBB-N-2 and SFOBB-N-5 is not suitable for unconfined aquatic disposal, because test results showed significant solid phase toxicity to *Nephtys* when compared to the reference sites. This material will be disposed of at an upland location. Material from the upper 12 feet of Site SFOBB-N-1 is also unsuitable for unconfined aquatic disposal or to wetland surfaces due to excessive bioaccumulation of individual constituents of PAHs and will be disposed of at an upland location.

Although the DMMO determined that the majority of dredged material from the project is suitable for unconfined aquatic disposal, contaminants are present. They include oil and grease, TRPH, chlorinated pesticides (DDD, DDE, and DDT[4]), metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc), organotins, and 12 PAHs. Concentrations appear unlikely to result in any acute toxicity to listed anadromous salmonids as a result of the re-suspension of contaminated sediments during project dredging. However, there remains a concern for chronic effects that may occur as a result of the uptake of contaminants by juvenile salmonids during their migration through the Bay.

d. Ammonia and Dissolved Oxygen

Two common by-products produced in anaerobic sediments containing adequate concentrations of organic matter are ammonia and hydrogen sulfide, which are highly toxic and produced by anaerobic aquatic microorganisms. Dillon and Moore (1990) report that ammonia can exert toxicity at relatively low concentrations on fish and other aquatic organisms. The release of ammonia during dredging and the disposal of dredged material could affect aquatic species as it is

[4]These are Persistent Organochlorine Compounds that are pesticides used historically for mosquito abatement and as insecticides; they are no longer commercially manufactured. DDT is gradually metabolized into DDE and DDD. Commercial DDT was a mixture of DDT, DDE and DDD. DDT: dichloro-diphenyl-trichloro-ethane; or (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane). DDE (1,1-dichloro-2,2-bis(chlorophenyl) ethylene); DDD: (1,1-dichloro-2,2-bis(p-chlorophenyl) ethane).

re-suspended in the water column.

For the East Span Project it appears unlikely that acute, short-term effects due to increased levels of ammonia at either the dredge site or the disposal site will occur due to the open environment at the disposal site, and to a slightly lesser extent at the dredge site. Un-ionized form of ammonia has great potential for adversely affecting listed salmonids, but the concentrations anticipated at the dredge and disposal sites are unlikely to directly affect juvenile or adult listed anadromous salmonids. Indirect effects, in a similar pattern as is described for turbidity, may occur through behavior modification resulting from avoidance of the increased concentration levels of ammonia near both sites.

e. Benthic Resources

Oliver *et al.* (1977) noted two phases of succession in benthic communities after disturbance (such as dredging or burial by disposal of dredged material). In the first phase, opportunistic species such as polychaetes move into a disturbed area. In the second phase, organisms surrounding the disturbed area re-colonize the affected site. Reilly *et al.* (1992) concluded that dredging-induced habitat alterations are minor compared to the large-scale disturbance of habitat in San Francisco Bay occurring from natural physical forces, such as seasonal and storm-generated waves, although these events would primarily occur in shallow water. However, dredged material may have substantially different characteristics than material that is resuspended through natural forces.

The SF-11 disposal site near Alcatraz Island has been used for decades and has a low biological standing crop of invertebrates. There will be some short-term impact to invertebrate colonies as a result of dredging, however, rapid recolonization rates indicate that this would be of minimal impact to salmonids.

Although benthic invertebrates in subtidal and intertidal habitats have been shown to be key food sources for juvenile salmonids during the outmigration (McCabe and Hinton 1998), it is unlikely a significant loss of prey species will occur from these activities on the bottom at either the dredge or disposal site. Within the upper portion of the water column at the disposal site there may be some loss of prey items.

3. Impacts to Critical Habitat

The entire San Francisco Bay is designated critical habitat for Central California Coast steelhead while areas north of the San Francisco-Oakland Bay Bridge are designated critical habitat for Central Valley steelhead, Central Valley spring-run chinook, and Sacramento River winter-run chinook. Permanent impacts to designated critical habitat in San Francisco Bay are expected to occur in intertidal areas just north of the Oakland Touchdown and a small area in Clipper Cove at YBI. Dredging for barge access at the Oakland Touchdown and the placement of fill to construct the westbound roadway are expected to result in the permanent loss of mud flats, sand flats, and

eelgrass beds. At Clipper Cove on YBI approximately 0.1 acre of an eelgrass bed will be impacted from the construction of a temporary barge dock. In total an estimated 3.24 acres of eelgrass beds will be permanently impacted.

The use of the eelgrass beds in San Francisco Bay by juvenile salmonids is unknown, but the areas are likely to provide some habitat value for foraging and rearing juvenile salmonids. Eelgrass can provide cover, and general habitat diversity and complexity for salmonids in the shallow water portions of San Francisco Bay.

Temporary impacts to the designated critical habitat of anadromous salmonids are expected during construction of the East Span Project. Pile driving and dredging will adversely affect the water column of San Francisco Bay. Impacts to the water column from high sound pressure levels are discussed above, as are impacts to water quality associated with dredging. Temporary loss of mud flats and sand flats in the vicinity of the Oakland Touchdown are expected due to the installation of geotube. The geotube will serve as a temporary tidal barrier during construction to protect the work area. Fish and other aquatic species will not have free access to approximately 2.63 acres of tidal sand and mud flats within the geotube protected area during construction.

Proposed on-site mitigation includes restoring the bathymetry of 1.73 acres of the barge access channel to facilitate the re-colonization of eelgrass and restoring 1.70 acres of sand flats. This on-site restoration is expected to restore some of the habitat value lost during project construction. Because the use of intertidal areas and eelgrass in San Francisco Bay by juvenile salmonids is thought to be low, these restoration actions are expected to provide minimal benefits to listed anadromous salmonids.

Off-site mitigation at Skaggs Island will allow for USFWS to acquire and restore approximately 3,000 acres of wetland and aquatic habitat. The USFWS would be responsible for designing, constructing, monitoring, and managing the habitat creation and/or restoration. The inclusion of eelgrass and sand flat habitat could provide some habitat benefits to juvenile anadromous salmonids, but the location in the north bay would primarily benefit Central Valley ESUs and not steelhead from south San Francisco Bay streams. It is anticipated that USFWS will work together with NMFS through an ESA Section 7 consultation on the acquisition and restoration of Skaggs Island when sufficient project-level information becomes available.

Caltrans will establish a $4 million fund for the restoration of federal- and State-listed salmonid habitat in the central and south Bay. These projects will be designed to restore and enhance anadromous salmonid habitat within San Francisco Bay tributaries. Properly designed and implemented restoration actions are expected to provide significant benefits to steelhead and designated critical habitat in central and south San Francisco Bay tributaries. It is anticipated that the individual restoration projects funded by this Caltrans account will undergo section 7 consultation with the Corps of Engineers, NMFS, or another appropriate Federal action agency when sufficient project-level information becomes available.

4. Integration and Synthesis of Effects on the ESUs

As discussed above, pile driving and dredging/disposal activities associated with the East Span Project are expected to result in adverse effects to listed anadromous salmonids during construction. For the three listed Central Valley ESUs (Central Valley steelhead, Central Valley spring-run chinook salmon, Sacramento River winter-run chinook salmon), the East Span Project is expected to result in minimal adverse effects, because few individuals are likely to be present within the area of direct construction impacts. High sound levels from pile driving are predicted to extend several hundred meters from the pile, but the geography and bathymetry of San Francisco Bay combined with the known behavior patterns of salmon and steelhead suggest the majority of Central Valley anadromous salmonids are likely to be on the north side of San Francisco Bay en route between the Golden Gate and their natal Central Valley streams. This portion of San Francisco Bay is several kilometers from the area that will be subject to high sound pressure levels. The dredging areas are also relatively distant from the primary migration routes of Central Valley ESUs, but the disposal site at SF-11 near Alcatraz Island could subject many Central Valley salmonids to degraded water quality during a disposal event. Therefore, it is expected the East Span Project will result in minimal adverse effects to threatened Central Valley salmon and steelhead ESUs or their designated critical habitat.

Central California Coast coho salmon utilize two streams in Marin County (one empties into Richardson Bay, the other into north San Francisco Bay) and neither adults nor juveniles (emigrating as one year-olds) are expected to be near the East Span Project pile driving area during their migration between the ocean and natal streams. Therefore, it is expected the East Span Project will result in minimal adverse effects to threatened Central California Coast coho salmon ESU or their designated critical habitat.

For Central California Coast steelhead, up to 2 percent of the juvenile population originating from south San Francisco Bay tributary streams may be adversely affected by pile driving during the construction of the East Span Project. Up to 0.5 percent of the steelhead adults returning to south San Francisco Bay streams may be adversely affected by pile driving. These construction-related impacts are expected to be limited to one year, but could extend partially into a second year depending upon the actual construction schedule determined by the contractor. Numerically south San Francisco Bay steelhead represent a very small portion of the entire Central California Coast steelhead ESU, but these south Bay tributaries represent a significant and unique portion of the geographic distribution of this ESU. Loss of 2 percent of the juvenile steelhead in south Bay streams is likely to reduce the number of adults returning by a similar percentage in the first and second years subsequent to the East Span Project's in-water construction. Loss of those adults and the 0.5 percent of returning adult steelhead during construction activities is likely to reduce juvenile production in south Bay streams in the years immediately following construction. These combined losses of adult and juvenile steelhead associated with the East Span Project are expected to manifest as a slight reduction (< 2 percent) in the number of adult returns in future years.

Under former baseline conditions, these reduced levels of juvenile steelhead production and adult returns would likely have resulted in long-term effects on the south Bay steelhead population's survival and potential for recovery. However, recent improvements to baseline conditions in two of the most important south San Francisco Bay steelhead streams are expected to significantly improve reproductive success and survival of juvenile steelhead. On Coyote Creek a fish ladder was installed in 1999 on Coyote Steel Dam, approximately 10 miles downstream of Anderson Dam. Prior to the construction of this ladder, adult steelhead had very limited access to the reach upstream with the highest quality spawning and juvenile rearing habitat in all of Coyote Creek. On Guadalupe River a fish ladder was constructed at the Alamitos Drop Structure in 1999. The Alamitos fish ladder provides upstream passage over a 13-foot drop structure and allows steelhead access to high quality spawning and rearing habitat in the upper watershed. These fish ladders on both Coyote Creek and Guadalupe River provide returning adult steelhead with suitable passage conditions at structures where no fish passage facilities existed prior to 1999.

Improved access to significantly better habitat conditions upstream for spawning (i.e. clean gravels) and rearing (i.e. suitable flows and temperatures) are expected to result in long-term benefits towards the survival and recovery of steelhead in south San Francisco Bay. Additional restoration actions implemented by the $4 million fund established by Caltrans are also expected to improve the environmental baseline in central and south San Francisco Bay steelhead streams. Therefore, the number of adult steelhead returning to south Bay streams is expected to improve and will provide the south San Francisco Bay steelhead populations additional resilience to contend with the potential adverse effects of the East Span Project. In consideration of the above, the East Span Project is not anticipated to reduce the likelihood of the survival and recovery of the local Central California Coast steelhead populations or the Central California Coast ESU.

Permanent loss of eelgrass beds, mud flats and sand flats in the vicinity of the Oakland Touchdown will diminish the value of designated critical habitat in San Francisco Bay for listed anadromous salmonids. However, observations to date suggest the use of these habitat types by juvenile salmonids is primarily limited to young fall-run chinook salmon prior to smolt migration (Baxter *et al.* 1999). Therefore, these habitat losses are expected to have minimal adverse effect on the function of this component of designated critical habitat for listed salmon and steelhead.

VI. Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." For the purposes of this consultation, the action area is the San Francisco Bay between the Richmond-San Rafael Bridge in the north, the Golden Gate Bridge in the west, and the San Mateo Bridge in the south. Non-Federal actions that may affect the action area include State angling regulation changes, voluntary State or private sponsored habitat restoration activities, State hatchery practices, discharge of stormwater and agricultural runoff, increased population growth, mining activities, and urbanization. State angling

regulations are generally moving towards greater restrictions on sport fishing to protect listed fish species. Habitat restoration projects may have short-term negative effects associated with in-water construction work, but these effects are temporary, localized, and the outcome is typically a benefit to these listed species. State hatchery practices may have negative effects on naturally produced salmonids through genetic introgression, competition, and disease transmission resulting from hatchery introductions. Farming activities within or adjacent to the action area may have negative effects on San Francisco Bay water quality due to runoff laden with agricultural chemicals. Future urban development and mining operations in the action area may adversely affect water quality and estuarine productivity.

VII. Conclusion

After reviewing the best available commercial and scientific information regarding the current status of effected listed anadromous salmonids, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed East Span Project is not likely to jeopardize the continued existence of endangered Sacramento River winter-run chinook salmon, threatened Central Valley spring-run chinook salmon, threatened Central California Coast steelhead, threatened Central Valley steelhead, or threatened Central California Coast coho salmon or result in the destruction or adverse modification of their designated critical habitats.

VIII. Incidental Take Statement

"Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, 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 ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by FHWA so that they become binding conditions of any grant or permit issued to Caltrans, as appropriate, for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the FHWA (1) fails to assume and implement the terms and conditions or (2) fails to require Caltrans or Caltrans' contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the FHWA or Caltrans must report the progress of the

action and its impact on the species to NMFS as specified in the incidental take statement (50 CFR §402.14(I)(3)).

A. Amount or Extent of Take Anticipated

It is anticipated that take associated with the East Span Project will be in the form of mortality, injury, harassment, and disturbance through temporary impacts from construction activities associated with pile driving and dredging.

1. Pile Driving

Underwater sound pressure waves generated by pile driving activities are expected to expose both adult and juvenile listed salmonids to lethal and injurious conditions. Most juvenile anadromous salmonids within a 69 m (204 dB re: 1 μPa) radius of the pile during the operation of large hammers will be killed instantaneously. Beyond this 69 m radius, up to a distance of 440 m (180 dB re: 1 μPa) from a pile driving operation, fish are expected to experience trauma in many organs including the inner ear, eyes, blood, nervous system, kidney, and liver. These injured fish are expected to have some difficulty in maneuvering or maintaining orientation in the water column, and many will be subject to delayed mortality. Still further out from the pile driving activity, up to possibly 4,400 m (150 dB re: 1 μPa) during the driving of large piles, fish may exhibit temporary abnormal behavior indicative of stress or exhibit a startle response, but not sustain permanent harm or injury.

The number of adult and juvenile Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, and Central Valley steelhead that will be harassed, injured or killed from pile driving cannot be accurately estimated, but is expected to be a very small number of individuals given their main migration corridor is the north side of central San Francisco Bay. Since Central California Coast coho salmon are limited to two streams in Marin County, neither adult nor juvenile coho salmon are expected to be near the pile driving area and no take is expected from pile driving. For Central California Coast steelhead originating from the south San Francisco Bay streams lethal and non-lethal take are likely to occur as described above. Based on the bathymetry of San Francisco Bay and the distribution of tidal currents, NMFS anticipates up to 2 percent of the juvenile steelhead steelhead originating from south San Francisco Bay streams will be adversely affected by pile driving and up to 0.5 percent of the steelhead adults returning to south San Francisco Bay streams will be adversely affected. The actual number of affected steelhead is dependent upon a number of factors including the pile driving schedule and sequence established by the contractor. Pile driving in deep water areas (greater than 5 m) during the period of December through May is expected to result in the greatest level of lethal and non-lethal take (2 percent of juveniles and 0.5 percent of adults). If this operation is repeated in the subsequent year, a second year class of steelhead will be similarly subjected to this level of take. However, these percentages would be significantly reduced if pile driving activities occur in shallow water areas during the winter and spring migration season, the bubble curtain performs better than expected, or fewer than 25 percent of the run migrate along the east side of YBI.

During the installation of cofferdams and geotubes, an unknown number of juvenile salmon and steelhead may be stranded and killed during sediment removal and dewatering. The number of fish lost to stranding in this manner is expected to be very few due to the low density of juvenile salmonids within a large estuarine environment such as San Francisco Bay.

2. Dredging and Disposal

Dredging and disposal activities are expected to result in "take" in the form of harassment and disturbance through temporary habitat impacts at and near the dredging and disposal sites. Habitat within several hundred meters at both the dredge and aquatic disposal sites will be temporarily degraded due to localized turbidity produced by dredge and disposal activities. Migration behavior and foraging of juvenile and adult salmon and steelhead are likely to be disrupted by the plume of turbid water occurring during and immediately following dredging and disposal events. An unknown amount of turbidity may also result from the air bubble attenuation system around each pile driving activity as it causes an upwelling area while operating. Impacts from turbidity are not expected to result in lethal take of any listed anadromous salmonid. Mortality of juvenile salmonids due to entrainment in a hydraulic dredge is expected to be very low.

B. Effect of the Take

In the accompanying biological opinion, NMFS has determined that the anticipated take is not likely to result in jeopardy to Central California Coast coho salmon, Central California Coast steelhead, Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, or Central Valley steelhead.

C. Reasonable and Prudent Measures

NMFS believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take of Central California Coast coho salmon, Central California Coast steelhead, Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, and Central Valley steelhead.

The FWHA shall:

1. Utilize measures to reduce the impacts from pile driving.
2. Utilize measures to reduce the impacts from dredging.
3. Utilize measures to reduce the impacts from dismantling the existing bridge.
4. Ensure the fisheries and hydroacoustic monitoring program is properly implemented.
5. Ensure the $4 million restoration fund for off-site steelhead restoration and enhancement projects is properly administered.

D. Terms and Conditions

FHWA must comply with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are non-discretionary.

1. Utilize measures to reduce the impacts from pile driving.

   1a. To avoid attracting fish with lights during nighttime pile driving operations, pile driving shall be limited to daylight hours to the extent practicable and the use of artificial lights shall be minimized. If needed, illumination for any pile driving operations shall be directed away from the water.

   1b. To maintain the integrity of the air bubble curtain, no barges, boat traffic, or other structure or equipment will be allowed to penetrate the curtain during pile driving activities.

   1c. Piles containing creosote for in-water construction will not be used.

   1d. Installation of the geotube shall occur during low tide to minimize the potential for entrapment and stranding of fish within the enclosed area.

2. Utilize measures to reduce the impacts from dredging.

   2a. The draghead of dredges shall be operated with the intake at or below the surface of the material being removed. The intake may be raised a maximum of three feet above the bed for brief periods of purging or flushing of the intake system. At no time shall the dredge be operated at a level higher than three feet above the bed.

3. Utilize measures to reduce the impacts from dismantling the existing bridge.

   3a. Dredging/disposal associated with barge access for the dismantling the existing bridge will be restricted to the period between June 1 and November 30.

   3b. All activities that will generate high sound pressure levels (>150 dB re: 1 μPa) associated with the dismantling of the existing bridge will be restricted to the period between June 1 and November 30.

4. Ensure the fisheries and hydroacoustic monitoring program is properly implemented.

   4a. A fisheries and hydroacoustics monitoring plan will be developed that includes the following:

      (1) underwater sound measurements at various distances and depths from pile driving operations

(2) evaluation of fish mortality and injury rates through the use of caged fish at various distances and depths from pile driving operations;
(3) observations of bird predation and behavior.

4b. The draft fisheries and hydroacoustic monitoring plan will provided to the NMFS for review and approval 90 days prior to initiation of pile driving.

4c. Data from the monitoring program will be made available to NMFS on a real-time basis.

4d. An interim report will be provided to NMFS prior to December 31, 2002, and a final report will be provided by June 1, 2004.

4e. All salmonids killed and collected by this project must be transferred to the NMFS Southwest Fisheries Science Center Santa Cruz Laboratory Tissue Repository within thirty days of collection.

5. Ensure the $4 million restoration fund for off-site steelhead restoration and enhancement projects is properly administered.

5a. Quarterly reports regarding the status of the steelhead restoration and enhancement fund shall be provided to NMFS beginning in June 2002 and continue until all funds have been spent.

5b. All proposed expenditures from the account shall be provided to NMFS 30 days in advance of the proposed withdrawal date. Proposed expenditures shall be fully described and tied to a proposed steelhead restoration and enhancement project in central or south San Francisco Bay tributaries. NMFS must provide written approval in advance of each withdrawal from the escrow account.

REPORTING REQUIREMENTS

All reports and other materials to be submitted to NMFS described in the above terms and conditions shall be submitted to:

San Francisco Bay Team Leader
National Marine Fisheries Service
777 Sonoma Ave., Room 325
Santa Rosa, California 95404
Phone (707) 575-6050
Fax (707) 578-3435

IX. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, or to develop information.

1. The FHWA, in conjunction with Caltrans, and other local, state, and federal agencies, should provide training for Caltrans Environmental and engineering staff that will assist in avoiding or minimizing the impacts of transportation projects of salmonids and their habitats.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NMFS requests notification of the implementation of any conservation recommendations.

X. Reinitiation Notice

This concludes formal consultation on the proposed San Francisco - Oakland Bay Bridge East Span Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the actions 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 agency actions that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner or to an extent 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, formal consultation shall be reinitiated immediately.

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Enclosure 2

San Francisco-Oakland Bay Bridge
East Span Seismic Safety Project

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS
(Magnuson-Stevens Fishery Conservation and Management Act - EFH Consultation)

San Francisco-Oakland Bay Bridge
East Span Seismic Safety Project

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS
(Magnuson-Stevens Fishery Conservation and Management Act - EFH Consultation)

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) set forth mandates for the National Marine Fisheries Service (NMFS), regional fishery management councils, and federal action agencies to identify and protect important marine and anadromous fish habitat. The Councils, with assistance from NMFS, are required to delineate "essential fish habitat" (EFH) in fishery management plans (FMPs) or FMP amendments for all managed species. Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NMFS regarding potential adverse effects of their actions on EFH, and respond in writing to NMFS' conservation recommendations. In addition, NMFS is required to comment on any state agency activities that would impact EFH. Although the concept of EFH is similar to that of "Critical Habitat" under the Endangered Species Act, measures recommended to protect EFH are advisory, not proscriptive.

The Pacific Fisheries Management Council has delineated EFH for west coast groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998b) and Pacific Coast Salmon (PFMC 1999). Species from each of the above Fisheries Management Plans (FMP) occur within the action area of the preceding biological opinion and require EFH consultation.

I. IDENTIFICATION OF ESSENTIAL FISH HABITAT

Essential fish habitat (EFH) is defined in the MSFCMA as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity...". NMFS regulations further define "waters" to include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" to include sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" to mean the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" to cover a species' full life cycle.

The geographic extent of EFH for coastal pelagic species and west coast groundfish includes waters, substrates and biological communities within bays and estuaries of the Pacific coast seaward from the high tide line (Mean Higher-High Water) or extent of upriver saltwater intrusion. This includes waters of San Francisco Bay which are within the action area of the

preceding biological opinion.

For Pacific coast salmon, the geographic extent of EFH currently being considered includes both marine and freshwater habitat. For purposes of this consultation, Pacific coast salmon EFH corresponds to "Critical Habitat" designated under the Endangered Species Act for Sacramento River winter-run chinook (58 FR 33212), Central Valley Spring-run chinook salmon, and Central California Coast coho salmon (64 FR 24049).

II. PROPOSED ACTION.

The San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (East Span Project) is described in the preceding biological opinion for the endangered Sacramento River winter-run chinook salmon, threatened Central Valley spring-run chinook salmon, threatened Central California Coast coho salmon, threatened Central California Coast steelhead, and threatened Cental Valley steelhead.

III. EFFECTS OF THE PROJECT ACTION

The following is a general description of the non-fishing related activities that directly or cumulatively, temporarily or permanently may threaten the physical, chemical and biological properties of the habitat utilized by west coast groundfish species, coastal pelagic species or Pacific coast salmon and their prey within the proposed project area. The direct result of these threats is that the function of EFH may be eliminated, diminished or disrupted.

Potential impacts to Pacific coast salmon EFH, specifically Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, and Central California Coast coho salmon, due to the proposed action have been described in the preceding biological opinion. These potential impacts would also apply to Central Valley fall and late-fall run chinook salmon.

Adverse effects of the proposed action on west coast groundfish (e.g. starry flounder, leopard shark, brown rockfish, English sole) EFH, coastal pelagic species (e.g. northern anchovy, Pacific sardine) EFH, and biological prey organisms (e.g., pacific herring, shiner perch) for EFH species may occur through direct mortality and injury during pile driving operations, and entrainment, turbidity, resuspension of contaminants, and degraded water quality during dredging and disposal activities. Additionally, the proposed project will destroy at least 3.24 acres of eelgrass habitat which functions as an important habitat type used by EFH species (e.g., Northern anchovy, English sole, and starry flounder) and their prey for foraging and shelter.

IV. CONCLUSION

Upon review of the anticipated effects of the proposed project, NMFS believes that San Francisco-Oakland Bay Bridge East Span Seismic Safety Project will adversely affect Pacific coast salmon EFH, coastal pelagic species EFH and west coast groundfish EFH.

V. EFH CONSERVATION RECOMMENDATIONS

Pursuant to Section 305(b)(4)(A) of the Magnuson-Stevens Act, NMFS recommends that the terms and conditions of the preceding biological opinion's Incidental Take Statement be adopted as EFH Conservation Recommendations for Pacific coast salmon, coastal pelagic species, and west coast groundfish. Additionally, NMFS recommends the following conservation recommendations be adopted:

1. A mitigation (compensation) plan for permanent and temporary losses of eelgrass habitat will be provided to the NMFS prior to beginning construction. This plan must be approved by NMFS before construction begins. The plan must include, but not be limited to the following mandatory components, with each mitigation component fully described in the plan.

a. Replace in-kind, permanently impacted eelgrass beds (currently estimated at 3.24 acres) at or near the project site through the creation of new eelgrass beds at the Oakland Touchdown area and at Clipper Cove on Yerba Buena Island. This would be accomplished by placing sand-filled plateaus to raise elevations of the Bay bottom to a level suitable to support eelgrass, and then planting the area with eelgrass from a donor site. The actual areas to be directly or indirectly impacted by dredging, by bridge installation, and by other actions are not clearly defined, and appropriate replacement ratios are yet to be determined by NMFS.

b. A mitigation fund will be established to finance an Adaptive Management Plan for providing mitigation for the balance of project impacts to eelgrass, replacing failed mitigation attempts, and other actions determined appropriate for eelgrass habitat restoration and enhancement. The amount and management of this fund will be negotiated with NMFS prior to construction. NMFS determines that eelgrass mitigation success in San Francisco Bay is speculative and that additional information, including habitat surveys and limiting factors analyses, is crucial and should be included in this Adaptive Management Plan. NMFS further determines that using the mitigation fund for this purpose is appropriate and sets no precedent for future similar mitigation actions in the bay.

2. ***Disposal of fine-grained sediments at disposal sites in San Francisco Bay will contribute to increased of turbidity levels. One of the disposal sites, SF-11, is dispersive, and any fine-grained sediments deposited at this site will resuspend and get transported to other areas, both inside and outside of the Bay. The resultant increased turbidity can inhibit foraging by fish and reduce production of eelgrass. Another result can be an overlying layer of fine-grained sediments over sand shoals or rocky areas, thereby reducing the quality of those types of habitats. These habitats are utilized by many groundfish species including flatfish and rockfish. To reduce impacts on EFH , the disposal of dredged materials shall only occur at upland disposal sites, when available. When upland disposal sites are not available in San***

Francisco Bay, then dredged materials shall be transported to the San Francisco Deep Ocean Disposal Site (SF-DODS) for disposal.

VI. FEDERAL AGENCY STATUTORY REQUIREMENTS

The Magnuson-Stevens Act (Section 305(b)(4)(B)) and federal regulations (50 CFR Section 600.920(j)) to implement the EFH provisions of the MSFCMA require federal action agencies to provide a written response to EFH Conservation Recommendations within 30 days of its receipt. The Federal action agency included in this consultation is the U.S. Department of Transportation. A preliminary response is acceptable if final action cannot be completed within 30 days. The final response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on designated EFH. If the response is inconsistent with our EFH Conservation Recommendations, it must provide justification for not implementing them.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

February 6, 2012

In response refer to:
F/SWR/2011/05965

James B. Richards
Deputy Director Environmental Planning and Engineering
Office of Natural Sciences and Permits
California Department of Transportation
111 Grand Avenue
Oakland, California 94623-0660

Dear Mr. Richards:

Thank you for your letter of August 11, 2011, requesting formal consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*), for the San Francisco-Oakland Bay Bridge East Span Seismic Project, located in the San Francisco Bay, San Francisco, California.

The enclosed supplemental biological opinion is based on our review of the remaining activities for the project, and describes NMFS' analysis of potential effects to the following listed species (Evolutionary Significant Units [ESU] or Distinct Population Segment [DPS]), and designated critical habitat, in accordance with section 7 of the ESA: Sacramento River winter-run Chinook salmon ESU (*Oncorhynchus tshawytscha*), Central Valley spring-run Chinook salmon ESU (*O. tshawytscha*), Central Valley steelhead DPS (*O. mykiss*), Central California Coast steelhead DPS (*O. mykiss*), and North American green sturgeon southern DPS (*Acipenser medirostris*).

In the enclosed supplemental biological opinion, NMFS concludes the proposed action is not likely to jeopardize the continued existence of listed salmonids or southern DPS green sturgeon, and is not likely to result in the destruction or adverse modification of salmonid or green sturgeon critical habitat. NMFS anticipates that take of listed salmonids and southern DPS green sturgeon as a result of this project will occur. An incidental take statement is included with the enclosed supplemental biological opinion.

NMFS has also evaluated the proposed action for potential adverse effects to Essential Fish Habitat (EFH) pursuant to section 305(b)(2) of the Magnuson Stevens Fishery Conservation and Management Act (MSA). Based on our review (Enclosure 2), NMFS concludes that the proposed action would result in adverse effects to EFH for various life stages of species managed under the Pacific Groundfish Fishery Management Plan (various rockfish, flatfish, roundfish and sharks)

and the Coastal Pelagic Fishery Management Plan (Northern anchovy and Pacific sardine) under the MSA. The proposed action contains measures to avoid, minimize, mitigate, or otherwise offset some potential adverse effects to EFH. With the additional EFH Conservation Recommendations provided by NMFS, adverse effects to EFH are expected to be adequately minimized or compensated.

Please contact Jacqueline Pearson Meyer at (707) 575-6057, or by e-mail Jacqueline.Pearson-Meyer@noaa.gov. if you have any questions regarding this ESA consultation, or Maureen Goff for EFH questions at 707-575-6067; Maureen. Goff@noaa.gov, or if you require additional information.

Sincerely,

for Rodney R. McInnis
Regional Administrator

Enclosures

cc: Chris Yates, NMFS, Long Beach
Jane Hicks, US Army Corps of Engineers, San Francisco
Vicki Frey, CDFG
Max Delaney, BCDC
Copy to file: ARN# 151422SWR99SR190

Enclosure 1

SUPPLEMENTAL BIOLOGICAL OPINION

ACTION AGENCY:	California Department of Transportation
ACTION:	Bridge Demolition and Dredging Activities for the San Francisco-Oakland Bay Bridge East Span Seismic Project.
CONSULTATION CONDUCTED BY:	National Marine Fisheries Service, Southwest Region
TRACKING NUMBER:	2011/05965
DATE ISSUED:	**February 6, 2012**

I. CONSULTATION HISTORY

In 1998, the California Department of Transportation (Caltrans) proposed to construct a new east span of the San Francisco-Oakland Bay Bridge (SFOBB), approximately 2.18 miles (3.5 kilometers) long, to the north of the existing east span, in order to meet lifeline[1] criteria for providing emergency relief access following a maximum credible earthquake (MCE). An MCE is the largest earthquake reasonably capable of occurring based on current geological knowledge. On October 31, 2001, formal section 7 consultation between NOAA's National Marine Fisheries Service (NMFS) and the Federal Highways Administration (FHWA) for the SFOBB East Span Seismic Project was completed with the issuance of a biological opinion (BO). NMFS analyzed the effects of the proposed construction of the SFOBB East Span Seismic Project on Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, Central California Coast steelhead, and Central California Coast coho salmon, and the critical habitat designated for these species, in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*).

Consultation history for the period of September 1998 through October 2001 is documented in the October 2001 BO. The primary concerns with the project considered in the 2001 BO were impacts to listed salmonid species and their designated critical habitat through activities causing

[1] Lifelines in this context are systems and facilities critical to emergency response and recovery after a natural disaster, including hospitals, fire control and policing, food distribution, communication, electric power, liquid fuel, natural gas, transportation (airports, highways, ports, rail, and transit), water and wastewater. In the case of the East Span, a lifeline connection would provide for post-earthquake relief access linking major population centers, emergency relief routes, emergency supply and staging centers, and intermodal links to major distribution centers. The East Span would be serviceable soon after a maximum credible earthquake.

impacts to listed salmonid species and their designated critical habitat through activities causing temporary and permanent impacts associated with sound impacts from pile driving for permanent pile installation, bridge dismantling, and loss or disturbance of aquatic habitat via degradation of eelgrass beds and benthic substrates from dredging activities, placement of temporary and permanent fill, and turbidity and sedimentation. Since the October 31, 2001, BO was issued, consultation has been reinitiated ten times[2] with NMFS to address proposed changes to the project, and to address impacts of the project to recently Federally-listed species.

By letter dated April 30, 2003, NMFS concluded reinitiated consultation with FHWA to address controlled blasting at Yerba Buena Island.

By letter dated January 20, 2004, NMFS concluded reinitiated consultation to address sound monitoring at Pier E3.

By letter dated July 20, 2004, NMFS concluded reinitiated consultation to address the relocation of a 10-inch diameter gas line.

By letter dated August 16, 2004, NMFS concluded reinitiated consultation to address an "on/off" study of the air bubble curtain at Pier E4W.

By letter dated December 3, 2004, NMFS concluded reinitiated consultation to address the use of an impact hammer at Pier T1.

By letter dated April 8, 2005, NMFS concluded reinitiated consultation to address the Eelgrass Pilot Project.

By electronic correspondence dated July 26, 2005, NMFS concluded reinitiated consultation to address the installation of an electric cable between the City of Oakland in Alameda County and Treasure Island in San Francisco County.

NMFS received a letter dated May 7, 2008, from Caltrans requesting reinitiation of consultation pursuant to section 7 of the Endangered Species Act (ESA) regarding the SFOBB East Span Seismic Project in order to address the remaining project activities' impacts on the recently Federally-listed North American southern Distinct Population Segment (DPS) green sturgeon (*Acipenser medirostris*). The southern DPS green sturgeon was listed as threatened on April 7, 2006 (71 FR 17757), and critical habitat was proposed for green sturgeon on September 8, 2008 (73 FR 52084). Supplemental biological and conference opinions were issued on April 10, 2009.

During June and July 2009, two meetings, several telephone conferences, and electronic

[2] This BO represents the tenth reinitiated consultation request for the SFOBB East Span Seismic Project to address the remainder of the proposed project actions, and potential impacts to the Federally-listed salmonids and green sturgeon, and effects associated with demolition activities of the old bridge.

communications occurred regarding a change to the SFOBB project description. On July 7, 2009, Caltrans submitted a request to modify the project description and construction method used during the construction of the Self-Anchored Suspension Span (SAS) of the SFOBB. NMFS received the letter regarding the requested changes on July 14, 2009, and an electronic mail request on August 7, 2009, to reinitiate consultation for the proposed changes. The changes included construction of a temporary access trestle extending from the main tower (T1) of the Self-Anchored Suspension Span. The temporary trestle required an additional 22 piles to be impact driven. NMFS issued supplemental biological and conference opinions for the changes to the project August 21, 2009.

Since the signing of the original October 2001 BO, the green sturgeon southern DPS was Federally listed as threatened (71 FR 17757), and critical habitat for the species was designated (74 FR 52300). Impacts on green sturgeon from construction activities were not considered in the 2001 BO, therefore remaining project activities and associated impacts to green sturgeon were included in the supplemental biological and conference opinions issued April 10, and August 21, 2009.

Several meetings, telephone conference calls, and electronic mail (e-mail) communications were exchanged between July 2011 and November 2011 regarding the existing bridge demolition and dredging activities for the project and assessment of potential impacts to the ESA-listed salmonids and southern DPS green sturgeon associated with remaining activities. NMFS received Caltrans' request for ESA and EFH consultation for the remaining bridge work on August 11, 2011, with additional requested information provided to NMFS on September 28, 2011 and January 8, 2012. The construction of the new bridge is nearly complete. In the October 2001 BO we provided an analysis of the overall effects anticipated from bridge demolition. However, impacts from bridge demolition were not fully analyzed for impacts to salmonids and green sturgeon. The decision to exclude detailed analyses on impacts associated with bridge demolition was based generally upon the lack of information at the time regarding the exact methods to be used for removal of the old bridge components. Given the time since the 2001 BO was issued, multiple changes to project scope, new species listings and critical habitat designations as well as new information becoming available, we can now provide an improved analysis of the anticipated effects from bridge demolition and associated pile driving. These effects will be considered in this opinion for salmonids and green sturgeon. All other remaining components (*e.g.*, construction of the new bridge) for the project remain the same as analyzed in prior consultations and are not expected to vary from what was originally considered. Therefore, impacts on salmonids and green sturgeon from the other remaining components are incorporated here by reference, and updated with additional information if warranted.

II. DESCRIPTION OF THE PROPOSED ACTION

Caltrans is reinitiating consultation on the SFOBB East Span Seismic Project in order to address

the impact of dismantling the existing east span on ESA-listed salmonids, North American southern DPS green sturgeon, and their respective critical habitats. The project is the construction of a new east span of the SFOBB, approximately 2.18 miles (3.5 kilometers) long, to the north of the existing east span located in the San Francisco Bay between Yerba Buena Island (YBI) and Oakland; and removal of the old bridge. The SFOBB is an important transportation component of the Bay Area that provides regional access between the San Francisco Peninsula and the East Bay. The purpose of the project is to provide a seismically upgraded crossing for current and future users between YBI and Oakland. The existing east span is not expected to withstand an MCE on the San Andreas or Hayward fault. The existing east span does not meet lifeline criteria for providing emergency relief access following an MCE and it does not meet all current operations and safety design standards. Construction activities for the new bridge began in 2001, and are expected to continue through 2017. Construction activities for the dismantling the existing east span will include: installation of temporary piles for support of trestles and falsework, removal of bridge decks and marine foundations, and dredging for a barge access channel. These activities are described in detail below.

A. Proposed Actions

The construction of the new bridge was originally divided among nine separate contracts: 1) Yerba Buena Island Transition Structure (YBIT); 2) Self-Anchored Suspension Span (SAS); 3) SAS Marine Foundations E2 and T1 (E2/T1); 4) Skyway Structure; 5) Oakland Approach Structure; 6) Geofill at the Oakland Touchdown; 7) Submarine Cables; 8) Storm-water Treatment System; and 9) Dismantling of the existing east span. The remaining construction activities include dismantling of the existing east span of the bridge. The project description presented below focuses on these remaining bridge removal activities, separated into the major bridge sections.

1. Dismantling of the Existing Bridge

The dismantling of the existing span is anticipated to take place immediately following the opening of the new east span to traffic, currently expected in the fall of 2013. Some preparatory activities related to the dismantling may take place as early as the summer of 2012. Caltrans has refined construction methodology to dismantle the existing east span and these proposed methods will be analyzed in this biological opinion. The existing east span of the old bridge can be divided into major Superstructure and Substructure Sections. The Superstructure consists of the Cantilever Superstructure, the 504’ Truss Span and the 288’ Truss Span, which require temporary in-water supports and trestles for dismantling. The Substructrue consists of in-water Marine Foundations. These structures are outlined below and shown in Figure 1.

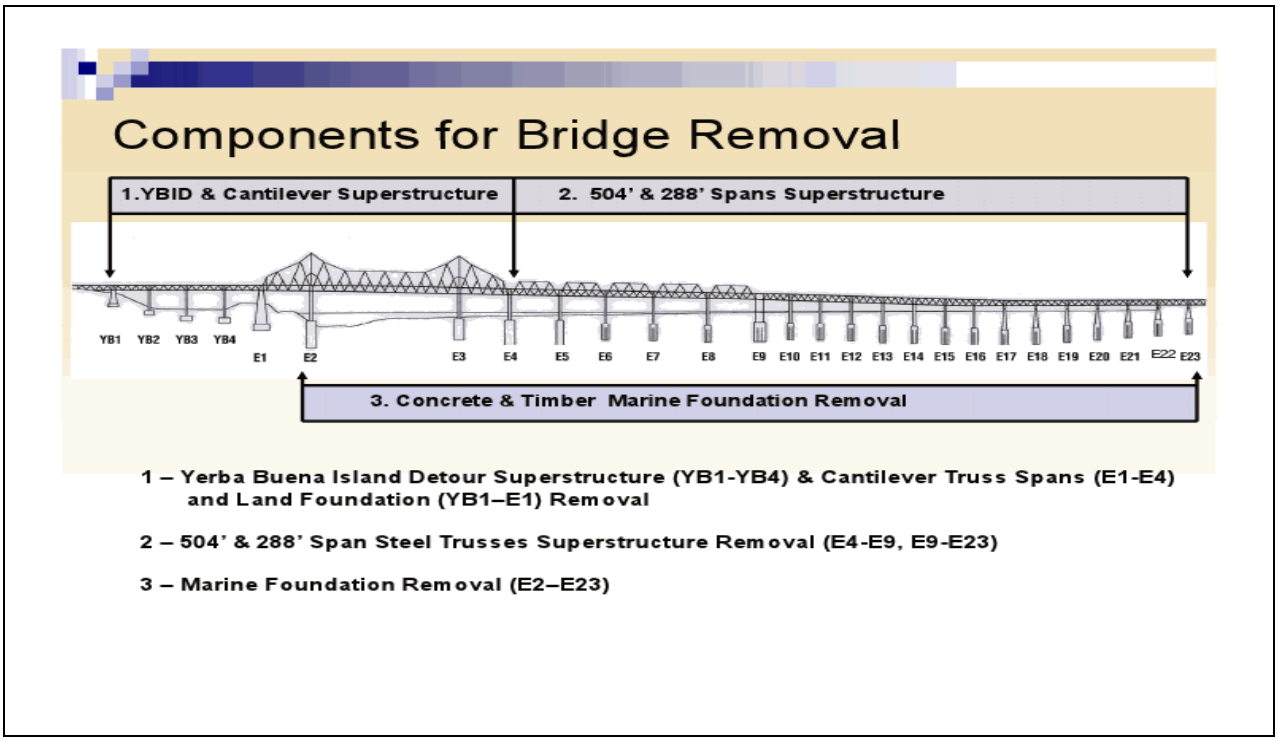

Figure 1. SFOBB Sections for Removal (Caltrans 2011).

a. Cantilever Superstructure

The Cantilever Superstructure section is comprised of three major elements: two cantilever anchor arm elements that are 154.8 meters (508 feet) long and 156 meters (512 feet) long, respectively; and a 426.7-meter (1 ,400-foot) long main span over the navigation channel consisting of a suspended segment which is supported on either side by anchor arms. The superstructure of this segment includes the trusses, road deck and steel support towers. Caltrans estimates approximately 440 24- to 36-inch diameter steel piles will be required to construct temporary supports for this section.

b. 504' & 288' Truss Spans Superstructure

This Superstructure segment of the bridge is comprised of two truss spans. The 504' Span consists of five, 153.6-meter (504-foot) long steel truss spans. The 288' Span consists of fourteen 87.8-meter (288-foot) long steel truss spans. The vertical clearance beneath the 504-foot spans is approximately 50 meters (165 feet) above mean high water levels, while the vertical clearance beneath the 288-foot spans varies greatly as the structure descends towards the Oakland shoreline. The superstructure of this segment includes the above trusses, road deck and steel and/or concrete support towers. Caltrans estimates approximately 1250 18- to 36-inch diameter steel pipe piles will be required to construct temporary supports for these sections.

Pile Supported Trestles and Falsework Required for Superstructure Removal. To remove the structures described above, two trestles and additional in-water falsework would be needed. These temporary structures, to be designed by the contractor, may be required to facilitate support of the existing east span until it is completely removed. Since the temporary structures will be contractor-designed, their exact nature (size, type, number of piles, *etc*.) will not be known until the dismantling begins. However, Caltrans has developed conservative estimates (maximum pile number, type and size anticipated) as to the approximate size, location and number of piles needed for these temporary structures. The anticipated temporary structures and size and quantity of piles needed to support these structures are described below.

Caltrans estimates that a maximum of 2,540 temporary piles may be installed to support all temporary structures. The steel pipe piles are expected to be 18 inches to 36 inches in diameter. There will also be 14-inch H-piles used for the YBI Access Trestle. When no longer needed, all temporary piles will be retrieved or cut off 0.46 meter (1.5 feet) below the mudline, per United States Coast Guard requirements. Additional piles (included in the 2,540 total) may be needed for other temporary structures for access, spuds, fenders, etc.

Two trestles may be needed to facilitate construction access and allow for the off-haul of materials. One of the trestles will extend into the Bay from the YBI shoreline (YBI Access Trestle). The other trestle will extend into the Bay from the Oakland shoreline (Oakland Access Trestle).

Caltrans anticipates that the YBI Access Trestle will be a small, approximately 650 square-meter (7,000 square foot), H-pile supported trestle constructed on the southeast side of YBI. The YBI Access Trestle would primarily be used for the off-haul of materials during the dismantling of the cantilever superstructure. Installation of the YBI Access Trestle is anticipated as one of the first orders of work for the dismantling and would likely be constructed during summer or fall 2012. This trestle is expected to be constructed in roughly the same footprint as a trestle constructed at YBI earlier for the SFOBB project, but has since been removed. Approximately 100 14-inch H-piles will be required for construction of the YBI Access Trestle. Although eelgrass has been documented in Coast Guard Cove near the proposed YBI Trestle, this structure is not expected to be constructed on any eelgrass beds, as the closest documented eelgrass to the YBI Trestle varied in distance from 30 - 130 meters when present, and no eelgrass was documented in four out of nine years surveyed.

The Oakland Access Trestle will be an approximately 8,920-square-meter (96,000 square foot) pipe pile-supported trestle constructed parallel to the southern side of the existing east span. The trestle would likely have fingers extending under the bridge, perpendicular to the main trestle to allow for access between the foundations. Caltrans anticipates that the trestle would extend westward from the Oakland shoreline, potentially as far as Pier E9 of the existing east span. The trestle would be used for construction access during the dismantling of the 504-foot and 288-foot superstructures and/or marine foundation removal. The Oakland Access Trestle may be

constructed between 2014 and 2017, depending on construction schedules. Approximately 700 18 to 36-inch diameter steel piles will be required for this trestle.

***Pile Installation*.** All pipe piles for the temporary structures and falsework required for demolition work will be installed with a vibratory hammer to drive the majority of the total pile lengths. The remainder of each pile length may, if not completed with the vibratory hammer, be impact-driven. Impact hammering will be done with the use of a marine pile driving energy attenuator *(i.e.,* air bubble curtain system), or other equally effective sound attenuation method (*e.g.,* dewatered cofferdam). A maximum of twenty piles may be impact-driven per day. In the event a pipe pile is entirely installed with a vibratory hammer, it will still be subject to final "proofing" with an impact hammer (a limited number of blows with an impact hammer intended to test integrity and seating of the pile).

The H-piles used for the YBI Access Trestle will be driven with an impact hammer. These piles will be driven in waters zero to three meters deep, and will not have a sound attenuation device implemented during construction due to site specific constraints which make it difficult to properly implement a bubble curtain.

Impact pile driving will be restricted to the period between June lst and November 30th. Vibratory driving and proofing of piles may be performed year-round.

c. Substructure - Marine Foundations

The in-water or marine foundations vary in type. Piers E2 through E5 consist of concrete caissons founded on deep bedrock. Piers E6 through E23 consist of lightly reinforced concrete foundations that are supported by timber piles (piers are numbered from west to east beginning at YBI with E1, and spanning across the Bay, ending at Oakland with E23). In the 2001 BO, methods for dismantling the concrete foundations were outlined, however, Caltrans has modified the description and currently proposes to use expansive cracking mortar to break the concrete into pieces small enough for removal and transport. This method is being considered to reduce the duration of time, labor and costs associated with other removal methods. A water quality impact study to identify and address potential effects resulting from the use of expansive cracking mortar is being prepared by Caltrans. A copy of the study will be provided to NMFS, the Regional Water Quality Control Board (RWQCB), and other appropriate resource agencies once finalized.

d. Additional Activities

Dredging. Dredging for the project remains the same as what was considered in previous BOs, and is incorporated here for reference. Dredging (either mechanical or hydraulic) will be required to create a barge access channel to dismantle the existing bridge and to remove piers from the existing bridge. Caltrans anticipates that 190,680 cubic yards of material will be dredged to create the barge access channel for dismantling the existing bridge. This material will be disposed of at either the San Francisco Deep Ocean Disposal Site (SF-DODS), at an upland wetland reuse site, or at a landfill reuse site. Information on dredging, disposal, impacts and mitigation measures is

presented in the Dredged Material Management Plan (DMMP), included as Appendix M of the FEIS. Updated dredge volume estimates and mitigation measures were provided to the Corps Dredged Material Management Office (DMMO) in September and November 2011 (M. Davignon, DMMO, pers. comm 2012). Sediment for disposal will be tested for contaminants prior to disposal to determine the most appropriate disposal site. At this time, the Corps DMMO believes the majority of the dredge material will be disposed of at the SF-DODS, but it has not been determined where all of the material will go. If a portion of the material does go to an upland wetland site, it will most likely go to a beneficial reuse site like the Montezuma Wetlands Restoration Project.

Removal of the existing piers will require 22,724 cubic yards of material to be dredged. This material will be disposed of at the Alcatraz Island site (SF-11).

Removal of Several Original Timber Piles. The final remaining activity identified by Caltrans is the proposed removal of a small number of original timber foundation piles from the existing east span for scientific purposes. There are two types of foundations that support the existing east span: concrete caissons founded on deep bedrock and reinforced concrete foundations that are supported by timber piles. The Toll Bridge Seismic Safety Peer Review Panel has requested that during the dismantling, Caltrans remove a few timber piles in an intact state for analysis of degradation during the intervening seventy-five years since their installation. These piles will most likely be removed from a pier closer to the Oakland shoreline and will be vibrated out from the mud.

2. Proposed Avoidance and Minimization Measures

To reduce potential impacts to federal and state listed fish species, critical habitat and EFH (including Habitat Areas of Particular Concern [HAPC])), Caltrans will limit both the size of piles and duration of impact pile driving, to the greatest extent feasible. Proposed avoidance and minimization measures are summarized below:

• Steel pipe pile sizes will be limited to 36-inches in diameter or smaller.

• Pile driving will occur only during daylight hours from one hour after sunrise to one hour before sunset during the seasonal salmonid and green sturgeon migration periods (December 1st – May 31st). Pile driving operations occurring outside the seasonal salmonid and green sturgeon migration period (June 1st - November 30th) shall direct illumination away from the water.

• All pipe piles will be initially installed with a vibratory hammer. The vibratory hammer will be used to drive the majority of the total pile lengths. In the event a pipe pile installed with a vibratory hammer does not achieve appropriate depth, it may be subject to being driven with an impact hammer.

• Use of a marine pile driving energy attenuator (*e.g.*, bubble curtain) will be required during impact driving of all pipe piles, with the exception of pile proofing and driving the H-piles.

• A maximum of 10% of the piles installed completely with a vibratory hammer may be proofed with an impact hammer, without the use of a marine pile driving energy attenuator.

• Proofing of piles will be limited to a maximum of two piles per day, for less than 1 minute per pile, administering a maximum of twenty blows per pile.

• Impact pile driving (with the exception of pile proofing) will be restricted to the period between June 1st and November 30th to avoid the migration period for salmonids and spawning adult green sturgeon.

• When construction activity occurs within 1,000 meters (3,200 feet) of an eelgrass bed or sand flat, measures (such as use of turbidity curtains) will be taken to ensure, to the extent practical, that turbidity generated by these activities does not exceed 50 Nephelometric Turbidity Units (NTU) or result in incremental increase greater than 10% of the background NTU at a distance greater than 30 meters (100 feet) from the activity.

3. Monitoring

a. Hydroacoustic and Biological Monitoring During Pile Driving

To assess the level of impact to fisheries, biological and hydroacoustic monitoring will be implemented within the vicinity of pile driving operations. Caltrans will perform hydroacoustic and bird predation monitoring during impact pile driving events for each of the temporary structures identified above. Hydroacoustic and bird predation monitoring will also be performed during the removal of concrete marine foundations if undertaken via mechanical means.

Monitoring will be representative of the different locations, equipment and methods used for pile installation, sound attenuation, and removal of the marine foundations. If sound estimates are consistent with anticipated levels per same bridge section, location, substrate type and water depth, Caltrans may not conduct hydroacoustic monitoring for all pile impact hammering. Caltrans will not stop monitoring without obtaining approval by NMFS. Real-time hydroacoustic monitoring will be conducted to ensure that underwater sound levels analyzed for in-water pile driving are not exceeded beyond the area anticipated. Bird predation monitoring will be performed by a qualified biologist. A draft monitoring and reporting program will be submitted to NMFS for review and comment 60 days prior to the start of in-water impact pile driving or marine foundation removal. Preliminary findings (real-time data) from hydroacoustic monitoring will be provided to NMFS' Office of Protected Resources within 24 hours of monitoring.

b. Water Quality Monitoring

Turbidity monitoring will be performed prior to and during dredging, excavation or fill activities. Monitoring will be conducted in accordance with methods and standards outlined in the Water

Quality Self-Monitoring Program required by the RWCQB Order No. R2-2002-0011, or as required by the RWQCB.

B. Description of the Action Area

The action area is defined as all areas affected directly or indirectly by Federal action and not merely the immediate area involved in the action (50 CFR § 402.02). The SFOBB East Span Seismic Project site, including the area around the bridge piers and the area necessary to accommodate construction-related equipment such as work barges and cranes, is located in San Francisco Bay, between YBI and Oakland. For the SFOBB East Span Seismic Project, NMFS defines the action area for the remaining project activities, to be: 1) the central and south San Francisco Bay, extending for a radial distance of approximately 3,981 m around the east span of the SFOBB associated with underwater sound pressure, and 2) the portion of the Bay extending approximately 2000 m from the south side of Alcatraz Island where the SF-11 dredge disposal site is located, and 3) the ocean floor and water column at the ocean disposal site. These areas, except for the ocean disposal site, are shown in Figure 2. This action area has been determined based on the direct and indirect effects of the project's pile driving and dredging/disposal activities during dismantling sections of the existing bridge.

Figure 2. SFOBB Action Area indicating the SF-11 dredge disposal site and the 3981 m radial distance for sound pressure impacts.

III. ANALYTICAL FRAMEWORK

A. Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this BO relies on four components: (1) the Status of the Species, which evaluates the salmonid ESUs and DPSs and the North American green sturgeon southern DPS's range-wide conditions, the factors responsible for that condition, and the species' likelihood of both survival and recovery; (2) the Environmental Baseline, which evaluates the condition of the listed species in the action area, the factors responsible for that condition, and the relationship of the action area to the likelihood of both survival and recovery of the listed species; (3) the Effects of the Action, which determines the direct and indirect effects of the proposed Federal action and the effects of any interrelated or interdependent activities on the species in the action area; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the species.

The jeopardy determination is made by adding the effects of the proposed Federal action and any Cumulative Effects to the Environmental Baseline and then determining if the resulting changes in species status in the action area are likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the listed species in the wild.

The jeopardy analysis in this BO places an emphasis on the range-wide likelihood of both survival and recovery of the listed species and the role of the action area in the survival and recovery of the listed species. The significance of the effects of the proposed Federal action is considered in this context, taken together with cumulative effects, for purposes of making the jeopardy determination. We use a hierarchical approach that focuses first on whether or not the effects on salmonids and green sturgeon in the action area will impact their respective populations. If the populations will be impacted, we assess whether this impact is likely to affect the ability of the populations to support the survival and recovery of the DPS or ESU.

B. Adverse Modification Determination

This biological opinion does not rely on the regulatory definition of destruction or adverse modification of critical habitat at 50 CPR 402.02[3]. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

The adverse modification analysis in this BO relies on four components: (1) the Status of Critical Habitat, which evaluates the range-wide and watershed-wide condition of critical habitat for the salmonid ESUs and DPSs and North American green sturgeon southern DPS in terms of primary constituent elements (PCEs – sites for spawning, rearing, and migration), the factors responsible for that condition, and the resulting conservation value of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of critical habitat in the action area, the

[3] This regulatory definition has been invalidated by Federal Courts.

factors responsible for that condition, and the conservation value of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs in the action area and how that will influence the conservation value of affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the conservation value of affected critical habitat units.

For purposes of the adverse modification determination, we add the effects of the proposed Federal action on listed salmonids and green sturgeon critical habitat in the action area, and any Cumulative Effects to the Environmental Baseline and then determine if the resulting changes to the conservation value of critical habitat in the action area are likely to cause an appreciable reduction in the conservation value of critical habitat range-wide. If the proposed action will negatively affect PCEs of critical habitat in the action area we then assess whether or not this reduction will impact the value of the DPS or ESU critical habitat designation as a whole.

C. Use of Best Available Scientific and Commercial Information

To conduct the assessment, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of the listed species and critical habitat has been published in a number of documents including peer-reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. Additional information regarding the effects of the project's actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources, the biological assessment for this project, and project meeting notes if applicable. Information was also provided in e-mails, site visits, and telephone conversations between February 2011 and January 2012. For information that has been taken directly from published, citable documents, those citations have been referenced in the text and listed at the end of this document.

A complete administrative record of this consultation is on file at the NMFS North Central Coast Office (Administrative Record Number 151422SWR99SR190).

IV. STATUS OF THE SPECIES AND CRITICAL HABITAT

This BO analyzes the effects of the bridge dismantling and dredging activities for the San Francisco-Oakland Bay Bridge East Span Seismic Project on the following Federally-listed species ESUs, DPSs, and designated critical in the action area that may be affected:

Sacramento River winter-run Chinook salmon ESU (*Oncorhynchus tshawytscha*)
Endangered (June 28, 2005, 70 FR 37160)

Critical habitat (June 16, 1993, 58 FR 33212)

Central Valley spring-run Chinook salmon ESU (*Oncorhynchus tshawytscha*)
Threatened (June 28, 2005, 70 FR 37160)
Critical habitat (September 2, 2005, 70 FR 52488)

Central Valley steelhead DPS (*Oncorhynchus mykiss*)
Threatened (January 5, 2006, 71 FR 834)
Critical habitat (September 2, 2005, 70 FR 52488)

Central California Coast steelhead DPS (*Oncorhynchus mykiss*)
Threatened (January 5, 2006, 71 FR 834)
Critical habitat (September 2, 2005, 70 FR 52488)

North American green sturgeon southern DPS (*Acipenser medirostris*)
Threatened (April 7, 2006, 71 FR 17757)
Critical habitat (October 9, 2009, 74 FR 52300)

A. Species Description and Life History

1. Chinook Salmon

a. General Life History for Chinook salmon

Chinook salmon return to freshwater to spawn when they are three to eight years old (Healy 1991). Runs are designated on the basis of adult migration timing; however, distinct runs also differ in the degree of maturation at the time of river entry, thermal regime and flow characteristics of their spawning site, and actual time of spawning (Myers *et al.* 1998). Both winter-run and spring-run Chinook salmon tend to enter freshwater as immature fish, migrate far upriver, and delay spawning for weeks or months. For comparison, fall-run Chinook salmon enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of rivers, and spawn within a few days or weeks of freshwater entry (Healey 1991). Adult Sacramento River winter-run Chinook salmon enter San Francisco Bay from November through June (Hallock and Fisher 1985), and delay spawning until spring or early summer. Adult Central Valley spring-run Chinook salmon leave the ocean to begin their upstream migration in late January and early February (CDFG 1998) and enter the Sacramento River between March and September, primarily in May and June (Yoshiyama *et al*. 1998, Moyle 2002). Lindley *et al*. (2007) indicates adult Central Valley spring-run Chinook salmon enter native tributaries from the Sacramento River primarily between mid-April and mid-June. Central Valley spring-run Chinook salmon adults enter freshwater in the spring, hold over summer, and spawn in the fall. Central Valley spring-run Chinook salmon juveniles typically spend a year or more in freshwater before migrating toward the ocean. Adequate instream flows and cool water temperatures are more critical for the survival of Central Valley spring-run Chinook salmon due to over summering by adults and/or juveniles.

Sacramento River winter-run Chinook salmon spawn primarily from mid-April to mid-August, peaking in May and June, in the Sacramento River reach between Keswick Dam and the Red Bluff Diversion Dam. Central Valley spring-run Chinook salmon typically spawn between September and October depending on water temperatures. Chinook salmon generally spawn in gravel beds that are located at the tails of holding pools (USFWS 1995). Eggs are deposited within the gravel where incubation, hatching, and subsequent emergence take place. The upper preferred water temperature for spawning adult Chinook salmon is 55 degrees Fahrenheit (^{o}F) (Chambers 1956) to 57 ^{o}F (Reiser and Bjornn 1979). The length of time required for eggs to develop and hatch is dependent on water temperature, and quite variable.

Sacramento River winter-run Chinook salmon fry (newly emerged juveniles) begin to emerge from the gravel in late June to early July and continue through October (Fisher 1994). Central Valley spring-run Chinook salmon fry emerge from November to March and spend about 3 to 15 months in freshwater prior to migrating towards the ocean (Keljson *et al*. 1981). Post-emergent fry seek out shallow, nearshore areas with slow current and good cover, and begin feeding on small terrestrial and aquatic insects and crustaceans. In the Sacramento River and other tributaries, juveniles may begin migrating downstream almost immediately following emergence from the gravel with emigration occurring from December through March (Moyle 2002). Fry and parr may spend time rearing within riverine and/or estuarine habitats including natal tributaries, the Sacramento River, non-natal tributaries to the Sacramento River, and the delta.

Within estuarine habitat, juvenile Chinook salmon movements are generally dictated by tidal cycles, following the rising tide into shallow water habitats from the deeper main channels, and returning to the main channels when the tide recedes (Levy and Northcote 1982; Levings 1982; Healey 1991). Juvenile Chinook salmon forage in shallow areas with protective cover, such as intertidal and subtidal mudflats, marshes, channels and sloughs (McDonald 1960, Dunford 1975). As juvenile Chinook salmon increase in length, they tend to school in the surface waters of the main and secondary channels and sloughs, following the tides into shallow water habitats to feed (Allen and Hassler 1986). Keljson *et al*. (1982) reported that juvenile Chinook salmon demonstrated a diel migration pattern, orienting themselves to nearshore cover and structure during the day, but moving into more open, offshore waters at night. The fish also distributed themselves vertically in relation to ambient light. During the night, juveniles were distributed randomly in the water column, but would school up during the day into the upper three meters of the water column. Juvenile Sacramento River winter-run Chinook salmon migrate to the sea after only rearing in freshwater for four to seven months, and occur in the delta from October through early May (CDFG 1998). Juvenile Chinook salmon were found to spend about 40 days migrating through the Delta to the mouth of San Francisco Bay and grew little in length or weight until they reached the Gulf of the Farallones (MacFarlane and Norton 2002). Based on the mainly ocean-type life history observed (*i.e.*, fall-run Chinook salmon) MacFarlane and Norton (2002) concluded that unlike other salmonid populations in the Pacific Northwest, Central Valley Chinook salmon show little estuarine dependence and may benefit from expedited ocean entry.

b. Species Status - Sacramento River winter-run Chinook Salmon

Sacramento River winter-run Chinook salmon were originally listed as threatened in August 1989, under emergency provisions of the ESA, and formally listed as threatened in November 1990 (55 FR 46515). The ESU is represented by a single extant naturally spawning population that is confined to the upper Sacramento River in California's Central Valley. NMFS designated critical habitat for winter-run Chinook salmon on June 16, 1993 (58 FR 33212). The ESU was reclassified as endangered on January 4, 1994 (59 FR 440), due to increased variability of run sizes, expected weak returns as a result of two small year classes in 1991 and 1993, and a 99 percent decline between 1966 and 1991. After completing status reviews in 2005, NMFS reconfirmed the endangered status of Sacramento River winter-run Chinook salmon on June 28, 2005 (70 FR 37160).

The Sacramento River winter-run Chinook salmon ESU has been completely displaced from its historical spawning habitat by the construction of Shasta and Keswick Dams. Approximately, 299 miles of tributary spawning habitat in the upper Sacramento River is now inaccessible to the ESU. Most components of the Sacramento River winter-run Chinook salmon life history (e.g., spawning, incubation, freshwater rearing) have been compromised by the habitat blockage in the upper Sacramento River. The remaining spawning habitat in the upper Sacramento River is artificially maintained by cool water releases from Shasta and Keswick Dams, and the spatial distribution of spawners is largely governed by the water year type and the ability of the Central Valley Project to manage water temperatures in the upper Sacramento River.

Between the time Shasta Dam was built and the listing of Sacramento River winter-run Chinook salmon as endangered, major impacts to the population occurred from warm water releases from Shasta Dam, juvenile and adult passage constraints at the Red Bluff Diversion Dam, water exports in the southern delta, acid mine drainage from Iron Mountain Mine, and entrainment at a large number of unscreened or poorly-screened water diversions (NMFS 1997). The naturally spawning component of this ESU has exhibited marked improvements in abundance and productivity in the early and mid-part of this decade. Population estimates in 2001 (8,224), 2002 (7,441), 2003 (8,218), and 2004 (7,701) show a recent increase in the escapement of Sacramento River winter-run Chinook salmon. These increases in abundance are encouraging, relative to the years of critically low abundance of the 1980s and early 1990s when numbers dipped as low as 200 (Good et al. 2005). However, returns of several West Coast Chinook salmon and coho salmon stocks were lower than expected in 2007, 2008, 2009, and 2010 numbers and show a precipitous decline with fish numbers of 2,542, 2,830, 4,658, and 1,596 respectively for these years (NMFS 2011 [JPE letter]).

A captive broodstock artificial propagation program for Sacramento River winter-run Chinook salmon has operated since the early 1990s as part of recovery actions for this ESU. As many as 150,000 juvenile salmon have been released by this program, but in most cases the number of fish released was in the tens of thousands (Good et al. 2005). NMFS reviewed this hatchery program in 2004 and concluded that as much as 10 percent of the natural spawners may be attributable to

the program's support of the population (69 FR 33102). The artificial propagation program has contributed to maintaining diversity through careful use of methods that ensure genetic diversity. If improvements in natural production continue, the artificial propagation program may be discontinued (69 FR 33102).

Several actions have been taken to improve habitat conditions for Sacramento River winter-run Chinook salmon, including: improved management of Central Valley water that has increased freshwater survival, changes in ocean and inland fishing harvest that have increased ocean survival and adult escapement, and implementation of habitat restoration efforts throughout the Central Valley. However, this population remains below established recovery goals (NMFS 1997) and the naturally-spawned component of the ESU is dependent on one extant population in the Sacramento River. There is particular concern about risks to the ESU's genetic diversity, life-history variability, local adaptation, and spatial structure (June 28, 2005, 70 FR 37160).

The naturally spawning component of this ESU has exhibited marked improvements in abundance and productivity in the early and mid-part of this decade. Population estimates in 2001 (8,224), 2002 (7,441), 2003 (8,218), and 2004 (7,701) showed an increase in the escapement of Sacramento River winter-run Chinook salmon. These increases in abundance were encouraging, relative to the years of critically low abundance of the 1980s and early 1990s when numbers dipped as low as 200 (Good *et al.* 2005). However, returns of several West Coast Chinook salmon and coho salmon stocks were lower than expected in 2007, 2008, 2009, and 2010 numbers and show a precipitous decline with fish numbers of 2,542, 2,830, 4,658, and 1,596 respectively for these years (NMFS 2011 [JPE letter]). Consistent with this downward population trend the ESU has experienced a negative growth rate over the last four years. The recent further decline in abundance is of concern to NMFS. However, this decline is due, in part, to poor marine survival conditions largely unrelated to ocean harvest, which has been low during much of this times (Williams *et al.* 2011)., The SWFSC's most recent viability report concluded that the ESU remains in danger of extinction and will remain so until viability is re-established by multiple, low-risk populations within its historical spawning range (Williams *et al.* 2011). Based on this report, NMFS' status review (NMFS 2011a) recommended maintaining the endangered listing determination for this species. NMFS reaffirmed no change to the listing of endangered for Sacramento River winter-run Chinook salmon ESU on August 5, 2011 (76 FR 50447).

c. Species Status - Central Valley spring-run Chinook Salmon

Central Valley spring-run Chinook salmon were listed as threatened on September 16, 1999 (64 FR 50394). This ESU consists of spring-run Chinook salmon occurring in the Sacramento River Basin. After completing the status reviews in 2005, NMFS reconfirmed the threatened status of Central Valley spring-run Chinook salmon on June 28, 2005 (70 FR 37160). As part of the listing determinations, NMFS made several changes involving West Coast hatchery populations. Central Valley spring-run Chinook salmon from the Feather River and Feather River Hatchery (FRH) have been included as part of the ESU (70 FR 37160). Central Valley spring-run Chinook salmon

in the Feather River were included in the ESU because they are believed by NMFS to be the only population in the ESU that displays early run timing. This early run timing is considered by NMFS to represent an important evolutionary legacy of the spring-run populations that once spawned above Oroville Dam (70 FR 37160). The Feather River Hatchery (FRH) population is closely related genetically to the natural Feather River population. The FRH's goal is to release five million spring-run Chinook salmon per year. Recent releases have ranged from about one-and-a-half to five million fish, with most releases below five million fish (Good *et al.* 2005).

Historically, the predominant salmon run in the Central Valley was the spring-run Chinook salmon. Extensive construction of dams throughout the Sacramento-San Joaquin basin has reduced the Central Valley spring-run Chinook salmon run to only a small portion of its historical distribution. The Central Valley drainage as a whole is estimated to have supported Central Valley spring-run Chinook salmon runs as large as 600,000 fish between the late 1880s and 1940s (CDFG 1998). The ESU has been reduced to only three naturally-spawning populations that are free of hatchery influence from an estimated 17 historic populations[4]. These three populations (spawning in three tributaries to the Sacramento River - Deer, Mill, and Butte creeks), are in close geographic proximity, increasing the ESU's vulnerability to disease or catastrophic events. Although the recent 5-year mean abundance for these three populations remains relatively small (ranging from 500 to over 4,500 spawners), short and long-term productivity trends are positive, and populations sizes have shown continued increases over the abundance levels of the 1980s.

Several actions have been taken to improve habitat conditions for Central Valley spring-run Chinook salmon, including: improved management of Central Valley water; various habitat restoration efforts in the Central Valley; and changes in freshwater harvest management measures. Although protective measures likely have contributed to recent increases in Central Valley spring-run Chinook salmon abundance, the ESU is still below levels observed from the 1960s through 1990. Threats from hatchery production (*i.e.*, competition for food between naturally-spawned and hatchery fish, run hybridization and genomic homogenization), climatic variation, high temperatures, predation, and water diversions still persist. Because wild Central Valley spring-run Chinook salmon ESU populations are confined to relatively few remaining watersheds and continue to display broad fluctuations in abundance, the Biological Review Team (BRT) (Good *et al*. 2005) concluded that the ESU is likely to become endangered within the foreseeable future.

Data from the 2007 adult Central Valley spring-run Chinook salmon return counts and estimates indicates a decline in returning adults across the range of Central Valley spring-run Chinook salmon within the Central Valley of California. From 2007-2009 the Central Valley experienced drought conditions and low river and stream discharges, a contributing factor to population declines. Additionally, ocean conditions are suspected as the principal short term cause because of the wide geographic range of declines (Southwest Fisheries Science Center 2008). With a few exceptions, Central Valley spring-run Chinook populations have declined over the past 10 years,

[4] There has also been a small run in Big Chico Creek in recent years (Good *et al.* 2005).

particularly since 2006. The only Central Valley spring-run Chinook salmon populations that seemed to have improved are in Battle Creek and Clear Creek. Overall, the status of the Central Valley spring-run Chinook salmon ESU has probably deteriorated since the status reviews in 2005, and the species likely has an increased risk of extinction (Williams *et al.* 2011). Based on this information, NMFS has chosen to maintain the threatened listing for this species (76 FR 50447), but recommends reviewing Central Valley spring-run Chinook status again in 2-3 years, (instead of the normal 5 years) if species numbers do not improve (NMFS 2011b).

2. Steelhead

a. General Life History - Steelhead

Steelhead are an anadromous form of *Oncorhynchus mykiss*, spending some time in both freshwater and saltwater. The older juvenile and adult life stages occur in the ocean, until the adults ascend freshwater streams to spawn. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (Busby *et al.* 1996). Although one-time spawners are the great majority, Shapolov and Taft (1954) reported that repeat spawners are relatively numerous (17.2 percent) in California streams; and may spawn one to four times over their lifetime. Eggs (laid in gravel nests called redds), alevins (gravel dwelling hatchlings), fry (juveniles newly emerged from stream gravels), and young juveniles, remain in freshwater until they become large enough to migrate to the ocean to finish rearing and maturing to adults. General reviews for steelhead in California document much variation in life history (Shapovalov and Taft 1954, Barnhart 1986, Busby *et al*. 1996, McEwan 2001). Although variation occurs, coastal California steelhead usually live in freshwater for two years, then spend one or two years in the ocean before returning to their natal stream to spawn. Steelhead from the tributaries of San Francisco Bay typically migrate to freshwater between November and April, peaking in January and February. They migrate to the ocean as juveniles from March through June, with peak migration occurring in April and May (Fukushima and Lesh 1998).

Steelhead fry generally rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Cover is an important habitat component for juvenile steelhead, both as a velocity refuge and as a means of avoiding predation (Shirvell 1990, Meehan and Bjornn 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Rearing steelhead juveniles prefer water temperatures of 7.2-14.4 degrees Celsius (˚C) and have an upper lethal limit of 23.9˚C (Barnhart 1986, Bjornn and Reiser 1991). They can survive in water up to 27˚C with saturated dissolved oxygen conditions and a plentiful food supply. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby *et al*. 1996).

Juvenile steelhead emigrate episodically from natal streams during fall, winter, and spring high flows. Barnhart (1986) reported that steelhead smolts in California range in size from 140 to 210 millimeter (mm) fork length.

b. Species Status - Central Valley steelhead

Central Valley steelhead were listed as threatened on March 19, 1998 (63 FR 13347), with populations in the Sacramento and San Joaquin River basins in California's Central Valley. NMFS evaluated the listing status of Central Valley steelhead and on June 14, 2004, proposed maintaining the threatened listing determination (69 FR 33102). On January 5, 2006, NMFS made a final listing determination, reconfirming the threatened status of Central Valley steelhead (71 FR 834). As part of the listing determination, NMFS included Central Valley steelhead produced at the Coleman and FRH hatcheries as part of the DPS.

Central Valley steelhead historically were well-distributed throughout the Sacramento and San Joaquin Rivers (Busby *et al.* 1996). Although it appears Central Valley steelhead remain widely distributed in Sacramento River tributaries, the vast majority of historical spawning areas are currently above impassable dams. Historic Central Valley steelhead run sizes were estimated at one to two million spawners in the Central Valley prior to 1850, and approximately 40,000 spawners in the 1960s. Over the past 40 years, the naturally-spawned steelhead populations in the upper Sacramento River have declined substantially. Central Valley steelhead spawning above the Red Bluff Diversion Dam has a small population size (the most recent five-year mean is less than 2,000 adults) and exhibits strongly negative trends in abundnace and population growth rate. However, there have not been any escapment estimates made for the area above the Red Bluff Diversion Dam since 1993, due to changes in dam operations. The only recent DPS-level estimate of abundance is a crude extrapolation from the incidental catch of out-migrating juvenile steelhed captured in a midwater trawl sampling program for juvenile Chinook salmon below the confluence of the Sacramento and San Joaquin Rivers. Based on this extrapolation, it is estimated that 3,600 females spawned in the Central Valley.

Until recently, steelhead were thought to be extirpated from the San Joaquin River system. Recent monitoring has detected small self-sustaining populations of steelhead in the Stanislaus, Mokelumne, Calaveras, and other streams previously thought to be devoid of steelhead (McEwan 2001). On the Stanislaus River, steelhead smolts have been captured in rotary screw traps at Caswell State Park and Oakdale each year since 1995 (Demko *et al.* 2000). Incidental catches and observations of steelhead juveniles also have occurred on the Tuolumne and Merced Rivers during fall-run Chinook salmon monitoring activities, indicating that steelhead are widespread, if not abundant, throughout accessible streams and rivers in the Central Valley (Good *et al.* 2005).

The 2005 status review concluded that the Central Valley steelhead DPS presently is in danger of extinction (Good *et al.* 2005). Steelhead have been extirpated from most of their historical range in this region. Habitat concerns in this DPS focus on the widespread degradation, destruction, and

blockage of freshwater habitat within the region, and water allocation problems. Widespread hatchery production of introduced steelhead within this DPS also raises concerns about the potential ecological interactions between introduced and native stocks. Because the Central Valley steelhead population has been fragmented into smaller isolated tributaries without any large source population, and the remaining habitat continues to be degraded by water diversions, the population remains at an elevated risk for future population declines. Emigrating Central Valley steelhead use the lower reaches of the Sacramento River and the delta for rearing and as a migration corridor to the ocean. Juvenile steelhead in the Sacramento River Basin migrate downstream during most months of the year, but the peak period of emigration occurs in the spring, with a much smaller peak in the fall. The most recent reviews, indicate that the Central Valley steelhead DPS may have worsened, from when it was considered endangered if extinction in 2005. Catch data from the Chipps Island monitoring program suggests that natural steelhead production has continued to decline. The most recent biological information indicates that the extinction risk of this DPS has increased since the 2005 status review. Several of the listing factors contributed to the decline including the drought and ocean conditions (Williams *et al.* 2011). Based on this information, NMFS choose to maintain the threatened listing for this species (76 FR 50447), but recommends reviewing Central Valley steelhead status again in 2-3 years, (instead of the normal 5 years) if species numbers do not improve (NMFS 2011c).

c. Species Status - Central California Coast steelhead

Central California Coast steelhead were listed as threatened on August 18, 1997 (62 FR 43937), with populations in coastal California streams from the Russian River to Aptos Creek, and several tributaries of San Francisco, San Pablo and Suisun Bays. NMFS evaluated the listing status of Central California Coast steelhead and on June 14, 2004, proposed maintaining the threatened listing determination (69 FR 33102). On January 5, 2006, NMFS made a final listing determination reconfirming the threatened status of Central California Coast steelhead (71 FR 834). As part of the new listing determination, NMFS included Central California Coast steelhead produced at the Don Clausen Hatchery and Kingfisher Flat Hatchery/Scott Creek (Monterey Bay Salmon and Trout Project) as part of the DPS.

Historically, approximately 70 populations[5] of steelhead existed in the CCC steelhead DPS (Spence *et al.* 2008). Many of these populations (about 37) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts (Bjorkstedt *et al.* 2005). The remaining populations were dependent upon immigration from nearby CCC steelhead DPS populations to ensure their viability (McElhaney *et al.* 2000, Bjorkstedt *et al.* 2005).

[5] Population as defined by Bjorkstedt *et al*. 2005 and McElhaney *et al*. 2000 as, in brief summary, a group of fish of the same species that spawns in a particular locality at a particular season and does not interbreed substantially with fish from any other group. Such fish groups may include more than one stream. These authors use this definition as a starting point from which they define four types of populations (not all of which are mentioned here).

While historical and present data on abundance are limited, CCC steelhead numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960s, including 50,000 fish in the Russian River - the largest population within the DPS (Busby *et al.* 1996). Recent estimates for the Russian River are on the order of 4,000 fish (NMFS 1997). Abundance estimates for smaller coastal streams in the DPS indicate low but stable levels with recent estimates for several streams (Lagunitas, Waddell, Scott, San Vincente, Soquel, and Aptos creeks) of individual run sizes of 500 fish or less (62 FR 43937). Some loss of genetic diversity has been documented and attributed to previous among-basin transfers of stock and local hatchery production in interior populations in the Russian River (Bjorkstedt *et al*. 2005). Similar losses in genetic diversity in the Napa River may have resulted from out-of-basin and out-of-DPS releases of steelhead in the Napa River basin in the 1970s and 80s. These transfers included fish from the South Fork Eel River, San Lorenzo River, Mad River, Russian River, and the Sacramento River. In San Francisco Bay streams, reduced population sizes and fragmentation of habitat has likely also led to loss of genetic diversity in these populations. For more detailed information on trends in CCC steelhead abundance, see: Busby *et al*. 1996, NMFS 1997, and Good *et al*. 2005, Spence *et al*. 2008.

CCC steelhead have experienced serious declines in abundance, and long-term population trends suggest a negative growth rate. This indicates the DPS may not be viable in the long term. DPS populations that historically provided enough steelhead strays to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead have maintained a wide distribution throughout the DPS, roughly approximating the known historical distribution, CCC steelhead likely possess a resilience that is likely to slow their decline relative to other salmonid species in worse condition. A recent status review concludes that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Good *et al*. 2005). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

A more recent viability assessment of CCC steelhead concluded that populations in watersheds that drain to San Francisco Bay are highly unlikely to be viable, and that the limited information available did not indicate that any other CCC steelhead populations could be demonstrated to be viable[6] (Spence *et al.* 2008). Although there were average returns (based on the last ten years of data) of adult CCC steelhead during 2007/08, research monitoring data from the 2008/09 and 2009/10 adult CCC steelhead returns indicate a decline in returning adults across their range compared to the last ten years. The most recent status update concludes that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Williams *et al.* 2011), as new and additional information available since Good *et al.* (2005) does not appear to suggest a change in extinction risk. On August 15, 2011, NMFS chose to maintain the threatened status of the CCC steelhead DPS (76 FR 50447).

6 Viable populations have a high probability of long-term persistence (> 100 years).

3. Green Sturgeon

a. General Life History – Green Sturgeon

North American green sturgeon are the most widely distributed, and most marine-oriented of sturgeon species belonging to the family Acipenseridae. Like all sturgeon, North American green sturgeon are anadromous, long-lived, and a slow growing species (Adams *et al.* 2002). Along the Pacific Coast, North American green sturgeon have been documented offshore from Ensenada, Mexico to the Bering Sea, Alaska and found in freshwater rivers from the Sacramento River to British Columbia (Moyle 2002).

Two sub-populations, or DPS of North American green sturgeon have been identified along the Pacific Coast. These DPS were identified based on evidence of spawning site fidelity (indicating multiple DPS tendencies), and on genetic analysis that indicates differences at least between the Klamath River and San Pablo Bay samples (Adams *et al*. 2002, Israel *et al*. 2004). The two identified DPS are: (1) a northern DPS consisting of populations in coastal watersheds northward of and including the Eel River; and (2) a southern DPS consisting of coastal and Central Valley populations south of the Eel River, with the only known spawning population occurring in the Sacramento River.

Data from commercial trawl fisheries and tagging studies indicate green sturgeon occupy waters within the 110 m contour on the continental shelf (NMFS 2005, Erickson and Hightower 2007). During the late summer and early fall, subadults and non-spawning adult green sturgeon frequently can be found aggregating in estuaries along the Pacific coast (Emmett *et al.* 1991, Moser and Lindley 2007). Particularly large concentrations of green sturgeon from both the northern and southern populations occur in the Columbia River estuary, Willapa Bay, Grays Harbor and Winchester Bay, with smaller aggregations in Humboldt Bay, Tillamook Bay, Nehalem Bay, San Francisco and San Pablo Bays (Emmett *et al.* 1991, Moyle *et al.* 1992, and Beamesderfer *et al.* 2007).

Of the two DPS, only the southern DPS is listed as a threatened species under the ESA. Co-occurrence of both northern and southern DPS green sturgeon within the Pacific Coast range is known, thus green sturgeon observed outside of natal rivers may belong to either DPS. Therefore, the geographical area occupied by the southern DPS is defined as the entire west coast range occupied by green sturgeon in North America. Within this range, southern DPS green sturgeon have been confirmed to occur from Graves Harbor, Alaska, to Monterey Bay, California (Lindley *et al*. 2008). Thesy are known to occur in nearshore marine waters, and are commonly observed in coastal bays, estuaries, and coastal marine waters from southern California to Alaska.

There is limited available data for green sturgeon on habitat usage, distribution and activities while present in nearshore coastal marine waters. New information regarding the migration and habitat use of the southern DPS green sturgeon has emerged. Lindley *et al*. (2008) report large-

scale migrations of green sturgeon along the Pacific Coast. It appears that southern DPS green sturgeon are migrating considerable distances up the Pacific Coast into other estuaries, particularly the Columbia River.

Kelly *et al.* (2007) indicated that green sturgeon enter the San Francisco Estuary during the spring and remain until autumn (see Table 6 in text). The authors studied the movement of adults in the San Francisco Estuary and found them to make significant long-distance movements with distinct directionality. The movements were not found to be related to salinity, current, or temperature, and Kelly *et al*. (2007) surmised that they are related to resource availability and foraging behavior. Acoustical tagging studies on the Rogue River (Erickson *et al*. 2002) have shown that adult green sturgeon will hold for as much as 6 months in deep (> 5m), low gradient reaches or off channel sloughs or coves of the river during summer months when water temperatures were between 15°C and 23°C. When ambient temperatures in the river dropped in autumn and early winter (<10°C) and flows increased, fish moved downstream and into the ocean. Erickson *et al.* (2002) surmised that this holding in deep pools was to conserve energy and utilize abundant food resources. Benson *et al.* (2007) found similar behavior on the Klamath and Trinity River systems with adult sturgeon acoustically tagged during their spawning migrations. Most fish held over the summer in discrete locations characterized by deep, low velocity pools until late fall or early winter when river flows increased with the first storms of the rainy season. Fish then moved rapidly downstream and out of the system. Recent data gathered from acoustically tagged adult green sturgeon revealed comparable behavior by adult fish on the Sacramento River based on the positioning of adult green sturgeon in holding pools on the Sacramento River above the Glenn Colusa Irrigation District (GCID) diversion (RM 205). Studies by Heublein (2006, 2009) and Vogel (2008) have documented the presence of adults in the Sacramento River during the spring and through the fall into the early winter months. These fish hold in upstream locations prior to their emigration from the system later in the year. Like the Rogue and Klamath river systems, downstream migration appears to be triggered by increased flows, decreasing water temperatures, and occurs rapidly once initiated. It should also be noted that some adults rapidly leave the system following their suspected spawning activity and enter the ocean only in early summer (Heublein 2006). This behavior has also been observed on the other spawning rivers (Benson *et al*. 2007*)* but may have been an artifact of the stress of the tagging procedure in that study.

Confirmed spawning populations of North American green sturgeon currently are found in only three river systems, the Sacramento and Klamath Rivers in California, and the Rogue River in southern Oregon (Erickson *et al*. 2002, Farr and Kern, 2005). During the late summer and early fall, sub-adults and nonspawning adult green sturgeon frequently can be found aggregating in estuaries along the Pacific coast (Emmett *et al.* 1991). Relatively large concentrations occur in the Columbia River estuary, Willapa Bay, and Grays Harbor, with smaller aggregations in San Francisco Estuary (Emmett *et* al 1991, Moyle *et al.* 1992).

Adult green sturgeon are believed to spawn every two to four years and generally exhibit fidelity to their spawning site. Green sturgeon reach sexual maturity only after several years of growth;

first spawning generally occurs at 15 years of age for males, and 17 years for females. Green sturgeon may migrate long distances upstream to reach spawning habitat. Southern DPS green sturgeon adults typically begin their upstream spawning migrations into the San Francisco Bay by late February to early March, reach Knights Landing by April, and spawn between March and July (Heublein 2006). Peak spawning is believed to occur between mid-April to mid-June and thought to occur in deep, fast water (> 3 m) of large rivers (Emmett *et al*. 1991, Adams *et al*. 2002).

Juvenile green sturgeon spend from one to four years in fresh and estuarine waters before they enter the ocean (Nakamoto *et al*. 1995, Adams *et al.* 2002). Juvenile green sturgeon have been salvaged at the Harvey O. Banks Pumping Plant and the John E. Skinner Fish Facility in the south Delta, and captured in trawling studies by the CDFG during all months of the year (CDFG 2002). The majority of these fish were between 200 and 600 mm indicating they were from 2 to 3 years of age based on Klamath River age distribution work by Nakamoto *et al*. (1995). The lack of a significant proportion of juveniles smaller than approximately 200 mm in the Delta indicates juvenile southern DPS green sturgeon likely hold in the mainstem Sacramento River, as suggested by Kyndard *et al*. (2005). Laboratory studies conducted by Allen and Cech, Jr. (2007) also indicated that juveniles spend approximately the first six months in fresh to brackish water and then transition into salt water at about 1.5 years of age (752 ± 7 mm). At approximately 100 to 170 dph, juvenile green sturgeon were able to tolerate prolonged exposure to salt water, however, there was decreased growth and activity levels, and mortality for some individuals at 100 dph. This data is consistent with the study conducted by Nakamoto *et al.* (1995), which indicated juveniles spend one to four years in fresh and estaurine waters, and disperse into salt water when at lengths of 300-750 mm.

Young green sturgeon appear to rear for the first one to two months in the Sacramento River between Keswick Dam and Hamilton City (CDFG 2002). Juvenile green sturgeon first appear in USFWS sampling efforts at RBDD in June and July at lengths ranging from 24 to 31 mm fork length (CDFG 2002, USFWS 2002). The mean yearly total length of post-larval green sturgeon captured in rotary screw traps at the RBDD ranged from 26 mm to 34 mm between 1995 and 2000 indicating they are approximately 2 weeks old. The mean yearly total length of post-larval green sturgeon captured in the GCID rotary screw trap, approximatley 30 miles downstream of RBDD ranged from 33 mm to 44 mm between 1997 and 2005 (CDFG, unpublished data), indicating they are approximately three weeks old (Van Eenennaam *et al*. 2001).

Both adult and juvenile green sturgeon are primarily benthic feeders (Moyle 2002). Adult green sturgeon are believed to feed mainly upon benthic invertebrates such as clams, mysid and grass shrimp, and amphipods (Radtke 1966, Adams *et al*. 2002), and to some extent on fish. Adult sturgeon caught in Washington State waters were found to have fed on Pacific sand lance (*Ammodytes hexapterus*) and callianassid shrimp (Moyle *et al.* 1992). Dumbauld *et al*. (in prep) noted that large green sturgeon collected in Willapa Bay, Washington in 2003 fed on thalassinid shrimp and fish. Adults captured in the Sacramento-San Joaquin Delta are known to feed on invertebrates such as shrimp, mollusks, amphipods, and additionally upon small fish (Adams *et al.*

2002).

Juvenile green sturgeon in the San Francisco Estuary have been shown to feed on opossum shrimp (*Neomysis mercedie*) and amphipods (*Corophium spp*.) (Moyle 2002). Radtke (1966) examined 74 juvenile southern DPS green sturgeon caught with gill nets and otter trawl in the Delta. *Corophium spp*. appeared to be the most important food of smaller green sturgeon and was the only item found in the eight smaller green sturgeon (190–390 mm) examined in the fall. All those examined in the spring and summer had eaten *Corophium*, which made up over half the volume of their diet during these seasons. *Neomysis awatschensis* (opossum shrimp) was also utilized heavily during spring and summer. Little is known of the behavioral dynamics of these juveniles, such as habitat preference and water column usage; however, based on diet work reported above and feeding morphology, juveniles are presumed to be benthically oriented.

Migratory corridors are downstream of the spawning areas and include the mainstem Sacramento River, delta, and estuary. These corridors allow the upstream passage of adults and the downstream emigration of juveniles. Migratory habitat condition is strongly affected by the presence of barriers which can include dams, unscreened or poorly screened diversions, and degraded water quality. Both spawning areas and migratory corridors are comprised of rearing habitat for juveniles, which feed and grow before and during their one to four year residence in fresh and estuarine waters. Rearing habitat condition and function may be affected by variation in annual and seasonal flow and temperature characteristics.

b. Population Trend – southern DPS green sturgeon

The precise population size of southern DPS green sturgeon is unknown, but is clearly much smaller than the northern DPS, and is, therefore more vulnerable to catastrophic events. Population abundance information concerning the southern DPS green sturgeon is described in the NMFS status reviews (Adams *et al*. 2002, BRT 2005). Limited population abundance information comes from incidental captures of southern DPS green sturgeon from the white sturgeon monitoring program by the CDFG sturgeon tagging program (CDFG 2002). CDFG utilizes a multiple-census or Peterson mark-recapture method to estimate the legal population of white sturgeon captures in trammel nets. By comparing ratios of white sturgeon to green sturgeon captures, CDFG provides estimates of adult and subadult southern DPS green sturgeon abundance. Estimated abundance between 1954 and 2001 ranged from 175 fish to more than 8,000 per year and averaged 1,509 fish per year. Unfortunately, there are many biases and errors associated with these data, and CDFG does not consider these estimates reliable. Fish monitoring efforts at RBDD and GCID on the upper Sacramento River have captured between 0 and 2,068 juvenile southern DPS green sturgeon per year (Adams *et al*. 2002).

Recent spawning population estimates using sibling-based genetics by Israel (2006b) indicates a maximum spawning population of 32 spawners in 2002, 64 in 2003, 44 in 2004, 92 in 2005, and 124 in 2006 above RBDD (with an average of 71). Based on the length and estimated age of post-

larvae captured at RBDD (approximately two weeks of age) and GCID (downstream; approximately three weeks of age), it appears the majority of southern DPS green sturgeon are spawning above RBDD. Note, there are many assumptions with this interpretation (*i.e*., equal sampling efficiency and distribution of post-larvae across channels) and this information should be considered cautiously.

Juvenile entrainment data from the Sacramento-San Joaquin Delta pumping facilities of the Central Valley Project and State Water Project provide an indication of how green sturgeon abundance has changed since 1968. The estimated average number of green sturgeon entrained each year at the State of California's John Skinner Fish Facility prior to 1986 was 732; from 1986 on, the average number decreased to 47. At the Federal Tracy Fish Collection Facility, the average prior to 1986 was 889; from 1986 to 2001 the average was 32 (70 FR 17386). Additional analysis of fish entrainment at the these fish facilities indicates that take of both southern DPS green sturgeon and white sturgeon per acre-foot of water exported has decreased substantially since the 1960s. Decreases in numbers of green sturgeon entrained in these facilities occurred while water export levels at both facilities have increased substantially (*i.e.* more water was pumped, but fewer green sturgeon were entrained).

Catches of subadult and adult southern DPS green sturgeon by the California Department of Water Resources Interagency Ecological Program (IEP) between 1996 and 2004 ranged from one to 212 green sturgeon per year (212 occurred in 2001), however, the portion of these captures consisting of southern DPS green sturgeon is unknown as the fish were primarily captured in San Pablo Bay which is known to consist of a mixture of northern and southern DPS green sturgeon.

Recent habitat evaluations conducted in the upper Sacramento and Feather Rivers suggest that, as for anadromous salmonids, large amounts of potential spawning habitat were made inaccessible or altered by dams (BRT 2005). Current spawning habitat for green sturgeon has been reduced to a limited area of the upper Sacramento River. There are at least two records of confirmed adult sturgeon observation in the Feather River (Beamesderfer *et al*. 2004). However, there are no observations of juvenile or larval sturgeon even prior to the 1960s when Oroville Dam was built (BRT 2005). There are unconfirmed reports that green sturgeon may spawn in the Feather River during high flow years (CDFG 2002).

While there is no direct record of green sturgeon occurrence in the San Joaquin River upstream of the Delta, indirect evidence has been discussed in a variety of sources (Moyle 2002, Lindley *et al*. 2004). Spawning in the San Joaquin River system has not been recorded, but alterations of the San Joaquin River tributaries (Stanislaus, Tuolumne, and Merced Rivers) and its mainstem occurred early in the European settlement of the region. During the later half of the 1800s, impassable barriers were built on these tributaries where the water courses left the foothills and entered the valley floor. Therefore, these low elevation dams have blocked potentially suitable spawning habitats located further upstream for over a century. Additional destruction of riparian and stream channel habitat by industrialized gold dredging further disturbed any valley floor

habitat that was still available for sturgeon spawning. It is likely that both white and green sturgeon utilized the San Joaquin River basin for spawning prior to the onset of European influence. This assumption is based on past use of the region by populations of Central Valley spring-run Chinook salmon and Central Valley steelhead which require similar spawning habitat to sturgeon. Although these two populations of salmonids have either been extirpated or greatly diminished in their use of the San Joaquin River basin over the past two centuries, their historical presence indicates that suitable spawning habitat for sturgeon once existed, such as clear, deep, cold and cobble-bottom stream reaches.

The most recent status review update concluded that the southern DPS green sturgeon is likely to become endangered in the foreseeable future due to the substantial loss of spawning habitat, the concentration of a single spawning population in one section of the Sacramento River, and multiple other risks to the species (BRT 2005). Based on this information, the southern DPS green sturgeon was Federally-listed as threatened on April 7, 2006 (71 FR 17757).

B. Critical Habitat Status

1. Salmonid Critical Habitat

Designated critical habitat for Sacramento winter-run Chinook includes the Sacramento River from Keswick Dam in Shasta County (River Mile [RM] 302) to Chipps Island (RM 0) at the westward margin of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay north of the SFOBB (June 16, 1993, 58 FR 33212). The critical habitat designation identifies physical and biological features of the habitat that are essential to the conservation of the species and that may require special management consideration and protection.

Critical habitat has been designated for Central Valley spring-run Chinook salmon, including approximately 1,150 miles of stream habitat within the Central Valley and an additional 254 square miles of estuarine habitat in Suisun, San Pablo, and San Francisco Bays (70 FR 52488).

Central Valley steelhead designated critical habitat includes approximately 2,317 miles of stream habitat within the Central Valley and an additional 254 square miles of estuarine habitat in Suisun, San Pablo and San Francisco Bays (70 FR 52488).

Critical habitat has been designated for Central California Coast steelhead, including approximately 1,676 miles of stream habitat in central coastal California and an additional 386 square miles of estuarine habitat in San Francisco and San Pablo bays (70 FR 52488).

The condition of salmon and steelhead critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations.

NMFS has determined that present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat[7]: logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals, including unscreened diversions for irrigation. Impacts of concern include alteration of streambank and channel morphology, alteration of water temperatures, loss of spawning and rearing habitat, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, removal of riparian vegetation resulting in increased streambank erosion, loss of shade (higher water temperatures) and loss of nutrient inputs (Busby *et al.* 1996, 58 FR 33212, 70 FR 52488). Water development has drastically altered natural hydrologic cycles in many California streams. Alteration of flows results in migration delays, loss of suitable habitat due to dewatering and blockage; stranding of fish from rapid flow fluctuations; entrainment of juveniles into poorly screened or unscreened diversions, and increased water temperatures harmful to salmonids. Overall, current condition of salmonid critical habitat is degraded, and does not provide the full extent of conservation value necessary for the recovery of these species.

2. Green Sturgeon

Critical habitat was designated for the southern DPS of green sturgeon on October 9, 2009 (74 FR 52300) and includes coastal United States marine waters within 60 fathoms depth from, and including, Monterey Bay, California, north to Cape Flattery, Washington, including the Strait of Juan de Fuca, Washington, to its United States boundary.

The current condition of critical habitat for the southern DPS of green sturgeon is degraded over its historical conditions (71 FR52084, 74 FR 52300). It does not provide the full extent of conservation values necessary for the recovery of the species, particularly in the upstream riverine habitat of the Sacramento River. In particular, passage and water flow PCEs have been impacted by human actions, substantially altering the historical river characteristics in which the southern DPS of green sturgeon evolved. In addition, the alterations to the Sacramento-San Joaquin River Delta may have a particularly strong impact on the survival and recruitment of juvenile green sturgeon due to their protracted rearing time in the delta and estuary. Loss of individuals during this phase of the life history of green sturgeon represents losses to multiple year classes rearing in the Delta, which can ultimately impact the potential population structure for decades to come.

C. Global Climate Change

Global climate change presents an additional potential threat to salmonids and southern DPS green sturgeon, and their respective critical habitat. Modeling of climate change impacts in California suggests that average summer air temperatures are expected to increase (Lindley *et al*.

[7] Other factors, such as over fishing and artificial propagation have also contributed to the current population status of steelhead. All these human induced factors have exacerbated the adverse effects of natural factors such as drought and poor ocean conditions.

2007). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al*. 2004). Total precipitation in California may decline; critically dry years may increase (Lindley *et al*. 2007, Schneider 2007). The Sierra Nevada snow pack is likely to decrease by as much as 70 to 90 percent by the end of this century under the highest emission scenarios modeled (Luers *et al*. 2006). Wildfires are expected to increase in frequency and magnitude, by as much as 55 percent under the medium emissions scenarios modeled (Luers *et al*. 2006). Vegetative cover may also change, with decreases in evergreen conifer forest and increases in grasslands and mixed evergreen forests. The likely change in amount of rainfall in northern and central coastal streams under various warming scenarios is less certain, although as noted above, total rainfall across the state is expected to decline. For the California North Coast, some models show large increases (75 percent to 200 percent) in rainfall amounts while other models show decreases of 15 percent to 30 percent (Hayhoe *et al*. 2004). Many of these changes are likely to further degrade salmonid and southern DPS green sturgeon habitat by, for example, reducing stream flows during the summer and raising summer water temperatures. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia et al. 2002). In marine environments, ecosystems and habitats important to sub adult and adult salmonids are likely to experience changes in temperatures, circulation and chemistry, and food supplies (Feely et al. 2004, Brewer 2008, Osgood 2008, Turley 2008). The projections described above are for the mid to late 21st Century. In shorter time frames, natural climate conditions are more likely to predominate (Cox and Stephenson 2007, Smith *et al.* 2007).

V. ENVIRONMENTAL BASELINE

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and the ecosystem in the action area. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process (50 CFR §402.02).

A. Environmental Setting in the Action Area

San Francisco Bay is the largest estuary on the west coast of North America. Located about halfway up the California coast from the Mexican border, it is the natural exit point of 40 percent of California's freshwater outflow. California's two largest rivers, the Sacramento and San Joaquin, merge to form the estuary. They drain part of the Sierra Nevada and Cascade mountains and form a large and convoluted delta in the Central Valley. The freshwater runoff in the delta flows seaward, mixing with ocean water through Suisun Bay, San Pablo Bay and lastly San Francisco Bay. San Francisco Bay empties into the Pacific Ocean through the Golden Gate.

The climate is Mediterranean; most precipitation falls in winter and spring as rain throughout the Central Valley and as snow in the Sierra Nevada and Cascades. The freshwater outflow pattern is seasonal; highest outflow occurs in winter and spring. In summer, freshwater inflow to San Francisco Bay is controlled mainly by water released from Central Valley reservoirs.
Ocean conditions affect the estuary. The California Current system dominates California's nearshore ocean environment. Off northern and central California, surface waters are driven south by northwesterly winds in spring and summer and, as a result of Ekman transport of surface water, cold, nutrient-rich water is upwelled to the surface and transported offshore. This creates one of the most productive ocean regions in the world. Ocean temperature is a major factor determining the distribution of fish and invertebrates along the coast and consequently, the marine fauna of the estuary. San Francisco Bay is in a transitional zone containing both cold water species from the north and sub-tropical fauna from the south (Parrish *et al.* 1981). In addition to the longitudinal temperature gradient and seasonal variation due to upwelling, there are large inter-annual temperature differences during El Niño events.

The northern portion of the action area, north of the SFOBB, is located in an area commonly termed the Central Bay. The Central Bay contains many of the bay's deepest areas as well as shallow shoals mainly along the eastern side. The southern portion of the action area, south of the SFOBB, includes the northernmost section of the South Bay. The South Bay has a central channel that narrows southward as well as broad shoals on either side of the channel. The deep channel (deeper than 15 m) running under the SFOBB and east of YBI within the action area is influenced by swift currents (up to three knots or greater) and has a substrate composed of unconsolidated sediments primarily consisting of a deep layer of soft bay mud, clay and silt overlaying the Franciscan Assemblage bedrock. Closer to the shoreline of YBI the substrate transitions shoreward from soft bottom substrate consisting of a pebble and sandy layer to an intertidal hard substrate composed of large boulders and rock and concrete rip-rap. Additionally, located within Coast Guard Cove, along the northeastern side of YBI, shallow subtidal and intertidal habitat exists with patches of eelgrass sparsely distributed. Besides salmonids and green sturgeon, the action area provides habitat within the water column, benthic substrate and shoreline of YBI, for an assemblage of marine algae, fish and macroinvertebrate species, as well as birds and marine mammals.

The disposal site is located near the center of central San Francisco Bay, just south of Alcatraz Island, where strong tidal currents (4 knots maximum) exist. The water depth at the disposal site near Alcatraz Island is 48 feet MLLW. During April, there may be a strong vertical salinity gradient, depending on recent rainfall events, which would result in fresher, lighter water comprising the upper layer of the water column. The sediment at the disposal site near Alcatraz Island historically was likely coarse-grain sediment, but has likely changed due to the deposition of dredged sediment which primarily consists of fine-grain material.

SF-DODS is located in the Pacific Ocean off the continental shelf west of the Farallon Islands in water ranging from 8,200 - 9,840 feet (2,500 - 3,000 meters) deep. The configuration of SFDODS is an oval with major and minor axes of 22,500 feet and 13,500 feet, respectively. The current velocity is about 0.5 knots. The sediment is composed of sand, silt and clay.

B. Status of Listed Species and Critical Habitat in the Action Area

1. Salmonids

Central San Francisco Bay, including the action area, is within the designated critical habitat for Sacramento River winter-run Chinook salmon. However, the action area does not possess critical habitat for Central Valley spring-run Chinook salmon, and Central Valley steelhead, although they do use it as a migration corridor. Both central and south San Francisco Bay in the action area are designated critical habitat for Central California Coast steelhead (70 FR 52488). PCEs of designated critical habitat for Sacramento River winter-run Chinook, Central Valley spring-run Chinook salmon, Central Valley steelhead, and Central California Coast steelhead in the action area include estuarine areas free of obstruction and excessive predation. Essential features include the estuarine water column, foraging habitat, and food resources used by salmonids (primarily CCC-steelhead in the action area), as part of their juvenile downstream migration or adult spawning upstream migration (58 FR 33212, 69 FR 71880). PCEs within the action area are degraded due to a variety of historical and on-going disturbance, described below. These activities have likely reduced availability of natural cover and forage items for steelhead. Natural cover for CCC steelhead in the action area may exist in eelgrass beds located along YBI if they are still present. Benthic habitat in the action area consists of Bay sand and mud.

The action area within the central bay includes a very small portion of the migratory pathway for the populations of Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead, as well as that portion of the Central California Coast steelhead DPS which spawns in several tributaries of central San Francisco, San Pablo, and Suisun Bays. Within the south bay, all adult and juvenile Central California Coast steelhead migrating from the Guadalupe River, Stevens Creek, San Francisquito Creek, Coyote Creek, Upper Penitencia Creek, Alameda Creek, and possibly San Leandro Creek (Leidy 2000) migrate under the SFOBB.

Returning adult salmon and steelhead migrate from the Pacific Ocean, through San Francisco Bay and upstream to spawning areas of their natal streams. Juvenile salmonids migrate downstream and through the bay, becoming smolts en route to the Pacific Ocean where they rear and become adults. Upstream migrations for adult steelhead and winter-run Chinook salmon through the bay typically begin in early December. Adult spring-run Chinook salmon migrate upstream through the bay during the spring months. Steelhead and Chinook salmon smolts migrate downstream through the bay during the late winter and spring months.

Historically, the tidal marshes located downstream of the confluence of the Sacramento and San Joaquin Rivers to the entrance of San Francisco Bay provided a highly productive estuarine environment for juvenile anadromous salmonids. During the course of their downstream migration, juvenile salmon and steelhead may still utilize the estuary for seasonal rearing, although recent data suggest that migration to the sea is rapid. This tendency to rapidly move through the estuary is contrary with salmonid migration in estuaries located at higher latitudes, as well as some of the coastal lagoon estuaries located along the central and northern California coast. MacFarlane and Norton (2002) found that juvenile Central Valley fall-run Chinook salmon travel downstream at a rate of approximately 1.6 km/day between Chipps Island (River Kilometer [RK] 68) and the Golden Gate Bridge (RK 3). Other findings from their research indicate that these fish: 1) show little increase in mean length or weight while in the estuary, suggesting that feeding and rearing activities in the estuary replace energy spent reaching the ocean; 2) their condition declined in the estuary, but improved markedly upon entering the ocean; and 3) whole body and organ contaminant concentrations showed a slight increase as the fish migrate from the delta through the bay, but body burden levels were well below published concentration levels that would be expected to cause chronic toxicity problems. Therefore, NMFS assumes that juvenile Chinook salmon present within the estuary are primarily transiting quickly out to sea, and not utilizing the bay as rearing habitat. Additionally, data suggest that migrating Central Valley fall-run Chinook salmon juveniles tend to occupy the deeper, more centrally located, channels during their outmigration (Jahn 2004).

Information regarding the size and timing of anadromous salmonid migrations through the action area is also available from CDFG's San Francisco Bay Study. Between 1980 and 1995, the San Francisco Bay study sampled several open water locations within the original action area for the 2001 BO with midwater trawls, bottom (otter) trawls, and beach seines (Baxter *et al*. 1999). The results of this study indicate that juvenile Chinook salmon are distributed within the Central Bay (and also likely found within the action area due to close proximity of sampling locations) during the period between January and June, and generally absent between June through November. However, the percentage of the population likely to be found between January and June within the action area is thought to be very low relative to the whole population, based on Chinook salmon adult run timing.

2. <u>Green Sturgeon</u>

As with salmonids, information regarding the spatial and temporal distribution of green sturgeon in the estuary is available from CDFG's San Francisco Bay Study. Between 1980 and 1995, the San Francisco Bay Study sampled several stations each month using midwater and bottom trawls (Baxter *et al*. 1999). The data show that most green sturgeon collected by trawls in the estuary range from about 200 to 1200 mm in length. However, the trawling methods used are not designed to adequately sample sturgeon, and therefore cannot be used to accurately estimate abundance of this species.

San Francisco Bay is within the range of designated critical habitat for southern DPS green sturgeon. It serves as an important habitat for all lifestages, as it supports rearing and serves as an important migratory/connectivity corridor between the Sacramento River system and nearshore coastal marine waters. Juveniles (1-4 years of age) and subadults (from 4 to 9 years of age for males, and 4 to 13 years of age for females) are believed to be present in the bay throughout the year (CDFG 2002), including the action area. These lifestages utilize the action area for rearing and migration. Adults likely occur within tidally influenced areas of the sloughs surrounding the Bay, but may also be present year-round in the estuary and action area depending on reproductive status. Pre-spawning adults could be present from February through May, post-spawned adults could be present October through January, and non-spawning adults may be present June through October. Adults may utilize the action area as a migration corridor and for foraging.

C. Factors Affecting the Species and Critical Habitat in the Action Area

Profound alterations to the environment of the San Francisco Bay estuary, including the action area, began with the discovery of gold in the middle of the 19th century. Dam construction, water diversion, hydraulic mining, and the diking and filling of tidal marshes soon followed, launching the San Francisco Bay area into an era of rapid urban development and coincident habitat degradation. There are efforts currently underway to restore the habitat in the bay area, if not directly within the action area, at least within surrounding tributaries and the estuary itself. There have also been alterations to the biological community as a result of human activities, including hatchery practices and the introduction of non-native species. The following describes, in general, the human activities that have affected these fish and their habitats, including: 1) altered flows from dam construction and water development; 2) land use activities and urban development; 3) industrial and urban pollution; 4) dredging and related shipping activity; 5) introduction of non-native species; 6) ecosystem restoration; and 7) impacts of construction from the SFOBB East Span Seismic Project to date.

1. Dam Construction and Water Development

Hydropower, flood control, and water supply dams of the Central Valley Project, State Water Project, and other municipal and private entities have affected water quantity, timing, and quality in San Francisco Bay, including in the action area. Altered stream flows and inflow through the Delta and Carquinez Strait have affected the natural cycles by which salmonids and green sturgeon base their migrations. The seasonal distribution of freshwater inflow differs in that the magnitude and duration of peak flows during the winter and spring are significantly reduced by water impoundment in upstream reservoirs. Salmonids and green sturgeon need sufficient freshwater flow within the bays and estuaries adjacent to the Sacramento River (*i.e.*, the Sacramento–San Joaquin Delta, and the Suisun, San Pablo, and San Francisco Bays [including the action area]) to allow adults to successfully orient to the incoming freshwater flow and migrate upstream to natal spawning grounds. Overall, present day water management practices in the

Central Valley reduce natural flow variability by creating more uniform flows year-round that diminish migratory cues, natural channel formation, and food web functions.

2. Land Use Activities and Urban Development

Historically, the tidal marshes of San Francisco Bay provided a highly productive estuarine environment for juvenile anadromous fish species. Returning adult salmonids and green sturgeon navigate their way through San Francisco Bay, including in or near the action area, as they seek the upstream spawning grounds of their natal streams. Juvenile salmonids primarily use the bay as a migratory pathway during their outmigration to the Pacific Ocean. However, non-spawning adults, subadults and juvenile green sturgeon may utilize the estuary year-round for foraging habitat, rearing, and also as a migration corridor to the sea. Land use activities since the 1850's associated with urban, industrial, and agricultural development have altered fish habitat quality in the Bay, such as destruction of eelgrass beds or degradation of water quality, and contributed to declines in fish populations.

Urbanization has been a major influence on the land surrounding the estuary. In the past 150 years, the diking and filling of tidal marshes have decreased the surface area of San Francisco Bay by 37 percent. More than 500,000 acres of the estuary's historic tidal wetlands have been converted to farms, salt ponds, and urban uses. Less than 45,000 acres of the estuary's historic tidal marshes remain intact, a reduction of 92 percent (San Francisco Estuary Project 1992). Today, nearly 30 percent of the land in the nine counties surrounding San Francisco Bay is urbanized. The increase in urban land reflects the growth of the human population. There are now more than 7.5 million individuals living in the bay area, making the region the fourth most populous metropolitan area in the United States. These changes have reduced the acreage of valuable farm land, wetlands, and riparian areas, and have increased pollutant loadings to the estuary. Non-point sources of pollution, such as urban and agricultural runoff, continue to degrade water quality in the bay, including the action area. While the action area encompasses a small area of the entire bay, the distribution of tidal currents, volume and flow of water throughout the bay influences the transport of pollutants. Consequently contaminants originating miles away from the bay are often mixed throughout the estuary. These contaminants may impair the physiological development of salmonid smolts and juvenile green sturgeon, which would reduce their survival potential during later life history phases.

Additionally, installation of docks, shipping wharves, marinas, and miles of rock rip-rap for shoreline protection has also contributed greatly to habitat degradation within the estuary. Correlated with the increase in bay area development, is an increase in marine/ocean vessel traffic transiting through the bay, including the action area. Increased marine traffic is also responsible for more pollutants to enter bay waters (*e.g.* oil spills) as well as disturbance to estuarine species resulting from elevated noise levels within the air and estuarine waters of the bay. Thus, the majority of factors associated with land use activities and urban development contribute to the continued degradation and loss of habitat for anadromous fish species within the bay and action

area.

3. Industrial and Urban Pollution

Industrial, municipal, and agricultural wastes have been discharged into the waters of San Francisco Bay with major historical point sources including agricultural wastes primarily from the Central Valley, wastes from fish, fruit and vegetable canneries, and municipal sewage. Additionally, mining activities occurring in the 19th century contributed to a substantial increase in sediment deposition and residues leaching from abandoned mines in the lower portion of the estuary. Associated with this sediment were high levels of mercury, which was used to help extract gold. Contaminants in sediment located along the San Francisco Port's waterfront contain elevated levels of polycyclic aromatic hydrocarbons (PAHs), a possible result from the use of creosote-treated wood piles in the construction of the piers that line San Francisco's waterfront. In addition, Dillon and Moore (1990) reported that major pollutant sources for San Francisco Bay include the freshwater flow from the Sacramento-San Joaquin River systems, over 50 waste treatment plants, and about 200 industries which are permitted to discharge directly into the bay (citing Luoma and Phillips 1988).

Many of these contaminants have been found in the tissue of fish inhabiting the estuary, prompting the California Department of Health to issue warnings regarding consumption of fish from within the estuary. Although salmonids and spawning adult green sturgeon are migratory through the action area, they do forage during this migration and therefore are subjected to the contaminants found in their prey. Additionally, theses contaminants may impair the physiological development of salmonid smolts and juvenile green sturgeon, which would reduce their survival potential during later life history phases. Moreover, since sturgeon are long-lived, and a large species, they are likely to bioaccumulate high levels of contaminants during their lifespan.

Although large-scale pollution of the estuary was partially relieved by the passage of the Clean Water Act in 1972, resulting in the construction of sewage treatment plants in all cities surrounding the Bay, non-point sources of pollution, such as urban runoff, continue to degrade water quality in the Bay, including the action area.

4. Dredging and Disposal

Hydraulic dredging is a common practice within the San Francisco Bay to maintain water depths suitable for navigation for both private and commercial vessel traffic. Such dredging operations use a cutterhead dredge pulling water upwards through intake pipelines, past hydraulic pumps, and down outflow pipelines to disposal sites placing benthically-oriented fish such as green sturgeon at risk. In addition, dredging operations can re-suspend contaminants and elevate toxics such as ammonia, hydrogen sulfide, and copper and may result in impacts through changes in bathymetry (NMFS 2006). NMFS is concerned about chronic effects that may occur as a result of the uptake of contaminants by green sturgeon during juvenile rearing and during both adult and

juvenile migration through the bay. Studies on white sturgeon in estuaries indicate that the bioaccumulation of pesticides and other contaminants adversely affects growth and may result in decreased reproductive success, green sturgeon are believed to experience similar risks from contaminants (73 FR 52084). Because salmonids do not spend long time periods in the Bay, they are less likely to experience these impacts.

The action area is located within a main navigation channel between the central and south San Francisco Bay, and near YBI and the Coast Guard Station at Coast Guard Cove. Therefore, this area has likely been subjected to maintenance dredging activities more frequently than other areas in the Bay in order to accommodate draft requirements for vessels. For this reason, the deep channel within the action area presumably possesses degraded habitat, due to frequent disturbance. Since all adult and juvenile Central California Coast steelhead migrating from tributaries to the south Bay (Guadalupe River, Stevens Creek, San Francisquito Creek, Coyote Creek, Upper Penitencia Creek, Alameda Creek, and possibly San Leandro Creek [Leidy 2000]) migrate under the SFOBB, they may have experienced greater risk of exposure to dredging activities, especially if dredging was conducted during a time of year when they were migrating under the SFOBB. Similarly, some green sturgeon may pass under the SFOBB and be subject to the same risks as CCC steelhead.

5. Introduction of Non-Native Species

As native fishes in the San Francisco Bay-Delta estuary became depleted in the late 19th Century, non-native species were brought to the bay and delta including American shad, striped bass, common carp, and white catfish. As their populations boomed, those of native fishes declined further. Introduction of non-native species accelerated in the 20th Century through deliberate introductions of fish; and unintended introductions of fish and invertebrates occurred from the release of ballast water from ships returning from foreign ports. Establishment of non-native species was probably facilitated by altered hydrologic regimes and reduction in habitats for native species. The introduction and spread of non-native species throughout the San Francisco Bay-Delta estuary has affected many native species, including listed salmonids (Cohen and Carlton 1995), and presumably green sturgeon, through predation and competition for food and habitat.

As currently seen in the San Francisco estuary, non-native invasive species can alter the natural food webs that existed prior to their introduction. Perhaps the most significant example is illustrated by the Asiatic freshwater clams *Corbicula fluminea* and *Potamocorbula amurensis*. The arrival of these clams in the estuary disrupted the normal benthic community structure and depressed phytoplankton levels in the estuary due to the highly efficient filter feeding of the introduced clams (Cohen and Moyle 2004). The decline in the levels of phytoplankton reduces the population levels of zooplankton that feed upon them, and hence reduces the forage base available to juvenile salmonids and green sturgeon transiting within the estuary, including those transiting the action area. A reduction in feeding can adversely impact the health and

physiological condition of these fish species as they rear and migrate through the estuary to the Pacific Ocean.

6. Ecosystem Restoration

Preliminary, significant steps towards the largest ecological restoration project yet undertaken in the United States have occurred during the past ten years in California's Central Valley. The CALFED Bay-Delta Program and the Central Valley Project Improvement Act's Anadromous Fish Restoration Program, in coordination with other Central Valley and Bay Area efforts, have implemented habitat restoration actions, including stream and wetland restoration projects, in close proximity to the action area. Restoration of wetland areas typically involves flooding lands previously used for agriculture, thereby creating additional wetland areas and rearing habitat for juvenile salmonids, green sturgeon, other fish species, and birds. Restoration of streams usually entails reducing erosion and sediment entry to the streams and enhancing riparian canopy and instream habitat. We anticipate these restoration projects will improve the habitat conditions for these animal species throughout the Bay, and thereby lead to potential increases in species numbers and distribution in the action area.

7. Impacts of construction from the SFOBB East Span Seismic Project to Date

a. Pile Driving

Pile driving associated with the construction of the SFOBB has occurred intermittently since the project's inception within the action area. Both permanent and temporary piles, ranging in size and installation methods, have been installed since 2003. Monitoring requirements for the installation of the large diameter (2.5 and 1.8 m) permanent piles, primarily for piles installed for the SAS Marine Foundations E2/T1, Skyway Structure, and Oakland Approach Structure required a caged fish hydroacoustic study and monitoring program, referred to as the Fisheries and Hydroacoustic Monitoring Program. The first phase of the monitoring project occurred during construction in November 2003 through January 2004. The second phase occurred during September 2004 through October 2004. Data from the reports show that caged fish[8] (shiner surfperch) immersed in water within the action area during pile driving suffered barotrauma effects, with 71 percent of the fish examined showing injuries to swim bladders and kidneys after exposure to unattenuated peak sound pressure levels (SPLs) between 207 and 209 decibels (dB) re one micropascal (re: 1µ Pa) (Illingworth and Rodkin 2004). Additionally, approximately 100 fish (perch and anchovies) that floated to the surface during piscivorous bird monitoring were collected and examined. These fish exhibited severe injuries to internal organs, including ruptured swim bladders as a result of exposure to unattenuated SPLs from pile driving. The report also noted that several hundred more fish were taken by gulls. However, the study did show use

[8] The caged fish monitoring study originally included the use of caged steelhead from the CDFG Nimbus hatchery. However due to excessive mortalities (95%) within the steelhead treatment groups, steelhead could not be included in analyses for the study.

of a bubble curtain for sound attenuation did in fact reduce peak SPLs, effectively reducing dB levels to 150 dB (re: 1µ Pa) at the 4,400 meter compliance criterion for the original project.

Similarly, more recent reports submitted for the hydroacoustic monitoring period during the installation of temporary towers D and F of the SAS also indicate fish mortality and bird predation/foraging occurrences resulting from high SPLs during unattenuated sound impact hammer pile driving activities. During the driving of the piles at Temporary Tower D, measurements were taken for the largest piles installed (42-inch diameter piles) on June 23, 2008. Piles driven with the Menck MHU 500T impact hammer were driven without any sound attenuation and resulted in the maximum peak of 217 dB peak (re: 1µ Pa) and 191 dB sound exposure level (SEL) at 20 meters north, and 206 dB peak (re: 1µ Pa) and 179 dB SEL (re: 1µ Pa^2-sec) at 135 meters north. In the initial project proposal for the SFOBB East Span Seismic Project, Caltrans and NMFS anticipated the temporary piles required to build falsework would be substantially smaller than the permanent piles (18 to 24 inches in diameter), and therefore SPLs would be lower and not at levels injurious to fish. However, changes to the project during the course of various planning phases resulted in plans consisting of more temporary piles than anticipated, and piles twice as large as what was originally proposed (42 to 48-inch diameter piles). Unfortunately this increase in number and size did not result in any sound attenuation methods being developed for the piles. Therefore, sound attenuation was not incorporated for the installation of in-water temporary piles required for falsework necessary to construct the Marine Foundations E2/T1, Skyway Structure, Oakland Approach Structure and most recently the temporary towers (D, F, and G) for the SAS. Fish kills have been documented as occurring as a result of pile driving within the action area (Garcia and Associates 2008, 2009). Although no records of listed salmonids or green sturgeon have been reported by Caltrans, there have been observations of mortality, incapacitation and stunning of other fish species during monitoring activities concurrent with pile driving. Given that many of these fish are forage species, these incidents of impacts effectively degraded anadromous fish habitat quality within the action area by decreasing the availability of food resources as well as exposing salmonids and green sturgeon to increased risk of injury as a result of high SPLs. Moreover, since monitoring of pile driving activities occurred for only 10 percent of the time, the possibility exists of unrecorded impacts to listed anadromous fish. Additionally, some temporary piles were driven during peak salmonid migration periods (December through May).

The remaining piles for temporary falsework needed to construct Temporary Tower G at YBI were driven into place between March 4, 2009 and May 15, 2009. As described in the April 10, 2009, supplemental biological opinion, NMFS developed a reasonable worst case scenario for the effects of this pile driving for temporary falsework at YBI on listed salmonids and green sturgeon. In summary, that reasonable worst case scenario assumed: 1) twenty-five percent of the CCC steelhead population migrate to the east side of YBI en route to and from the Golden Gate; 2) juvenile, subadult and non-spawning adult green sturgeon could be present in the action area year-round; 3) roughly two percent of adult green sturgeon spawners could be present in the action area February through May; 4) remaining pile driving will occur in areas greater than five meters deep

during peak migration periods for spawning CCC adult steelhead (February through May,) and for spawning adult green sturgeon (February through May); 5) a maximum of three piles will be installed per day (with an impact hammer) intermittently over the course of four months; and 6) some pile installation will occur at night. The 4982 m diameter of the impact area corresponding to the 206 peak dB and 187 SEL during that phase of construction was the greatest distance considered due to the maximum peak dB level obtained from initial hydroacoustic measurements during the construction of Temporary Tower D. With these assumptions, we expected roughly two percent of the outmigrating juvenile and post-spawned adult population of steelhead originating from south San Francisco Bay tributaries were likely to be injured or killed by sound pressure levels exceeding 206 dB (re: 1 µPa), 187 SEL (re: 1 µPa^2-sec) during the remaining pile driving in 2009. We also estimated that a small number of juvenile, subadult, and adult spawning green sturgeon were likely to be injured or killed by these sound pressure levels.

Results from Caltran's hydroacoustic and biological monitoring indicate that the maximum sound pressure levels expected did not extend beyond the area of impact analyzed in the April 10, 2009, biological opinion during pile driving for temporary falsework at YBI. However, additional fish kills did occur (*e.g.*, pacific herring [*Clupea pallasii*]) as documented in the reports submitted for hydroacoustic and biological monitoring, taken during the installation of Temporary Tower G between March 4 and May 19, 2009. Hydroacoustic measurements taken during the installation of the 42 and 48-inch diameter piles indicate that SPLs ranged from 166-223 peak dB (re: 1 µPa), at both deep and shallow water sensors out from 500 m in to 14 m distances from the piles. Accumulated SELs ranged between 176 -226 dB (re: 1µ Pa^2-sec) at distances out from 560 m in to 17 m, respectively. On July 23, 2009, NMFS received notification from Caltrans that during impact hammer pile driving on May 7, 2009, pacific herring were killed, and the biological monitoring reports submitted for other monitored pile driving events document several other bird predation events. However, as with the installation of Temporary Towers D and F, Caltran's biologists did not see any injury or mortality for ESA-listed fish species. Based on this information, and the lack of anadromous dead fish sighted by Caltrans' biological monitors during this pile driving, NMFS assumes the losses of listed species during this pile driving were as described in the April 10, 2009, BO. Incidental take was expected for no more than two percent adult and juvenile CCC steelhead, and adult spawning green sturgeon, and for only a very small number of juvenile, subadult and non-spawning adult green sturgeon.

Similarly, during the installation of twenty-two 36-inch diameter steel piles for the construction of the T1 Temporary Access Trestle for the SAS, the biological monitors observed a small amount of bird strikes during one pile driving event. However, no ESA-listed fish were observed. Although there were some problems encountered with implementation of the bubble curtain (likely due to slope and substrate), due to the timing and short duration of this pile driving event and location, and no observed injuries or mortality of ESA-listed fish species in the action area, NMFS assumes that any losses that may have occurred were as described in the August 21, 2009 BO.

b. Dredging

Near the Oakland shore, dredging was required for the SFOBB East Span Seismic Project for barge access, foundation construction, and pile cap construction. The barge access channel is located on the north side of the new, replacement bridge. The material was disposed of at the deep ocean disposal site (SF-DODS), approximately 50 nautical miles west of the Golden Gate Bridge; thus, no impacts to anadromous fish or their habitat were likely from dredge disposal due to the location and depth of the site. However, disturbance to aquatic substrate including eelgrass beds within the original action area occurred as a result of project activities. As part of the habitat restoration mitigation for this project, Caltrans proposed mitigation for impacts to special aquatic sites in the intertidal areas just to the north of the Oakland Touchdown, and at off-site locations. Caltrans, in coordination with NMFS Restoration Center and Habitat Conservation Division are currently working on these projects to ensure that success criteria has or will be met and will provide benefits to anadromous fish, primarily steelhead and possibly green sturgeon. The restoration approach is distinct from the creation of new eelgrass habitat in that it focuses on restoring areas that are historically known to have supported eelgrass habitat. Caltrans and NMFS intend that this approach maximize the potential for planting success by incorporating site manipulation, monitoring and data collection.

VI. EFFECTS OF THE ACTION

The remaining bridge demolition and dredging activities for the SFOBB East Span Seismic Safety Project are expected to result in short-term adverse effects to listed salmonids, primarily Central California Coast (CCC) steelhead, and southern DPS green sturgeon, and their respective critical habitats. For the three listed salmonid ESUs originating from the Central Valley (Central Valley steelhead, Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon), NMFS expects that adult fish generally remain on the north side of San Francisco Bay after entering the estuary through the Golden Gate, migrating rapidly around Angel Island and through San Pablo Bay towards the Delta and their natal Central Valley streams. Although a few adult salmon have been recorded feeding near YBI in the summer, the number of adults that uses this area is likely small. For salmonid smolts originating from Central Valley streams, it is generally thought that they, too, utilize the north side of the Bay as their primary migration corridor (MacFarlane and Norton 2002, Jahn 2004). The analyses of impacts on salmonids and green sturgeon from prior construction activities are reported above in the Environmental Baseline, and are included below and in our integration and synthesis of effects.

A. Dismantling of the Existing Bridge

1. Pile Driving and Underwater Sound Pressure

a. Impacts on Fish

The underwater sound pressure waves that have the potential to adversely affect listed anadromous fish species originate with the contact of the hammer with the top of the steel pile. The impact of the hammer on the top of the steel pile causes a wave to travel down the pile and causes the pile to resonate radially and longitudinally like a gigantic bell. Most of the acoustic energy is a result of the outward expansion and inward contraction of the walls of the steel pipe pile as the compression wave moves down the pile from the hammer to the end of the pile buried in the bay bottom. Water is virtually incompressible and the outward movement of the pipe pile (by a fraction of an inch) followed by the pile walls pulling back inward to their original shape, sends an underwater pressure wave propagating outward from the pile in all directions. The steel pipe pile resonates sending out a succession of waves even as it is pushed several inches deeper into the bay bottom.

In 2004, NMFS, FHWA and Caltrans formed the Fisheries Hydroacoustic Working Group (FHWG) to address the issue of potential impacts to listed species from exposure to underwater sounds produced by pile driving. As a result of this, Caltrans contracted with prominent experts in the field of underwater acoustics to review existing literature and conduct research on the effects of underwater sound on fish (Hastings and Popper 2005, Popper 2006). At a FHWG meeting in Vancouver, Washington in June 2008, an Agreement in Principle between NMFS, Caltrans and others was reached regarding the establishment of interim thresholds to be used to assess physical injury to fish exposed to underwater sound produced during pile driving. Specifically, this included a single strike peak SPL of 206 dB (re: 1 μPa) and an accumulated SEL of 187 dB (re: 1 μPa ^{2}sec) for fish greater than 2 grams or 183 dB (re: 1 μPa ^{2}sec) for fish less than 2 grams. The decision to include the SEL metric along with peak dB SPL metric was based upon the primary rationale that this SEL metric provided a way to sum the energy over multiple impulses, which cannot be accomplished with peak pressure. Using SEL, the exposure of fish to a total amount of energy (*i.e*. dose) can be used to determine a physical injury response. If either threshold is exceeded, then physical injury is assumed to occur. There is uncertainty as to the behavioral response of fish to high levels of underwater sound produced when driving piles in or near water. Based on the information currently available, and until new data indicate otherwise, NMFS believes a 150 dB root-mean-square pressure (RMS) threshold for behavioral responses for salmonids and green sturgeon is appropriate.

Fish may be injured or killed when exposed to elevated underwater sound pressure levels generated by steel piles installed with impact hammers. Pathologies to fish associated with very high sound levels are collectively known as *barotraumas*. Barotraumas are pathologies associated with exposure to drastic changes in pressure. These include hemorrhage and rupture of internal organs, including the swim bladder and kidneys in fish. Death can be instantaneous, occur within minutes after exposure, or occur several days later. Gisiner (1998) reports swim bladders of fish can perforate and hemorrhage when exposed to blast and high-energy impulse noise underwater. If the swim bladder bursts and the air escapes from the body cavity or is forced out of the pneumatic duct, the fish may sink to the bottom. If the swim bladder bursts but the air stays inside the body cavity, the fish is likely to stay afloat but have some difficulty in maneuvering or

maintaining orientation in the water column. With salmonids, the swim bladder routinely expands and contracts as they swim near the surface or swim in deeper water near the bottom. At high sound pressure levels of pile driving, the swim bladder may rapidly and repeatedly expand and contract, hammering the internal organs that cannot move away since they are bound by the vertebral column above and the abdominal muscles and skin that hold the internal organs in place below the swim bladder (Gaspin 1975). This pneumatic pounding may result in the rupture of capillaries in the internal organs as indicated by observed blood in the abdominal cavity, and maceration of the kidney tissues. The pneumatic duct, which connects the swim bladder with the esophagus, may not make a significant difference in the vulnerability of the salmonids since it is so small relative to the volume of the swim bladder (Gaspin 1975). Green sturgeon are likely to suffer similar effects to those of salmonids since they possess similar anatomy and physiology (*e.g.*, physostomous[9] swim bladder). More recent research shows Chinook salmon can experience a range of physical injuries when exposed to SPLs beginning at 203 dB SEL (re: 1µ Pa^2-sec) (Halvorsen *et al*. 2011).

Fish can also die when exposed to lower sound pressure levels if exposed for longer periods of time. Hastings (1995) found death rates of 50 percent and 56 percent for gouramis (*Trichogaster sp.*) when exposed to continuous sounds at 192 dB (re: 1 µPa) at 400 Hz and 198 dB (re: 1 µPa) at 150 Hz, respectively, and 25 percent for goldfish (*Carassius auratus*) when exposed to sounds of 204 dB (re: 1 µPa) at 250 Hz for two hours or less. Hastings (1995) also reported that acoustic "stunning," a potentially lethal effect resulting in a physiological shutdown of body functions, immobilized gourami within eight to thirty minutes of exposure to the aforementioned sounds.

High sound pressure levels can also result in hearing damage to fish (Carslon *et al*. 2007). Structural damage to the fish inner ear by intense sound has been examined by Enger (1981) and Hastings *et al.* (1995, 1996) with scanning electron microscopy. Hastings *et al.* (1996) found destruction of sensory cells in the inner ears of oscars (*Astronotus ocellatus*) four days after being exposed to continuous sound for one hour at 180 dB (re:1 µPa) at 300 Hz. Hastings (1995) also reported that 13 out of 34 goldfish exposed for two hours to sound pressure levels ranging from 192 to 204 dB (re:1 µPa) at either 250 or 500 Hz experienced equilibrium problems that included swimming backwards and/or upside down and wobbling from side to side. These fish recovered within one day suggesting that the damage was not permanent. This fish behavior could have been caused by post-traumatic vertigo (lack of balance and dizziness caused by a problem in the inner ear) similar to that experienced by humans after a severe blow to the body or head.

Additional detrimental effects on fish from loud sounds include stress, increasing risk of mortality by reducing predator avoidance capability, and interfering with communication necessary for navigation and reproduction. Scholik and Yan (2001) reported temporary threshold shifts for

[9] Physostomous fish are those species that possess swim bladders connected to the esophagus by a thin tube called the *ductus pneumatucus*. Gas pressure (air) is regulated in these fish by swallowing air to fill the swim bladder or releasing it into the gut through the tube.

fathead minnows (*Pimephales promelas*) exposed to 24 hours of white noise with a bandwidth of 300 – 4000 Hz and overall sound pressure level of only 142 dB (re:1 μPa). Their results indicated that the effects could last longer than 14 days. Even if threshold shifts do not occur, loud sounds can mask the ability of aquatic animals to hear their environment, thus increasing their vulnerability to predators or ability avoid areas that may pose safety risks and possibly affect migration behavior.

Pile driving and the resulting underwater sound pressure may result in "agitation" of salmonids and green sturgeon indicated by a change in swimming behavior detected by Shin (1995) with salmonids, or "alarm" detected by Fewtrell *et al.* (2003). Salmonids and green sturgeon may exhibit a startle response to the first few strikes of a pile. The startle response is a quick burst of swimming that may be involved in avoidance of predators (Popper 1997). A fish that exhibits a startle response may not necessarily be injured, but it is exhibiting behavior that suggests it perceives a stimulus indicating potential danger in its immediate environment. However, fish do not exhibit a startle response every time they experience a strong hydroacoustic stimulus. From the recent pile driving studies along the west coast, biologists have observed that fish may startle and swim away from the stimulus at the start of pile driving, but that they observed the fish to recover, and in some cases turn around and pass by the area of impact multiple times (M. Molnar, pers. comm. 2011). Thus a ramping up of the hammer during the initial phase of pile driving is not necessarily suitable or reliable fish avoidance or minimization measure as has been proposed in some pile driving projects.

A study in Puget Sound, Washington suggests that pile driving operations disrupt juvenile salmon behavior (Feist *et al*. 1992). Though no underwater sound measurements are available from that study, comparisons between juvenile salmon schooling behavior in areas subjected to pile driving/construction and other areas where there was no pile driving/construction indicate that there were fewer schools of fish in the pile-driving areas than in the non-pile driving areas. The results are not conclusive but there is a suggestion that pile-driving operations may result in a disruption in the normal migratory behavior of the salmon in that study, though the mechanisms salmon may use for avoiding the area are not understood at this time. Since green sturgeon share similar migration patterns to those of Chinook salmon, it is reasonable to assume that similar behavioral patterns would result from pile driving operations for green sturgeon.

b. Assessment of Project Pile Driving Effects

The results of the above pile driving projects and information available in the literature are helpful in assessment of the potential effects of pile driving associated with bridge demolition activities for the SFOBB East Span Seismic Project, but considerable uncertainty remains. Effects on an individual fish during pile driving at the SFOBB East Span Seismic Project will be dependant on a number of variables associated with environmental conditions at the project site and variables associated with the specific construction schedule, including:

1. Size and force of the hammer strike
2. Distance from the pile
3. Depth of the water around the pile
4. Depth of the fish in the water column
5. Amount of air in the water
6. The texture of the surface of the water (size and number of waves on the water surface)
7. Bottom substrate composition and texture
8. Size of the fish
9. Species of fish
10. Presence of a swim bladder
11. Physical condition of the fish
12. Effectiveness of bubble curtain and/or other sound pressure attenuation technology

Studies researching the effectiveness of bubble curtains or other sound attenuation devices have indicated that in many cases, sound pressure levels can be decreased effectively by 10 dB or more if properly implemented. Caltrans will use specially designed bubble curtains for sound attenuation during impact pile driving (excluding pile proofing). Therefore, an estimation of sound pressure levels derived from current data for pile driving with the use of sound attenuation will be used to assess the potential area of impact during situations when the maximum sound pressure levels are anticipated to occur. Sound estimates for pile proofing and impact hammering of the H-piles will be analyzed assuming no sound attenuation methods will be implemented.

As stated above, a dual metric criteria of 206 dB (re: 1 µPa) peak SPL for any single strike and an accumulated SEL of 187 dB (re: 1 µPa ^{2}-sec) are currently used by NMFS and Caltrans as thresholds to correlate physical injury to fish greater than 2 grams in size from underwater sound produced during the installation of piles with impact hammers. As distance from the pile increases, sound attenuation from geographical spreading and transmission loss reduces sound pressure levels and the potential harmful effects to fish also decrease. Disturbance and noise associated with construction at the pile driving site may also startle fish and result in dispersion from the action area. Currently, there is very little data available regarding effects of pile driving directly focused on green sturgeon. However, during the construction of the Benicia-Martinez Bridge in 2002, unattenuated piles driven with a large impact hammer did result in the mortality of a white sturgeon. The piles for the bridge piers were 2.5-m diameter steel piles, with each pier consisting of about eight piles each. Piles were driven in water about 12 and 15 m deep in the main channel. Peak underwater sound pressure levels ranged from 227 dB (re: 1 µPa) at approximately five meters from the pile to 178 dB at approximately 1,100 m from the pile (Illingworth and Rodkin 2007, D. Woodbury, pers. comm. 2012).

Water depth at the pile driving site will also influence the rate of sound attenuation. In deep water areas high sound pressure waves are likely to travel further out into San Francisco Bay than they would otherwise travel if encapsulated within an air bubble curtain, or conducted within a dewatered cofferdam, thereby resulting in adverse impacts to salmonids and green sturgeon over a

larger area. In contrast, within shallow water, much of the acoustic energy is expected to be absorbed by the bottom and reflected off the surface back down to the bottom and even backwards towards the pile. Thus, the rate of attenuation is much higher in shallower water and the expected area of adverse effects is expected to be reduced. The bridge demolition and dredging activities associated with the SFOBB East Span Seismic Project are located in an area of strong tidal currents, and the majority of temporary piles to be installed for bridge dismantling are expected to occur in waters greater than 5 m deep (15 to 25 m), and therefore may have less sound propagation loss resulting in acoustic energy reaching greater distances from the pile driving area. Only along the southeast side of YBI where the H-piles are to be installed are water depths shallow enough (0-3 meters) that sound is not expected to travel great distances into the deeper water column if unattenuated. Without minimizing sound propagation through attenuation measures such as a bubble curtain or other means, sound pressure levels are expected to travel greater distances and these deeper channel areas are the known migration corridors for CCC steelhead to and from south Bay tributaries, and are likely migration corridors for both adult and juvenile green sturgeon traveling between natal streams in the Sacramento River Delta and the Golden Gate Bridge. Therefore, the specific construction schedule determined by the contractor will also greatly influence the level of potential impact on listed CCC steelhead and green sturgeon. If the contractor drives the deeper water piles during the summer and fall months, between June and November, no listed salmonids are expected to be impacted. Juvenile, subadult, and both adult spawners and non-spawning green sturgeon however, could be present in the project area. Tracking studies conducted in the San Francisco Bay by CALFED (NMFS and the University of California at Davis collaboration) recorded three adult green sturgeon within or near the action area. They were recorded near a monitor at Pier 30 in May and August 2007 and February 2009 (California Fish Tracking Database, unpublished data 2011). Two of these fish were recorded in the Sacramento River before and after they transited the Bay, suggesting that these were spawning adults (California Fish Tracking Database, unpublished data 2011). The third fish was only recorded in the Bay and is believed to be a non-spawning summer resident. Since the specific construction schedule and sequence of pile driving and pile "proofing" activities has not been precisely established at this time, and due to limited information on the percentage of green sturgeon likely to be within the action area, the vulnerability of listed southern DPS green sturgeon to deep water pile driving is uncertain. Additionally, without knowing the exact timing of pile proofing during migration periods for salmonids, principally CCC steelhead, the exact number of CCC steelhead affected during this time is unknown. Because of these uncertainties, we used a reasonable worst case scenario[10], below, to estimate the amount of green sturgeon and CCC steelhead affected.

The temporary trestles and falsework necessary for dismantling all sections of the existing bridge will require a total of 2,540 steel pipe piles and H-piles (Table 1) as follows. For the Cantilever Superstructure approximately 440 24-inch and 36-inch diameter piles will be required. The 504' Superstructure will require 450 24-inch and 36-inch diameter piles. The 288' Superstructure

[10] This worst case scenario is the same approach as described in both the April 10 and August 21, 2009, Supplemental Biological Opinions.

needs 700 18-inch to 36-inch piles. The Oakland Access Trestle will also require 700 18-inch to 36-inch piles. Construction of the YBI Access Trestle along the southeast side of YBI will require 100 H-piles. In addition, there may be up to 150, 18-inch to 36-inch other piles for temporary structures, fenders, access, etc. The contractor will install all piles with a vibratory hammer, and then drive some of them with an impact hammer when necessary. Final proofing may be done on 10% of the steel pipe piles installed entirely with a vibratory hammer to ensure load bearing capacity. For the piles located west of Pier E9, the 24-inch impact driven piles will require approximately 133 strikes per pile, with no more than 20 piles installed per day. The 36-inch impact driven piles at this location are expected to require 158 strikes, and no more than 20 installed per day. Piles east of Pier E9 will require approximately 124 strikes for the 24-inch piles, and 107 strikes for the 36-inch piles, with no more than 20 piles being driven on a given day. The H-piles needed to construct the YBI Access Trestle will be driven with an impact hammer and are expected to require no more than 60 strikes per pile for 10 piles a day. The location of the YBI Access Trestle would make incorporation of a bubble curtain difficult, so one will not be used during impact hammering of the H-piles. Pile "proofing" will occur for no more than two piles per day, requiring only 20 strikes per pile for both the 24- and 36-inch piles. Pile proofing is not expected to exceed more than two minutes per day; due to the short duration required for proofing no sound attenuator device will be used.

In order to minimize the adverse effects of impact pile driving to Federally-listed salmonids and green sturgeon during the installation of piles, Caltrans has incorporated the following avoidance and minimization measures (repeated here from the Project Description): 1) all pile installation with be installed with a vibratory hammer to the greatest extent feasible; 2) an impact hammer will be restricted to the period between June 1st and November 30th (excluding pile proofing) to avoid salmonid and spawning adult green sturgeon migration periods; 3) Caltrans will incorporate an air bubble curtain sound attenuation system to reduce sound pressure and exposure levels during impact pile driving for all impact hammer driven piles (excluding "proofing" of piles, and the H-piles); 4) the H-piles necessary for construction of the YBI Access Trestle will be installed in shallow water zero to three meters deep and installation will also be restricted to the period of June 1st to November 30th; 5) only two piles will be proofed for a duration of no more than 2 minutes a day for the 10% of piles that may require testing for load bearing capacity, no more than 244[11] will be tested for the entire duration of this project (2012-2017); and 6) a biological and hydroacoustic monitoring program will be implemented to obtain real-time data during impact pile driving to ensure effectiveness of the bubble curtain, and that sound pressure and exposure levels do not exceed what has been analyzed in this BO.

[11] The 100 H-piles will not need to be proofed, so only 10% of 2440 piles may need to be tested.

Table 1. Size and number of steel piles required for trestles and falsework.

Temporary Structure	Pile Sizes and Type	Maximum Number of Piles
Cantilever Superstructure Temporary Supports	24- to 36-inch diameter steel pipe	440
504' Superstructure Temporary Supports	24- to 36-inch diameter steel pipe	450
288' Superstructure Temporary Supports	18- to 36-inch diameter steel pipe	700
Oakland Access Trestle	18- to 36-inch diameter steel pipe	700
YBI Access Trestle	14-inch steel H-piles	100
Other (spud, fenders, access, etc.)	18-to 36-inch diameter steel pipe	150
Total Piles For Project		**2540**

NMFS has analyzed the effects of the proposed pile driving for the remaining trestles and falsework necessary for bridge demolition, including the proposed avoidance and minimization measures. In *A Compendium of Pile Driving Sound Data* (Illingworth and Rodkin 2007) the most recent pile driving case studies are compiled in order to provide information regarding the underwater sound pressure levels generated with the installation of steel piles and hammer types. Several pile driving case studies conducted for this project as well as others within the San Francisco Bay and other bays, estuaries and rivers along California's north coast region are included in the compendium. NMFS and Caltrans used data taken from these studies and the dual metric threshold criteria for onset of physical injury, and current threshold criteria for sub-injury to estimate the area of impact for this project. As a result, NMFS does not anticipate SPLs and SELs and RMS values to be exceeded beyond the following distances surrounding each pile during each construction phase, for fish greater than or equal to 2 grams:

- For attenuated piles (using an air bubble curtain, or other device), 206 dB peak SPL at 1 m (2 m diameter), 187 dB accumulated SEL at 34 m (68 m diameter), and 150 dB RMS at 398 m (796 m diameter);

- For proofed piles, 206 dB peak SPL at 7 m (14 m diameter), 187 dB accumulated SEL at 19 m (38 m diameter), and 150 dB RMS at 3981 m (7962 m diameter);

- For the steel H-piles, 206 dB peak SPL at 10 m (radial distance) , 187 dB accumulated SEL at 65 m (radial distance), and 150 dB RMS at 1311 m.

As distance from the pile increases, sound pressure levels decrease and the potential harmful effects to fish also decrease. Hence the distance to reach the 150 dB RMS corresponding to sub-injurious sound levels (*i.e.* non-lethal, behavioral responses), is not expected to extend beyond a 3981 m radius from the east span of the bridge for any pile driving event. This larger area defines

the total area of impact expected from pile driving for the entire duration of bridge dismantling activities.

Estimates were made based upon the largest pile size and type anticipated to be used for this project, during attenuated and unattenuated impact hammer pile driving, which are the 36-inch steel pipe piles, and 14-inch steel H-piles. This reasoning assumes installing the largest piles with the same number of strikes as the smaller piles is expected to result in the largest area of impact. Using the attenuated (assuming 10 dB reduction) reference values of 189 dB peak (re: 1 µPa), 160 dB SEL (re: 1 μPa^2-sec) and 174 dB RMS measured at 10 meters, and estimating a total of 3160 strikes per day (158 strikes per pile, 20 piles maximum) with a transmission loss (TL) of 15 dB[12]; results in the distance to reach the injury and sub-injury thresholds provided above for attenuated impact hammer installation of the piles. For installation of the H-piles, Caltrans assumes a higher TL of 17 dB, due to site specific conditions. However, since Caltrans will need to also proof a small subset of the piles (10%) with an impact hammer, the largest area of impact is based upon the unattenuated RMS threshold distance of 3981 m (7962 diameter) for the 36-inch piles.

Given the uncertainties described above associated with these types of projects, NMFS has developed a reasonable worst case scenario of likely effects to fish from pile driving. Below, we review project specific uncertainties associated with the likely effects, and then describe the scenario we used and the results in terms of likely effects on listed salmonids and green sturgeon.

Summer and Fall. The project's pile driving activities occurring from June 1st through November 30th for the temporary structures are not expected to result in adverse effects to listed salmonids because no life stage is expected to be present during construction between June 1st and November 30th. Additionally, during this time, the project's pile driving activities are not expected to result in impacts to adult spawning green sturgeon. However, juvenile, sub-adult and some non-spawning adult green sturgeon have the potential to be within the action area year-round. The incorporation of a bubble curtain during this timeframe, when impact hammer pile driving occurs is expected to reduce the area where injury may occur, and also reduce the area where sub-injury is possible.

Another concern is that any pile driving that occurs after dusk during the summer and fall months, could overlap with the period when the majority of downstream fish movement occurs. Shapovalov and Taft (1954) report that emigrating juvenile steelhead move downstream at all hours of the day and night, but the bulk of downstream fish movement occurs during the night or at least in the early morning or late evening. Because they share other migration similarities with salmonids, such as outmigrating through the estuary in the spring months, green sturgeon may possess a similar behavior. Artificial lights that are used on the pile driving platforms after dark may also attract fish to the immediate vicinity of the operation and into the area of lethal sound

12 NMFS recommends using the Practical Spreading Loss model ($TL = 15*\log(R_1/R_0)$), unless data are available to support a different model.

pressure levels. Although juvenile green sturgeon swimming behaviors encountered within the estuary is not clear, research by Van Eenennaam *et al*. (2001) indicates that juvenile green sturgeon exhibit nocturnal activity patterns in freshwater whereby they move higher into the water column at night. If this same type of nocturnal behavior occurs in the estuary, their vulnerability to pile driving impacts could increase at night. However, the majority of the remaining pile driving activities for the project are not expected to occur at night, and if night work is necessary it will be restricted to the period of June 1st through November 30th, and Caltrans will direct illumination away from the water.

Winter and Spring. Pile proofing may occur year-round, which has the potential to affect migrating salmonids (primarily CCC steelhead), from December 1st through May 31st, and green sturgeon. However, the duration for pile proofing during peak (February-May) migration periods is expected to occur for no more than two minutes a day, thus the area of impact where injury may occur in any given pile proofing scenario is only expected to be a 19 m radial (38 m diameter) distance. Beyond the 19 m radius, extending out to the 3981 m (7962 m diameter) distance is where sub-injurious effects may occur. Although this is a seemingly large area during peak migration times, the limited duration is not expected to substantially alter migration behavior. Sound pressure levels extending out to this distance would only reach to the north, south and east of the pile driving area as YBI blocks the area to the west. Additionally, the area within 3981 m radius from the pile during proofing is predominantly located in deeper waters in the Bay where currents are stronger and fish are expected to quickly transit through during migration. No more than 244 piles total will be proofed in this manner over the duration of this project phase (2012-2017), and an even smaller subset of those will be proofed during winter and spring months, so NMFS anticipates, given the short duration of each proofing event, nearly all of salmonid and green sturgeon migration periods will be free from disturbances resulting from pile driving. Moreover, NMFS expects any migrating fish that may be disturbed but not injured during a pile proofing event will quickly return to normal behavior patterns once pile driving ceases. No lasting adverse effects are likely mainly due to their larger bodies (above two grams), and because pile driving activities will occur only in the daytime during migration season which would avoid crepuscular and nocturnal periods when salmonid and sturgeon migratory activity is likely the highest.

c. Amount of Salmonids and Green Sturgeon Affected

Overall, the largest area of potential injury occurring from any pile driving event associated with dismantling of the bridge is in the deeper water habitat is 34 m (68 m diameter), and occurs during the summer and fall months when all listed salmonids are absent. However, several lifestages of green sturgeon have the potential to be present during this time, but this impact area is small compared with the size of the action area, and overall habitat range within the San Francisco Bay for green sturgeon. Moreover, this area of the Bay has been disturbed during the past several years' construction of SFOBB East Span and is also a navigation channel. The presence of barges, boats, recently constructed towers and work equipment in the nearshore and navigation

channel along the eastern side of YBI extending to Oakland have disturbed the water column and benthic substrate. Therefore, NMFS expects it to be unlikely for juvenile, subadult and non-spawning adult green sturgeon to be present during construction in this area, as these life stages of green sturgeon are more likely to be located in areas of the Bay that possess higher quality habitat, and less frequent disturbance. Although temporary disturbances to the water column and associated habitat during pile driving may disrupt foraging or other behavior of juvenile, sub-adult and non-spawning green sturgeon, this temporary loss of foraging habitat and disturbance is minimal, given the small footprint of the pile driving when these age groups are expected to be present compared to the available habitat within the Bay for green sturgeon.

As described above, while little information is available to determine how and where listed anadromous salmonids and green sturgeon migrate through and utilize San Francisco Bay, general inferences can be made based upon known behavior patterns of salmon, steelhead and green sturgeon and their likely migration corridors within the Bay. As mentioned previously, only a very small percentage of fish from the three Central Valley ESUs will likely be present in the SFOBB East Span Seismic Project action (during the associated bridge demolition and dredging activities) area and vulnerable to the adverse effects of high sound pressure levels. However, CCC steelhead, which spawn in tributaries flowing into the south San Francisco Bay, are likely to be present in greater percentages within the action area since they must pass under the SFOBB. These steelhead are most likely to be exposed to harmful sound levels during pile driving (mainly proofing). Considering the bathymetry of San Francisco Bay and the distribution of tidal currents, NMFS believes it is likely that between 20 and 30 percent (average of 25%) of the steelhead run from south San Francisco Bay streams pass east YBI and through the SFOBB East Span Seismic Project action area, based on the division of flow around YBI and our assumption that steelhead numbers will be distributed in the flows around YBI proportionally similar to the flow division.

Adult and juvenile salmonids, and green sturgeon, are likely to take advantage of tidal currents to travel through San Francisco Bay on their migration routes. The large volume of tidal exchange at the SFOBB East Span Seismic Project construction site is expected to assist with the transport of listed salmonids and green sturgeon both to and away from areas of high sound pressure levels during pile driving. However, it is possible that an individual fish will make multiple passes through the construction area and be vulnerable more than once to harmful sound pressure levels during pile driving. The potential for multiple exposures depends on how the movements of salmonid smolts and adults, and juvenile and adult green sturgeon, are influenced by tidal currents, which is currently unknown; although this scenario is most likely to be a concern for juvenile and subadult green sturgeon since they inhabit the bay year-round.

The precise size of the steelhead run in south San Francisco Bay tributaries and precise abundance of green sturgeon in the San Francisco Bay and its tributaries is unknown. Therefore, determining the precise number of threatened CCC steelhead and juvenile and subadult southern DPS green sturgeon that may be injured or killed by the SFOBB East Span Seismic Project pile driving activities is difficult at best, and not possible at this time. In lieu of precisely determining the

number of individual CCC steelhead adversely affected, estimates of the area of potential impact due to pile driving and a percentage of the population passing through this area of impact were calculated by NMFS. For estimating the number of juvenile and subadult green sturgeon adversely affected, NMFS used the likely area of potential impact due to pile driving and the potential life stage (juvenile, subadult, and adult) of green sturgeon likely present or passing through the active pile driving area to assess the level of impact. For the purposes of this analysis, the zones of potential impact are defined as the area where there may be injury, mortality, and behavioral impacts to listed anadromous salmonids and green sturgeon. Based on current pile driving research, the area of injury and mortality of salmonids green sturgeon is defined as the area with sound pressure levels exceeding 206 dB (re: 1 μPa), or 187 SEL (re: 1 μPa^2-sec). This zone of impact is within the 34 m distance (68 m diameter) from an active pile driving operation corresponding to the installation of the largest 36-inch diameter piles, the 65 m zone corresponding to the impact driven 14-inch H-piles, and the 19 m zone corresponding to the proofing of the largest 36-inch piles. Within these zones[13], salmonids (primarily CCC steelhead) and green sturgeon could experience a range of physical injuries, including damage to the inner ear, eyes, blood, nervous system, kidney, and liver. These injuries could result in the delayed mortality of some of these fish.

Adult salmonids, due to their large size, can usually tolerate higher pressure levels (40-50 psi) (Hubbs and Rechnitzer 1952) and immediate mortality rates of adults are expected to be less than that experienced by juvenile salmonids. Given that adult green sturgeon are on average significantly larger than salmon, they could, presumably, tolerate higher levels of sound pressure and be less affected by pile driving activities. Similarly, juvenile green sturgeon are typically around 600 mm in length by the time they inhabit the estuary, close in size to some adult salmonids, therefore it is anticipated that they will also be more resilient and capable of recovering quickly from temporary disturbances associated with pile driving. However, they are vulnerable to injury or death from pile driving (especially if within close proximity), as demonstrated by the lethal SPLs resulting in the death of a white sturgeon (likely a juvenile) documented during the construction of the Benicia-Martinez Bridge installation. Although it should be noted that the piles used for construction of the Benicia-Martinez Bridge were 96-inch diameter piles compared to the largest 36-inch piles that will be used for this project.

Beyond the physical injury range, extending out to the 150 dB RMS (re: 1 μPa) isopleth[14] at a distance 398 m from the pile during attenuated impact hammering of 36-inch piles, the 3981 m distance during unattenuated pile proofing, and the 1311 m distance during impact hammering the H-piles, NMFS estimates fish greater than 2 grams will be agitated or disturbed, but survive exposure to SPLs and not sustain permanent harm or injury. These fish may demonstrate temporary abnormal behavior indicative of stress or exhibit a startle response. As described previously, a fish that exhibits a startle response is not injured, nor is its fitness likely to be

[13] Excluding the summer and fall months when salmonid species are likely to be absent.

14 An isopleth is a contour line in water column that has the same pressure at all points, in this example the isopleth is the underwater pressure threshold level (e.g. 150 db RMS) at the given distance away from the pile.

reduced, but it is exhibiting behavior that suggests it perceives a stimulus indicating potential danger in its immediate environment, and startle responses are likely to extinguish after a few pile strikes.

In summary, based upon the information above, our reasonable worst case scenario assumes: 1) twenty-five percent of the south bay CCC steelhead population migrate to the east side of YBI en route to and from the Golden Gate; 2) juvenile, subadult and adult green sturgeon could be present in the action area year-round; 3) roughly three percent of adult spawning green sturgeon could be present in the action area February through May; 4) remaining pile driving will occur in areas greater than five meters deep during peak migration periods for spawning CCC adult steelhead and spawning adult green sturgeon (February through May); 5) a maximum of two piles will be proofed per day (with an impact hammer) intermittently over the course of these four months; 6) some pile installation may occur at night in the summer and fall months (June through November); and 7) the 3981 m radial distance of the impact area corresponding to the 150 dB RMS is the greatest distance considered for the entire demolition phase due to the data taken from hydroacoustic measures during the construction of this project and others. With these assumptions, roughly .0003 percent of the outmigrating juvenile and post-spawned adult population of steelhead originating from south San Francisco Bay tributaries will be injured, killed or harassed by sound pressure levels exceeding 206 dB (re: 1 µPa), 187 SEL dB (re: 1 µPa $^{2-}$sec), or 150 dB RMS (re: 1 µPa) during the remaining pile driving over 5 winter-spring seasons (2013-2017). The .0003 percentage of steelhead is determined based upon the following assumptions, that approximately 25 percent of the south Bay CCC steelhead population are estimated to transit east of YBI through the action area, and two piles will be proofed with an impact hammer within a given 24 hour period for only a two minute duration during the entire migration season (December 1st to May 31st). The worst case scenario then, is that *all* pile proofing will occur during migration season, for two minutes per day annually during these six months which equates to approximately .001 percent of time. In NMFS judgment, this percentage of time is so small that very few, if any, CCC steelhead are likely to be adversely affected. To be adversely affected a CCC steelhead would have to be within 3981 meters of a pile during the 2 minute proofing. The probability that this will occur is very low.

For green sturgeon, primarily juvenile and subadult green sturgeon and some adults located within the San Francisco Bay within a distance of 3981 m of pile driving will be injured, killed, agitated or disturbed or by sound pressure levels exceeding 206 dB (re: 1 µPa), 187 SEL dB (re: 1 µPa $^{2-}$ sec), and 150 dB RMS (re: 1 µPa). For the three percent spawning adult green sturgeon that may be injured, killed, agitated or disturbed, estimation, NMFS based this upon an average abundance estimate of 71 returning annual spawners (Israel 2006b), and the 2007 and 2009 tracking data provided by CALFED, with three adults recorded within the action area (one summer resident and two spawning adults) between February and August (see *Effects of the Action* pages 43-44).

NMFS assumes that the use of a vibratory hammer will effectively minimize sound pressure waves to levels at or below the dual metric criteria thresholds (*i.e.*, 206 peak dB, or 187 dB SEL).

If Caltrans installs the majority of temporary piles with a vibratory hammer, and only uses an impact hammer for minimal re-taps and pile proofing, the remaining pile driving activities are not anticipated to result in substantial incidence of physical injury or mortality to fish; and our reasonable worst case scenario may not be realized.

2. Removal of Marine Foundation-Additional Methods

Preliminary information for removal of marine concrete foundations with an expansive cracking mortar indicates that the area can safely be contained from debris or turbidity associated with concrete break-down through the use of a cofferdam or turbidity curtains. Unless results from the Caltrans study indicate there are unacceptable toxicity risks other negative impacts from this type of compound not previously considered, NMFS assumes this approach to foundation removal will not injure fish but may result in temporary impacts habitat from brief episodes of turbidity or perhaps shifts in pH of the water column.

3. Turbidity

Pile driving, and removal of the concrete marine foundations, and old timber piles are also expected to create temporary increases in turbidity in the adjacent water column. These minor and localized elevated levels of turbidity will quickly disperse from the project area with tidal circulation. Listed anadromous salmonids and green sturgeon in the San Francisco Bay estuary commonly encounter, and typically avoid, areas of increased turbidity due to storm flow runoff events, wind and wave action, and benthic foraging activities of other aquatic organisms. Therefore, the minor and localized areas of turbidity associated with this project's in-water construction is not expected to impair or harm listed salmonids or green sturgeon and will not result in long-term impacts to aquatic habitat.

4. Dredging and Disposal

Potential effects are entrainment of juvenile fish (Dutta and Sookachoff 1975, Boyd 1975, Armstrong *et al.* 1982, Tutty 1976). Potential indirect effects include behavioral (Sigler *et al.* 1984, Berg and Northcote 1985, Whitman *et al.* 1982, Gregory 1988) and sub-lethal impacts from exposure to increased turbidity (Sigler 1988, Sigler *et al.* 1984, Kirn *et al.* 1986, Emmett *et al.* 1988, Servizi 1988); redistribution and/or release of contaminants, with increased potential for chronic or acute toxicity; mortality from predatory species that benefit from activities associated with dredged material disposal; changes in the native sediment characteristics near disposal sites; and shifts in sediment dynamics that may alter available food supply (Morton 1977).

The proposed disposal of a portion of the dredged material at SF-DODS is unlikely to adversely affect listed salmonids or green sturgeon due to its location and depth. The SF-DODS is located approximately 50 miles offshore of San Francisco in the Pacific Ocean, and is between 8,200 - 9,840 feet (2,500 - 3,000 meters) deep. Listed anadromous fish species are unlikely to occur at

this area since adult and sub-adult salmonids in the ocean are typically foraging on the continental shelf in shallower water due to the distribution of their prey species (euphausids and small schooling fish), and adult green sturgeon are generally found within the 110-m contour of the continental shelf. Considering the very low likelihood of listed anadromous fish species within the area affected at SF-DODS during a disposal event, this portion of the project is unlikely to adversely affect listed salmonids or green sturgeon. Therefore, the SF-DODS portion of the action area is not considered further in this opinion. However, for removal of the existing piers, it is anticipated that 22,724 cubic yards of material will be dredged. This material will be disposed of at the Alcatraz Island site (SF-11).

a. Entrainment.

Dredging techniques expected to be employed for this project can be categorized as either hydraulic or mechanical. Both methods may be used, and dredging for barge access to dismantle the existing bridge could take several months to complete. Entrainment of listed fish (primarily juveniles) can occur when hydraulic dredging is used; mechanical dredging is unlikely to entrain fish. If the dredging draghead is in operation while held above the surface of material being removed and fish are present, they may be unable to overcome the water velocities near the dredging draghead and be pulled into the hold of the ship. Dutta (1976) reported that salmon fry were entrained by suction dredging in the Fraser River. Braun (1974a, b), in testing mortality of entrained salmonids, found that 98.8 percent of entrained juveniles were killed. Boyd (1975) indicated that suction pipeline dredges operating in the Fraser River during fry migration took substantial numbers of juveniles. Further testing in 1980 by Arseneault (1981) resulted in entrainment of chum and pink salmon, but in low numbers relative to the total number of salmonids out-migrating (0.0001 to 0.0099 percent). Based the small chance of entrainment, and the likely location of salmonids in the upper part of the water column, NMFS does not expect salmonids will be entrained. Green sturgeon, because of their known foraging behavior on the substrate of channels and estuaries, could be entrained. Juvenile, subadult and non-spawning adult green sturgeon may be present year-round within the active dredging area, although their numbers are expected to be low because most of the action area is not high quality foraging habitat for sturgeon. NMFS expects only a few, if any, green sturgeon may be entrained and killed, as any green sturgeon present will probably leave the area due to the disturbance produced by the draghead.

b. Turbidity.

There is little direct information available to assess the effects of turbidity in San Francisco Bay on juvenile or adult green sturgeon. Review of the literature regarding the effects of turbidity associated with dredging operations on anadromous salmonids indicates turbidity may interfere with visual foraging, increase susceptibility to predation, and interfere with migratory behavior. Similar effects are assumed for green sturgeon. Moreover, if fish are present during a disposal event, they may be smothered or otherwise negatively affected by large amounts of sediment

being delivered at one time, rather than brief bursts of turbidity that would be encountered episodically and usually dissipated after a short duration through tidal action.

The Port of Oakland evaluated turbidity plumes associated with clamshell dredging operations for its 50-foot port deepening project. The results indicated that increases in turbidity were localized, with the most concentrated portion of the plume located near the bottom and decreasing concentrations nearer the surface (Port of Oakland 1998). The lateral extent of a turbidity plume during dredging depends on the tide, currents, and wind conditions during the dredging activities. Depending on the body of water and the hydraulics of the system, sediment plumes can extend approximately several hundred to 1,000 m from the operation.

LaSalle (1988) described the physical characteristics of sediment dispersal during hopper dredging activities. Hopper dredges are a type of mechanical dredge in which the "hopper" is the container for dredged material. As the hopper dredge is filled, dredged material is often stored in the hopper until overflow of material begins. In general, sediment concentrations at the bottom are up to 500 mg/l and 100-150 mg/l at the surface, given no overflow occurs. When overflow does occur, sediment concentrations in the upper water column may reach levels as high as 1000 mg/l. LaSalle (1988) cautioned that site specificity is a very important consideration.

Because fish tend to avoid areas of high turbidity and return when concentrations of solids are lower, impacts are expected to be temporary. For the SFOBB East Span Seismic Project, turbidity levels that may induce mortality are not expected to occur due to the location of both the dredge and disposal sites. Estuarine currents and water column mixing are expected to rapidly disperse and dissipate concentrations of solids as they settle. However, turbidity may alter the behavior of adult, subadult and juvenile green sturgeon and salmonids. They are likely to avoid areas of increased turbidity at the dredge site and disposal events near Alcatraz Island. This alteration of behavior may adversely affect feeding and interfere with migratory behavior, although the effects are not expected to be at a level that adversely affects growth or reproductive success.

c. Contaminants.

In the aquatic environment, most anthropogenic chemicals and waste materials, including toxic organic and inorganic chemicals, eventually accumulate in the sediment. Contaminated sediments may be directly toxic to aquatic life or can be a source of contaminants for bioaccumulation in the food chain (Ingersoll 1995). Fine sediments in the project dredging areas increase the likelihood of a problem with contaminants, because this fraction consists of particles with relatively large ratios of surface area to volume, which increase the sorptive capacity for contaminants.

Environmental contaminants discharged into aqueous systems tend to associate with particulate material in the water column and with consolidated bedded sediments. Caltrans performed sampling, chemical analyses and acute toxicity bioassays of bay sediments from the project area to determine the suitability of dredged material for disposal. Chemical analyses were performed for

priority pollutant metals; total and dissolved sulfides; total recoverable petroleum hydrocarbons (TRPH); phthalate esters; PAHs; pesticides; polychlorinated biphenyls (PCBs); mono-, di-, tri- and tetrabutyltin and total organic carbon (TOC). Biological analyses were conducted for 96-hour layered-solid-phase bioassay, 10-day solid phase bioassay and 28-day bioaccumulation. The results of these studies showed a general absence of significant contamination, with low or non-detectable concentrations of chemical contaminants of concern except at two groups of dredge sites, SFOBB-N-2/SFOBB-N-5 and SFOBB-N-1 (USACOE letter dated October 31, 2001).

Material from the upper 12 feet of testing locations SFOBB-N-2 and SFOBB-N-5 is not suitable for unconfined aquatic disposal, because test results showed significant solid phase toxicity to *Nephtys* (a marine polychaete or "catworm") when compared to the reference sites. This material will be disposed of at an upland location. Material from the upper 12 feet of Site SFOBB-N-1 is also unsuitable for unconfined aquatic disposal or to wetland surfaces due to excessive bioaccumulation of individual constituents of PAHs and will be disposed of at a confined upland location.

Although the DMMO of the U.S. Army Corps of Engineers determined that the majority of dredged material from the SFOBB East Span Seismic Project is suitable for unconfined aquatic disposal, contaminants are present. They include oil and grease, TRPH, chlorinated pesticides (DDD, DDE, and DDT[15]), metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc), organotins, and 12 PAHs. Given that the concentrations are at a low enough level, these contaminants are anticipated to re-suspend and rapidly disperse, and are unlikely to result in any acute toxicity to listed salmonids and green sturgeon.

d. Anaerobic Sediments

Two common by-products produced in anaerobic sediments containing adequate concentrations of organic matter are ammonia (NH_3) and hydrogen sulfide (H_2S), which are highly toxic and produced by anaerobic aquatic microorganisms. Dillon and Moore (1990) report that NH_3 can exert toxicity at relatively low concentrations on fish and other aquatic organisms. The release of NH_3 during dredging and the disposal of dredged material could affect aquatic species as it is re-suspended in the water column. NMFS expects that acute, short-term effects due to increased levels of NH_3 at either the dredge site or the SF-11 disposal site are unlikely to occur due to tidal influence and water column mixing at the disposal site, and (to a slightly lesser extent) at the

[15]These are Persistent Organochlorine Compounds that are pesticides used historically for mosquito abatement and as insecticides; they are no longer commercially manufactured. DDT is gradually metabolized into DDE and DDD. Commercial DDT was a mixture of DDT, DDE and DDD. DDT: dichloro-diphenyl-trichloro-ethane; or (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane). DDE (1,1-dichloro-2,2-bis(chlorophenyl) ethylene); DDD: (1,1-dichloro-2,2-bis(p-chlorophenyl) ethane).

dredge site. The un-ionized form of NH_3 has potential for adversely affecting listed salmonids and green sturgeon, but the limited concentrations NMFS anticipates at the dredge and disposal sites are unlikely to directly affect these species. Typically, when un-ionized NH_3 is exposed to water it is rapidly diluted and converted to a less toxic ammonium ion. Similarly, H_2S undergoes a chemical reaction when exposed to water. It is oxidized and converted to elemental sulfur, which is less toxic to fish and other aquatic life.

For both of these by-products, the degree of hazard exhibited to salmonids and green sturgeon is dependent upon the temperature, pH and dissolved oxygen content of the water. However, temperature and pH are not considered a significant concern given the location of the removal and disposal sites, *i.e.*, deep waters that are tidally influenced with consistent water column mixing. Because the dredge removal and disposal sites are located in a large, open body of water the principal impact from anaerobic sediments is the probable decrease in DO content as the sediments are exposed and disposed of and temporarily re-suspended in the water column. When anaerobic sediments are exposed to the water column, the aforementioned chemical reactions for NH_3 and H_2S will deplete DO. Salmonids and green sturgeon that may be exposed to low levels of DO could be adversely impacted. Assuming that there are no restrictions present to prevent escape from these areas of low DO, green sturgeon behavior may be affected in a similar manner as described above for turbidity, *i.e.*, avoidance of the increased concentration levels of NH_3 and H_2S, and decreased DO near the sites. However, if there are particulates or suspended solids in the sediment that could impede or prevent escape by green sturgeon, the resulting impacts may be in the form of physical injury or mortality. NMFS considers the potential for this occurrence to be a very low probability due to the large, open area within the action area under the SFOBB, and the location of the SF-11 disposal site, south of Alcatraz Island. Both of these areas are expected to provide large enough, unconfined areas to disallow fish impediment.

e. Benthic Resources

Oliver *et al.* (1977) noted two phases of succession in benthic communities after disturbance (such as dredging or burial by disposal of dredged material). In the first phase, opportunistic species such as polychaetes move into a disturbed area. In the second phase, organisms surrounding the disturbed area re-colonize the affected site. Reilly *et al.* (1992) concluded that dredging-induced habitat alterations are minor compared to the large-scale disturbance of habitat in San Francisco Bay occurring from natural physical forces, such as seasonal and storm-generated waves, although these events would primarily occur in shallow water. However, dredged material may have substantially different characteristics than material that is resuspended through natural forces.

The SF-11 disposal site near Alcatraz Island has been used for decades and has a low biological standing crop of invertebrates. Although benthic invertebrates have been shown to be key food sources for juvenile and adult green sturgeon, (Radtke 1966, Moyle *et al.* 2002, Moyle 2002, Adams *et al*. 2002), it is unlikely a significant loss of prey species will occur from these activities

on the bottom at either the dredge or disposal sites. There will be some short-term impact to invertebrate colonies as a result of dredging or disposal. Rates of recovery listed in the literature can range from several months to several years for estuarine muds (McCauley *et al.* 1976, Oliver *et al.* 1977, Currie & Parry 1996, Tuck *et al*.1998, Watling *et al.* 2001). Recolonization can also take up to 1 to 3 years in areas of strong current but up to 5 to 10 years in areas of low current (Oliver *et al.* 1977). Thus, forage resources for fish that feed on the benthos may be substantially reduced before full recovery of the site is achieved. Based on available literature, NMFS assumes recovery of prey resources will not occur within one year. However, because the dredge area and disposal sites are located within highly disturbed portions of the bay, NMFS assumes there are better foraging habitats located elsewhere, therefore this would be of minimal impact to green sturgeon.

f. Disposal at Upland or Wetland sites

If any material is disposed of at upland or wetland wetland site, the DMMO anticipates that it will go to The Montezuma Wetlands Restoration Project (M. D'Avignon, DMMO, pers. comm. 2012). This area encompasses approximately 1800 acres in Solano County near the Montezuma Slough and Grizzly Island Wildlife Area. The goal of this restoration project is to provide habitat for both locally endangered species of plants and animals. However, no dredge material will be disposed of at any unconfined upland or wetland site if contaminant/toxicity tests indicate it would be unsafe to do so for the surrounding environment or aquatic and wetland species. Based on this information, NMFS does not anticipate adverse effects to listed salmonids or green sturgeon from upland or wetlands disposal.

g. Dredging and Disposal Summary

Due to the limited amount of data on the distribution and abundance of salmonids and green sturgeon in the portions of the action area affected by dredging and disposal, NMFS cannot predict the precise number of salmonids and green sturgeon affected by dredging and disposal activities. NMFS estimates that only a small percentage of the salmon and green sturgeon present in the action area is likely to be affected due to: 1) the small size of the affected areas relative to the action area; 2) limited locations and duration of dredging and disposal; 3) the temporary nature of the effects; and 4) the broad distribution of salmonids and green sturgeon in the Bay. A very small number of green sturgeon may be entrained and killed if hydraulic dredging equipment is used.

B. Impacts to Critical Habitat

The action area located within the Central Bay is designated critical habitat for Sacramento River winter-run Chinook, Central Valley spring-run Chinook and Central Valley steelhead. The entire San Francisco Bay is designated critical habitat for CCC steelhead, and is designated critical habitat for southern DPS green sturgeon. Temporary impacts to designated critical habitat for

salmonids and designated critical habitat of southern DPS green sturgeon are expected during construction of the falsework and trestles required for demolition of the old bridge, and dredging for barge access of the SFOBB East Span Seismic Project. Pile driving and dredging will adversely affect the water column and benthic substrate of San Francisco Bay within the action area. Impacts to the water column from high sound pressure levels were discussed previously, as were impacts to water quality associated with dredging. There will also be temporary impacts associated with shading and foraging habitat loss within the action areas while temporary structures are in place. However, temporary structures will not be directly located where eelgrass beds have been documented and are not expected to pose impacts to eelgrass from shading. Removal of the old structure will ultimately reduce shading in the project area.
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These impacts are unlikely to reduce the value of critical habitat for these species in the action area once removal of the existing bridge is complete. Most critical habitat in the action area is either 1) expected to quickly return to pre-project conditions (*e.g.*, sound pressure levels and turbidity generated by construction activities will no longer be present). During construction activities, impacts to the value of critical habitat for these species in the action area is expected to be minimal because of limited extent of most effects and or the short duration of effects (*e.g.*, pile proofing). Habitat outside of the affected areas or times will not be affected.

As described above, impacts to benthic organisms at the dredging and disposal sites may last for several years following disturbance from activities associated with this project. NMFS expects these impacts will be discountable to the value of green sturgeon critical habitat considering the current low value of these areas as habitat and the large amount of critical habitat available to green sturgeon elsewhere in San Francisco Bay.

Caltrans established a SFOBB East Span Seismic Project mitigation fund for the restoration of Federal-and State-listed salmonid habitat in the central and south Bay. These projects were designed to restore and enhance anadromous salmonid habitat within San Francisco Bay tributaries. Properly designed and implemented restoration actions are expected to provide significant benefits (as discussed in the Environmental Baseline) to steelhead and designated critical habitat in San Francisco Bay tributaries. Of the projects completed, only the Indigenous Oyster Habitat Project, located at the Marin Rod and Gun Club in San Pablo Bay at Point San Quentin, adjacent to the Marin County side of the Richmond-San Rafael Bridge, is thought to potentially provide similar habitat enhancements for green sturgeon. Caltrans and NMFS are currently working on an eelgrass project that may provide habitat enhancements for salmonids and green sturgeon.

VII. CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or privately sponsored activities, not involving Federal activities, that are reasonably certain to occur within

the action area of the Federal action subject to consultation." For the purposes of this consultation, the action area is located within the central and south San Francisco Bay in an area encompassing a 3981 m radius (7962 m diameter) surrounding the east span of the SFOBB, an area extending approximately 2000 m south of Alcatraz Island at the SF-11 disposal site, and the SF-DODS ocean disposal site. Non-Federal actions that may affect the action area include State angling regulation changes, voluntary State or privately sponsored habitat restoration activities, State hatchery practices, discharge of storm water and agricultural runoff, increased population growth, recreational harvest, and urbanization. State angling regulations are generally moving towards greater restrictions on sport fishing to protect listed fish species. Farming activities within or adjacent to the action area may have negative effects on San Francisco Bay water quality due to runoff laden with agricultural chemicals. Future urban development within the Bay may also adversely affect water quality and estuarine productivity within the action area.

VIII. INTEGRATION AND SYNTHESIS OF EFFECTS

A. Effects to Species

The remaining dismantling and dredging/disposal activities associated with the SFOBB East Span Seismic Project are expected to result in adverse effects to Federally-listed anadromous salmonids and green sturgeon during construction[16]. For the three listed Central Valley ESUs (Central Valley steelhead DPS, Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon), the remaining activities of the SFOBB East Span Seismic Project are expected to result in adverse effects to a small number of fish from these ESUs, because few individuals are likely to be present within the area of direct construction impacts. Harmful sound levels from pile driving are predicted to extend several thousand meters from the pile. However, given the geography and bathymetry of San Francisco Bay, and the location of the active pile driving areas along the east side of YBI, combined with the known behavior patterns of salmonids and adult spawning green sturgeon, it is probable that the majority of Central Valley anadromous salmonids are likely to be on the north side of San Francisco Bay en route between the Golden Gate and their natal Central Valley streams. Similarly, adult spawning green sturgeon will likely to be located on the north side of San Francisco Bay during migration, en route between the Golden Gate Bridge and the Sacramento River during construction activities. Since this portion of San Francisco Bay is several kilometers from the area that will be subject to the highest sound pressure levels, only very small numbers of three Central Valley ESU salmonids and adult spawning green sturgeon are anticipated to be in the action area and exposed to harmful sound pressure levels. Thus impacts to Central Valley salmonid numbers are very small and likely exert no discernible effect on future adult returns.

CCC steelhead must pass through the action area on route to natal streams within the south Bay, and during juvenile emigration from south Bay tributaries to the Pacific Ocean. CCC steelhead

[16] Remaining activities to construct the new east span are unlikely to result in adverse effects to listed salmonids or sturgeon (over water work) and are not considered further here.

was listed as threatened under the ESA because their numbers are dramatically reduced from historical estimates. This DPS does retain resiliency in the face of natural environmental fluctuations, but is at risk because its small numbers and other factors reduce its ability to persist in the face of natural disturbances. For CCC steelhead, up to .0003 percent annually of the outmigrating juvenile and post-spawned adult population originating from south San Francisco Bay tributary streams may be adversely affected during 2012-2017 by pile driving during dismantling of the bridge. This impact occurs to populations that have likely suffered recent losses from pile driving that occurred during the installation of temporary piles since the project began construction (now part of the Environmental Baseline).

Numerically, south San Francisco Bay steelhead represent a very small portion of the entire CCC steelhead, but these south Bay tributaries represent a significant and unique portion of the geographic distribution of this DPS. While the magnitude of loss is very small, these combined losses of adult and juvenile salmonids associated with the bridge demolition and dredging activities of the SFOBB East Span Seismic Project may manifest as a reduction in the number of adults returning for the next generation of the south Bay CCC steelhead populations because, for example, these losses are in addition to the most recent, previous pile driving impacts in 2009 (see Environmental Baseline). However, the likely impacts of this project are not expected to appreciably reduce the resiliency of these south Bay populations, (*i.e.*, their likelihood of survival and recovery) because salmonids have evolved and are adapted to variable systems (Bisson *et al*. 1997); and favorable water years and ocean conditions are likely to allow for subsequent years with greater population abundance that will replace the small number of steelhead killed by this project. Improvements to baseline conditions as a result of the restoration efforts funded by Caltrans and others to restore, enhance, or create salmonid habitat may improve reproductive success and survival of CCC steelhead. In consideration of the above, the demolition activities associated with the SFOBB East Span Seismic Project are not anticipated to reduce the likelihood of the survival and recovery of the local CCC steelhead populations or the Central California Coast DPS.

For adult green sturgeon, NMFS estimates that approximately three percent of spawning adult green sturgeon may potentially be injured or killed by the project's remaining activities. This estimate is based upon an average annual abundance estimate of 71 returning spawners and the 2007 tracking data provided by CALFED, with three adults recorded within the action area (one summer resident and two spawning adults) between February and August. Although it is not possible to predict the exact percentage of juvenile green sturgeon that may be adversely affected by pile driving activities, NMFS assumes that the majority of the juvenile, subadult and non-spawning adult green sturgeon will be located in areas with better quality habitat, possessing abundant food resources such as intertidal sloughs. The dredging areas are also relatively distant from the primary migration routes of adult green sturgeon, but a small amount of green sturgeon may be entrained and killed if hydraulic dredging is used. Therefore, it is expected the remaining activities of the SFOBB East Span Seismic Project will result in injury or mortality to a small portion of threatened adult, sub-adult, and juvenile green sturgeon, although the exact number affected remains uncertain. Green sturgeon may also be behaviorally affected by the projects activities. However, these behavioral changes are not expected exert any discernible effects on

the fitness of individual fish.

Similar to CCC steelhead, the potential impacts from pile driving that have occurred from the installation of piles since the project began construction may have caused injury or mortality or adverse behavioral changes to green sturgeon, potentially reducing levels of juvenile production and adult returns. Although the population of green sturgeon is low, and a small number of green sturgeon may have been harmed or killed by previous pile driving activities at this site, the possible injury or mortality resulting from exposure to high SPLs during prior and remaining pile driving activities, or entrainment during dredging activities of a small number of juvenile or subadult green sturgeon is not expected to appreciably decrease the number of returning adults, because of the number of juveniles produced by these populations. Since no spawning or freshwater rearing habitat will be affected by the proposed pile driving or dredging activities or operations, impacts on spawning survival and survival from egg to juvenile are not expected. In addition, because green sturgeon are long-lived species, it is presumed that adults not harmed or killed by this project will continue to spawn in future years and produce juveniles to replace any lost during construction of the project. Therefore, the abundance, distribution, and reproduction of the southern DPS green sturgeon is not likely to be appreciably reduced by the associated effects of the project's actions during bridge demolition and dredging for the SFOBB East Span Seismic Project.

B. Effects to Designated Critical Habitat

Within the action area, only the central Bay is designated critical habitat for the three listed Central Valley ESUs (Central Valley steelhead DPS, Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon). Both the central and south San Francisco Bay is designated critical habitat for CCC steelhead. Impacts to designated critical habitat of anadromous salmonids are expected during bridge demolition and construction as a result of pile driving. Pile driving will adversely affect critical habitat within the action area through temporary elevated SPLs and turbidity, as well as temporary loss of foraging habitat and shading while temporary structures are in place. However, as discussed previously, restoration efforts resulting in improved access to significantly better habitat conditions in Bay tributaries and wetlands are expected to result in long-term increase in the value of critical habitat for CCC steelhead in south San Francisco Bay. Additional restoration actions implemented by the mitigation fund established by Caltrans are also expected to improve the value of critical habitat in central and south San Francisco Bay CCC steelhead streams.

The entire San Francisco Bay is critical habitat for green sturgeon. Impacts to the water column and bay substrate are expected to occur as a result of pile driving and dredging/disposal activities. Pile driving will adversely affect critical habitat within the action area though temporarily elevated SPLs and temporary increases in turbidity. Similarly, dredging and disposal, and removal of old timber piles associated with bridge dismantling are expected to result in adverse effects to critical habitat through temporary increases in turbidity, temporary increase in amounts of contaminants in the water column and temporary disturbance of benthic substrate. Because no spawning or freshwater rearing habitat will be affected by the proposed actions, and only a small portion of

their estuarine foraging and rearing habitat is affected temporarily by the proposed actions, impacts from the project's activities are not expected to reduce the value of critical habitat for green sturgeon for the conservation of this species.

IX. CONCLUSION

After reviewing the best available commercial and scientific information regarding the current status of listed anadromous salmonids and green sturgeon, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed bridge demolition and dredging activities for the SFOBB East Span Seismic Project are not likely to jeopardize the continued existence of CCC steelhead, Central Valley steelhead, Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon or southern DPS green sturgeon.

After reviewing the best available commercial and scientific information regarding the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed remaining activities for the SFOBB East Span Seismic Project are not likely to adversely modify or destroy the critical habitat of CCC steelhead, Central Valley steelhead, Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, or southern DPS green sturgeon.

X. SUPPLEMENTAL INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS as an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, 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 the purpose of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this supplemental incidental take statement.

A. Amount or Extent of Take Anticipated

It is anticipated that take associated bridge demolition and dredging activities for the SFOBB East Span Seismic Project will be in the form of injury and mortality as a result of construction activities associated with bridge dismantling for listed CCC steelhead and Central Valley salmonids (Central Valley steelhead, Central Valley spring-run Chinook salmon, Sacramento

River winter-run Chinook salmon), and green sturgeon.

1. Pile Driving

Pile driving with an impact hammer is expected to result in incidental take in the form of injury, mortality to salmonids and green sturgeon through exposure to temporary high SPLs (> 206 dB peak SPL or 187 dB SEL) within the water column during the installation of the temporary trestles and falsework require for bridge dismantling. The number of salmonids and green sturgeon that may be incidentally taken during activities is expected to be small. Because finding dead or injured fish will be difficult due to their small size in relation to the size of the action area, the difficulty in observing dead or injured fish in the waters of the bay due to depth and the presence of predators and scavengers such as birds, NMFS will use the area of sound pressure wave impacts extending into the water column from each pile, and the time period for pile driving as a surrogate for number of fish. For salmonids and southern DPS green sturgeon, those fish located within the 38 m diameter from the pile during attenuated pile driving of the 36-inch diameter steel piles, within the 14 m diameter for unattenuated pile proofing of the 36-inch piles, and within the 65 m distance from the Yerba Buena Island shoreline during the installation of the H-piles may be injured or killed. Beyond these distances, extending out to the 796 m, 3981 m and 1311 m diameters corresponding with SPLs > 150 dB RMS, of the above events fish may exhibit behavioral responses such as agitation or rapid bursts in swimming speeds. If Caltrans' monitoring indicates that sound pressure levels greater than 206 dB peak (re: 1 μPa), or 187 dB SEL (re: 1 $\mu Pa^2 sec$), or 150 dB RMS (re: 1 μPa) extend beyond these distances the amount of incidental take may be exceeded.

2. Dredging and Disposal

Dredging and disposal activities are not expected to result in incidental take of salmonids. Incidental take may occur as injury or mortality of juvenile and adult green sturgeon due to entrainment in a hydraulic dredge. However, entrainment of green sturgeon in a hydraulic dredge is expected to be very low due to the relatively limited area affected by dredging for this project. Because of the difficulty in observing green sturgeon entrainment in dredging equipment in a deep, dark, and turbid aquatic environment[17], NMFS will use the position of the draghead, during operation (i.e., flushing or sucking up water or sediment) of all dredging equipment as a surrogate for the amount of take. If any dredging draghead is operated at a height of more than three feet above the bottom of the estuary, incidental take may have been exceeded.

B. Effect of the Take

In the accompanying supplemental biological opinion, NMFS has determined that the anticipated take is not likely to result in jeopardy to Central Valley salmonids, CCC steelhead or the green sturgeon Southern DPS.

[17] Similarly, any sturgeon entrained would likely be ground up in the dredging equipment and difficult to find in the substrate removed by dredging.

C. Reasonable and Prudent Measures

NMFS believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take of listed salmonids and green sturgeon.

Caltrans shall:

1. Utilize measures to minimize and avoid the take of green sturgeon from dredging.
2. Utilize measures to minimize and avoid the take of salmonids and green sturgeon from dismantling the existing bridge.
3. Ensure the fisheries and hydroacoustic monitoring program is properly implemented.

D. Terms and Conditions

Caltrans must comply with the following terms and conditions, which implement the reasonable and prudent measures described above.

1. Utilize measures to reduce the take of green sturgeon from dredging.

    a. The draghead of dredges shall be operated with the intake at or below the surface of the material being removed. The intake may be raised a maximum of three feet above the bed for brief periods of purging or flushing of the intake system. At no time shall the draghead be operated at a level higher than three feet above the bed.

2. Utilize measures to reduce the take of listed salmonids and green sturgeon from dismantling the existing bridge.

    a. Ensure all avoidance and minimization measures as described in the Fisheries and Hydroacoustic Monitoring Program during pile driving are properly implemented.

3. Ensure the approved fisheries and hydroacoustic monitoring program is properly implemented.

    a. Real-time monitoring shall be conducted to ensure that underwater sound levels analyzed in this biological opinion do not exceed the distances for the piles described in this opinion. These distances are:

- Attenuated piles, 206 dB peak SPL at 1m (2 m diameter), 187 dB accumulated SEL at 34 m (68 m diameter), and 150 dB RMS at 398 m (796 m diameter);

- Proofing of piles, 206 dB peak SPL at 7 m (14 m diameter), 187 dB accumulated SEL at 19 m (38 m diameter), and 150 dB RMS at 3981 m (7962 m diameter);

- Steel H-piles, 206 dB peak SPL at 10 m, 187 dB accumulated SEL at 65 m (radial distance), and 150 dB RMS at 1311 m.

b. Caltrans shall monitor underwater sound during impact hammer pile driving activities as described in the final monitoring and reporting program. Caltrans shall submit to NMFS a draft monitoring and reporting program for review and approval 60 days prior to the start of in-water impact pile driving or marine foundation removal. This program shall include provisions to provide daily summaries of the hydroacoustic monitoring results (real-time data) to NMFS, as well as more comprehensive final summary reports on a monthly basis during the pile-driving season. Specifically, the monitoring and reporting program shall include:

- Preliminary daily biological and hydroacoustic monitoring reports are to be submitted by close-of-business (COB) the day following pile driving that provides real-time data regarding the distance (actual or estimated using propagation models) to the thresholds (206 dB Peak, 187 dB accumulated SEL, and 150 dB RMS) used in this biological opinion to determine adverse effects to listed species. If underwater sound exceeds these thresholds at the distances provided above from the piles being driven, then NMFS must be contacted within 24 hours before continuing to drive additional piles.

- A final hydroacoustic monitoring summary shall be submitted to NMFS, due 30 days following pile driving events for each temporary structure required for bridge removal. The reports must provide a review of the daily monitoring data and process, as well as any problems that were encountered;

- A description of the locations of hydroacoustic monitoring stations that were used to document the extent of the underwater sound footprint during pile driving activities, including the number, location, distances, and depths of hydrophones and associated monitoring equipment shall also be included in the reports;

- The reports must also provide the total number of pile strikes per pile, the interval between strikes, the peak SPL and SEL per strike, and accumulated SEL per day for each hydroacoustic monitor deployed;

- The reports will also include observations of bird predation and behavior; and evaluation of fish mortality and injury rates through the use of visual observations and collections during pile driving events.

c. All green sturgeon and salmonids killed and collected by this project must be immediately frozen and transferred to the NMFS Southwest Fisheries Science Center Santa Cruz Laboratory Tissue Repository within thirty days of collection.

REPORTING REQUIREMENTS

All reports and other materials to be submitted to NMFS described in the above terms and conditions shall be submitted to:

Jacqueline Meyer c/o the
North Central Coast Office Supervisor
National Marine Fisheries Service
777 Sonoma Ave., Room 325
Santa Rosa, California 95404
Phone (707) 575-6057
Fax (707) 578-3435

XI. REINITATION NOTICE

This concludes formal consultation on the proposed bridge demolition and dredging activities for the San Francisco - Oakland Bay Bridge East Span Seismic Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the actions 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 agency actions that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the action is subsequently modified in a manner or to an extent 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, formal consultation shall be reinitiated immediately.

XII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, or to develop information.

1. To avoid adverse impacts to anadromous fish species, pile driving with an impact hammer during peak migration periods should be avoided.

2. To avoid attracting fish with lights during nighttime pile driving operations, all pile driving should be limited to daylight hours.

3. To minimize the effects of sound pressure waves to anadromous fish species, sound attenuation methods should be developed and incorporated into all pile driving projects.

4. To avoid entrainment of green sturgeon in hydraulic dredging equipment, the diameter of the draghead intake should be 10 inches or smaller.

5. Caltrans and other local, state, and Federal agencies should provide training for Caltrans environmental and engineering staff that will assist in avoiding or minimizing the impacts of transportation projects on ESA-listed salmonids, green sturgeon and their habitats.

6. Caltrans and other local, state, and Federal agencies should develop and implement pile driving projects using driving frames or pile installation methods that do not preclude the use of sound attenuation systems.

7. Caltrans and other local, state, and Federal agencies should include in bid packages to contractors specific requirements for scheduling construction activities that adhere to seasonal work windows in order to avoid principal migration times for anadromous fish species.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NMFS requests notification of the implementation of any conservation recommendations.

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Enclosure 2

Bridge Demolition and Dredging Activities for the San Francisco-Oakland Bay Bridge East Span Seismic Project.

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

Statutory and Regulatory Information

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, establishes a national program to manage and conserve the fisheries of the United States through the development of federal Fishery Management Plans (FMPs), and federal regulation of domestic fisheries under those FMPs, within the 200-mile U.S. Exclusive Economic Zone ("EEZ") 16 U.S.C. §1801 *et seq*. To ensure habitat considerations receive increased attention for the conservation and management of fishery resources, the amended MSA required each existing, and any new, FMP to "describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 1855(b)(1)(A) of this title, minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat." 16 U.S.C. §1853(a)(7). Essential Fish Habitat (EFH) is defined in the MSA as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" 16 U.S.C. §1802(10). The components of this definition are interpreted at 50 C.F.R. §600.10 as follows: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

Pursuant to the MSA, each federal agency is mandated to consult with NMFS (as delegated by the Secretary of Commerce) with respect to any action authorized, funded, or undertaken, or proposed to be, by such agency that may adversely affect any EFH under this Act 16 U.S.C. §1855(b)(2). The MSA further mandates that where NMFS receives information from a Fishery Management Council or federal or state agency or determines from other sources that an action authorized, funded, or undertaken, or proposed to be, by any federal or state agency would adversely affect any EFH identified under this Act, NMFS has an obligation to recommend to such agency measures that can be taken by such agency to conserve EFH. 16 U.S.C. §1855(4)(A). The term "adverse effect" is interpreted at 50 C.F.R. §600.810(a) as any impact that reduces quality and/or quantity of EFH and may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce quantity and/or quality of EFH. In addition, adverse effects to EFH may result from actions occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

If NMFS determines that an action would adversely affect EFH and subsequently recommends measures to conserve such habitat, the MSA proscribes that the Federal action agency that receives the conservation recommendation must provide a detailed response in writing to NMFS within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NMFS EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations. 16 U.S.C. §1855(b)(4)(B).

I. BACKGROUND AND CONSULTATION HISTORY

On August 5, 2011, NMFS received the California Department of Transportation's (Caltrans) letter requesting re-initiation of EFH consultation for the seismic retrofit of San Francisco-Oakland Bay Bridge (SFOBB) for additional details, project updates, and activities related to dismantling of the old structure between San Francisco and Alameda Counties, California.

Caltrans originally initiated consultation on construction of the new bridge and dismantling of the existing bridge in 2001. The original 2001 Biological Opinion (BO) includes EFH conservation recommendations, primarily for turbidity and impacts to eelgrass associated with dredging. In response to EFH and other recommendations, terms, and conditions, Caltrans developed a $15.5 million package that included $1 million dollars to be used in partnership with NMFS for bay-wide eelgrass research, and $2.5 million for eelgrass and sand flat restoration. Approximately $1 million of the $2.5 million for eelgrass and sand flat restoration was spent on a pilot project in Berkeley. The remaining funds, which with accrued interest now total approximately $1.9 million, will be used for further eelgrass mitigation/restoration in San Francisco Bay. Caltrans eelgrass mitigation was based on 3.6 acres of predicted impacts, and only 1.5 acres were actually impacted.

Supplemental consultations and reinitiations have occurred since the 2001 BO as outlined in the preceding BO (see Section I. Consultation History).

II. PROPOSED ACTION

Dismantling of the original SFOBB is proposed and the project is described in the preceding BO. The activities and avoidance/minimization measures specifically relevant to EFH are described here in additional detail. Sections of the bridge would be dismantled in phases occurring from west to east starting at the Yerba Buena Island (YBI) Cantilever section, followed by 504' and then 288' spans, and finally the Oakland Shore spans. To facilitate dismantling of the original bridge, four sets of temporary structures (2 trestles, and 2 sets of falsework) would be constructed in four phases, with approximately one set estimated to be constructed per year. The estimated number of piles required for the temporary structures is based the maximum number potentially needed.

Construction of the YBI Access Trestle is proposed for summer or fall of 2012, would be in place an estimated 2-4 years, and would require a maximum of 100 H-piles, driven by impact hammer. YBI Trestle would result in temporary fill of 1.6 cubic yards and temporary shading of 7,000 square feet.

Construction of the Oakland Access Trestle is dependent on the contractor and whether they prefer to do the work by barge[18]. If constructed (between 2014 and 2017), the trestle would be in place an estimated 1-4 years, and would require a maximum of 700 18" to 36" pipe piles, driven by vibratory hammer with an estimated 10% of those piles proofed by impact hammer. The trestle would be constructed parallel to the southern side of the existing east span. The Oakland Access Trestle would result in temporary fill of 1800 cubic yards and temporary shading of 96,000 square feet (maximum).

Additional falsework for bridge dismantling may require installation of a maximum of 2,540 pilings below the bridge. Falsework would be installed beneath the existing structure. Construction of the falsework for dismantling of the cantilever section is proposed for 2013-2014, would be in place an estimated 1-2 years, and would require a maximum of 440 piles, driven by vibratory hammer with an estimated 10% of those piles proofed by impact hammer. Cantilever falsework would result in temporary fill of 2924 cubic yards. Construction of the falsework for dismantling of the 504' and 288' spans is proposed for 2014-2016 and would be in place an estimated 1-3 years. Falsework for the removal of the 504' spans would require a maximum of 450 24' to 36' pipe piles. Falsework for the removal of the 288' spans would require a maximum of 700 18" to 36" pipe piles. Piles would be driven by vibratory hammer with an estimated 10%

[18] Construction of the Oakland Access Trestle is dependent on the contractor and whether they prefer to do the work by barge. If work by barge is included by the contractor, the Oakland Trestle may not be built, or may only be partially built, along with dredging of the access channel. Impacts and conservation recommendations for dredging the access channel were addressed in the 2001 Biological Opinion.

of those piles proofed by impact hammer. Falsework for the removal of the 504' and 288' spans would result in temporary fill of 3947 cubic yards. A maximum of 150 other pilings (18" to 36" pipe piles) may be required for coffer dams, spuds, fenders, or other temporary structures, as needed. Other pilings may result in temporary fill of up to 1030 cubic yards of fill.

Dismantling of each section would most likely begin with installation of falsework, removal of concrete decks, followed by dismantling and removal of the steel structures at and above the bridge deck, and finally the dismantling and removal of steel towers that supported the superstructure. Upon completion of bridge dismantling, all falsework would be removed and, whenever possible, temporary pilings would be fully extracted by rocking or vibrating out. If pilings cannot be fully extracted, they will be cut off below the mudline. Dismantling would also eventually include removal of marine foundations, but at this time there is insufficient information on means and methods to determine potential impacts to EFH. Removal of marine foundations will be addressed in a supplemental consultation when the process has been further developed.

Dredging may also occur but was covered under previous consultations in 2001 and 2009, and the current Corps of Engineers permit includes additional dredge episodes and sufficient cubic yardage to cover the dismantling activities described herein. Caltrans was originally permitted for four dredging episodes. They have dredged twice already under the current permit and have 2 episodes left - one for the barge access channel along the south side of the bridge from E11 to E21 and one for around the pier foundations. They currently do not anticipate any increases in volume, area, or depth. Dredging will go through DMMO process for sediment characterization and disposal.

BMPs and conservation measures include the following:

- Debris from bridge dismantling, including lead paint and asbestos, will be contained with netting and tenting and will not be allowed to enter the water (Caltrans 2011).

- Temporary structures and pilings in the Bay will be fully removed upon completion of the project (Caltrans 2011).

- Caltrans will continue to perform turbidity monitoring during activities with the potential to produce turbidity and suspended sediment. Monitoring will be conducted in accordance with methods and standards outlined in the Water Quality Self-Monitoring Program required by RWQCB Order No. R2-2002-0011. The Department will ensure, to the extent practical, that turbidity generated by construction activities do not exceed 50 NTU or result in incremental increase greater than 10% of the background NTU at a distance greater than 30 meters (100 feet) from the activity, when the activity occurs within 1,000 meters (3,200 feet) of an eelgrass bed or sand flat, or as required by the RWQCB (Galvez-Abadia 2011).

- Caltrans proposes project-wide eelgrass surveys conducted annually at both YBI and Oakland, during the growing season, during all years which have in-water work. Surveys

will be consistent with prior eelgrass surveys performed for this project from 1999 to 2007 (Galvez-Abadia 2011).

The BMPs described as part of the proposed action in the consultation initiation package, in Caltrans' email outlining proposed turbidity monitoring and eelgrass surveys (Galvez-Abadia 2011), and at the Interagency Meetings (June 23 & October 27, 2011) are effective to reduce or avoid some adverse effects to EFH. NMFS regards these conservation measures as integral components of the proposed action and expects that all proposed activities will be completed consistent with those measures. We have completed our effects analysis accordingly. Any deviation from these conservation measures will be beyond the scope of this consultation and may require supplemental consultation to determine what effect the modified action is likely to have on EFH.

III. ACTION AREA

For purposes of this EFH consultation, the action area occurs between Yerba Buena Island and Oakland along the length of the original San Francisco-Oakland Bay Bridge eastern spans. The length of the bridge to be dismantled extends approximately 2.3 miles from west to east over Yerba Buena Island, a deep water ship channel, sand and mudflats, and the Oakland Touch Down (OTD) area**.** The YBI Trestle would be constructed extending out from the southeastern shoreline of Yerba Buena Island in an area less than 10 feet deep and characterized by relatively light sediment deposits over bedrock. Eelgrass has been documented in Coast Guard Cove near the proposed YBI Trestle. Surveys performed annually 1999-2005 and in 2007 show variability in the spatial extent of the beds. The closest documented eelgrass to the YBI Trestle varied in distance from 30 - 130 meters when present; no eelgrass was documented in four out of nine years surveyed. The Oakland Trestle and the falsework for dismantling the 288' spans are proposed in a shallow area characterized by mudflats. The trestle would extend westward from the Oakland shoreline along the south edge of the existing bridge. The closest eelgrass to the Oakland Trestle documented in previous surveys ranged from 20 – 150 meters and was present every year surveys were conducted.

IV. EFFECTS OF THE ACTION

Based on information provided in the Biological Assessment and developed during consultation, NMFS concludes that the proposed action would adversely affect EFH for various federally managed species within the Pacific Groundfish FMP, Coastal Pelagics FMP, and the Pacific Salmon FMP. The proposed bridge superstructure and support dismantling could adversely affect EFH, including estuary HAPC due to: (1) temporary turbidity/suspended sediment effects, (2) temporary elevated levels of underwater sound, (3) temporary loss of subtidal habitat, (4) temporary disturbance of benthic habitat, and (5) temporary increase of shaded areas.

Installation and pulling of temporary piles will result in short-term localized increases in turbidity. Considerable resuspension of bottom sediments is expected to occur with piling removals. If sediment loads remain high for an extended period of time, the primary productivity of an aquatic area may be reduced (Cloern 1987). Turbidity would generally be expected to dissipate quickly due to strong currents in the project area. However, the cumulative impact may be significant as large numbers of pilings are proposed for installation and removal over an extended period of time. Fish may suffer reduced feeding ability (Benfield and Minello 1996) and be prone to fish gill injury (Nightingale and C.A. Simenstad 2001) if exposed to excessive high levels of turbidity However, turbidity impacts to fish are expected to be temporary and minor as fish tend to move out of areas with persistently high levels of suspended sediment.

Increased turbidity from sediment resuspension in the water column can reduce light penetration and lower the rate of photosynthesis for submerged aquatic vegetation (SAV) (Dennison 1987). SAV in the form of eelgrass (*Zostera* sp.) has been documented near the project area, and is designated as an EFH Habitat Area of Particular Concern (HAPC). Eelgrass is an ecologically important SAV, providing structure and refuge for estuarine fish. Eelgrass beds serve as a refuge from predation, food source, and nursery for many commercially and recreational important finfish and shellfish species. In addition, eelgrass beds provide physical benefits in bays and estuaries, dampening wave and current action, trapping suspended particulates, and reducing erosion by stabilizing the sediment. Turbidity generated within 250 meters of eelgrass beds has the potential for indirect impacts due to reduction in light levels. The eelgrass monitoring proposed by Caltrans may detect potential impacts due to turbidity generated by project activities if distribution and densities are compared to a suitable control site. If eelgrass surveys indicate a significant decline in distribution or density due to the dismantling project activities (i.e., compared to control site conditions), NMFS will consider dismantling impacts within the context of the 3.6 acres of originally predicted impacts for which the mitigation package was developed.

Caltrans has included measures to monitor and minimize turbidity in San Francisco Bay to satisfy Regional Water Quality Control Board requirements. However, light monitoring for photosynthetically active radiation (PAR) in nearby eelgrass beds is not proposed. Water column turbidity reduces the amount of light available for photosynthesis and consequently affects the depth distribution, density and productivity of eelgrass (Thayer 1984; Zimmerman 1991; Lee 2007). Eelgrass in San Francisco Bay is adapted to growing in low light environments, but if the period of irradiance-saturated photosynthesis (H_{sat}) falls below 3-5 hours per day, growth is negatively affected (Zimmerman 1991). Light monitoring provides an opportunity to avoid and minimize impacts associated with increased turbidity, which is preferable to mitigation for impacts. Monitoring for turbidity levels does not equate to H_{sat} because it does not take light levels into account.

Pile driving for this project will create elevated underwater sound pressure waves in EFH with potential impacts to fish species managed under the MSA. Fish can be injured or killed when exposed to elevated underwater sound pressure waves generated from pile driving. Elevated sound levels will temporarily adversely affect EFH. In most cases fish will likely leave the area in

response to sound transmitted through water and sediment. In some situations they may be injured or killed. Noise impacts to fish are described in detail in the preceding BO (see Section VI. Effects of the Action).

A maximum of approximately 0.24 acres of estuarine benthic EFH in San Francisco Bay will be impacted by temporary fill associated with pilings. These areas will also experience additional disturbance upon piling removal. The fine grain sediment associated with mudflats within the project area is considered foraging habitat for some species of fish managed under the Pacific Groundfish FMP, providing a substrate for infaunal and bottom-dwelling organisms, such as polychaete worms, crustaceans, and other EFH prey types (NMFS 2007). Rates of recovery listed in the literature range from several months to several years for estuarine muds (McCauley 1976; Oliver 1977; Currie 1996; Tuck 1998; Watling 2001). Thus, EFH forage resources for fish that feed on the benthos may be substantially reduced for several years during and after construction before recovery is achieved. Temporary falsework will be installed and removed in phases and the locations will be shifted as bridge dismantling work progresses from west to east. As a result, the maximum number of 2,450 temporary pilings will be distributed over a large area and will not be installed simultaneously. Some permanent fill below the mudline may result if individual pilings cannot be fully extracted by rocking or vibrating out. These piling fragments would be cut off below the potential scour zone and below what is typically considered the biologically active surface zone of benthic mud.

Trestles will result in approximately 2.4 acres of temporary overwater shading. Shading is known to decrease primary productivity, alter predator-prey interactions, change invertebrate assemblages, and reduce the density of benthic invertebrates (Helfman 1981; Glasby 1999; Struck, Craft et al. 2004; Stutes, Cebrian et al. 2006); all of which lead to an overall reduction in the quality of EFH. Effects of shading from trestles will be temporary and will, for the most part, occur in areas where overwater structures already exist. Falsework will be installed beneath the existing structure and will not result in increased shading. Temporary structures, including trestles, will not be directly located where eelgrass beds have been documented and are not expected to pose impacts to eelgrass from shading. Removal of the old structure will ultimately reduce shading in the project area.

V. CONSERVATION RECOMMENDATIONS

To adequately avoid and minimize the potential direct and indirect adverse impacts to eelgrass HAPC from construction activities and turbidity, NMFS recommends the following:

1. Light monitoring (as described in the Light Monitoring Protocol provided by NMFS) for photosynthetically active radiation (PAR) should be conducted in nearby eelgrass beds during construction activities occurring within 250 meters of the Oakland and Yerba Buena Island eelgrass beds. This includes activities that may produce turbidity and suspended sediment such as trestle installation and removal, and piling removals. If daily light levels fall below 5 hour H_{sat} at sampling sites but not at reference locations, turbidity-

producing activities should be paused and modified, and /or turbidity control measures should be put in place. Results of the light monitoring should be provided to NMFS monthly.

2. Eelgrass surveys should include a suitable control site in an adjacent or comparable area to monitor natural variability, changes in shoot density, or decline/increase in eelgrass beds that may not be associated with project activities.

VI. EFH CONCLUSION

As described in the above effects analysis, NMFS has determined that the proposed project would adversely affect EFH for various federally-managed species within the Pacific Groundfish, Coastal Pelagic, and Pacific Salmonid FMPs. As described above, the adverse effects are expected to be temporary and may be offset long-term by benefits from removing the existing bridge. The proposed action contains measures to avoid, minimize, mitigate, or otherwise offset some potential adverse effects to EFH. With the additional EFH Conservation Recommendations provided here, potential adverse effects to EFH are expected to be adequately minimized or compensated.

This concludes EFH consultation for the proposed dismantling of the superstructure and supports for the San Francisco-Oakland Bay Bridge Project between San Francisco and Alameda Counties, California.

VII. FEDERAL AGENCY STATUTORY REQUIREMENTS

Please be advised that regulations (50 CFR 600.920(k)) to implement the EFH provisions of the MSA require your office to provide a written response to this letter within 30 days of its receipt and prior to the final action. A preliminary response is acceptable if final response cannot be completed within 30 days. Your final response must include a description of how the EFH Conservation Recommendations will be implemented and any other measures that will be required to avoid, mitigate, or offset the adverse impacts of the activity. If your response is inconsistent with our EFH Conservation Recommendations, you must provide an explanation for not implementing this recommendation at least 10 days prior to final approval of the action.

Pursuant to 50 CFR 600.920(l), Caltrans must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conclusion or Conservation Recommendations. NMFS also expects that further consultation will be required on the marine foundation removals, for which there is currently insufficient information on means and methods.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

FEB 2 2011

Mr. Jeffrey Jensen
Chief, Office of Biological Science and Permits
State of California Department of Transportation
P.O. Box 23660
Oakland, California 94623-0660

Dear Mr. Jensen:

Enclosed is an Incidental Harassment Authorization issued to the California Department of Transportation, under the authority of Section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1361 *et seq.*), to take small numbers of marine mammals by Level B harassment incidental to construction of the East Span of the San Francisco-Oakland Bay Bridge, San Francisco Bay, California.

You are required to comply with the conditions contained in this Authorization. In addition, you must cooperate with any Federal, State or local agency monitoring the impacts of your activities. The Authorization requires monitoring the presence of marine mammals, mitigating adverse impacts to the lowest level practicable, and reporting any behavioral modifications resulting from your activity as observed by qualified individuals.

If you have any questions concerning the Authorization or its requirements, please contact Monica DeAngelis, Southwest Regional Office, National Marine Fisheries Service (NMFS) at (562) 980-3232, or Shane Guan, Office of Protected Resources, NMFS, at (301) 713-2289, ext 137.

Sincerely,

James H. Lecky
Director
Office of Protected Resources

Enclosure

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL MARINE FISHERIES SERVICE

Incidental Harassment Authorization

The California Department of Transportation (CALTRANS) is hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1371(a)(5)(D)) and 50 CFR 216.106, to take, incidentally by Level B harassment, small numbers of marine mammals incidental to construction of a replacement bridge for the East Span of the San Francisco-Oakland Bay Bridge (SF-OBB), California:

1. This Authorization is valid from February 7, 2011, until February 6, 2012.

2. This Authorization is valid only for activities involving the construction of the East Span of SF-OBB, California.

3. Species Impacted and Level of Takes

(a) The taking, by incidental Level B harassment only, is limited to the species listed under condition 3(b) below. The taking by serious injury or death of these species, or the taking by harassment, injury or death of any other species of marine mammal is prohibited and may result in the modification, suspension or revocation of this Authorization.

(b) The species authorized for takings by incidental harassment are the California sea lion (*Zalophus californianus*), Pacific harbor seal (*Phoca vitulina richardsi*), harbor porpoise (*Phocoena phocoena*), and gray whale (*Eschrichtius robustus*).

(c) The taking of any marine mammal in a manner prohibited under this Authorization must be reported within 48 hours of the taking to the Director, Southwest Regional Office, National Marine Fisheries Service, Telephone (562) 980-4000 and the Director, Office of Protected Resources, National Marine Fisheries Service, Telephone (301) 713-2332.

4. The holder of this Authorization is required to cooperate with the National Marine Fisheries Service and any other Federal, state or local agency monitoring the impacts of the activity on marine mammals. The holder must notify Monica DeAngelis of the Southwest

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Regional Office (562-980-3232) at least 24 hours prior to starting activities (unless constrained by the date of issuance of this Authorization).

5. Mitigation Requirements

The holder of this authorization must:

(a) Comply with equipment noise standards of the U.S. Environmental Protection Agency and ensure that all construction equipment has noise control devices no less effective than those provided on the original equipment.

(b) Conduct briefings between construction supervisors and crews, marine mammal monitoring team, acoustical monitoring team, and CALTRANS staff prior to the start of all pile-driving activity, and when new personnel join the work, that explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

(c) For all in-water permanent pile-driving, establish marine mammal safety zones of 500 meters (1,640 feet) for pinnipeds and 150 meters (492 feet) for cetaceans around each of the pile-driving sites before pile driving commences. These radii represent received levels of 180 dB re 1 μPa_{rms} for harbor porpoises and/or gray whales, and 190 dB re 1 μPa_{rms} for California sea lions and/or harbor seals, respectively.

(d) If marine mammals are visually sighted within the safety zone(s) prior to start of pile-driving, the Resident Engineer (or other authorized individual) is required to delay pile-driving of the segment until the harbor porpoises and/or gray whales have moved beyond the 180 dB re 1 μPa_{rms} safety zone, or seals and/or sea lions have moved beyond the 190 dB re 1 μPa_{rms} safety zone. Verification may be conducted either through sighting by a qualified observer or by waiting until enough time has elapsed without a sighting (at least 15 minutes for pinnipeds and 30 minutes for cetaceans) to assume the animal has moved beyond the safety zone.

(e) If marine mammals are sighted within the safety zone(s) after pile-driving has begun, have a qualified marine mammal observer record the species, numbers and behaviors of the animal(s) and report to Monica DeAngelis at the Southwest Regional Office, National Marine Fisheries Service, phone (562-980-3232) within 48 hours of the sighting.

(f) The holder of this Authorization shall require the contractor(s) to "soft-start" impact and vibratory pile driving operations.

6. Monitoring Requirements

(a) General.

(1) The holder of this Authorization must designate a minimum of three biologically-trained, on-site individual(s), approved in advance by the National Marine Fisheries Service's Southwest Regional Office, to monitor the area for marine mammals before, during, and after pile driving activities from boats.

(2) The National Marine Fisheries Service must be informed immediately of any changes or deletions to any portions of the monitoring plan in accordance with condition 7(a) of this Authorization.

(b) Visual Monitoring

(1) For all in-water permanent pile-driving one three-person observer team must visually monitor each pile-driving site. When multiple sites are in operation, more than one observer team must be utilized from boats.

(2) Pre-Activity Monitoring: At least 30 minutes prior to the start of all in-water permanent pile-driving segments, marine mammal monitor(s) must conduct observations on the number, type(s), location(s), and behaviors of marine mammals in the designated safety zones and buffer zones, as well as other areas near pile driving sites. If the time between pile-segment driving is less than 30 minutes, a new 30-minute survey is unnecessary provided marine mammal monitors continue observations during the interruption. If pile driving ceases for 30 minutes or more and a marine mammal is sighted within the designated safety zone(s) prior to the commencement of pile-driving, the observer(s) must notify the Resident Engineer (or other authorized individual) immediately (see condition 5(e)).

(3) Monitoring during Activity: During all in-water permanent pile-driving marine mammal monitor(s) shall conduct and record observations on marine mammals in the vicinity of the pile driving sites and pay particular attention to designated safety zones.

(4) Post-Activity Monitoring: For a minimum of 30 minutes after in-water permanent pile-driving stops, marine mammal monitor(s) shall conduct observations of the project area and record information on the number, type(s), location(s), and behavior of marine mammals and pay attention to designated safety zones.

(5) Monitoring on Yerba Buena Island Haul-out: The holder of this authorization shall coordinate with the Richmond Bridge harbor seal survey team to collect observational data from Yerba Buena Island twice a week during in-water pile-driving activity.

(6) Monitoring under Low Light Condition: In late afternoon and/or early evening when light condition is low, marine mammal monitor(s) shall use infrared (IR) scopes to conduct observation of the project area.

(7) Monitoring at Control Site(s): At least one appropriate control site (i.e., harbor seal haul-out site(s) not impacted by the East Span project) must be designated and monitored twice a week during periods of in-water pile-driving.

(8) Data on all observations must be recorded and shall include the following information:

(i) date and time that pile driving or removal starts and ends;

(ii) location of sighting;

(iii) species;

(iv) number of individuals;

(v) number of calves present;

(vi) duration of sighting;

(vii) behavior of marine animals sighted;

(viii) direction of travel;

(ix) distance from pile driving/removal;

(x) environmental information associated with sighting event including Beaufort sea state, wave height, tide state, water currents, wind direction, visibility, glare, percentage of glare, percentage of cloud cover;

(xi) when in relation to pile driving or removal activities did the sighting occur (before, "soft-start", during, or after the pile driving or removal); and

(xii) other human activity in the area.

7. Reporting

(a) If in-water pile driving or removal is conducted, the holder of this Authorization must consult once a week by telephone or e-mail with Monica DeAngelis, or her designee, at the Southwest Regional Office, National Marine Fisheries Service (562-980-

3232), providing a status report on the appropriate reporting items found under condition 7(b), unless other arrangements for monitoring reports are agreed to in writing.

(c) A report on all activities must be submitted to the Southwest Regional Office and the Office of Protected Resources, National Marine Fisheries Service, within 90 days after completion of the activities. This report must contain the following information:

(1) Dates and types of activities;

(2) The results of the visual monitoring program, including all items identified in Section 6(b)(8); and

8. A copy of this Authorization must be in the possession of all contractors and marine mammal monitors operating under the authority of this Incidental Harassment Authorization.

2 2011

James H. Lecky
Director
Office of Protected Resources
National Marine Fisheries Service

Date

United States Coast Guard

Maintenance & Logistics Command Pacific

LICENSE TO USE REAL PROPERTY UNDER COAST GUARD CONTROL

The **UNITED STATES OF AMERICA**, acting by and through the **UNITED STATES COAST GUARD**, Commander, Maintenance & Logistics Command Pacific (s), Chief Civil Engineering Division, 1301 Clay Street, Suite 700N, Oakland, California 94612-5203, (hereafter called "LICENSOR"), and pursuant to 14 U.S.C. § 94(a)(14), grants to the **STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION**, whose mailing address is P.O. Box 23440, Oakland, California 94623-0440 (hereafter called "LICENSEE"), a License (hereinafter called "LICENSE) to use federal property under the administrative control of the U.S. Coast Guard on Yerba Buena Island, California (YBI) at the location indicated on Exhibits" A" and "B" (hereinafter called "PREMISES"), attached hereto and made a part hereof, for the following purpose and subject to the following terms and conditions:

PURPOSE

For more than a century the U.S. Coast Guard and its predecessor agencies have relied upon the facilities on YBI to support the vital operations it conducts in the San Francisco Bay, the Pacific Ocean, and eastward along the major rivers in Northern California. The LICENSEE requires continued access to a portion of YBI in order to continue its construction of a new eastern span to the San Francisco - Oakland Bay Bridge. This construction project is in many respects a task without precedent, and over the course of the last six years the facts and circumstances of the construction and of the Coast Guard's use of YBI have sufficiently changed to justify the issuance of this new LICENSE with the terms stated herein. This license will supersede the current License Agreement DTCG-Z71111-03-RP-002L which expires December 31, 2010. Because construction shall continue for a period significantly beyond that originally contemplated by the LICENSOR and LICENSEE, both parties deemed it necessary to renegotiate. The underlying intent of this LICENSE is that CALTRANS be able to continue its construction to completion without impairing the Coast Guard mission and current or future federal interest in the land or diminishing the value of the federal lands on YBI or by creating environmental liabilities or tort liability for the United States.

TERMS AND CONDITIONS OF THE LICENSE

The LICENSOR grants to the LICENSEE the non-exclusive right to use the described premises together with the non-exclusive right of ingress and egress upon the property of Coast Guard Sector San Francisco, Yerba Buena Island, California. This license is granted at no cost due to the benefit to the general public.

1. Term. This LICENSE shall be in effect for the period from July 1, 2009 to June 30, 2015.

2. Assignment of LICENSE. This LICENSE shall be neither assignable nor transferable by the LICENSEE. No permanent interest in the real property subject to this LICENSE shall vest in the LICENSEE.

3. Termination/Revocation.

   By LICENSOR: the LICENSOR may revoke this LICENSE and reenter and take possession of the PREMISES:

   a. If the LICENSEE does not cure any violations of the terms of this LICENSE within fifteen (15) days of the receipt of notice of the violations from the LICENSOR; or
   b. If the property is declared excess, or is legislatively transferred by the United States Congress to another entity; or
   c. In case of war or national emergency or any other imminent or substantial security threat that requires the LICENSOR'S exclusive use of the PREMISES; or
   d. If any of the information provided to the LICENSOR by the LICENSEE in its application for this LICENSE or at any time during the course of the LICENSE is discovered to be false, fraudulent, or materially incorrect; or
   e. At any time, by giving at least thirty (30) days' notice in writing to the LICENSEE. Said notice shall be computed commencing with the day after the date of mailing of the termination notice.

   By LICENSEE: the LICENSEE may surrender this LICENSE at any time by giving thirty (30) days written notice of termination to the LICENSOR at the above address.

   This LICENSE may be revoked at any time by the mutual consent of both parties.

4. Permits. Licenses and Taxes. The LICENSEE is responsible for obtaining all local, state or federal permits, licenses or other necessary regulatory authorizations to carry out any of the purposes of this LICENSE set forth in this document, and is responsible for the payment of any state or local taxes generated by its activities on the PREMISES.

5. Laws. The LICENSEE shall comply with all applicable federal, state and local laws or regulations pertaining to any activities conducted on the PREMISES.

6. Scope. Except for the construction of the new eastern span of the San Francisco-Oakland Bay Bridge, no alteration of existing premises or facilities, or construction of permanent improvements shall be made without the written approval of the LICENSOR. Any structure or device erected or installed without LICENSOR'S written consent, or with written consent and is later found to interfere with the proper

operation of any of LICENSOR'S equipment or facilities, shall be removed immediately upon notification from the LICENSOR and at the LICENSEE'S own expense. Upon revocation, expiration, or surrender of this LICENSE, and to the extent directed by the LICENSOR, the LICENSEE shall restore the premises or facilities, at no cost to LICENSOR to the same condition as existed on the date of entry under this LICENSE, or better, reasonable wear and tear excepted.

7. Maintenance of PREMISES. LICENSEE shall maintain the PREMISES, including buildings, if applicable, and all equipment, fixtures, and appurtenances furnished by the LICENSOR under this LICENSE, in good repair and condition.

8. Restrictions. Unless specified by this document, the LICENSEE shall at no time permit:

- **a.** Access to any Coast Guard facilities or equipment except as directed by LICENSOR.
- **b.** Any interference with or restrictions to the use of Coast Guard operations, equipment or access.
- **c.** The removal of any LICENSOR property, of any nature whatsoever, from the premises unless authorized by the Coast Guard.

9. Damage to property.

- **a.** The LICENSEE is responsible for any damage to or destruction of any property belonging to the LICENSOR, its officers, employees, contractors, agents, or guests which results from the LICENSEE'S use of the PREMISES or of its project activities on adjacent property.
- **b.** The LICENSEE shall promptly repair or replace any damaged or destroyed property to the satisfaction of the LICENSOR.
- **c.** In lieu of repairs or replacement, and at the LICENSOR'S discretion, the LICENSEE shall pay to the LICENSOR money in an amount sufficient to compensate for the LICENSOR for the loss sustained as a result of the damage to or destruction of the property.
- **d.** LICENSEE shall consult with LICENSOR, and comply with LICENSOR specifications in restoring LICENSOR property impacted by the project activities.
- **e.** LICENSEE shall, in coordination with and without cost to the LICENSOR, remove all project related security fencing at the conclusion of the project and perform a thorough external cleaning to all LICENSOR'S structures affected by project activities.

10. Restoration of the Premises.

- **a.** The LICENSEE shall restore the premises to the condition in which it was received unless the Coast Guard directs LICENSEE to restore premises in a different manner.

b. LICENSEE shall clean up and remove all trash and refuse generated by the LICENSEE'S use of the PREMISES and shall replace any property that it may have relocated during its use of the PREMISES.

c. If the LICENSEE fails to restore the PREMISES, including the removal of trash and relocation of property, the LICENSEE shall pay any costs incurred by the LICENSOR to restore the PREMISES.

d. LICENSEE will consult with LICENSOR on the selection of mature trees and shrubbery to replant on the PREMISES and provide the LICENSOR with a plan for replanting.

11. Access to PREMISES and Parking. The LICENSEE, its officers, employees, contractors, agents, and the participants in its activities shall enter & exit the premises by routes established in consultation with the LICENSOR'S representative (see Section 25), and shall comply with all posted traffic & parking control signs unless relief is granted by the LICENSOR'S representative. The LICENSEE and all its officers, employees, contractors, agents and guests, are advised that they are subject to all additional security measures, including access closure, which may be enacted by Coast Guard Sector San Francisco for reasons of enhanced Military or National Security at anytime.

12. General Provisions.

a. This LICENSE will not be administrated for profit.

b. The LICENSOR shall have unrestricted access to the PREMISES for inspection, maintenance or any other purpose.

c. The LICENSEE shall at no time permit or allow:

(1) Any activities while on the premises that involve the solicitation of funds for private or commercial interests, including fund raising for nonprofit organizations and causes.

(2) Any controlled substances to be brought unto the premises, nor may any controlled substances be possessed, used, solicited, transferred, or sold on the premises.

(3) Any alcoholic beverages to be brought unto the premises.

If the LICENSEE'S equipment at any time causes interference with any of the LICENSOR'S equipment or operation, it shall be the sole responsibility of the LICENSEE to correct any interference problems, or cease operation and remove all equipment as soon as possible.

13. Specific Provisions. The LICENSEE agrees to the following:

a. To coordinate all work with LICENSOR's representative (see Section 25) and to immediately comply with the direction or lawful order of the LICENSOR's representative.

b. LICENSEE will, without cost to the LICENSOR, take all reasonable actions and measures, subject to the prior approval of the LICENSOR, to ensure the safety of LICENSOR personnel, visitors and property within the project site at all times while on YBI during the project construction term. LICENSEE shall provide pedestrian and vehicle protection from overhead hazards for unrestricted access/passage through the construction site and in adjacent areas in accordance with standard safety distances. In addition, LICENSEE shall ensure all falling objects/debris in the project area are contained within 10 feet of the overhead activity designated for contractor use. If containment within the designated area cannot be provided without use of the LICENSOR's adjacent facilities, the LICENSEE will formally submit a specific plan of action for review and obtain permission by the LICENSOR 14 days prior to any use of the LICENSOR's adjacent facility. The LICENSEE at their expense shall relocate all LICENSOR's equipment and required personnel as necessary for the duration of the overhead activity.

c. Provide a construction activity schedule a minimum of 14 days in advance of the commencement of construction activities on the PREMISES and provide regular updates to this schedule as necessary to reflect any changes. LICENSEE will further provide LICENSOR with a minimum of 5 days advance notice of any activities, including but not limited to blasting, which have a potential to injure, damage, or impact LICENSOR personnel, equipment, facilities and/or activities and any plans to eliminate impacts to the LICENSOR.

d. To maintain LICENSOR's unrestricted (24/7/365) access to its property for all pedestrians, vessels, and vehicles. 24/7/365 access requirement can be relaxed in increments of up to 15 minutes. However, it cannot be relaxed in such a way as to exceed cumulatively more than 15 minutes of relaxed access. Restricted access greater that 15 minutes requires 14 days advance notice, in writing to the LICENSOR. LICENSOR may deny the request if it will affect the efficient operation of the Coast Guard mission or Coast Guard personnel, employees, or contractors. LICENSEE is solely responsible to coordinate all project activities across LICENSEE's multiple contracts to insure delays cumulatively applied by each contract do not violate the 15 minute provision.

e. LICENSEE shall not create any (regardless of 15 minute allowance) traffic delays during peak facility commute times Monday through Friday from 6:30AM to 8:30AM; 1:30-3:30PM, or during special events declared by LICENSOR (time periods for special events shall be coordinated by the LICENSOR's on-site representative). In addition, LICENSEE shall provide traffic control on the portion of McCalla Road (lower portion) between Southgate road and the LICENSOR's base. Traffic control will consist of the use of flaggers. This traffic control shall be in operation Monday through Friday 6:30 am to 3:30 pm and when necessary. LICENSEE must be ready to assist Coast Guard security with traffic control in emergencies incidences, fire, spills, etc.

f. Emergency access is defined as an egress route or plan on-the-spot to detour around an unforeseen project related event blocking access to the LICENSOR premises on YBI, such as, but not limited to equipment collapse, road failures, fire, landslides, etc. The LICENSEE will provide emergency access to Coast Guard facilities on YBI within thirty (30) minutes of any incident completely blocking access. LICENSEE may be required to provide water taxi service to Coast Guard facilities during periods of project activities or emergencies that block, severely alter or delay vehicle access to the island. Coast Guard required emergency access to accomplish mission, vice project-related access may require LICENSEE to immediately 'clear an accessible path' for CG vehicle access at no-cost to the LICENSOR.

g.To provide, without cost to the LICENSOR, all necessary real property descriptions, including metes and bounds legal descriptions and drawings, prepared by a registered land surveyor, for all documents the LICENSOR must prepare as a result of the LICENSEE'S activities upon its property or for mitigation of LICENSEE's impacts to LICENSOR.

h. LICENSEE must submit drawings, including profile contours and property boundaries for both the temporary and permanent realignments of the lower portion of Macalla Road and its access from LICENSOR controlled property for LICENSOR review, comment and concurrence. LICENSEE will fully describe the environmental impacts of road construction upon LICENSOR controlled property on the drawings. LICENSEE will be responsible for all environmental documentation required including mitigation measures required for the project.

i. LICENSEE will, at its own expense and in coordination with the LICENSOR's representative, provide for the continued physical security needs of the LICENSOR in the PREMISES at YBI through the erection of a perimeter security fence to LICENSOR specifications, and will provide for additional security coordination, including non-project access closure, when necessary for reasons of enhanced Military or National Security Threat Conditions. The effect will be to provide the LICENSOR a continuous secure perimeter during the entire license period of construction on YBI. Once the YBI portion of the project has been completed, LICENSEE will at its own expense and in coordination with the LICENSOR's representative, re-establish a permanent security fence to LICENSOR specifications along the perimeter of LICENSOR controlled property, tying into the new entrance gate system discussed in Subsection 13. j. below. If mutual agreement cannot be reached with respect to LICENSOR's fence requirements, LICENSOR's requirements shall prevail.

j. LICENSEE will provide, without cost to the LICENSOR, paved temporary and permanent access road and parking through the PREMISES and outside the PREMISES when necessary to ensure 24/7 access to Coast Guard facilities on YBI. These alignments will be developed in close cooperation with the LICENSOR'S own Civil Engineering personnel. Both alignments will include

provisions for oversize vehicles that regularly visit the LICENSOR facilities at YBI and will provide adequate signage for LICENSOR facilities with street lighting having the same capabilities as the present entrance gate system (programmable entrance system, security cameras, telephone, entrance card-lock & keypad system, magnetic roadway pad, etc. The permanent alignment will not include access to non-LICENSOR facilities (i.e. Building 262 - commonly referred to as "the Torpedo Facility") from LICENSOR controlled property. The permanent alignment will be constructed to State of California standards and will include a 4-foot wide pedestrian lane clear of objects such as light poles or signs. The permanent telecommunications Easement shall be located by LICENSEE adjacent to the eventual permanent alignment of the LICENSOR'S access road. Once the easement is consummated, a copy will be attached to this license for reference purposes. LICENSEE in cooperation with the LICENSOR has constructed a "secondary" entrance to the Base in addition to the "temporary" entrance described above. LICENSEE shall ensure one entrance is in use and left unobstructed at all times during the bridge project license period, subject to the 15 minute rule as stated in Section 13.d.

k. LICENSEE understands that vehicle parking on the LICENSOR facility is constrained and LICENSEE's project will require the temporary elimination of significant portions of LICENSOR's existing parking areas. LICENSEE will take all reasonable measures to ensure, without cost to the LICENSOR, that any areas available for parking during the duration of the project license period will remain accessible for LICENSOR'S use. Any parking relocation shall be mutually agreed to by both parties, and may be located on or off base. These measures may include, but are not limited to, the construction of temporary roads to access parking areas cut off from their normal access routes by the project. In addition, LICENSEE shall provide off base storage/parking areas to directly offset any parking capacity loss on the facilities at no cost to LICENSOR. These temporary roadways and parking areas will be removed by LICENSEE, at its own expense, upon the completion of the project and the areas restored to their previous condition unless the LICENSOR requests otherwise. When project related activities on the Premises have concluded, LICENSEE shall construct the replacement parking in a configuration that is mutually acceptable.

l. All pavement repairs performed by LICENSEE under Section 11.a of this LICENSE shall be of at least equal quality to the pre-existing condition of the pavement.

m. LICENSEE will control access to the PREMISES and, if requested by the LICENSOR'S representative, be able to provide the names of all personnel who are or will be present on the PREMISES.

n. LICENSEE must complete a utility study for location prior to initiating any subsurface investigation. LICENSEE will coordinate this action with the LICENSOR'S representative.

o. LICENSEE will, at its own expense, relocate any utilities serving the LICENSOR'S property and coordinate such actions with the LICENSOR's representative and all appropriate parties.
p. LICENSEE will be responsible for any interruption to utility service caused by their actions on the PREMISES and will take immediate action, at its own expense, to place any interrupted service back into effect.
q. LICENSEE will, without cost to the LICENSOR, protect, maintain and repair any affected LICENSOR facilities and relocate affected utilities (telecommunications, electricity, natural gas, water, sewer, storm drainage, cable TV etc.) if necessary which serve the LICENSOR within the project construction area for the duration of the project. Any predictable interruptions of utility service will be coordinated with the LICENSOR'S representative and all appropriate parties with at least 7-day advance notice. Unpredictable interruptions of utility service will be dealt with in a responsive and efficient manner. LICENSEE will coordinate, and bear all costs associated with, the delivery of emergency utility service to the LICENSOR facilities on YBI that are necessitated by any interruptions of those utility systems by project activities, for the duration of the project. Once the project is completed, LICENSEE will prepare and execute appropriate agreements with utility owners for any such related utilities upon project property which LICENSEE controls.
r. LICENSEE shall assume all financial responsibility for compliance with the Native American Graves Protection and Repatriation Act (NAGPRA). If required, LICENSEE must prepare NAGPRA documentation for LICENSOR review and approval.
s. LICENSEE will provide LICENSOR with a copy of the fully executed final Curation Agreement with the Phoebe Hearst Museum of the University of California Berkeley.
t. The LICENSEE is responsible for insuring that if any unanticipated concentrations of prehistoric or historic period materials are encountered on the PREMISES it will cease all work until a qualified archaeologist, secured by the LICENSEE, can evaluate the find and make recommendations. Prehistoric materials might include obsidian and chert-flaked stone tools (e.g. projectile points or knives) or tool-making debris; culturally darkened soil ("midden") containing heat-affected rock, artifacts, or shellfish remains; and stone milling equipment (e.g. mortars, pestles or handstones). Historic-period materials might include stone, concrete or adobe footings and walls; filled wells or privies; and deposits of metal, glass and or ceramic refuse.
u. The LICENSEE is responsible for insuring that if human remains or objects of Native American origin (e.g. funerary objects, sacred objects, or items of cultural patrimony) are encountered on the PREMISES, work shall be halted in the area of the discovery and the LICENSOR'S representative will be notified immediately. No work shall commence in the subject area without the written approval of the LICENSOR.

v. LICENSEE will provide LICENSOR with all data generated under its Archeological Response Protection Act (ARPA) permit, and under NAGPRA, if applicable.
w. LICENSEE will be responsible for any documentation required for the data collection and will provide a copy of all data gathered to the LICENSOR'S designated Real Property Specialist representative as indicated in Section 25. below.
x. LICENSEE will, for the duration of the project activities and without cost to the LICENSOR, provide adequate engineering measures are applied to ensure the stability of the steep hillside slope in the PREMISES between Treasure Island Road and the vicinity of the Coast Guard Barracks. LICENSEE will be responsible for and, without cost to the LICENSOR, will expeditiously take all reasonable actions and measures to prevent, or where prevention is not possible, to mitigate, all slides in an area up to 600 feet south of the existing Bridge for the duration of the project activities on YBI.
y. LICENSEE will take, without cost to the LICENSOR, all reasonable long-term actions and measures to provide a firm and stable hillside within the PREMISES, through the following rainy season beginning in the first October after LICENSEE is no longer present on the Licensed slope area until the rainy season ends in the following June.
z. LICENSEE must submit drawings of the elevations of any structure it will construct on the PREMISES, including topographic contours and excavation plans, for LICENSOR review. An elevation and/or oblique drawing must be included to show the relationship between the new structure and the surrounding LICENSOR's buildings. The drawings must be approved by the designated Real Property Specialist representative indicated in Section 25 below.
aa. When LICENSEE dismantles the temporary detour structure that it constructs on the PREMISES as a part of the its project, LICENSEE must demolish the structure's footings to 3- feet below ground surface, and restore the ground they occupy under a plan acceptable to LICENSOR. LICENSOR shall determine what temporary underground structures/utilities are to be removed.
bb. **(1)** LICENSEE will, without cost to the LICENSOR, monitor and mitigate project noise generated on YBI 85 dBA and greater from the exterior of the Sector Buildings (Bldg. 18 to 27). Coast Guard (CG) Safety and Health Policy and Occupational Medical Surveillance and Evaluation Program (OMSEP) standards require that hearing protection is required when noise levels are 85 dBA or greater. Additionally, this is the threshold at which personnel would be required to enter into the CG OMSEP for hazardous noise exposure. In order to mitigate permanent hearing damage to CG personnel that are affected for any periods where the noise will exceed 85 dBA, LICENSEE will be required to take mitigation measures, including but not limited to: ear plugs, signage and other types of mitigation measures directed and approved by the Coast Guard Sector San Francisco Facility Engineer. Mitigation of project noise will also be required during special

operations or outdoor ceremonies on YBI. Mitigation measures required will be determined by the Coast Guard Sector San Francisco Facility Engineer. If construction and ambient noise levels are expected to exceed this standard, noise mitigation measures shall be planned and approved by the Sector San Francisco Facility Engineer in-advance.

(2) LICENSEE further understands that personnel in outdoor areas surrounding Buildings 18 – 27 on the LICENSOR's facilities may be exposed to unsafe levels of noise during impact type mechanical operations (i.e. pile driving) between the hours of 7:00AM to 7:00PM. LICENSEE will perform vibration monitoring and provide a weekly report to the Sector San Francisco Facility Engineer. Sensors will be set up adjacent to Buildings 25 and 27. If vibration becomes intolerable for operations at the Sector, LICENSEE will be alerted and mitigate the issues. Mitigation for generated impact noise includes but is not limited to adequate safety advisory signage, as well as hearing protection stations for use by any of the LICENSOR's personnel or visitors exposed in the defined zones. Additionally, LICENSEE will take all reasonable means necessary at no cost to the LICENSOR to coordinate "no pile driving" periods to minimize disruption to base operations. The length and time period for the "no pile driving" period will be mutually agreed upon by the LICENSOR's and LICENSEE's site representative.

In order to monitor and to mitigate noise pollution for Coast Guard members and their families living in Coast Guard housing on YBI, noise measurements for work during the hours of 7:00PM to 7:00AM (evening hours) shall be taken at QTRS 9 (external reading), at locations adjacent to structures, and in line with source noise or any occupied space on the LICENSOR's property as deemed necessary by the LICENSOR's on-site representative. Coast Guard Sector San Francisco Facility Engineer may require additional noise samplings by LICENSEE's noise engineer at LICENSEE's expense at a frequency not to exceed twice a month. The LICENSEE's engineer shall provide reports and sampling data from the noise sampling within 12 hours of the noise measurements. The contractor shall provide the LICENSOR with all noise reports and sampling data obtained by the noise engineer within 24 hours of its receipt from the noise engineer. At any time that the project noise exceeds 78 dBA (external) between the hours of 7:00PM and 7:00AM (5 dBA over present ambient noise levels of 73 dBA based on noise survey conducted on April 4, 2002), affected LICENSOR personnel and/or families shall be relocated at LICENSEE's expense to agreed upon area hotels for the duration of the excessive noise activity.

(3) LICENSEE will provide two (2) weeks advance warning to the LICENSOR's representative of periods of noise exceeding the criteria set forth when occasioned by necessary construction work on or near the PREMISES. Relocation shall include, at no cost to resident or LICENSOR, the boarding of affected resident's pets. Lists of qualified residents and dependents (updated by

the LICENSOR as necessary) will be provided LICENSEE at least three (3) days prior to any scheduled relocation. In addition to the actual relocation costs, LICENSEE will pay for both the temporary lodging and parking for any qualified LICENSOR members or dependents under this relocation provision. Per diem will be paid directly to relocated LICENSOR residents by LICENSEE.

ee. LICENSEE will provide, at its own expense, a scheduled transportation service to transport relocated LICENSOR members to and from their YBI duty stations, at the beginning and end of their scheduled duty shifts, for the duration of their relocation. Should noise, dust or debris exceed the criteria set forth or conditions become unsafe for employees, LICENSEE shall cease all work until all safety issues are resolved to the Coast Guard's satisfaction.

ff. LICENSEE shall provide areas or a traffic plan that allows any vehicle to turn around or clear the base entrance access queuing when the entrance gate is closed due to elevated security levels, etc. In addition, No blockage of Coast Guard residence driveways or access roads shall occur at any time.

gg. Any mitigation impacts, including air mitigation, shall be agreed to by mutual consent of both parties. If mutual agreement cannot be reached, mitigation requirements shall prevail. In addition, any road damage that adversely impacts Coast Guard vehicles, government or personal, shall be repaired by the LICENSEE at no cost to the government. Said repairs shall be approved by both parties.

hh. LICENSEE has demolished and removed Building 206 (Qtrs. 8 garage/guest house). When licensed period project related activities on the Premises have concluded, the LICENSEE, if requested by LICENSOR, shall provide a replacement of equal functional utility, of a mutually acceptable design that will visually compliment any nearby historic structures on the original site, or provide compensation to the LICENSOR of equal value. If the capability provided by Building 206 is provided on another mutually acceptable site as determined by the LICENSOR, the original site will be restored to match the surrounding area. If mutual agreement cannot be reached, LICENSOR's requirements shall prevail.

ii. Attachments 1 and 2, attached hereto and made a part hereof, depict the area used to construct temporary parking areas to be utilized in connection with a proposed stairway to be constructed to alleviate access issues to the Coast Guard Facility located on YBI. When use of the temporary parking areas are no longer required, or at the conclusion of the project, the LICENSEE, to the extent directed by the LICENSOR's representative, shall remove all alterations and additions made, or installed, and restore the premises to the same, or better condition, as existed on the date of entry under this LICENSEE. LICENSOR may, in its sole and absolute discretion, request LICENSEE to abandon all alterations and additions constructed on the licensed premises under this license.

14. Liability. The LICENSEE shall be liable for any loss of, or damage to, the premises or facilities incurred as a result of its use and shall make such restoration or repair, or monetary compensation as may be directed by the LICENSOR.

15. Indemnification.

a. LICENSEE shall indemnify and hold harmless the United States, the Coast Guard, its officers, agents, servants and employees, from any and all liability, including the death, dismemberment, or any other or injury to any persons, or loss or damage to the property of any persons, which may result from the use of the PREMISES by the LICENSEE.

b. LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands, liabilities, and damages that may in any manner be imposed on or incurred by LICENSOR as a result of any act, default, or omission of the LICENSEE, its officers, employees, contractors, agents, or guests or the participants in its activities in connection with the LICENSEE's use of the premises or for any injuries sustained by any individual who has come on the premises as a result of the LICENSEE's use of the premises and may be injured in the course of participating in an inherently hazardous activity, an athletic activity, or another recreational activity while on the premises, whether or not the activity is a sanctioned part of the LICENSEE's use of the premises.

c. The LICENSEE further agrees to indemnify and hold the LICENSOR harmless for any public or private environmental claims or liabilities arising from use of the described premises pursuant to this LICENSE or associated projects.

d. Alcoholic beverages are prohibited during the LICENSEE's use of the PREMISES. The LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands, liabilities, and damages that may in any manner be imposed on or incurred by LICENSOR as a result of any act or omission, no matter whether the act or omission occurs on or off the installation, following the consumption of alcohol at the PREMISES by the LICENSEE, its officers, employees, contractors, agents, or guests or the participants in its activities.

e. LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands, liabilities, and damages that may in any manner be imposed on or incurred by LICENSOR as a result of any act, default, or omission of the LICENSEE, its officers, employees, contractors, agents, or guests or the participants in its activities in connection with the use of the premises under this LICENSE.

f. LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands, liabilities, and damages that may arise from any listed hazards and the LICENSEE'S potentially incompatible use of the premises.

16. Insurance. The LICENSEE is a self insured entity. LICENSEE shall provide a Letter of Self-Insurance. This LICENSE is not valid without a Letter of Self-Insurance.

17. Non-Discrimination. The LICENSEE, for itself, its personal representatives, officers, employees, contractors, agents, successors in interest (if applicable) and assignees (if applicable) as a part of the consideration hereof, and as a term and condition of this LICENSE, does hereby covenant and agree that:

- **a.** No individual on the grounds of race, sex, color, religion, age, marital status or national origin shall be excluded from participation in, denied the benefits of, or otherwise discriminated against in the use said premises;
- **b.** No individual on the grounds of race, sex, color, religion, age, marital status or national origin shall be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the construction of any improvements on, over, or under said premises or in the furnishing of services in connection with the use of the premises by the LICENSEE.
- **c.** That the LICENSEE shall use the premises in compliance with all other requirements imposed by or pursuant to Title 49 Code of Federal Regulations, Part 21, Nondiscrimination in Federally Assisted programs of the Department of Homeland Security-Effectuation of Title VI or the Civil Rights Act of 1964, and as said regulations may be amended.

18. Title VI.

- **a.** The LICENSEE or the LICENSEE'S successor in interest shall comply with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000 01 et.seq.) and the regulations issued pursuant thereto.
- **b.** The LICENSEE has executed the Standard Department of Homeland Security Title VI Assurances, an executed copy of which is attached as Exhibit "D" and is hereby made a part of this LICENSE. The LICENSEE accepts the provisions of the Assurances as part of the terms, conditions, and covenants of this LICENSE.
- **c.** In the event of breach of any of the terms, conditions, and covenants of the Standard Department of Homeland Security Title VI Assurances, the United States shall have the right to terminate the LICENSE and reenter and repossess said land and the government facilities thereon, and hold same as if said LICENSE had never been made or issued.

19. Officials Not to Benefit. No member or delegate to Congress or Resident Commissioner shall be admitted to any share or part of this LICENSE or any benefit to arise there from, but this provision shall not be construed to extend to this LICENSE if made with a corporation whose membership includes a member or delegate to Congress or Resident Commissioner, who indirectly receives a general benefit from this LICENSE.

20. Covenant Against Contingent Fees. The LICENSEE warrants that no person or selling agency has been employed or retained to solicit or secure this LICENSE upon an agreement or understanding for a commission, percentage, brokerage or contingent fee. For Breach or violation of this warranty, the LICENSOR shall have the right to annul this LICENSE without liability or in its discretion recover from the LICENSEE the amount of such commission, percentage, brokerage or contingent fee in addition to the consideration if any, herein set forth.

21. Architectural Barriers Act responsibilities. The LICENSEE hereby accepts any and all responsibilities the LICENSOR may have under the Architectural Barriers Act of 1968, as amended, 42 U.S.C 4151 et. seq. (hereinafter referred to as the Act), regarding the PREMISES. Specifically, any alterations done to any buildings encompassed by this LICENSE shall be done according to the accessibility standards set by the General Services Administration in accordance with the Act.

22. Nondiscrimination on the Basis of Handicap in Program and Activities. LICENSEE shall use the PREMISES in compliance with the regulations in 49 C.F.R. Parts 21 and 27, Nondiscrimination on the Basis of Handicap in Programs and Activities Receiving or Benefiting From Federal Financial Assistance" respectively. LICENSEE understands that persons or organizations which are allowed the use of Federal property without having to pay the full fair market rental consideration are treated as having received Federal Financial Assistance. This LICENSE is not valid unless prior to the execution of this LICENSE, the LICENSEE has signed the Standard Department of Homeland Security Title VI Assurances form (a copy of which is attached to and made a part of this LICENSE).

23. Governing Law and Regulations. The LICENSEE, its officers, employees, contractors, agents, and guests and the participants in its activities, while on the Coast Guard installation are subject to all applicable Federal, state, and local laws, regulations, directives, and orders, including those issued by the LICENSOR or a designated representative, including the installation's Officer of the Day, Master at Arms, or a member of the installation's security force.

24. Environmental Issues, Documentation and Protection.

- **a.** LICENSEE has completed and submitted to LICENSOR for review an Environmental/NEPA Analysis Checklist.
- **b.** The LICENSEE may not unlawfully pollute the air, ground, or water, nor create a public nuisance. The LICENSEE shall, at no cost to the LICENSOR, promptly comply with all applicable federal, state, and local laws, regulations, and directives regulating the quality of the environment. This does not affect the LICENSEE'S right to contest the validity of such laws, regulations, or directives or to try to enjoin their applicability. LICENSEE will be responsible

for all environmental documentation including mitigation measures required for the project.

c. The LICENSEE acknowledges that the potential for release of hazardous substances and/or contamination exists on the PREMISES and that the LICENSEE shall take all reasonable measures to protect human health and the environment and minimize disruption to existing hazardous substances and/or contamination, and prevent any new releases and/or new exposure pathways. LICENSEE will be responsible for any new releases and/or new exposure pathways from any known and/or potential sources of hazardous substances from surface or subsurface soil, surface and ground water, and/or air. LICENSEE will contain, handle and dispose of all potential contamination or hazardous substances or materials.

d. LICENSEE acknowledges that it must take special precautions to prevent further contamination of LICENSOR property when excavating in the area of the diesel fuel plume southwest of Building 270, and on the former shoreline landfill adjoining LICENSOR property. LICENSEE must submit its mitigation measures to LICENSOR in advance for review.

e. The LICENSEE shall use all required means to protect the environment and natural resources from any damage arising from the LICENSEE'S use of the PREMISES and activities incident to its use. If any damage results to the environment or natural resources, the LICENSEE shall restore the environment or damaged resources.

f. The LICENSEE agrees to comply with all applicable federal, state and local environmental laws and regulations, including but not limited to those laws concerning any petroleum products, toxic substances, medical wastes and hazardous materials, substances or wastes.

g. The LICENSEE will contain, handle, and dispose of all lead-based materials in a proper manner and restore the premises, at least, its current condition following its work on the premises.

h. The LICENSEE will not dispose of any contaminated materials or soil on LICENSOR controlled federal property.

i. In the event that any significant additional environmental information or documentation to the LICENSEE'S Final Environmental Impact Statement (EIS) dated May 8, 2001, is needed to comply with any Federal, State or local law or regulation, the LICENSEE will, without cost to the LICENSOR, ensure such compliance.

j. LICENSEE must prepare and complete adequate environmental documentation for all environmental impacts, known or unknown, whether or not specifically listed in this LICENSE and for temporary and permit construction projects, and provide this documentation to the LICENSOR for review.

k. Any site-specific environmental documentation that is not available at the time this LICENSE is executed shall be provided to the LICENSOR for its review at the earliest possible date.

l. LICENSOR shall be informed of the qualifications of contractors performing abatement work that requires certified personnel. LICENSOR shall be informed, in advance, of the procedures that will be followed by contractors, and health and safety measures that will be employed to protect LICENSOR personnel, employees, contractors, agents and guests.

m. For all hazardous materials removed from the PREMISES, including but not limited to, lead based paint and asbestos containing materials, the LICENSEE shall be provided documentation that such wastes were hauled by a licensed carrier to an approved facility for disposal. LICENSOR shall be given copies of all manifests.

n. LICENSEE shall, without cost to the LICENSOR, prevent surface water runoff from carrying sediment into San Francisco Bay. LICENSEE shall provide for LICENSOR review, copies of each Storm Water Prevention Plan (SWPPP) prepared by its contractors for the PREMISES. LICENSEE is responsible for coordinating its SWPPPs with LICENSOR SWPPP.

25. Designation of Principal Representatives.

a. Mark Shindler is designated as the LICENSEE'S principal representative and on-site representative of the LICENSEE and may be contacted at telephone/fax number (510) 286-5319/ (510) 286-5379

b. The Coast Guard Sector San Francisco Engineering Officer is designated as the LICENSOR'S on-site representative. The representative is ENG3 Gregory Ressio and can be contacted at telephone number (415) 399-3536.

c. The representative for Sector San Francisco Facility Engineering is LT Joseph McPherson and can be contacted at telephone number (415) 399-3504.

d. The representative for all real estate (contractual) matters pertaining to the license is MLCPAC(s), Ms. Beverly Freitas, Senior Real Property Specialist, telephone number (510) 637-5527. The LICENSEE shall be responsible for coordinating its use of the PREMISES and any revisions to the requirements of this license with Ms. Freitas the LICENSOR'S Real Property Specialist representative.

26. Exhibits. The following exhibits are attached and made a part hereof:

(1) Exhibits "A" & "B" - Drawing depicting areas covered under the license in yellow.

(2) Exhibit "C" - Aerial depicting temporary parking area in green.

(3) Exhibit "D" - Standard Department of Homeland Security Title VI Assurances.

(4) Exhibit "E" - Letter of Self-Insurance.

27. Notification. The LICENSEE shall notify all of its officers, employees, contractors, agents, or guests who will use the PREMISES of the terms of this LICENSE and that

they are required to comply with all applicable terms of this LICENSE if they enter the PREMISES.

28. Entire Agreement. This LICENSE, with exhibit(s) constitutes the primary agreement between the LICENSOR and the LICENSEE. Any prior understanding or representation of any kind, which proceeded the date of this LICENSE, is not binding on either party, except to the extent the understandings are incorporated into this LICENSE.

IN WITNESS WHEREOF, the parties hereto have hereunto subscribed their names as of the dates below written:

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

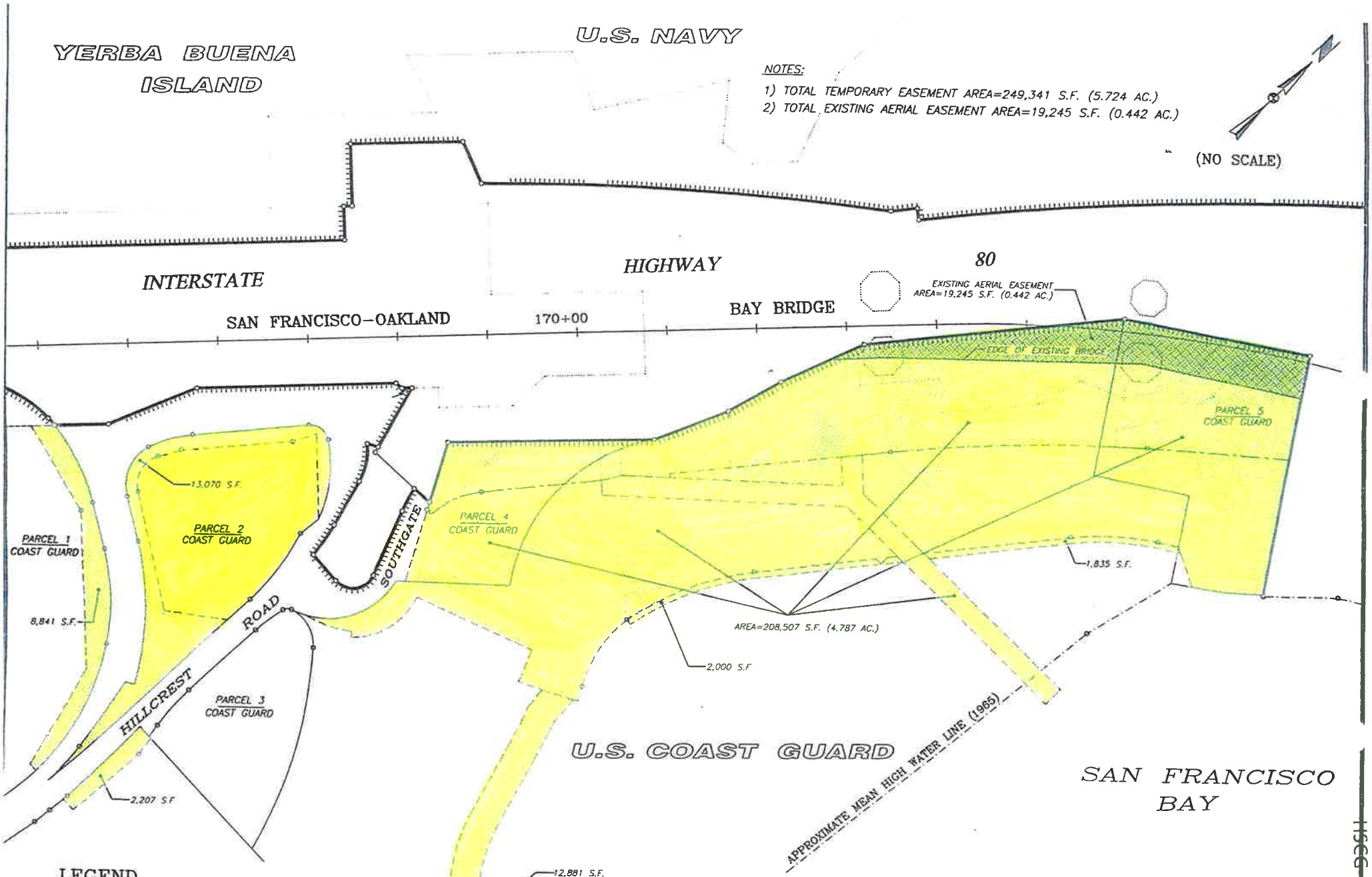
By: _____
R. A. MACPHERSON
Deputy District Director
Right of Way

Date: 6/22/09

UNITED STATES OF AMERICA
UNITED STATES COAST GUARD

By: _____
J. GORDON TOWNLEY
Real Property Specialist
U. S. Coast Guard
Civil Engineering Division MLCPAC

JUN 29 2009



SHOWN FOR REFERENCE PURPOSES ONLY
ACTUAL SIZE AND ALIGNMENT OF THIS AREA
SUBJECT TO MODIFICATION

EXHIBIT ("A")

YERBA BUENA ISLAND
U.S. COAST GUARD PARCELS

USCG 774444 09 RP 0601

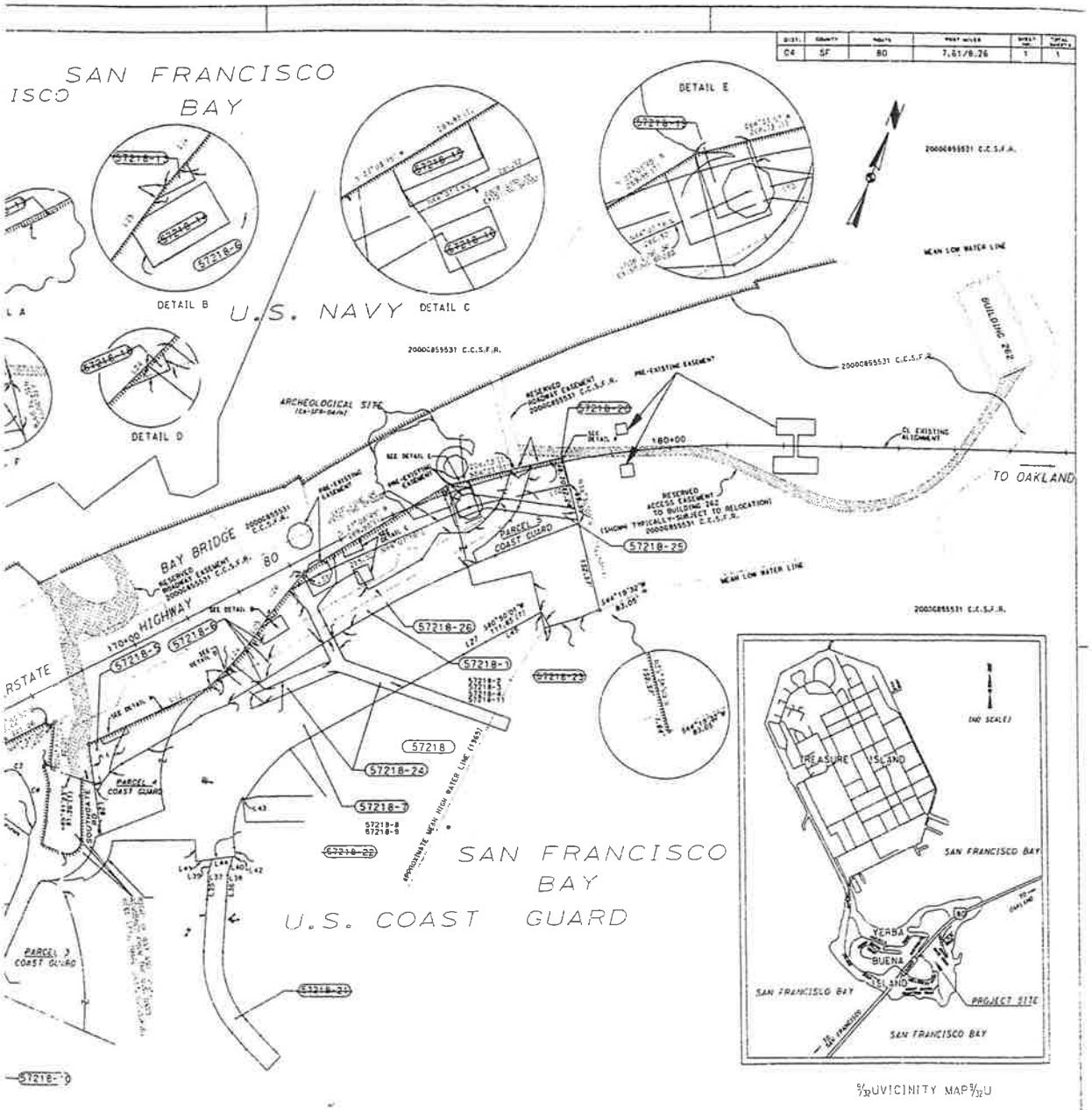


EXHIBIT ("B")

SFOBB East Span
South-South Detour Project
Additional Construction Area within Coast Guard ROW

DH. BY: CHN | DATE: 10/22/06 | CO. SF | RTE. 80 | P.M. 7.61/8.26
CA: 04-0120R4

MAP REFERENCE

HSCG-Z71111-09-RP-060L

Street View
Traffic
More...
Map
Satellite
Terrain
8.B
Pine
Tree
8.A
Stairs
9
50 ft
20 m
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EXHIBIT ("C")

EXHIBIT "D"

STANDARD DHS TITLE VI ASSURANCE

The **STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION** (Recipient) agrees that, as a condition to receiving any federal financial assistance from the Department of Homeland Security, it will comply with Title VI of the Civil Rights Act of 1964, 78 Statue 252, 42 USC §2000d - 42 USC §2000d-4 (hereinafter referred to as the Act), and all requirements imposed by or pursuant to Title 6, Code of Federal Regulations, Department of Homeland Security, Subtitle I, Office of the Secretary, Part 21, Nondiscrimination on the basis of race, color, or national origin in programs or activities receiving Federal financial assistance from the Department of Homeland Security, which effectuate Title VI of the Civil Rights Act of 1964 (hereinafter referred to as the Regulations) and other pertinent directives, to the end that in accordance with the Act, Regulations, and other pertinent directives, 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 otherwise subjected to discrimination under any program or activity for which the Recipient receives federal financial assistance from the Department of Homeland Security, including the United States Coast Guard, and HEREBY GIVES ASSURANCE THAT it will promptly take any measures necessary to effectuate this agreement. This assurance is required by subsection 21.7(a)(1) of the Regulations. More specifically and without limiting the above general assurance, the Recipient hereby gives the following specific assurances with respect to its License.

1. That the Recipient agrees that each "program" and each "facility" as defined in the Regulations, will be (with regard to a program") conducted, or will be (with regard to a "facility") operated in compliance with all requirements imposed by, or pursuant to, the Regulations.

2. That the Recipient shall insert the following notification in all solicitations for bids for work or material subject to the Regulations and made in connection with this License and, in adapted form in all proposals for negotiated agreements:

   The **STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION** in accordance with Title VI of the Civil Rights Act of 1964, 78 Statue 252, 42 USC §2000d to 2000d-4 and Title 6, Code of Federal Regulations, Department of Homeland Security, Subtitle I, Office of the Secretary, Part 21, Nondiscrimination in federally-assisted programs of the Department of Homeland Security issued pursuant to such Act, hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

3. That the Recipient shall insert the clauses of Appendix A of this assurance in every contract subject to the Act and the Regulations.

4. That where the Recipient receives federal financial assistance to construct a facility, or part of a facility, this assurance shall extend to the entire facility and facilities operated in connection therewith.

5. That where the Recipient receives federal financial assistance in the form of, or for the acquisition of real property or an interest in real property, the assurance shall extend to rights to space on, over or under such property.

6. That this assurance obligates the Recipient for the period during which federal financial assistance is extended to the program, except where the federal financial assistance is to provide, or is in the form of, personal property, or real property or interest therein or structures or improvements thereon, in which case the assurance obligates the Recipient or any transferee for the longer of the following periods:

a) the period during which the property is used for a purpose for which the federal financial assistance is extended, or for another purpose involving the provision of similar services or benefits; or

b) the period during which the Recipient retains ownership or possession of the property.

7. The Recipient shall provide for such methods of administration for the program as are found by the Secretary of Homeland Security or the official to whom he delegates specific authority to give reasonable guarantee that it, other recipients, sub-grantees, contractors, subcontractors, transferees, successors in interest and other participants of federal financial assistance under such program will comply with all requirements imposed or pursuant to the Act, the Regulations and this assurance.

8. The Recipient agrees that the United States has a right to seek judicial enforcement with regard to any matter arising under the Act, the Regulations, and this assurance.

THIS ASSURANCE is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contract, property, discounts or other federal financial assistance extended after the date hereof to the Recipient by the Department of Homeland Security under the License and is binding on it, other recipients, sub-grantees, contractors, subcontractors, transferees, successors in interest and other participants in the License.

The person or persons whose signatures appear below are authorized to sign this assurance on behalf of the Recipient.

STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION

By **R. A. MACPHERSON**
Deputy District Director
Right of Way

6/22/09
Date

APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

(1) Compliance with Regulations: The contractor shall comply with the Regulations relative to nondiscrimination in federally-assisted programs of the Department of Homeland Security (hereinafter, "DHS") Title 6, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

(2) Nondiscrimination: The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations.

(3) Solicitations for Subcontractors, Including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurement of material or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

(4) Information and Reports: The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the United States Coast Guard to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the Recipient, or the United States Coast Guard, as appropriate, and shall set forth what efforts it has made to obtain the information.

(5) Sanctions for Noncompliance: In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the Recipient shall impose such contract sanctions as it or the United States Coast Guard may determine to be appropriate, including, but not limited to:
   (a) Withholding of payments to the contractor under the contract until the contractor complies; and/or
   (b) Cancellation, termination or suspension of the contract, in whole or in part.

(6) Incorporation of Provisions: The contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the Recipient or the United States Coast Guard may direct as a means of enforcing such provisions including sanctions for noncompliance: provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Recipient to enter into such litigation to protect the interest of the Recipient and in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

State of California • Arnold Schwarzenegger, Governor
State and Consumer Services Agency
DEPARTMENT OF GENERAL SERVICES
Administration Division
Office of Risk & Insurance Management

June 22, 2009

United States Coast Guard

STATE OF CALIFORNIA
PUBLIC LIABILITY AND WORKERS' COMPENSATION INSURANCE
FISCAL YEAR JULY 1, 2009 TO JUNE 30, 2010
RE: YERBA BUENA ISLAND LICENSE FOR
BAY BRIDGE RETROFIT

To Whom It May Concern:

The State of California has elected to be insured for its motor vehicle and general liability exposures through a self-insurance program. The State Attorney General administers the general liability program through an annual appropriation from the General Fund. The Office of Risk and Insurance Management administers the motor vehicle liability program.

Under this form of insurance, the State and its employees (as defined in Section 810.2 of the Government Code) are insured for any tort liability that may develop through carrying out official activities, including state official operations on non-state owned property. Should any claims arise by reason of such operations or under an official contract or license agreement, they should be referred to the Attorney General, State of California, Tort Liability Section, 1300 I Street, Suite 1101, PO Box 944255, Sacramento, CA 94244-2550.

The State of California has entered into a Master Agreement with the State Compensation Insurance Fund to administer workers' compensation benefits for all state employees, as required by the Labor Code.

Sincerely,

Jeffrey N. Dierks

Jeffrey N. Dierks
Associate Risk Analyst
916-376-5279
jeff.dierks@dgs.ca.gov

Communication aids or services will be provided to individuals with disabilities upon request. The California Relay Service telephone numbers are (voice) 1-800-735-2922 and (TTY) 1-800-735-2929.

EXHIBIT "E"

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
23 December 2002

Mr. Jim Bozionelos
Right of Way Agent
Right of Way Acquisition
California Department of Transportation
P.O. Box 23440
Oakland, California 94623-0440

Dear Mr. Bozionelos:

I am forwarding (Enclosure 1 & 2), for your information and records, fully executed copies of the Coast Guard Licenses allowing the California Department of Transportation (CALTRANS) the ability to utilize Coast Guard controlled federal property at our Group San Francisco's Yerba Buena Island (YBI) facility in furtherance of your upcoming construction of the new eastern span of the San Francisco – Oakland Bay Bridge. One License, DTCG-Z71111-03-RP-010L, which allows CALTRANS to perform the demolition of the four Coast Guard structures (Nos. 30, 40, 75 and 270), will be effective 1 December 2001 through 31 September 2004. The other License, DTCG-Z71111-03-RP-002L, that covers the use of a significant portion of the Group property for the actual construction of the new eastern span, will be effective 1 January 2003 through 31 December 2010. These Licenses are renewable in the event your work exceeds the listed time period. Please ensure that all provisions of these Licenses are adhered to in coordinating CALTRANS' use of this property.

If you have any further questions regarding this matter, please contact me at the address above or (510) 437-5900.

Sincerely,

ROBERT B. VAN DE LOO
Realty Specialist
Real Property Branch
By direction of the Commander

Encl: (1) Coast Guard License No. DTCG-Z71111-03-RP-002L, with exhibits
(2) Coast Guard License No. DTCG-Z71111-03-RP-010L, with exhibits

Copy: CG GROUP San Francisco
CG ISC Alameda
CG CEU Oakland

Maintenance & Logistics Command Pacific

LICENSE

The **UNITED STATES OF AMERICA**, acting by and through the **UNITED STATES COAST GUARD**, Commander (sr), Maintenance & Logistics Command Pacific, Coast Guard Island, Building 54-D, Alameda, California, 94501-5100, (hereafter called "LICENSOR"), grants to the **STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION,** whose mailing address is P.O. Box 23440, Oakland, California 94623-0440 (hereafter called "LICENSEE"), a License (hereinafter called "LICENSE") to utilize Coast Guard controlled federal property on Coast Guard Group San Francisco's Yerba Buena Island (YBI) facility at the location indicated on Exhibit 1 (hereinafter called "PREMISES"), attached hereto and made a part hereof, for the purpose of constructing a new eastern span to the San Francisco – Oakland Bay Bridge, subject to the following terms and conditions:

1. The LICENSOR grants to the LICENSEE the non-exclusive right to use the described premises together with the non-exclusive right of ingress and egress upon the property of Coast Guard Group San Francisco, Yerba Buena Island, California.

2. Term. This LICENSE shall be in effect for the period of **1 January 2003** to **31 December 2010** and is renewable for a further term with the written approval of the LICENSOR, if so requested by the LICENSEE.

3. Assignment of LICENSE. This LICENSE shall be neither assignable nor transferable by the LICENSEE. No permanent interest in the real property subject to this LICENSE shall vest in the LICENSEE.

4. This Section is reserved.

5. Termination/Revocation

By LICENSOR: the LICENSOR may revoke this LICENSE and reenter and take possession of the PREMISES:

a. If the LICENSEE does not cure any violations of the terms of this LICENSE within thirty (30) days of the receipt of notice of the violations from the LICENSOR; or
b. If the property is relinquished to the Bureau of Land Management, is declared excess by the General Services Administration, or is legislatively transferred by the United States Congress to another entity; or
c. In case of war or national emergency or any other imminent or substantial security threat that requires the LICENSOR's exclusive use of the PREMISES; or
d. If any of the information provided to the LICENSOR by the LICENSEE in its application for this LICENSE or at any time during the course of the LICENSE is discovered to be false, fraudulent, or materially incorrect; or
e. At any time by giving at least thirty (30) days' notice, in writing, to the LICENSEE. Said notice shall be computed commencing with the day after the date of mailing.

By LICENSEE: the LICENSEE may surrender this LICENSE at any time by giving thirty (30) days written notice of termination to the LICENSOR at the above address.

This LICENSE may be revoked at any time by the mutual consent of both parties.

6. Permits, Licenses and Taxes. The LICENSEE is responsible for obtaining all local, state or federal permits, licenses or other necessary authorizations to carry out any of the purposes of this LICENSE set forth in this document and is responsible for the payment of any state or local taxes generated by its activities on the PREMISES.

7. Laws. The LICENSEE shall comply with all applicable federal, state and local laws or regulations pertaining to any activities conducted on the PREMISES.

8. Scope. Except for the construction of the new eastern span of the San Francisco – Oakland Bay Bridge, no alteration of existing premises or facilities, or construction of permanent improvements shall be made without the written approval of the LICENSOR. Any structure or device erected or installed without LICENSOR's written consent, or with written consent and is later found to interfere with the proper operation of any of LICENSOR's equipment or facilities, shall be removed immediately upon written notification from the LICENSOR and at the LICENSEE's own expense. Upon revocation, expiration, or surrender of this LICENSE, and to the extent directed by the LICENSOR, the LICENSEE shall restore the premises or facilities to the same or as good condition as existed on the date of entry under this LICENSE, reasonable wear and tear excepted.

9. Maintenance of PREMISES. LICENSEE shall maintain the PREMISES, including buildings, if applicable, and all equipment, fixtures, and appurtenances furnished by the LICENSOR under this LICENSE, in good repair and condition.

10. Restrictions. Unless specified by this document, the LICENSEE shall at no time permit:
   a. Access to any Coast Guard equipment or facilities.
   b. Any interference with or restrictions to the use of Coast Guard operations, equipment or access.
   c. The removal of any LICENSOR property, of any nature whatsoever, from the premises.

11. Damage to property.
   a. The LICENSEE is responsible for any damage to or destruction of any property belonging to the LICENSOR, its officers, employees, contractors, agents, or guests which results from the LICENSEE's use of the PREMISES or of its project activities on adjacent property.
   b. The LICENSEE shall promptly repair or replace any damaged or destroyed property to the satisfaction of the LICENSOR.
   c. In lieu of repairs or replacement, and at the sole LICENSOR's discretion, the LICENSEE may pay to the LICENSOR money in an amount sufficient to compensate for the LICENSOR for the loss sustained as a result of the damage to or destruction of the property.
   d. LICENSEE shall consult with LICENSOR, and comply with LICENSOR specifications in restoring LICENSOR property impacted by the project activities.
   e. LICENSEE shall, in coordination with and without cost to the LICENSOR, remove all project related security fencing at the conclusion of the project and perform a thorough external cleaning to all LICENSOR's structures affected by project activities.

12. Restoration of the Premises.
   a. The LICENSEE shall restore the premises to the condition in which it was received.
   b. LICENSEE shall clean up and remove all trash and refuse generated by the LICENSEE's use of the PREMISES and shall replace any property that it may have relocated during its use of the PREMISES.
   c. If the LICENSEE fails to restore the PREMISES, including the removal of trash and relocation of property, the LICENSEE shall pay any costs incurred by the LICENSOR to restore the PREMISES.
   d. LICENSEE will consult with LICENSOR on the selection of mature trees and shrubbery to replant in the PREMISES and provide the LICENSOR with a plan for replanting.

13. Access to PREMISES and Parking. The LICENSEE, its officers, employees, contractors, agents, and the participants in its activities shall enter & exit the premises by routes established in consultation with the LICENSOR's designated principal representative (see Section 27), and shall comply with all posted traffic & parking control signs unless relief is granted by the LICENSOR's designated principal representative. The LICENSEE and all it's officers, employees, contractors, agents and guests, are advised that they are subject to all additional security measures, including access closure, that may be enacted by Coast Guard Group San Francisco for reasons of enhanced Military or National Security.

14. General Provisions.
    a. This LICENSE will not be administrated for profit.
    b. The LICENSOR shall have access to the PREMISES at all reasonable times for inspection, maintenance or any other purpose.
    c. The LICENSEE shall at no time permit or allow:
        (1) Any activities while on the premises that involve the solicitation of funds for private or commercial interests, including fund raising for nonprofit organizations and causes.
        (2) Any controlled substances to be brought unto the premises, nor may any controlled substances be possessed, used, solicited, transferred, or sold on the premises.
        (3) Any alcoholic beverages to be brought unto the premises.
    d. If the LICENSEE's equipment causes interference with any of the LICENSOR's equipment or operation, it shall be the sole responsibility of the LICENSEE to correct any interference problems, or cease operation and remove all equipment.

15. Specific Provisions. The LICENSEE agrees to the following:
    a. **To coordinate all work with LICENSOR's designated principal representative (see Section 27) and to immediately comply with the direction or lawful order of the LICENSOR's designated principal representative.**
    b. **To hold an initial meeting to discuss this project at Coast Guard Group San Francisco with the LICENSOR's designated principal representative and representatives of the LICENSEE and their contractor.**
    c. **LICENSEE will, without cost to the LICENSOR, take all reasonable actions and measures, subject to the prior approval of the LICENSOR, to ensure the safety of LICENSOR personnel, visitors and property within the project site at all times while on YBI during the project construction term.**
    d. **To provide a project schedule a minimum of 14 days in advance of the commencement of this project on the PREMISES and provide regular updates to this schedule as necessary to reflect any changes. LICENSEE will further provide LICENSOR with a minimum of 3 day advance notice of any activities, including but not limited to blasting, which have to potential to injure, damage, or impact LICENSOR personnel, equipment, facilities and/or activities.**
    e. **To maintain LICENSOR's 24-hour a day, 7-day per week access to its property for all vehicles including, but not limited to, trucks, pedestrians and vessels. This access is subject to 3-day advance notification of construction activities which would otherwise block access for more than 15 consecutive minutes.**
    f. To provide, without cost to the LICENSOR, all necessary real property descriptions, including metes and bounds legal descriptions and drawings, prepared by a registered land surveyor, for all documents the LICENSOR must prepare as a result of the LICENSEE's activities upon its property.
    g. LICENSEE must submit drawings, including profile contours and property boundaries, for both the temporary and permanent realignments of the portion of Macalla Road and its access from LICENSOR controlled property for LICENSOR review, comment and concurrence. LICENSEE will fully describe the environmental impacts of road construction upon LICENSOR controlled property.
    h. LICENSEE will, at its own expense and in coordination with the LICENSOR's designated principal representative, provide for the continued physical security needs of the LICENSOR in the PREMISES at YBI through the erection of a perimeter security fence to LICENSOR specifications, and will provide for additional security coordination, including non-project access closure, when necessary for reasons of enhanced Military or National Security Threat Conditions. The effect will be to provide the LICENSOR a continuous secure perimeter during the period of project construction on YBI. Once the YBI portion of the project has been completed, LICENSEE will at its own expense and in coordination with the LICENSOR's designated principal representative, re-establish a security fence to LICENSOR specifications along the perimeter of LICENSOR controlled property, tying into the new entrance gate system discussed in Subsection 15.i. below.
    i. LICENSEE will provide, without cost to the LICENSOR, project mandated paved temporary

and permanent access road alignments through the PREMISES. These alignments will be developed in close cooperation with the LICENSOR's own Civil Engineering personnel. Both alignments will include provisions for oversize vehicles that regularly visit the LICENSOR facilities at YBI and will provide adequate signage for LICENSOR facilities with street lighting and an entrance gate system, having the same capabilities as the present entrance gate system (programmable entrance system, security cameras, telephone, entrance card-lock & keypad system, magnetic roadway pad, etc.). The permanent alignment will not include access to non-LICENSOR facilities (i.e. Building 262 – commonly referred to as "the Torpedo Facility") from LICENSOR controlled property. The permanent alignment will be constructed to appropriate State of California standards and will include a 4-foot wide pedestrian lane clear of objects such as light poles or signs. The permanent telecommunications Easement shall be located by LICENSEE adjacent to the eventual permanent alignment of the LICENSOR's access road.

j. LICENSEE understands that vehicle parking on the LICENSOR facility is constrained and will take all reasonable measures to ensure, without cost to the LICENSOR, that any areas available for parking during the duration of the project will be made accessible for vehicles. These measures may include, but are not limited to, the construction of temporary roads to access parking areas cut off from their normal access routes by the project. These temporary roadways will be removed by LICENSEE, at its own expense, upon the completion of the project and the areas restored to their previous condition unless the LICENSOR requests otherwise.

k. All pavement repairs performed by LICENSEE under Section 12.a of this LICENSE shall be of identical quality to, or better than, the pre-existing condition of the pavement.

l. LICENSEE will control access to the PREMISES and, if requested by the LICENSOR's designated principal representative, be able to provide the names of all personnel who are or will be present on the PREMISES.

m. LICENSEE must complete a utility location prior to initiating any subsurface investigation. LICENSEE will coordinate this action with the LICENSOR's designated principal representative.

n. LICENSEE will, at its own expense, relocate any utilities serving the LICENSOR's property and coordinate such actions with the LICENSOR's designated principal representative and all appropriate parties.

o. LICENSEE will be responsible for any interruption to utility service caused by their actions on the PREMISES and will take immediate action, at its own expense, to place any interrupted service back into effect.

p. LICENSEE will, without cost to the LICENSOR, protect, maintain and repair any affected LICENSOR facilities and relocate affected utilities (telecommunications, electricity, natural gas, water, sewer, storm drainage, etc.) if necessary which serve the LICENSOR within the project construction area for the duration of the project. Any predictable interruptions of utility service will be coordinated with the LICENSOR's designated principal representative and all appropriate parties with at least 7-day advance notice. Unpredictable interruptions of utility service will be dealt with in a responsive and efficient manner. LICENSEE will coordinate, and bear all costs associated with, the delivery of emergency utility service to the LICENSOR facilities on YBI that are necessitated by any interruptions of those utility systems by project activities, for the duration of the project. Once the project is completed, LICENSEE will prepare and execute appropriate agreements with utility owners for any such related utilities upon project property which LICENSEE controls.

q. LICENSEE shall assume all financial responsibility for compliance with the Native American Graves Protection and Repatriation Act (NAGPRA). If required, LICENSEE must prepare NAGPRA documentation for LICENSOR review and approval, 25 U.S.C. § 3001-3013.

r. LICENSEE will provide LICENSOR with a copy of the fully executed final Curation Agreement with the Phoebe Hearst Museum of the University of California Berkeley.

s. The LICENSEE is responsible for insuring that if any unanticipated concentrations of prehistoric or historic period materials are encountered on the PREMISES it will cease all work until a qualified archaeologist, secured by the LICENSEE, can evaluate the find and make recommendations. Prehistoric materials might include obsidian and chert-flaked stone tools

(e.g. projectile points or knives) or tool-making debris; culturally darkened soil ("midden") containing heat-affected rock, artifacts, or shellfish remains; and stone milling equipment (e.g. mortars, pestles or handstones). Historic-period materials might include stone, concrete or adobe footings and walls; filled wells or privies; and deposits of metal, glass and/ or ceramic refuse.

t. The LICENSEE is responsible for insuring that if human remains or objects of Native American origin (e.g. funerary objects, sacred objects, or items of cultural patrimony) are encountered on the PREMISES, work shall be halted in the area of the discovery and the LICENSOR's designated principal representative will be notified immediately. No work shall commence in the subject area without the written approval of the LICENSOR.

u. LICENSEE will provide LICENSOR with all data generated under its ARPA permit, and under NAGPRA, if applicable.

v. LICENSEE will share all data gathered by its project with the LICENSOR's designated principal representative.

w. LICENSEE will provide, for the duration of the project activities and without cost to the LICENSOR, that adequate engineering measures are applied to ensure the stability of the steep hillside slope in the PREMISES between Treasure Island Road and the vicinity of the Coast Guard Barracks. LICENSEE will be responsible for and, without cost to the LICENSOR, will expeditiously take all reasonable actions and measures to prevent, or where prevention is not possible, to mitigate, all slides in an area up to 600 feet south of the existing Bridge for the duration of the project activities on YBI.

x. LICENSEE will take, without cost to the LICENSOR, all reasonable long-term actions and measures to provide a firm and stable hillside within the PREMISES, through the following rainy season beginning in the first October after LICENSEE is no longer present on the Licensed slope area until the rainy season ends in the following June.

y. LICENSEE must submit drawings of the elevations of the temporary detour structure it will construct on the PREMISES, including topographic contours and excavation plans, for LICENSOR review. An elevation and/or oblique drawing must be included to show the relationship between the temporary detour and the barracks.

z. When LICENSEE dismantles the temporary detour structure that it constructs on the PREMISES as a part of the its project, LICENSEE must demolish the structure's footings to 2-feet below ground surface, and restore the ground they occupy under a plan acceptable to LICENSOR.

aa. LICENSEE will, without cost to the LICENSOR, monitor and mitigate project noise generated on YBI, not to exceed 78dBA Lmax (5 dBA over present ambient noise levels of 73 dBA based on noise survey conducted on April 4, 2002), during the hours of 7:00 p.m. to 7:00 a.m., from the project for the residents of LICENSOR's barrack and family housing areas. If construction noise levels are expected to exceed this standard, noise mitigation measures (e.g., a sound barrier) shall be required. Impact-type mechanical operations, such as pile driving and jack-hammering, shall not be conducted during the aforementioned evening hours (e.g., 7:00 p.m. to 7:00 a.m.), regardless of the presence of noise mitigation measures. Noise measurements for construction during the hours of 7:00 p.m. to 7 a.m. (evening hours) shall be taken on the sidewalk outside of Building 26, adjacent to the breezeway and nearest the barracks room window. If a sound barrier is constructed, at least five noise measurements along the entire length of the sound barrier shall be taken between the sound barrier and Building 26. In addition, the Coast Guard Group San Francisco Facility Engineer may also request additional noise samplings by LICENSEE's noise engineer at LICENSEE's expense at a frequency not to exceed twice a month. The noise engineer shall provide reports and sampling data from the noise sampling within 12 hours of the noise measurements. The contractor shall provide the LICENSEE with all noise reports and sampling data obtained by the noise engineer within 24 hours of its receipt from the noise engineer. At any time that the project noise exceeds these standards, the affected LICENSOR personnel or families shall be relocated, at LICENSEE's expense, as per as per Subsection 15. dd. below.

bb. LICENSEE shall, without cost to the LICENSOR, prepare and implement a statistically defensible sampling strategy that characterizes project compliance with the National Ambient Air Quality Standards, including PM 2.5 and lead, without regard to time or area weighting, at

locations where LICENSOR personnel and families may be exposed. LICENSOR may also request additional air sampling by the Certified Industrial Hygienist (CIH) at LICENSEE's expense at a frequency not to exceed twice a month. The CIH shall provide reports and sampling data within 48 hours of the air sampling measurements. LICENSEE shall provide the LICENSOR with all air sampling reports and data obtained by the CIH within 24 hours of its receipt from the CIH. Visible dust will be controlled through the use of water or other dust palliatives. At any time that the contractor exceeds these standards, the affected LICENSOR personnel and/or families shall be relocated, at LICENSEE's expense, as per Subsection 15. dd. below.

cc. LICENSEE will, without cost to the LICENSOR, ensure all materials, whether waste, non-waste, or construction byproducts are contained within the access-controlled area of the PREMISES. At any time any project-related materials pose an actual or potential hazard to LICENSOR personnel or families, the affected LICENSOR personnel or families shall be relocated, at CALTRANS expense, as per Subsection 15. dd. below.

dd. LICENSEE will provide 7-day advance warning to the LICENSOR's designated principal representative of periods of noise, dust or debris exceeding the criteria set forth in Subsections 15. aa., bb. and cc. above between the hours of 7:00 p.m. and 7:00 a.m. when occasioned by necessary construction work on or near the PREMISES and will relocate any resident LICENSOR member or dependent on YBI, without cost to those residents or the LICENSOR, to agreed upon area hotels within a 10-mile drive of YBI for the duration of the excessive noise activity. Lists of qualified residents and dependents (updated by the LICENSOR as necessary) will be provided to LICENSEE's designated contact by their LICENSOR counterpart at least 3 days in advance of any scheduled relocation. In addition to the actual relocation costs, LICENSEE will pay for both the temporary lodging and parking for any qualified LICENSOR members or dependents under this relocation provision. Per diem will be paid directly to relocated LICENSOR residents by LICENSEE under provisions of Subsection 12.g. of the Memorandum of Agreement established between the LICENSOR and the LICENSEE, and effective on 26 June 2002, which is incorporated herein by reference. LICENSEE will provide, at its own expense, a scheduled transportation service to transport relocated LICENSOR members to and from their YBI duty stations, at the beginning and end of their scheduled duty shifts, for the duration of their relocation.

16. Liability. The LICENSEE shall be liable for any loss of, or damage to, the premises or facilities incurred as a result of its use and shall make such restoration or repair, or monetary compensation as may be directed by the LICENSOR.

17. Indemnification.

a. LICENSEE shall indemnify and hold harmless the United States, the Coast Guard, its officers, agents, servants and employees, from all liability they may be liable for including the death or injury to any persons, or loss or damage to the property of any persons resulting from the use of the PREMISES by the LICENSEE under the Federal Tort Claims Act (28 U.S.C. 2671 et. seq.), any applicable environmental law or regulation, or other laws.

b. LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands, liabilities, and damages that may in any manner be imposed on or incurred by LICENSOR as a result of any act, default, or omission of the LICENSEE, its officers, employees, contractors, agents, or guests or the participants in its activities in connection with the LICENSEE's use of the premises or for any injuries sustained by any individual who has come on the premises as a result of the LICENSEE's use of the premises and may be injured in the course of participating in an inherently hazardous activity, an athletic activity, or another recreational activity while on the premises, whether or not the activity is a sanctioned part of the LICENSEE's use of the premises.

c. The LICENSEE further agrees to indemnify and hold the LICENSOR harmless for any public or private environmental claims or liabilities arising from use of the described premises pursuant to this LICENSE.

d. Alcoholic beverages are prohibited during the LICENSEE's use of the PREMISES. The LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands,

liabilities, and damages that may in any manner be imposed on or incurred by LICENSOR as a result of any act or omission, no matter whether the act or omission occurs on or off the installation, following the consumption of alcohol at the PREMISES by the LICENSEE, its officers, employees, contractors, agents, or guests or the participants in its activities.

e. LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands, liabilities, and damages that may in any manner be imposed on or incurred by LICENSOR as a result of any act, default, or omission of the LICENSEE, its officers, employees, contractors, agents, or guests or the participants in its activities in connection with the use of the premises under this LICENSE.

f. LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands, liabilities, and damages that may arise from any listed hazards and the LICENSEE's potentially incompatible use of the premises.

18. Insurance. The LICENSEE is a self insured entity. LICENSEE shall provide a Letter of Self-Insurance. This LICENSE is not valid without a Letter of Self-Insurance.

19. Non-Discrimination. The LICENSEE, for itself, its personal representatives, officers, employees, contractors, agents, successors in interest (if applicable) and assignees (if applicable) as a part of the consideration hereof, and as a term and condition of this LICENSE, does hereby covenant and agree that:

a. No individual on the grounds of race, sex, color, religion, age, marital status or national origin shall be excluded from participation in, denied the benefits of, or otherwise discriminated against in the use said premises;

b. No individual on the grounds of race, sex, color, religion, age, marital status or national origin shall be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the construction of any improvements on, over, or under said premises or in the furnishing of services in connection with the use of the premises by the LICENSEE.

c. That the LICENSEE shall use the premises in compliance with all other requirements imposed by or pursuant to Title 49 Code of Federal Regulations, Part 21, Nondiscrimination in Federally Assisted programs of the Department of Transportation - Effectuation of Title VI or the Civil Rights Act of 1964, and as said regulations may be amended.

20. Title VI.

a. The LICENSEE or the LICENSEE's successor in interest shall comply with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000 01 et.seq.) and the regulations issued pursuant thereto.

b. The LICENSEE has executed the Standard Department of Transportation Title VI Assurances, an executed copy of which is attached as Exhibit 2 and is hereby made a part of this LICENSE. The LICENSEE accepts the provisions of the Assurances as part of the terms, conditions, and covenants of this LICENSE.

c. In the event of breach of any of the terms, conditions, and covenants of the Standard Department of Transportation Title VI Assurances, the United States shall have the right to terminate the LICENSE and reenter and repossess said land and the government facilities thereon, and hold same as if said LICENSE had never been made or issued.

21. Officials Not to Benefit. No member or delegate to Congress or Resident Commissioner shall be admitted to any share or part of this LICENSE or any benefit to arise therefrom, but this provision shall not be construed to extend to this LICENSE if made with a corporation whose membership includes a member or delegate to Congress or Resident Commissioner, who indirectly receives a general benefit from this LICENSE.

22. Covenant Against Contingent Fees. The LICENSEE warrants that no person or selling agency has been employed or retained to solicit or secure this LICENSE upon an agreement or understanding for a commission, percentage, brokerage or contingent fee. For Breach or violation of this warranty, the LICENSOR shall have the right to annul this LICENSE without liability or in its discretion recover from the LICENSEE the amount of such commission, percentage, brokerage or contingent fee in addition to the

consideration if any, herein set forth.

23.. Architectural Barriers Act responsibilities. The LICENSEE hereby accepts any and all responsibilities the LICENSOR may have under the Architectural Barriers Act of 1968, as amended, 42 U.S.C 4151 et. seq. (hereinafter referred to as the Act), regarding the PREMISES. Specifically, any alterations done to any buildings encompassed by this LICENSE shall be done according to the accessibility standards set by the General Services Administration in accordance with the Act.

24. Nondiscrimination on the Basis of Handicap in Program and Activities. LICENSEE shall use the PREMISES in compliance with the regulations in 49 C.F.R. Parts 21 and 27, Nondiscrimination on the Basis of Handicap in Programs and Activities Receiving or Benefiting From Federal Financial Assistance" respectively. LICENSEE understands that persons or organizations which are allowed the use of Federal property without having to pay the full fair market rental consideration are treated as having received Federal Financial Assistance. This LICENSE is not valid unless prior to the execution of this LICENSE, the LICENSEE has signed the Standard Department of Transportation Title VI Assurances form (a copy of which is attached to and made a part of this LICENSE).

25. Governing Law and Regulations. The LICENSEE, its officers, employees, contractors, agents, and guests and the participants in its activities, while on the Coast Guard installation are subject to all applicable Federal, state, and local laws, regulations, directives, and orders, including those issued by the LICENSOR or a designated representative, including the installation's Officer of the Day, Master at Arms, or a member of the installation's security force.

26. Environmental Issues, Documentation and Protection.

a. LICENSEE has completed and submitted to LICENSOR for review an Environmental/NEPA Analysis Checklist.
b. The LICENSEE may not unlawfully pollute the air, ground, or water, nor create a public nuisance. The LICENSEE shall, at no cost to the LICENSOR, promptly comply with all applicable federal, state, and local laws, regulations, directives regulating the quality of the environment. This does not effect the LICENSEE's right to contest the validity of such laws, regulations, or directives or to try to enjoin their applicability.
c. The LICENSEE acknowledges that the potential for release of hazardous substances and/or contamination exists on the PREMISES and that the LICENSEE shall take all reasonable measures to protect human health and the environment and minimize disruption to existing hazardous substances and/or contamination, and prevent any new releases and/or new exposure pathways. LICENSEE will be responsible for any new releases and/or new exposure pathways from any known and/or potential sources of hazardous substances from surface or subsurface soil, surface and ground water, and/or air. LICENSEE will contain, handle and dispose of all potential contamination or hazardous substances or materials.
d. LICENSEE acknowledges that it must take special precautions to prevent further contamination of LICENSOR property when excavating in the area of the diesel fuel plume southwest of Building 270, and on the former shoreline landfill adjoining LICENSOR property if there is potential problem. LICENSEE must submit its mitigation measures to LICENSOR in advance for review.
e. The LICENSEE shall use all required means to protect the environment and natural resources from any damage arising from the LICENSEE's use of the PREMISES and activities incident to its use. If any damage results to the environment or natural resources, the LICENSEE shall restore the environment or damaged resources.
f. The LICENSEE agrees to comply with all applicable federal, state and local environmental laws and regulations, including but not limited to those laws concerning any petroleum products, toxic substances, medical wastes and hazardous materials, substances or wastes.
g. The LICENSEE will contain, handle, and dispose of all lead-based materials in a proper manner and restore the premises, at least, its current condition following its work on the premises.
h. The LICENSEE will not dispose of any contaminated materials or soil on LICENSOR controlled federal property.

i. In the event that any significant additional environmental information or documentation to the LICENSEE's Final Environmental Impact Statement (EIS) dated May 8, 2001, is needed to comply with any Federal, State or local law or regulation, the LICENSEE will, without cost to the LICENSOR, ensure such compliance.
j. LICENSEE must prepare adequate environmental documentation for all environmental impacts, known or unknown, whether or not specifically listed in this LICENSE, and provide this documentation to the LICENSOR for review.
k. Any site-specific environmental documentation that is not available at the time this LICENSE is executed shall be provided to the LICENSOR for its review at the earliest possible date.
l. LICENSOR shall be informed of the qualifications of contractors performing abatement work that requires certified personnel. LICENSOR shall be informed, in advance, of the procedures that will be followed by contractors, and health and safety measures that will be employed to protect LICENSOR personnel, employees, contractors, agents and guests.
m. For all hazardous materials removed from the PREMISES, including but not limited to, lead based paint and asbestos containing materials, the LICENSOR shall be provided documentation that such wastes were hauled by a licensed carrier to an approved facility for disposal. LICENSOR shall be given copies of all manifests.
n. LICENSEE shall, without cost to the LICENSOR, prevent surface water runoff from carrying sediment into San Francisco Bay. LICENSEE shall provide for LICENSOR review, copies of each Storm Water Prevention Plan (SWPPP) prepared by its contractors for the PREMISES. LICENSEE is responsible for coordinating its SWPPPs with LICENSOR SWPPP.

27. Designation of Principal Representatives.

a. Mark Shindler is designated as the LICENSEE's principal representative of the LICENSEE and may be contacted at telephone/fax number (510) 286-5319/(510) 286-5379
b. **The Coast Guard Group San Francisco Engineering Officer** is designated as the LICENSOR's principal representative. The principal representative can be contacted at telephone number **(415) 399-3504 / fax 3434**. The LICENSEE shall coordinate its use of the PREMISES with the LICENSOR's principal representative.

28. Exhibits. The following exhibits are attached and made a part hereof:
(1) Drawing of project site on Coast Guard controlled federal property on Yerba Buena Island, construction and excavation limits indicated in the color yellow.
(2) Standard Department of Transportation Title VI Assurances.
(3) Letter of Self-Insurance.

29. Notification. The LICENSEE shall notify all of its officers, employees, contractors, agents, or guests who will use the PREMISES of the terms of this LICENSE and that they are required to comply with all applicable terms of this LICENSE if they enter the PREMISES.

30. Entire Agreement. This LICENSE, with exhibit(s) constitutes the only agreement between the LICENSOR and the LICENSEE. Any prior understanding or representation of any kind, which proceeded the date of this LICENSE, is not binding on either party, except to the extent the understandings are incorporated into this LICENSE.

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IN WITNESS WHEREOF, the parties hereto have hereunto subscribed their names as of the dates below written.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BY _____ 12/19/02
Signature R. A. MACPHERSON Date

Deputy District Director
Title Right of Way

UNITED STATES OF AMERICA
U.S. COAST GUARD

_____ 20 December 2002
SHERRY SHIRKEY Date
Chief, Real Property Branch
Maintenance & Logistics Command Pacific
By direction of the Commander

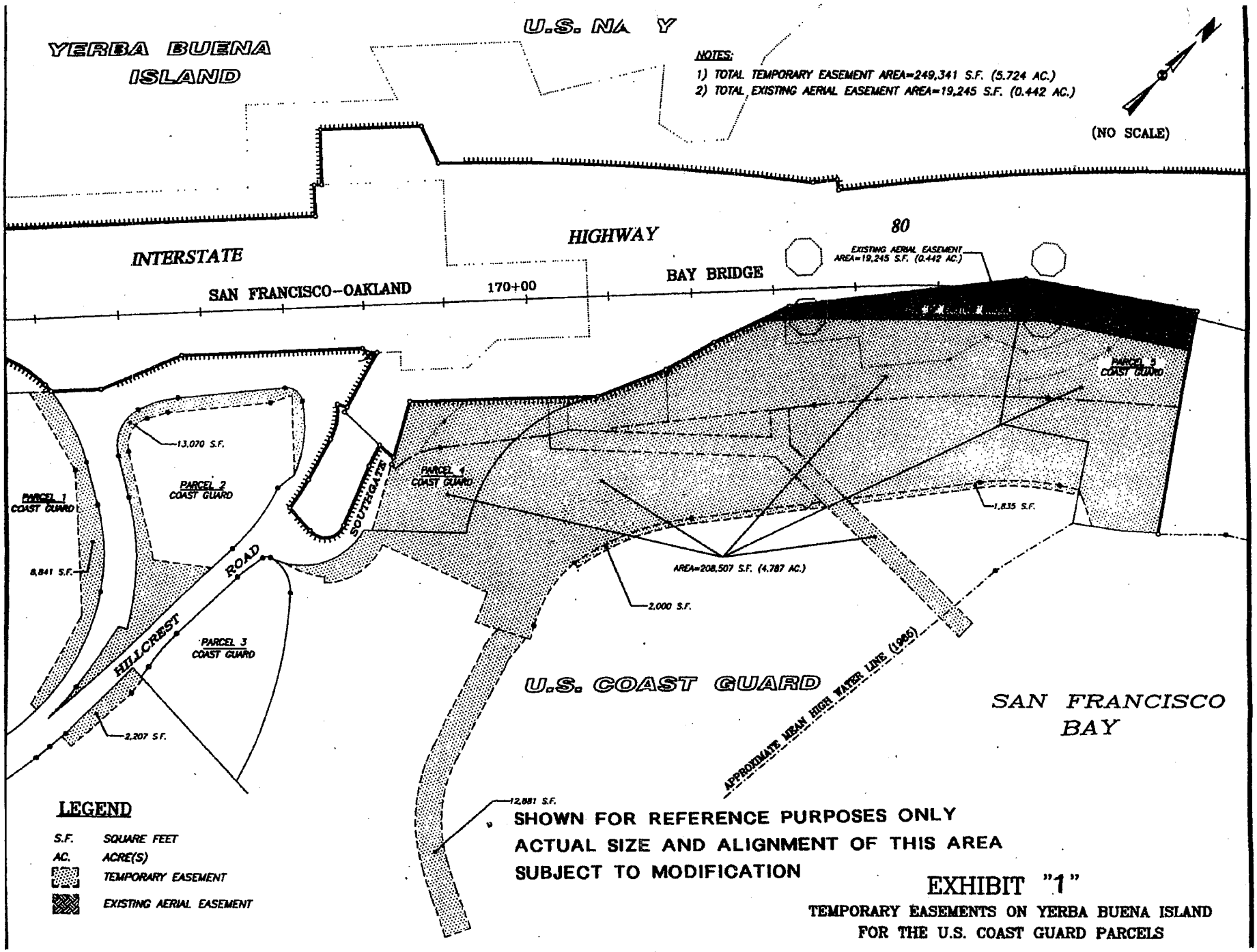


EXHIBIT "1"

TEMPORARY EASEMENTS ON YERBA BUENA ISLAND
FOR THE U.S. COAST GUARD PARCELS

STANDARD DOT TITLE VI ASSURANCE

The State of California, Department of Transportation (Recipient) agrees that as a condition to receiving any federal financial assistance from the U.S. Department of Transportation it will comply with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 USC 2000d-42, USC 2000d-4 (hereinafter referred to as the Act), and all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-Assisted Programs of the U.S. Department of Transportation - Effectuation of Title VI of the Civil Rights Act of 1964 (hereinafter referred to as the Regulations) and other pertinent directives, to the end that in accordance with the Act, Regulations, and other pertinent directives, 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 otherwise subjected to discrimination under any program or activity for which the Recipient receives federal financial assistance from the U.S. Department of Transportation, including the United States Coast Guard, and HEREBY GIVES ASSURANCE THAT it will promptly take any measures necessary to effectuate this agreement. This assurance is required by subsection 21.7(a)(1) of the Regulations. More specifically and without limiting the above general assurance, the Recipient hereby gives the following specific assurances with respect to its License.

1. That the Recipient agrees that each "program" and each "facility" as defined in subsections 21.23(e) and 21.23(b) of the Regulations, will be (with regard to a "program") conducted, or will be (with regard to a "facility") operated in compliance with all requirements imposed by, or pursuant to, the Regulations.

2. That the Recipient shall insert the following notification in all solicitations for bids for work or material subject to the Regulations and made in connection with this License and, in adapted form in all proposals for negotiated agreements:

> STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION (Recipient), in accordance with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 USC 2000d to 2000d-4 and Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in federally-assisted programs of the U.S. Department of Transportation issued pursuant to such Act, hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, minority business enterprises will afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

3. That the Recipient shall insert the clauses of Appendix A of this assurance in every contract subject to the Act and the Regulations.

4. That where the Recipient receives federal financial assistance to construct a facility, or part of a facility, the assurance shall extend to the entire facility and facilities operated in connection therewith.

5. That where the Recipient receives federal financial assistance in the form, or for the acquisition of real property or an interest in real property, the assurance shall extend to rights to space on, over or under such property.

6. That this assurance obligates the Recipient for the period during which federal financial assistance is extended to the program, except where the federal financial assistance is to provide,

or is in the form of, personal property, or real property or interest therein or structures or improvements thereon, in which case the assurance obligates the Recipient or any transferee for the longer of the following periods:

(a) the period during which the property is used for a purpose for which the federal financial assistance is extended, or for another purpose involving the provision of similar services or benefits; or
(b) the period during which the Recipient retains ownership or possession of the property.

7. The Recipient shall provide for such methods of administration for the program as are found by the Secretary of Transportation or the official to whom he delegates specific authority to give reasonable guarantee that it, other recipients, subgrantees, contractors, subcontractors, transferees, successors in interest, and other participants of federal financial assistance under such program will comply with all requirements imposed or pursuant to the Act, the Regulations and this assurance.

8. The Recipient agrees that the United States has a right to seek judicial enforcement with regard to any matter arising under the Act, the Regulations, and this assurance.

THIS ASSURANCE is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contract, property, discounts or other federal financial assistance extended after the date hereof to the Recipient by the U.S. Department of Transportation under the License and is binding on it, other recipients, subgrantees, contractors, subcontractors, transferees, successors in interest and other participants in the License.

The person or persons whose signatures appear below are authorized to sign this assurance on behalf of the Recipient.

STATE OF CALIFORNIA,
DEPARTMENT OF TRANSPORTATION

12/19/02

By (Signature of Authorized Official) Date
R. A. MACPHERSON

Deputy District Director
Title Right of Way

Appendix A

APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

(1) Compliance with Regulations: The contractor shall comply with the Regulations relative to nondiscrimination in federally-assisted programs of the U.S. Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

(2) Nondiscrimination: The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractor, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations.

(3) Solicitations for Subcontractor, Including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurement of material or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

(4) Information and Reports: The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the United States Coast Guard to be pertinent to ascertain compliance with such Regulation, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the Recipient, or the United States Coast Guard, as appropriate, and shall set forth what efforts it has made to obtain the information.

(5) Sanctions for Noncompliance: In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the Recipient shall impose such contract sanctions as it or the United States Coast Guard may determine to be appropriate, including, but not limited to:

(a) Withholding of payments to the contractor under the contract until the contractor complies; and/or

(b) Cancellation, termination or suspension of the contract, in whole or in part.

(6) Incorporation of Provisions: The contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the Recipient or the United States Coast Guard may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Recipient to enter into such litigation to protect the interest of the Recipient, and in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

DEPARTMENT OF GENERAL SERVICES
OFFICE OF RISK AND INSURANCE MANAGEMENT
1325 J Street, Suite 1800
Sacramento, CA 95814-2944
(916) 445-4612
FAX (916) 327-5776

November 25, 1997

Robert Van de Loo
Realty Specialist
United States Coast Guard
MLC-Pacific
Coast Guard Island
Alameda, CA 94501-5100

STATE OF CALIFORNIA
PUBLIC LIABILITY AND WORKERS' COMPENSATION INSURANCE
Department of Transportation

To whom it may concern:

The State of California has elected to be insured for its motor vehicle and general liability exposures through a self-insurance program. The State Attorney General administers the general liability program through an annual appropriation from the General Fund. The Office of Risk and Insurance Management administers the motor vehicle liability program.

Under this form of insurance, the State and its employees (as defined in Section 810.2 of the Government Code) are insured for any tort liability that may develop through carrying out official activities, including state official operations on non-state owned property. Should any claims arise by reason of such operations or under an official contract or license agreement, they should be referred to the Attorney General, State of California, Tort Liability Section, 1300 I Street, Suite 1101, PO Box 944255, Sacramento, CA 94244-2550.

The State of California has entered into a Master Agreement with the State Compensation Insurance Fund to administer workers' compensation benefits for all state employees, as required by the Labor Code.

Sincerely,

Susan Pipes

Susan Pipes
Associate Risk Analyst
(916)322-5289
CALNET 8-492-5289

SP:sdp

EXHIBIT (3)

Maintenance & Logistics Command Pacific

LICENSE

The **UNITED STATES OF AMERICA**, acting by and through the **UNITED STATES COAST GUARD**, Commander (sr), Maintenance & Logistics Command Pacific, Coast Guard Island, Building 54-D, Alameda, California, 94501-5100, (hereafter called "LICENSOR"), grants to the **STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION,** whose mailing address is P.O. Box 23440, Oakland, California 94623-0440 (hereafter called "LICENSEE"), a License (hereinafter called "LICENSE") to utilize Coast Guard controlled federal property on Coast Guard Group San Francisco's Yerba Buena Island (YBI) facility at the location indicated on Exhibit 1, attached hereto and made a part hereof, and further defined in Subsection 15.c. below (hereinafter called "PREMISES"), for the purpose of conducting a project to demolish and remove Building Nos. 30, 40, 75, 270 in furtherance of CALTRANS' upcoming construction of the new eastern span of the San Francisco – Oakland Bay Bridge project, subject to the following terms and conditions:

1. The LICENSOR grants to the LICENSEE the non-exclusive right to use the PREMISES together with the non-exclusive right of ingress and egress upon the property of Coast Guard Group San Francisco, Yerba Buena Island, California.

2. Term. This LICENSE shall be in effect for the period of **1 December 2002** to **31 September 2004** and is renewable for a further term with the written approval of the LICENSOR, if so requested by the LICENSEE.

3. Assignment of LICENSE. This LICENSE shall be neither assignable nor transferable by the LICENSEE. No permanent interest in the real property subject to this LICENSE shall vest in the LICENSEE.

4. This Section is reserved.

5. Termination/Revocation

By LICENSOR: the LICENSOR may revoke this LICENSE and reenter and take possession of the PREMISES:

a. If the LICENSEE does not cure any violations of the terms of this LICENSE within thirty (30) days of the receipt of notice of the violations from the LICENSOR; or
b. If the PREMISES is relinquished to the Bureau of Land Management, is declared excess by the General Services Administration, or is legislatively transferred by the United States Congress to another entity; or
c. In case of war or national emergency or any other imminent or substantial security threat that requires the LICENSOR's exclusive use of the PREMISES; or
d. If any of the information provided to the LICENSOR by the LICENSEE in its application for this LICENSE or at any time during the course of the LICENSE is discovered to be false, fraudulent, or materially incorrect; or
e. At any time by giving at least thirty (30) days' notice, in writing, to the LICENSEE. Said notice shall be computed commencing with the day after the date of mailing.

By LICENSEE: the LICENSEE may surrender this LICENSE at any time by giving thirty (30) days written notice of termination to the LICENSOR at the above address.

This LICENSE may be revoked at any time by the mutual consent of both parties.

6. Permits, Licenses and Taxes. The LICENSEE is responsible for obtaining all local, state or federal permits, licenses or other necessary authorizations to carry out any of the purposes of this LICENSE set forth in this document and is responsible for the payment of any state or local taxes generated by its activities on the PREMISES.

7. Laws. The LICENSEE shall comply with all applicable federal, state and local laws or regulations pertaining to any activities conducted on the PREMISES.

8. Scope. Except for the demolition and removal of Buildings Nos. 30, 40, 75, 270, no alteration of existing premises or facilities, or construction of permanent improvements shall be made without the written approval of the LICENSOR. Any structure or device erected or installed without LICENSOR's written consent, or with written consent and is later found to interfere with the proper operation of any of LICENSOR's equipment or facilities, shall be removed immediately upon written notification from the LICENSOR and at the LICENSEE's own expense. Upon revocation, expiration, or surrender of this LICENSE, and to the extent directed by the LICENSOR, the LICENSEE shall restore the premises or facilities to the same or as good condition as existed on the date of entry under this LICENSE, reasonable wear and tear excepted.

9. Maintenance of PREMISES. LICENSEE shall maintain the PREMISES, including buildings, if applicable, and all equipment, fixtures, and appurtenances furnished by the LICENSOR under this License, in good repair and condition.

10. Restrictions. Unless specified by this document, the LICENSEE shall at no time permit:
   a. Access to any Coast Guard equipment or facilities.
   b. Any interference with Coast Guard operations or access.
   c. The removal of any LICENSOR property, of any nature whatsoever, from the PREMISES.

11. Damage to property.
   a. The LICENSEE is responsible for any damage to or destruction of any property belonging to the LICENSOR, its officers, employees, contractors, agents, or guests that results from the LICENSEE's use of the PREMISES.
   b. The LICENSEE shall promptly repair or replace any damaged or destroyed property to the satisfaction of the LICENSOR.
   c. In lieu of repairs or replacement, and at the sole LICENSOR's discretion, the LICENSEE may pay to the LICENSOR money in an amount sufficient to compensate for the LICENSOR for the loss sustained as a result of the damage to or destruction of the property.

12. Restoration of the PREMISES.
   a. The LICENSEE shall restore the PREMISES to the condition in which it was received.
   b. LICENSEE shall clean up and remove all trash and refuse generated by the LICENSEE's use of the facility and shall replace any property that it may have relocated during its use of the facility.
   c. If the LICENSEE fails to restore the facility, including the removal of trash and relocation of property, the LICENSEE shall pay any costs incurred by the LICENSOR to restore the facility.

13. Access to PREMISES and Parking. The LICENSEE, its officers, employees, contractors, agents, and the participants in its activities shall enter and exit the PREMISES by routes established in consultation with the LICENSOR's designated principal representative, and shall comply with all posted traffic and parking control signs unless relief is granted by the LICENSOR's designated principal representative. The LICENSEE and all it's officers, employees, contractors, agents and guests, are advised that they are subject to all additional security measures, including access closure, that may be enacted by Coast Guard Group San Francisco for reasons of enhanced Military or National Security.

14. General Provisions.
   a. This LICENSE will not be administrated for profit.
   b. The LICENSOR shall have access to the PREMISES at all reasonable times for inspection, maintenance or any other purpose.
   c. The LICENSEE shall at no time permit or allow:
      (1) Any activities while on the PREMISES that involve the solicitation of funds for private or commercial interests, including fund raising for nonprofit organizations and causes.

(2) Any controlled substances to be brought unto the PREMISES, nor may any controlled substances be possessed, used, solicited, transferred, or sold on the PREMISES.
(3) Any alcoholic beverages to be brought unto the PREMISES.

d. If the LICENSEE's equipment causes interference with any of the LICENSOR's equipment or operation, it shall be the sole responsibility of the LICENSEE to correct any interference problems, or cease operation and remove all equipment.

15. Specific Provisions. The LICENSEE agrees to the following:

a. **To coordinate all work with LICENSOR's designated principal representative (see Section 27) and to immediately comply with the direction or lawful order of the LICENSOR's designated principal representative.**
b. **To hold an initial meeting to discuss this project at Coast Guard Group San Francisco with the LICENSOR's designated principal representative and representatives of the LICENSEE and their contractor.**
c. **LICENSEE shall use only the area adjacent to the buildings to be demolished for project related activities after consultation with and the concurrence of the LICENSOR's designated principal representative.**
d. **To provide a project schedule a minimum of 14 days in advance of the commencement of this project on the PREMISES and provide regular updates to this schedule as necessary to reflect any changes.**
e. **To maintain LICENSOR's 24-hour a day, 7 day per week, pedestrian and vehicular access to its property. All potential restrictions to this access will be coordinated and agreed upon in advance, with the LICENSOR's designated principal representative.**
f. **Coordinate any access to the PREMISES between the hours of 18:00 and 08:00 in advance with the LICENSOR's designated principal representative.**
g. The LICENSEE will properly contain, handle and dispose of all potentially contaminated materials.
h. The LICENSEE will not allow the disposal of contaminated soils on the property of the LICENSOR.
i. All pavement repairs performed by LICENSEE under Section 12.a of this LICENSE shall be of identical quality to, or better than, the pre-existing condition of the pavement.
j. LICENSEE must forward the names of all personnel who will be present on the PREMISES to the LICENSOR's designated principal representative.
k. LICENSEE will, at its own expense and in coordination with the LICENSOR's designated principal representative, relocate any of the LICENSOR's security fencing disturbed by their project to provide a continuous security perimeter for the remainder of the LICENSOR's property. The LICENSEE shall, at its own expense and in coordination with the LICENSOR's designated principal representative, perform any necessary reestablishment of this security fence at the completion of its project.
l. LICENSEE must complete a utility location prior to initiating any subsurface investigation. LICENSEE will coordinate this action with the LICENSOR's designated principal representative.
m. LICENSEE will, at its own expense, relocate any utilities serving the LICENSOR's property and coordinate such actions with the LICENSOR's designated principal representative and all appropriate parties.
n. LICENSEE will be responsible for any interruption to utility service caused by their actions on the PREMISES and will take immediate action, at its own expense, to place any interrupted service back into effect.
o. LICENSEE will, without cost to the LICENSOR, protect, maintain and repair any affected LICENSOR facilities and relocate affected utilities (telecommunications, electricity, natural gas, water, sewer, storm drainage, etc.) if necessary which serve the LICENSOR within the project construction area for the duration of the project. Any predictable interruptions of utility service will be coordinated with the LICENSOR's designated principal representative and all appropriate parties with at least 7-day advance notice. Unpredictable interruptions of utility service will be dealt with in a responsive and efficient manner. LICENSEE will coordinate, and bear all costs associated with, the delivery of emergency utility service to the LICENSOR

facilities on YBI that are necessitated by any interruptions of those utility systems by project activities, for the duration of the project.

p. LICENSEE shall, at the completion of each working day, ensure that areas affected by work noted in Section 8 are clean, free of debris and trash.

q. LICENSEE shall assume all financial responsibility for compliance with the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. § 3001 - 3013.

r. The LICENSEE is responsible for insuring that if any unanticipated concentrations of prehistoric or historic period materials are encountered on the PREMISES it will cease all work until a qualified archaeologist, secured by the LICENSEE, can evaluate the find and make recommendations. Prehistoric materials might include obsidian and chert-flaked stone tools (e.g. projectile points or knives) or tool-making debris; culturally darkened soil ("midden") containing heat-affected rock, artifacts, or shellfish remains; and stone milling equipment (e.g. mortars, pestles or handstones). Historic-period materials might include stone, concrete or adobe footings and walls; filled wells or privies; and deposits of metal, glass and/ or ceramic refuse.

s. The LICENSEE is responsible for insuring that if human remains or objects of Native American origin (e.g. funerary objects, sacred objects, or items of cultural patrimony) are encountered on the PREMISES, work shall be halted in the area of the discovery and the LICENSOR's designated principal representative will be notified immediately. No work shall commence in subject area without the written approval of the LICENSOR.

t. LICENSEE will share all data gathered by this work with the LICENSOR's designated principal representative.

u. LICENSEE shall, without cost to the LICENSOR, prepare and implement a statistically defensible sampling strategy that characterizes project compliance with the National Ambient Air Quality Standards, including PM 2.5 and lead, without regard to time or area weighting, at locations where LICENSOR personnel and families may be exposed. LICENSOR may also request additional air sampling by the Certified Industrial Hygienist (CIH) at LICENSEE's expense at a frequency not to exceed twice a month. The CIH shall provide reports and sampling data within 48 hours of the air sampling measurements. LICENSEE shall provide the LICENSOR with all air sampling reports and data obtained by the CIH within 24 hours of its receipt from the CIH. Visible dust will be controlled through the use of water or other dust palliatives.

v. LICENSEE will, without cost to the LICENSOR, ensure all materials, whether waste, non-waste, or construction byproducts are contained within the access-controlled area of the PREMISES.

16. Liability. The LICENSEE shall be liable for any loss of, or damage to, the PREMISES or facilities incurred as a result of its use and shall make such restoration or repair, or monetary compensation as may be directed by the LICENSOR.

17. Indemnification.

a. LICENSEE shall indemnify and hold harmless the United States, the Coast Guard, its officers, agents, servants and employees, from all liability they may be liable for including the death or injury to any persons, or loss or damage to the property of any persons resulting from the use of the PREMISES by the LICENSEE under the Federal Tort Claims Act (28 U.S.C. 2671 et. seq.), any applicable environmental law or regulation, or other laws.

b. LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands, liabilities, and damages that may in any manner be imposed on or incurred by LICENSOR as a result of any act, default, or omission of the LICENSEE, its officers, employees, contractors, agents, or guests or the participants in its activities in connection with the LICENSEE's use of the PREMISES or for any injuries sustained by any individual who has come on the PREMISES as a result of the LICENSEE's use of the PREMISES and may be injured in the course of participating in an inherently hazardous activity, an athletic activity, or another recreational activity while on the PREMISES, whether or not the activity is a sanctioned part of the LICENSEE's use of the PREMISES.

c. The LICENSEE further agrees to indemnify and hold the LICENSOR harmless for any public or

private environmental claims or liabilities arising from use of the described PREMISES pursuant to this LICENSE.

d. Alcoholic beverages are prohibited during the LICENSEE's use of the PREMISES. The LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands, liabilities, and damages that may in any manner be imposed on or incurred by LICENSOR as a result of any act or omission, no matter whether the act or omission occurs on or off the PREMISES, following the consumption of alcohol at the PREMISES by the LICENSEE, its officers, employees, contractors, agents, or guests or the participants in its activities.

e. LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands, liabilities, and damages that may in any manner be imposed on or incurred by LICENSOR as a result of any act, default, or omission of the LICENSEE, its officers, employees, contractors, agents, or guests or the participants in its activities in connection with the use of the PREMISES under this LICENSE.

f. LICENSEE shall indemnify and hold harmless the LICENSOR against all actions, claims, demands, liabilities, and damages that may arise from any listed hazards and the LICENSEE's potentially incompatible use of the PREMISES.

18. Insurance. The LICENSEE is a self insured entity. LICENSEE shall provide a Letter of Self-Insurance. This LICENSE is not valid without a Letter of Self-Insurance.

19. Non-Discrimination. The LICENSEE, for itself, its personal representatives, officers, employees, contractors, agents, successors in interest (if applicable) and assignees (if applicable) as a part of the consideration hereof, and as a term and condition of this LICENSE, does hereby covenant and agree that:

a. No individual on the grounds of race, sex, color, religion, age, marital status or national origin shall be excluded from participation in, denied the benefits of, or otherwise discriminated against in the use said PREMISES;

b. No individual on the grounds of race, sex, color, religion, age, marital status or national origin shall be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the construction of any improvements on, over, or under said PREMISES or in the furnishing of services in connection with the use of the PREMISES by the LICENSEE.

c. That the LICENSEE shall use the PREMISES in compliance with all other requirements imposed by or pursuant to Title 49 Code of Federal Regulations, Part 21, Nondiscrimination in Federally Assisted programs of the Department of Transportation - Effectuation of Title VI or the Civil Rights Act of 1964, and as said regulations may be amended.

20. Title VI.

a. The LICENSEE or the LICENSEE's successor in interest shall comply with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000 01 et.seq.) and the regulations issued pursuant thereto.

b. The LICENSEE has executed the Standard Department of Transportation Title VI Assurances, an executed copy of which is attached as Exhibit 2 and is hereby made a part of this LICENSE. The LICENSEE accepts the provisions of the Assurances as part of the terms, conditions, and covenants of this LICENSE.

c. In the event of breach of any of the terms, conditions, and covenants of the Standard Department of Transportation Title VI Assurances, the United States shall have the right to terminate the LICENSE and reenter and repossess said land and the government facilities thereon, and hold same as if said LICENSE had never been made or issued.

21. Officials Not to Benefit. No member or delegate to Congress or Resident Commissioner shall be admitted to any share or part of this LICENSE or any benefit to arise therefrom, but this provision shall not be construed to extend to this LICENSE if made with a corporation whose membership includes a member or delegate to Congress or Resident Commissioner, who indirectly receives a general benefit from this LICENSE.

22. Covenant Against Contingent Fees. The LICENSEE warrants that no person or selling agency has been employed or retained to solicit or secure this LICENSE upon an agreement or understanding for a

commission, percentage, brokerage or contingent fee. For Breach or violation of this warranty, the LICENSOR shall have the right to annul this LICENSE without liability or in its discretion recover from the LICENSEE the amount of such commission, percentage, brokerage or contingent fee in addition to the consideration if any, herein set forth.

23.. Architectural Barriers Act responsibilities. The LICENSEE hereby accepts any and all responsibilities the LICENSOR may have under the Architectural Barriers Act of 1968, as amended, 42 U.S.C 4151 et. seq. (hereinafter referred to as the Act), regarding the PREMISES. Specifically, any alterations done to any buildings encompassed by this LICENSE shall be done according to the accessibility standards set by the General Services Administration in accordance with the Act.

24. Nondiscrimination on the Basis of Handicap in Program and Activities. LICENSEE shall use the PREMISES in compliance with the regulations in 49 C.F.R. Parts 21 and 27, Nondiscrimination on the Basis of Handicap in Programs and Activities Receiving or Benefiting From Federal Financial Assistance" respectively. LICENSEE understands that persons or organizations which are allowed the use of Federal property without having to pay the full fair market rental consideration are treated as having received Federal Financial Assistance. This LICENSE is not valid unless prior to the execution of this LICENSE, the LICENSEE has signed the Standard Department of Transportation Title VI Assurances form (a copy of which is attached to and made a part of this LICENSE).

25. Governing Law and Regulations. The LICENSEE, its officers, employees, contractors, agents, and guests and the participants in its activities, while on the Coast Guard installation are subject to all applicable Federal, state, and local laws, regulations, directives, and orders, including those issued by the LICENSOR, the LICENSOR's designated principal representative, or the installation's Officer of the Day, Master at Arms, or a member of the installation's security force.

26. Environmental Protection.

a. LICENSEE has completed and submitted to LICENSOR for review an Environmental/NEPA Analysis Checklist.
b. The LICENSEE may not unlawfully pollute the air, ground, or water, nor create a public nuisance. The LICENSEE shall, at no cost to the LICENSOR, promptly comply with all applicable federal, state, and local laws, regulations, directives regulating the quality of the environment. This does not effect the LICENSEE's right to contest the validity of such laws, regulations, or directives or to try to enjoin their applicability.
c. The LICENSEE acknowledges that the potential for release of hazardous substances and/or contamination exists on the PREMISES and that the LICENSEE shall take all reasonable measures to protect human health and the environment and minimize disruption to existing hazardous substances and/or contamination, and prevent any new releases and/or new exposure pathways. LICENSEE will be responsible for any new releases and/or new exposure pathways from any known and/or potential sources of hazardous substances from surface or subsurface soil, surface and ground water, and/or air. LICENSEE will contain, handle and dispose of all potential contamination or hazardous substances or materials.
d. LICENSEE acknowledges that it must take special precautions to prevent further contamination of LICENSOR property when excavating in the area of the diesel fuel plume southwest of Building 270, and on the former shoreline landfill adjoining LICENSOR property if there is potential problem. LICENSEE must submit its mitigation measures to LICENSOR in advance for review.
e. The LICENSEE shall use all required means to protect the environment and natural resources from any damage arising from the LICENSEE's use of the facility and activities incident to its use. If any damage results to the environment or natural resources, the LICENSEE shall restore the environment or damaged resources.
f. The LICENSEE agrees to comply with all applicable federal, state and local environmental laws and regulations, including but not limited to those laws concerning any petroleum products, toxic substances, medical wastes and hazardous materials, substances or wastes.
g. The LICENSEE will contain, handle, and dispose of all lead-based materials in a proper

manner and restore the PREMISES, at least, its current condition following its work on the PREMISES.

h. The LICENSEE will not dispose of any contaminated materials or soil on Coast Guard property.

i. In the event that any significant additional environmental information or documentation to the LICENSEE's Final Environmental Impact Statement (EIS) dated May 8, 2001, is needed to comply with any Federal, State or local law or regulation, the LICENSEE will, without cost to the LICENSOR, ensure such compliance.

j. LICENSEE must prepare adequate environmental documentation for all environmental impacts, known or unknown, whether or not specifically listed in this LICENSE, and provide this documentation to the LICENSOR for review.

k. Any site-specific environmental documentation that is not available at the time this LICENSE is executed shall be provided to the LICENSOR for its review at the earliest possible date.

l. LICENSOR shall be informed of the qualifications of contractors performing abatement work that requires certified personnel. LICENSOR shall be informed, in advance, of the procedures that will be followed by contractors, and health and safety measures that will be employed to protect LICENSOR personnel, employees, contractors, agents and guests.

m. For all hazardous materials removed from the PREMISES, including but not limited to, lead based paint and asbestos containing materials, the LICENSOR shall be provided documentation that such wastes were hauled by a licensed carrier to an approved facility for disposal. LICENSOR shall be given copies of all manifests.

n. LICENSEE will, in furtherance of its project and without cost to the COAST GUARD, remove Building Nos. 30, 40, 75 and 270, and will properly demolish and dispose of all materials off-site in accordance with all applicable Federal, State and local laws and regulations, including any hazardous materials these buildings may contain.

27. Designation of Principal Representatives.

a. Mark Shindler is designated as the LICENSEE's principal representative of the LICENSEE and may be contacted at telephone/fax number (510) 286-5319/(510) 286-5379

b. **The Coast Guard Group San Francisco Engineering Officer** is designated as the LICENSOR's principal representative. The principal representative can be contacted at telephone number **(415) 399-3504 / fax 3434**. The LICENSEE shall coordinate its use of the PREMISES with the LICENSOR's principal representative.

28. Exhibits. The following exhibits are attached and made a part hereof:

(1) Drawing showing project buildings, indicated in the color red, on Coast Guard controlled federal property on Yerba Buena Island.

(2) Standard Department of Transportation Title VI Assurances.

(3) Letter of Self-Insurance.

29. Notification. The LICENSEE shall notify all of its officers, employees, contractors, agents, or guests who will use the PREMISES of the terms of this LICENSE and that they are required to comply with all applicable terms of this LICENSE if they enter the PREMISES.

30. Entire Agreement. This LICENSE, with exhibit(s) constitutes the only agreement between the LICENSOR and the LICENSEE. Any prior understanding or representation of any kind, which proceeded the date of this LICENSE, is not binding on either party, except to the extent the understandings are incorporated into this LICENSE.

IN WITNESS WHEREOF, the parties hereto have hereunto subscribed their names as of the dates below written.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BY _____ 12/19/02
Signature R. A. MACPHERSON Date

Deputy District Director
Title Right of Way

UNITED STATES OF AMERICA
U.S. COAST GUARD

_____ 30 December 2002
SHERRY SHIRKEY Date
Chief, Real Property Branch
Maintenance & Logistics Command Pacific
By direction of the Commander

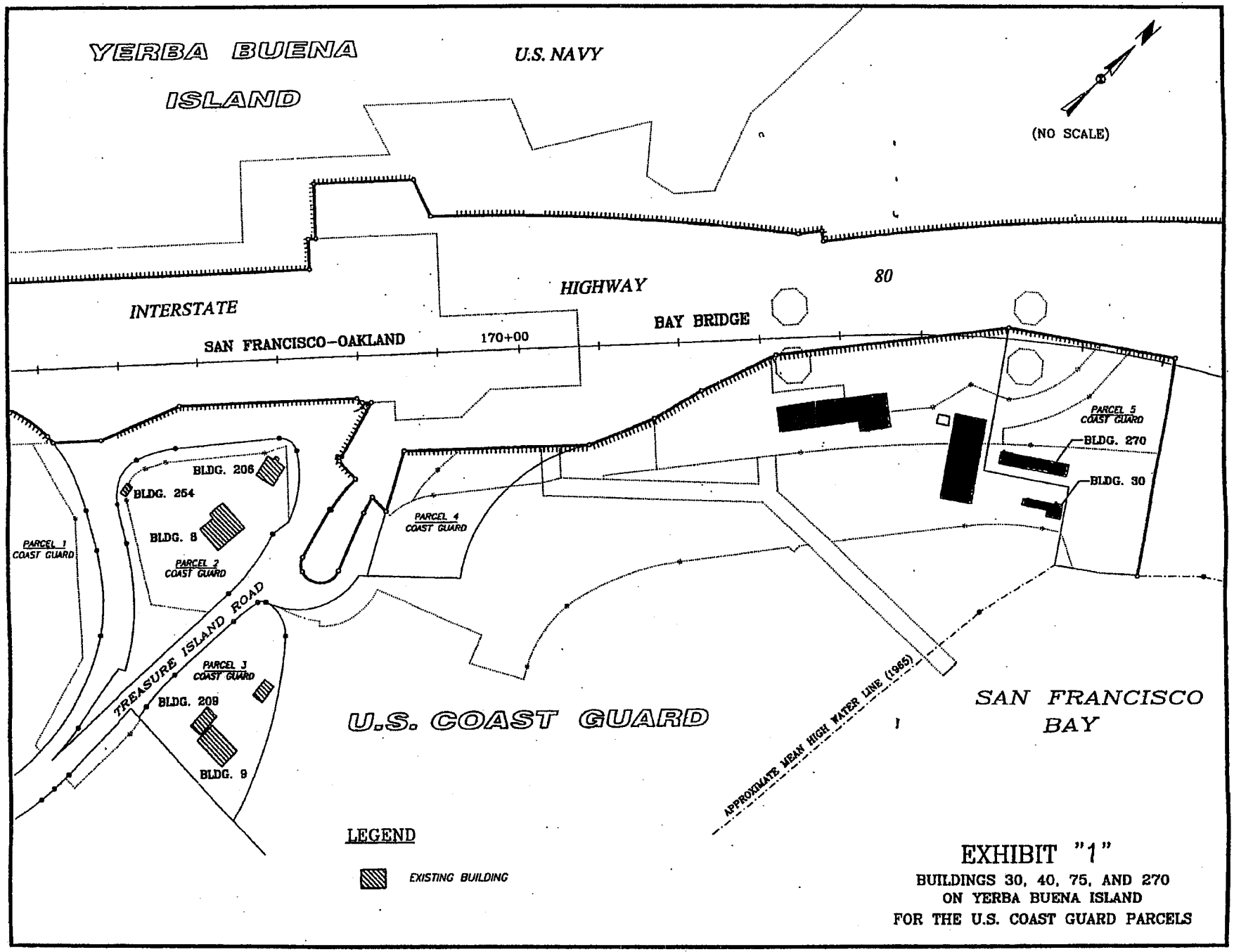


EXHIBIT "1"

BUILDINGS 30, 40, 75, AND 270
ON YERBA BUENA ISLAND
FOR THE U.S. COAST GUARD PARCELS

STANDARD DOT TITLE VI ASSURANCE

The State of California, Department of Transportation (Recipient) agrees that as a condition to receiving any federal financial assistance from the U.S. Department of Transportation it will comply with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 USC 2000d-42, USC 2000d-4 (hereinafter referred to as the Act), and all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-Assisted Programs of the U.S. Department of Transportation - Effectuation of Title VI of the Civil Rights Act of 1964 (hereinafter referred to as the Regulations) and other pertinent directives, to the end that in accordance with the Act, Regulations, and other pertinent directives, 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 otherwise subjected to discrimination under any program or activity for which the Recipient receives federal financial assistance from the U.S. Department of Transportation, including the United States Coast Guard, and HEREBY GIVES ASSURANCE THAT it will promptly take any measures necessary to effectuate this agreement. This assurance is required by subsection 21.7(a)(1) of the Regulations. More specifically and without limiting the above general assurance, the Recipient hereby gives the following specific assurances with respect to its License.

1. That the Recipient agrees that each "program" and each "facility" as defined in subsections 21.23(e) and 21.23(b) of the Regulations, will be (with regard to a "program") conducted, or will be (with regard to a "facility") operated in compliance with all requirements imposed by, or pursuant to, the Regulations.

2. That the Recipient shall insert the following notification in all solicitations for bids for work or material subject to the Regulations and made in connection with this License and, in adapted form in all proposals for negotiated agreements:

> STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION (Recipient), in accordance with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 USC 2000d to 2000d-4 and Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in federally-assisted programs of the U.S. Department of Transportation issued pursuant to such Act, hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, minority business enterprises will afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

3. That the Recipient shall insert the clauses of Appendix A of this assurance in every contract subject to the Act and the Regulations.

4. That where the Recipient receives federal financial assistance to construct a facility, or part of a facility, the assurance shall extend to the entire facility and facilities operated in connection therewith.

5. That where the Recipient receives federal financial assistance in the form, or for the acquisition of real property or an interest in real property, the assurance shall extend to rights to space on, over or under such property.

6. That this assurance obligates the Recipient for the period during which federal financial assistance is extended to the program, except where the federal financial assistance is to provide,

or is in the form of, personal property, or real property or interest therein or structures or improvements thereon, in which case the assurance obligates the Recipient or any transferee for the longer of the following periods:

(a) the period during which the property is used for a purpose for which the federal financial assistance is extended, or for another purpose involving the provision of similar services or benefits; or
(b) the period during which the Recipient retains ownership or possession of the property.

7. The Recipient shall provide for such methods of administration for the program as are found by the Secretary of Transportation or the official to whom he delegates specific authority to give reasonable guarantee that it, other recipients, subgrantees, contractors, subcontractors, transferees, successors in interest, and other participants of federal financial assistance under such program will comply with all requirements imposed or pursuant to the Act, the Regulations and this assurance.

8. The Recipient agrees that the United States has a right to seek judicial enforcement with regard to any matter arising under the Act, the Regulations, and this assurance.

THIS ASSURANCE is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contract, property, discounts or other federal financial assistance extended after the date hereof to the Recipient by the U.S. Department of Transportation under the License and is binding on it, other recipients, subgrantees, contractors, subcontractors, transferees, successors in interest and other participants in the License.

The person or persons whose signatures appear below are authorized to sign this assurance on behalf of the Recipient.

STATE OF CALIFORNIA,
DEPARTMENT OF TRANSPORTATION

12/19/02

By (Signature of Authorized Official) Date
R. A. MACPHERSON

Deputy District Director
Title Right of Way

Appendix A

APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

(1) Compliance with Regulations: The contractor shall comply with the Regulations relative to nondiscrimination in federally-assisted programs of the U.S. Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

(2) Nondiscrimination: The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractor, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations.

(3) Solicitations for Subcontractor, Including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurement of material or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

(4) Information and Reports: The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the United States Coast Guard to be pertinent to ascertain compliance with such Regulation, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the Recipient, or the United States Coast Guard, as appropriate, and shall set forth what efforts it has made to obtain the information.

(5) Sanctions for Noncompliance: In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the Recipient shall impose such contract sanctions as it or the United States Coast Guard may determine to be appropriate, including, but not limited to:

(a) Withholding of payments to the contractor under the contract until the contractor complies; and/or

(b) Cancellation, termination or suspension of the contract, in whole or in part.

(6) Incorporation of Provisions: The contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the Recipient or the United States Coast Guard may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Recipient to enter into such litigation to protect the interest of the Recipient, and in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

DEPARTMENT OF GENERAL SERVICES
OFFICE OF RISK AND INSURANCE MANAGEMENT
1325 J Street, Suite 1800
Sacramento, CA 95814-2944
(916) 445-4612
FAX (916) 327-5776

November 25, 1997

Robert Van de Loo
Realty Specialist
United States Coast Guard
MLC-Pacific
Coast Guard Island
Alameda, CA 94501-5100

STATE OF CALIFORNIA
PUBLIC LIABILITY AND WORKERS' COMPENSATION INSURANCE
Department of Transportation

To whom it may concern:

The State of California has elected to be insured for its motor vehicle and general liability exposures through a self-insurance program. The State Attorney General administers the general liability program through an annual appropriation from the General Fund. The Office of Risk and Insurance Management administers the motor vehicle liability program.

Under this form of insurance, the State and its employees (as defined in Section 810.2 of the Government Code) are insured for any tort liability that may develop through carrying out official activities, including state official operations on non-state owned property. Should any claims arise by reason of such operations or under an official contract or license agreement, they should be referred to the Attorney General, State of California, Tort Liability Section, 1300 I Street, Suite 1101, PO Box 944255, Sacramento, CA 94244-2550.

The State of California has entered into a Master Agreement with the State Compensation Insurance Fund to administer workers' compensation benefits for all state employees, as required by the Labor Code.

Sincerely,

Susan Pipes

Susan Pipes
Associate Risk Analyst
(916)322-5289
CALNET 8-492-5289

SP:sdp

EXHIBIT (3)

MEMORANDUM OF AGREEMENT
BETWEEN THE
UNITED STATES COAST GUARD
AND THE
STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION
REGARDING THE NEW EASTERN SPAN OF THE
SAN FRANCISCO - OAKLAND BAY BRIDGE

1. PARTIES. The parties to this Memorandum of Agreement ("MOA") are the United States Coast Guard ("COAST GUARD") and the State of California's Department of Transportation ("CALTRANS").

2. AUTHORITY. This MOA is authorized under the provisions of 14 U.S.C. § 141(a).

3. PURPOSE. The purpose of this MOA is to set forth terms by which the COAST GUARD and CALTRANS will cooperate in CALTRANS' future construction of a new eastern span of the San Francisco – Oakland Bay Bridge ("PROJECT"), portions of which will be constructed on COAST GUARD controlled federal real property ("PROPERTY") on Yerba Buena Island ("YBI"). This MOA will provide a framework for the complex interrelationship that must exist for the successful completion of the PROJECT and is intended to ensure minimal disruption of ongoing COAST GUARD operational and other mission-related activities that occur on or adjacent to YBI.

4. Responsibilities.

a. COAST GUARD.

(1) Will, subject to applicable federal statutes and regulations, and to any required intra-Federal Government approvals, grant CALTRANS all necessary temporary real property interests, as identified on Exhibit "A," needed to allow CALTRANS the use of the PROPERTY for the duration of those temporary interests as noted on Exhibit "A." Subject to applicable federal statutes and regulations, the COAST GUARD will authorize CALTRANS to demolish Buildings 30, 40, 75 and 270. The COAST GUARD also will fully comply with National Environmental Policy Act (NEPA) and all other applicable federal environmental statutes. These temporary interests will be granted by COAST GUARD License(s), which will become effective on 1 January 2003 for an eight year term, and will be renewable in the event of project delay at no further cost to CALTRANS. The Licenses will be sent to CALTRANS for signature on or before 1 August 2002.

(2) Will, subject to applicable federal statutes and regulations, and to any required intra-Federal Government approvals, grant CALTRANS all necessary permanent real property interests, as identified on Exhibit "B" (or for the telecommunications Easement, at the location described in Subsection 4.b.(8) below)

needed for the permanent improvements that CALTRANS will place upon the PROPERTY. The COAST GUARD also will fully comply with National Environmental Policy Act (NEPA) and all other applicable federal environmental statutes. These permanent interests will be conveyed by COAST GUARD signed Easement(s), which will be sent to CALTRANS on or before 1 January 2004. COAST GUARD acknowledges that CALTRANS desires to acquire fee absolute interest in all Easement areas as described in Exhibit "B." However, since the COAST GUARD cannot relinquish fee interest in federal property, CALTRANS' acquisition will be limited to obtaining the aforementioned Easement(s) in lieu of fee. COAST GUARD further agrees that the Easement(s) will contain:

- A prohibition against storage within the permanent Easement areas of flammable materials, explosives, or similar items that would endanger the overhead bridge structure; and
- A requirement that construction of any improvements within the permanent Easement areas will conform to CALTRANS standards concerning construction of structures underneath bridges to maximize access for maintenance and any other future construction purposes, and minimize potential damage that may be caused by normal operation of the overhead roadway.

If the COAST GUARD declares any portion of the Easement areas excess to its needs, the COAST GUARD will advise the federal government agency handling the excess transaction of CALTRANS interest in obtaining fee to the property.

(3) Will provide, without cost to CALTRANS, timely consultation and coordination support for the duration of the PROJECT.

(4) In addition to the real property interests granted under Subsection 4.a.(1) above, due to their close proximity to PROJECT related activities, the COAST GUARD will provide, without cost to CALTRANS, security for Senior Officer Family Quarters No. 8 and 9, for periods of time when they have been vacated.

(5) Cause the renovation of COAST GUARD Building No. 3 as a Watchstander Berthing Facility, with construction to be complete on or about January 30, 2003. COAST GUARD will award a Design/Build contract and perform the other COAST GUARD-responsible functions with respect to Watchstander Berthing as are more specifically detailed in paragraph 4.b.(14) below.

b. CALTRANS.

(1) Will pay to the COAST GUARD:

(a) The lump sum of $9,700,000 (nine million seven hundred thousand dollars) to compensate the COAST GUARD for:

(i) the temporary use of the land described in 4.a.(1) above for the duration of the PROJECT, including the right to demolish the four

structures located on that land, and the loss of storage capacity of those structures.

(ii) the permanent use of the land described in 4.a.(2) above to be permanently subject to Easement(s) in favor of CALTRANS.

(iii) compensation for Senior Officer Family Quarters No. 8 being vacated for the duration of the PROJECT, commencing no later than 1 July 2003. The procedures affecting this item are further described in Subsection 4.b.(15) below.

This lump sum payment is made pursuant to the COAST GUARD'S authority in 14 U.S.C. § 141 (a) to require reimbursement when providing the use of its facilities which are especially qualified to assist CALTRANS, an Agency of the State of California. The reimbursement is to compensate the COAST GUARD for the loss of useable space on YBI. In recognition of the PROJECT'S broad impacts on COAST GUARD operations and other mission related activities within the San Francisco Bay Area, some COAST GUARD functions may be reorganized and some structures may be located on other COAST GUARD controlled property within the Greater San Francisco Bay Area.

(b) As of this date, the impact of the PROJECT on Senior Officer Family Quarters No. 9 is unknown. Once construction has begun, if it is reasonably determined by the COAST GUARD that the Senior Officer Family Quarters No. 9 must also be vacated for a portion or the entirety of the Duration of the PROJECT, the additional sum of $4,100 (four thousand one hundred dollars) per month as compensation for Senior Officer Family Quarters No. 9 being vacated, for the actual period of COAST GUARD vacancy arising from PROJECT related disruptions to its residents. The procedures affecting this item are further described in Subsection 4.b. (16) below.

(c) The additional amounts necessary to pay the actual cost to renovate the third floor of COAST GUARD Building No. 3 as a COAST GUARD watchstander berthing facility for the duty crews of both COAST GUARD Group and Station San Francisco. This amount and procedures affecting this item are further described in Subsection 4. b.(14) below.

(2) Will provide, without cost to the COAST GUARD, 24-hour per day, 7-day per week access to the COAST GUARD's YBI facilities during the course of the PROJECT subject to 3-day advance notification of construction activities which would otherwise block access for more than 15 consecutive minutes. COAST GUARD access is for all vehicles including, but not limited to, trucks, pedestrians, and vessels.

(3) Noise, Dust and Debris Standards.

(a) Will, without cost to the COAST GUARD, monitor and mitigate PROJECT noise generated on YBI, not to exceed 78dBA Lmax (5 dBA over

present ambient noise levels of 73 dBA based on noise survey conducted on April 4, 2002), during the hours of 7:00 p.m. to 7:00 a.m., from the PROJECT for the residents of COAST GUARD barrack and family housing areas. If construction noise levels are expected to exceed this standard, noise mitigation measures (e.g., a sound barrier) shall be required. Impact-type mechanical operations, such as pile driving and jack-hammering, shall not be conducted during the aforementioned evening hours (e.g., 7:00 p.m. to 7:00 a.m.), regardless of the presence of noise mitigation measures. Noise measurements for construction during the hours of 7:00 p.m. to 7 a.m. (evening hours) shall be taken on the sidewalk outside of Building 26, adjacent to the breezeway and nearest the barracks room window. If a sound barrier is constructed, at least five noise measurements along the entire length of the sound barrier shall be taken between the sound barrier and Building 26. In addition, the COAST GUARD Group San Francisco Facility Engineer may also request additional noise samplings by CALTRANS' noise engineer at CALTRANS' expense at a frequency not to exceed twice a month. The noise engineer shall provide reports and sampling data from the noise sampling within 12 hours of the noise measurements. The contractor shall provide the COAST GUARD with all noise reports and sampling data obtained by the noise engineer within 24 hours of its receipt from the noise engineer. At any time that the PROJECT noise exceeds these standards, the affected COAST GUARD personnel or families shall be relocated, at CALTRANS expense, as per Subsection 4.b.(13) below.

(b) Will, without cost to the COAST GUARD, prepare and implement a statistically defensible sampling strategy that characterizes PROJECT compliance with the National Ambient Air Quality Standards, including PM 2.5 and lead, without regard to time or area weighting, at locations where COAST GUARD personnel and families may be exposed. The COAST GUARD may also request additional air sampling by the Certified Industrial Hygienist (CIH) at CALTRANS expense at a frequency not to exceed twice a month. The CIH shall provide reports and sampling data within 48 hours of the air sampling measurements. CALTRANS shall provide the COAST GUARD with all air sampling reports and data obtained by the CIH within 24 hours of its receipt from the CIH. Visible dust will be controlled through the use of water or other dust palliatives. At any time that the contractor exceeds these standards, the affected COAST GUARD personnel or families shall be relocated, at CALTRANS expense, as per Subsection 4.b.(13) below.

(c) Will, without cost to the COAST GUARD, ensure all materials, whether waste, non-waste, or construction byproducts are contained within the access-controlled area of the PROJECT site. At any time any PROJECT-related materials pose an actual or potential hazard to Coast Guard personnel or families, the affected Coast Guard personnel or families shall be relocated, at CALTRANS expense, as per Subsection 4.b.(13) below.

(4) Will, without cost to the COAST GUARD, protect, maintain and repair any affected COAST GUARD facilities and relocate affected utilities (telecommunications,

electricity, natural gas, water, sewer, storm drainage, etc.) if necessary which serve the COAST GUARD within the designated PROJECT construction area for the duration of the PROJECT. Any predictable interruptions of utility service will be coordinated with the COAST GUARD Group San Francisco Engineer Officer with at least 7-day advance notice. Unpredictable interruptions of utility service will be dealt with in a responsive and efficient manner. CALTRANS will coordinate, and bear all costs associated with, the delivery of emergency utility service to the COAST GUARD facilities on YBI that are necessitated by any interruptions of those utility systems by PROJECT activities, for the duration of the PROJECT. Once the PROJECT is completed, CALTRANS will prepare & execute appropriate agreements with utility owners for any such related utilities upon PROJECT property which CALTRANS controls.

(5) Will, without cost to the COAST GUARD, ensure that its PROJECT plans and its construction activities will not cause interference with or restrictions on the use of COAST GUARD electronic or communications equipment.

(6) Will, in furtherance of its PROJECT and without cost to the COAST GUARD, remove Building Nos. 30, 40, 75 and 270, as identified on Exhibit "C" of this MOA and will properly demolish and dispose of all materials off-site in accordance with all applicable Federal, State and local laws and regulations, including any hazardous materials these buildings may contain.

(7) Will provide, without cost to the COAST GUARD, all necessary real property descriptions, including metes and bounds legal descriptions and drawings, prepared by a registered land surveyor, for all documents described in Subsections 4.a.(1) and (2).

(8) Will provide, without cost to the COAST GUARD, PROJECT mandated paved temporary and permanent access road alignments through the PROPERTY. These alignments will be developed in close cooperation with the COAST GUARD's own Civil Engineering personnel. Both alignments will include provisions for oversize vehicles that regularly visit the COAST GUARD facilities at YBI and will provide adequate signage for COAST GUARD facilities with street lighting and an entrance gate system, having the same capabilities as the present entrance gate system (programmable entrance system, security cameras, telephone, entrance card-lock & keypad system, magnetic roadway pad, etc.). The permanent alignment will not include access to non-COAST GUARD facilities (i.e. Building 262 – commonly referred to as "the Torpedo Facility") from COAST GUARD controlled property. The permanent alignment will be constructed to appropriate State of California standards and will include a 4-foot wide pedestrian lane clear of objects such as light poles or signs. The permanent telecommunications Easement shall be located by CALTRANS adjacent to the eventual permanent alignment of the COAST GUARD access road.

(9) Understands that vehicle parking on the COAST GUARD facility is constrained and will take all reasonable measures to ensure, without cost to the COAST GUARD, that any areas available for parking during the duration of the PROJECT will be made accessible for vehicles. These measures may include, but are not limited to,

the construction of temporary roads to access parking areas cut off from their normal access routes by the PROJECT. These temporary roadways will be removed by CALTRANS, at its own expense, upon the completion of the PROJECT and the areas restored to their previous condition unless the COAST GUARD requests otherwise.

(10) Will provide, for the duration of the PROJECT and without cost to the COAST GUARD, that adequate engineering measures are applied to ensure the stability of the steep hillside slope it is allowed to use per Subsection 4.a.(1) between Treasure Island Road and the vicinity of the COAST GUARD Barracks. CALTRANS will be responsible for and, without cost to the COAST GUARD, will expeditiously take all reasonable actions and measures to prevent, or where prevention is not possible, to mitigate, all slides in an area up to 600 feet south of the existing Bridge for the duration of the PROJECT on YBI.

(11) Will take, without cost to the COAST GUARD, all reasonable long-term actions and measures to provide a firm and stable hillside within the Licensed area CALTRANS is allowed to use per Subsection 4.a.(1), through the following rainy season beginning in the first October after CALTRANS is no longer present on the Licensed slope area until the rainy season ends in the following June.

(12) Will, without cost to the COAST GUARD, provide for the continued physical security needs of COAST GUARD controlled PROJECT property at YBI through the erection of a perimeter security fence to COAST GUARD specifications, and will provide for additional security coordination, including non-PROJECT access closure, when necessary for reasons of enhanced Military or National Security Threat Conditions. The effect will be to provide the COAST GUARD a secure perimeter during the period of PROJECT construction on YBI. Once the YBI portion of the PROJECT has been completed, CALTRANS will re-establish a security fence to COAST GUARD specifications along the perimeter of COAST GUARD controlled property, tying into the new entrance gate system discussed in Subsection 4.b.(8) above.

(13) Will provide 7-day advance warning to the COAST GUARD Group San Francisco Engineer Officer of periods of noise, dust or debris exceeding the criteria set forth in Subsection 4.b.(3) above between the hours of 7:00 p.m. and 7:00 a.m. when occasioned by necessary construction work on or near the PROPERTY and will relocate any resident COAST GUARD member or dependent on YBI, without cost to those residents or the COAST GUARD, to agreed upon area hotels within a 10-mile drive of YBI for the duration of the excessive noise activity. Lists of qualified residents and dependents (updated by the COAST GUARD as necessary) will be provided to CALTRANS' designated contact by their COAST GUARD counterpart at least 3 days in advance of any scheduled relocation. In addition to the actual relocation costs, CALTRANS will pay for both the temporary lodging and parking for any qualified COAST GUARD members or dependents under this relocation provision. Per diem will be paid directly to relocated COAST GUARD residents by CALTRANS under provisions of Subsection 12.g. below. CALTRANS will provide, at its own expense, a scheduled transportation service to transport relocated COAST GUARD members to and from their

YBI duty stations, at the beginning and end of their scheduled duty shifts, for the duration of their relocation.

(14) Watchstander Berthing.

(a) As provided in Subsection 4.b.(1)(c) above, CALTRANS will pay the actual cost to renovate the third floor of COAST GUARD Building No. 3 as a COAST GUARD Watchstander Berthing Facility for the duty crews of both COAST GUARD Group and Station San Francisco. Exhibit "D" is a Conceptual Design Description of the COAST GUARD Temporary Watchstander Berthing Quarters Relocation project. The estimated cost of this renovation is $1,226,000. (one million two hundred twenty six dollars).

(b) CALTRANS will pay the estimated cost of $1,226,000 within 10 days after the full execution of this MOA.

(c) COAST GUARD will provide to CALTRANS on or about July 17, 2002 its Detailed Cost Estimate consistent with the Conceptual Design Description in Exhibit "D". Upon contract award, COAST GUARD will provide CALTRANS with copies of those portions of the contract necessary to show contract price. If requested by CALTRANS, COAST GUARD will provide to CALTRANS the 50 per cent design submittal, final design drawings and specifications, and SHPO comments and concurrence. If requested by CALTRANS, COAST GUARD will allow CALTRANS to inspect the complete and original project files, with the understanding that the original contract documentation will be located in Seattle, Washington.

(d) COAST GUARD will award a Design/ Build type contract consistent with the Conceptual Design Description in Exhibit "D" and California State Historic Preservation Office (SHPO) mandated changes, if any. Completion of construction is anticipated to be on or about January 30, 2003.

(e) If the Watchstander Berthing Facility total actual project costs are less than the total amount advanced by CALTRANS for this facility, COAST GUARD will return the excess to CALTRANS after the renovation has been completed. If the total project costs exceed the total amount advanced, CALTRANS will reimburse COAST GUARD for the excess.

(f) "Actual cost" for the project design and construction includes only direct costs incurred or expended by COAST GUARD for the following Watchstander Berthing project elements:

1) Design and engineering services
2) Administration and travel costs
3) Design, purchase and install furnishings
4) Construction costs
5) Construction inspection

COAST GUARD in-house design services are not included in "actual cost", but COAST GUARD administration and travel costs are included. All other items are contracted.

(g) After Watchstander Berthing project completion, COAST GUARD will provide CALTRANS with a Final Accounting of all Watchstander Berthing facility direct project costs, including all the items detailed in paragraph 4.b.(14)(f) above.

(h) The third floor of COAST GUARD Building No. 3 currently is used for storage. In addition to the payments for actual cost, if requested by the COAST GUARD, CALTRANS will provide an in-kind replacement storage facility, at no cost to COAST GUARD, readily accessible from YBI, for the displaced storage function.

(15) Senior Officer Family Quarters No. 8 will be vacated by its COAST GUARD residents for reasons of the impending disruption of the PROJECT by 1 July 2003. The CALTRANS payment of $9,700,000 provided for in Subsection 4.b.(1)(a) includes compensation to the COAST GUARD for this vacation. In addition to this payment, CALTRANS will provide the following in-kind services at its own expense: Provide a perimeter security fence, to COAST GUARD specifications, around the Quarters 8 property; when requested by the COAST GUARD, remove this security fence and perform a thorough external cleaning to Quarters No. 8 prior to its return for use by COAST GUARD residents.

(16) Will, at the request of the COAST GUARD, for PROJECT related disruptions to its residents, provide the lump sum rental value of $4,100 per month for the period of PROJECT related disruptions causing the loss of use of Senior Officer Family Quarters No. 9. If the Quarters 9 property is vacated by the COAST GUARD during the duration of that PROJECT disruption, CALTRANS will, at its own expense, provide a perimeter security fence, to COAST GUARD specifications, protecting the Quarters 9 property. CALTRANS will, at its own expense and when requested by the COAST GUARD, remove this security fence and perform a thorough external cleaning to Quarters No. 9 prior to its return for use by COAST GUARD residents.

(17) In the event that any significant additional environmental information or documentation to the PROJECT Final EIS (dated May 8, 2001) is needed to comply with any applicable Federal, State or local law or regulation, CALTRANS will, without cost to the COAST GUARD, ensure such compliance. CALTRANS acknowledges that the potential for release of hazardous substances and contamination exist on the PROPERTY. In the execution of all activities authorized under this MOA, CALTRANS shall take all reasonable measures to protect human health and the environment and minimize disruption to existing hazardous substances and/or contamination, and prevent any new releases and/or new exposure pathways. CALTRANS will be responsible for any new releases and/or new exposure pathways from any known

and/or potential sources of hazardous substances from surface or subsurface soil, surface and ground water, and/or air. CALTRANS will properly contain, handle and dispose of all potential contamination or hazardous substances or materials.

(18) Will, without cost to the COAST GUARD, take all reasonable actions and measures, subject to the prior approval of the COAST GUARD, to ensure the safety of COAST GUARD personnel, visitors and property within the PROJECT site at all times while on YBI during the PROJECT construction term.

(19) CALTRANS shall bear sole responsibility, to the extent allowable under California law, for all CALTRANS caused negligent PROJECT related damage and injury to COAST GUARD property, employees, contractors, visitors, and guests on, or when traveling over CALTRANS controlled portions of COAST GUARD property.

5. POINTS OF CONTACT. Both parties will provide primary points of contact initiating any future discussions of issues related to this MOA. Contacts are listed by title with current address, telephone and telefax numbers. The COAST GUARD and CALTRANS will promptly notify the other in the event the primary point of contact is changed. This notification shall be in writing, by letter to the appropriate office. Primary points of contact are listed as follows:

COAST GUARD: Chief, Civil Engineering Division, MLC-Pacific (s), Coast Guard Island, Alameda, CA 94501; telephone: (510) 437-3512; telefax: (510) 437-5753.

CALTRANS:

Office Chief, Toll Bridge Program, California Department of Transportation, P.O. Box 23660, Oakland, CA 94623; telephone: (510) 286-5085; telefax: (510) 622-5460;

and

Office Chief, Right of Way, California Department of Transportation, P.O. Box 23660, Oakland, CA 94623; telephone: (510) 286-5400; telefax: (510) 286-5482.

6. RESOLUTION OF DISPUTES. The parties agree that, in the event of a dispute between the parties, CALTRANS and the COAST GUARD shall use their best efforts to resolve the dispute in an informal fashion through consultation and communication, or other forms of non-binding alternative dispute resolution mutually acceptable to the parties. If they cannot agree, either party may initiate the following alternative dispute resolution (ADR) process. The dispute shall be summarized in writing, and provided to the Chairman, Department of Transportation Board of Contract Appeals (DOTBCA), 400 7th Street, S.W., Washington, D.C. 20590. The party initiating the ADR process will identify this MOA in the aforesaid written summary and provide the DOTBCA with a copy of this MOA. The DOTBCA will assign the matter to a judge and that judge will then advise the other party of the submission, and establish, on an ad hoc basis, the

further process for resolution. The result of the ADR before the DOTBCA shall be binding and final.

7. 1938 AGREEMENT. The Agreement established between the California Toll Bridge Authority and the United States of America, as signed by the Secretary of the California Toll Bridge Authority on December 3, 1938 and the Attorney General of the United States on December 16, 1938, regarding the free passage over the Bay Bridge by personnel of the United States remains in effect and will be permanently incorporated into the real property documents described in Subsection 4.a.(2) above.

8. OTHER PROVISIONS. Nothing in this MOA is intended to conflict with current law or regulation or the directives of the U.S. COAST GUARD or the U.S. Department of Transportation or CALTRANS. If a term of this MOA is inconsistent with such authority, then that term shall be invalid, but the remaining terms and conditions of this MOA shall remain in full force and effect.

9. EFFECTIVE DATE. This MOA shall become effective on the date the last party executes the MOA.

10. MODIFICATION. This MOA may be modified only upon the mutual written consent of the parties.

11. TERMINATION. The terms of this Agreement, as modified with the written consent of both parties, will remain in effect until the earlier of 21 June 2022 or the completion of the PROJECT, or sooner upon the mutual written agreement of both parties.

12. FUNDING and PAYMENT.

a. CALTRANS shall make all payments to United States Coast Guard by checks delivered to the COAST GUARD Point of Contact listed in Section 5.

b. CALTRANS shall make the $9,700,000 payment in exchange for the executed license(s) described in Subsection 4.a.(1).

c. CALTRANS will make the $1,226,000 estimated payment for the Watchstander Berthing Facility referred to in Subsection 4.b.(14) within 10 days after the full execution of this MOA.

d. CALTRANS will make payment(s) for any additional amounts needed to reimburse COAST GUARD for actual costs for the Watchstander Berthing Facility within 30 days after notification to CALTRANS of the occurrence of additional actual costs, and within 30 days after COAST GUARD provides its final accounting to CALTRANS. COAST GUARD will return any excess funds from the Watchstander Berthing Project to CALTRANS within 30 days after final accounting. All costs are subject to audit by CALTRANS or the U.S. Department of Transportation and any

reported overpayments will be returned within 30 days of final determination of the allowability of those costs.

e. CALTRANS will make any payments that may become due because of the unavailability of Senior Officer Family Quarters No. 9 as referred to in Subsection 4.b.(16) within 30 days after COAST GUARD notification to CALTRANS.

f. Relocation Assistance Program payments will be paid directly by CALTRANS to affected COAST GUARD personnel contemporaneously with the relocation.

g. The total of all direct CALTRANS payments to the COAST GUARD and affected COAST GUARD personnel under this Section, excluding relocation payments of Subsection 12.f. above, shall in no event exceed the sum of $13,000,000 (thirteen million dollars).

13. EXHIBITS. The following exhibits are attached hereto and made a part hereof:

a. Exhibit "A" – Drawing of Real Property Licensed Area
b. Exhibit "B" – Drawing of Permanent Easement Area
c. Exhibit "C" – Drawing of Building Nos. 30, 40, 75 and 270
d. Exhibit "D" – Temporary Watchstander Berthing Quarters Relocation – Conceptual Design Description

APPROVED BY:

Thomas H. Gilmour

THOMAS H. GILMOUR
REAR ADMIRAL, U.S. Coast Guard
Commander, Maintenance & Logistics Command Pacific

JUN 21 2002
DATE

R. A. MACPHERSON
Deputy District Director, Right of Way
State of California, Department of Transportation

6/26/02
DATE

Approved as to form

WILLIAM B. BASSETT
HQ Legal Division, State of California, DOT

6/25/02
DATE

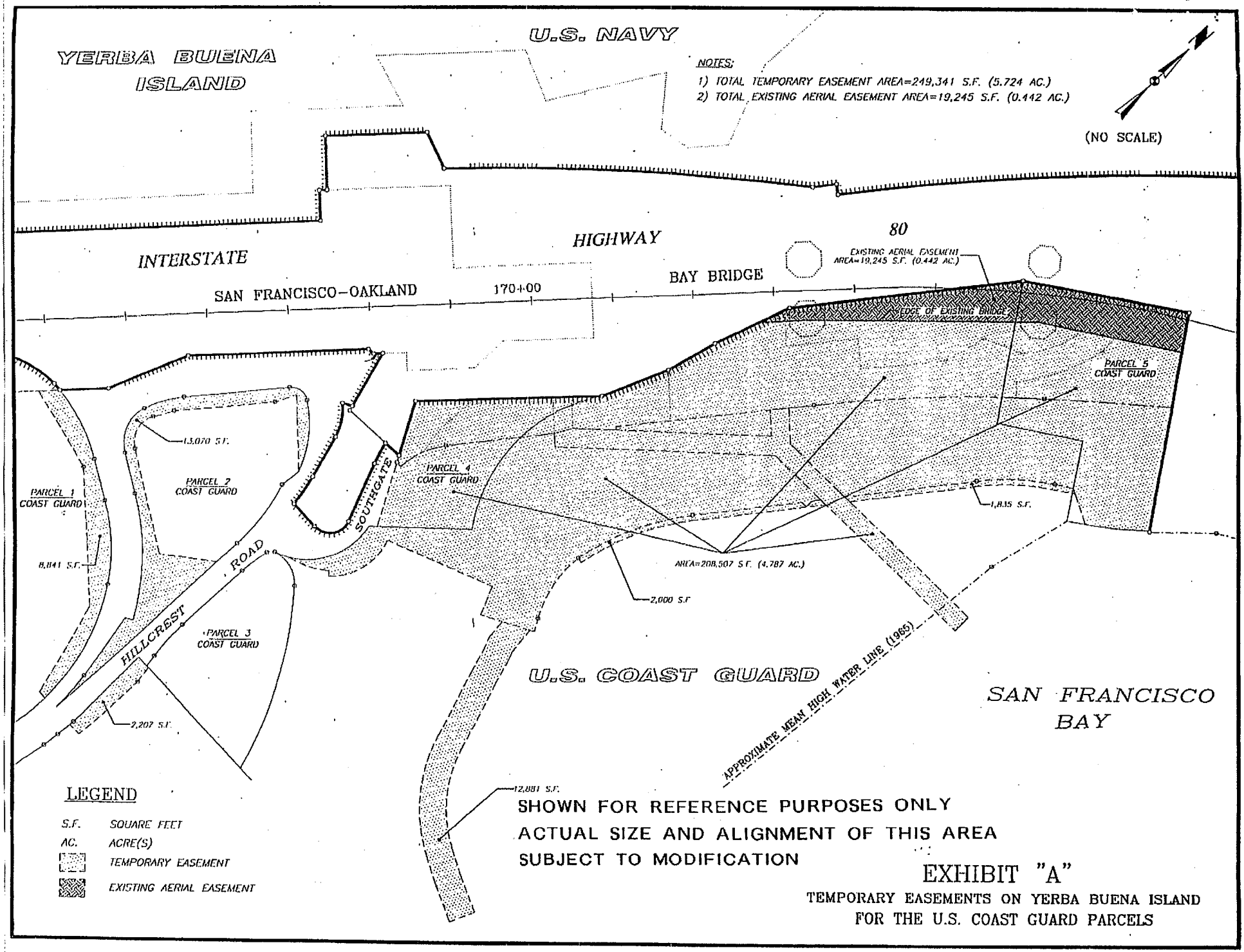


EXHIBIT "A"

TEMPORARY EASEMENTS ON YERBA BUENA ISLAND
FOR THE U.S. COAST GUARD PARCELS

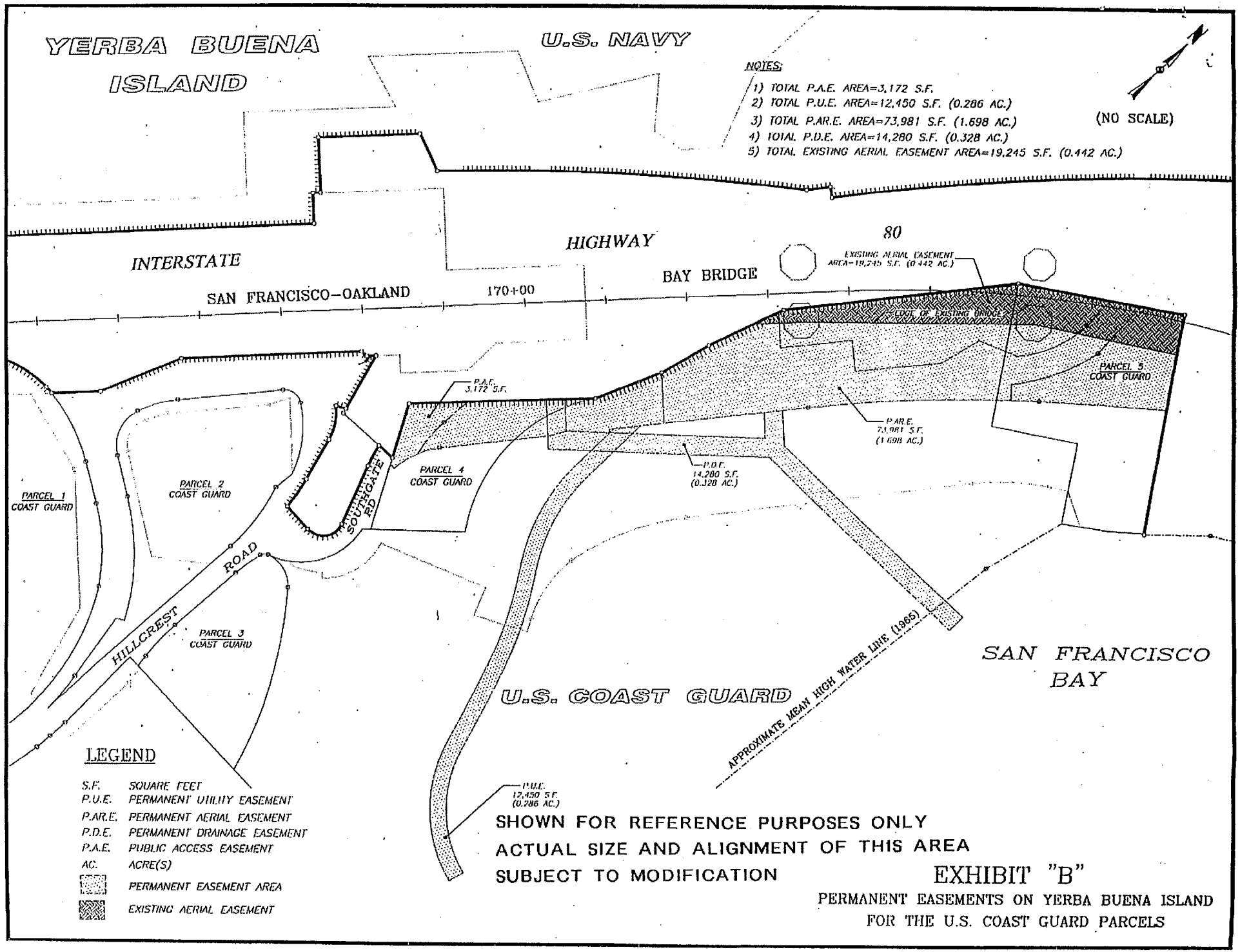


EXHIBIT "B"

PERMANENT EASEMENTS ON YERBA BUENA ISLAND
FOR THE U.S. COAST GUARD PARCELS

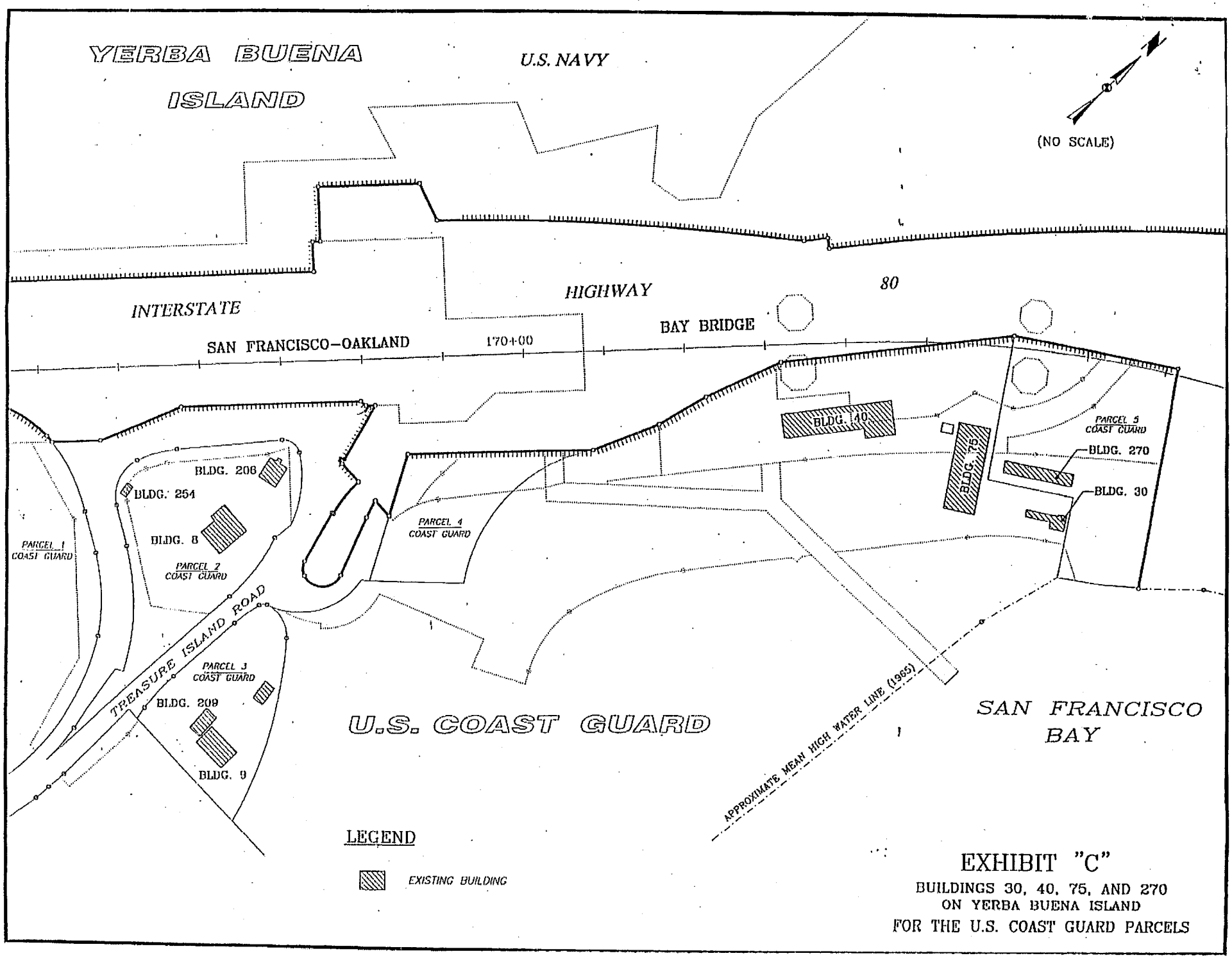


EXHIBIT "C"

BUILDINGS 30, 40, 75, AND 270
ON YERBA BUENA ISLAND
FOR THE U.S. COAST GUARD PARCELS

Yerba Buena Island, CA
Temporary Watchstander Berthing Quarters Relocation

Architectural:

The proposed project would construct 10 berthing modules on the third floor of Building 3 per Coast Guard design standards. Each module will include living and bathroom areas. Construction methods and finishes include: standard "stick-built" systems, standard grade carpeting in berthing areas and vinyl flooring in the bathrooms, painted gypsum board walls and ceilings and standard quality plumbing fixtures to meet plumbing codes. The design and construction systems employed will attempt to reduce the impact of known lead paint and asbestos containing materials in the project budget.

Building 3's means of egress will be modified to accommodate the changed occupancy of the third floor from storage to dormitory usage. The entire interior stairwell will be enclosed to create a protected primary means of egress. The construction of a temporary exterior stairway will provide the code required secondary means of egress.

The California State Historic Preservation Office (SHPO) must approve the project's plans prior to construction due to the historic nature of Building 3. The proposed project to provide berthing on the third floor of Building 3 is therefore subject to change if the SHPO considers the work to have an adverse impact on the structure's historic significance. The Coast Guard's Facilities Design & Construction Center will work with the SHPO to minimize the impact of the proposed construction on the building and reduce associated costs wherever possible while maintaining the project's overall functional requirements.

Mechanical:

Plumbing & Fire Protection: The project would install a 2 1/2" water service into the building to service the berthing toilet facilities and provide an automatic fire suppression system on the third floor. Existing systems are inadequate to support the proposed work.
Heating and Ventilating: Heating and ventilation will be provided to the third floor berthing area. The building's existing heating system will be modified to support the additional loads. Ventilation fans will be installed to provide code required outside air to the berthing spaces.

Electrical:

Electrical work to support the proposed third floor berthing will include: a new power service to Building 3, a new main panel board on the first floor and secondary distribution systems. The building's existing fire alarm system will be modified to accommodate the change in occupancy on the third floor.

The building's telecommunication service will be modified to provide telephone service for the berthing rooms.

EXHIBIT (D)

Memorandum of Agreement

Among
the Federal Highway Administration,
the United States Coast Guard,
the California State Historic Preservation Officer
and the Advisory Council on Historic Preservation
For the San Francisco Oakland Bay Bridge East Span Seismic Safety Project
in San Francisco and Alameda Counties, California

WHEREAS, the Federal Highway Administration (FHWA) proposes to approve design changes to the Interstate system and possibly to fund a seismic safety project for the east span of the San Francisco-Oakland Bay Bridge (Undertaking) proposed by the California Department of Transportation (Caltrans); and

WHEREAS, the four build alternatives being considered for this Undertaking include retrofit of the existing structure, constructing a replacement bridge to the south of the existing bridge, and constructing a replacement bridge to the north of the existing bridge on one of two possible alignments; and

WHEREAS, FHWA will be the lead federal agency for this Undertaking ; and

WHEREAS, the United States Coast Guard (Coast Guard) has independent review responsibilities for its bridge permit for navigational features; and

WHEREAS, portions of this Undertaking will occur on lands currently under the federal jurisdictions of the Department of the Navy (Navy) and the Coast Guard, and

WHEREAS, the Undertaking will include transfer of land, or interest in land, necessary for the Undertaking, under United States Department of Transportation (USDOT) authority pursuant to Title 23 of United States Code (U.S.C.) Section 107(d) and acquisition of such land has been delegated by the Secretary of Transportation to FHWA, which would then transfer the land to Caltrans; and

WHEREAS, such land transfer will not include title to any historic properties with the exceptions of the archaeological site CA-SFr-04/H and the air space over the Navy Building 262; and

WHEREAS, this Undertaking may adversely affect historic properties listed or eligible for listing on the National Register of Historic Places, including the San Francisco-Oakland Bay Bridge, the Navy Building 262, the Naval Officers' Quarters Historic District, the Key Pier Substation, and archaeological site CA-SFr-04/H, and may have effects on archaeological properties that have not yet been identified; and

WHEREAS, Naval Station Treasure Island Base Closure and Reuse is a separate Undertaking from the subject Undertaking; and

WHEREAS, FHWA has consulted with the California State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (Council) pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f); and

WHEREAS, FHWA and Caltrans have consulted with local governments; the Department of the Navy; City of Oakland and City and County of San Francisco; the Foundation for San Francisco's Architectural Heritage; the San Francisco Planning & Urban Research Association; the Mayor's Treasure Island Project Office; the National Park Service (Western Regional Office); the National Trust for Historic Preservation; the California Preservation Foundation; the Oakland Landmarks Preservation Advisory Board; the San Francisco Landmarks Preservation Advisory Board; the Oakland Cultural Heritage Survey; the Port of Oakland; the Oakland Heritage Alliance and the Oakland Department of Public Works about the Undertaking and its effects on historic properties, and have taken all comments received from these parties into account; and

WHEREAS, FHWA and Caltrans have consulted with the following non-federally recognized Ohlone Native Americans identified by the California Native American Heritage Commission as Native American groups and individuals with a potential interest in the project area about the effects of the Undertaking on archaeological properties, and have taken all comments received from these parties into account: Chairperson Rosemary Cambra of the Muwekma Indian Tribe, Chairperson Tony Cerda of the Costanoan Rumsen Carmel Tribe, Mr. Andrew Galvan of The Ohlone Indian Tribe, Ms. Jakki Kehl, Mr. Kenneth Marquis, Ms. Jenny Mousseaux (Mcleod), Mr. Patrick Orozco, Ms. Katherine Erolinda Perez, Mr. Alex Ramirez, Chairperson Rudy Rosales of the Ohlone/Costanoan-Esselen Nation, Chairperson Ann Marie Sayer of the Indian Canyon Mutsun Band of Costanoan, Ms. Linda G. Yamane and Chairperson Irene Zwierlein of the Amah Tribal Band; and

WHEREAS, all non-federally recognized Ohlone Native Americans listed above will be invited to concur in the Agreement and to participate in the development and implementation of the Research Design and Treatment Plan (Treatment Plan); and

WHEREAS, Caltrans, the Department of the Navy, the City of Oakland and the City and County of San Francisco have been or will be invited to concur in the Agreement,

NOW, THEREFORE, FHWA, the Coast Guard, the SHPO, and the Council agree that the Undertaking will be implemented in accordance with the following stipulations in order to take into account the effect of the Undertaking on historic properties.

STIPULATIONS

FHWA will ensure that the following stipulations are carried out as applicable:

I. Applicability of Stipulations

A. Retrofit existing bridge

If the alternative chosen is to retrofit the existing bridge, the following stipulations will be carried out: II, III.E, III.G, IV.A, IV.B, V.A, V.B, V.C, V.D, and VII through XII.

B. Replacement bridge to south of existing bridge

If the alternative chosen is a replacement bridge to the south of the existing bridge, all of the stipulations in this Agreement will be carried out except for IV.C and V.D.

C. Replacement bridge to north of existing bridge

If the alternative chosen is a replacement bridge to the north of the existing bridge, all of the stipulations in this Agreement will be carried out except for V.D.

II. Professional Standards

All activities regarding history, historic preservation, historical archaeology and prehistoric archaeology that are carried out pursuant to this Agreement will be carried out by or under the direct supervision of persons meeting at a minimum the Secretary of the Interior's professional qualifications standards (48 FR 44738–9) in these disciplines.

III. Mitigation of effects on the San Francisco–Oakland Bay Bridge (Bay Bridge)

A. Salvage

Caltrans will offer selected components of the bridge to the East Bay Regional Park District or other owner of the proposed Oakland touchdown park (south of the new bridge, between the toll plaza and the shoreline in Oakland), for display or other use in the park. Caltrans will also provide the Oakland Museum of California, the Western Railway Museum in Rio Vista, Solano County, and any other interested parties an opportunity to select components of the bridge for curation, display, or other appropriate use. Caltrans will remove the items selected in a manner that minimizes damage and will deliver them with legal title to the recipient.

B. Permanent interpretive exhibits

1. Caltrans will consult with the East Bay Regional Park District or other owner of the proposed Oakland touchdown park about their interest in having interpretive exhibits incorporated into the design of the park which describe the Bay Bridge as originally constructed. If consultation results in agreement between Caltrans and the park owner concerning the nature and extent of the exhibits before January 1, 2008, Caltrans will produce and install the exhibits. The interpretive exhibits may include, but are not necessarily limited to: plaques or markers, salvaged components of the bridge, a mural or other depiction of the bridge, and the large clock that formerly stood atop the toll plaza canopy.

2. If consultation does not result in agreement between Caltrans and the park owner, Caltrans will seek an alternative East Bay location for the interpretive exhibits. Appropriate alternative locations may include Marina Park in Emeryville or the Berkeley Pier.

3. Caltrans will also consult with the City and County of San Francisco about their interest in having similar interpretive exhibits on Yerba Buena Island, and will produce and install the exhibits only if consultation results in agreement between Caltrans and the City and County of San Francisco before January 1, 2008.

C. Museum exhibit

1. Caltrans will consult with the Oakland Museum of California, the Academy of Sciences in San Francisco and/or other Bay Area museums about their interest in preparing and presenting an exhibit relating to the history and engineering of the major bridges of the San Francisco Bay, and will discuss with an interested museum the scope, content, and cost of such an exhibit.

2. If this consultation results in agreement between Caltrans and a museum to prepare and present such an exhibit, Caltrans will identify and conserve documentary materials in its possession related to the Bay Bridge and other major bridges of the San Francisco Bay that are considered most appropriate for such an exhibit, possibly including photographs, drawings, videotape, models, oral histories, and salvaged components from the bridges. In addition, Caltrans will assist the museum by contributing to the cost of preparing and presenting the exhibit, as well as the cost of an exhibit catalog or related museum publication in conjunction with the exhibit, in a manner and to the extent agreed upon by Caltrans and the museum.

D. Permanent curation and display of exhibit materials

At the conclusion of the museum exhibit described in Stipulation III.C., Caltrans will select historic items and interpretive materials from the exhibit to be offered to local governments, historical societies, and other interested parties in the Bay Area for permanent curation and public display. Caltrans will notify potential public and non-profit venues, which Caltrans has determined meet acceptable curation standards, of the availability of materials and will deliver the materials at its own expense to the selected venues. In the event there are multiple requests for the same items, Caltrans shall consider the proposals submitted by the requesters for the materials and shall decide which party shall receive the item, based on the ability of the requester properly to curate and exhibit the item.

E. Oral history

Caltrans will produce oral history documentation related to the construction and operation of the Bay Bridge, which will include audiotape and transcripts and may also include videotape. Caltrans will select appropriate subjects for interviews, who may include engineers and construction workers who participated in the construction of the bridge, bridge maintenance workers, bridge railway train operators, and others whose lives were affected by the bridge. Copies of the documentation will be provided to the Bancroft Library of the University of California at Berkeley, the Oakland History Room of the Oakland Public Library, the History Center at the San Francisco Public Library, the California Historical Society, and the Oakland Museum of California.

F. Documentary videos

1. Caltrans will provide copies of one or more of the existing documentary videos about the construction of the Bay Bridge to the public libraries of Oakland, San Francisco, Emeryville and Berkeley, as well as the California Historical Society.

2. In addition, Caltrans will produce curriculum materials to accompany the videos and will provide the curriculum materials and videos to the public school systems of Oakland, San Francisco, Emeryville and Berkeley, and to other school districts upon request.

3. Within 180 days after FHWA determines that the Undertaking has been completed, FHWA, in consultation with the SHPO, will re-evaluate the Bay Bridge, a property listed on the National Register of Historic Places, and determine whether the National Register nomination should be amended or whether the bridge no longer qualifies for listing and should be removed from the National Register. As appropriate, FHWA will prepare and submit to the SHPO either an amended nomination or petition for removal, to be processed according to the procedures set forth in 36 CFR Part 60 (60.14 and 60.15).

IV. Mitigation of effects on Navy Building 262 on Yerba Buena Island

A. Protective measures

Caltrans, in consultation with the property owner, will develop and implement measures to protect Building 262 from damage by any aspect of the Undertaking. Such measures will include, but not necessarily be limited to, vibration monitoring during pile driving in the vicinity of this building. The protective measures will be included in the contract specifications and in Caltrans' Resident Engineer's "pending" file.

B. Repair of inadvertent damage

Caltrans will ensure that any damage to Building 262 resulting from the Undertaking will be repaired in accordance with the Secretary of the Interior's *Standards for Rehabilitation.* Caltrans will photographically document the condition of the building prior to the start of the Undertaking to establish the baseline condition for assessing damage. A copy of this photographic documentation will be provided to the Navy and the City and County of San Francisco. Prior to implementation, Caltrans shall provide the plans for any repairs to the SHPO for review and comment to ensure conformance with the Secretary of the Interior's Standards for Rehabilitation.

C. Historic Structure Report

Caltrans will prepare or fund the preparation of an historic structure report for Building 262, to promote the reuse of this building. The historic structure report will, at a minimum, describe the significance and historic uses of the building; identify and assess the condition of original materials; describe later alterations; assess the structural condition of the building, including seismic safety considerations; and make recommendations for future seismic retrofit, other structural improvements, and appropriate preservation treatments. The scope of the historic structure report will be developed in consultation with the property owner. Copies of the report will be provided to the Navy and the City and County of San Francisco for review and to the SHPO for its records.

V. Mitigation of effects on the Naval Officers' Quarters Historic District, Quarters 8, Quarters 10, and Building 267 on Yerba Buena Island

A. Protective measures

Caltrans, in consultation with the Navy and the Coast Guard, will develop and implement measures to protect the Naval Officers' Quarters Historic District, Quarters 8, Quarters 10, and Building 267 from damage by any aspect of the Undertaking. The protective measures will be included in the contract specifications and in Caltrans' Resident Engineer's "pending" file.

B. Repair of inadvertent damage to buildings

Caltrans will ensure that any damage to the buildings of the Naval Officers' Quarters Historic District, Quarters 8, Quarters 10, or Building 267 resulting from the Undertaking will be repaired in accordance with the Secretary of the Interior's Standards for Rehabilitation. Caltrans will photographically document the condition of these buildings prior to the start of the Undertaking to establish the baseline condition for assessing damage. A copy of this photographic documentation will be provided to the Navy, the Coast Guard, and the City and County of San Francisco. Prior to implementation, Caltrans shall provide the plans for any repairs to SHPO for review and comment to ensure conformance with the Secretary of the Interior's Standards for Rehabilitation.

C. Restoration of the grounds

1. Caltrans will ensure that the grounds within the National Register boundaries of the Naval Officers' Quarters Historic District, Quarters 8, and Quarters 10 are restored after completion of the bridge project and removal of all temporary structures, to their condition prior to the start of the Undertaking. Caltrans will photographically document the grounds of these properties prior to the start of the Undertaking to establish the baseline condition for restoration. A copy of this photographic documentation will be provided to the Navy, the Coast Guard, and the City and County of San Francisco. Restoration of the grounds will include, but will not necessarily be limited to: new sod in grass areas, replacement of shrubbery and trees; regrading and revegetation of disturbed slopes; repair or replacement of damaged paving, sidewalks and curbs.

2. The Undertaking includes revegetation of disturbed slopes, including the areas south of the Naval Officers' Quarters Historic District and southeast of Quarters 10, which currently screen the existing bridge from these historic properties. Caltrans will establish construction limits in this area to preserve as much of the existing vegetation around Quarters 1 as possible, and will develop and implement a revegetation plan for affected areas, including the planting of mature trees, monitoring, and replanting as necessary to ensure success of the plan, in order to return the slope behind Quarters 1

to a natural appearance and to establish visual screening of the bridge comparable to the existing condition.

D. Screen planting in front of YB-3

In consultation with the property owner, Caltrans will develop and implement a planting plan to screen the concrete-encased pier YB-3 from Quarters 1, a property within the Naval Officers' Quarters Historic District and individually listed on the National Register of Historic Places, by planting along the top of the slope at the east end of the Naval Officers' Quarters Historic District.

VI. Minimizing Visual and Physical Impacts on Historic Properties on Yerba Buena Island

A. Design Features

FHWA shall ensure that the final design for any replacement structure minimizes visual and physical impacts to the Officers' Quarters Historic District and other historic properties with regard to the following features: color of concrete surface; texture of concrete surface; size, type and spacing of bridge deck light standards; bridge accent lighting, if it is considered; bridge suspension cables uplighting; landscaping restoration around the historic district; signage in the vicinity of the Historic District; number, mass, spacing of bridge piers; and height of the deck.

B. Review of Design Features

FHWA will afford the Council and SHPO the opportunity to review the design for the specific features cited in section A. of this stipulation, and will provide the Council and SHPO with documentation relevant to that review. The Council and SHPO shall have thirty (30) days after receipt to review and comment on this documentation. If the Council or SHPO so requests, FHWA, Caltrans, and any project design consultants, will meet with the Council and SHPO during the time frame stipulated, to address any Council or SHPO comments. Absent objection from the Council or SHPO within the stipulated time frame, FHWA may assume Council and SHPO concurrence with the proposed design and authorize Caltrans to proceed with final design. Final design documents will not be subject to further review under this Agreement. If the Council or SHPO objects within the stipulated time frame, FHWA will proceed in accordance with Stipulation X., below, to resolve the objection, except that objections pertaining to the number, mass, and spacing of bridge piers, or to the height of the bridge deck, will be exempt from Stipulation X. Objections exempt from Stipulation X. will be taken into account by FHWA before it authorizes Caltrans to proceed with final design.

C. Construction period

Caltrans shall take all practical measures to minimize the construction period of the project, particularly the period of use of temporary structures in the vicinity of the Officers' Quarters Historic District.

VII. Mitigation of effects on archaeological properties and development and implementation of a Treatment Plan for Archaeological Resources

FHWA will ensure that all required archaeological work is carried out by Caltrans or Caltrans' consultants.

A. Treatment plan development

Caltrans will prepare a comprehensive Treatment Plan for archeological resources. The Treatment Plan will include a data recovery plan for the prehistoric component of CA-SFr-4/H, guidelines for evaluation and data recovery of any American Period deposits within CA-SFr-4/H, as well as for treatment of unanticipated discoveries of any other archaeological deposits within the area of the Undertaking. The Treatment Plan will be consistent with the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 FR 44734–37) and take into account the Council's publication, Treatment of Archaeological Properties: A Handbook (ACHP 1980), and SHPO guidelines.

B. Treatment Plan specifics

The Treatment Plan will specify, at a minimum:

a. the properties or portion of properties where evaluation and/or data recovery are to be carried out;
b. the properties, if any, that will be affected by the Undertaking but for which no data recovery will be carried out;
c. the manner in which any unanticipated discoveries will be treated;
d. the research questions to be addressed through data recovery, with an explanation of their relevance and importance;
e. the methods to be used for data recovery, with an explanation of their relevance to the research questions;
f. the methods to be used in analysis, data management, and dissemination of data, including a schedule;
g. the proposed disposition of recovered materials and records;
h. the manner in which any human remains and sacred objects of Native American origin on federal or non-federal lands will be treated;

i. coordination with interested Native Americans during development and implementation of the Treatment Plan;

j. the proposed methods for disseminating results of the work;

k. a plan to comply with NAGPRA, if appropriate.

l. archival research required to establish context for evaluation of any American Period deposits found and to predict types of other archaeological properties that may be buried within the area of the Undertaking.

C. Treatment Plan review

Caltrans will coordinate with tribes and other interested Native Americans during the development of the Treatment Plan to solicit their views on the contents of the Treatment Plan, the public interpretive material, treatment of burials, the scope of the data recovery, and other topics of interest to Native Americans. Caltrans, in consultation with interested Native Americans, will develop a process for determining appropriate tribal affiliation should there be a discovery of human remains.

Caltrans will submit the Treatment Plan to all parties to this Agreement and interested Native Americans for a thirty (30) calendar day review following receipt of the Plan. If any party fails to submit their comments within thirty (30) days, Caltrans may assume that party's concurrence with the Treatment Plan. Caltrans will take any review comments into account, revise the Treatment Plan accordingly, and will notify any party whose comments were not incorporated into the Treatment Plan. Any disputes arising under the terms of this stipulation and not able to be solved by consensus will be resolved in accordance with Stipulation X.

D. Notification

Caltrans will promptly notify the SHPO, the Navy and the Coast Guard, as appropriate, if any properties are found that meet the conditions for eligibility set forth in the Treatment Plan. Absent objection pursuant to Stipulation X, Caltrans may combine the evaluation and data recovery phases of treatment of American Period or previously unidentified archaeological deposits and proceed in accordance with the Treatment Plan for any properties that meet the conditions for eligibility set forth in the Treatment Plan, and terminate any further consideration of properties which do not meet such conditions.

E. Report standards and dissemination

Caltrans will ensure that all reports resulting from implementation of the Treatment Plan meet contemporary professional standards and the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 FR 44734–37). Copies of all final reports will be provided to the SHPO, the Northwest Information Center at Sonoma State University, the Navy, Coast Guard and other interested parties as appropriate, such as

Native Americans, the Native American Heritage Commission, historical societies, and professional and amateur archaeological societies.

F. Public interpretive materials

Caltrans will develop public interpretive materials, covering potential historical and archaeological resources within the project area, and will disseminate these materials to both the public at large and educational institutions. Interpretive materials may include, but are not necessarily limited to: a mobile exhibit on the archaeology and history of Yerba Buena Island, curriculum materials, a web site, and other public presentations.

G. Confidentiality

The signatories to this Agreement acknowledge that historic properties covered by this Agreement are subject to the provisions of § 304 of the National Historic Preservation Act of 1966 and § 6254.10 of the California Government Code (Public Records Act), relating to the disclosure of archeological site information and, having so acknowledged, will ensure that all actions and documentation prescribed by this Agreement are consistent with § 304 of the National Historic Preservation Act of 1966 and § 6254.10 of the California Government Code.

VIII. Annual report

Caltrans will prepare an annual report describing the status of its efforts to comply with the mitigation measures set forth in Stipulations III through VII of this Agreement. The annual report will be prepared following the end of each fiscal year (July 1 to June 30) and will be distributed by Caltrans to all of the signatories to this Agreement by July 30 of each year, until FHWA determines that the *applicable* mitigation measures set forth in Stipulations III through VII inclusive, of this Agreement have been completed.

IX. Amendments, termination and new agreement

A. Amendments

If any signatory to this Agreement determines that an amendment to its terms should be made, the signatory will immediately consult with the other signatories to this Agreement pursuant to 36 CFR 800.6 (c)(7). This agreement may be amended only upon written concurrence of all signatory parties.

B. Termination

If the signatory parties to this Agreement do not reach consensus on amendment(s) as provided for in this stipulation, FHWA, the Council or the SHPO may terminate it. The party terminating the Agreement will in writing provide all other signatories with an explanation of the reasons for termination. If the Agreement is not amended or terminated, the Agreement will remain in effect as originally executed, and FHWA will notify the other signatories that the attempt to reach consensus on amendment(s) was unsuccessful.

C. Action following termination

If this Agreement is terminated by FHWA, the Council or the SHPO for any reason, and FHWA determines that the Undertaking will proceed, FHWA will execute a new Memorandum of Agreement with the signatories under 36 CFR 800.6, or request the comments of the Council pursuant to 36 CFR 800.7(a).

X. Dispute resolution

A. Disputes regarding actions

1. Should any signatory to this Agreement object to the manner in which the terms of this Agreement are implemented, or to any documentation prepared in accordance with and subject to the terms of this Agreement, FHWA will consult further with the objecting party to resolve the objection. If FHWA determines within fourteen (14) days of receipt that such objection cannot be resolved, FHWA will forward all documentation relevant to the dispute to the Council, including FHWA's proposed response to the objection. Within thirty (30) days after receipt of all pertinent documentation, the Council will:

   a. advise FHWA that it concurs in FHWA's proposed response, whereupon FHWA will respond to the objection accordingly; or

   b. provide FHWA with recommendations which FHWA will take into account in reaching a final decision regarding the dispute.

2. Any Council comment provided in response to FHWA's request will be taken into account by FHWA with reference only to the subject of the dispute. The signatories' responsibilities to carry out all actions under this Agreement that are not the subject of the dispute will remain unchanged. FHWA may authorize Caltrans to implement that portion of the Agreement which is subject to dispute after receiving and taking into account, any Council comments issued in accordance with this stipulation. FHWA's decision regarding resolution of the dispute will be final.

3. If the Council fails to comment within the time period specified in this stipulation, FHWA may authorize Caltrans to implement that portion of the Agreement which is subject to dispute in accordance with FHWA's proposed response to the objection as submitted to the Council, and after taking into account any SHPO or Council comments. FHWA's decision regarding resolution of the dispute will be final.

XI. Public objections

If any member of the public objects to the manner in which the provisions of this Agreement are implemented, FHWA shall immediately notify the other parties in writing of the objection and take the objection into account. FHWA shall consult with the objecting party and, if the objecting party so requests, with any or all of the other signatories, for no more than thirty (30) calendar days. Within fourteen (14) calendar days following closure of the consultation period, FHWA will render a decision regarding the objection and notify all parties of this decision in writing. In reaching its decision, FHWA will take comments from all parties into account. . No provision of this stipulation will preclude FHWA and Caltrans from continuing to implement any provision of the Agreement that is subject to public objection.

XII. Duration

A. Reconsideration

If FHWA determines that construction of the Undertaking has not been initiated within ten years following execution of this Agreement, the signatories shall consult to reconsider its terms. Reconsideration may include continuation of the Agreement as originally executed, amendment, or termination in accordance with Stipulation IX.

B. Terms fulfilled

This Agreement will be in effect through FHWA's implementation of the Undertaking, and will terminate and have no further force or effect when FHWA, in consultation with the other signatories, determines that the terms of this Agreement have been fulfilled in a satisfactory manner. FHWA will provide the other signatories with written notice of its determination and of termination of this Agreement.

Execution and implementation of this Agreement evidence that FHWA and the Coast Guard have afforded the Council a reasonable opportunity to comment on the Undertaking and the effect of the Undertaking on historic properties, and have themselves taken into account the effect of the Undertaking on historic properties.

Federal Highway Administration

By: David A. Nicol Date: 25 May 00

Title: Assistant Division Administrator

United States Coast Guard

By: R Jankowski CAPT, USCG Date: 25 May 00

Title: Chief, Civil Engineering Division

California State Office of Historic Preservation

By: Daniel Abeyta Date: 25 May 00

Title: Acting SHPO

Advisory Council on Historic Preservation

By: John M. Fowler Date: 5/26/00

Title: EXECUTIVE DIRECTOR

Concurring Parties:

Concur:
United States Navy

By: _____ Date: _____

Title: _____

Concur:
California Department of Transportation

By: Tony V. Harris Date: 5/25/00

Title: Acting Director

Concur:
City of Oakland

By: _____ Date: _____

Title: _____

Concur:
City and County of San Francisco

By: _____ Date: _____

Title: _____

Concur:
Chairperson Rosemary Cambra, Muwekma Indian Tribe

By: _____ Date: _____

Concur:
Chairperson Tony Cerda, Costanoan Rumsen Carmel Tribe

By: _____ Date: 6/27/00

Concur:
Mr. Andrew Galvan, The Ohlone Indian Tribe

By: _____ Date: _____

Concur:
Ms. Jakki Kehl

By: _____ Date: _____

Concur:
Mr. Kenneth Marquis

By: _____ Date: _____

Concur:
Ms. Jenny Mousseaux (Mcleod)

By: _____ Date: _____

Concur:
Mr. Patrick Orozco

By: _____ Date: _____

Concur:
Ms. Katherine Erolinda Perez

By: _____ Date: _____

Concur:
Chairperson Tony Cerda, Costanoan Rumsen Carmel Tribe

By: _____ Date: _____

Concur:
Mr. Andrew Galvan, The Ohlone Indian Tribe

By: Andrew A Galvan Date: 14 VII 2000
Feast Day of Blessed Kateri Tekawitha

Concur:
Ms. Jakki Kehl

By: _____ Date: _____

Concur:
Mr. Kenneth Marquis

By: _____ Date: _____

Concur:
Ms. Jenny Mousseaux (Mcleod)

By: _____ Date: _____

Concur:
Mr. Patrick Orozco

By: _____ Date: _____

Concur:
Ms. Katherine Erolinda Perez

By: _____ Date: _____

Concur:
Mr. Alex Ramirez

By: _____ Date: _____

Concur:
Chairperson Rudy Rosales, Ohlone/Costanoan-Esselen Nation

By: _____ Date: _____

Concur:
Chairperson Ann Marie Sayer, Indian Canyon Mutsun Band of Costanoan

By: Ann Marie Sayers Date: July 20, 06

Concur:
Ms. Linda G. Yamane

By: _____ Date: _____

Concur:
Chairperson Irene Zwierlein, Amah Tribal Band

By: _____ Date: _____

I would like to see more input from the native American people & history & contributions of the original people. This is as though we are invisible

Amendment No. 1

Maintenance & Logistics Command Pacific

LICENSE

WHEREAS a LICENSE, dated 20 December 2002, was entered into, by and between the **UNITED STATES OF AMERICA**, acting by and through the **UNITED STATES COAST GUARD**, Commander (sr), Maintenance & Logistics Command Pacific, Coast Guard Island, Building 54-D, Alameda, California, 94501-5100 (hereinafter called "LICENSOR"), granting to the **STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION**, whose mailing address is P.O. Box 23440, Oakland, California, 94623-0440 (hereinafter called "LICENSEE"); and

WHEREAS, the LICENSEE has requested the LICENSOR amend said LICENSE for the purpose of including additional land in order to construct additional improvements necessary for its project to construct a new eastern span to the San Francisco – Oakland Bay Bridge on the Licensed PREMISES and to relocate and/or construct certain improvements requested by LICENSOR; and

NOW THEREFORE, in consideration for the LICENSEE's coordination and construction of interim parking facilities for the LICENSOR's exclusive use, roadways to access such parking facilities, and, at the end of the project activities, to construct a replacement tennis court facility, this LICENSE is amended, subject to the following terms and conditions:

1. This LICENSE is hereby amended to include, as Licensed PREMISES, the area depicted on the drawing that is attached to this Amendment (Exhibit A), which drawing is hereby made a part of this Amendment.

2. The LICENSEE shall physically move the Quarters No. 8 garage/guest house structure (Building 206) to a location mutually acceptable to LICENSOR and LICENSEE. If, in the determination of the LICENSOR, this building is structurally damaged beyond repair during the action to move, store, or reestablish it, LICENSEE shall reconstruct a building of equal functional utility, to a design that is mutually acceptable to both parties, on the original site, or any other site that is mutually acceptable, when project related activities on the PREMISES have concluded.

3. Pursuant to Subsection 15.j. of the LICENSE, the LICENSEE's project will require the temporary elimination of significant portions of LICENSOR's existing parking areas. The LICENSEE shall establish new parking areas for LICENSOR's exclusive access and use for the duration of project related activities on the PREMISES. These replacement parking areas will be constructed over LICENSOR's existing tennis court facility and adjacent areas. When project related activities on the PREMISES have concluded, LICENSEE shall reconfigure these replacement parking areas to match the facilities present prior to LICENSEE's use, or to any other configuration that is mutually acceptable. This reconfiguration will include the restoration of the tennis court facility.

4. Subsection 15.aa. is modified as follows (text in bold/italics and strike-throughs indicate changes):

> LICENSEE will, without cost to the LICENSOR, monitor and mitigate project noise generated on YBI, not to exceed 78dBA Lmax (5 dBA over present ambient noise levels of 73 dBA based on noise survey conducted on April 4, 2002), during the hours of 7:00 p.m. to 7:00 a.m., from the project ***and all noise associated with the double-deck temporary detour structure*** for the residents of LICENSOR's barracks and family housing areas. If construction ***and ambient*** noise levels, ***within the LICENSEE's, agents's, and assigns's, direct control*** are expected to exceed this standard, noise mitigation measures (e.g. a sound barrier) shall be required. Impact-type mechanical operations, ***including but not limited to*** ~~such as~~ pile driving and jackhammering, shall not be conducted during the aforementioned evening hours (e.g. 7:00 p.m. to 7:00 a.m.), regardless of the presence of noise mitigation measures. Noise measurements for construction during the hours of 7:00 p.m. to 7 a.m. (evening hours) shall be taken on the sidewalk outside of Building 26, adjacent to the breezeway and nearest the

barracks room window. If a sound barrier is constructed, at least five noise measurements along the entire length of the sound barrier shall be taken between the sound barrier and Building 26. In addition, the Coast Guard Group San Francisco Facility Engineer may also request additional noise samplings by LICENSEE's noise engineer, at LICENSEE's expense, at a frequency not to exceed twice a month. The noise engineer shall provide reports and sampling data from the noise sampling within 12 hours of the noise measurements. The contractor shall provide the LICENSEE with all noise reports and sampling data obtained by the noise engineer within 24 hours of its receipt from the noise engineer. At any time that the project noise exceeds these standards, the affected LICENSOR personnel or families shall be relocated, at LICENSEE's expense, as per Subjection 14.dd. below.

It is understood and agreed to between the parties hereto that all terms and conditions of the LICENSE shall remain in full force and effect.

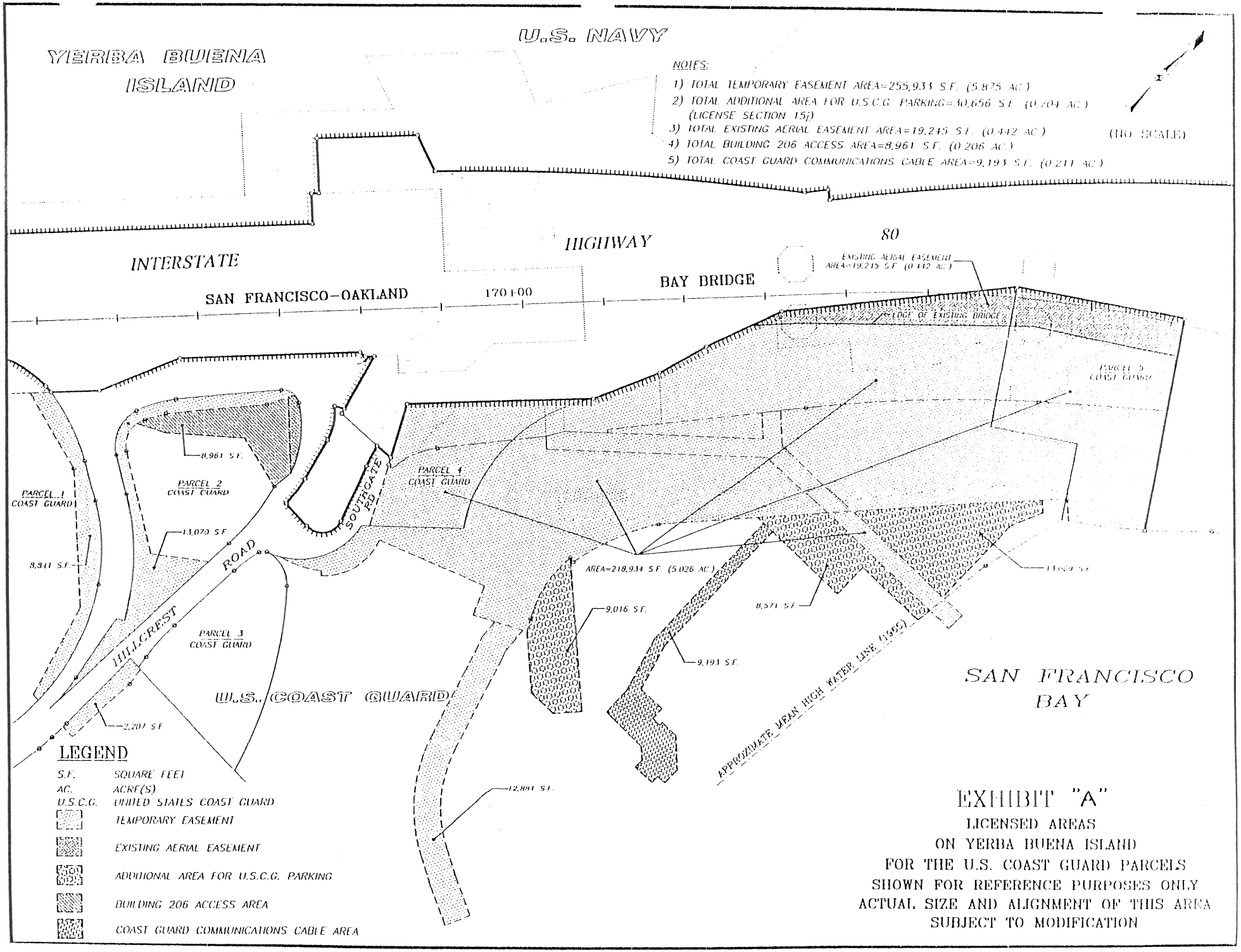
IN WITNESS WHEREOF, the parties hereto have hereunto subscribed their names as of the dates below written.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BY: _____ 5/14/03
R. A. MACPHERSON — Date
Deputy District Director
Division of Right of Way

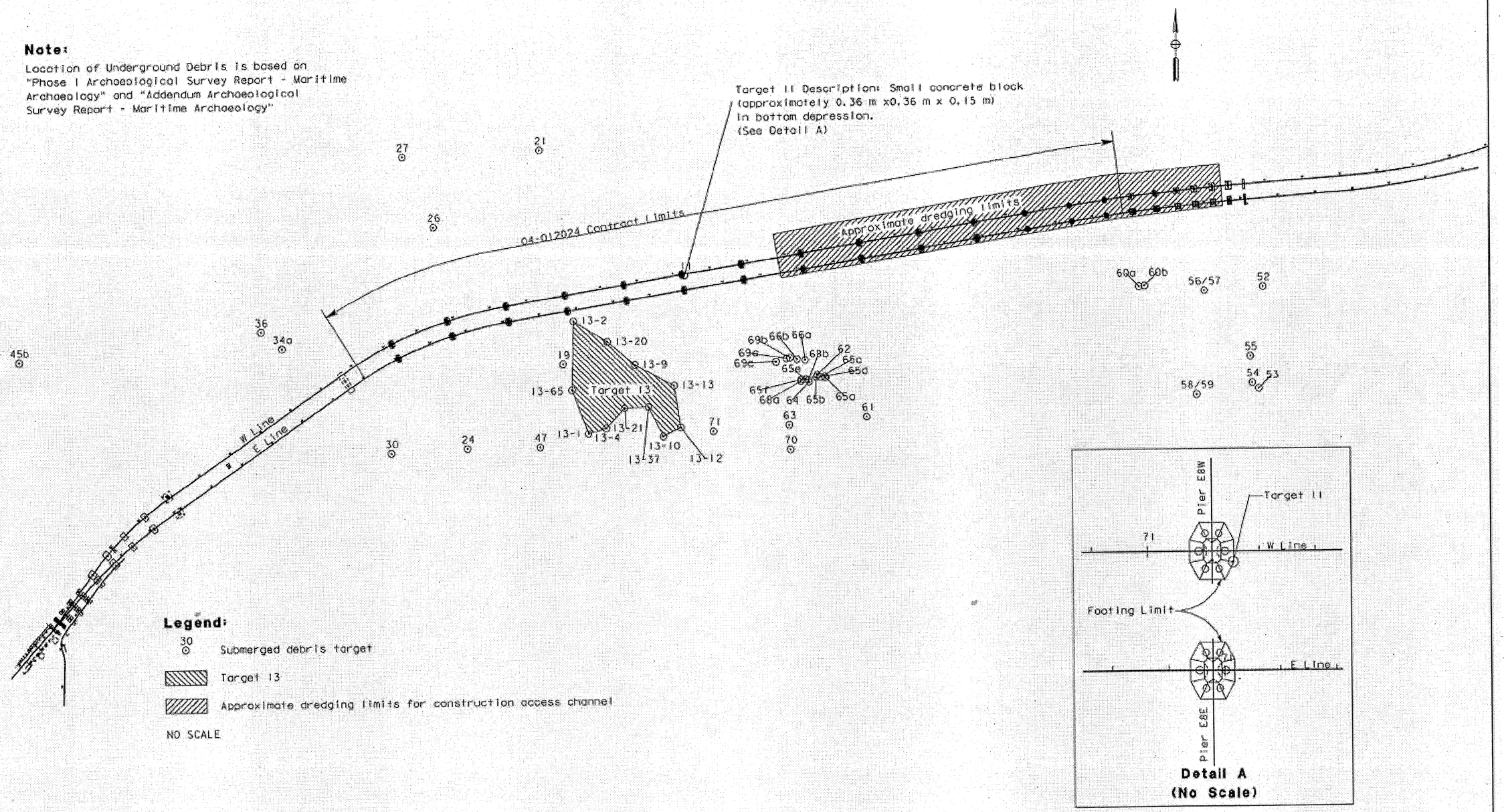
UNITED STATES OF AMERICA
U.S. COAST GUARD

_____ 14 May 2003
SHERRY SHIRKEY — Date
Chief, Real Property Branch
Maintenance & Logistics Command Pacific
By direction of the Commander


U.S. NAVY
YERBA BUENA ISLAND
NOTES:
1) TOTAL TEMPORARY EASEMENT AREA=255,933 S.F. (5.875 AC.)
2) TOTAL ADDITIONAL AREA FOR U.S.C.G. PARKING=30,656 S.F. (0.704 AC.) (LICENSE SECTION 15j)
3) TOTAL EXISTING AERIAL EASEMENT AREA=19,245 S.F. (0.442 AC.)
4) TOTAL BUILDING 206 ACCESS AREA=8,961 S.F. (0.206 AC.)
5) TOTAL COAST GUARD COMMUNICATIONS CABLE AREA=9,193 S.F. (0.211 AC.)
(NO SCALE)
INTERSTATE
HIGHWAY
80
SAN FRANCISCO-OAKLAND
BAY BRIDGE
170+00
EXISTING AERIAL EASEMENT AREA=19,245 S.F. (0.442 AC.)
EDGE OF EXISTING BRIDGE
PARCEL 5 COAST GUARD
PARCEL 1 COAST GUARD
PARCEL 2 COAST GUARD
PARCEL 3 COAST GUARD
PARCEL 4 COAST GUARD
8,961 S.F.
13,070 S.F.
8,941 S.F.
2,207 S.F.
SOUTHGATE RD.
HILLCREST ROAD
AREA=218,934 S.F. (5.026 AC.)
9,016 S.F.
8,571 S.F.
9,193 S.F.
12,891 S.F.
U.S. COAST GUARD
APPROXIMATE MEAN HIGH WATER LINE (1969)
SAN FRANCISCO BAY
LEGEND
S.F. SQUARE FEET
AC. ACRE(S)
U.S.C.G. UNITED STATES COAST GUARD
TEMPORARY EASEMENT
EXISTING AERIAL EASEMENT
ADDITIONAL AREA FOR U.S.C.G. PARKING
BUILDING 206 ACCESS AREA
COAST GUARD COMMUNICATIONS CABLE AREA
EXHIBIT "A"
LICENSED AREAS
ON YERBA BUENA ISLAND
FOR THE U.S. COAST GUARD PARCELS
SHOWN FOR REFERENCE PURPOSES ONLY
ACTUAL SIZE AND ALIGNMENT OF THIS AREA
SUBJECT TO MODIFICATION

Note:

Location of Underground Debris is based on "Phase I Archaeological Survey Report - Maritime Archaeology" and "Addendum Archaeological Survey Report - Maritime Archaeology"



Legend:

30 ⊙ Submerged debris target

Target 13

Approximate dredging limits for construction access channel

NO SCALE

Caltrans Metric

SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Underwater Debris
SF/ALA-80
04-012024
May, 2001

DIST.	COUNTY	ROUTE	KILOMETER POST	SHEET NO.	TOTAL SHEETS
04	SF, ALA	80	13.9/14.3 0.0/1.6	1	1

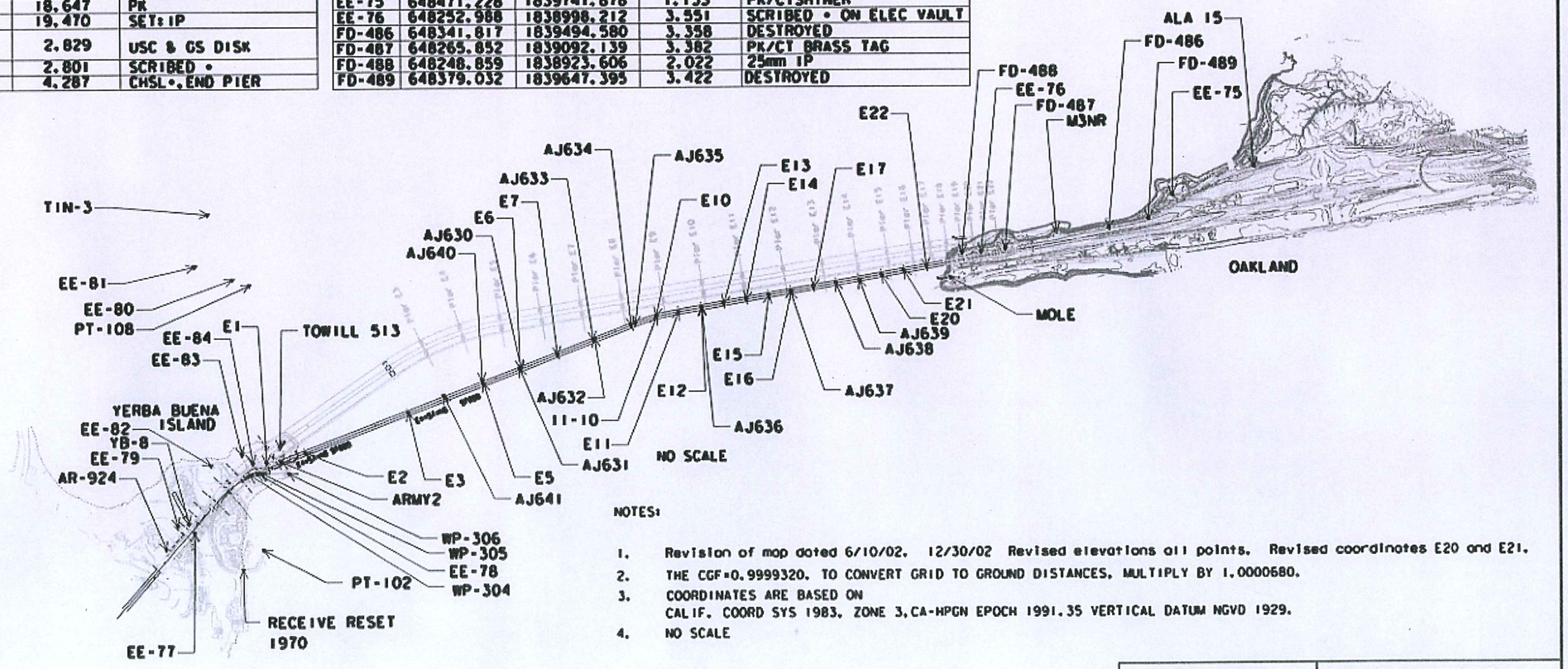
Caltrans Metric

PROFESSIONAL LAND SURVEYOR
RICHARD E. ERSKINE
EXP: 12-31-02
NO. 6431
STATE OF CALIFORNIA

Densified Control SFOBB Derived from 3D, 2D, and Digital Level Runs

Name	Northing	Easting	Elevation	Description
E1	647449.035	1836219.052	19.905	FND:PK
ARMY2	647452.867	1836277.761	24.104	USC & GS DISK
TIN-3	648410.557	1835991.839	2.418	BC IN HH
E5	647751.469	1837059.847	6.456	LEAD • TACK
E6	647806.991	1837204.718	1.548	LEAD • TACK
E7	647862.477	1837349.579	1.598	LEAD • TACK
YB-8	647215.680	1835911.467	46.888	LEAD • TACK
E10	648010.363	1837735.400	1.550	LEAD • TACK
E11	648025.958	1837823.334	1.564	LEAD • TACK
E12	648041.513	1837911.032	1.560	LEAD • TACK
E13	648056.978	1837998.370	1.537	LEAD • TACK
E14	648072.445	1838085.706	1.553	LEAD • TACK
E15	648087.917	1838173.048	1.535	LEAD • TACK
E16	648103.419	1838260.368	1.496	LEAD • TACK
E17	648118.909	1838347.859	1.493	LEAD • TACK
E20	648165.504	1838610.738	1.566	LEAD • TACK
E21	648181.034	1838698.388	1.536	LEAD • TACK
E22	648196.566	1838786.012	1.477	LEAD • TACK
EE-77	647179.870	1835934.536	46.043	PK
EE-78	647409.267	1836182.986	5.344	PK
EE-79	647207.300	1835869.572	53.584	LEAD • TACK
EE-80	648158.966	1836088.322	4.004	CHSL•,T.I. PIER
EE-81	648207.997	1835937.149	2.427	CHSL•,BEGIN PIER
EE-82	647440.117	1836000.391	10.035	PK/SH
EE-83	647479.118	1836121.990	18.647	PK
EE-84	647446.709	1836165.460	19.470	SET:IP
RECEIVE RESET 1970	647037.691	1836125.126	2.829	USC & GS DISK
PT-102	647113.832	1836206.655	2.801	SCRIBED •
PT-108	648136.508	1836154.577	4.287	CHSL•,END PIER

Name	Northing	Easting	Elevation	Description
E3	647639.939	1836768.818	9.340	LEAD • TACK
E2	647487.240	1836370.396	9.356	LEAD • TACK
WP-304	647402.816	1836154.461		PK/CTSHINER
WP-305	647409.665	1836198.504		PK/CTSHINER
WP-306	647407.891	1836305.906	3.046	PK/CTSHINER
TOWILL 513	647507.415	1836270.078	21.993	FND ALUM CAP MKD 54
AJ630	647811.481	1837206.687	1.520	1" CT ALLOY DISK
AJ631	647809.066	1837200.481	1.519	1" CT ALLOY DISK
AJ632	647922.604	1837495.932	1.540	1" CT ALLOY DISK
AJ633	647919.429	1837490.372	1.517	1" CT ALLOY DISK
AJ634	647973.567	1837638.323	1.638	1" CT ALLOY DISK
AJ635	647980.876	1837653.949	1.616	1" CT ALLOY DISK
AJ636	648042.277	1837913.261	1.540	1" CT ALLOY DISK
AJ637	648099.421	1838258.755	1.482	1" CT ALLOY DISK
AJ638	648134.614	1838434.904	1.512	1" CT ALLOY DISK
AJ639	648144.974	1838525.661	1.541	1" CT ALLOY DISK
AJ640	647763.790	1837055.180	6.400	1" CT ALLOY DISK
AJ641	647705.489	1836905.091	6.398	1" CT ALLOY DISK
AR924	647117.419	1835823.654		PK/CTSHINER
MOLE	648154.168	1838879.640	2.521	4" BR NGS DISK
11-10	648007.695	1837736.156		LEAD • TACK
M3NR	648329.365	1839290.275	4.035	DESTROYED
ALA 15	648577.706	1840060.660	1.424	3 CM BRASS DISC
EE-75	648471.228	1839741.878	1.153	PK/CTSHINER
EE-76	648252.988	1838998.212	3.551	SCRIBED • ON ELEC VAULT
FD-486	648341.817	1839494.580	3.358	DESTROYED
FD-487	648265.852	1839092.139	3.382	PK/CT BRASS TAG
FD-488	648248.859	1838923.606	2.022	25mm IP
FD-489	648379.032	1839647.395	3.422	DESTROYED



NOTES:

1. Revision of map dated 6/10/02. 12/30/02 Revised elevations all points. Revised coordinates E20 and E21.
2. THE CGF=0.9999320. TO CONVERT GRID TO GROUND DISTANCES, MULTIPLY BY 1.0000680.
3. COORDINATES ARE BASED ON CALIF. COORD SYS 1983, ZONE 3, CA-HPGN EPOCH 1991.35 VERTICAL DATUM NGVD 1929.
4. NO SCALE

STATE OF CALIFORNIA
BUSINESS, TRANSPORTATION AND HOUSING AGENCY
DEPARTMENT OF TRANSPORTATION
DISTRICT 04

CONTROL DIAGRAM

Drawn By Ben Ip	DATE 4/25/2001	CO. SF, ALA	RTE. 80	KILOMETER POST 13.9/14.3 0.0/1.6
Drawing Revised By AJ Burgess	DATE 12/30/2002			
Ck'D. By Ric Erskine	DATE 12/31/2002	NO. 1/1		

Sample of Private Aids to Navigation Application Form

SFOBB San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

April 2001

DEPARTMENT OF TRANSPORTATION
U.S. COAST GUARD
CG-2554 (Rev. 7-76)

PRIVATE AIDS TO NAVIGATION APPLICATION

(See attached instructions and copy of Code of Fed. Reg., Title 33, Chap. 1, Part 66)

Form Approved
OMB-004-R5681

NO PRIVATE AID TO NAVIGATION MAY BE AUTHORIZED UNLESS A COMPLETED APPLICATON FORM HAS BEEN RECEIVED (14 U.S.C. 83; 33 C.F.R. 66.01-5).

1. ACTION REQUESTED FOR PRIVATE AIDS TO NAVIGATION: A. ☐ ESTABLISH AND MAINTAIN B. ☐ DISCONTINUE C. ☐ CHANGE D. ☐ TRANSFER OWNERSHIP

2. DATE ACTION TO START

3. AIDS WILL BE OPERATED: A. ☐ THROUGHOUT THE YEAR B. ☐ TEMPORARILY UNTIL _____ C. ☐ ANNUALLY _____ TO _____

4. NECESSITY FOR AID *(Continue In Block 8)*

5. GENERAL LOCALITY

6. CORPS OF ENGINEERS AUTHORIZED THIS STRUCTURE OR BUOY BY ☐ PERMIT OR ☐ LETTER *(file and date)*

FOR DISTRICT COMMANDERS ONLY

7. APPLICANT WILL FILL IN APPLICABLE REMAINING COLUMNS

LIGHT LIST NUMBER OR PAGE	NAME OF AID	NO. OR LTR. (7a)	LIGHT PER. (7b)	LIGHT FLASH LGTH. (7c)	LIGHT COLOR (7d)	POSITION (7e)	DEPTH OF WATER (7f)	CAN-DLE POWER (7g)	HT. ABOVE WATER (7h)	STRUCTURE TYPE, COLOR, AND HEIGHT ABOVE GROUND (7i)	REMARKS *(See Instructions)* (7j)

SAMPLE ONLY

8. ADDITIONAL COMMENTS

9a. NAME AND ADDRESS OF PERSON IN DIRECT CHARGE OF AID

9b. TELEPHONE NO.

10a. NAME AND ADDRESS OF PERSON OR CORPORATION AT WHOSE EXPENSE AID IS MAINTAINED

10b. THE APPLICANT AGREES TO SAVE THE COAST GUARD HARMLESS WITH RESPECT TO ANY CLAIM OR CLAIMS THAT MAY RESULT ARISING FROM THE ALLEGED NEGLIGENCE OF THE MAINTENANCE OR OPERATION OF THE APPROVED AID(S).

10c. DATE

10d. SIGNATURE AND TITLE OF OFFICIAL SIGNING

FOR USE BY DISTRICT COMMANDER

SERIAL NO.

CLASSIFICATION OF AIDS

Class

RECD.

CHART

L. N. M.

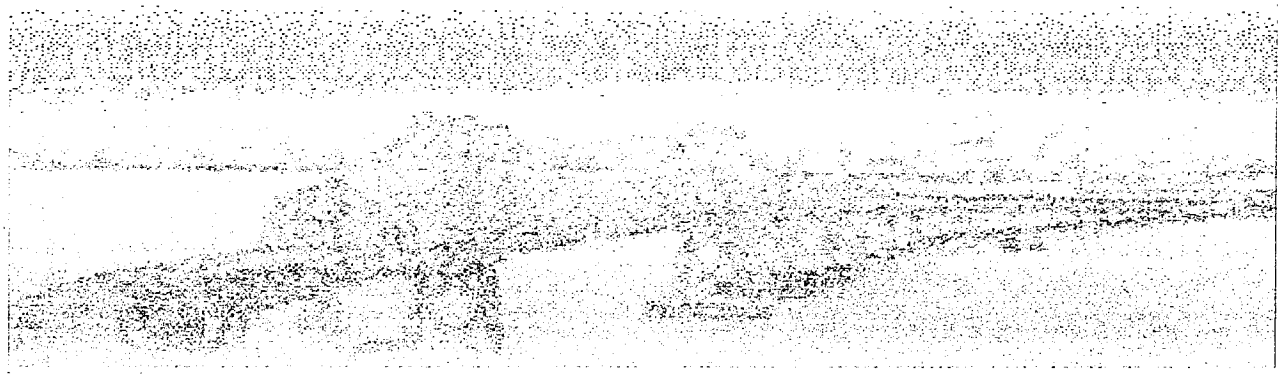
DATE APPROVED

SIGNATURE *(By direction)*

PREVIOUS EDITIONS ARE OBSOLETE

San Francisco – Oakland Bay Bridge
East Span Seismic Safety Project

Geotechnical & Materials Report for Yerba Buena Island



January 2002

Caltrans Contract 04A0148
Task Order 185.20.25

Geotechnical & Materials Report for Yerba Buena Island

San Francisco – Oakland Bay Bridge East Span Seismic Safety Project

Prepared for:

CALIFORNIA DEPARTMENT OF TRANSPORTATION

Submitted by:

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
(San Francisco, CA)

January 2002

Geotechnical & Materials Report for Yerba Buena Island

San Francisco – Oakland Bay Bridge East Span Seismic Safety Project

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Geotechnical & Materials Report
for
Yerba Buena Island

San Francisco – Oakland Bay Bridge
East Span Seismic Safety Project

1.0 GENERAL

1.1 Project Description

This report presents geotechnical design criteria for the Yerba Buena Island (YBI) portions of the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project. The areas at the YBI discussed in this report are within the envelope of the N6 alignment proposed for the new SFOBB (Figure 1). It includes (1) Interstate 80 from the YBI Tunnel east portal to 1.3 kilometer east of the east portal, (2) associated permanent ramps and roadways, and (3) temporary detour ramps leading to the proposed N6 replacement bridge alignment as shown in Figure 2.

The geotechnical design criteria presented in this report include:

- recommended geotechnical design of the permanent roadways, and temporary detour roadways on the Yerba Buena Island;
- structural pavement sections of proposed permanent and temporary roadways;
- geotechnical design criteria for the YBI substation; and
- geotechnical design criteria related to restoration of slopes after completion of the YBI transition and temporary detour structures.

This report is primarily a product of engineering analysis that incorporates the site investigation and data obtained by Fugro-Earth Mechanics (Fugro/EMI). Their work included (1) review of published literature, (2) site reconnaissance, (3) subsurface exploration, (4) geophysical testing, and (5) field and laboratory testing. This report does not provide geotechnical recommendations pertaining to bridge piers, retaining structures, or abutments for the proposed YBI transition and temporary detour structures.

1.2 Background

During the Loma Prieta earthquake in 1989, one of the east spans of the San Francisco Oakland Bay Bridge (SFOBB) collapsed. This prompted Caltrans to embark on a seismic retrofit program to upgrade the bridge. In 1995, Caltrans presented a retrofit strategy for the SFOBB East Span to the Seismic Advisory Board, which raised issues relative to replacement in lieu of seismic retrofit.

Subsequently, Caltrans developed and presented a preliminary design of a continuous viaduct replacement structure to Bay Bridge Design Task Force which was appointed by the Metropolitan Transportation Commission (MTC). The MTC and their task force advised against Caltrans' proposed replacement bridge type. This led Caltrans to contract TY Lin International and Moffatt & Nichol Engineers to develop 30 percent designs for two alternative bridge types. These two alternatives only differed east of the YBI. One alternative was a cable-stay bridge, the other a suspension type of bridge. The majority of the bridge would always have been a skyway structure.

To support the design efforts, Caltrans contracted with Fugro-Earth Mechanics (a joint venture between Fugro West, Inc. and Earth Mechanics, Inc.) in 1997 to conduct geotechnical and geological investigations and studies for the replacement bridge.

1.3 Existing Facilities and Proposed Improvements

The existing SFOBB is a double-decked structure constructed in the 1930s. It currently carries 10 lanes of Interstate 80 traffic, 5 eastbound and 5 westbound, across the San Francisco Bay. The bridge is bisected by YBI longitudinally, with the west spans extending from San Francisco to YBI and the east spans extending from YBI to Oakland.

The N6 alignment lies to the north of the existing I-80 bridge on YBI and includes two main transition structures and two temporary detour structures, permanent and temporary eastbound (EB) on-ramp structures, and modifications to the existing viaduct in the tunnel approach area (Figure 2).

The eastbound and westbound transition structures will connect the main span structure to the existing viaduct section near the eastern portal of the YBI. The two transition structures will be supported for most of their lengths by single- to multiple-column bents, and will eventually emerge into the existing double-deck viaduct structure. Near the end of the

viaduct, the structures will be supported on two-column bents and outrigger bents.

The proposed length of each transition structure is approximately 410 meters. The westbound structure has an overall deck width of 25 meters. The eastbound structure is similar to the westbound structure with the exception that a 3.6 meter-wide bike/pedestrian path cantilevers from the south edge of the deck.

The proposed length of each detour (westbound or eastbound) is approximately 500 meters. The overall width is about 20 meters and the height of the deck from the ground varies from zero to 55 meters.

During construction of the transition and detour structures, temporary detour ramps, retaining walls, and permanent on-ramp structures and roadways will be constructed. Traffic in the existing Interstate 80 has to be maintained during construction of the transition structures and temporary detour structures. Temporary detour ramps/roadways will be constructed in various stages to divert the traffic.

1.4 Pertinent Reports and Investigations

The site investigation program consisted of two (2) phases, both of which were performed by Fugro-EMI between 1998 and 2000:

Phase 1 Investigation

In 1998, Fugro/Earth Mechanics, Inc. carried out the Phase 1 subsurface investigation of the proposed N6 alignment on YBI between landfall and the eastern portal of the Yerba Buena Tunnel to obtain a preliminary interpretation of the subsurface conditions along the N6 alignment with particular emphasis on the main span. The subsurface investigation included review of aerial photos, field geological mapping, drilling of three land borings drilled to depths of 30 to 76 meters, geophysical surveys, and in situ/laboratory testing. No soil samples but rock cores were collected under this phase of investigation.

The three borings (Borings 98-13 through 98-15) were drilled during the months of March and April 1998 by CH2M Hill on the northernmost area of the island called "The Northeast Point". The geophysical surveying and geological mapping were performed by NORCAL Geophysical Consultants, Inc. (NORCAL) in a low-lying central area called "Saddle Area" in July 1998.

Laboratory testing of rock samples was performed by Geotest Unlimited of San Leandro, California.

The results of the subsurface investigation were presented in a report entitled "Preliminary Yerba Buena Island Geotechnical Site Characterization Report for San Francisco-Oakland Bay Bridge East Span Seismic Safety Project" dated June 1998.

Phase 2 Investigation

The Phase 2 subsurface investigation was carried out by Fugro-Earth Mechanics, Inc. between 1998 and 2000 to determine subsurface conditions of the foundations of the proposed N6 alignment and the associated transition and detour structures. It comprised a total of 47 soil/rock borings and 17 CPTs, in situ soil and rock laboratory testing over a period of 14 months (October 1998 – December 1999).

Due to delays in acquiring access permits to the U.S. Navy property on YBI, the Phase 2 investigation was further divided into two phases. The Phase 2A investigation was done in 1998 in which a total of 8 borings and 7 CPTs were made by Fugro-EMI in October 1998 on US Coast Guard premises. These borings were planned to characterize the southern detour structure of the N6 alignment.

The Phase 2B investigation was performed during fall 1999 on U.S. Navy Property. It consisted of 39 borings and 10 CPTs, which were planned at each pier foundation of the proposed new N6 alignment.

The results of Phase 2 subsurface investigation were summarized by Fugro-EMI in a report entitled "Draft Site Characterization Report, Yerba Buena Island, SFOBB, East Span Seismic Safety Project" in March 2000. The Site Characterization Report is divided into four separate volumes, namely:

- Volume 1: Main Text
- Volume 2: Boring and Cone Penetrometer Logs
- Volume 3A/B: Soil and Rock Laboratory Testing
- Volume 4: In situ Testing

Other reports related to this project include the following:

- Seismic Design Criteria for YBI Permanent and Temporary Detour Structures by Earth Mechanics, Inc., March 1999.

- Marine Geotechnical Site Characterization for San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, Volumes 1 and 2, by Fugro-Earth Mechanics Inc., A Joint Venture, June, 1998.

- Oakland Shore Approach Geotechnical Site Characterization Report for San Francisco-Oakland Bay Bridge East Span Seismic Safety Report, Volumes 1-4, by Fugro-Earth Mechanics Inc., A Joint Venture, August 1999.

- Geotechnical Design Report – Interstate Highway 80, Oakland Mole Touchdown SFOBB East Span Seismic Safety Project by Engineering Service Center, Caltrans, December 1999.

- Caltrans (1997), Geologic Issues for the Proposed New East Span of the San Francisco Oakland Bay Bridge, report to MTC, August.

2.0 PHYSICAL SETTINGS

2.1 Climate

The climate in the project area is of the Mediterranean type and is moderated by the proximity to the San Francisco Bay. The mean low and high summer temperatures range from 13°C to 24°C. In the winter, the mean low and high temperatures range from 7°C to 17°C. In general, the amount of precipitation increases inland from the bay as elevation increases. The average annual precipitation varies from 500 to 600 mm, which occurs in the winter.

2.2 Site Conditions

The project site topography is very rugged from the east YBI tunnel portal towards the east, with elevations ranging from sea level to approximately 50 meters above sea level. Yerba Buena Island, east of the eastern Yerba Buena Tunnel portal is segregated into three distinct topographic, geomorphic, and geologic zones as shown in Figure 3.

- Northeast Point – This zone extends from the northeast tip of the island to about 250 meters southwest of the eastern point of the island. The Northeast Point zone is bounded by the eastern edge of the parade ground (Saddle Area zone) to the west and the San Francisco Bay to the north, east and south.

- Saddle Area – This zone is the parade ground on the island. The Saddle Area zone extends about 130 meters southwest from the Northeast Point zone and is bounded by the San Francisco Bay to the north and south, and the Eastern Tunnel Approach zone to the

west. The U.S. Coastal Guard Base occupies the southeastern portion of this zone.

- Eastern Tunnel Approach – This zone extends southwest from the western edge of the Saddle Area to the eastern portal of the Yerba Buena Island. The Eastern Tunnel Approach zone is bounded to the north and south by the San Francisco Bay.

2.3 Topographic Features

2.3.1 Northeast Point

The Northeast Point is a relatively flat-topped ridge bounded by moderately to very steep slopes leading down to the San Francisco Bay to the northwest, and relatively flat, low-lying pads of artificial fill to the north, east, and southeast. Elevations range from sea level to about El. 23.5 meters above MSL. The artificial pads surrounding the Northeast Point range in elevation from sea level to about El. 5.8 meters above MSL.

Slopes in the vicinity of the Northeast Point are inclined from being flat at the top of the point and on the artificial fill pads to about 45 degrees along the northwestern margin of the Northeast Point. Subvertical slopes are present in local areas. In general, the steepest slopes are located along the landfill margins of the artificial fill pads and at the bedrock slopes on the northeastern, northern, and northwestern margins of the point. Slopes descending to the south and southwest towards the Saddle Area are typically moderately inclined at about 5 to 15 degrees.

2.3.2 Saddle Area

The Saddle Area is essentially a flat area with moderately to steeply inclined slopes descending towards the San Francisco Bay to the northwest and to an artificial fill pad (the Coast Guard Station) to the southeast. Elevations of the Saddle Area range from sea level to about El. 13 meters. The artificial fill pad located at the southeastern portion of the Saddle Area zone ranges in elevation from sea level to about El. 4.5 meters.

Along the northwestern margin of the Saddle Area are slopes descending from 33 to 50 degrees down the bay. Slopes descending from the parade ground down to the artificial fill pad are inclined from about 16 to 30 degrees. Some slopes along the northern edge of the Saddle Area are retained by retaining walls.

2.3.3 Eastern Tunnel Approach

The topography of the Eastern Tunnel Approach zone is characterized by moderately to steeply inclined terrain ascending to the south and southwest. The margin of this zone descends moderately to steeply to the east to an artificial fill pad and to the west to the bay. Elevations of this zone range from sea level to about El. 61 meters above MSL at the eastern Yerba Buena Tunnel Portal.

Slopes in the Eastern Tunnel Approach zone range from being near flat lying at the artificial fill pad along the eastern margin of the zone to about 55 degrees. The steepest slopes are located on the eastern half of the zone between Hillcrest Road (also known as Treasure Island Road) and the Coast Guard Station. These slopes are inclined at 30 to 55 degrees. The slope inclination beneath the N6 alignment varies from about 5 degrees near the tunnel portal to about 15 degrees southwest of the Saddle Area zone.

2.4 Surface Drainage

Surface drainage, in general, follows the existing topography of the project site. Surface water drains from uphill to the low-lying Saddle Area and ultimately to the Bay in the north, northeast, and south.

2.5 Geology

The project site is located in the Coastal Ranges geologic and geomorphic province of central and northern California. The Coastal Ranges extend from approximately 500 km south and 400 km north of the project site to where the province intersects the Transverse Ranges geologic and geomorphic province and Klamath Mountains, respectively.

The San Francisco Bay occupies a wide linear northwest trending structural depression within the Coast Range Geomorphic Province of northern California. The depression, called the San Francisco Bay – Santa Clara Valley (SFB-SCV) depression, is bounded by the Santa Cruz Mountains to the southwest and the East Bay Hills and Diablo Range to the northeast. The Coastal Range Province consists of sedimentary, metamorphic, volcanic, and igneous rocks predominately ranging in age from the Jurassic/Cretaceous to recent.

Within the San Francisco Bay are located two major fault systems in a historically active tectonic setting - the San Andreas Fault in the

west and the Hayward fault in the east. Yerba Buena Island is approximately 18 kilometers east of the San Andrea Fault and 12 kilometers west of the Hayward Fault. The island is underlain by Franciscan Formation basement rocks comprising interbedded graywacke sandstone, mudstone, and claystone of varying proportions.

Most of the Franciscan Formation on the island is covered with unlithified sand and alluvial deposits with artificial fill in localized areas. The unlithified sand could be eolian in origin (Schlocker, 1974) and covers most of the bedrock on the island, except along the slopes at landfall and the previously graded Northeast Point. Areas of artificial fill surrounding the island were formed by placing dredged bay deposits and cut materials from Yerba Buena Island in relatively shallow water areas.

2.6 Faults and Seismicity

There are no known significant faults on Yerba Buena Island (Fugro/EMI, 2000). Faults mapped out by Fugro/EMI in 2000 do not exhibit major geomorphic or deformational indicators such as wide gouges zones, shear zones, or warped bedding that are indicative of past movements. However, there are abundant intra-formational shear zones within bedrock with displacements on the order of millimeters and centimeters (Fugro/EMI, 2000). Several fracture zones and minor shear zones were encountered in boreholes and exposed within the rock slopes of the Northeast Point. There are no historic earthquake events associated with fault rupturing on the island.

Site seismicity is controlled by both the San Andreas Fault in the west and the Hayward Fault in the east. Sets of design level acceleration time histories based on both San Andreas and Hayward Fault rupture scenarios were prepared by EMI for use in structural and geotechnical design (EMI, 1999). A thorough discussion on seismic issues is provided in draft Seismic Ground Motion for SFOBB East Span Seismic Safety Project by Fugro-Earth Mechanics, Joint Venture dated December 24, 1998.

2.7 Earth Materials

The N6 alignment of the SFOBB crosses geologic terrain underlain by the following earth materials:

- Artificial fill (af)

- Sedimentary Deposits and Alluvium (Q_s and Q_{al})
- Landslide Deposits (Q_{ols} and Q_{ls})
- Franciscan Formation (Jkf)

However, most of the N6 alignment and its associated exit and entrance ramps will be underlain either by Franciscan bedrock or by silty sand to sand which is the dominant stratigraphy of the sediments on the Island. Geologic sections along the N6 alignment have been prepared by Fugro/EMI in their report entitled "Draft Site Characterization Report, Yerba Buena Island, SFOBB East Span Seismic Safety Project" dated March 1, 2000.

2.7.1 Artificial Fill (af)

2.7.1.1 Shoreline Fills

Artificial fill was mapped along the island shoreline northeast and east of the Northeast Point, and east of the Saddle Area and Eastern Tunnel Approach. The origin of the shoreline fill is not certain. The shoreline fill may consist of rubble from onshore excavations (i.e., YBI Tunnel and Northeast Point grading), and debris and bay deposits from offshore dredging. The US Coastal Guard Base is entirely on fill.

2.7.1.2 Saddle Area Fills

Artificial fill was also encountered within the Saddle Area ranging from zero to 6.4 meters. The thickest fill appears to be concentrated along the southeastern margin of the Saddle Area, below the existing alignment of the SFOBB. Beneath the proposed N6 alignment, the thick thickness appears to vary from about 1 to 3.7 meters, thickening towards the northwest.

The type of artificial fill in the Saddle Area is not known except at Boring B-95-3 where the fills are composed of soil similar to the unconsolidated sedimentary and alluvial deposits that underlie the fills. Boulders found in the lower portion of the fill may be from the Yerba Buena Tunnel excavation that took place in the early 1930's when excavated rock was dumped from the tunnel construction site onto the adjacent saddle area. Detritus and debris could also be present in fill materials in the Saddle Area.

2.7.1.3 Other Fills

Other fills exist on the island in the existing bridge foundation areas and on existing roadway and paved areas as shown on the longitudinal profiles A-A' and B-B'[1] on Plate 1 and Plate 2. These fills may comprise derivatives of earth materials found on YBI, along with imported earth materials such as aggregate base material and asphaltic concrete.

[1] A-A' and B-B' are cut along the proposed WB/EB transition structures, respectively.

2.7.2 Sedimentary Deposits (Q_s)

Sedimentary deposits overlie most of the Yerba Buena Island with the exception of locations at the Northeast Point and shoreline fills and along the slopes leading down to landfall. Outcrops of Franciscan Formation rocks were also encountered above and southeast of the Yerba Buena Island.

The unconsolidated sedimentary deposits predominantly composed of silty sand with interbeds of clayey sand and clayey silt. Its thickness ranges from 1 to 40 meters with the thickest section in the vicinity of 95-6 at the east side of the main island between the east portal of Yerba Buena Tunnel and the Nimitz Building. The materials are typically moist except on the upper slopes where they are locally dry to moist. In the Saddle Area and on the Coast Guard Base, the sedimentary deposits may be wet due to shallow groundwater. The materials are typically dense and very stiff with blowcounts increasing irregularly with depth.

The grain size consistency of the sands indicates that the sands were deposited in an eolian (wind-blown) environment similar to eolian sands covering Angel Island and underlying more than half of the City of San Francisco (Schlocker, 1974).

The lowest unit of the Sedimentary Deposit unit is generally a clay or sandy clay up to 10 meters thick. The clay is generally very stiff to hard and unstratified.

2.7.3 Landslide Deposits (Q_{ols} and Q_{ls})

Landslides were mapped at various locations on Yerba Buena Island as part of the study by Fugro-EMI in 1998. The modes of slope failure come in the form of:

- Discontinuity-controlled rock failures
- Relatively deep-seated rotational landslides
- Surficial failures

Locations of the landslides mapped by Fugro/EMI during site reconnaissance can be found from the Geologic Map of the Geotechnical Site Characterization Report, dated June 1998.

Discontinuity-controlled rock failures were observed in Franciscan Formation slopes surrounding the Northeast Point and Eastern Tunnel Approach. The rock wedge failures are reportedly concentrated in the northern slope of the Northeast Point. In this area, a number of relatively small to large failures were observed. The sizes of rock wedge failures vary and range up to over 30 meters in width and length. A larger rock wedge failure was observed to fail in the vicinity of the proposed West Pier (Fugro/EMI, 1998).

Relatively deep seated rotational landslides were mapped on the west and northwest margin of the Eastern Tunnel Approach zone. These landslides are believed to have occurred in historical time. The closest of the relatively deep-seated rotational landslides is located about 60 meters to the northwest of the proposed N6 alignment and is judged to be well outside the proposed alignment and outside the immediate project site.

Surficial slope failures (in a depth of about 1 meter) have occurred predominantly in unconsolidated sedimentary deposits on the southwest slope of the Eastern Tunnel Approach above the Coast Guard Station. These landslides occurred in steep slopes (greater than 40 degrees) above the Coast Guard Base, and were believed to have been caused by saturation of sand during prolonged, intense rainfall in the winters of 1997 and 1999. Some of these landslides reportedly failed a few days before Fugro-EMI field mapping in February 1998. Several minor landslides

are located in the vicinity of the proposed detour structures and permanent and temporary ramps and roadways.

Additional debris-flow failures and zones of shallow creeping soils were identified in the Franciscan Formation (Fugro/EMI, 1998). They are located on the northwest and southeast slopes of the Eastern Tunnel Approach and on east- and north-facing slopes of the Northeast Point. Of these areas, only the surficial failures of the Northeast Point could impact the proposed N6 alignment. A zone of creeping soils was observed by Fugro-EMI above the Torpedo Building and will be beneath the proposed alignment.

2.7.4 Franciscan Formation (J_{kf})

The Franciscan Formation forms the bedrock for Yerba Buena Island and underlies mapped surficial sediments. Outcrops of the Franciscan Formation were observed in a number of places on the island such as:

- the Northeast Point
- on the slopes descending to landfall on the northwestern and southeastern slopes of the Eastern Tunnel Approach
- the east and west portals of the Yerba Buena Tunnel
- in isolated locations near the highest point of the island.

The Franciscan Formation is composed of fresh, slightly to intensely fractured, soft to very hard, locally friable interbedded graywacke sandstone, siltstone, and mudstone. Pyrite was observed on some discontinuities indicating that the Franciscan Formation has undergone some low grade metamorphism.

The bedrock typically strikes to the northwest and dips about 35 to 70 degrees to the northeast. In general, the dips are deepest in the westerly portion of the study area and decrease towards the Northeast Point.

2.8 Groundwater

Groundwater was encountered in borings drilled in previous investigations. Based on the boring log data, it appears that ground water is present in the Saddle Area at El. +2.7 to +6.6 meters

above MSL. The groundwater surface becomes elevated to El. +5 to +15 meter in the Northeast Point Area. Borings 95-2, 98-13, and 98-15 recorded increasing groundwater elevations, respectively, ranging from El. 4.9 to 15.4 meters above MSL. Groundwater was encountered at El. +27 meter at the Eastern Tunnel Approach.

Due to the vicinity of the ocean and the relatively small body of the island, the natural groundwater table should generally be expected near adjacent ocean levels. These levels would be affected by tidal fluctuations. Significantly higher levels have also been measured due to surface runoff from seasonal rains, temporarily retained in the rock fractures.

3.0 OTHER GEOTECHNICAL DRILLING/TESTING

3.1 General

Apart from two phases of subsurface exploration, nine shallow soil borings (99-161, 99-165, 99-401 through 99-405, 99-311 and 99-312) were made in 1999 at selected locations by Parsons Brinckerhoff to determine the general soil characteristics for design of roadways, culverts, and utilities. These borings were drilled by Fugro-EMI. In addition, two pavement deflection test borings (00-601 and 00-602) were performed by CHEC Consultants, Inc. under the supervision of Fugro-EMI in March 2000 (Figure 4). Bulk samples were taken at several locations and sent to the laboratory for testing. Laboratory tests were performed by EMI, the results of which are presented in Appendix A.

Field pavement deflection tests were also performed in 00-601 and 00-602 to determine the integrity of the existing pavement sections in late 1999 and early 2000. Results of the field pavement deflection tests are presented in Section 8.

3.2 Laboratory Testing

Laboratory testing was conducted to provide data relating to relevant engineering properties of the soils and rock for the design of roadway and utility as well as for the YBI substation. Parsons Brinckerhoff (PB) selected soil samples for testing. The selected soil samples were tested by EMI for soil classification, corrosion potential, and R-value at EMI's laboratory. All testing was performed in general accordance with California Test Methods and applicable American Society for Testing and Materials (ASTM) standards.

4.0 ROADWAYS, CULVERT/UTILITY PIPES, & EMBANKMENT FOUNDATIONS

4.1 Roadways

Construction of the new EB/WB transition structures and temporary EB/WB detour structures will necessitate the shifting of existing local roadways within the project site. Accordingly, the local roadways have to be modified to accommodate the new alignment. There are five (5) new permanent roadways, one (1) new ramp, and three (3) reconstructed ramps proposed in the project. Permanent ramps include: the eastbound entrance ramp (R1 Line), westbound entrance ramp (R3 Line), westbound exit ramp (R4 Line), and eastbound exit ramp (R5 Line)[1]. New local roadways include Macalla Road (MR Line), USCG Road (CG Line and CG1 Line), Southgate Road (SG Line), Hillcrest Road (R6 Line), and Torpedo Factory Road (TF Line).

[1] Note that there is no R2 Line proposed for this project

The proposed new roadways and ramps along with the temporary detour ramps are to be constructed on either native sandy materials in the sloping terrain or artificial fill in the Saddle Area. These materials, in general, are medium dense to very dense and are considered to provide adequate support to new roadways and ramps. Further discussions of each of the roadways and ramps are presented in Section 8.4.

4.2 Culverts/Utility Pipes & Electric Conduits

Culverts/utility pipes and electric conduits proposed along the new roadways and ramps will generally be located in native sandy materials except those in the Saddle Area where artificial fill overlies the native sandy soils. The native sandy soils and artificial fill are basically medium dense to dense and are expected to provide adequate support to the culverts/utility pipes and electric conduits.

Groundwater table is expected to be below the invert elevations of the proposed culverts/utility pipes and electric conduits except in the Saddle Area where groundwater fluctuates at a depth of about 5 meters. Excavations for these substructures will be made mostly in the dry; but groundwater may be encountered at the excavations in the Saddle Area where it can be readily handled by sump pumping.

The allowable overfill height for steel or concrete culverts should be in accordance with Chapter 850 of the Highway Design Manual. The minimum thickness of cover required for design purposes over pipes and pipe arches can be found from Table 854.9 of the Highway Design Manual.

All backfill around the culverts/utility pipes and electric conduits should be placed in accordance with Section 19 of the Caltrans Standard Specifications (latest edition).

Culverts/utility pipes and electric conduits will be buried on slopes as steep as 1:1 (V:H). Excavation of these substructures should be carried out in stages and shored by ground stabilizers consisting of post/boards made of Redwood or treated Douglas Fir with preservatives. Concrete anchors at regular intervals should be constructed to provide additional support to the concrete encasements that house the electric conduits. Based on the existing subsurface profiles, the concrete duct banks will be founded on dense native sandy soils. Stone bedding should be placed below utility pipes. Trench backfill may be soil cement or engineered fill compacted in lifts in accordance with Section 19 of the Caltrans Standard Specifications (latest edition).

4.3 Embankments

Existing Coast Guard Road and Torpedo Factory Road will be modified to accommodate for construction of the new eastbound transition structure as well as the eastbound temporary detour structure. Small embankments of height about several meters will be constructed along the existing Coast Guard road and Torpedo Factory Road in the southeast of the YBI. These two new roadways are identified as CG Line and TF Line. The embankments will be placed over existing artificial fill.

Embankment fill will be imported borrow. Fill slopes of 2:1 (H:V) or flatter should be used. For areas with right of way constraints, the fill slope may be steepened to 1.5:1 (H:V). If steeper slopes (e.g. greater than 1.5:1) are required, reinforcing the fill slopes with geogrids or the like is necessary.

The gravelly and sandy materials obtained from demolition of roadways and excess material obtained during preparation of subgrade for temporary and permanent detours and roadways for structural sections can be used for embankment construction, if the field engineer determines this material is acceptable (i.e., it has a minimum R-value of 20).

4.3.1 Benching into Existing Slopes

Where fill is to be placed on slopes steeper than 6:1 (H:V), benches should be cut into the exposed ground surface. Horizontal benches should be excavated progressively uphill as the fill is placed to develop a good bonding between the material and fill (Figure 5).

Benches should extend below loose natural materials into competent soil and bedrock where fills are planned over hillsides. Typically, benches should be excavated at least 1 meter into competent material and have a minimum width of 2 meters.

The final locations of benches and depth of sub-excavation should be determined by the Engineer at the time of grading. In all cases, the benches should be examined and meet the approval of the Engineer prior to fill placement.

4.3.2 Erosion Control

Erosion control is recommended for all slopes. District Landscape Architecture Branch should be consulted.

4.3.3 Earthwork Factors

Most of the embankments will be constructed from imported borrow. The earthwork factor of 0.9 may be used for embankment materials excavated and reused in embankment construction. Use 1.0 for the earthwork factor for materials obtained from demolition of existing roadway.

5.0 RETAINING STRUCTRES

5.1 General

There are four temporary and two permanent retaining walls to be constructed in this project. The four temporary walls are located at T2 and T-4 lines, and the two permanent walls are located behind the Abutment W11 of the EB On-Ramp and at the east side of the SG-line leading to the EB on-ramp structure. Borings were performed by EMI in 1999 to determine the soil conditions at these locations. Borings 99-402 and 00-403 were drilled to depths of 11.1 and 12.2 meters at the proposed T4 and T2 Lines, respectively. No borings were drilled along the proposed alignment of the permanent wall at SG-line. The closest borings to this wall are 99-313 and 99-204, which were drilled to depths of 15.7 and 30.5 meters, respectively.

The proposed temporary retaining walls will be constructed along T2 Line between Station 49+12 and Station 49+82 along the west edge and Station 49+12 and Station 49+77 along the east edge. Based on Boring 00-403, the walls will be cut walls into sloping grounds. The walls will be about 5 meters in height according to the preliminary grading plan.

Other temporary retaining walls are proposed at the temporary eastbound entrance ramp detour (T4 Line) between Station 50+02 and 50+70.

These walls are to be tied in with the temporary walls at T2 Line. Like the T2 Line walls, the T4 Line walls are cut walls in sloping terrains. The height of the wall is about 2 to 5 meters. Upon shifting the traffic from the eastbound entrance ramp detour (T3 Line), the walls will be backfilled to original grades.

The proposed permanent wall behind Abutment W11 of the EB On-Ramp will consist of five segments with height varying from about 2.4 to 6.5 meters from the top of the footing. The wall is to be supported on spread footing over dense to very dense sands with some fines (Fugro-EMI, 2001). The other permanent wall will be located at the east side of the SG-line from Station 10+94 to Station 11+40. Based on a preliminary sketch of wall configuration, this wall is a permanent Caltrans Standard Type 5 wall up to 3.6 meters high founded on natural soil with level soil backfill to retain the relocated Southgate Road (Fugro-EMI, 2001). The wall will be founded on a sloping terrain that has suffered shallow surficial landslides.

Abutment Walls

In addition to the temporary and permanent retaining walls described above, two permanent abutment walls are proposed – W11 and W11R. W11 is located at the EB On-Ramp while W11R is located at the YBI Transition Structure. The abutment walls are designed by TY Lin/Moffat & Nichol.

5.2 Subsurface Conditions

The subsurface conditions at the temporary and permanent wall locations typically consist of, in descending order, (1) asphalt concrete, (2) medium to very dense silty fine sand and coarse to fine sands with occasional layers of gravel, and (3) stiff to very hard sandy lean clay. Bedrock was encountered at a depth of 21.3 meters at Boring 99-204.

Groundwater is expected to be at least 10 meters or more below existing ground surface. No signs of seepage were noticed in areas where the retaining walls are proposed.

5.3 Foundations

5.3.1 Temporary Walls (Figure 6)

Two temporary walls each are proposed for the T2 and T4 Lines. The temporary walls will be cut walls into medium dense to dense silty fine sand to fine sand. The cut walls can be supported by soil nails. Due to the temporary nature

of the walls, which will be eventually backfilled, it is our opinion that the face of cut wall can be covered with a layer of 100- to 150-mm thick shotcrete with a wire mesh after soil nails are installed.

5.3.2 Permanent Walls

The eastern side of SG-line is to be widened and supported by a series of cantilever and counterfort walls. The permanent walls vary in height from 2.4 meters in the south to about 7 meters in the north where the counterfort wall is tied in with an abutment supporting the EB on-ramp structure. The abutment (W11) is approximately 7 meters high. These walls are located in close proximity to shallow surficial landslides mapped by Fugro-EMI in their site investigation. The walls are designed and discussed by TY Lin/Moffat & Nichol under a separate volume.

Two tieback walls each of length 15 and 21 meters are proposed at existing Bent 48 and between Bent 48 and new abutment W11 to retain soils and to allow for construction of the new abutment W11. These walls are intended to support open faces at existing columns of Bent 48. The tieback walls are each of height about 6 meters and each consists of three rows of tiebacks as shown in TY Lin/Moffat & Nichol's drawings. The tieback walls are designed and discussed by TY Lin/Moffat & Nichol under a separate volume.

5.4 Settlement/Heave

Heave of the temporary wall foundations is expected as overburden soils are removed. The heave is expected to be very minimal and less than 12.5 mm. Settlement of the permanent wall depends on the type of wall foundation, which is discussed by TY Lin/Moffat & Nichol under a separate volume.

5.5 Geotechnical Parameters for Temporary Walls

The temporary walls at T2 and T4 Lines will be soil nail walls. The key design parameters of the soil nail system are classified into the following four groups:

1. Mechanical properties of in situ ground, particularly soil type, cohesion, and angle of internal friction;

2. Geometrical properties of the finished grade and reinforcement;

3. Mechanical properties of the reinforcement and grout mixture; and

4. The limiting unit friction that can be mobilized along the nail in the specified ground.

Table 1 below presents recommended temporary soil nailed wall design parameters

Table 1 Soil Nailed Wall Design Parameters

Sand:	Angle of internal friction = 38°
	Cohesion = 4.8 kPa
	Unit weight = 18.1 kN/m^3
	Ultimate Side Friction of sand = 240 kPa
	Global Stability Factor of Safety = 1.5
	External Stability Factor of Safety = 1.25 (Static)
	= 1.05 (Seismic)
	Horizontal Seismic Coefficient (k_h) = 0.2g
	Vertical Seismic Coefficient (k_v) = 0

5.6 Construction Considerations

5.6.1 Temporary Walls

Soil excavation for the temporary walls at T-2 and T-4 Lines will be done by a backhoe working down the excavations. The construction process is carried out starting at the top of the cut and progressing in incremental steps towards the lower levels (Figure 7). There are three main repetitive steps in the construction of the wall:

1. Excavation of limited area (1.5 meter (Height) x 5 meters (Length));

2. Immediate shotcrete ground support (100 to 150 mm thick) with face drainage; and

3. Drilling and installation of soil nails.

The cut slopes must be excavated to ensure minimum disturbance of the ground, and special care should be taken to prevent local instability that could undermine and induce movements in the upper part of the walls. The shotcreting

and soil nail installation should be carried out as soon as possible after the bench excavation is completed.

5.6.2 Abutment Walls

Abutment walls are to be planned at the eastbound entrance ramp (R1 Line) and the ED1 Line. The walls will be constructed over sloping grounds composed of medium dense to dense silty to fine sands with gravel. Design of these abutment walls is performed by TY Lin/Moffat & Nichol.

5.6.3 Permanent Walls

A series of permanent cantilever/counterfort walls is proposed along the existing Southgate Road (SG Line) south of the East Bound on-ramp structure. These walls will be located on top of slopes that have been subject to previous landsliding. The walls will be designed by TY Lin/Moffat & Nichol. Discussion of geotechnical issues related to construction of this wall is presented in the Geotechnical Foundation Report for the YBI Approach and Main Span Structures by EMI in July 2001.

Two tieback walls are proposed to support the existing columns at Bent 48. Construction of these walls will require top down excavation in stages. The excavation will be supported by tiebacks and shotcrete which eventually will be covered by cast-in-place concrete facing. Details of the design are performed by TY Lin/Moffat & Nichol.

6.0 YBI SUBSTATION

6.1 Description

The substation is located on the east side of YBI, about 45 meters (150 feet) west of the existing SFOBB, and about 180 meters (600 feet) northeast of the east tunnel portal (Figure 8). Macalla Road borders the site on the north and a west-bound bridge on ramp in the east. The general ground elevation is about 4.5 to 6 meters (15 to 20 feet) above the planned substation floor elevation. Although there may be some minor utilities on the site (storm drainage and electrical), the area is vacant and the ground is covered with trees, brush, and asphalt parking area. Figure 8 also presents the layout of the substation.

6.2 Subsurface Conditions

One boring (99-401) drilled to a depth of 5.2 meters was performed at YBI substation. In addition, site conditions at YBI have been determined from the following:

- Boring 99-201 which is located about 20 meters southeast of Boring 99-401.
- "Preliminary, Yerba Buena Island Geotechnical Site Characterization Report, San Francisco-Oakland Bay Bridge, East Span Seismic Safety Project", prepared for Caltrans by Fugro-Earth Mechanics JV dated June, 1998.
- 1995 Logs of Test Borings and Cone Penetrometer Tests by Caltrans for Earthquake Retrofit Project No. 19, San Francisco-Oakland Bridge-East Viaduct.
- A visual site inspection, including observation of conditions exposed in the excavation slope on the east side of the substation site.

The substation is generally underlain by dense to very dense silty sand to find sand with silt and gravel. Depth of soil to bedrock as encountered in 99-201 is about 35.4 meters which is comparable with the Geologic Map prepared by EMI/Fugro and the Caltrans test borings. The soil is basically wind deposited sand. Beneath the sand is the San Franciscan bedrock that outcrops at the portal area and other parts of YBI. Although landslides have been identified on some of the steeper slopes on this side of YBI, none of the landslides are in the vicinity of the substation.

The following soil properties were used to develop the foundation recommendations:

Cohesion, c=0
Angle of internal friction, $\phi'=36°$
SPT N-value = 30 blows/0.3 m (below loose surface layer)
Cone penetrometer tip resistance, q_c = 14.36 MPa (150 tsf)
Total unit weight, γ = 19.6 KN/m^3 (125 pcf)

6.3 Fault Location and Ground Shaking

YBI is located about 17.7 km (11 miles) east of the San Andreas fault and 12 km (7-1/2 miles) west of the Hayward fault; both of these faults are active strike-slip faults. Ground shaking at YBI on either the weathered rock or dense sand can be represented by the EMI "soft rock outcrop motion design spectra" as reported in their December 24, 1998 report "Seismic Ground

Motion for San Francisco-Oakland Bay Bridge, East Span Seismic Safety Project.

6.4 Groundwater

Data inferred from 99-201 and 99-401 indicated that groundwater would be well below the proposed foundation grade of the substation.

6.5 Foundations

The substation building can be supported on conventional spread footing foundations. Minimum foundation dimensions should conform to applicable UBC criteria.

a). Bearing Pressures

Spread footings can be founded on the natural soil and can be designed for the following:

- Isolated footings q_a = 167.5 kPa (3,500 psf)

- Strip footings q_a = 143.64 kPa (3,000 psf)

These values include a factor of safety of at least 3.0 against ultimate soil failure. A 50% increase (i.e., for a safety factor of 2.0) can be used for transient loads, including seismic. All footings should be at least 460 mm (18 inches) wide and should have a minimum embedment of 460 mm (18 inches), measured below the lowest adjacent final soil grade.

Where the natural soil is in a loose condition or disturbed during grading, foundation subgrade should be compacted prior to foundation construction. As a minimum, the bottom of all footing excavations should be compacted with hand compactors to a minimum of 95% relative compaction before reinforcing steel and concrete are placed. This requirement must be stated in the specification.

b). Foundation Settlement

Footing designed for the above values are expected to settle between 6 and 12 mm (¼ to ½ inch). Most of the settlement is expected to occur immediately after application of the loads.

c). Resistance to Lateral Loads

Resistance to lateral loads can be obtained from sliding friction on the bottom and passive pressure against the sides of foundations as follows:

Coefficient of sliding friction, $\mu = 0.4$ (interface friction angle $\delta = 22°$)
Coefficient of lateral earth pressure, $k_a = 0.26$
Coefficient of seismic increment $\Delta k_{AE} = 0.15$

Passive pressures:

$p_p = 40.8$ kN/m^3 (260 pcf), effective fluid pressure for static loads

$p_p = 62.8$ kN/m^3 (400 pcf), effective fluid pressure for seismic loads

The passive pressure values include safety factors of 3.0 and 2.0 for static and seismic loads, respectively.

Additional lateral resistance to seismic loads can occur from sliding friction on the back (soil side) of the retaining or basement walls in the direction parallel to the wall. A frictional resistance of 0.478 kPa (10 psf) per 0.3 meter (1 foot) of wall height can be used.

d). At-rest Earth Pressures Against Basement Walls

Basement walls are restrained against rotation and should be designed for at-rest earth pressure conditions:

At-rest pressure for level backfill, $p_o = 7.84$ kN/m^3 (50 pcf), equivalent fluid pressure

At-rest pressure for existing natural sloping backfill, $p_o = 8.62$ kN/m^3 (55 pcf), equivalent fluid pressure.

Although not required by the UBC criteria, it is recommended that an additional seismic earth pressure be added to the above static earth pressure. An approximate Mononobe-Okabe method was used to calculate the seismic earth pressure increment. For a peak ground acceleration, $k_h = 0.4g$, and 1.5 x multiplication factor for restrained walls, the recommended seismic earth pressure increment is $\Delta p_{oe} = 3.05H$ kN/m^2 (19H psf) applied as a uniform pressure, H is the height of basement wall in feet.

Walls should be provided with a positive back drain. This can be constructed using (1) geocomposite drainage mat, (2) a 0.3-meter (one-foot) thick layer of Caltrans Class 2 material, or (3) a 0.3-meter (one-foot) thick layer of 19 mm (¾-inch) drain rock encapsulated in filter fabric. A perforated collector pipe with a positive gravity discharge should be provided. Where moisture migration through walls is to be avoided, walls should be sealed with a water-proof membrane. Final grading should be designed to convey surface runoff away from structures.

e). Seismic Design

The 1997 UBC has many new terms with respect to fault location and behavior. The following values are appropriate:

Factor	Value
Seismic Zone Factor, Z	0.4
Soil Profile	S_D for stiff soils
Seismic Source Type	A, for M≥7.0 (moment magnitude)
Near-Source Factor, N_a	1.0 (greater than 10 km from fault)
Near-Source Factor, N_v	1.12 (greater than 10 km, but less than 15 km from fault)
Seismic Coefficient, C_a	0.44 (N_a) = 0.44
Seismic Coefficient, C_v	0.64 (N_v) = 0.72

f). Slab-on-Grade Floors

Slabs for the substation can be supported on non-expansive compacted engineered fill. Slab-on-grade subgrade should be rolled to produce a dense, uniform surface, and compacted to a minimum of 95 percent per CALTRAN Test 216. The slabs should be underlain with a capillary moisture break consisting of at least 100 mm (4 inches) of crushed gravel, one-quarter inch minimum and three-quarters inch maximum in size. Where migration of moisture vapor through slabs would be detrimental, an impermeable membrane moisture vapor barrier should be provided between the drain rock and the slabs. The membrane should be covered with 50 mm (2 inches) of sand to protect it during construction.

g). Pavements

A subgrade R-value of 50 is recommended to be used for design of pavement for the parking area at the substation. Using this R-value and assuming traffic index for the parking lot of 8.0, we have determined the pavement thicknesses for the parking area (see Table 2 below). After grading the site, the pavement subgrade will consist of dense silty sand.

Table 2 Flexible Pavement Design for YBI Substation

(Subgrade R-value = 50, TI = 8.0)

Alternative 1		Alternative 2		Alternative 3 (Full-depth AC)	
110 mm	AC (A)	110 mm	AC (A)	200 mm	AC*
215 mm	AB (2)	140 mm	CTB (A)		

Notes: 1. All layers in compacted thickness

2. Aggregate base with a minimum R-value of 78.
3. * Full Depth AC option (No base or subbase)

All pavement construction and materials should conform to applicable sections of the latest edition of the Caltrans Specifications. The top 200 mm of subgrade beneath pavements should be stabilized, moisture conditioned to optimum, and compacted to a minimum degree of compaction of 95 percent per CALTRAN TEST 216. Subsequent Class 2 aggregate base should be compacted to 95 percent.

Where trees are located adjacent to the pavement area, it is recommended that a suitable impervious root barrier be included to minimize water and root migration into the pavement layer.

6.6 Earthwork and Site Grading – YBI Substation

6.6.1 General

The grading plan shows that excavation will be required as part of site preparation to provide the desired finished grades and adequate surface gradients for the control of surface runoff. Major construction at the site include excavation for the basement walls at the north and west sides of the substation. Cuts as high as 6 meters (20 feet) will be made at the north side of the substation. We expect the cuts will be in medium dense to dense silty sand.

6.6.2 Stripping

Soils containing roots and organic matter must be stripped from all areas required for new construction, including areas to receive fill and where building foundations, concrete slab-on-grade, and pavements are to be constructed. The stripped material should be removed from the site or stockpiled for later distribution in landscaping.

6.6.3 Removal of Existing fills and Unsuitable Materials

We expect no artificial fill is present at the site as it is essentially located in a native sloping terrain. If any artificial fill is encountered, it is recommended that it be removed in its entirety. Soft soils encountered at local areas should be removed in their entirety.

6.6.4 Structural Backfill

Soil/rock excavated from the native ground can be used for structural backfill of the basement walls as well as for site grading. The excavated materials should not contain organic or expansive material, have no rock or similar irreducible materials with a maximum dimension greater than 75

mm (3 inches), and should be approved by the geotechnical engineer before use. Imported materials, if required, should be non-expansive (Plasticity Index less than 6) and should have a Sand Equivalent value of not less than 20.

6.6.5 Basement Wall Construction

Construction of the base walls should be performed in 7.5-meter (25-ft) sections. Temporary cut slopes can be made no steeper than 1:1 (H:V). Excavation for the footings of the basement walls should be done in the dry season.

6.6.6 Compaction

All structural backfill should be placed in uniform lifts not exceeding eight inches in their loose state. The subgrade and all fills should be compacted by mechanical means only with acceptable compaction equipment to a minimum of 95% relative compaction per CALTRAN TEST Method 216. The upper six inches of the subgrade exposed after stripping and excavation should be scarified, moisture conditioned, and properly compacted to 95% relative compaction prior to fill placement. Structural backfill placed behind the basement walls can be compacted to relative compaction of not less than 90%.

The subgrade and all fill materials should be moisture conditioned to within two percent of the optimum moisture content determined in the laboratory.
Compaction equipment, which may cause excessive displacement or may damage structures, should not be used.

7 CORROSION INVESTIGATION

One of the most useful factors in determining soil corrosivity is electrical resistivity. The electrical resistivity of a soil is a measure of its resistance to the flow of electric current. Corrosion of buried metal is an electrical chemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil. A decrease in resistivity suggests higher vulnerability to corrosivity as its moisture and chemical contents increase.

According to Caltrans Memos to Designers 301 (May 1996), a corrosive area is an area where the soil contains more than 500 ppm of chlorides, more than 2,000 ppm of sulfates or has a minimum resistivity of less than 1,000 ohm-cm. In corrosive areas, steel pipes and shells are not ordinarily used.

To determine corrosivity of the site, the minimum electrical resistivity and pH of selected samples were measured per California Test Method 643. In addition,

the samples were also chemically analyzed for chloride and sulfate contents in accordance with California Test Methods 422 and 417, respectively. All the tests were performed by EMI as shown in Table 3.

7.1 Artificial Fills

The fill in the Saddle Area consists of poorly graded sands with gravel and sandy gravel with less than 25% fines to finer grained poorly graded sands up to 45% fines and traces of gravel or roadbed materials. Seven (7) soil samples were tested for minimum resistivity, pH, and soluble sulfate and chloride contents. Test results indicated minimum resistivity of all samples exceeded 1,000 ohm-cm and all pH-values were near neutral. According to Caltrans Memo to Designers 3-1 (1996), the sandy soils are found not to be aggressive towards bare metal.

7.2 Sedimentary Deposits

Sedimentary deposits consist of two major units:

- An upper deposit of medium dense to very dense silty sands up to 40 meters thick with varying amounts of fines and occasional beds of clayey silts, followed by

- A deep deposit of stiff to very hard sandy clays up to 20 meters thick.

A total of 38 samples of sand and clay deposits were tested for minimum resistivity, pH and soluble sulfate and chloride contents. The test results are fairly consistent among the unit with a few exceptions in the Saddle Area as described below:

Most of the sandy samples at shallow depths had minimum resistivities exceeding 2,000 ohm-cm. pH values vary between 5.3 to 8.4. Soluble sulfate contents were less than 700 ppm except in Boring 99-305 where one sample at a depth of 3.8 meters recorded soluble contents of 1,641 ppm. All soluble chloride contents were less than 500 ppm except a high level of 612 ppm was measured in Boring 99-161 at the top 1.5 meter depth, 3,090 ppm in Boring 99-171 in the upper 1-meter depth, and 681 in Boring 99-207 at a depth of about 3 meters.

Clay samples had minimum resistivities exceeding 1,000 ohm-cm and all pH-values were near neutral from 6.5 to 7.9 except in a sample at a depth of 16.8 meters in Boring 99-204 where a resistivity of 950 ohm-cm was recorded. Soluble sulfates and chlorides were all less than 500 ppm.

Table 3 CORROSIVE TEST RESULTS

Boring No	Depth (meter)	Soil Type (USCS)	Resistivity (Ohm-cm)	PH	Sulfate Content (ppm)	Chloride Content (ppm)
98-163	0.61	SM	2,200	6.3	51	205
98-163	16.78	SM/ML	1,300	7.3	100	312
98-168	0.76	SM	11,000	7.0	121	148
98-168	4.58	SM	8,200	7.0	65	142
98-168	13.73	SM	3,200	6.9	62	277
98-168	15.25	CL	2,100	8.0	170	168
98-168	16.78	CL	2,000	8.3	180	190
98-307	18.3	CL	1,600	7.9	150	226
98-308	0.92	SM	2,300	7.5	120	178
98-308	15.25	CL/SC	1,500	7.5	100	204
98-310	9.15	ML	2,000	7.1	105	253
98-311	0.76	ML/(CH-CL)	1,400	7.2	110	245
99-161	0-1.53	SM/ML	3,200	6.0	23	**612**
99-170	7.63	SM/ML	2,200	7.5	105	253
99-171	0.76	ML	5,000	7.9	62	**3,093**
99-171	6.10	SM	5,300	7.6	110	204
99-172	1.53	SM	9,600	7.3	90	430
99-172	7.63	SM	5,300	5.6	155	521
99-174	3.05	SM	4,800	6.8	125	309
99-174	3.20	SM	4,800	6.8	125	309
99-174	15.56	ML	1,500	7.3	150	253
99-175	4.58	SM	5,900	7.6	123	305
99-175	12.2	SM	4,900	7.4	110	246
99-175	19.83	CL	2,000	7.6	120	284
99-201	1.53	SP-SM	6,000	8.1	185	183
99-201	7.63	SP-SM	11,000	7.9	115	238
99-203	1.53	SM/ML	6,500	7.7	30	157
99-204	7.63	SM	4,900	7.9	145	261
99-204	16.78	CL	**950**	7.0	140	27.5
99-205	3.05	SM	2,100	5.8	85	236
99-206	1.53	SM/ML	5,200	5.7	45	460
99-207	3.05	SM	2,000	5.3	120	**681**
99-208	1.53	ML	1,200	6.5	73	460
99-220	22.88	CL	1,300	7.1	300	212
99-305	1.53	SM	**1,000**	7.8	529	405
99-305	3.81	SM	**1,000**	7.9	1641	206
99-305	12.20	CL	1,100	7.9	83	288
99-308	0.92	SM	2,300	7.5	120	178
99-312	0.92	SM	7,500	8.3	80	275
99-312	1.53		6,600	8.4		
99-312	9.15	SC	39,000	7.5	115	154
99-402	0-0.92	SM/ML	2,500	8.0	90	182
99-402	0.92	SM	3,300	6.8	122	492
99-402	9.15	SC	6,400	7.1	60	202
99-404	0-0.62	SM	6,400	7.1	62	368
99-405	0-0.5	SM	4,100	7.1	70	453

Note: **Bold** numericals indicate exceedances of Caltrans Corrosivity Limits : Minimum resistivity 1000 ohm-cms, maximum chloride content = 500 ppm, and maximum sulfate content = 2,000 ppm.

7.3 Conclusions and Recommendations

Based on the limits set forth by Caltrans Memo to Designers 3-1, no special corrosion protection would be required for steel elements embedded in the sand and clay soils in most of the project site. However, in Boring 99-161, Boring 99-171 and Boring 99-207 where soluble chloride levels exceed 500 ppm limits as per Caltrans Memo to Designers 3-1 (1996) and the high soluble sulfate content (i.e., 1,641 ppm) recorded in

Boring 99-305, Type II cement with appropriate corrosion protection against these soluble salts should be used in this marine environment for any concrete structures in contact with these soils. At other locations, Type I or II cement can be used.

In addition to soil corrosivity, the life of buried steel pipes and culverts can be increased by using heavier gage steel or coating the culvert pipe. The estimated life of any gage steel culverts may be calculated by means of California Test Method 643.

8 PAVEMENT

8.1 General

The temporary and permanent ramps and roadways for this project have been classified as Light and Medium with Traffic Index (TI) of 8 and 10, respectively. Table 4 below presents the Traffic Indices for the proposed temporary and permanent ramps and roadways for the YBI project.

Table 4 Traffic Indices

Roadway or Ramp	Traffic Index (TI)
Permanent Ramps and Local Roadways (R1, R2, R3, R4, R5, R6, MR1, SG, CD, CD1, and TF)	10.0
Temporary Mainline – EDI Line	11.0
Temporary Ramps and Local Roadways (T2, T3, T4, & T5)	8.0

8.2 R-value Testing and Determination

Samples from representative areas within the project limits were selected and tested for R-value. A total of six (6) samples were tested from five (5) borings. The test results indicate that the R-value of the subgrade soil and existing fill varied from 26 to 80. Based upon the proposed grading plans, a majority of the proposed ramps and roadways will be constructed on new and existing fill material, though few will be built on cut sections. Recommended R-values of various types of materials on which the structural sections will be constructed are as follows:

Native Soils

Native soils are predominantly poorly graded fine sand and fine silty sand with gravel. R-values samples taken at locations along the project alignment show R-values in the range of 26 to 80. An R-value of 50 is assigned for these materials.

Structure Backfill

Structure backfill should be predominantly granular as per requirement of Section 19 of the Standard Specifications. An R-value of 50 is assigned for this material.

Embankment Materials

Embankment material will be imported borrow materials with a minimum R-value of 20.

At all locations, soils with an R-value less than 20 should not be incorporated within 1.2 meters of the proposed subgrade. If at any locations unsuitable materials (to be determined by the Engineer in the field) are encountered, they should be subexcavated to a firm ground below the grading plane and backfilled with imported borrow or selected material having an R-value of 20 of more.

Table 5 R-Value Test Results

Boring	Depth (m)	Soil Type	R-value
98-163	0-0.46	SM	80
99-312	0-0.61	SM/CL	64
99-312	0.61-0.92	SM/CL	68
99-402	0-0.92	SM/ML	26
99-404	0-0.52	SM	67
99-405	0-0.5	SM	65

8.3 Pavement Deflection Testing

Pavement deflection testing was performed by CHEC Consultants, Inc, under the supervision of EMI in March 2000 (Figure 4). The testing was done by means of DYNAFLECT nondestructive pavement testing device. The testing equipment and analysis procedure used by CHEC Consultants, Inc. were based upon California Test Method 356.

The deflection testing was performed in only one lane of all the four segments tested. The locations of the test segments are summarized in Table 6 below.

Table 6 Locations of Pavement Deflection Testing

Pavement Deflection No.	Location
00-601A	Macalla Road to 100 meters South of Macalla Road
00-601B	West Side of Intersection to East Side of Intersection
00-602A	Bay Bridge to 41.4 meters east
00-602B	41.4 meters east to 215 east of the Bay Bridge

Results of the pavement deflection tests can be found from a report entitled "Deflection Testing and Analysis Structural Pavement Design for Yerba Bunea Island" prepared by CHEC Consultants, Inc in April 2000. Table 7 below summarizes the results of the tests.

Table 7 Pavement Deflection Test Results

Pavement Deflection No.	Actual Pavement Depth[1](mm)	Structural Overlay Requirement[2](mm)
00-601A	146 (AC)	168 (AC)
00-601B	140 (AC)	45 (AC)
00-602A	300 (AC)	15 (AC)
00-602B	178 (AC), >50 (CTB)[3]	45 (AC)

Notes:
1. AB thickness was not determined.
2. Based on ten-year Traffic Index of 10.0.
3. As built drawings indicate that CTB is about 205 mm thick.

At pavement section 00-602B, the required structural overlay is 46 mm which is smaller than the minimum overlay thickness of 91 mm for pavements placed on top of CTB for reflective crack control as recommended in California Test Method 356. We recommend placing a 45 mm overlay with paving fabric over this segment of Macalla Road which should satisfy the structural overlay requirement and help delay reflective cracking.

8.4 Pavement Structural Sections

The alternative pavement structural sections presented in the following subsections are recommended for the permanent and temporary ramps and local roadways as well as for the temporary mainline (ED1) which is the at-grade portion of the temporary eastbound detour structure. The footings of the temporary eastbound detour structure must be in place before the roadway can be completed.

Below summarize pavement structural section alternatives for each proposed roadway, which is followed by selection of the recommended structural section based upon an economic analysis in Section 8.4.16.

8.4.1 Eastbound Entrance Ramp (R1 Line)

The eastbound entrance ramp (R1 Line) is predominantly an aerial structure supported on piers. The beginning of the entrance ramp will be at grade from Station 50+90 to Station 51+15 for a length of about 25 meters. An abutment wall is proposed at around Station 51+15 which is founded on sloping grades. On the east side of the ramp is proposed a bicycle/pedestrian path. The design of the foundation and abutment wall will be undertaken by TY Lin/Moffat & Nichol under a separate volume.

Recommended structural section for at grade portion of the R1 Line is as follows:

Design Factors: TI = 10 R-value = 50
GE required = 490 mm

Thickness T/W & Shoulders

Alternative 1 (Full Depth Asphalt Concrete)

30 mm	OGAC
185 mm	AC (A)
75 mm	ATPB

Alternative 2

30 mm	OGAC
105 mm	AC(A)
75 mm	ATPB
185 mm	AB

Alternative 3

30 mm	OGAC
105 mm	AC(A)
75 mm	ATPB
100 mm	CTB (A)

8.4.2 Westbound Entrance Ramp (R3 Line)

Westbound entrance ramp (R3 Line), located just southeast of the new substation, will be regraded following construction of the westbound detour structure and the new YBI substation. The regraded portion of R3 Line starts

from Station 0+00 to Station 0+90 (approximately) and is approximately 90 meters long. Minor cut and fill will be required for regrading R3 Line. Approximately 5 meters of the regraded ramp (Station 0+85 to Station 0+90) will be constructed over the existing pavement.

Borings from the new YBI substation subsurface investigation indicate that R3 Line is underlain by dense to very dense silty sand to find sand with silt and gravel. Recommended structural section for this ramp is the same as for the R1 Line in Section 8.4.1.

8.4.3 Eastbound Exit Ramp (R4 Line)

Eastbound exit ramp (R4 Line) will be reconstructed after completion of the eastbound SFOBB main line and traffic is directed back to the main line. The eastbound exit ramp starts from Station 50+30 to Station 51+40 for a total length of 110 meters. R4 Line will be located on fill and cut slopes formed by ED1 Line.

Recommended structural section for this ramp is the same as for the R1 Line in Section 8.4.1.

8.4.4 Westbound Exit Ramp (R5 Line)

Westbound exit ramp (R5 Line) is to be reconstructed after completion of westbound SFOBB main line and traffic is directed back to the main line. It starts from Station 50+16 to Station 50+88 for a total length of 72 meters.

A temporary eastbound entrance ramp detour, T4 Line, is to be constructed at the time T2 Line is created. This includes lowering the existing grades of the roadway and constructing two series of temporary walls from Station 50+02 to Station 50+89. The temporary wall is about 2 to 3 meters in height. Upon completion of T3 Line, this temporary detour ramp will be backfilled to the original grades and becomes R5 Line – the westbound exit ramp.

Site investigation (99-402) shows that R5 Line is underlain by medium dense to dense silty fine sand. No groundwater was reportedly encountered at 99-402 at the time of drilling.

Recommended structural section for R-5 Line will be the same as for the R1 Line in Section 8.4.1. Structural section for T4 Line is as follows:

T4 Line

Design Factors: TI = 8 R-value = 50
GE required = 390 mm

Thickness T/W & Shoulders (Full-depth Asphalt Concrete)

Alternative 1		Alternative 2		Alternative 3 (Full-depth AC)	
110 mm	AC (A)	110 mm	AC (A)	200 mm	AC*
215 mm	AB (2)	140 mm	CTB (A)		

Notes: 1. All layers in compacted thickness
4. Aggregate base with a minimum R-value of 78.
5. * Full Depth AC option (No base or subbase)

8.4.5 Westbound Exit Ramp to Southbound Treasure Island Road (R6 Line)

Two phases of construction are planned on the westbound exit ramp to southbound Hillcrest Road. The first phase includes excavating portion of the exit ramp from Station 50+42 to Station 51+15 which is identified as "T2" Line; and the second phase consists of backfilling the excavated area to the proposed finished grades at R-6 Line. Site investigation based upon 99-403 indicated that the area is underlain by medium dense to dense sand to silty sand with gravel and that no groundwater was encountered in 99-403.

Recommended structural sections for T2 and R-6 line are the same as for T4 Line in Section 8.4.4 and R1 Line in Section 8.4.1, respectively.

8.4.6 Macalla Road (MR Line)

Macalla Road is to be reconstructed and widened at the junction of Southgate Road and Macalla Road (MR Line). The length of the new road is about 135 meters. Concrete curbs are to be provided at both sides of the roadway. The beginning and the end of the new roadway will be constructed over existing roadway, while the remaining will be constructed over sloping terrains. Moderate cut and fill will be required for construction of this roadway. Traffic will have to be maintained on Macalla Road during construction.

Site investigation indicates that Macalla Road is underlain by dense silty sand to poorly graded sand with gravel. Recommended structural section for the MR Line is the same as for the R1 Line in Section 8.4.1.

8.4.7 New USCG Road (CG Line and CG1 Line)

A new USCG road (CG Line) is proposed southeast of the existing USCG road. The new USCG road will branch off from the existing USCG access road at Station 10+00 and end at Station 12+05. The majority of the CG Line will be supported on embankment fill. The end of the CG Line is tied into an existing

road leading to Macalla Road in the northwest. A new road (CG1 Line) leading to the USCG complex is also proposed at Station 10+41 of the CG Line. This new road is also founded on embankment fill.

Site investigation indicates that the new road will be constructed on dense silty sand to fine sand. The embankment fill will be constructed over existing fill consisting of clayey to silty sand and clay with gravel. Groundwater was encountered at a depth of 2 to 4 meters below existing ground surface.

Recommended structural section for the CG and CG-1 Lines are as follows:

Design Factors: TI = 10 R-value = 20
GE required = 780 mm

Alternative 1 (Full Depth Asphalt Concrete)

30 mm	OGAC
260 mm	AC
75 mm	ATPB
105 mm	AS (2)

Alternative 2

30 mm	OGAC
120 mm	AC (A)
75 mm	ATPB
170 mm	AB (3)
230 mm	AS (2)

Alternative 3

30 mm	OGAC
120 mm	AC
75 mm	ATPB
110 mm	CTB (A)
230 mm	AS (2)

8.4.8 Southgate Road (SG Line)

Southgate Road (SG Line) is proposed from Station 10+23 to Station 11+64 for a length of 141 meters. The SG Line will be lower than the existing road and minor fill will be placed for construction of the SG Line. Part of the fill will be supported by a retaining wall to be designed by TY Lin/Moffat & Nichol under a separate volume. Portion of the new roadway from Station 10+23 to Station 10+28 will be formed over an existing roadway. Sidewalk of width 1400 mm is proposed on the west side of the new roadway.

The Southgate Road is located on the hillside above the U.S. Coast Guard Base. The hillside slope is roughly at an inclination of 1:1 and steeper. Site investigation by Fugro-EMI has indicated that the hillside slope is composed of an upper deposit of medium dense to very dense silty sands up to 40 meters thick with varying amounts of fines and occasional beds of clayey sands followed by a deep deposit of stiff to very stiff clays up to 20 meters.

Recent intense rainfall (winter of 98-99) resulted in several large shallow soil slips on the steep slopes above the Coast Guard base. These slides involved surficial sands of Sedimentary Deposit for a depth of about 1 meter (Fugro-EMI, 2000). Other similar but degraded scarps are present, indicating that these features have occurred in the past and are a recurring phenomenon.

Recommended structural section for this ramp is the same as for the R1 Line in Section 8.4.1.

8.4.9 Hillcrest Road (H Line)

Hillcrest Road (H Line) will be reconstructed from Station 50+38 to Station 50+90 for a length of 52 meters. The first 35 meter stretch of the road will be paved over the existing road, while the remaining 17 meters of the road will be on existing grades and/or fill. Bicycle/pedestrian path is proposed at the east side of the road.

Recommended structural section for this ramp is the same as for the R1 Line in Section 8.4.1.

8.4.10 Torpedo Factory Road (TF Line)

Because of the construction of the temporary Eastbound Detour Structure, two phases of construction work will be carried out on Torpedo Factory Toad. Phase 1 comprises construction of a temporary road (T5 Line) that branches off from the existing Torpedo Factory Road near pier No.EB12 of the temporary Eastbound Detour structure. The second phase of work includes construction of the permanent Torpedo Factory Road (TF Line) which eventually ties into the new USCG Road (CG Line). The TF Line starts from Station 10+00 and ends at Station 11+25. Station 10+00 to Station 11+20 will be supported on a small fill embankment of height up to about 2 meters. From Station 11+20 to Station 11+25, a thin layer of asphalt concrete will be placed over the existing pavement.

The T5 Line is located south of the TF Line. It starts at Station 10+35 and ends at Station 11+72 conforming to existing Torpedo Road. The T5 Line will be constructed on a small embankment of height up to 2 meters. Minor cut is required for the T5 Line.

Site investigation indicates that the TF Line is underlain by less than one meter to two meters of composed of silty sand with gravel which overlies dense to very dense native beach sand and/or weathered sandstone. T5 Line is underlain by fill of thickness up to about 5.5 meters. The fill is composed of medium to dense silty fine sand and medium stiff sandy clay with gravel. Groundwater was encountered at around 2 to 3 meters below ground surface.

Recommended structural sections for T5 Line and TF Lines are as follows:

T5 Line

Design Factors: TI = 8 R-value = 20
GE required = 625 mm

Thickness T/W & Shoulders

Alternative 1		Alternative 2		Alternative 3 (Full-depth AC)	
150 mm	AC (A)	150 mm	AC (A)	275 mm	AC*
345 mm	AB (2)	230 mm	CTB (A)		

Notes: 1. All layers in compacted thickness
6. Aggregate base with a minimum R-value of 78.
7. * Full Depth AC option (No base or subbase)

TF Line

Design Factors: TI = 10 R-value = 20
GE required = 780 mm

Alternative 1 (Full Depth Asphalt Concrete)

30 mm	OGAC
260 mm	AC
75 mm	ATPB
105 mm	AS

Alternative 2

30 mm	OGAC
120 mm	AC (A)
75 mm	ATPB
170 mm	AB (3)
230 mm	AS (2)

Alternative 3

30 mm	OGAC
120 mm	AC
75 mm	ATPB
110 mm	CTB (A)
230 mm	AS (2)

8.4.11 Temporary Mainline (ED1 Line)

ED1 Line is a temporary road that connects the existing SFOBB to the temporary eastbound detour structure. This is an at-grade portion of the temporary eastbound detour structure. The temporary roadway will be constructed over sloping grades and existing roadway. Portions of the roadway will be made in cut and the remaining portion in fill. Abutment walls will be constructed at this section. Design of the abutment walls was performed by TY Lin/Moffat & Nichols.

Site investigation (99-402) shows that ED1 Line is underlain by medium dense to dense silty fine sand. No groundwater was reportedly encountered at 99-402 at the time of drilling.

Recommended structural section for ED1 line is as follows:

Design Factors: TI = 11 R-value = 20
GE required = 860 mm

Thickness T/W & Shoulders

Alternative 1 (Full Depth Asphalt Concrete)

30 mm	OGAC
290 mm	AC
75 mm	ATPB
105 mm	AS

Alternative 2

30 mm	OGAC
140 mm	AC (A)
75 mm	ATPB
180 mm	AB (3)
260 mm	AS (2)

Alternative 3

30 mm	OGAC
140 mm	AC
75 mm	ATPB
120 mm	CTB (A)
255 mm	AS (2)

The structural section for ED1 Line has been designed to eliminate the need for a subgrade drain system. The water infiltrating through existing pavement will be drained through the ATPB or CTPB layer of the proposed structural section.

When the change in grade of existing pavement is greater than 0.3 meter, reconstruction of the structural section is required.

8.4.12 Temporary Eastbound Entrance Ramp Detour (T3 Line)

A temporary eastbound entrance ramp detour is proposed in the north portion of Hillcrest Road. The temporary ramp, called T3 Line, is to be constructed over existing pavement. Construction of this temporary ramp will be made after the at-grade portion of the eastbound detour (ED1 Line) is completed. Due to the temporary nature of the ramp, a full depth asphalt concrete is recommended for this ramp. Recommended structural section for this ramp is the same as for the T4 Line in Section 8.4.4.

8.4.13 Structural Section for Bike Path and Sidewalk

Recommended structural sections for bike path/pedestrian path and sidewalk are as follows:

Bike Path :	110 mm AC (A)
	150 mm AS (4)
Sidewalk :	110 mm PCC
	150 mm AS (4)

8.4.14 Existing Ramps/Roadways

Existing ramps/roadways within the limits of the project have minor to intermediate cracking. We recommend that the existing traveled way structural section of all the ramps/roadways, which will become part of the proposed ramp/roadway traveled way or shoulder within the limits of the project, be overlaid with a minimum of 45 mm AC (Type A).

The following preparatory work should be done prior to AC overlay on all the ramps/roadways within the limits of the project:

- Dig out and repair only areas of severe failure (rutting > ½", loose pavement or spalling) and backfill with full-depth AC. Depth of repairs will vary, but should not be less than the thickness of the existing pavement. All exposed base material shall be compacted to 95% of Caltrans Test Method 216.

- Seal all cracks wider than 6 mm.

- Prior to placing AC overlay, place reinforcing fabric over existing pavement, extending a minimum of 600 mm into the proposed widened area. The fabric shall conform to the requirements of Section 88 of the Standard Specifications. Reinforcing fabric will not be needed for those locations which require more than 107 mm AC overlay.

- With asphalt overlays, wedge cutting is recommended at all conforms to provide a smooth taper and transition. An adequate application of tack coat is required for proper bond.

8.4.15 Drainage of Structural Section

Rapid drainage of a pavement structural section is essential to minimize the length of time the structural section is saturated. This can be achieved by placing a drainage layer system under the full width of the pavement surface during construction. The drainage layer system typically consists of (1) ATPB (or CTPB), (2) a collector system, and (3) outlets, vents, and cleanouts.

When superelevation transitions pass through a point of level cross-slope, edge drains should be provided on both sides of the roadway for a minimum distance of 30 meters, centered about the point of level cross slope. Non-ATPB sections are to be used only where the ATPB layer cannot be drained as determined by the project engineer.

In connection with the use of ATPB, as indicated in Section 606 of the Highway Design Manual, filter fabric will be required only around the collector trenches. For freeway extension, ATPB and edge drain should extend into the shoulder. For the proposed ramp structural sections, the ATPB layer and edge drain should extend one foot into the outside and inside shoulder. If the ramp's traveled structural section is used for shoulders, then the ATPB should extend all the way to the edge of the shoulders.

To provide adequate drainage, edge drains should be installed on the low side of the superelevation at all times. At all locations, provisions must be made to drain the water from the ATPB or edge drain via collector trenches into suitable discharge outlets (refer to Section 842 of the Highway Design Manual). Cleanouts and vents should also be provided.

The size and spacing of the non-slotted outlet pipes for the edge drains should be as prescribed in the Highway Design Manual, Section 606 (Figure 606.2A). In areas where roadway grades are equal to or greater than 4%, intermediate cross-drain interceptors, as shown on Figure 606.2B of the Highway Design Manual, should be provided at an approximate spacing of 150 meters.

8.4.16 Economic Analysis

Economic analysis has been carried out to determine the most economical alternative for the pavement structural section for each of the proposed roadways discussed in Section 8. The results of the analysis are presented in Table 8 below. The breakdown of the analysis for each of the alternatives can be found in Appendix D.

Table 8: Cost Comparisons of Pavement Structural Sections

Proposed Roadway	Alternative Number	Total Cost ($/m^2)	Recommended
R1, R3, R4, R5, R6, H, SG, and MC Lines	Alt. No. 1: OGAC=30 mm AC(A)=185 mm ATPB=75 mm	26.97	
	Alt. No. 2: OGAC=30 mm AC(A)=105 mm ATPB=75 mm AB=185 mm	**21.01**	Recommended (Note that the extra depth will reduce the amount of embankment fill)
	Alt. No. 3: OGAC=30 mm AC(A)=105 mm ATPB=75 mm CTB(A)=100 mm	30.09	
CG, CG1 and TF Lines	Alt. No. 1: OGAC=30 mm AC(A)=260 mm ATPB=75 mm AS=105 mm	37.59	
	Alt. No. 2: OGAC=30 mm AC(A)=120 mm ATPB=75 mm AB=170 mm AS=230 mm	**30.91**	Recommended (Note that the extra depth will reduce the amount of embankment fill)
	Alt. No. 3: OGAC=30 mm		

	AC(A)=120 mm ATPB=75 mm CTB(A)=110 mm AS=230 mm	41.97	
ED1 Line	Alt. No. 1: OGAC=30 mm AC(A)=290 mm ATPB=75 mm AS=105 mm Alt. No. 2: OGAC=30 mm AC(A)=140 mm ATPB=75 mm AB=180 mm AS=260 mm Alt. No. 3: OGAC=30 mm AC(A)=140 mm ATPB=75 mm CTB(A)=120 mm AS=255 mm	40.83 **34.11** 46.23	Recommended
T2, T3 & T4 Lines	Alt. No. 1: AC(A)=200 mm Alt. No. 2: AC(A)=110 mm AB(3)= 215 mm Alt. No. 3: AC(A)=110 mm CTB(A)=140 mm	**21.60** **18.76** 32.88	Recommended for T3 Line Recommended for T2 & T4 Lines
T5 Line	Alt. No. 1: AC(A)=275 mm Alt. No. 2: AC(A)=150 mm AB(3)= 345 mm Alt. No. 3: AC(A)=150 mm CTB(A)=230 mm	29.70 **27.24** 50.70	Recommended (Note that the extra depth will reduce the amount of embankment fill)

9 EARTHWORK

9.1 Description

Massive earthwork will be required for construction of the transition and detour structures for the N6 alignment. This includes temporary excavations of existing roadways and ramps connecting the existing Bay Bridge, construction of temporary and permanent retaining walls, placement of embankment fill, backfilling excavation areas, placing new

structural sections for new pavements, construction of piers/bents, and restoration of slopes.

The following earthwork recommendations pertain only to the temporary and permanent roadways and ramps for the N6 alignment. Those for the approach structures are covered under a separate report entitled "Draft Geotechnical Foundation Report for the Yerba Buena Island Approach and Main Span Structures by Fugro-EMI (July, 2001).

9.2 Recommendations

9.2.1 Site Preparation

The proposed new roadways and ramps will require nominal preparation in areas to support new pavements, compacted fill, or other improvements. Native soils and fill surface to support new fill or structures should be stripped of vegetation, organic topsoil, and other deleterious materials. An average stripping depth of 100 mm may be used for preliminary design. The stripped surface should be scarified to a depth of 200 mm, water-conditioned to 2 to 4 percent above the optimum value and compacted.

Where embankment is to be placed at the location of an existing pavement, the existing pavement should be ground down and thoroughly mixed with fill before it is compacted.

9.2.2 Fill Placement and Compaction

New fill should be placed and compacted on the prepared surface as described in Sections 19-5 and 19-6 of the Caltrans Standard Specification (latest edition) except that Caltrans Test Method 216 should be used as a basis for compaction testing. Fill should be placed in horizontal layers not exceeding 200 mm in loose thickness. Where new embankment is to be placed against existing slopes steeper than 6:1 (H:V), the new fill should be keyed and benched into the existing slopes as described in Section 19-6. The existing slope should be cut into a minimum of 2 meters horizontally as the fill is brought up in layers.

Fill placed against abutments, foundations, and retaining walls should meet the requirements for Structure Backfill as discussed in Section of this report. Compaction requirements for Structure Backfill should comply with Section 19-3.06 of Caltrans Standard Specifications (latest

edition). Structural Embankment should be used within the upper 600 mm of finished subgrade elevation beneath pavements. Common Embankment Fill may be used elsewhere.

9.2.3 Excavation

Materials encountered within the project area consist of silty fine sand to sandy clay with gravel and bedrock of Franciscan Formation. Excavation can be performed using conventional earthmoving equipment. Bedrock can be removed by means of controlled blasting.

9.2.4 Re-use of Excavated Materials

The native soils are predominantly composed of silty fine sand to poorly graded fine sand. The existing fill in the low-lying area is composed of silty fine sand to sandy clay with rock, construction debris, and other imported earth materials such as aggregate base material and asphaltic concrete. The native soils and existing fill generally provide adequate material for re-use as common embankment fill except that rock larger than 100 mm inches in diameter should be removed or crushed.

9.2.5 Cut and Fill Slopes

Finished cut and fill slopes in new embankment should not exceed 2:1 (H:V). Where fill slopes have to be steeper than 2:1, the slopes should be stabilized by geogrid reinforcement. Braced excavations will be required for construction deep cuts in soil deposits. This can be accomplished by means of soil nailed walls.

9.2.6 Temporary Excavations

The sides of temporary excavations in soils less than 6 meters in depth may be constructed no steeper than 1: 1 (H:V). If steeper cuts are necessary, the cut slopes should be stabilized with soil nails and shotcrete facing. Shoring and bracing should conform to OSHA regulations.

Temporary excavation in rock may be made as steep as conditions permit, and stabilized with rock dowels or anchors

as required.

9.2.7 Dewatering

The groundwater table is not expected to be encountered in excavations less than 5 meters below natural grade within the proposed N-6 alignment except in the low-lying area such as the USCG base and the Navy Army base. Dewatering by means of sump pumping may be adequate at the low-lying area.

9.2.8 Surface Drainage and Erosion Control

Adequate surface drainage is essential to intercept and control surface runoff in order to minimize slope erosion and subsurface infiltration. Effective erosion control with appropriate ground cover is also important.

It is recommended concrete lined surface ditches be provided at the top of fill slopes where the adjacent uphill terrain drains toward these slopes. Drainage benches with concrete lined ditches should also be provided on cut and fill slopes exceeding 10 meters in vertical height. The benches should be planned at vertical intervals of not more than 10 meters. The benches should be 1 meter wide. The concrete lined ditches should be constructed along the inside of the benches. The benches should be graded to direct surface water towards the ditches and away from the lower slope. The ditches should be sufficiently sloped to allow gravity flow of water in the ditch to the designated collection point.

Positive surface drainage should also be provided throughout the project site to prevent ponding of surface water and minimize infiltration. The ground surface should be properly graded to facilitate surface runoff flow. Care should be taken to grade areas at the top of cut and fill slopes to effectively control and collect surface water runoff.

Fill slopes and temporary cut slopes which will be left in place for over one (1) year should be planted as soon as possible to minimize future erosion and possible slope deterioration. Hydroseeding or other effective methods of seeding should be considered.

10. SLOPE RESTORATION

Construction of pier/bent foundations for the transition and detour structures at YBI will require excavations in steep soil and rock slopes. Examples are bridge bents W6, W7, W8, W9, W10, abutment wall W11, and Piers W2L and W3R of the YBI transition structures, and EB1 through EB5 and WB5 through WB12 of the YBI temporary detour structures. Design of the temporary cut slopes for construction of these bents was carried out by Fugro/EMI and is presented under the Draft Geotechnical Foundation Report for the YBI Approach and Main Span Structures by Fugro/EMI in July 2001.

Upon completion of the pier/bent construction, excavations in soil slopes shall be backfilled with compacted fill in accordance with Caltrans Standards to the finished grade as shown on the Plans. All new fill slopes should be benched into native ground as described in Section 4.3.1 above. Surface of the slopes shall be hydroseeded and planted with shrubs. In areas where steep slopes are to be reinstated, reinforced soil slopes will need to be constructed and vegetation planted on the face of the reinforced soil slopes.

Two options are available in restoring slopes excavated in rock (Figures 9 & 10). The first option is to backfill the excavation area with compacted fill or geogrid-reinforced soils if steep slopes are to be required. The other option is to leave the temporary rock excavations in place and to stabilize the rock face with rock dowels and/or rock anchors and shotcrete facing, if warranted to enhance the long-term stability of the rock slopes. To match the existing texture of the adjoining rock slopes, textured shotcrete can be used (Figure 11). Another alternative is to create a planting bed at the excavation area with trees and shrubs or creeping plants (Figure 12).

11 EARTHQUAKE CONSIDERATIONS

11.1 Ground Shaking/Fault Rupture

It is likely that the project site will be subject to strong ground shaking from an earthquake occurring on either San Andreas Fault to the west or Hayward Fault to the east during the service life of the proposed structures. Specific criteria for design of the aerial structures within the project to resist lateral forces from seismic shaking are given in a separate sets of design level acceleration time histories based on both San Andreas and Hayward Fault Rupture scenarios developed by EMI. A thorough discussion of seismic issues is provided in Draft Seismic Ground Motion for SFOBB, East Span Seismic Safety Project by Fugro-EMI, JV dated December 24, 1998.

11.2 Liquefaction

The project site is typically underlain by artificial fill and sedimentary deposits of

high relative densities and strengths as described in Section 2.7. Sandy fills in the Parade Ground of the North Saddle Area consist of fine sands and gravels with SPT blowcounts varying from 6 to 30 blows per 0.3 meter. The groundwater in this area was measured at about 4 to 6 meters. The fills are above groundwater and as a result, soil liquefaction is expected not to occur in these fills. The sandy sedimentary deposits below these fills are medium dense to very dense silty sands with blowcounts of typically over 30 blows per 0.3 meter. Soil liquefaction of these sandy soils is unlikely due to their high relative density.

Fills in the south Saddle Area (US Coast Guard Ground) consist mainly of medium to coarse-grained sands and gravels with SPT blowcounts ranging from 4 to 30 blows per 0.3 meter. Groundwater is generally about 5 meters below existing grade, which is at the base of the fills. In the presence of fines and significant amounts of gravel and rock in the shallow soils, the liquefaction potential of these fills is generally expected to be low. Due to heterogeneity of the fill, loose sandy soils may be present. In these localized areas, the fill may have liquefaction potential locally if they are saturated and ponded as was reported in localized areas during the 1989 Loma Prieta Earthquake. The underlying sedimentary deposits are 15 to 18 meters thick, comprising clayey sands to sandy clays. These materials exhibit high strengths with SPT blowcounts varying from 30 to 70 blows per 0.3 meter. These deposits have a very low liquefaction potential.

Elsewhere in the project site, fills and sedimentary sediments are medium dense to dense or stiff to very stiff. Groundwater is typically located in the sedimentary deposits but it is unlikely liquefaction will occur in these areas.

11.3 Seismic Settlements

No significant new fills will be placed as part of the proposed approaches. Foundations for the aerial structures in the Saddle Area will likely consist of deep foundations due to high loading. The existing artificial fills and sedimentary deposits exhibit high relative densities and strengths and hence seismic stability and settlements of embankments are not issues of concern.

11.4 Slope Stability

Soil and rock slope stability studies were undertaken by Fugro/EMI in areas which would affect existing and future bridge bents (see Fugro-EMI, 2001). In 1997, Caltrans performed a rock slope stability study for the seismic retrofit of the existing Bay Bridge. Their findings concluded that no past large scale instability had occurred at the site and the slopes at piers E-1 and E-2 will be stable even during a maximum credible earthquake.

As for the seismic stability of the fill embankments to be constructed for the approach ramps and roadway, it is expected that minor slumping or rock fall would occur in an event of a major earthquake at these locations.

12 RECYCLING

The quantity of potentially recycled materials generated from this project will be minor. However, base and surfacing to be removed may be buried in the embankment in accordance with Section 19-6.01 of the Standard Specifications. Otherwise, excavated materials should become the property of the contractor to be disposed of outside of the state right-of-way.

13 MATERIAL SOURCES

Table 9 below summarizes the local/commercial sources for the various materials. These sources are the closest source to the project limits. Included are their respective haul distance to the site.

14 RECOMMENDED MATERIAL SPECIFICATIONS

14.1 Earthwork

Earthwork and fill materials shall conform to Caltrans Standard Specifications dated July 1995.

14.2 Bases and Subbases

Bases

Aggregate base shall be Class 3; and conform to all of the provisions for Class 2 aggregate base except for the following grading change to the Percentage Passing the No. 200 sieve as per SSP 26.1:

	38 mm maximum		19 mm maximum	
Sieve Size	**Operating Range**	**Contract Compliance**	**Operating Range**	**Contract Compliance**
No. 200	2-11	0-14	2-11	0-14

Aggregate Subbase

Aggregate subbase shall be Class 4 and shall conform to the provisions in Section 25 of the Standard Specifications and these special provisions.

Class 4 aggregate subbase shall be clean and free from vegetable matter and other deleterious substances.

The percentage composition by weight of Class 4 aggregate subbase shall conform to the following grading when determined by Test Method No. California 202:

	Percentage Passing	
Sieve Sizes	**Operating Range**	**Contract Compliance**
63.5 mm	100	100
No. 4	30-65	25-70
No. 200	0-15	0-18

Class 4 aggregate subbase shall also conform to the quality requirements shown in the following table:

	Quality Requirements		
	Test Method No. Calif.	**Operating Range**	**Contract Compliance**
Sand Equivalent	217	21 Min.	18 Min.
Resistance Value "R"	301	-----	50 Min.

14.3 Imported Borrow

Imported borrow for embankment fill shall have a minimum R-value of 20 and shall conform to the provision of Section 19 of the Standard Specifications and the current Standard Special Provisions.

14.4 Structure Backfill

Structure backfill shall have a minimum R-value of 50 and shall conform to the provision of Section 19 of the Standard

14.5 Imported Materials (Shoulder Backing)

Imported materials for shoulder backing shall conform to SSP 19.3 and current District ½ sheet as in the following.

Delete Paragraphs 5 and 6 and add the following:

Imported material for shoulder backing shall conform to the following grading:

TABLE 9 MATERIAL DATA TABLE

SOURCE / PRODUCT	Haul Dist. (approx.miles)	Imported Borrow	Aggregate Subbase	Aggregate Base	CTB (A)	CTB (E)	ATPB	AC (A)	OGAC	AC Base	Structural Backfill	Permeable Material
American Rock & Asphalt 961 Western Dr. Richmond, CA 94801 Tel: 510-233-8362	15	x	x	x	x	x	x	x	x	x	x	x
Berkeley Asphalt Company Berkeley Ready Mix 699 Virginia, Berkeley, CA Tel: 510-526-1611 or 510-526-9022	9	x	x	x	x		x	x	x	x		x
Gallagher & Burk Inc. (Asphalt Plant) 344 High St. Oakland, CA 94601 Tel: 510-261-0466	6	x						x	x	x		x
Gallagher & Burk Inc. (Leona Quarry) 7100 Mountain Blvd Oakland, CA 94605 Tel: 510-635-5200	6		x	x	x	x					x	
Larms 743 High St. Oakland, CA 94601 Tel: 510-532-7474	5		AS(2)									x
East Bay Excavating Co. 28814 Mission Blvd, Hayward, CA Tel: 510-538-5050	18	x	AS(2)	x				x		x	x	
Kaiser Sand & Gravel 2770 N. Main, Walnut Creek, CA Tel: 510-933-2143	20		x	x	x			x	x	x		CL (1)

Sieve Sizes	% Passing
25.4 mm	100
19.0 mm	87-100
No. 4	30-74
No. 200	7-23

14.6 Open Graded Asphalt Concrete (OGAC)

Open graded asphalt concrete shall conform to the provisions in Section 39, "Asphalt Concrete", of the Standard Specifications and Standard Special Provisions sections 39.01 and 39.02.

14.7 Asphalt Concrete

Asphalt concrete shall be Type A.

14.8 Permeable Materials

Permeable material shall be Class 2 and conform to Section 68 of the Standard Specifications.

14.9 Pavement Reinforcing Fabric

Pavement reinforcing fabric shall conform to Section 88-1.02 of the Standard Specifications.

14.10 Filter Fabric

Filter fabric shall conform to Section 88-1.03 of the Standard Specifications.

14.11 Asphalt Treated Permeable Base (ATPB)

Asphalt treated permeable base shall conform to Section 29 of the Standard Specifications.

14.12 Cemented Treated Base (CTB)

Cement treated base shall be Class A and shall conform to the provision of Section 27 of the Standard Specifications and to current Standard Special Provisions.

14.13 Alternative Modular Retaining Wall

For specifications regarding Concrete Modular, Geosynthetic Reinforcement (Geogrid), Permeable Material, Structural Backfill,

Leveling Pad, Wall Construction, Handling and Storage, Measurement and Payments, refer to the attached specifications.

15 CLOSURE

This report has been prepared for the exclusive use of design of the roadway at YBI. The findings, conclusions, and recommendations presented in this report were prepared in accordance with generally accepted professional geotechnical engineering practices. No other warranty, expressed or implied, is made.

The analyses and recommendations given in this report are based in part upon the data obtained by Fugro-EMI from their site investigations in 1998-1999. The nature and extent of variations in subsurface conditions between the drill holes may not become evident until construction. Should variations become evident, it will be necessary to re-evaluate the recommendations given in this report.

16 REFERENCES

California Department of Transportation (1997), *Geologic Issues for the Proposed New East Span of the San Francisco-Oakland Bay Bridge*, report to MTC, August.

CHEC Consultants, Inc. (2000), *Deflection Testing and Analysis Structural Pavement Design for Yerba Buena Island*, report to Earth Mechanics, April.

Earth Mechanics, Inc. (1999), *Seismic Design Criteria for YBI Permanent and Temporary Detour Structures*, memo submitted to Caltrans, March.

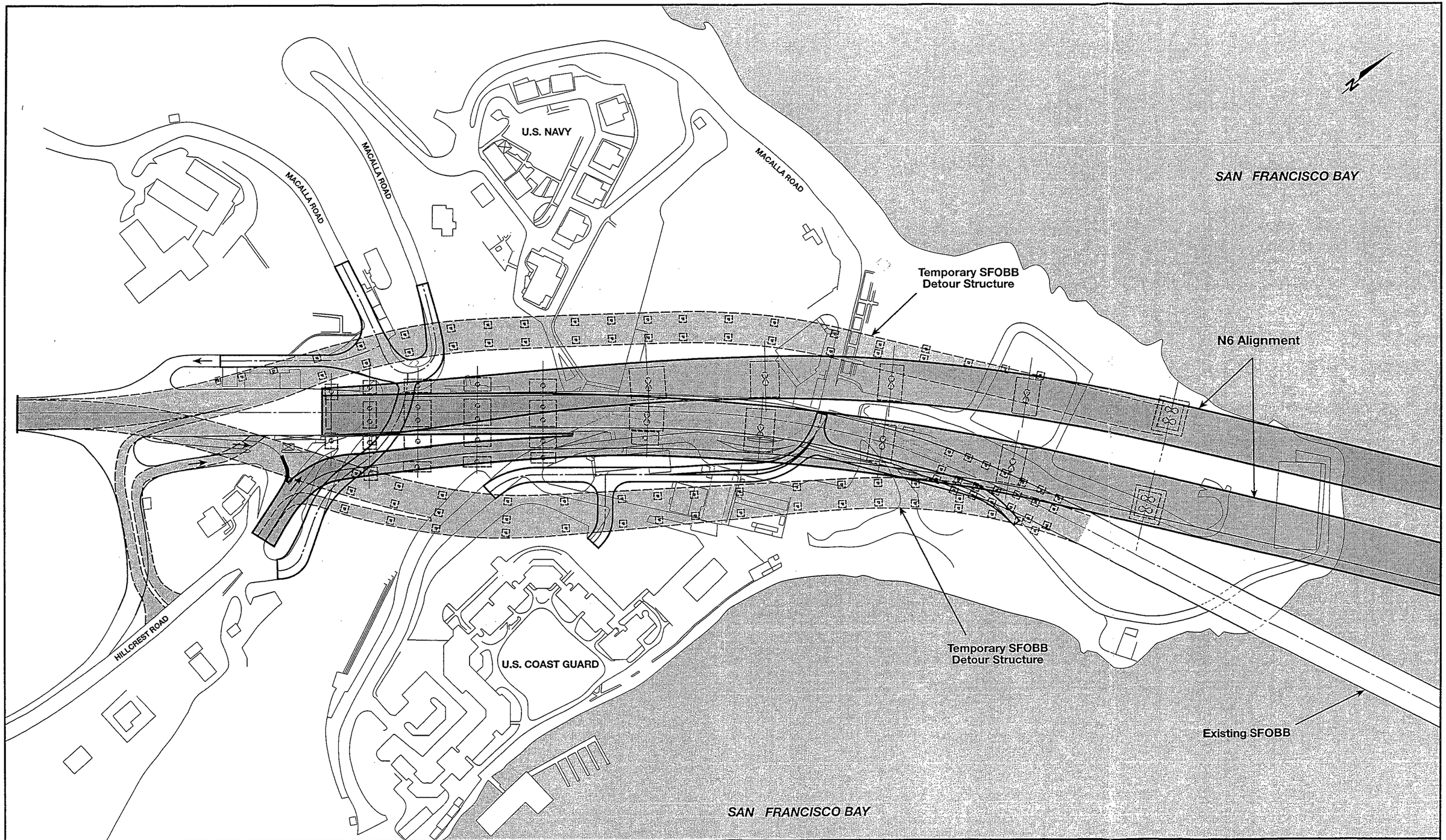
Fugro-Earth Mechanics, Inc. (2001), Draft Geotechnical Foundation Report for Yerba Buena Island Approach and Main Span Structures for SFOBB East Span Seismic Safety Project, July.

Fugro-Earth Mechanics (2000), *Draft Site Characterization Report Yerba Buena Island, San Francisco Oakland Bay Bridge East Span Seismic Safety Project*, Volumes 1-4, March.

Fugro-Earth Mechanics (1998), *Preliminary Yerba Buena Island Geotechnical Site Characterization, SFOBB East Span Seismic Safety Project*, Fugro Job No. 98-42-0038, report to Caltrans, June.

Parsons Brinckerhoff Quade & Douglas, Inc. (1998), *Hazardous Wastes Assessment, SFOBB East Span Seismic Safety Project*, report to Caltrans, September.

Schlocker, J. (1974), *Geology of the San Francisco North Quadrangle, California*, U.S. Geological Survey Professional Paper 782, pp. 78-80.



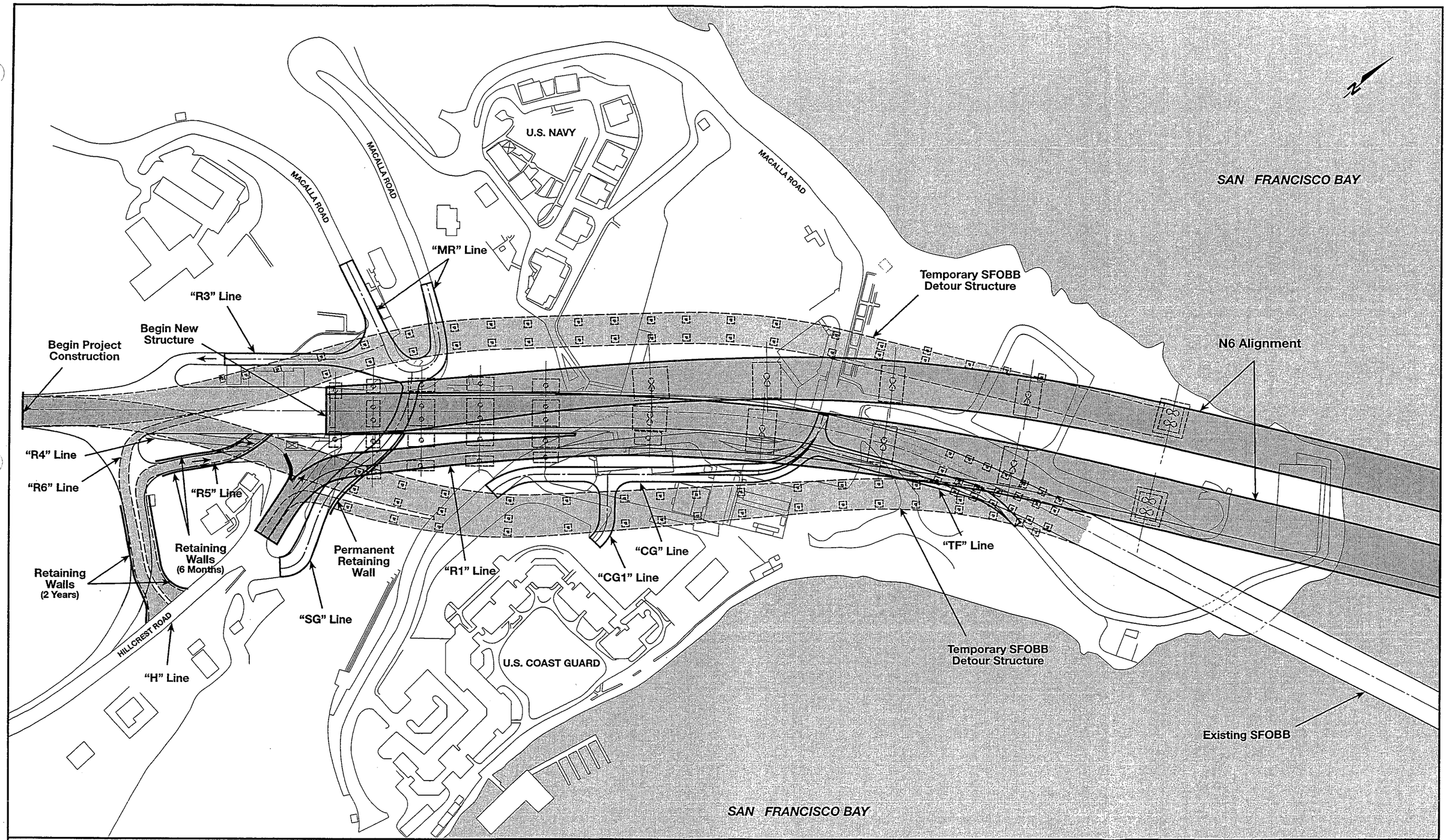
SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,000
0 25 50 100 m

Project Location Map
Yerba Buena Island

Figure 1

6/7/00



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

GRAPHIC SCALE 1:2,000
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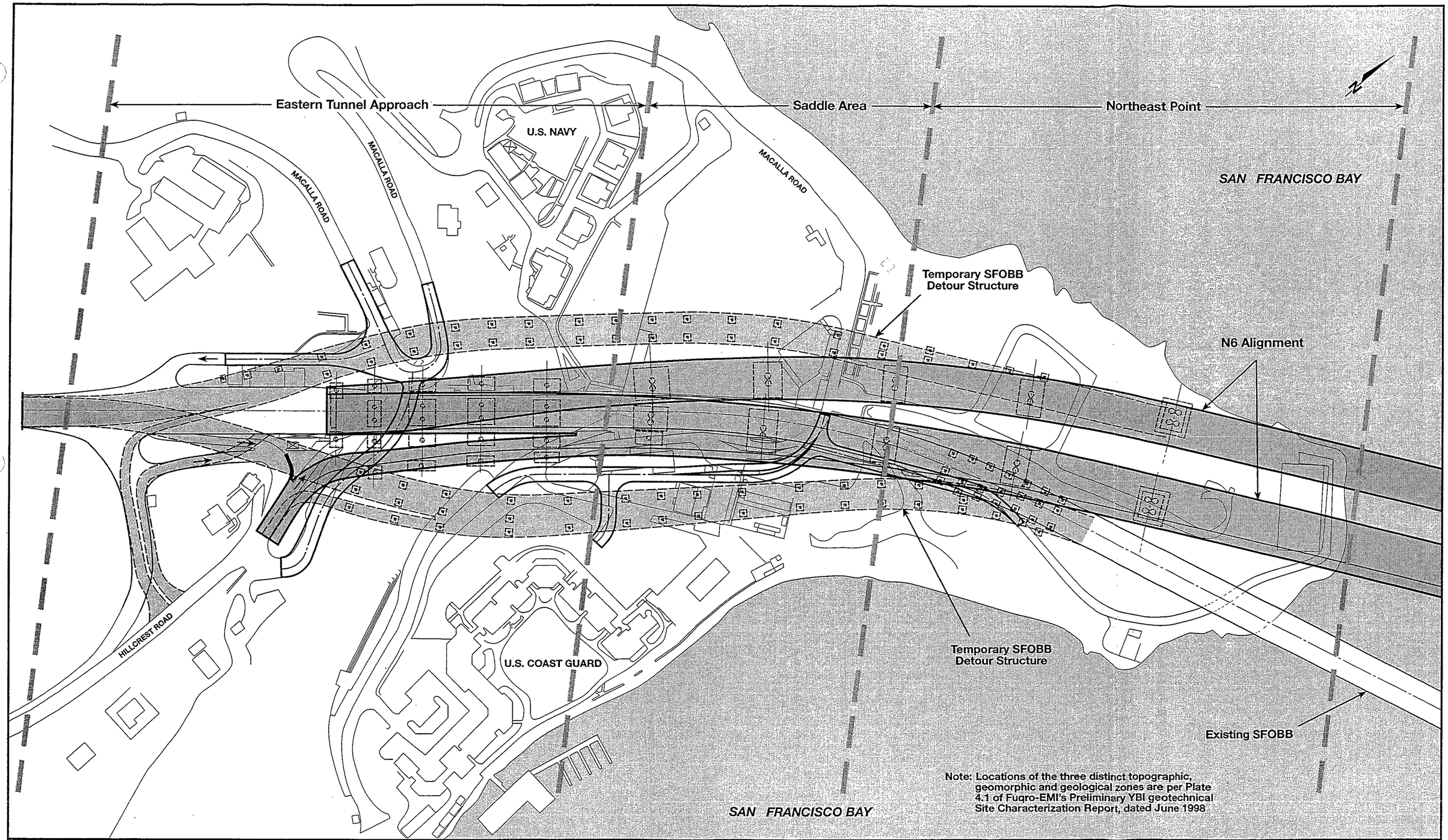
N6 Alignment and Associated Roadways and Ramps, Yerba Buena Island

Figure 2

6/7/00



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

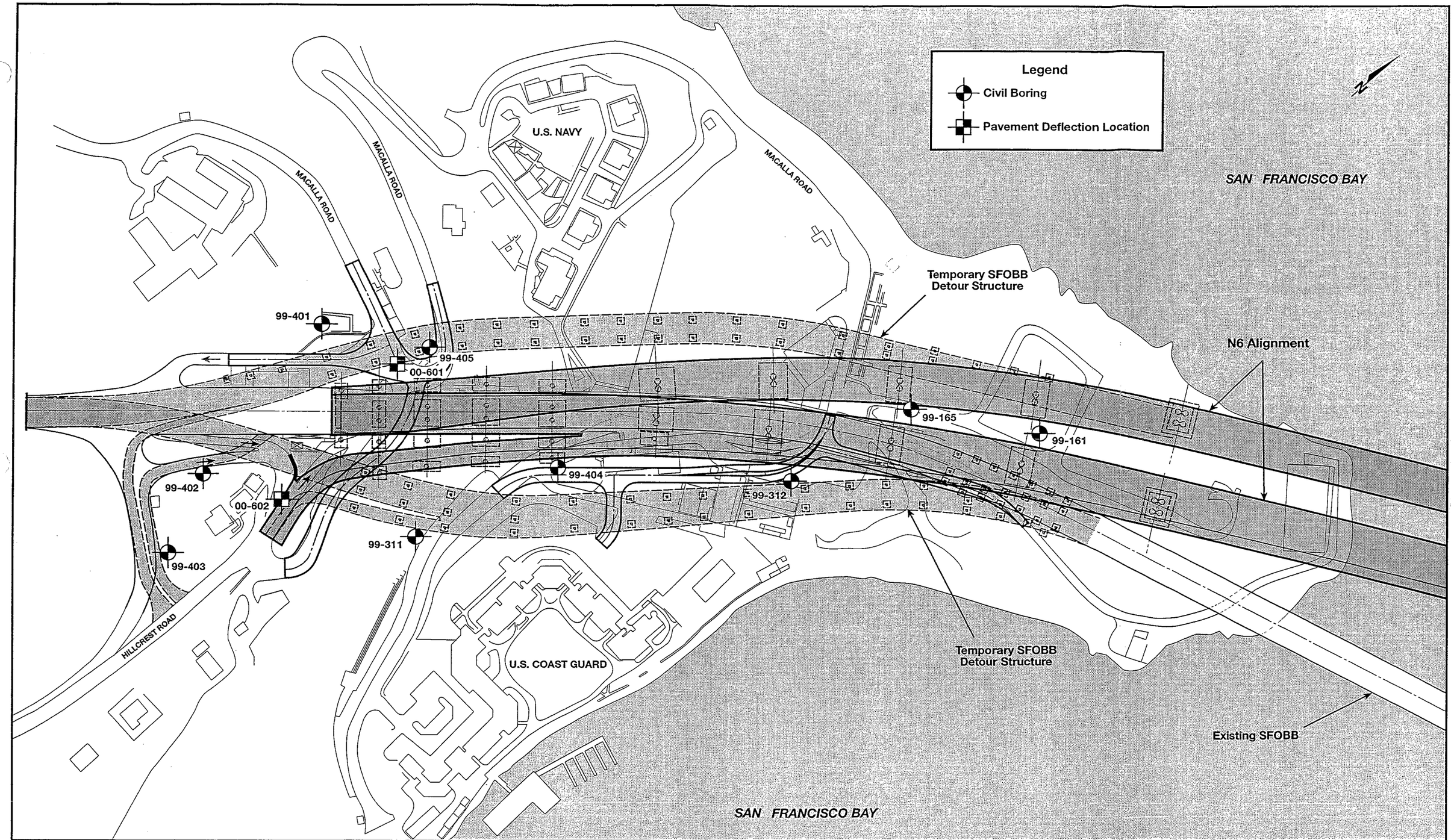
GRAPHIC SCALE 1:2,000

0 25 50 100 m

Geographic Nomenclature
Yerba Buena Island

Figure 3

6/7/00



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

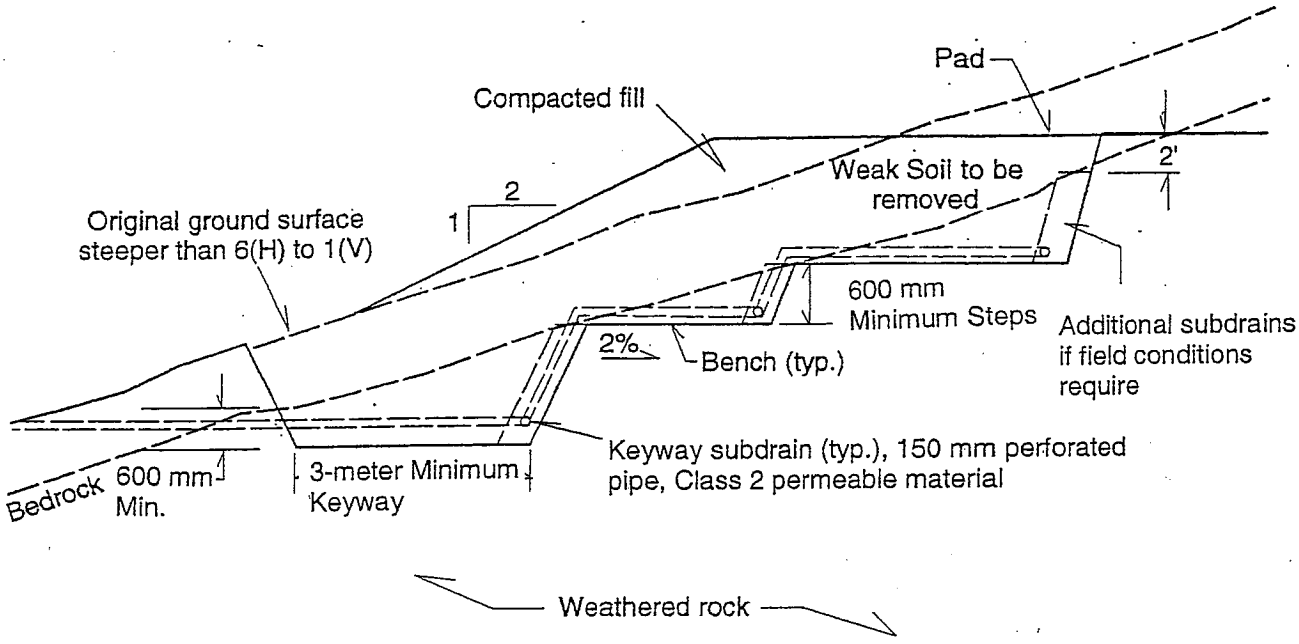
GRAPHIC SCALE 1:2,000
0 25 50 100 m

Civil Boring & Pavement Deflection
Location Plan, Yerba Buena Island

Figure 4

6/7/00

Fill slopes over 10 meters high and steeper than 2.5(H) to 1(V) must have 2-meter wide drainage benches with concrete-lined V-ditches on 10-meter vertical intervals



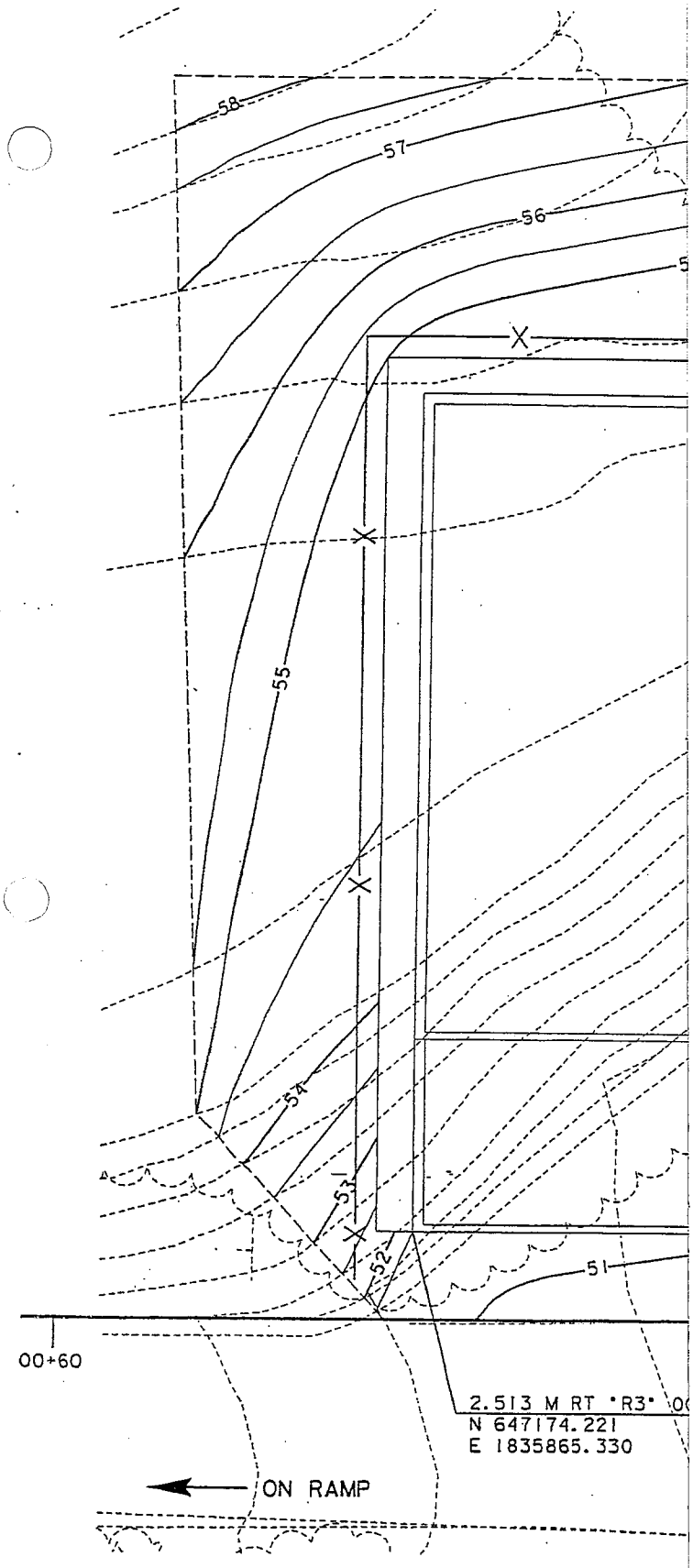
NOTES:

1. Final benching and keyway depths to be determined in the field during construction.

2. Slope subdrain pipes at 2% or greater, discharge in closed pipes sloped at least 1% to suitable outlet.

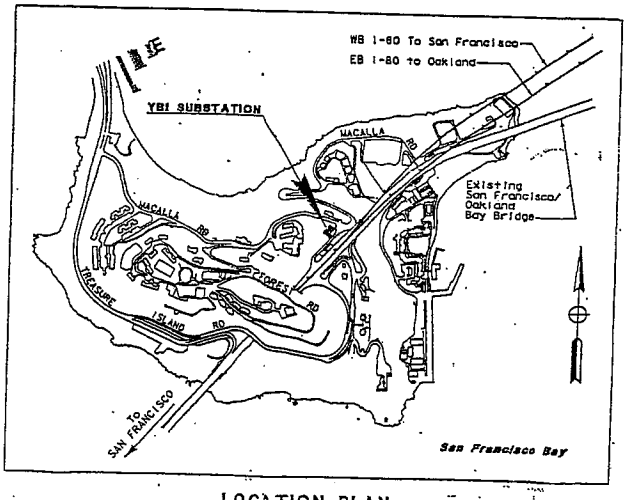
3. Install cleanouts at ends, angles and junctions of pipe.

Figure 5 Benching into Existing Slopes



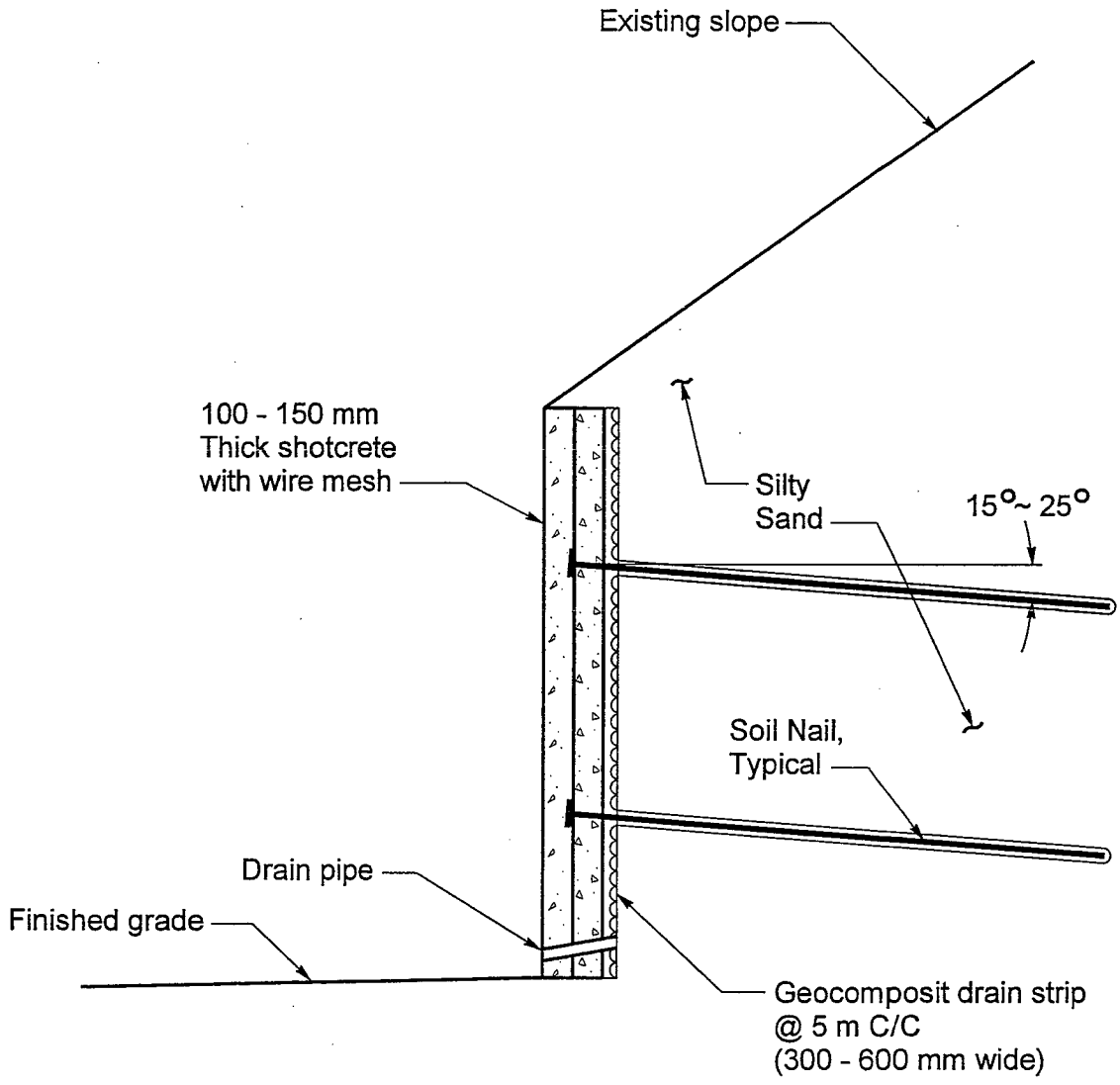
LEGEND:

Boring by EMI in 1999.



LOCATION PLAN
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



TYPICAL TEMPORARY CUT WALL

Schematic Diagram - Not to Scale

Metric

PARSONS BRINCKERHOFF 303 Second St., Suite 700N, San Francisco, CA 94107	Caltrans District 4	Bay Bridge East Span Replacement Project		
	Interstate Route 80	YBI Substation Typical Temporary Cut Wall		
	City and County of San Francisco			
	Geotechnical Soils Report	July 2000	Revision 0	Figure 6

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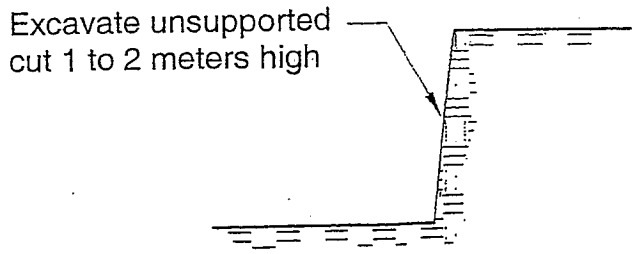
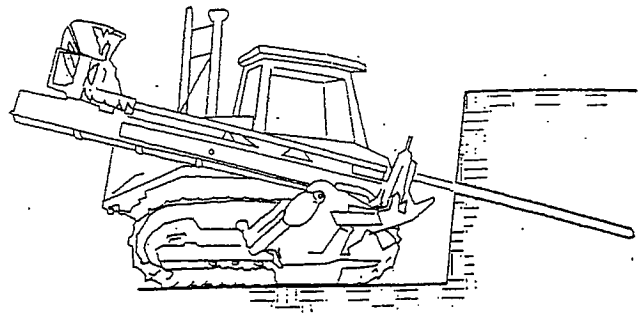
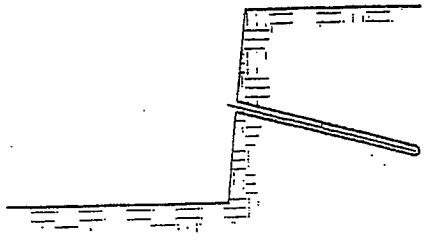


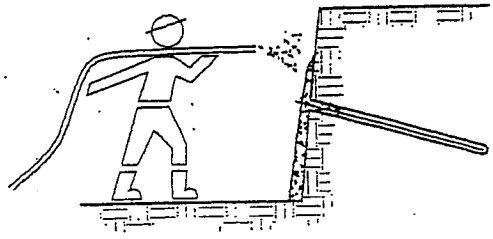
STEP 1 EXCAVATE SMALL CUT



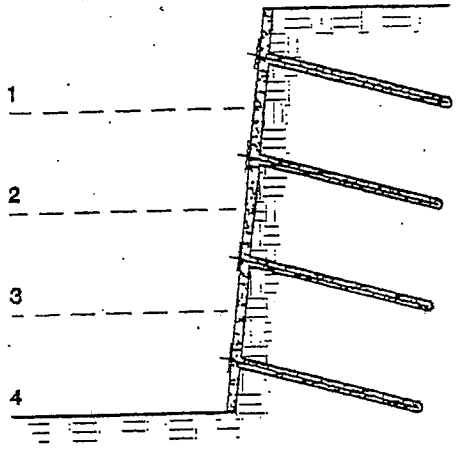
STEP 2 DRILL HOLE FOR NAIL



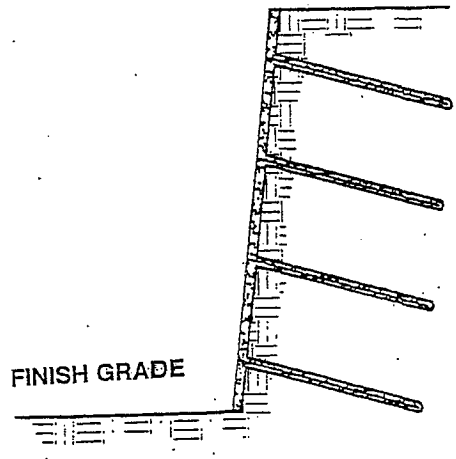
STEP 3 INSTALL AND GROUT NAIL



STEP 4 PLACE DRAINAGE STRIPS, INITIAL SHOTCRETE LAYER & INSTALL BEARING PLATES AND NUTS

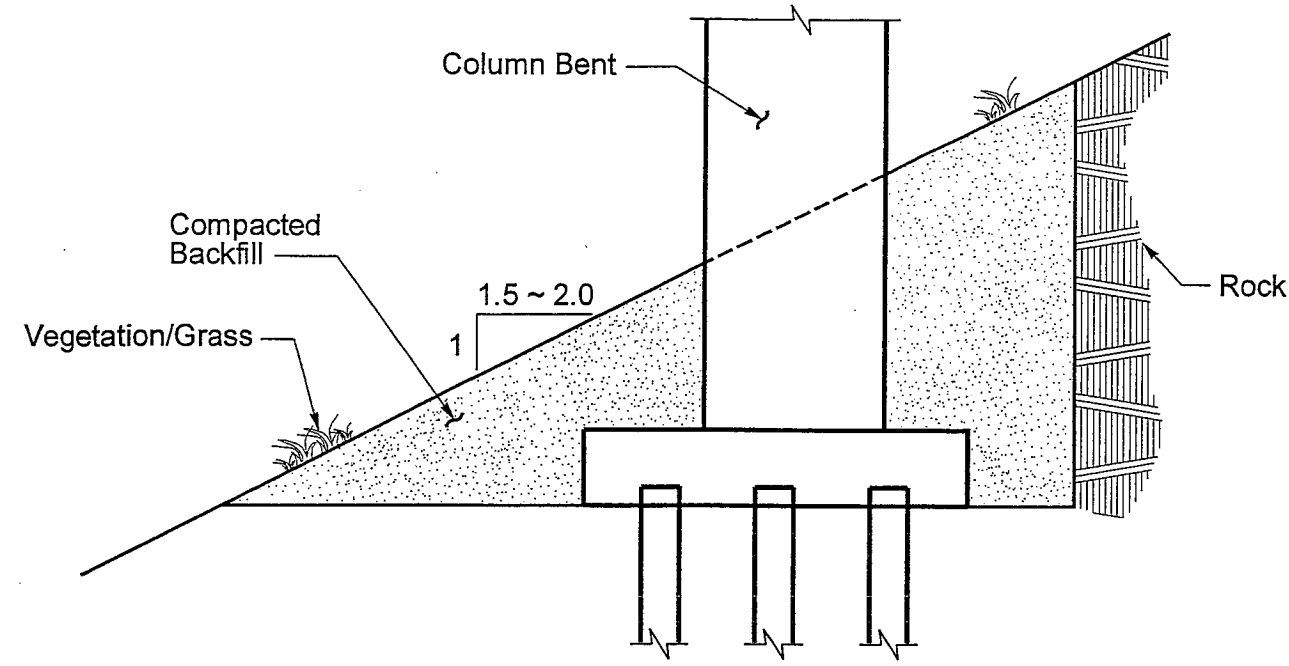


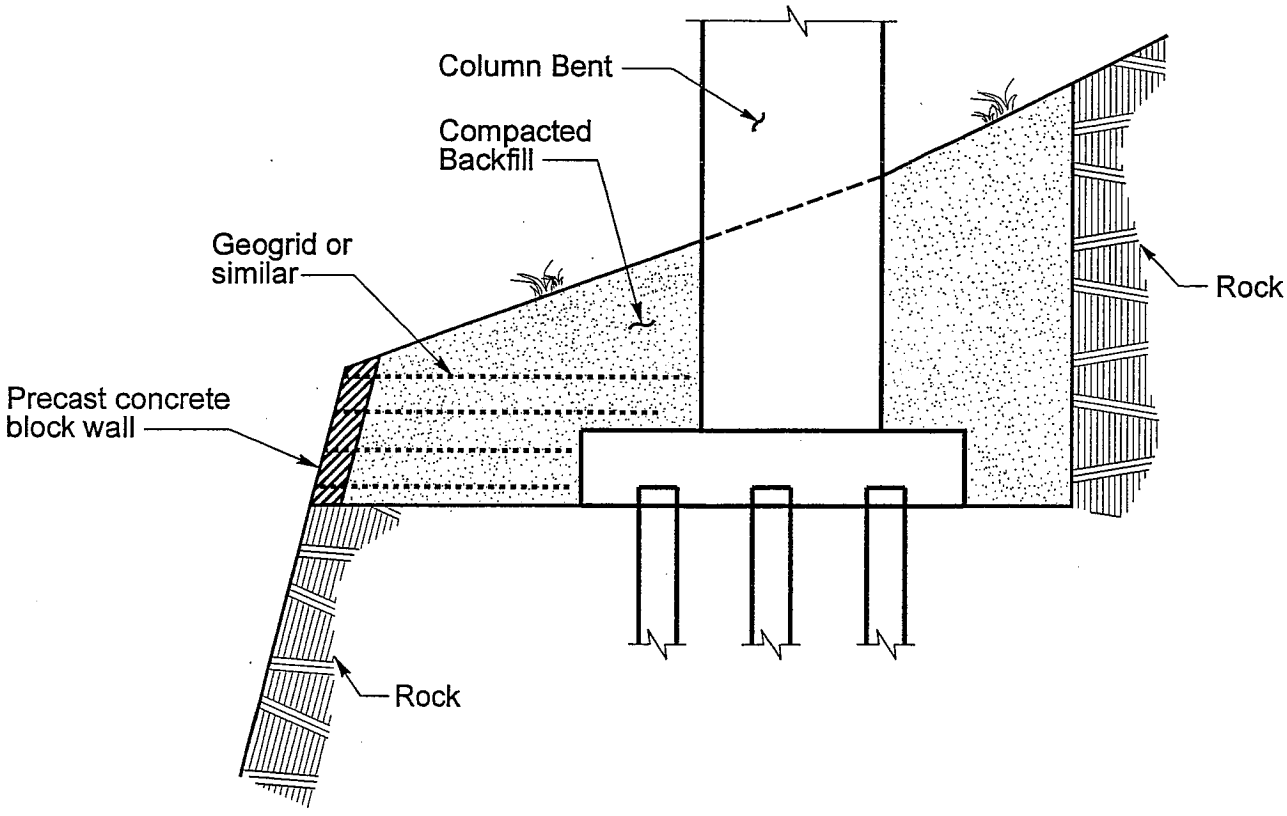
STEP 5 REPEAT PROCESS TO FINAL GRADE



STEP 6 PLACE FINAL FACING

FIGURE 7 CONSTRUCTION SEQUENCE OF TEMPORARY CUT WALL





SLOPE RESORATION OPTION 1

Backfilling Excavation Areas

Schematic Diagram - Not to Scale

Caltrans Metric

PB PARSONS BRINCKERHOFF 303 Second St., Suite 700N, San Francisco, CA 94107	Caltrans District 4	Bay Bridge East Span Replacement Project	
	Interstate Route 80	YBI Substation Slope Restoration Option 1	
	City and County of San Francisco		
	Geotechnical Soils Report	July 2000	Revision 0	Figure 9

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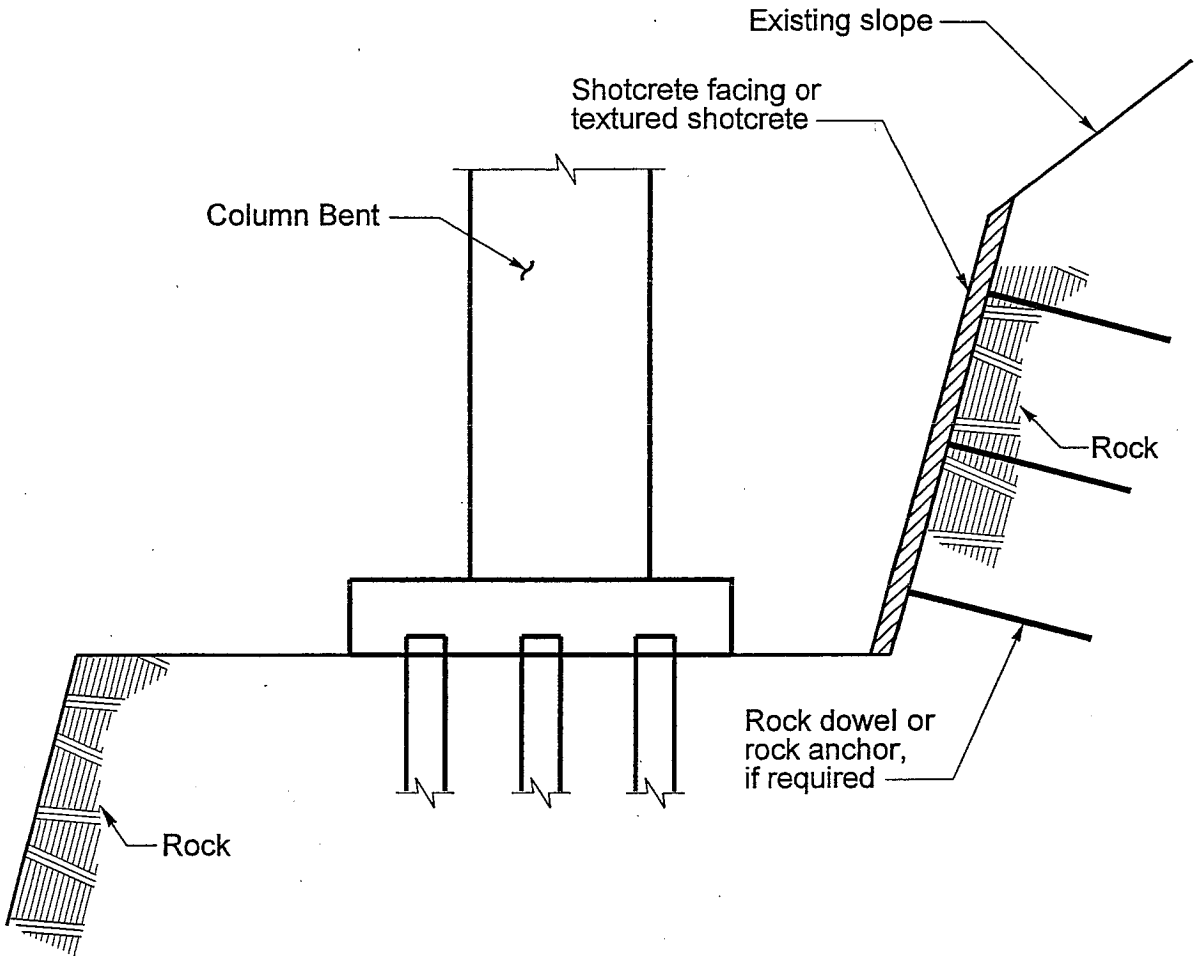

SLOPE RESORATION OPTION 2

Stabilizing Rock Cut with Dowels or Anchors
and Shotcrete Facing or Textured Shotcrete

Schematic Diagram - Not to Scale

Metric

PARSONS BRINCKERHOFF 303 Second St., Suite 700N, San Francisco, CA 94107	Caltrans District 4	Bay Bridge East Span Replacement Project	
	Interstate Route 80	YBI Substation Slope Restoration Option 2	
	City and County of San Francisco		
	Geotechnical Soils Report	July 2000	Revision 0	Figure 10

By: DovisJo - 2000 08:25:15
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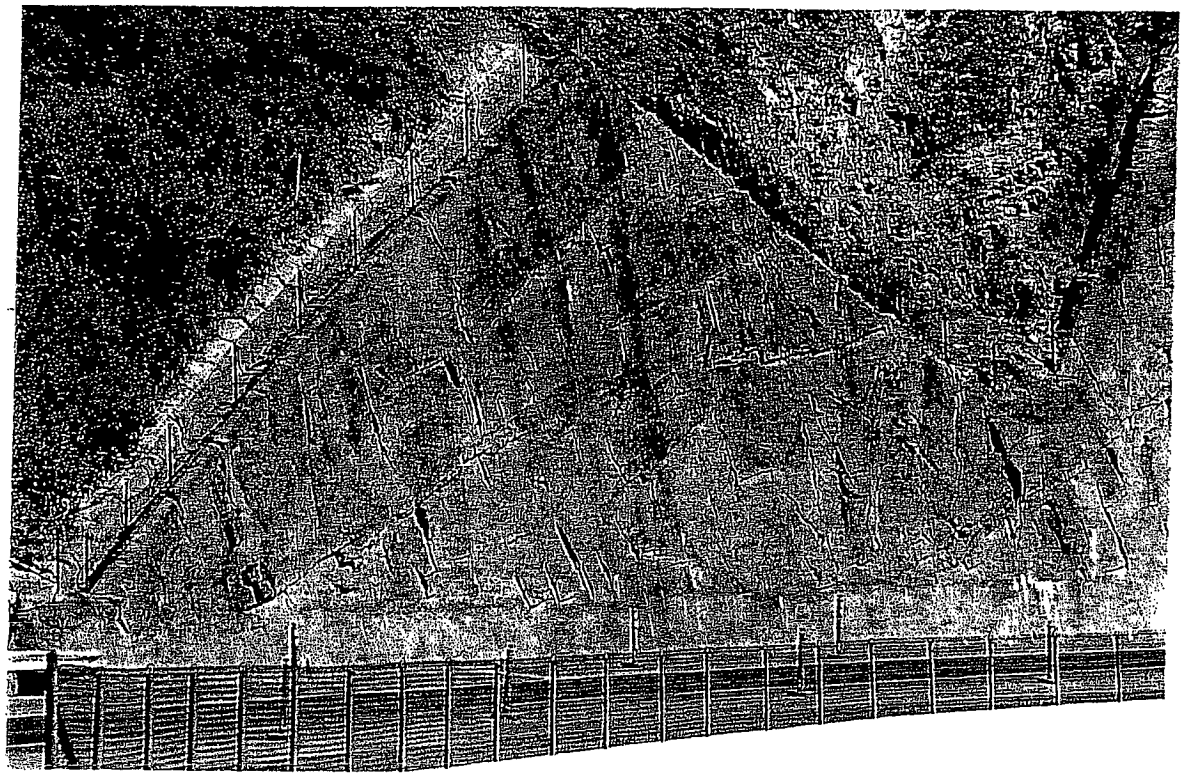


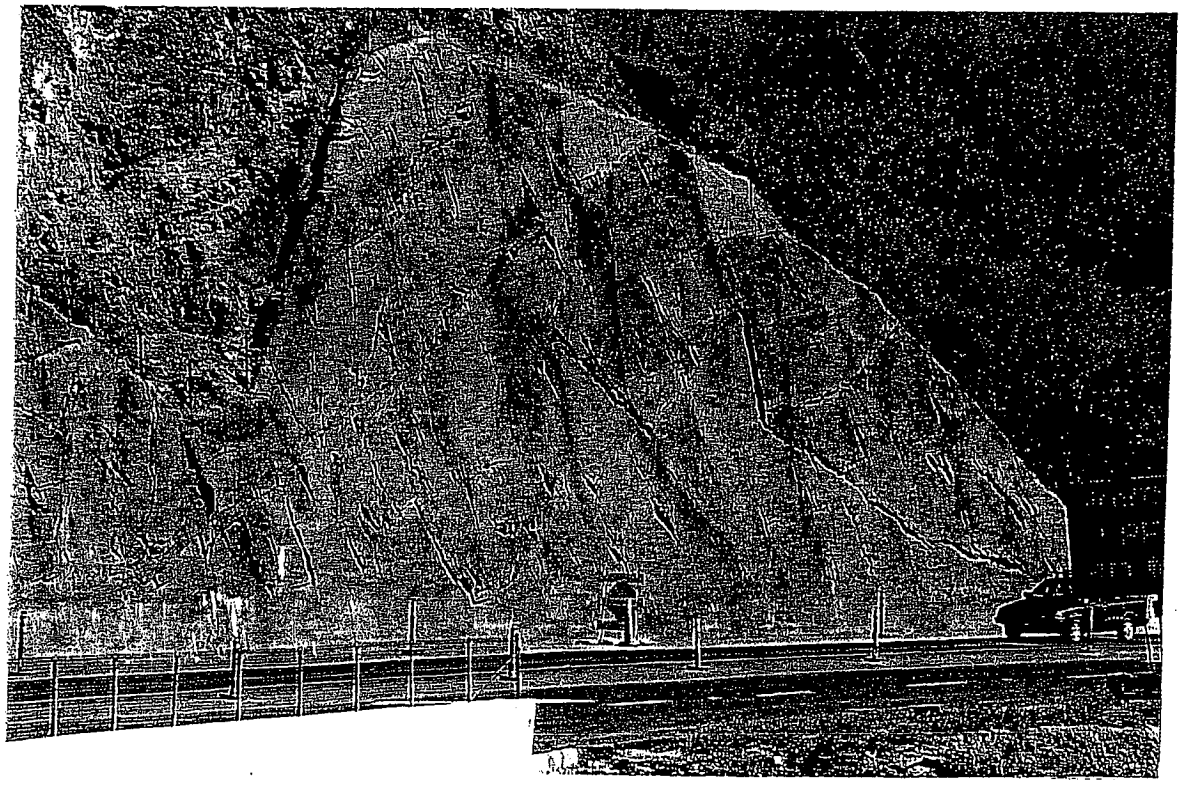
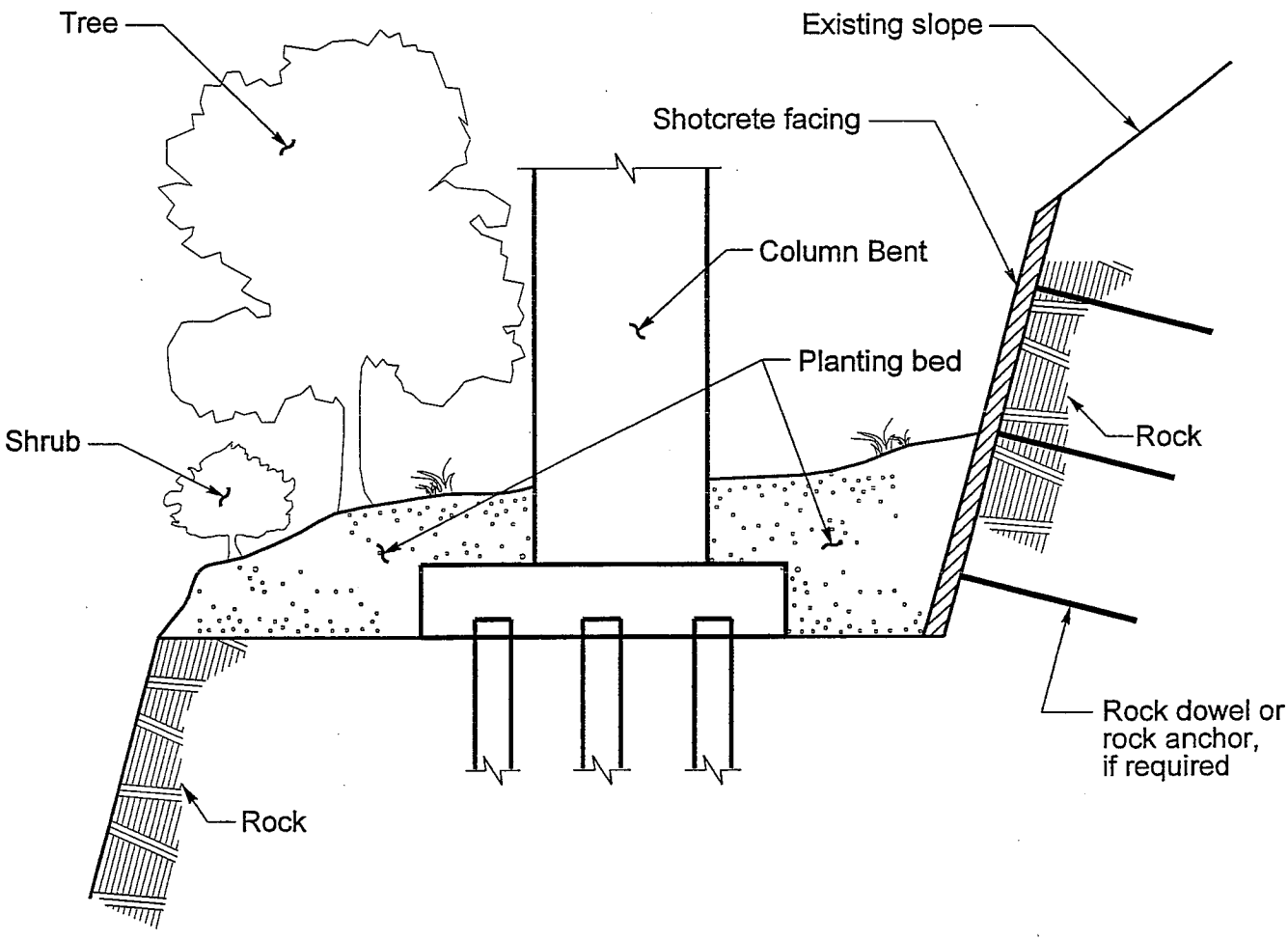


FIGURE 11 TEXTURED SHOTCRETE FACING



SLOPE RESORATION OPTION 3

Providing a Planting Bed
At the Excavation Area

Schematic Diagram - Not to Scale

PARSONS BRINCKERHOFF 303 Second St., Suite 700N, San Francisco, CA 94107	Caltrans District 4	Bay Bridge East Span Replacement Project	
	Interstate Route 80	YBI Substation Slope Restoration Option 3	
	City and County of San Francisco		
	Geotechnical Soils Report	July 2000	Revision 0	Figure 12

By: Davisla 2000 08:53:53
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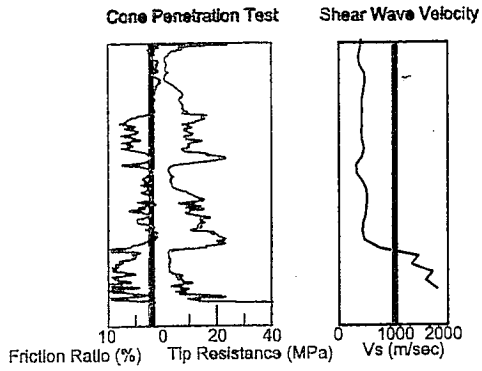
LEGEND



99-301 10 m LT

Offset from Stationline
LT = Left of Stationline
RT = Right of Stationline
o.c. = on center (on Stationline)

25

34
57
64
46
41
56
>50
>50

Standard Penetration Test (blows per 0.3m)

Rock Mass Shear Modulus (MPa) from Unconfined Compression Test

md SP —— Soil Type

ls = Loose
md = Medium Dense
d = Dense
vd = Very Dense
Sa. = Sandy
Cl. = Clayey

sl. = slightly
mod. = moderately
int. = intensely
IR = Intact Rock
WR = Weathered Rock
HR = Hydrocarbon Contamination

USCS SYSTEM:
SP = Poorly Graded Sand
CL = Clay
SM = Silty Sand
GP = Poorly Graded Gravel
GM = Silty Gravel
ML = SILT

3448
552
152

73
25
33
100

Rock Quality Designation (%)

Rock Mass Shear Modulus (MPa) from In-situ Pressuremeter Test

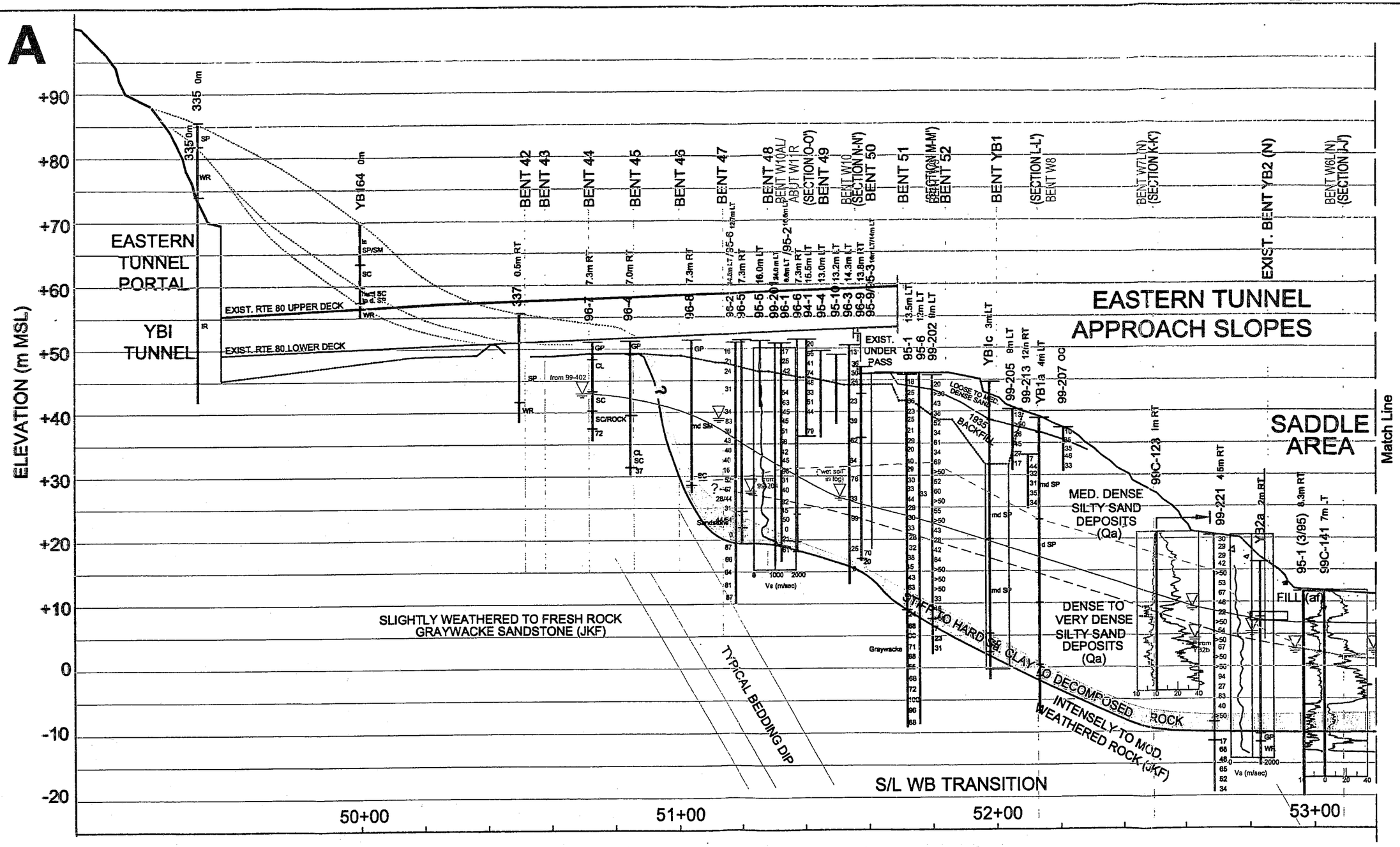
af	Artificial Fill Loose to Medium Dense Silty Sands, with Gravel (as indicated)
Qs	Sand Deposits Loose to Medium Dense Sands
Qls	Landslide Debris Loose to Medium Dense Sands and Silts (Slopewash) and Vegetation
Qa	Alluvium Medium to Very Dense Silty Sands with some zones of Silt and Sandy Clays (as indicated)
Qa	Alluvium Stiff to Very Hard Sandy Clay and medium dense to very dense Clayey Sand, grading to decomposed, intensely weathered bedrock (Qa)
JKf	Moderately to Intensely Weathered Bedrock Brownish Sandstone, Siltsone and Claystone of the Franciscan Formation
JKf	Slightly Weathered to Fresh (Intact) Bedrock Grayish Sandstone, Siltsone and Claystone of the Franciscan Formation
	Potentially Liquefible Zone

USCG = U.S. Coast Guard Base

KEY TO PLATES 2.1 TO 2.2
Yerba Buena Island Approach
SFOBB East Span Seismic Safety Project

PLATE 1.0

Earth Mechanics

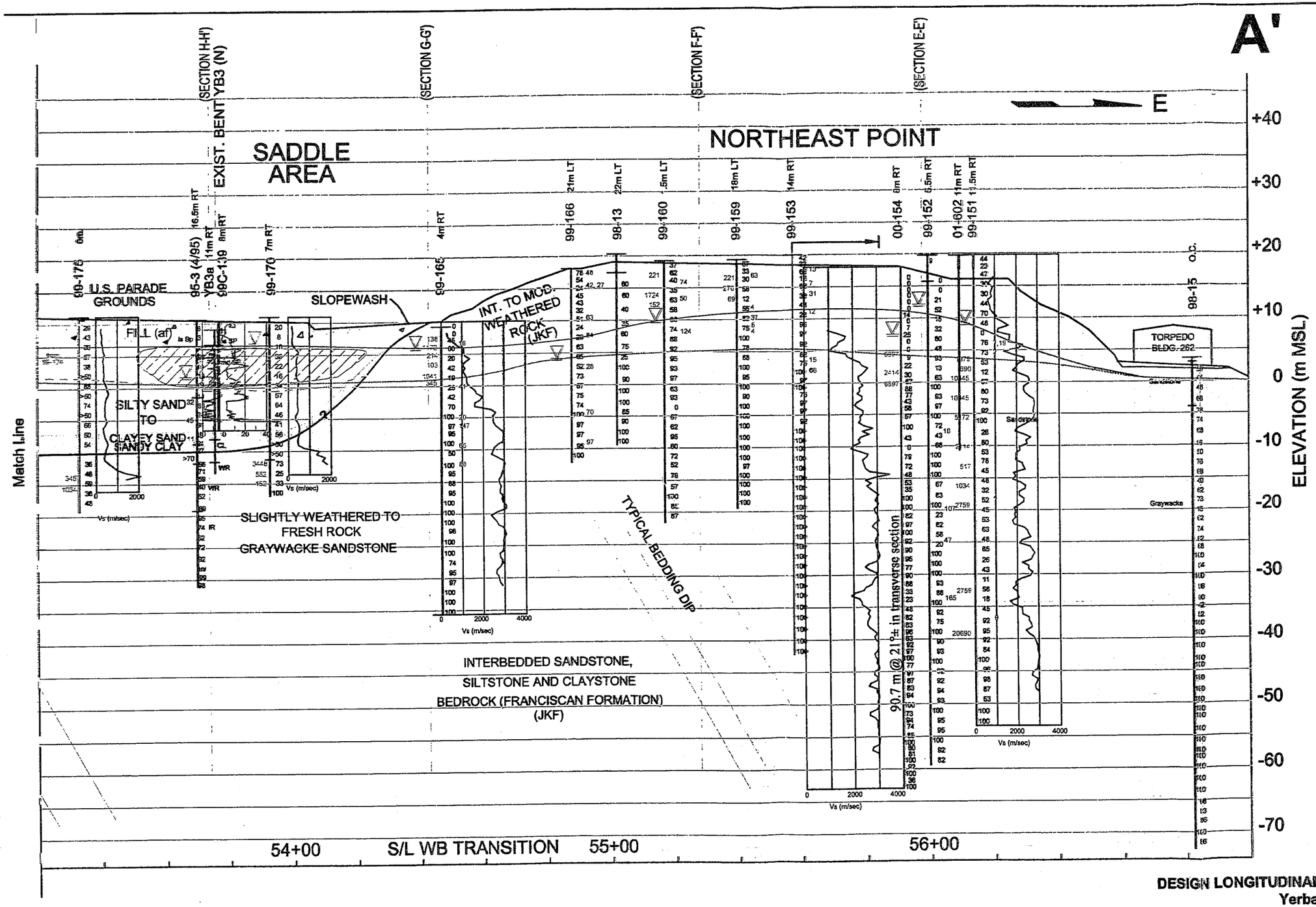


DESIGN LONGITUDINAL SECTION A-A' (WB Transition Alignn
Yerba Buena Island Approach
SFOBB East Span Seismic Safety Project

PLATE 2.1 (Sheet 1 of 2)

Earth Mechanics

Fugro

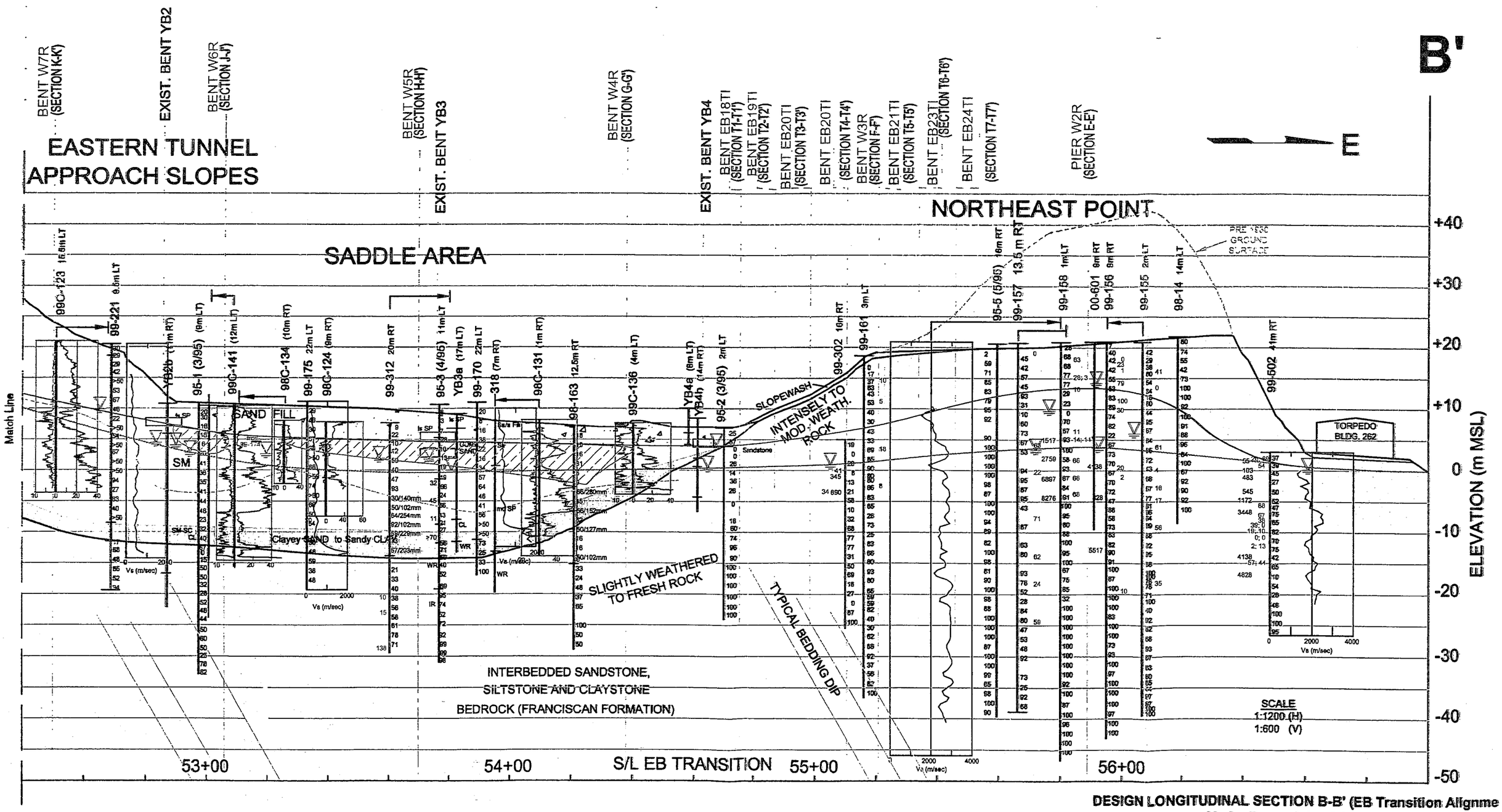


DESIGN LONGITUDINAL SECTION A-A' (WB Transition Alignm
Yerba Buena Island Approach
SFOBB East Span Seismic Safety Project

PLATE 2.1 (Sheet 2 of 2)

Earth Mechanics

FUGRO



DESIGN LONGITUDINAL SECTION B-B' (EB Transition Alignme
Yerba Buena Island Approach
SFOBB East Span Seismic Safety Project

PLATE 2.2 (Sheet 2 of 2)

APPENDIX A: RESULTS OF LABORATORY TESTING

Updated: 2/28/00 /EMI

Boring No.	Sample No.	Depth	Soil Type	Pocket Penetrometer	Torvane Shear	Moisture Content	Dry Unit Weight	Void Ratio	Porosity	Grain Size Distribution					Atterberg Limits			Soil Corrosivity				R-Value	Compaction Test		Direct Shear Test				Unconsol. Undrained Triaxial
				SoilTest CL-700A	Humboldt E-285 ASTM D-4648	ASTM D-2216	ASTM D-2937			CT 202, 203					CT 204			CT 532, 643		CT 417	CT 422	ASTM D-2844	CT 216	CT 216	ASTM D-3080				ASTM D-2850
				q_u	S_u	w	γ_d	e	n	Gravel	Sand	Fines	C_u	C_c	LL	PL	PI	Resistivity	pH	SS	SC	R	γ_d	w*	ϕ_{peak}	C_{peak}	ϕ_{res}	C_{res}	S_u
(-)	(-)	(m)	(USCS)	(tsf)	(kg/cm²)	(%)	(kN/m³)	(-)	(%)	(%)	(%)	(%)	(-)	(-)	(%)	(%)	(%)	(ohm-cm)	(-)	(ppm)	(ppm)	(-)	(pcf)	(%)	(deg)	(kPa)	(deg)	(kPa)	(ksf)
	D-22	25.32	ML			10.4	NA																						
98-309	B-1	0-0.45																											
	S-2	0.46	CL			10.0																							
	S-3	1.52	GP-GM			10.9				65	22	13																	
	S-4	3.05	SM/CL			22.4																							
	D-5	4.58	SM			22.0	16.8	0.58	0.37																				
	S-6	6.10	SP-SM			16.6				32	58	10	3.8	1.3															
	D-7	7.63	SP-SM			19.6	17.7	0.50	0.33																				
	S-8	9.15	SP-SM			23.7																							
	D-9	10.98	SP-SM			20.2	17.2	0.54	0.35																				
	S-10	12.20	SM/ML			20.4				1	62	37																	
	D-11	13.73	ML-CL	>4.5		16.1	19.1	0.39	0.28																				5.8
	S-12	15.25	ML-CL			17.4																							
98-310	B-1	0-1.22	SM			6.8				3	80	17	16	5.7															
	S-2	1.52	SM			7.4				0	84	16	13	4.2															
	D-3	3.36	SM			17.2	15.9	0.67	0.40																				
	S-4	4.58	SM			15.1																							
	D-5	6.41	CL to SC	2.25		17.5	18.1	0.46	0.32	0	52	48	51	0.7															
	S-6	7.63	SC			29.6																							
	D-7	9.15	ML	>4.5		13.9	14.2	0.87	0.46									2000	7.1	105	253								
	S-8	10.68	ML			18.1																							
98-311	S-1	0.76	ML/(CH-CL)*			14.3				1	31	68	24	0.5	25	17	8	1400	7.2	110	245								
	D-2	1.52	ML/(CH-CL)	>4.5		16.5	18.0	0.47	0.32	0	48	52	49	0.6	28	19	9								38.4	17.4	30.7	2.5	
	S-3	3.05																											
99-161	B-1	0-1.53	SM/ML			10.2												3200	6.0	23	612								
99-167	S-1	1.53	SM			8.0																							
	S-2	2.29	SM			10.4																							
99-170	B-1	0-1.53																											
	S-2	0.76	SM			73.8																							
	D-3	1.53	SM	>4.5		9.0	17.9	0.48	32.32	0	77	23													25.3	19.0	26.6	10.9	
	S-4	2.29	SM			18.8				0	69	31																	
	D-5	3.05	SM	1.00	0.10	7.3	16.8	0.58	36.67																32.5	3.2	32.7	1.2	
	S-6	4.58	SM			13.0				0	76	24																	
	D-7	6.10	SP-SM	2.75-3.0	0.23	17.8	17.2	0.54	35.04	1	87	12																	
	S-8	7.63	SM/ML			16.9				0	64	36			18	15	3	2200	7.5	105	253								
	D-9	9.15	CL	2.5-3.5	0.50	16.7	18.1	0.46	31.61																31.9	22.7	30.4	6.0	
	S-10	10.68	SM			19.0				0	85	15																	
	S-10	12.20	SC	1.5-1.75		21.2	16.9	0.56	36.03																				
	S-12	13.73	SM			21.4				0	85	15																	
	D-13	15.25	SM			25.8																							
	S-14	16.78	CL			20.5				16	41	43			34	16	18												
	D-15	18.30	CL	>4.5	>1.0	17.1	18.1	0.46	31.51						29	16	13												4@10%
	S-16	19.83	CL			17.2				0	37	63																	
	S-17	21.35	CL			19.0																							
99-171	B-1	0-1.53																											

Updated: 2/28/0 K/EMI

Boring No.	Sample No.	Depth	Soil Type	Rocket Penetrometer	Torvane Shear	Moisture Content	Dry Unit Weight	Void Ratio	Porosity	Grain Size Distribution					Atterberg Limits			Soil Corrosivity				R-Value	Compaction Test		Direct Shear Test				Unconsol. Undrained Triaxial
				Soil Test CL-700A	Humboldt E-285 ASTM D-4648	ASTM D-2216	ASTM D-2937			CT 202, 203					CT 204			CT 532, 643		CT 417	CT 422	ASTM D-2844	CT 216	CT 216	ASTM D-3080				ASTM D-2850
				q_u	S_u	w_n	γ_d	e	n	Gravel	Sand	Fines	C_u	C_c	LL	PL	PI	Resistivity	pH	SS	SC	R	γ_d	w^*	ϕ_{peak}	C_{peak}	ϕ_{res}	C_{res}	S_u
(-)	(-)	(m)	(USCS)	(tsf)	(kg/cm²)	(%)	(kN/m³)	(-)	(%)	(%)	(%)	(%)	(-)	(-)	(%)	(%)	(%)	(ohm-cm)	(-)	(ppm)	(ppm)	(-)	(pcf)	(%)	(deg)	(kPa)	(deg)	(kPa)	(ksf)
	D-6	4.58	NO REC																										
	S-7	6.10	SP-SM			19.2				0	91	9																	
	D-8	7.63	SP-SM			21.2	16.7	0.59	37.00	0	92	8																	
	S-9	9.15	SP-SM			22.8				0	90	10																	
	D-10	10.68	CL	2.75	0.85	16.2	18.8	0.41	29.00						22	12	10												2.55@10 %
	S-11	12.20	CL			18.0												1100	7.9	83	288								
	D-12	13.73	CL			16.6																							
99-312	B-0	0-0.61	SM/CL							SAME AS B-1								NS	NS	NS	NS	64	124.5	11.5					
	B-1	0.61-	SM/CL			9.3				0	79	21										68	125.5	11.0					
	D-2	0.92	SM	2.0-2.25		10.8	17.4	0.52	34.40	0	74	26						7500	8.3	80	275	NS	NS	NS					
	S-3	1.53	CMB			10.2												6600	8.4										
	D-4	2.29	SM/CL	0.75		13.1	17.3	0.53	34.60																39.2	3.3	32.9	2.0	
	S-5	3.05	SM			18.2				27	60	13																	
	D-6	4.27	SM			18.2	17.3	0.53	34.50																				
	S-7	5.80	SM			18.1																							
	D-8	7.93	SC	>4.5	>1.0	15.0	19.0	0.39	28.10	0	70	30			27	15	12								25.8	10.5	32.6	33.6	
	S-9	9.15	SC			19.2				0	78	22						39,000	7.5	115	154								
	D-10	10.68	SM	2.25		19.9	17.4	0.52	34.40																				
	S-11	12.20	SM			22.1																							
	D-12	13.73	SP-SM	1.00	0.20	22.2	16.7	0.58	36.70	0	91	9													33.0	21.3	29.3	5.2	
	S-13	15.25	SP-SM			22.0																							
	D-14	16.78	SM	3.00	0.45	20.7	17.3	0.53	34.85																				
	S-15	18.30	SC			19.8				0	70	29																	
	D-16	19.83	SM	3.00	0.45	21.0	17.2	0.54	35.00																				
	S-17	21.35	ML to CL			15.1				12	54	34																	
	D-18	22.88	ML to CL	0.75-2.5		14.5	19.5	0.36	26.50																				2.55@10 %
99-313	B-1	0-0.92	SM			5.2				22	56	22																	
	S-2	0.92	ML			3.5				49	37	14																	
	D-3	1.53	(NO SAMPLE)																										
	S-4	2.29	GM			4.5				53	33	14																	
	S-5	3.05	GW-GM			11.9				68	24	8																	
	D-6	4.58	SP			3.0	16.9	0.56	36.10																29.5	6.3	30.2	2.6	
	S-7	6.10	SM			8.4				0	74	24																	
	D-8	7.63	SP-SM	1.75		10.4	17.5	0.51	33.80	0	92	8													32.9	12.9	27.6	8.3	
	S-9	9.15	SM			11.5				0	87	13																	
	D-10	10.68	SM or ML	3.50		13.0																			31.0	11.2	29.4	10.9	
	S-11	12.20	SM			13.8				0	57	43																	
	D-12	13.73	SM			26.8				31	35	34																	
	S-13	15.25	ML			14.3																							
99-401	S-1	0.76	Sp-SM			3.4																							
	S-2	1.53	SM			2.8				0	76	24																	
	S-3	2.29	SM			2.3																							

Updated: 2/28/0. K/EMI

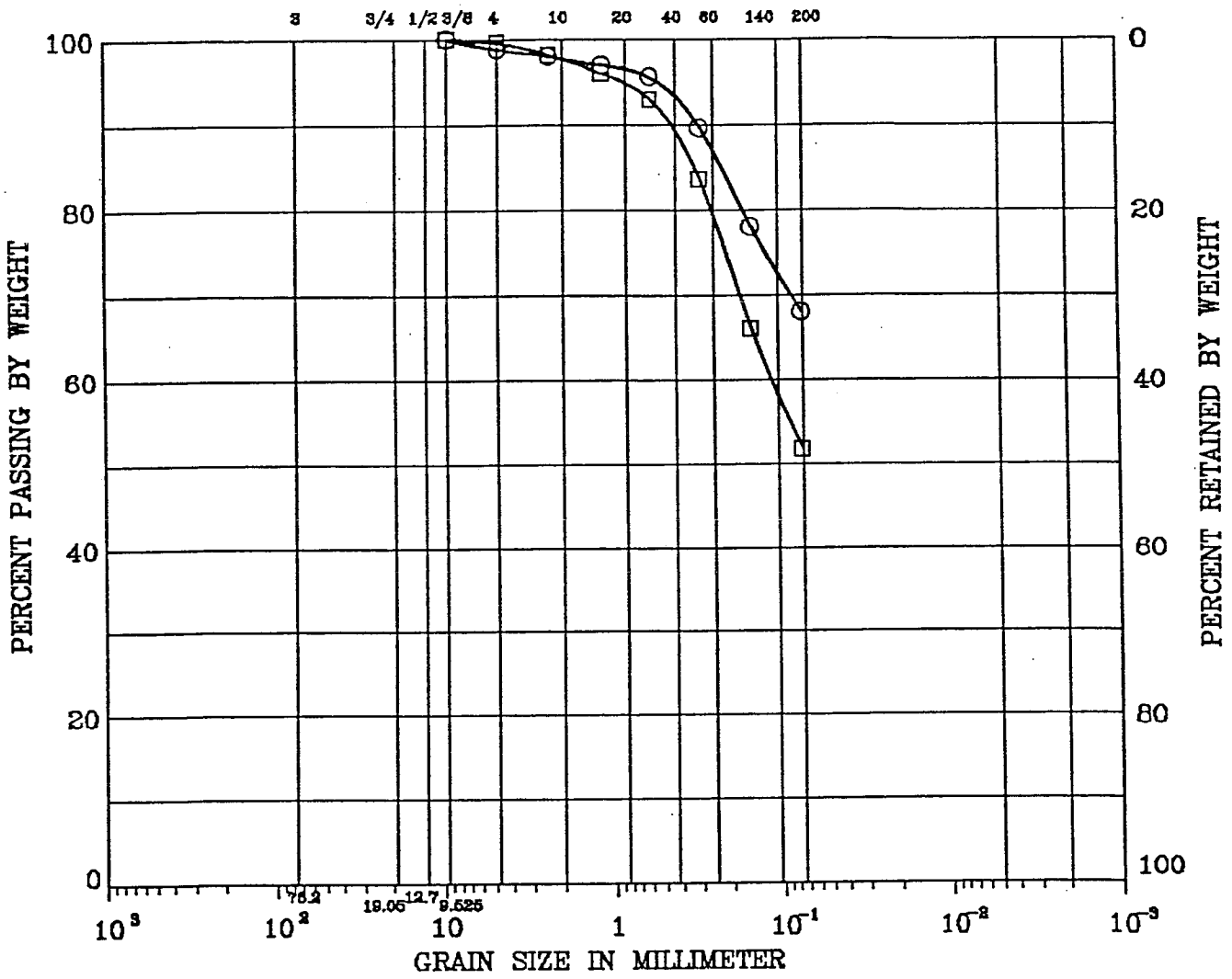
Boring No	Sample No	Depth	Soil Type	Pocket Penetro-meter	Torvane Shear	Moisture Content	Dry Unit Weight	Void Ratio	Poro-sity	Grain Size Distribution					Atterberg Limits			Soil Corrosivity				R-Value	Compaction Test		Direct Shear Test				Unconsol. Undrained Triaxial
				SoilTest CL-700A	Humboldt E-285 ASTM D-4648	ASTM D-2216	ASTM D-2937			CT 202, 203					CT 204			CT 532, 643		CT 417	CT 422	ASTM D-2844	CT 216	CT 216	ASTM D-3080				ASTM D-2850
				q^*_u	S_u	w	γ_d	e	n	Gravel	Sand	Fines	C_u	C_c	LL	PL	PI	Resistivity	pH	SS	SC	R	γ_d	w*	ϕ_{peak}	c_{peak}	ϕ_{res}	c_{res}	S_u
(-)	(-)	(m)	(USCS)	(tsf)	(Kg/cm²)	(%)	(kN/m³)	(-)	(%)	(%)	(%)	(%)	(-)	(-)	(%)	(%)	(%)	(ohm-cm)	(-)	(ppm)	(ppm)	(-)	(pcf)	(%)	(deg)	(kPa)	(deg)	(KPa)	(ksf)
	S-4	3.05	SM			3.1				0	69	31																	
	S-5	4.73	SP-SM			1.2																							
99-402	B-1	0-0.92	SM/ML			5.0				19	58	23						2500	8.0	90	182	26	135.5	8.5					
	S-2	0.92	SM			8.0				0	66	34						3300	6.8	122	492	NS	NS	NS					
	D-3	1.53	SM	2.00		5.0	17.2	0.54	35.00	0	79	21						NS	NS	NS	NS				36.0	1.4	35.0	0.3	
	S-4	2.29	SM			8.4																							
	D-5	3.05	SM	2.50		7.8	17.7	0.50	33.20	0	82	18													30.0	12.3	32.7	3.2	
	S-6	4.58	SM			19.2																							
	D-7	6.10	SM	2.00		15.0	17.5	0.51	33.70	0	85	15													33.5	23.6	29.8	7.5	
	S-8	7.63	SM			9.6				0	76	24																	
	D-9	9.15	SC			12.1	19.3	0.37	27.00									6400	7.1	60	202				39.0	20.7	31.9	0.8	
	S-10	10.68	CL-ML	>4.5		13.8									23	17	6												
99-404	B-1	0-0.62	SM			3.5				0	81	19						6400	7.1	62	368	67	118	13					
99-405	B-1	0-0.5	SM			7.3				0	72	28						4100	7.1	70	453	65	124.5	11.5					
TOTAL	407			42	18	389	141	141	141	32	167	167	20	20	31	31	31	45	45	44	44	6	5	6	53	51	53	50	6

Abbreviations:

CMB	Crushed Miscellaneous Base
C_u	Coefficient of uniformity
C_c	Coefficient of curvature
e	porosity
n	Void ratio
SC	Soluble Chloride Content
SS	Soluble Sulfate Content
LL	Liquid Limit
PL	Plastic Limit
PI	Plasticity Index
q^*_u	Unconfined compressive strength reading (q_u=0.5q^*_u)
S_u	Undrained shear strength
USCS	Unified Soil Classification System
w	in-situ water content
w*	optimum water content
γ_d	Dry unit weight
ϕ_{peak}	peak soil friction angle
c_{peak}	peak cohesive strength
ϕ_{res}	post-peak ("residual") soil firction angle at large displacement
c_{res}	post-peak ("residual") cohesive strength at large displacement
NS	No soil - quantity of soil collected or remaing after other testing was completed is insufficient to conduct test

UNIFIED SOIL CLASSIFICATION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN INCHES			U.S. STANDARD SIEVE No.			HYDROMETER



SYMBOL	BORING	DEPTH (ft)/(m)	LL (%)	PI (%)	DESCRIPTION	
○	98-311/S-1	2.5/0.76	25	8	Light Olive Brown, Silt (ML) Lensed Greenish Gray, Fat Clay (CH)	—(CL)
□	98-311/D-2	5.0/1.53	28	9	Light Olive Brown, Silt (ML) Lensed Greenish Gray, Fat Clay (CH)	

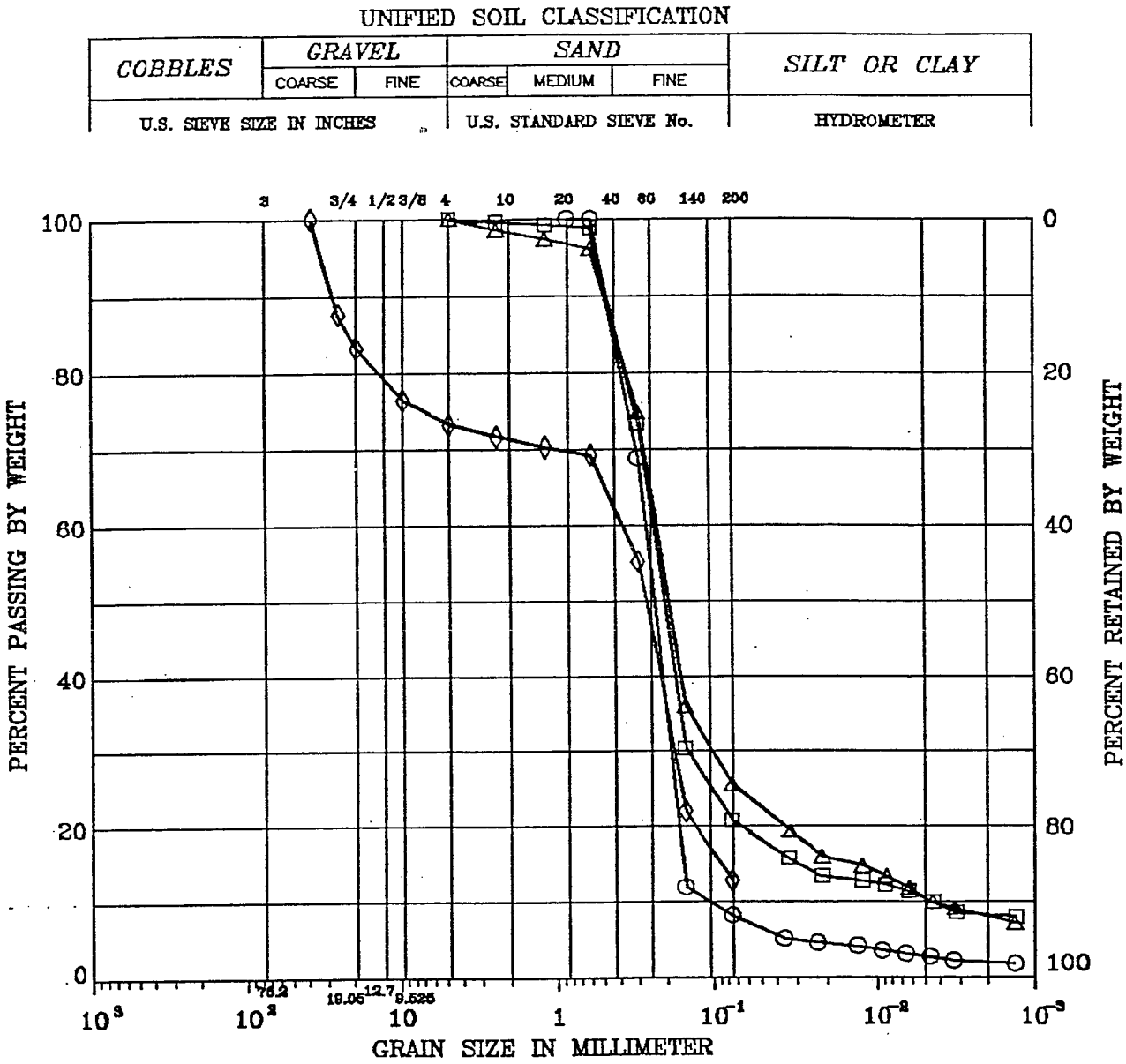
Remark : Sample greater than No. 50 Sieve are Cemented nodules.

YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

GRAIN SIZE DISTRIBUTION
(CALTRANS TEST METHOD 202 & 203)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00



SYMBOL	BORING	DEPTH (ft)/(m)	LL (%)	PI (%)	DESCRIPTION
○	99-305/D-8	25.0/7.63			Poorly-Graded Sand with Silt (SP-SM)
□	99-312/B-1	1.5-3/0.46-0.92			Weathered, Silty Sand (SM) lensed Clay (CL)
△	99-312/D-2	3.0/0.92			Silty Sand (SM)
◇	99-312/S-5	10.0/3.05			Silty Sand with Gravel (SM)

YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

Earth Mechanics, Inc.
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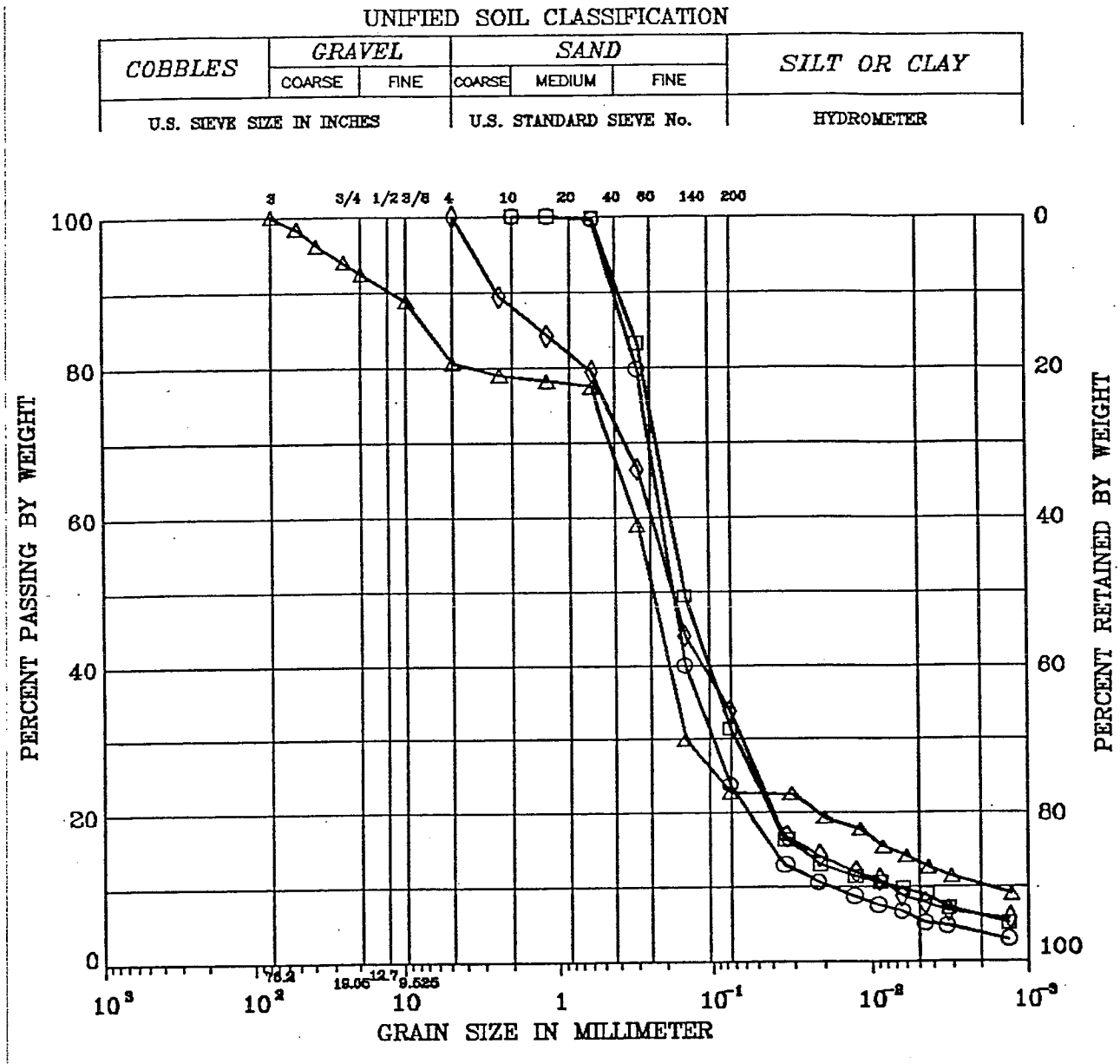
GRAIN SIZE DISTRIBUTION
(CALTRANS TEST METHOD 202 & 203)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00



SYMBOL	BORING	DEPTH (ft)/(m)	LL (%)	PI (%)	DESCRIPTION
○	99-401/S-2	5.0/1.53			Silty Sand (SM)
□	99-401/S-4	10.0/3.05			Silty Sand (SM)
△	99-402/B-1	0-3/0-0.92			Silty Sand with Gravel (SM)
◊	99-402/S-2	3.0/0.92			Silty Sand (SM)

YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

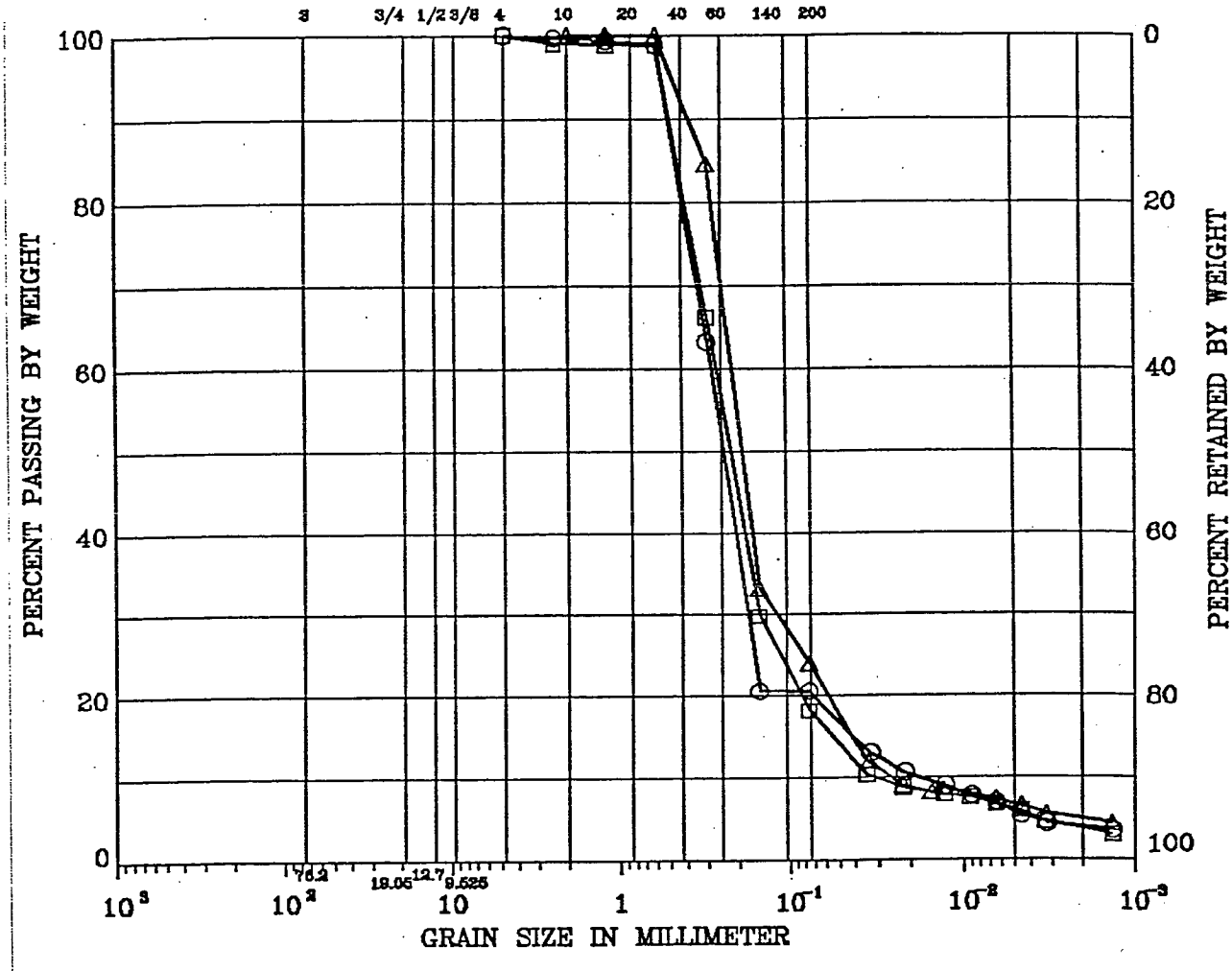
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

GRAIN SIZE DISTRIBUTION
(CALTRANS TEST METHOD 202 & 203)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00

UNIFIED SOIL CLASSIFICATION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN INCHES			U.S. STANDARD SIEVE No.			HYDROMETER



SYMBOL	BORING	DEPTH (ft)/(m)	LL (%)	PI (%)	DESCRIPTION
○	99-402/D-3	5.0/1.53			Silty Sand 1SM)
□	99-402/D-5	10.0/3.05			Partial cemented Silty Sand (SM)
△	99-402/S-8	25.0/7.63			Silty Sand (SM)

YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

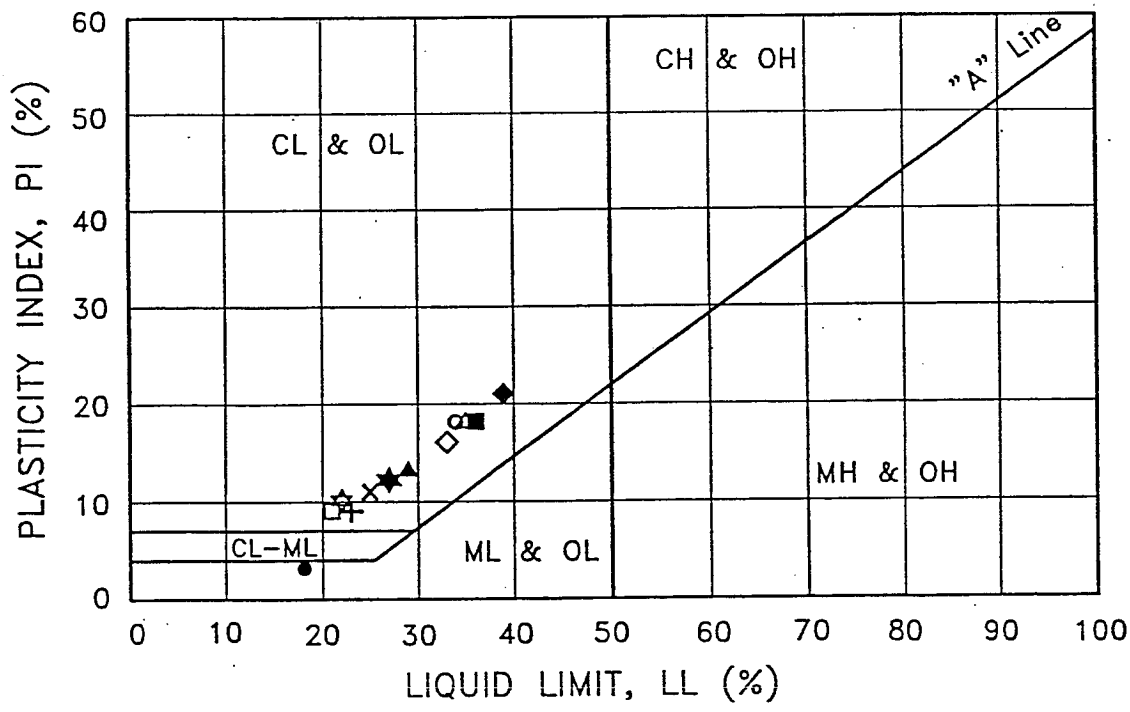
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

GRAIN SIZE DISTRIBUTION
(CALTRANS TEST METHOD 202 & 203)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00

SADDLE AREA BORINGS

Symbol	Boring	Sample#	Depth (m)	LL (%)	PL (%)	PI (%)	USCS
●	99-170	S-8	7.63	18	15	3	ML
○	99-170	S-14	16.78	34	16	18	CL
▲	99-170	D-15	18.30	29	16	13	CL
△	99-171	S-11	13.73	35	17	18	ML
■	99-172	D-13	15.25	36	18	18	CL
□	99-174	S-15	13.73	21	12	9	CL
◆	99-174	D-16	15.40	39	18	21	CL
◇	99-174	S-17	15.40	33	17	16	CL
★	99-175	S-13	19.83	27	15	12	CL
✡	99-305	D-10	10.68	22	12	10	CL
+	99-312	D-8	7.93	27	15	12	CL
×	99-312	D-18	22.88	36	18	18	CL



USCS = United Soil Classification System

YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

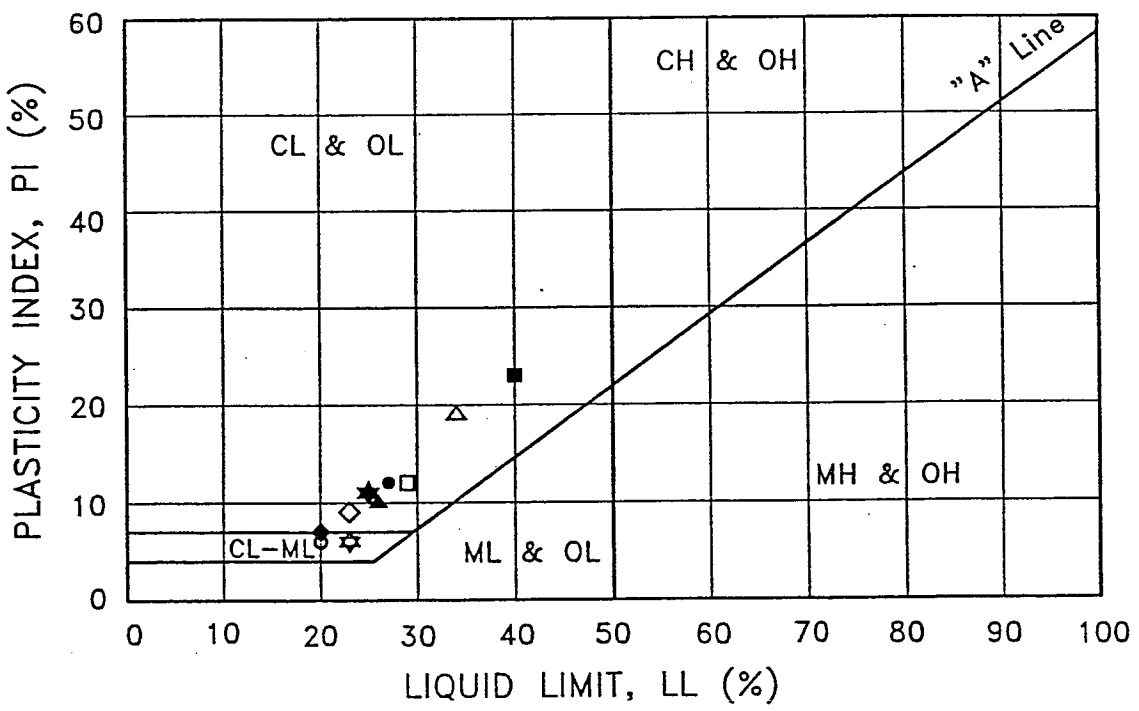
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

ATTERBERG LIMITS
(CALTRANS TEST METHOD 204)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00

TUNNEL APPROACH BORINGS

Symbol	Boring	Sample#	Depth (m)	LL (%)	PL (%)	PI (%)	USCS
●	99-201	S-24	33.55	27	15	12	CL
○	99-202	S-20	25.93	20	14	6	CL-ML
▲	99-202	S-28	38.13	26	16	10	CL
△	99-204	S-14	16.78	34	15	19	CL
■	99-220	D-16	21.35	40	17	23	CL
□	99-220	S-17	22.88	29	17	12	CL
◆	99-221	S-19	25.93	20	13	7	CL-ML
◇	99-221	S-20	27.45	23	14	9	CL
★	99-221	S-22	30.50	25	14	11	CL
✡	99-402	S-10	10.68	23	17	6	CL/ML



USCS = United Soil Classification System

YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

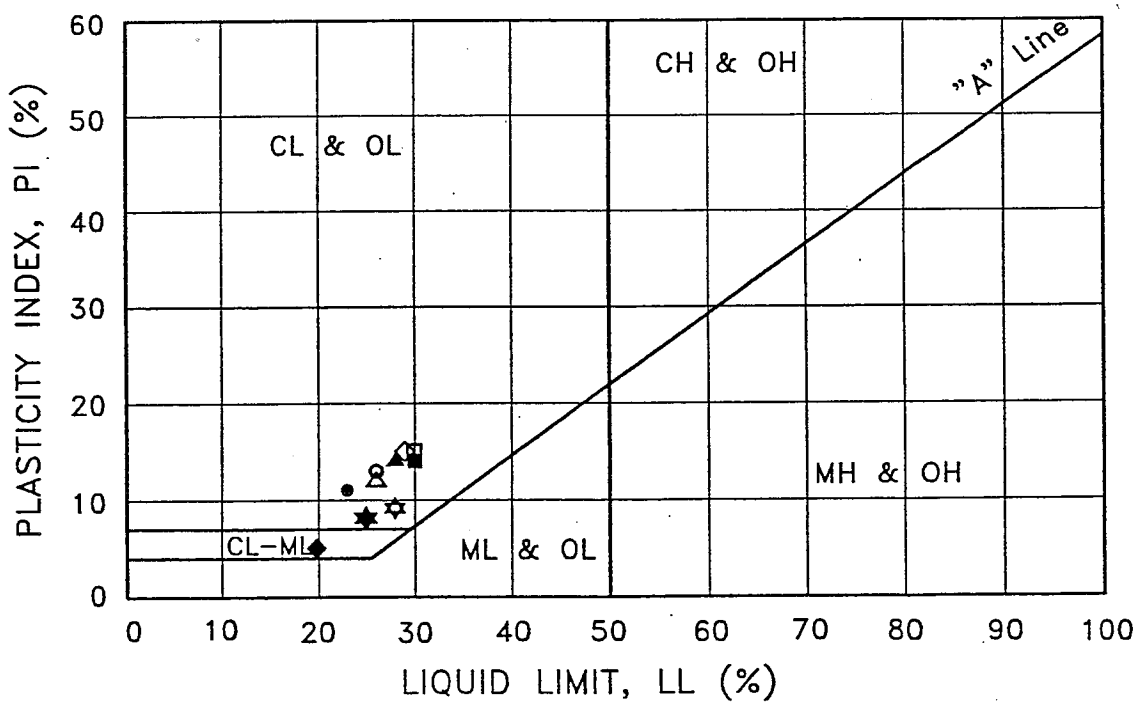
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

ATTERBERG LIMITS
(CALTRANS TEST METHOD 204)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00

COAST GUARD BORINGS

Symbol	Boring	Sample#	Depth (m)	LL (%)	PL (%)	PI (%)	USCS
●	98-163	D-14	18.30	23	12	11	CL
○	98-168	S-11	15.25	26	13	13	CL
▲	98-168	D-12	16.78	28	14	14	CL
△	98-306	S-14	18.30	26	14	12	CL
■	98-306	S-15	19.83	30	16	14	CL
□	98-307	S-12	18.30	30	15	15	CL
◆	98-308	S-2	0.92	20	15	5	CL-ML
◇	98-308	D-13	16.78	29	14	15	CL
✱	98-311	S-1	0.76	25	17	8	CL
✡	98-311	D-2	1.53	28	19	9	CL



USCS = United Soil Classification System

YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

ATTERBERG LIMITS
(CALTRANS TEST METHOD 204)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00

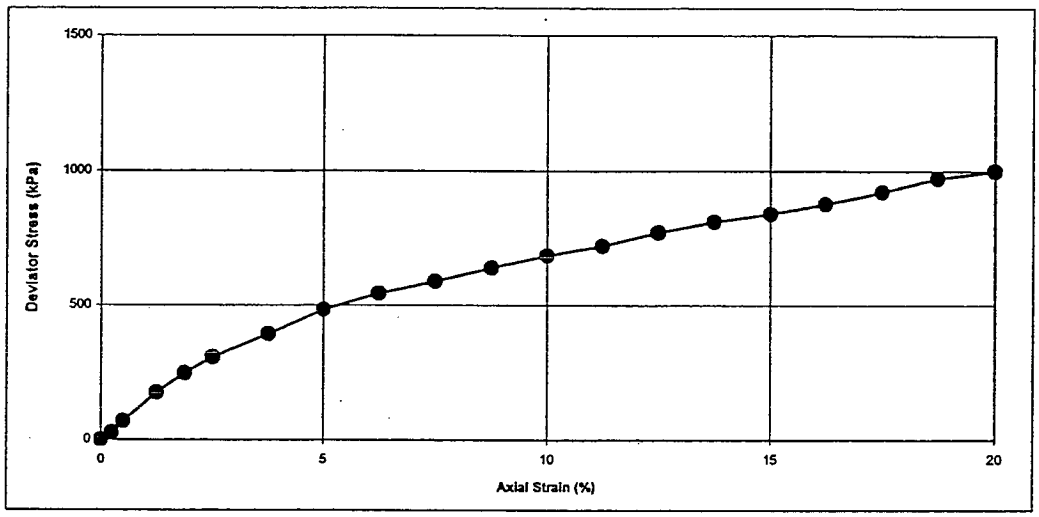
AP Engineering and Testing, Inc.

GEOTECHNICAL TESTING LABORATORY

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

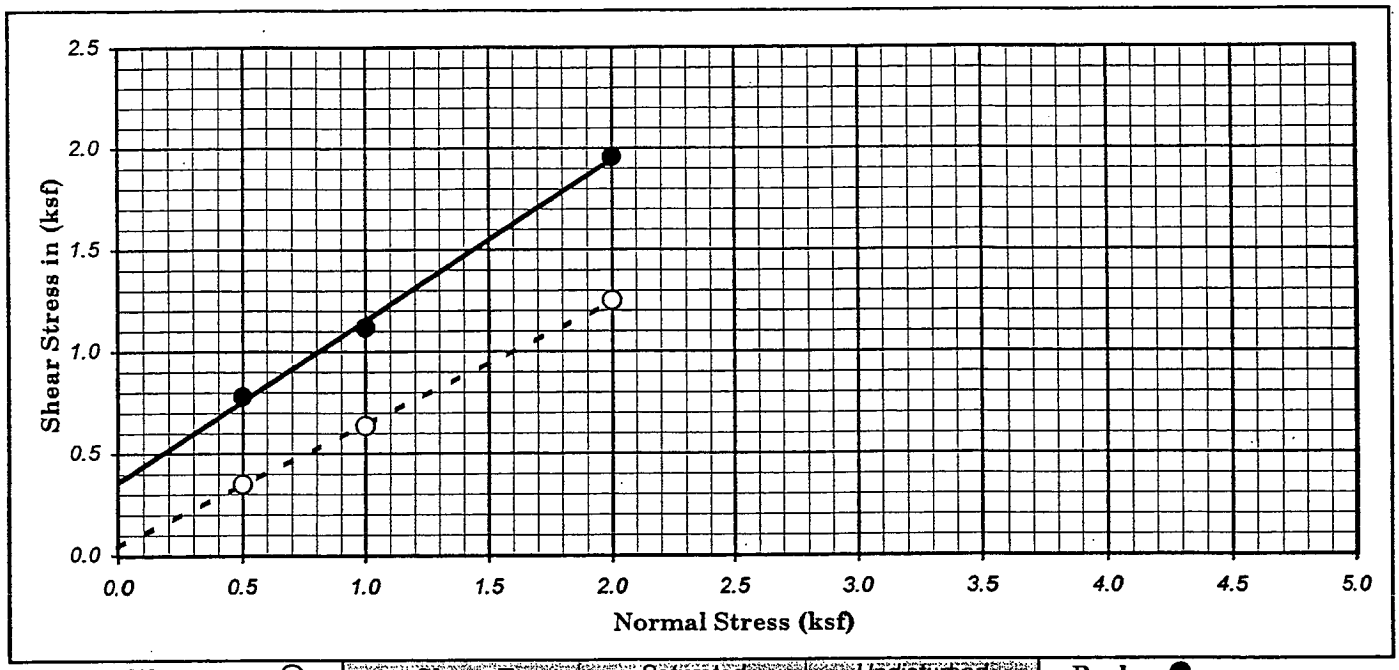
Project Name:	SFOBB - YBI Exploration, Task 5	Sample Type:	Undisturbed
Project No.:	98-145-2	Soil Description	Olive Yellow Clayey Sand
Boring No.:	99-312	Dry Density (kN/m³):	19.7
Sample No.:	D-18	Moisture Content (%)	14.0
Depth (meters):	22.9	Test Date:	2/7/00

Sample Diameter (inch):	2.415	Wt. Wet Soil+Container(gms)	301.49
Sample Hieght (inch):	4	Wt. Dry Soil+Container(gms)	270.92
Sample Weight (gms):	688.0	Wt. Container (gms)	52.12

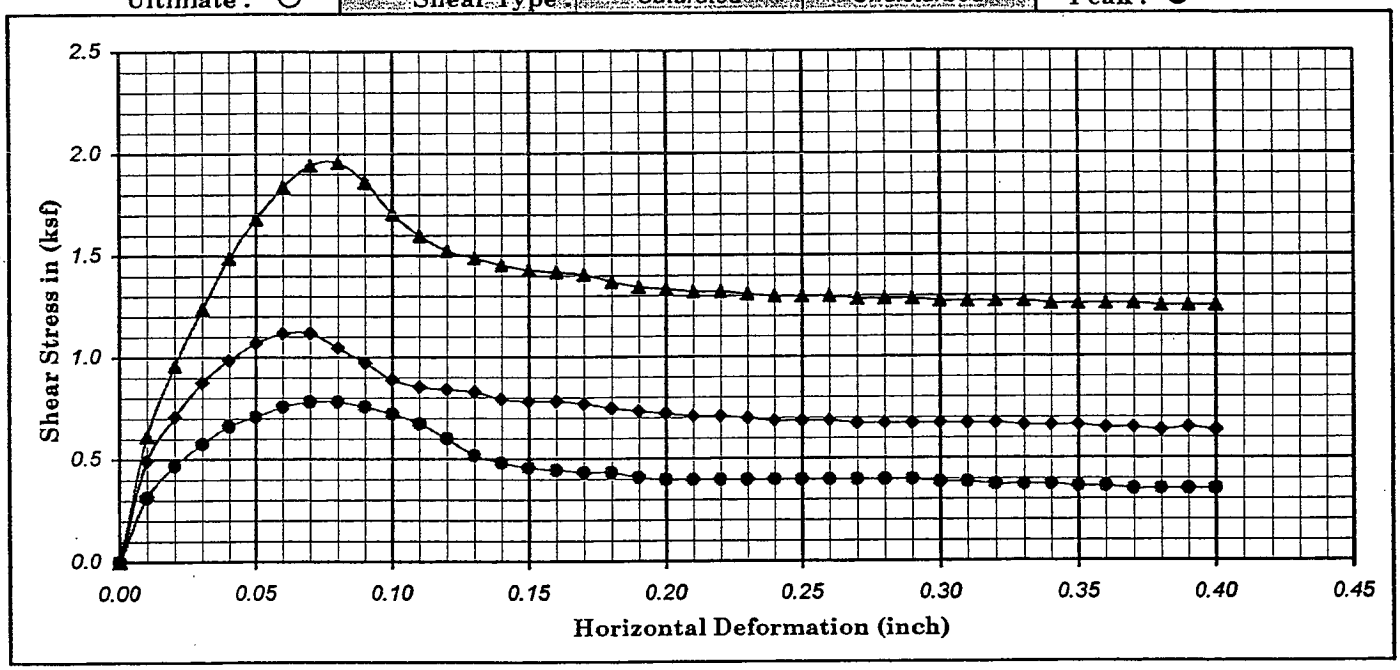


Confining Pressure : 513.9 kPa

Load (lbs)	Deformation (inch)	Area (sq.in)	Deviator Stress (kPa)	Axial Strain (%)
0	0.00	4.58	0.00	0.00
18	0.01	4.59	27.03	0.25
46	0.02	4.60	68.89	0.50
118	0.05	4.64	175.39	1.25
168	0.075	4.67	248.13	1.88
210	0.10	4.70	308.19	2.50
272	0.15	4.76	394.06	3.75
339	0.20	4.82	484.75	5.00
386	0.25	4.89	544.69	6.25
424	0.30	4.95	590.34	7.50
466	0.35	5.02	640.04	8.75
506	0.40	5.09	685.46	10.00
540	0.45	5.16	721.36	11.25
586	0.50	5.24	771.79	12.50
625	0.55	5.31	811.39	13.75
658	0.60	5.39	841.85	15.00
696	0.65	5.47	877.38	16.25
743	0.70	5.55	922.64	17.50
796	0.75	5.64	973.48	18.75
830	0.80	5.73	999.45	20.00



Ultimate : ○ | Shear Type : Saturated | Undisturbed | Peak : ●



Boring No. : 98 - 311		Strength Intercept (C) :	0.36	(ksf)	Peak	0.04	(ksf)	Ultimate
Sample No. : D - 2			17.24	(kPa)		2.01	(kPa)	
Depth (ft/m) : 5.0	1.53	Friction Angle (ϕ) :	38.38	Degree		31.04	Degree	
Description : Light Olive Brown, Silt (ML) lensed Fat Clay (CH)					Shear Rate (inch/minute) :		0.01	

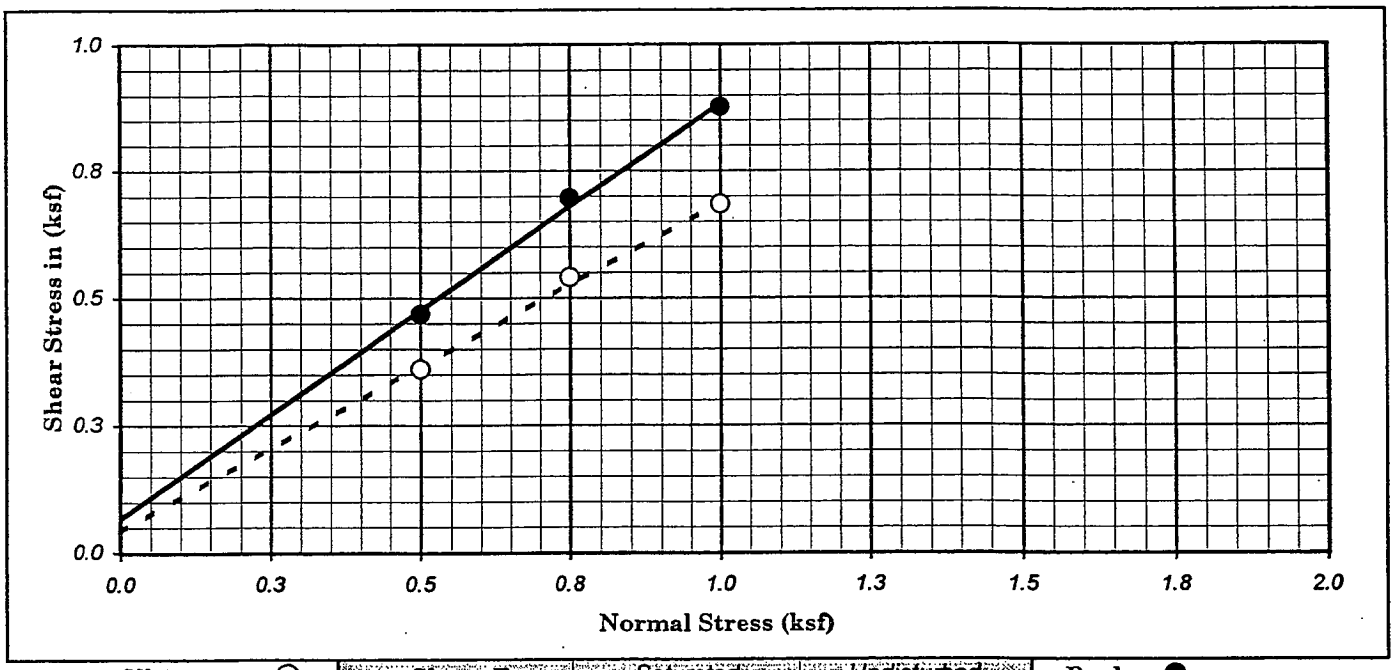
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m³)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	18.24	112.73	17.74	0.50	0.50	23.94	0.78	37.35	0.35	16.66
◆	18.52	113.03	17.79	0.49	1.00	47.88	1.12	53.43	0.64	30.45
▲	17.15	115.02	18.10	0.47	2.00	95.76	1.96	93.65	1.25	59.75

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

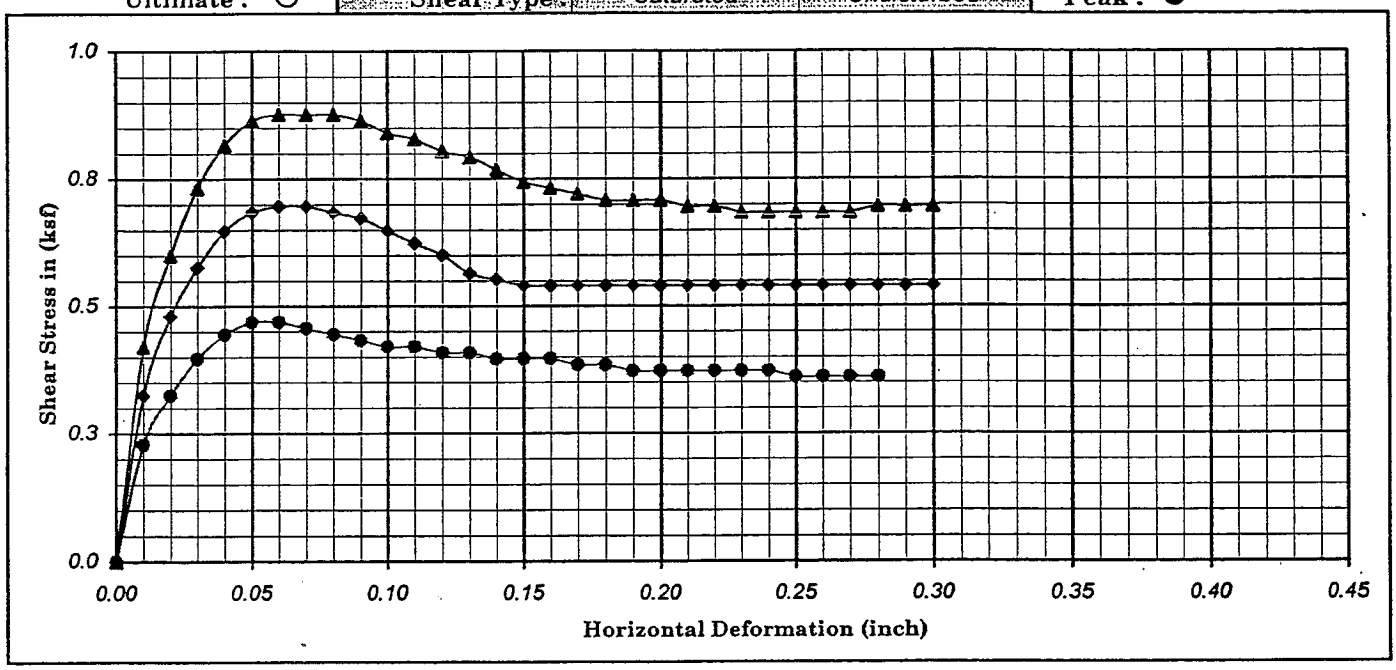
San Francisco / Oakland Bay Bridge
East Span Replacement

DIRECT SHEAR TEST
(ASTM D-3080)

Project No. : 98 - 145 | Date : 01/19/99 | Figure No. :



Ultimate : ○ | Shear Type : Saturated | Undisturbed | Peak : ●



Boring No. : 99 - 312		Strength Intercept (C) :	0.07	(ksf)	Peak	0.04	(ksf)	Ultimate
Sample No. : D - 4			3.26	(kPa)		2.01	(kPa)	
Depth (ft/m) : 7.5	2.29	Friction Angle (ϕ) :	39.21	Degree		32.94	Degree	
Description : Very Dark Grayish Brown, Silty Sand (SM) lensed Clay (CL)					Shear Rate (inch/minute) :	0.02		

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	20.05	108.64	17.10	0.55	0.50	23.94	0.47	22.41	0.36	17.24
◆	20.30	105.68	16.63	0.60	0.75	35.91	0.70	33.32	0.54	25.86
▲	20.86	107.58	16.93	0.57	1.00	47.88	0.88	41.94	0.68	32.75

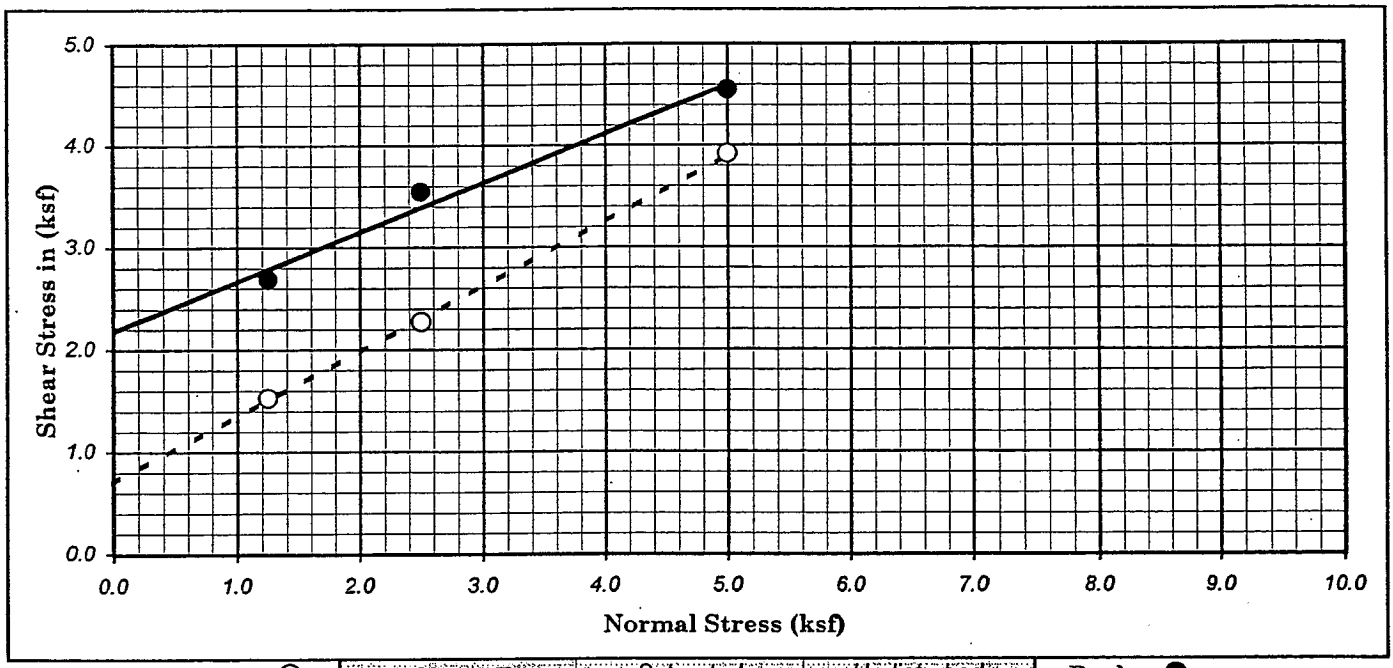
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

SFOBB - YBI Exploration, Task 5

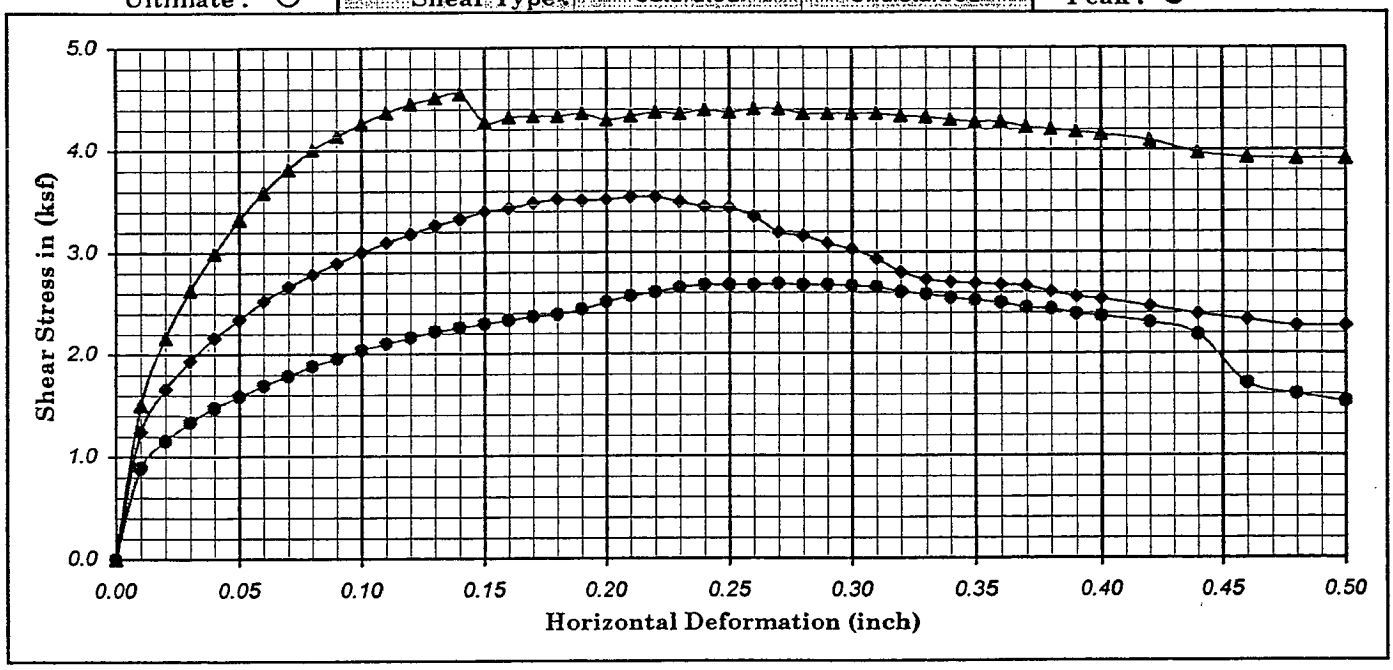
DIRECT SHEAR TEST

(ASTM D-3080)

Project No. : 98 - 145 | Date : 01/27/00 | Figure No. :



Ultimate : ○ | Shear Type : Saturated Undisturbed | Peak : ●



Boring No. : 99 - 312		Strength Intercept (C) :	2.18	(ksf)	Peak	0.70	(ksf)	Ultimate
Sample No. : D - 8			104.57	(kPa)		33.59	(kPa)	
Depth (ft/m) : 26.0	7.93	Friction Angle (ϕ) :	25.77	Degree		32.62	Degree	
Description : Light Olive Brown, weathered, partial cemented Clayey Sand (SC)					Shear Rate (inch/minute) :		0.01	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m³)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	20.37	114.66	18.05	0.47	1.25	59.85	2.69	128.70	1.52	72.97
◆	20.09	114.86	18.08	0.47	2.50	119.70	3.54	169.50	2.27	108.59
▲	17.93	115.40	18.16	0.46	5.00	239.40	4.55	217.76	3.91	187.35

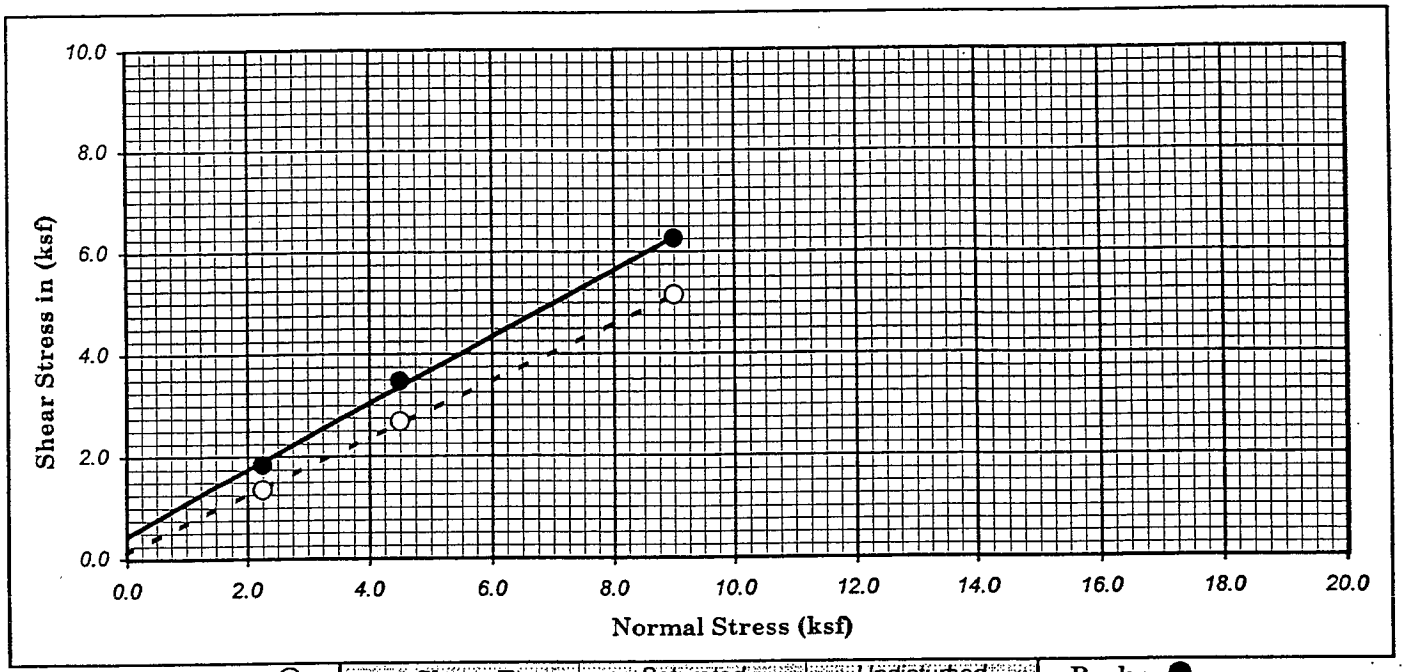
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

SFOBB - YBI Exploration, Task 5

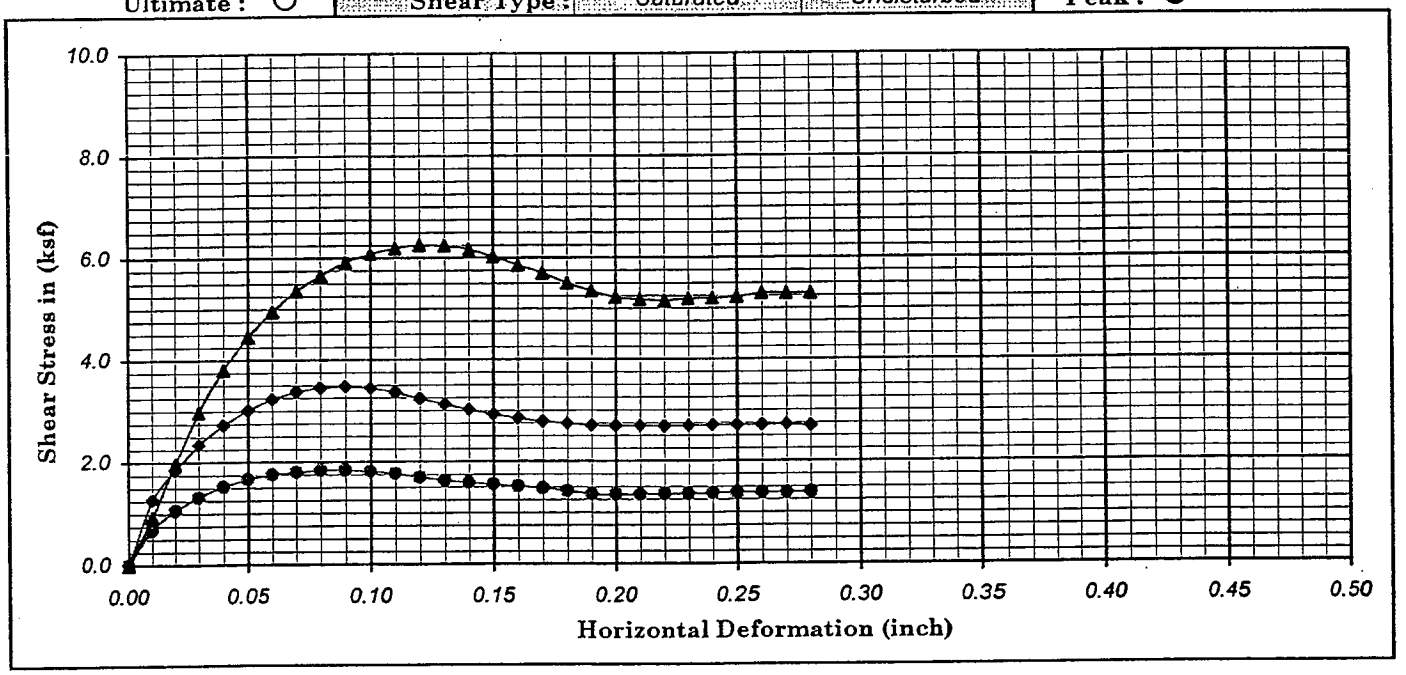
DIRECT SHEAR TEST

(ASTM D-3080)

Project No. : 98 - 145 | Date : 01/27/00 | Figure No. :



Ultimate : ○ | Shear Type : Saturated | Undisturbed | Peak : ●



Boring No. : 99 - 312		Strength Intercept (C) :	0.44	(ksf)	Peak	0.11	(ksf)	Ultimate
Sample No. : D - 12			21.28	(kPa)		5.17	(kPa)	
Depth (ft/m) : 45.0	13.73	Friction Angle (ϕ) :	32.98	Degree		29.32	Degree	
Description : Olive Brown, Poorly-Graded Sand with Silt (SP-SM)					Shear Rate (inch/minute) :			0.01

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	24.04	102.24	16.09	0.65	2.25	107.73	1.84	87.91	1.34	64.35
◆	24.59	101.69	16.01	0.66	4.50	215.46	3.47	166.05	2.68	128.13
▲	24.53	100.71	15.85	0.67	9.00	430.92	6.25	299.30	5.15	246.49

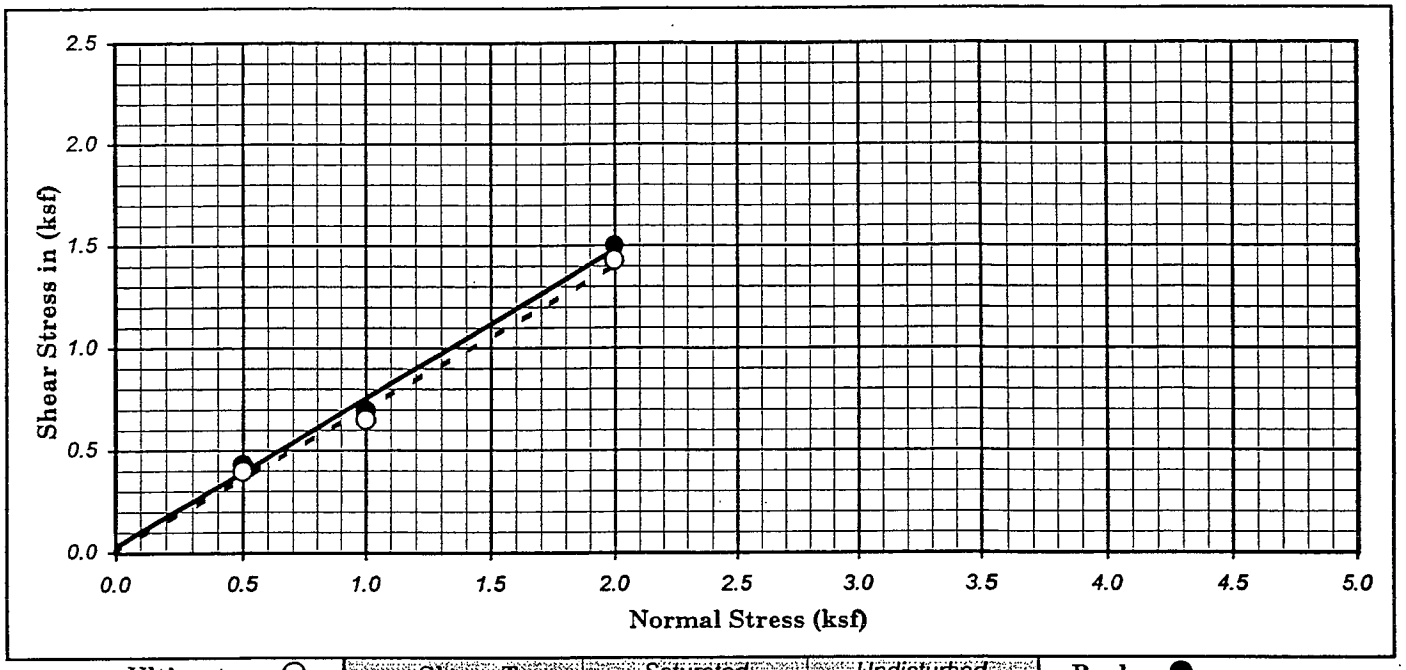
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

SFOBB - YBI Exploration, Task 5

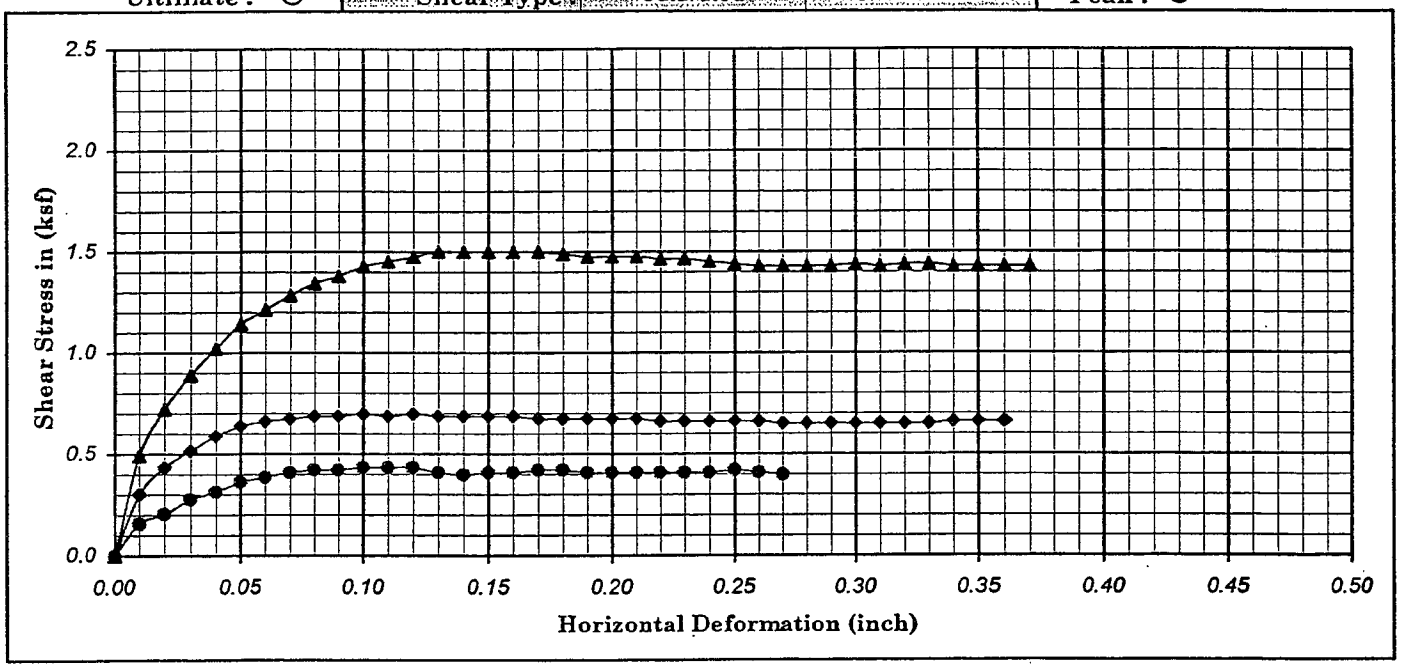
DIRECT SHEAR TEST

(ASTM D-3080)

Project No. : 98 - 145 | Date : 01/27/00 | Figure No. :



Ultimate : ○ | Shear Type : Saturated Undisturbed | Peak : ●



Boring No. : 99 - 402		Strength Intercept (C) :	0.03	(ksf)	Peak	0.01	(ksf)	Ultimate
Sample No. : D - 3			1.44	(kPa)		0.29	(kPa)	
Depth (ft/m) : 5.0	1.53	Friction Angle (ϕ) :	35.95	Degree		35.04	Degree	
Description : Light Yellowish Brown, Silty Sand (SM)						Shear Rate (inch/minute) :		0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	20.69	105.70	16.64	0.59	0.50	23.94	0.43	20.68	0.40	18.96
◆	22.26	104.16	16.39	0.62	1.00	47.88	0.70	33.32	0.65	31.03
▲	19.29	107.99	17.00	0.56	2.00	95.76	1.50	71.82	1.43	68.37

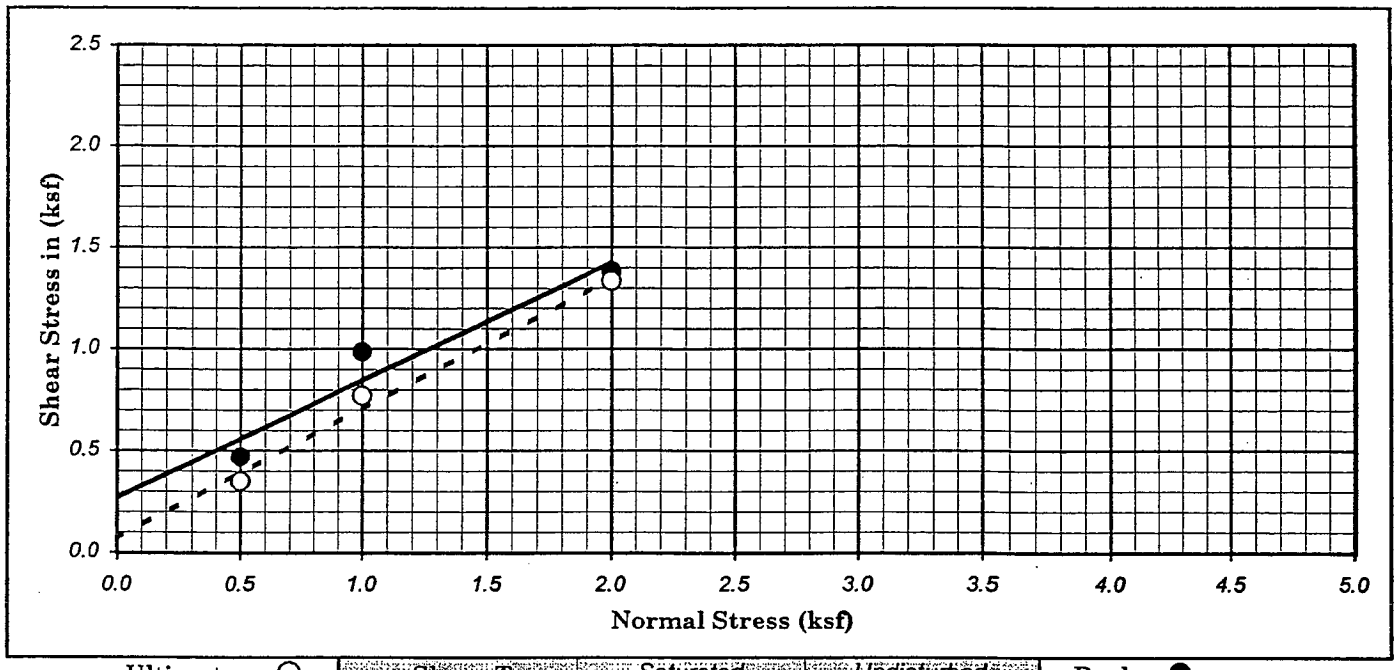
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

SFOBB - YBI Exploration, Task 5

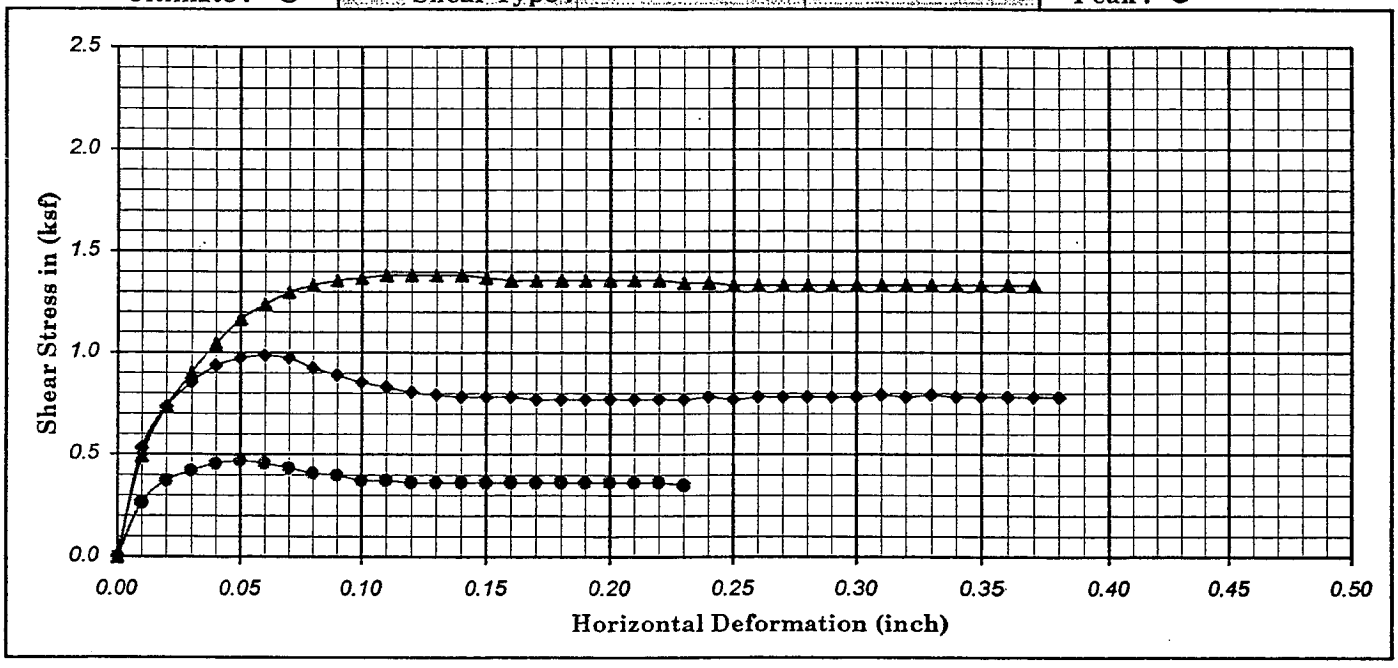
DIRECT SHEAR TEST

(ASTM D-3080)

Project No. : 98 - 145 | Date : 02/01/00 | Figure No. :



Ultimate : ○ | Shear Type : Saturated | Undisturbed | Peak : ●



Boring No. : 99 - 402		Strength Intercept (C) :	0.27	(ksf)	Peak	0.07	(ksf)	Ultimate
Sample No. : D - 5			12.93	(kPa)		3.16	(kPa)	
Depth (ft/m) : 10.0	3.05	Friction Angle (ϕ) :	30.02	Degree		32.74	Degree	
Description : Light Olive Brown, Silty Sand (SM)					Shear Rate (inch/minute) :		0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	21.47	106.16	16.71	0.59	0.50	23.94	0.47	22.41	0.35	16.66
◆	22.81	103.63	16.31	0.63	1.00	47.88	0.98	47.11	0.77	36.77
▲	19.87	107.69	16.95	0.57	2.00	95.76	1.38	66.07	1.33	63.78

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

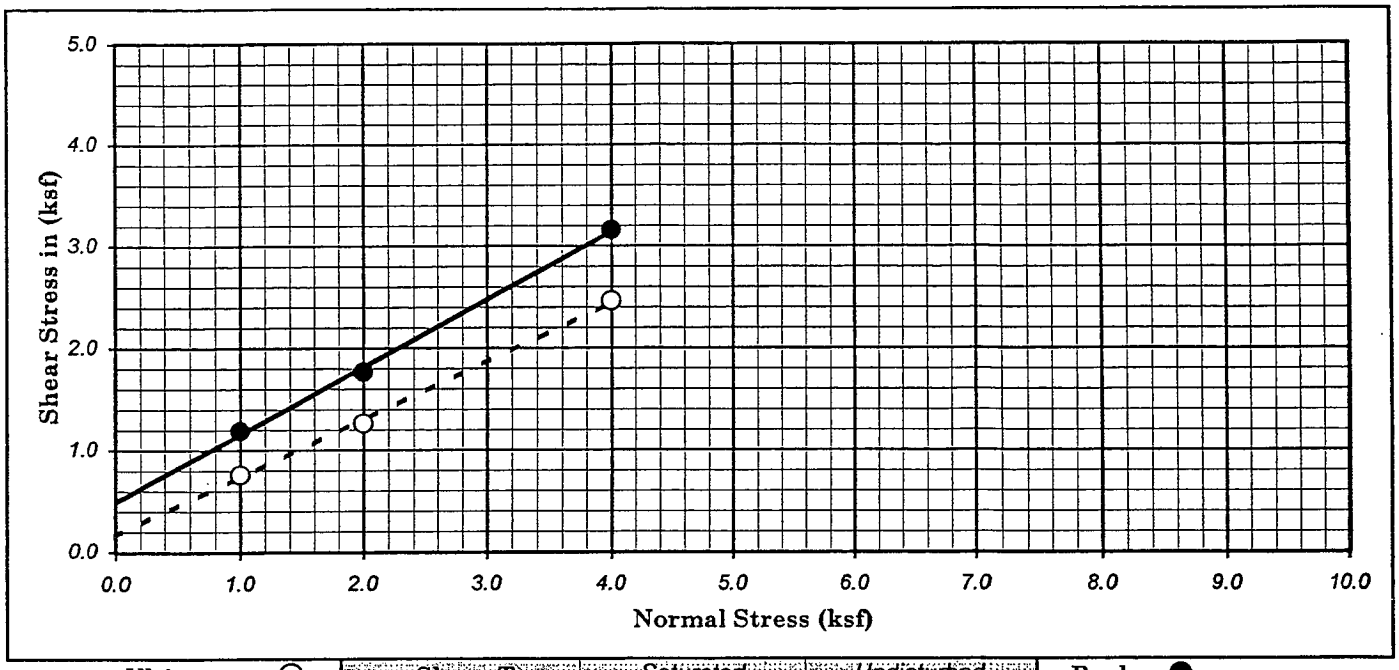
SFOBB - YBI Exploration, Task 5

Project No. : 98 - 145 | Date : 02/03/00

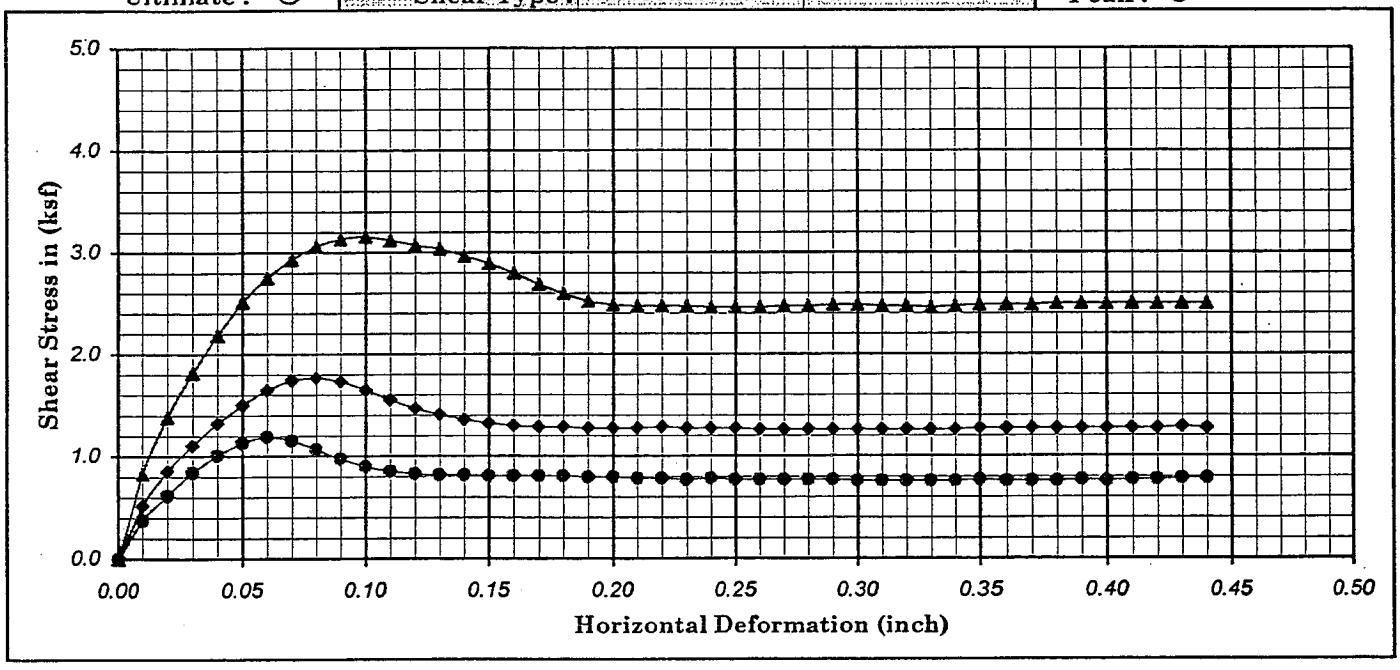
DIRECT SHEAR TEST

(ASTM D-3080)

Figure No. :



Ultimate : ○ | Shear Type : Saturated | Undisturbed | Peak : ●



Boring No. : 99 - 402		Strength Intercept (C) :	0.49	(ksf)	Peak	0.16	(ksf)	Ultimate
Sample No. : D - 7			23.56	(kPa)		7.47	(kPa)	
Depth (ft/m) : 20.0	6.10	Friction Angle (ϕ) :	33.49	Degree		29.79	Degree	
Description : Olive Brown, Silty Sand (SM)					Shear Rate (inch/minute) :		0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	21.29	104.80	16.50	0.61	1.00	47.88	1.19	56.88	0.76	36.20
◆	19.78	108.28	17.04	0.56	2.00	95.76	1.76	84.46	1.26	60.33
▲	21.25	105.09	16.54	0.60	4.00	191.52	3.16	151.11	2.46	117.78

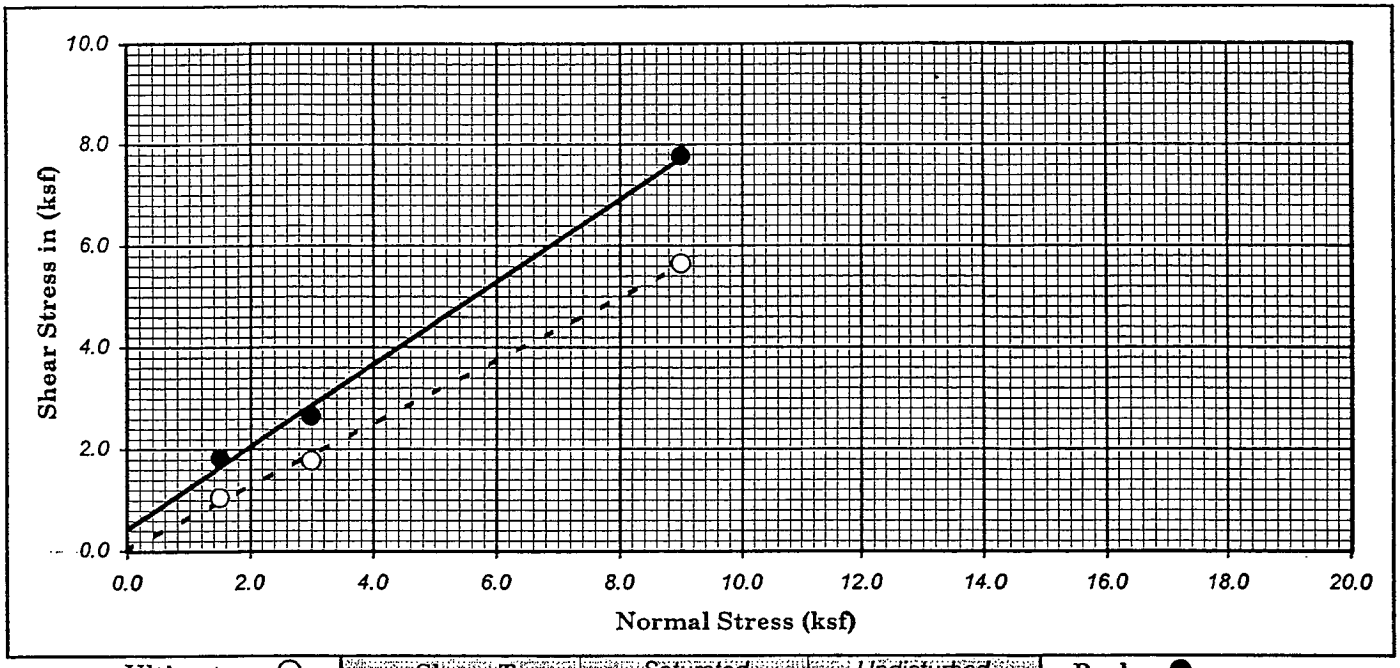
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

SFOBB - YBI Exploration, Task 5

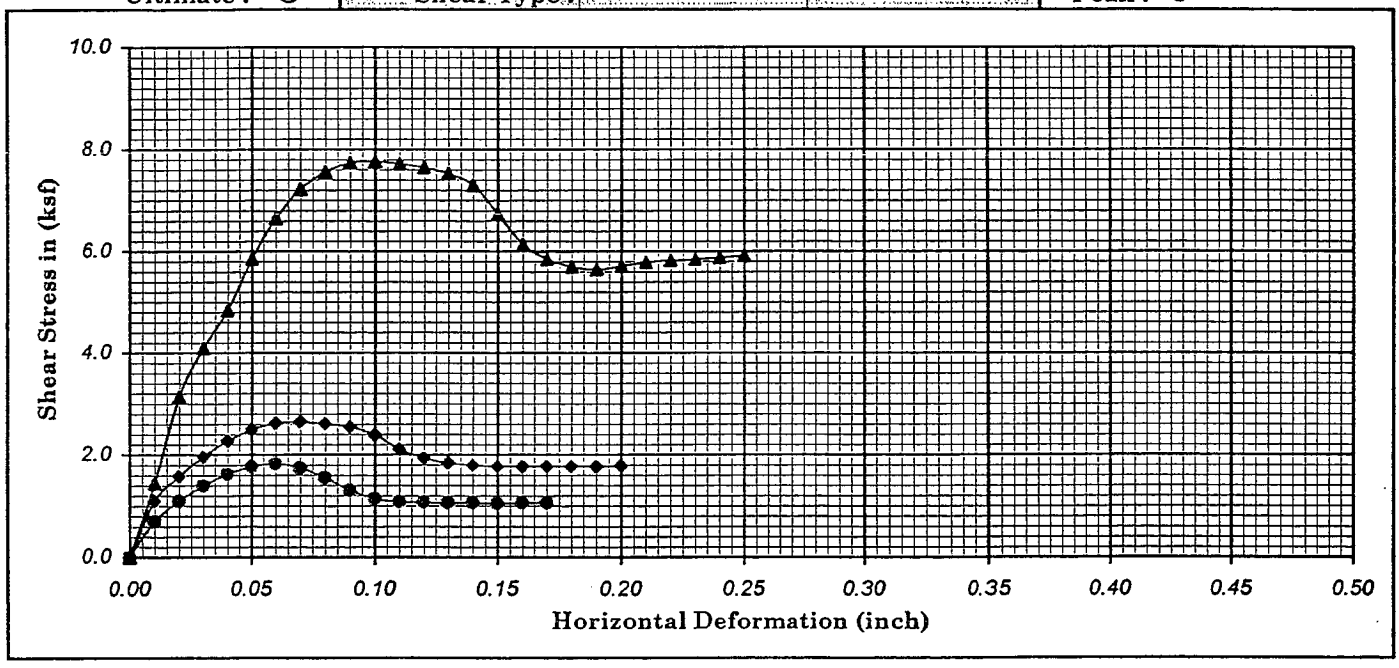
DIRECT SHEAR TEST

(ASTM D-3080)

Project No. : 98 - 145 | Date : 02/01/00 | Figure No. :



Ultimate : ○ | Shear Type : Saturated | Undisturbed | Peak : ●



Boring No. : 99 - 402		Strength Intercept (C) :	0.43	(ksf)	Peak	0.02	(ksf)	Ultimate
Sample No. : D - 9			20.71	(kPa)		0.77	(kPa)	
Depth (ft/m) : 30.0	9.15	Friction Angle (ϕ) :	38.99	Degree		31.89	Degree	
Description : Light Olive Gray, Clayey Sand (SC)					Shear Rate (inch/minute) :		0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	16.17	116.19	18.29	0.45	1.50	71.82	1.82	87.33	1.04	49.99
◆	15.66	119.48	18.81	0.41	3.00	143.64	2.64	126.40	1.76	84.46
▲	14.11	122.41	19.27	0.38	9.00	430.92	7.76	371.69	5.64	270.00

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

SFOBB - YBI Exploration, Task 5

DIRECT SHEAR TEST

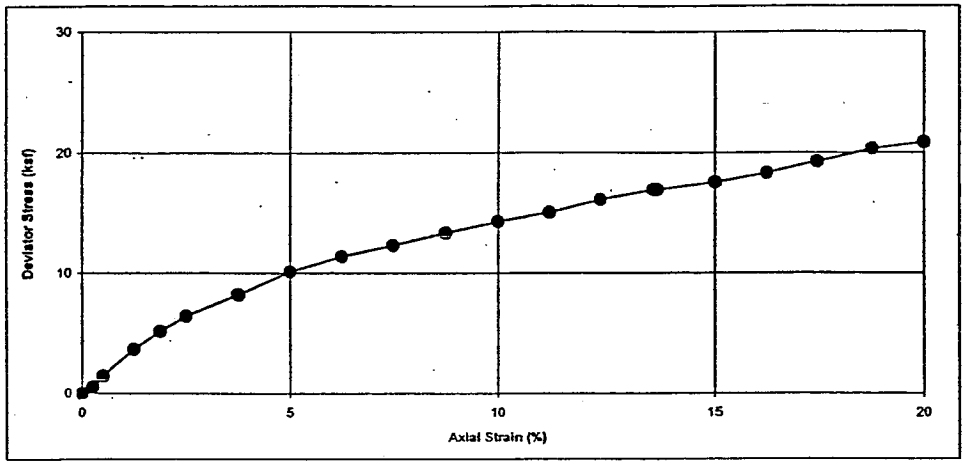
(ASTM D-3080)

Project No. : 98 - 145 | Date : 02/01/00

Figure No. :

Project Name:	SFOBB - YBI Exploration, Task 5	Sample Type:	Undisturbed
Project No.:	98-145-2	Soil Description	Light Olive Brown Lean Clay
Boring No.:	99-312	Dry Density (pcf):	125.5
Sample No.:	D-18	Moisture Content (%)	14.0
Depth (feet):	75	Test Date:	2/7/00

Sample Diameter (inch):	2.415	Wt. Wet Soil+Container(gms)	301.49
Sample Hieght (inch):	4	Wt. Dry Soil+Container(gms)	270.92
Sample Weight (gms):	688.02	Wt. Container (gms)	52.12



Confining Pressure : 10.7 ksf

Load (lbs)	Deformation (inch)	Area (sq.in)	Deviator Stress (ksf)	Axial Strain (%)
0	0.00	4.58	0.00	0.00
18	0.01	4.59	0.56	0.25
46	0.02	4.60	1.44	0.50
118	0.05	4.64	3.66	1.25
168	0.075	4.67	5.18	1.88
210	0.10	4.70	6.44	2.50
272	0.15	4.76	8.23	3.75
339	0.20	4.82	10.12	5.00
386	0.25	4.89	11.38	6.25
424	0.30	4.95	12.33	7.50
466	0.35	5.02	13.37	8.75
506	0.40	5.09	14.32	10.00
540	0.45	5.16	15.07	11.25
586	0.50	5.24	16.12	12.50
625	0.55	5.31	16.95	13.75
658	0.60	5.39	17.58	15.00
696	0.65	5.47	18.32	16.25
743	0.70	5.55	19.27	17.50
796	0.75	5.64	20.33	18.75
830	0.80	5.73	20.87	20.00

YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

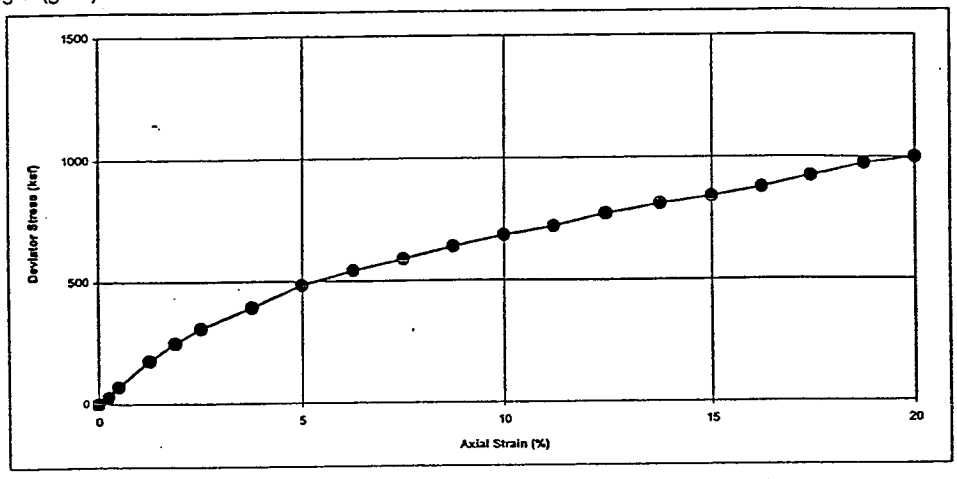
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST
(ASTM D-2850)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00

Project Name:	SFOBB - YBI Exploration, Task 5	Sample Type:	Undisturbed
Project No.:	98-145-2	Soil Description	Light Olive Brown Lean Clay
Boring No.:	99-312	Dry Density (kN/m³):	19.7
Sample No.:	D-18	Moisture Content (%)	14.0
Depth (meters):	22.9	Test Date:	2/7/00

Sample Diameter (inch):	2.415	Wt. Wet Soil+Container(gms)	301.49
Sample Hieght (inch):	4	Wt. Dry Soil+Container(gms)	270.92
Sample Weight (gms):	688.0	Wt. Container (gms)	52.12



Confining Pressure : 513.9 kPa

Load (lbs)	Deformation (inch)	Area (sq.in)	Deviator Stress (kPa)	Axial Strain (%)
0	0.00	4.58	0.00	0.00
18	0.01	4.59	27.03	0.25
46	0.02	4.60	68.89	0.50
118	0.05	4.64	175.39	1.25
168	0.075	4.67	248.13	1.88
210	0.10	4.70	308.19	2.50
272	0.15	4.76	394.06	3.75
339	0.20	4.82	484.75	5.00
386	0.25	4.89	544.69	6.25
424	0.30	4.95	590.34	7.50
466	0.35	5.02	640.04	8.75
506	0.40	5.09	685.46	10.00
540	0.45	5.16	721.36	11.25
586	0.50	5.24	771.79	12.50
625	0.55	5.31	811.39	13.75
658	0.60	5.39	841.85	15.00
696	0.65	5.47	877.38	16.25
743	0.70	5.55	922.64	17.50
796	0.75	5.64	973.48	18.75
830	0.80	5.73	999.45	20.00

YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

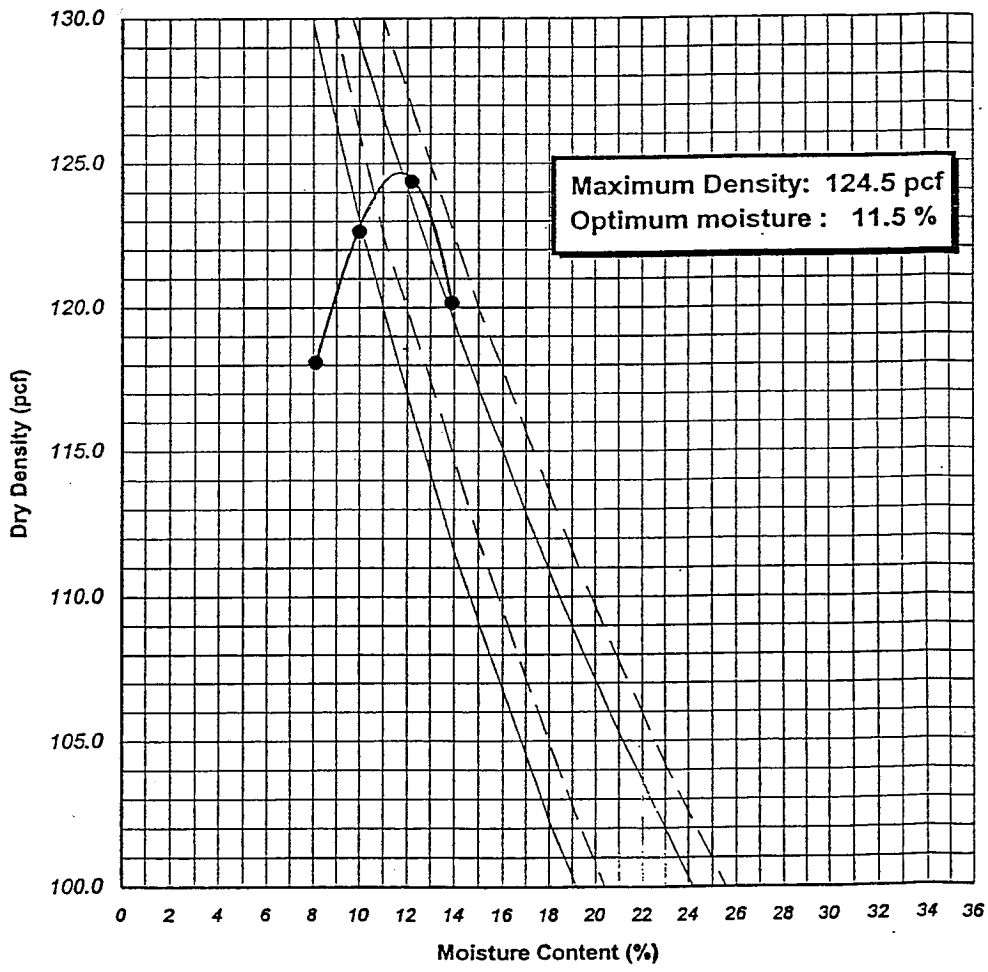
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST
(ASTM D-2850)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00

Boring/Sample No. B 99-312 / B-1 @ 0-2.0'
Description: D. Brown, F.M. Silty Sand w. Gravel

Method: Cal. Impact 216	Blows:	20	Layers:	5	Hammers: 10 lbs	
Specimen		A	B	C	D	E
Initial Wet Weight	(grams)	2400	2400	2400	2400	
Water added	(c.c.)	0	50	100	-50	
Height of Specimen	(in.)	10.55	10.20	10.40	11.15	
Wet Density	(pcf)	134.9	139.5	136.9	127.7	
Water Content	(%)	10.0	12.2	13.9	8.1	
Dry Density	(pcf)	122.6	124.4	120.2	118.1	



YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

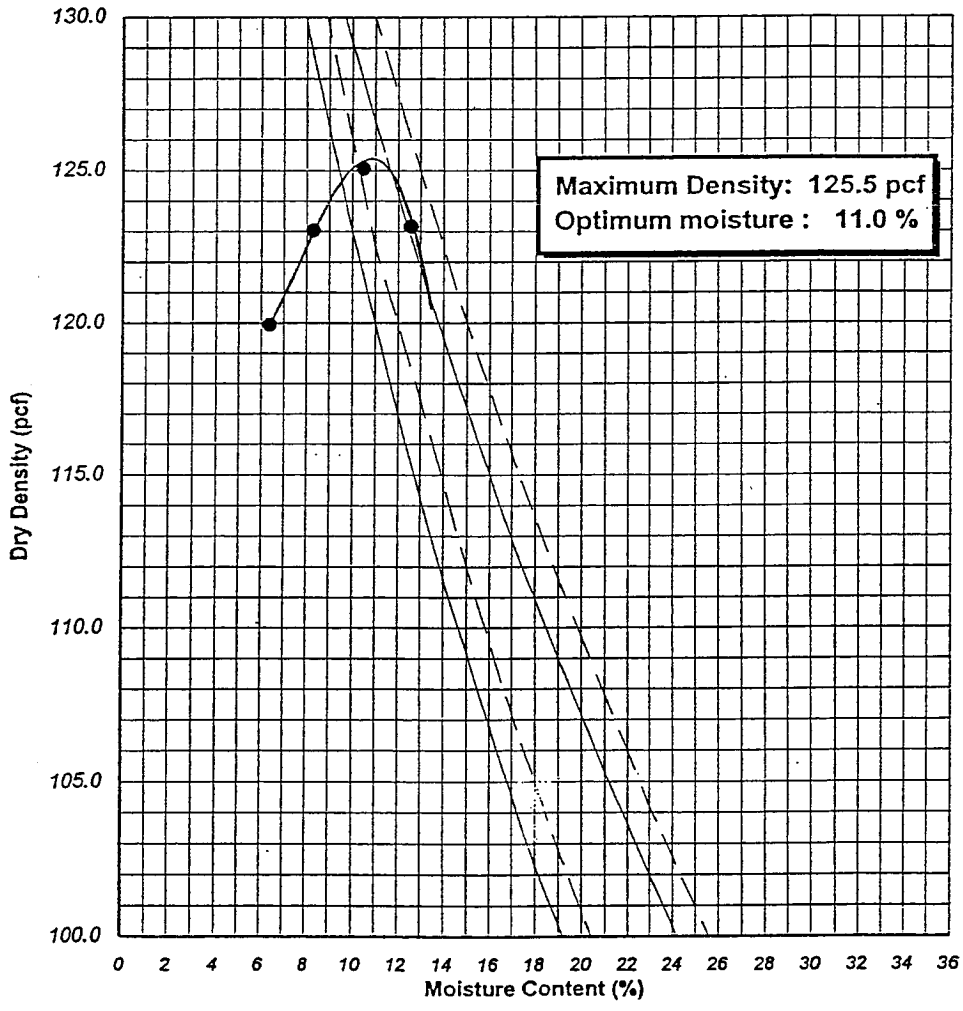
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

RELATIVE COMPACTION TEST
(CALTRANS TEST METHOD 216)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00

Boring/Sample No. B99-312/B-2@2'-3'
Description: D.Brown, F.M. Silty Sand

Method: Cal. Impact 216	Blows:	20	Layers:	5	Hammers: 10 lbs	
Specimen		A	B	C	D	E
Initial Wet Weight	(grams)	2550	2550	2400	2350	
Water added	(c.c.)	0	50	100	150	
Height of Specimen	(in.)	11.85	11.35	10.30	10.05	
Wet Density	(pcf)	127.6	133.2	138.2	138.7	
Water Content	(%)	6.4	8.3	10.5	12.6	
Dry Density	(pcf)	119.9	123.0	125.1	123.2	



YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

RELATIVE COMPACTION TEST
(CALTRANS TEST METHOD 216)

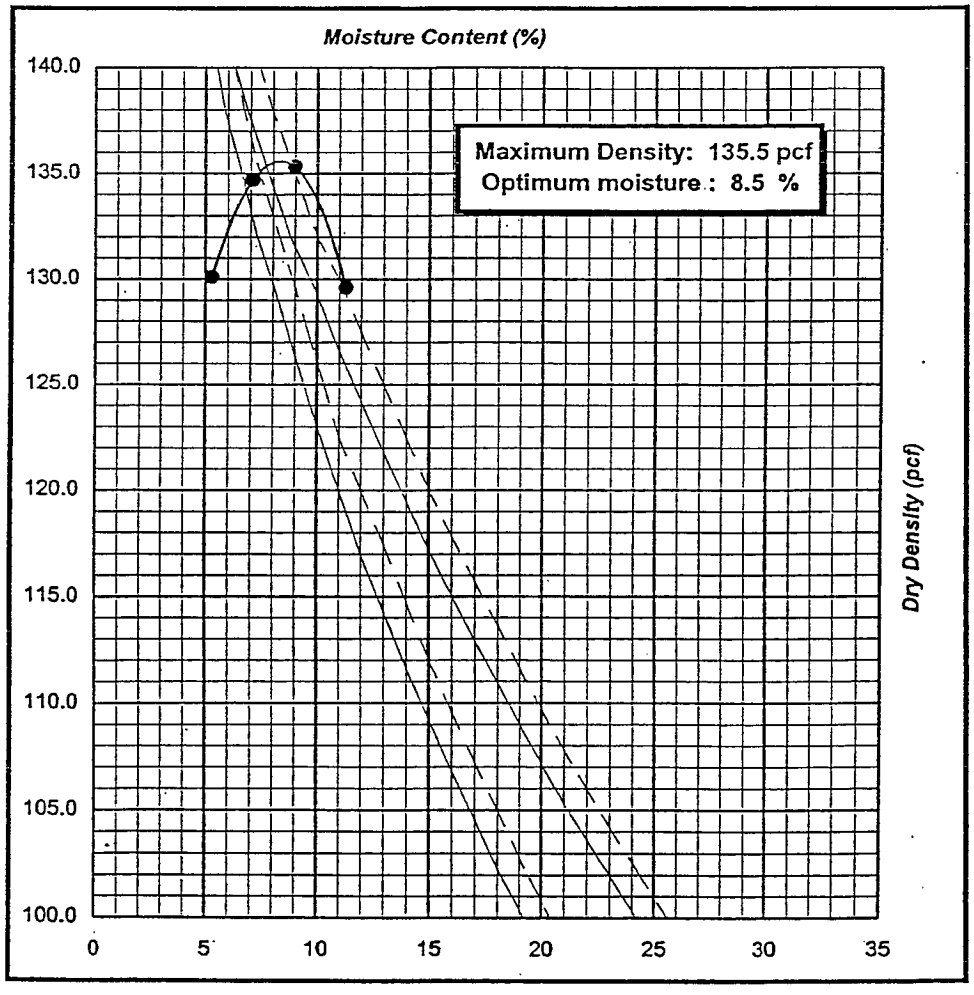
PROJECT NO. 98-145 | REPORT DATE: 2/17/00

Boring/Sample No. B 99-402, B1 @ 0-3'
Description: D. Brown, Sandy Silt w. Gravel

Method: Cal. Impact 216	Blows:	20	Layers:	5	Hammers: 10 lbs	
Specimen		A	B	C	D	E
Initial Wet Weight	(grams)	2550	2550	2550	2550	
Water added	(c.c.)	0	50	100	150	
Height of Specimen	(in.)	11.20	10.60	10.35	10.60	
Wet Density	(pcf)	135.0	142.7	146.1	142.7	
Corrected Wet Density	(pcf)	137.0	144.2	147.5	144.2	
Water Content	(%)	5.3	7.1	9.0	11.3	
Dry Density	(pcf)	130.1	134.7	135.3	129.6	

Rock Correction	
% of +3/4"	7.53
% of -3/4"	92.47
Density of +3/4" (pcf)	165.96
Agg. Adj. (Y) of +3/4"	1.00

$$\text{Corrected Wet Density} = \frac{100}{\dfrac{\%\ of +3/4"}{(Density\ of +3/4")Y} + \dfrac{\%\ of -3/4"}{Density\ of -3/4"}}$$



YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

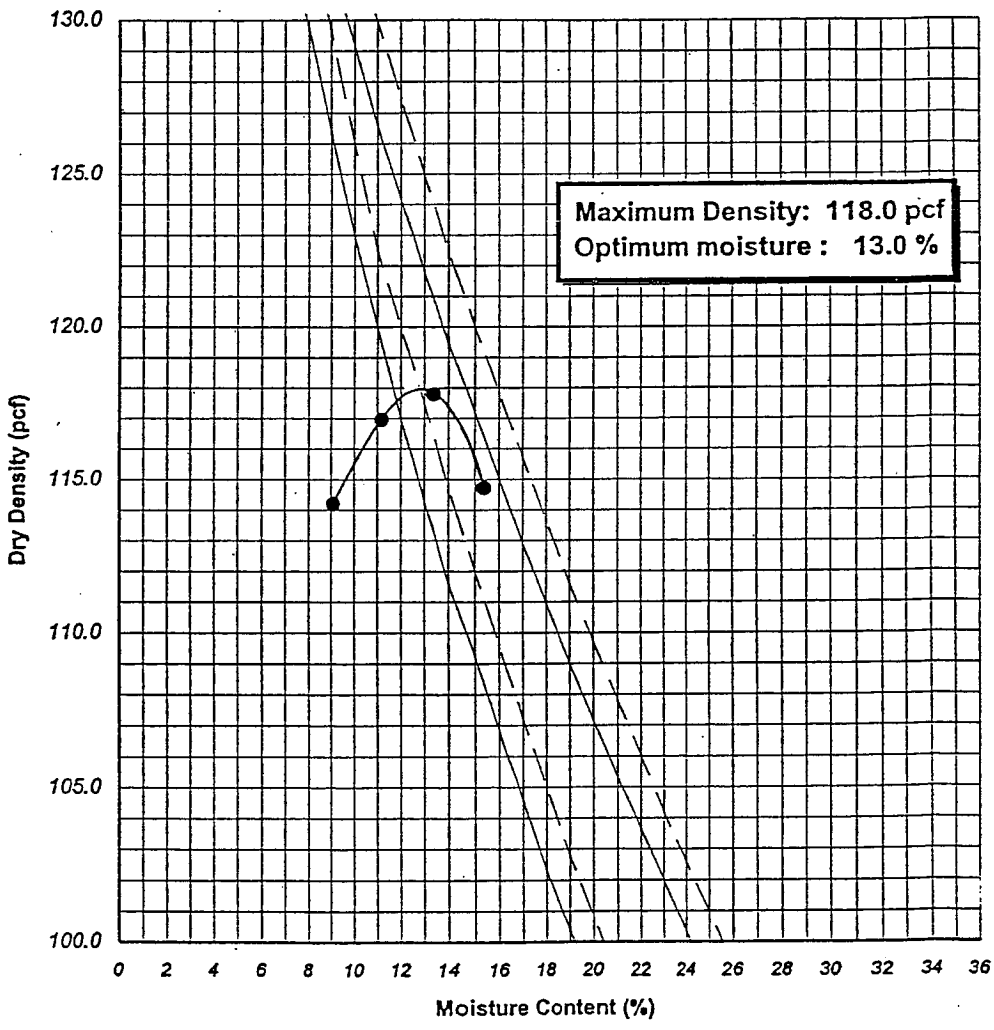
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

RELATIVE COMPACTION TEST
(CALTRANS TEST METHOD 216)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00

Boring/Sample No. B-99-404-2 / B-0 @ 0-2'
Description: Brown, F.M. Silty Sand w. some Gravel

Method: Cal. Impact 216	Blows:	20	Layers:	5	Hammers: 10 lbs	
Specimen		A	B	C	D	E
Initial Wet Weight	(grams)	2500	2500	2500	2500	
Water added	(c.c.)	50	100	150	200	
Height of Specimen	(in.)	11.90	11.40	11.10	11.20	
Wet Density	(pcf)	124.6	130.1	133.6	132.4	
Water Content	(%)	9.1	11.2	13.4	15.4	
Dry Density	(pcf)	114.2	117.0	117.8	114.7	



YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

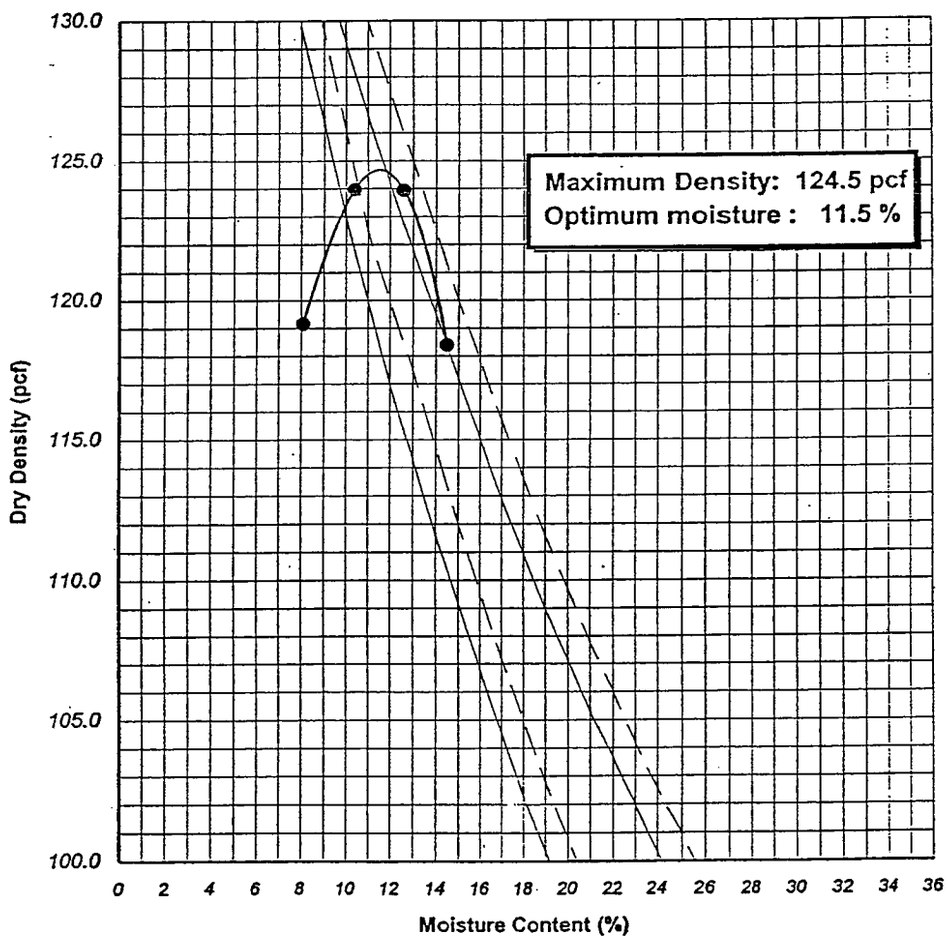
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

RELATIVE COMPACTION TEST
(CALTRANS TEST METHOD 216)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00

Boring/Sample No. B 99-405 / B-1 @ 0-2.0'
Description: D. Brown, F.M. Silty Sand w. Gravel

Method: Cal. Impact 216	Blows:	20	Layers:	5	Hammers: 10 lbs	
Specimen		A	B	C	D	E
Initial Wet Weight	(grams)	2400	2400	2400	2400	
Water added	(c.c.)	0	50	100	-50	
Height of Specimen	(in.)	10.40	10.20	10.50	11.05	
Wet Density	(pcf)	136.9	139.5	135.6	128.8	
Water Content	(%)	10.4	12.6	14.5	8.1	
Dry Density	(pcf)	124.0	123.9	118.4	119.2	



YERBA BUENA ISLAND EXPLORATION
SFOBB EAST SPAN SEISMIC SAFETY

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

RELATIVE COMPACTION TEST
(CALTRANS TEST METHOD 216)

PROJECT NO. 98-145 | REPORT DATE: 2/17/00

LOG OF BORING B404

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Sheet 1 of 1

Project Name	: SFOBB EAST SPAN REPLACEMENT, PHASE 2 INVESTIGATION		
Project Location	: YERBA BUENA ISLAND		
E.M.I. Project No.	: 98-145	Site Condition :	
Weather	: SUNNY	Elevation :	
Drilling Company	: EMI	Operator :	NA
Type of Rig	: NA - MANUAL	Drop (in) :	NA
Borehole Diameter	: NA	Drive Wt. (lbs) :	NA
Logged By	: MK	Date Drilled :	NOV. 23, 1999
Start Time	:	Water Table :	
Stop Time	:		

Comments :

Depth (ft)	Boring Type	Sample Number	Sample Type	Blows/6"	Recovery (inch)	SOIL/ROCK DESCRIPTION
0-2'			B			Bulk Sample @ 0'-2'
						fi-co Sand and Gravel, moist, med. dense,
						gray/brn

LOG OF BORING B405

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Sheet 1 of 1

Project Name	: SFOBB EAST SPAN REPLACEMENT, PHASE 2 INVESTIGATION		
Project Location	: YERBA BUENA ISLAND		
E.M.I. Project No.	: 98-145	Site Condition :	
Weather	: SUNNY	Elevation :	
Drilling Company	: EME	Operator :	NA
Type of Rig	: NA - MANUAL	Drop (in) :	NA
Borehole Diameter	: NA	Drive Wt. (lbs) :	NA
Logged By	: MC	Date Drilled :	NOV. 23, 1999
Start Time	:	Water Table :	
Stop Time	:		

Comments :

Depth (ft)	Boring Type	Sample Number	Sample Type	Blows/6"	Recovery (inch)	SOIL/ROCK DESCRIPTION
0'-2'			B			Bulk Sample @ 0'-2'
						Silty Sand w/ some organic mat'l (wood chips, roots)
						moist, loose to med. dense, dark brn

APPENDIX C: DYNAFLECT ANALYSES

DEFLECTION TESTING AND ANALYSIS
STRUCTURAL PAVEMENT DESIGN
FOR
YERBA BUENA ISLAND

FOR
EARTH MECHANICS

PREPARED BY
CHEC CONSULTANTS, INC
APRIL 2000
JOB NO. 99348

chec
ENGINEERING
CONSULTANTS

Civil Consulting
Pavement Management
Asphalt Technology

April 5, 2000

Job No: 99348

Earth Mechanics
17660 Newhope Street
Suite E
Fountain Valley, CA 92708

Attn: Mr. Mike Kapuskar
Project Engineer

Subject: Deflection Testing/Analysis and Structural Pavement Design
Northgate and Macalla Roads

Dear Mr. Kapuskar:

We have complete our analysis for the subject roadways on Yerba Buena Island as outlined in our revised proposal dated December 6, 1999.

This report contains a description of the defects found in each segment, structural overlay requirement based on California Test Method 356 and our recommendations.

Table 1, of this report, provides a summary of our recommendations for the subject roads, and Figure 1 provides the core thickness and locations taken during our field investigation.

If you have any questions regarding this report, please contact us at 800-523-2223.

Very truly yours
CHEC CONSULTANTS, INC.

Michael J. Mogen
Staff Engineer
CA E.I.T. #105798

Reviewed by:

Alan Curtis, P.E.
President
CA C.E. #23326

REGISTERED PROFESSIONAL ENGINEER
Charles Alan Curtis
No. 23,326
Exp. 12/01
CIVIL
STATE OF CALIFORNIA

MJM:AC/dh

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Macalla Road and Northgate Intersection (00 - 601 B) 8
Macalla Road (00 - 602 A and B) 10

FIGURE 1

chec

TABLE 1

PAVEMENT DEFLECTION ANALYSIS SUMMARY
TEN YEAR TI RECOMMENDATIONS
YERBA BUENA ISLAND
JOB NO: 99348

FROM	TO	STRUCTURAL REQUIREMENT	RECOMMENDED ACTION
NORTHGATE ROAD (00 - 601 A)			
Macalla Road	100 Feet South	S1: 0.55 ft	Delay Action
MACALLA / NORTHGATE INTERSECTION (00 - 601 B)			
West Side	East Side	E1: 0.15 ft	0.15 ft. Overlay with Fabric
MACALLA ROAD (00 - 602 A and B)			
Bay Bridge	Pavement Change	E1: 0.05 ft	0.15 ft. Overlay with Fabric
Pavement Change	215 ft E. of Bridge	E1: 0.15 ft	0.15 ft. Overlay with Fabric

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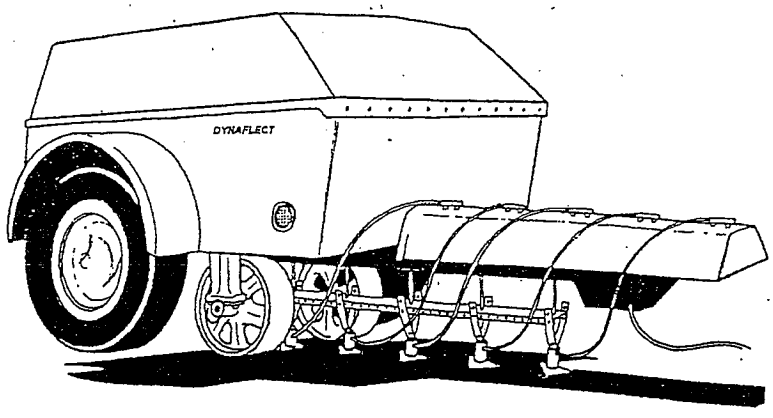
DEFLECTION TESTING AND ANALYSIS
YERBA BUENA ISLAND

TESTING AND ANALYSIS PROCEDURE

California Test Method 356

Testing was performed using the DYNAFLECT nondestructive pavement testing device. The device places a 1000-lb oscillatory load on the pavement surface. Motion sensing geophones (sensors) placed on the pavement surface "read" the pavement deflection resulting from the load. A strong pavement will deflect less than a weak pavement under the same loading. The figure on this page provides a schematic of this device. A single sensor was used for this analysis. The testing equipment and analysis procedure are based on California Test Method 356.



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A. The procedure is basically a fatigue analysis. The measured maximum deflection is the amplitude of pavement bending for each repetition of load. (The design number of load repetitions is indicated by the Traffic Index or T.I.). If the existing pavement is fairly thick, the tolerable deflection to prevent fatigue failure is lower than for a comparable thinner pavement. Thus, a thicker pavement requires a thicker overlay to reduce the deflection.

B. The second half of the analysis is based on the need to retard reflective cracking, or the propagation of old cracks in the underlying pavement through the new overlay. The overlay should be at least half the thickness of the existing pavement to retard reflective cracking. A fabric interlayer may be substituted for 0.10 ft. of AC for crack control purposes only. The structural needs of the pavement must first be satisfied before reflective crack retardation is considered.

When a structural overlay requirement exceeds 0.30 ft. it becomes more economical to reconstruct the structural section. The reason that reconstruction is more economical than an overlay or milling and overlaying is that a reconstruction design has a twenty-year design life and an overlay only has a ten-year design life. Based on a cost per year ratio, reconstruction is more economical.

DESIGNER'S GENERAL NOTES

The following general notes are provided to assist the design engineer in developing the plans and specifications for this project. Some of these guidelines are reflected in the recommendations found within this report.

1. Before placing an overlay, all severely cracked areas of asphalt pavement should be removed and replaced with full-depth AC. Depth of repairs will vary, but should never be less than the thickness of the existing pavement. All exposed base material shall be compacted to 95% of AASHTO T-180.

2. The minimum overlay thickness is typically 0.13 ft. in order to get proper placement and compaction.

3. All specified thicknesses in this report are design minimums and do not include a construction tolerance.

4. With asphalt overlays, wedge cutting is recommended at all conforms to provide a smooth taper and transition. The typical width at roadside gutters is 6 ft.

5. Prior to an overlay, an adequate application of tack coat is required for proper bond. The type and application rate are to be determined by the design engineer.

BACKGROUND

CHEC Consultants, Inc. was hired to determine the structural overlay requirements and provide rehabilitation recommendation for the two roads included in this study. Our recommendations will be used to aid in preparing the plans and specifications for the roads.

PROCEDURE

Deflection testing was performed in only one lane for all of the segments included in this study. The test points were taken at an interval that provided at least 15 points per segment. The actual interval used is stated on the deflection data sheets located after the text for each segment. The existing visible defects and type of pavement were noted, and color photographs were obtained during deflection testing.

FINDINGS AND RECOMMENDATIONS

The ten-year T.I. of 10.0 used for this analysis was provided by Earth Mechanics over the telephone. The structural overlay requirements, determined from the deflection analysis, our recommendations, core locations and thicknesses are shown on Figure 1, of this report. Table 1 summarizes the structural overlay requirements and our recommendations for both roads included in this study.

The following provides a description of each road segment tested, and includes the pavement defects, color photographs, structural overlay requirements and our recommendations.

NORTHGATE ROAD (00 - 601 A)

From: Macalla Road

To: 100 ft. south of Macalla Road

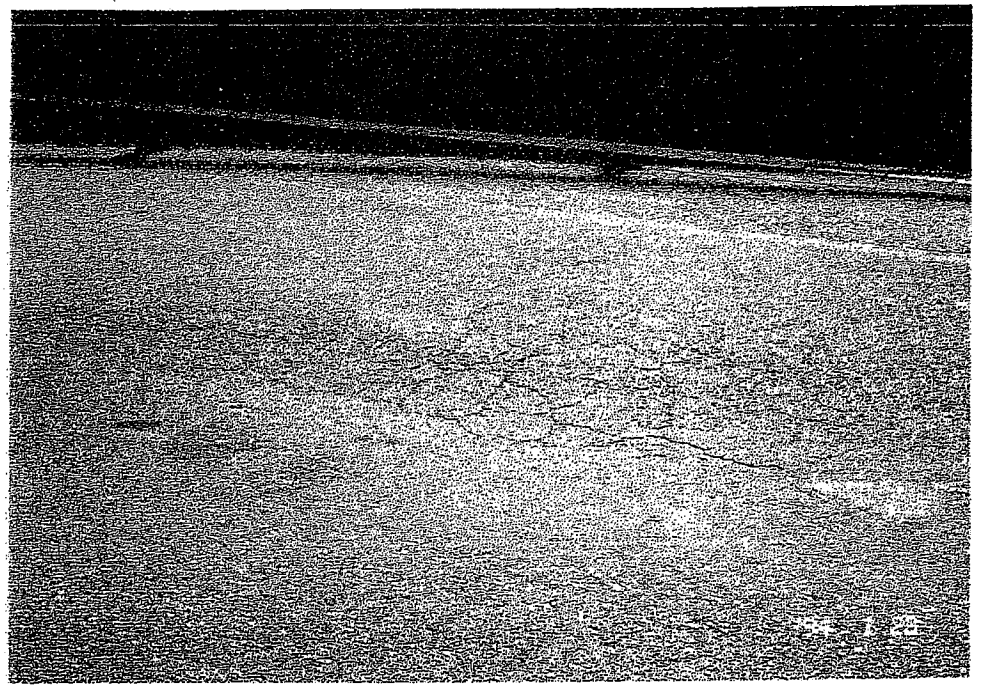
The eastbound lane of this segment was tested and cored. The existing pavement thickness was determined to be 5.75 inches, the aggregate base layer was not logged. The defects noted include slight to moderate longitudinal cracking (see the first photo on the following page) and isolated, moderate alligator cracking (see the second photo on the following page).

The structural overlay requirement for the lane tested was determined to be 0.55 ft. of asphalt concrete. Although there is no significant cracking in this segment of Northgate Road, the deflection data shows that the current structural section is not sufficient to carry the loading expected by a T.I. of 10.0.

Based on the structural overlay requirement, this segment of Northgate should be reconstructed. However, reconstruction could be delayed for several years until the defects warrant such an action. If work is delayed, this segment should be evaluated each year to address any safety hazards that develop such as potholes of severe alligator cracking.

If it is desirable to place an overlay on this segment of Northgate road in order to meet aesthetic requirements and not structural requirements, then the overlay should be at least 0.15 ft. thick. Paving fabric should also be placed on this segment of the roadway.

NORTHGATE ROAD



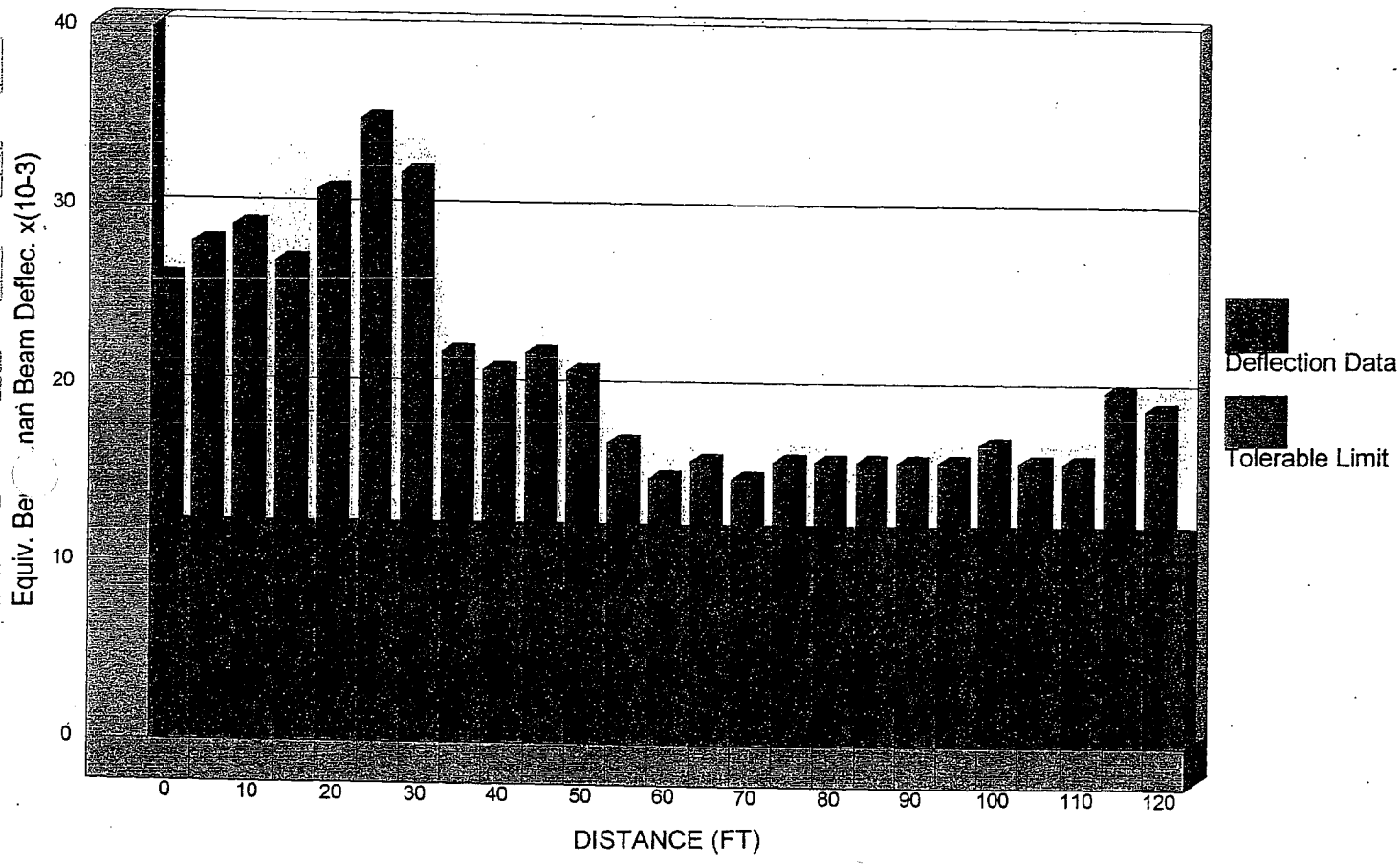
NOTE: The large block alligator cracking is consistent with our deflection analysis.

CHEC Engineering Software
DYNAFLECT ANALYSIS
Earth Mechanics
JOB NO: 99348

Date: 04-03-00

Road Name: Northgate Road | Direction: S1 | Start: 0 | Interval: 5 ft
Road Number: 00 - 601 A | From: 100 Feet South of Macalla Road | To: Macalla Road

DYNAFLECT ANALYSIS



STASTICAL ANALYSIS	80TH %	90TH %	MEAN	MIN	MAX	
AS TESTED	28	30	22	15	35	%REPLACED
80TH % Replaced						
90 TH % Replaced						

STRUCTURAL DATA — Thickness: 5.75 in T.I = 10.0

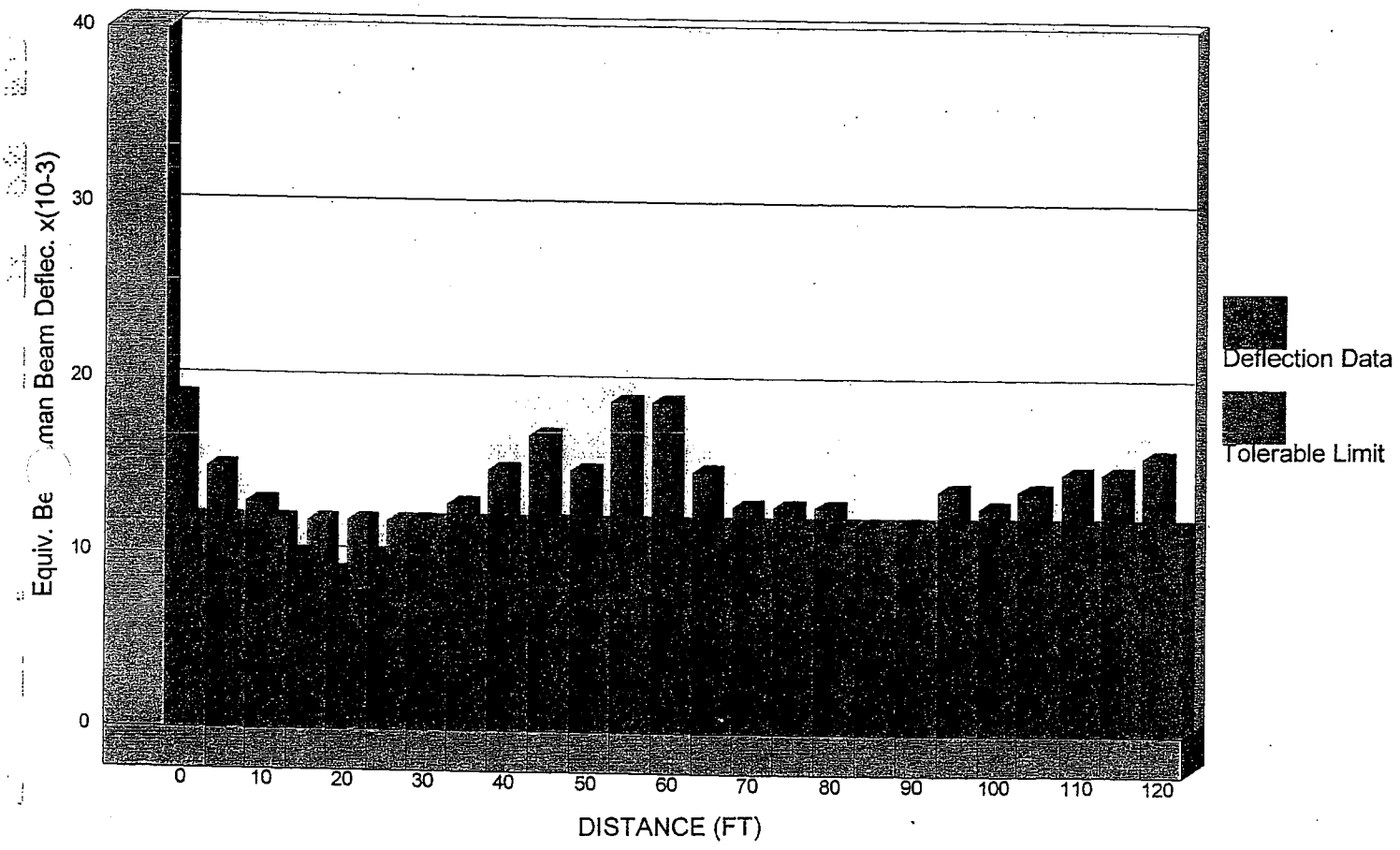
STRUCTURAL DESIGN	DEFLECTION	TOLERABLE	%ROADS	OVERLAY
AS TESTED	28	12	56	0.55 ft.
80TH % Replaced				
TH % Replaced				

CHEC Engineering Software
DYNAFLECT ANALYSIS
Earth Mechanics
JOB NO: 99348

Date: 04-03-00

Road Name: Macalla/Northgate Direction: E1 Start: 0 Interval: 5 ft
Road Number: 00 - 601 B From: West Side of Intersection To: East Side of Intersection

DYNAFLECT ANALYSIS



STASTICAL ANALYSIS	80TH %	90TH %	MEAN	MIN	MAX	
AS TESTED	17	18	15	9	19	%REPLACED
80TH % Replaced						
90 TH % Replaced						

STRUCTURAL DATA Thickness: 5.50 in T.I = 10.0

STRUCTURAL DESIGN	DEFLECTION	TOLERABLE	%ROADS	OVERLAY
AS TESTED	17	12	31	0.15 ft.
80TH % Replaced				
90TH % Replaced				

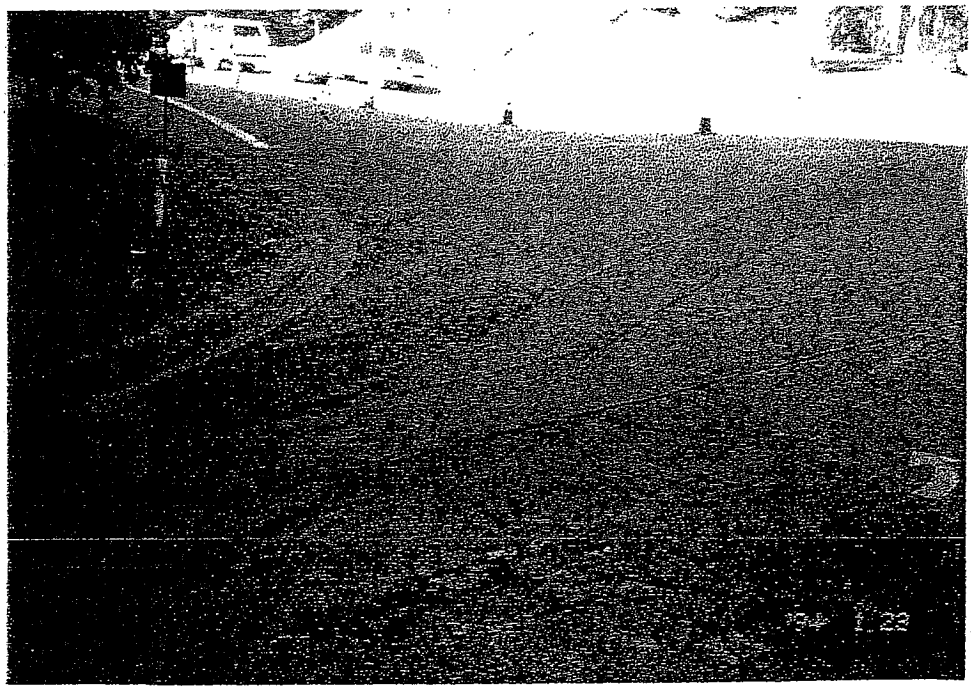
MACALLA ROAD AND NORTHGATE INTERSECTION (00 - 601 B)

From: West Side of Intersection

To: East Side of Intersection

The eastbound lane of this segment of roadway was tested and the only significant defect noted was severe alligator cracking as shown in the photo below. These areas should be dug out and replaced with full-depth AC.

The structural overlay requirement for this segment of roadway was determined to be 0.15 ft. of asphalt concrete. We recommend a 0.15 ft. overlay with paving fabric for this segment of the roadway. Paving fabric is necessary to help meet the reflective crack overlay requirement based on an existing AC thickness of 5.5 inches.



MACALLA ROAD

MACALLA ROAD (00 - 602 A and B)

From: Bay Bridge

To: 215 Feet East of the Bay Bridge

This section of Macalla Road was broken into two segments based on a visual change in the pavement surface. Our coring also identified a different structural section for both segments. The first segment limits were from the Bay Bridge to 136 ft. east. The second segment ran from the previous limit to 215 ft. east of the Bay Bridge. The defects in both segments were limited to slight shrinkage cracking as shown in the photo on the following page.

The core information revealed a 12 inch asphalt concrete layer for segment 1 and a 7 inch AC layer and at least 2 inches of cement treated base (CTB) for segment 2.

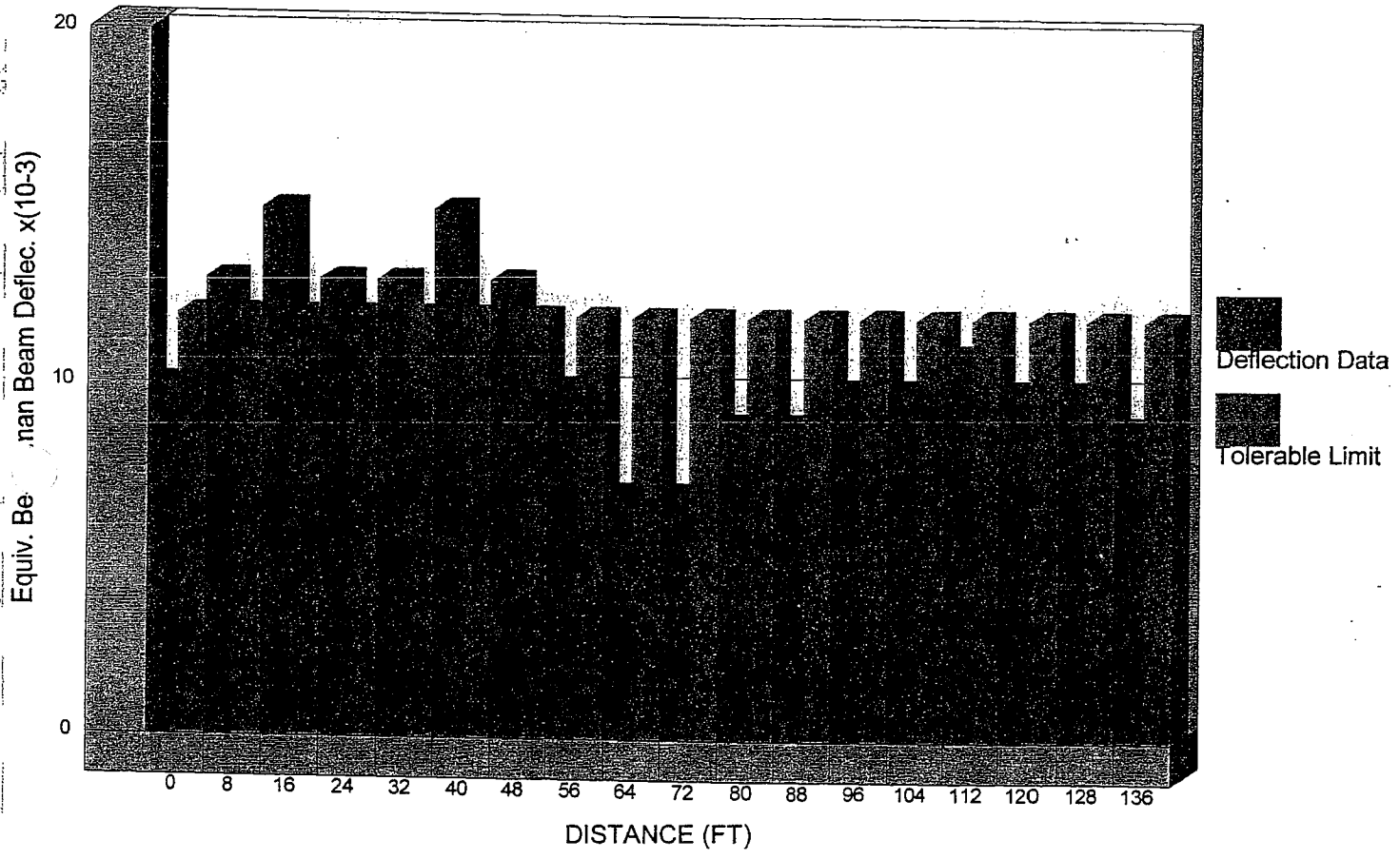
The structural overlay requirement for segment 1 was determined to be 0.05 ft. of asphalt concrete and 0.15 ft. for section 2. California Test Method 356 recommends a minimum overlay thickness of 0.30 ft. for pavements placed on top of CTB for reflective crack control. However, we recommend placing a 0.15 ft. overlay with paving fabric over this entire segment of Macalla Road which should satisfy the structural overlay requirement and help delay reflective cracking.

CHEC Engineering Software
DYNAFLECT ANALYSIS
Earth Mechanics
JOB NO: 99348

Date: 04-03-00

Road Name: Macalla Road | Direction: E1 | Start: 0 | Interval: 8 ft
Road Number: 00 - 602 A | From: Bay Bridge | To: Pavement Change

DYNAFLECT ANALYSIS



STASTICAL ANALYSIS	80TH %	90TH %	MEAN	MIN	MAX	
AS TESTED	14	15	11	7	15	%REPLACED
80TH % Replaced						
90 TH % Replaced						

STRUCTURAL DATA — Thickness: 12.0 in T.I = 10.0

STRUCTURAL DESIGN	DEFLECTION	TOLERABLE	%ROADS	OVERLAY
AS TESTED	14	12	12	0.05 ft.
80TH % Replaced				
90TH % Replaced				

CHEC Engineering Software
DYNAFLECT ANALYSIS
Earth Machanics
JOB NO: 99359

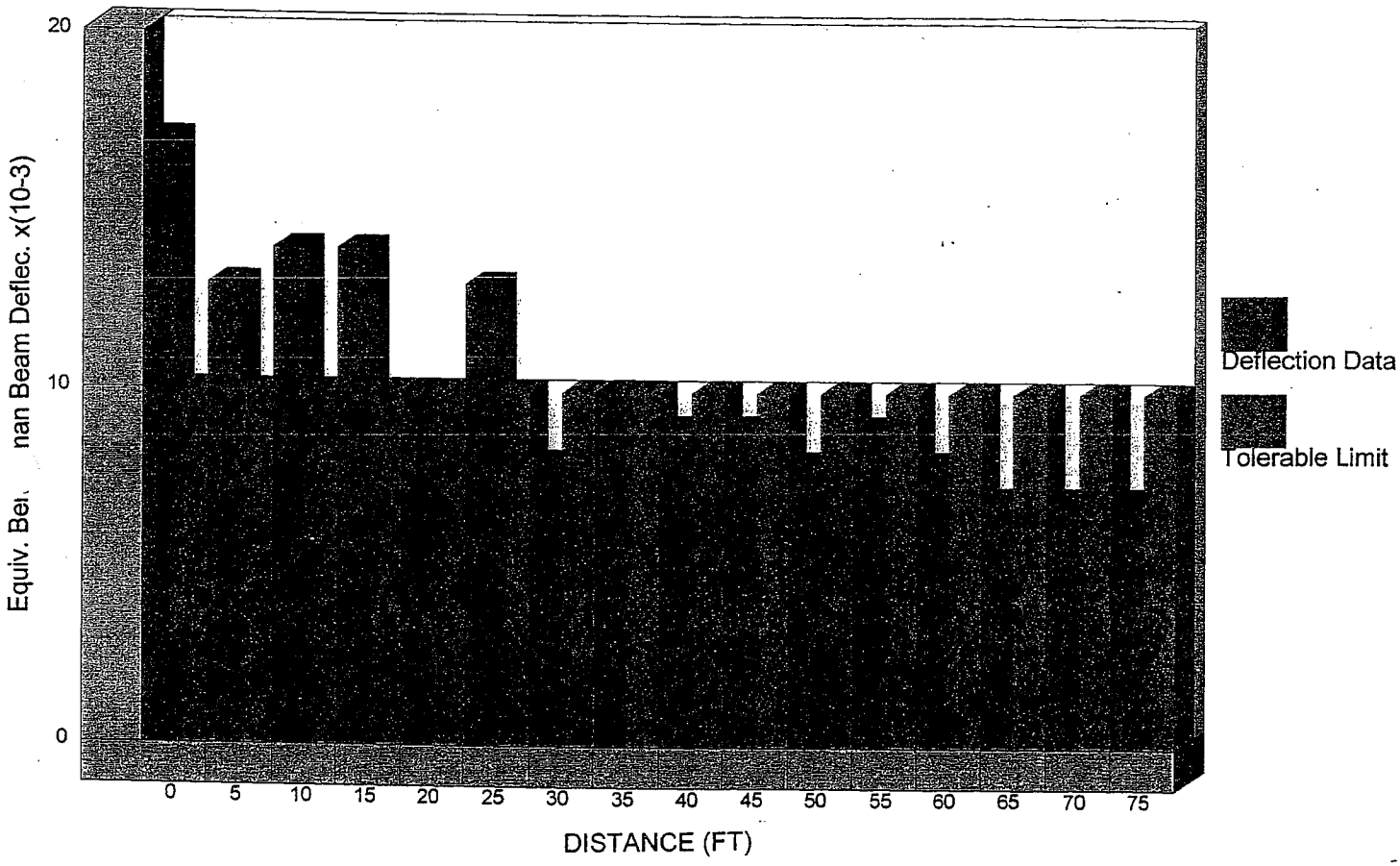
Date: 04-03-00

Road Name: Macalla Road
Road Number: 00 - 602 B

Direction: E1 Start: 0
From: Pavement Change

Interval: 5 ft
To: 215 feet east of the Bay Bridge

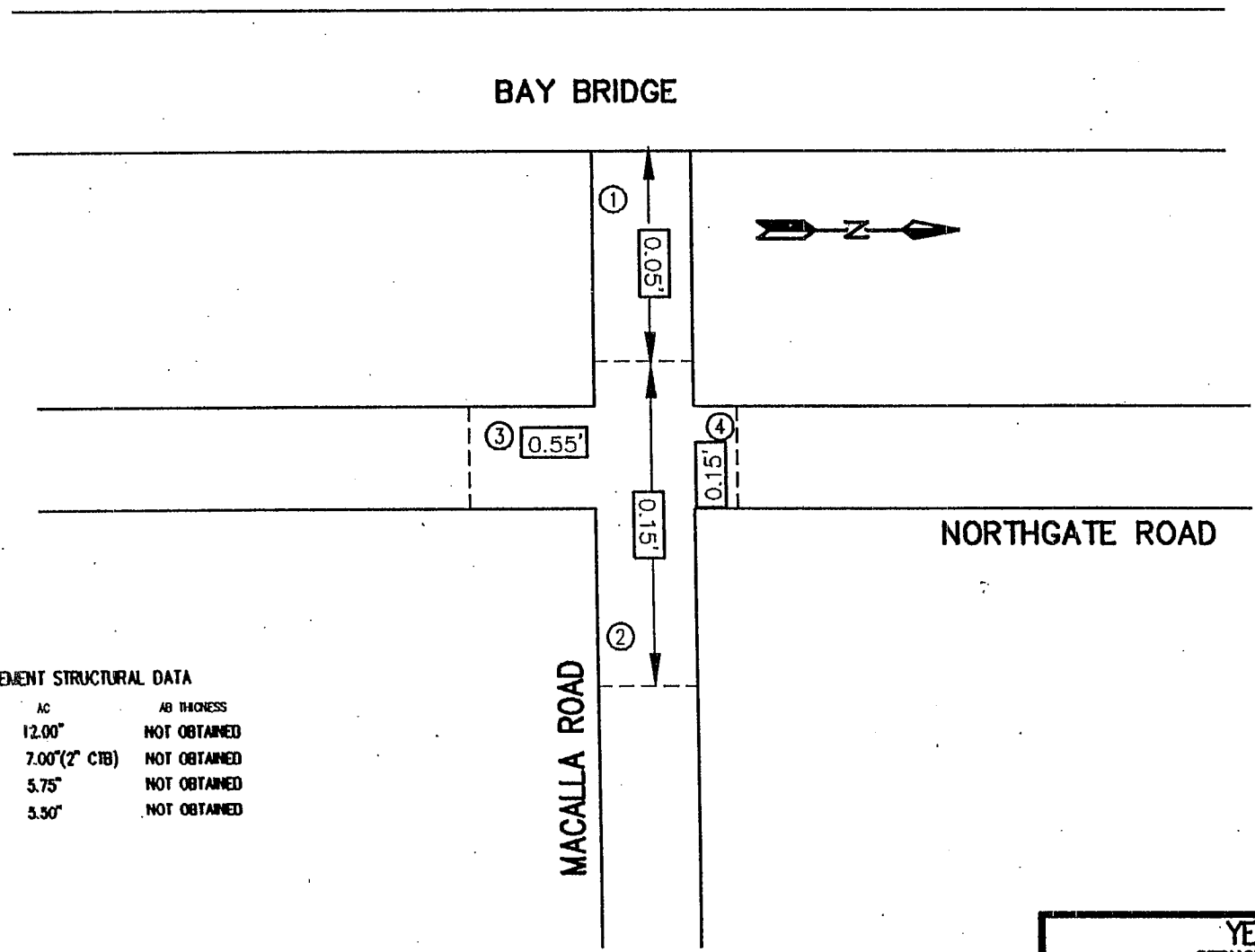
DYNAFLECT ANALYSIS



STASTICAL ANALYSIS	80TH %	90TH %	MEAN	MIN	MAX	
AS TESTED	14	15	11	7	17	%REPLACED
80TH % Replaced						
90 TH % Replaced						

STRUCTURAL DATA Thickness: Rigid T.I = 10.0

STRUCTURAL DESIGN	DEFLECTION	TOLERABLE	%ROADS	OVERLAY
AS TESTED	14	10	27	0.15 ft.
80TH % Replaced				
[illegible]TH % Replaced				



PAVEMENT STRUCTURAL DATA

CORE NO.	AC	AB THICKNESS
1	12.00"	NOT OBTAINED
2	7.00"(2" CTB)	NOT OBTAINED
3	5.75"	NOT OBTAINED
4	5.50"	NOT OBTAINED

LEGEND

(#) CORE LOCATION

0.45' STRUCTURAL OVERLAY REQUIREMENT

YERBA BUENA ISLAND
STRUCTURAL OVERLAY REQUIREMENTS

SCALE: NONE	JOB NUMBER: 99348	DRAWN BY: BCB
DATE: 4-5-00		ACAD: \WORK2000\99348

FIGURE 1

chee CONSULTANTS, INC.
8796 AIRPORT ROAD, REDDING, CA 96002

DRAWING NUMBER: 1 of 1

APPENDIX D: PAVEMENT STRUCTURAL SECTION ECONOMIC ANALYSIS

San Francisco Oakland Bay Bridge - East Span Seismic Safety Project
Contract 1 - YBI/SAS

PAVEMENT STRUCTURAL SECTION ECONOMIC ANALYSIS

R1, R3, R4, R5, R6, H, SG & MC LINES

Description	Unit	Total Area m^2	Depth m	Volume m^3	Quantity	Unit Price	Total
Alternative 1							
AC (Open Graded)	TONNE	1	0.03	0.030	0.072	$45	$3.24
AC (Type A)	TONNE	1	0.185	0.185	0.444	$45	$19.98
ATPB	M^3	1	0.075	0.075	0.075	$50	$3.75
		Total Depth=	0.29		Total Cost per square meter =		$26.97
Alternative 2							
AC (Open Graded)	TONNE	1	0.03	0.030	0.072	$45	$3.24
AC (Type A)	TONNE	1	0.105	0.105	0.252	$45	$11.34
ATPB	M^3	1	0.075	0.075	0.075	$50	$3.75
AB (Class 3)	M^3	1	0.185	0.185	0.185	$32	$5.92
		Total Depth=	0.395		Total Cost per square meter =		$21.01
Alternative 3							
AC (Open Graded)	TONNE	1	0.03	0.030	0.072	$45	$3.24
AC (Type A)	TONNE	1	0.105	0.105	0.252	$45	$11.34
ATPB	M^3	1	0.075	0.075	0.075	$50	$3.75
CTB (A)	M^3	1	0.1	0.100	0.1	$150	$15.00
		Total Depth=	0.31		Total Cost per square meter =		$30.09

Recommended

Note: The extra depth of Alt. 2 will reduce the amount of embankment.

PAVEMENT STRUCTURAL SECTION ECONOMIC ANALYSIS

CG, CG1 & TF LINES

Description	Unit	Total Area m^2	Depth m	Volume m^3	Quantity	Unit Price	Total
Alternative 1							
AC (Open Graded)	TONNE	1	0.03	0.030	0.072	$45	$3.24
AC (Type A)	TONNE	1	0.26	0.260	0.624	$45	$28.08
ATPB	M^3	1	0.075	0.075	0.075	$50	$3.75
AS (Class 4)	M^3	1	0.105	0.105	0.105	$24	$2.52
		Total Depth=	0.47		Total Cost per square meter =		$37.59
Alternative 2							
AC (Open Graded)	TONNE	1	0.03	0.030	0.072	$45	$3.24
AC (Type A)	TONNE	1	0.12	0.120	0.288	$45	$12.96
ATPB	M^3	1	0.075	0.075	0.075	$50	$3.75
AB (Class 3)	M^3	1	0.17	0.170	0.17	$32	$5.44
AS (Class 4)	M^3	1	0.23	0.230	0.23	$24	$5.52
		Total Depth=	0.625		Total Cost per square meter =		$30.91
Alternative 3							
AC (Open Graded)	TONNE	1	0.03	0.030	0.072	$45	$3.24
AC (Type A)	TONNE	1	0.12	0.120	0.288	$45	$12.96
ATPB	M^3	1	0.075	0.075	0.075	$50	$3.75
CTB (A)	M^3	1	0.11	0.110	0.11	$150	$16.50
AS (Class 4)	M^3	1	0.23	0.230	0.23	$24	$5.52
		Total Depth=	0.565		Total Cost per square meter =		$41.97

Recommended

Note: The extra depth of Alt. 2 will reduce the amount of embankment.

PAVEMENT STRUCTURAL SECTION ECONOMIC ANALYSIS

ED1 LINE

Description	Unit	Total Area m^2	Depth m	Volume m^3	Quantity	Unit Price	Total
Alternative 1							
AC (Open Graded)	TONNE	1	0.03	0.030	0.072	$45	$3.24
AC (Type A)	TONNE	1	0.29	0.290	0.696	$45	$31.32
ATPB	M^3	1	0.075	0.075	0.075	$50	$3.75
AS (Class 4)	M^3	1	0.105	0.105	0.105	$24	$2.52
		Total Depth=	0.5		Total Cost per square meter =		$40.83
Alternative 2							
AC (Open Graded)	TONNE	1	0.03	0.030	0.072	$45	$3.24
AC (Type A)	TONNE	1	0.14	0.140	0.336	$45	$15.12
ATPB	M^3	1	0.075	0.075	0.075	$50	$3.75
AB (Class 3)	M^3	1	0.18	0.180	0.18	$32	$5.76
AS (Class 4)	M^3	1	0.26	0.260	0.26	$24	$6.24
		Total Depth=	0.685		Total Cost per square meter =		$34.11 **Recommended**
Alternative 3							
AC (Open Graded)	TONNE	1	0.03	0.030	0.072	$45	$3.24
AC (Type A)	TONNE	1	0.14	0.140	0.336	$45	$15.12
ATPB	M^3	1	0.075	0.075	0.075	$50	$3.75
CTB (A)	M^3	1	0.12	0.120	0.12	$150	$18.00
AS (Class 4)	M^3	1	0.255	0.255	0.255	$24	$6.12
		Total Depth=	0.62		Total Cost per square meter =		$46.23

PAVEMENT STRUCTURAL SECTION ECONOMIC ANALYSIS

T2, T3, & T4 LINES

Description	Unit	Total Area m^2	Depth m	Volume m^3	Quantity	Unit Price	Total	
Alternative 1 (Full Depth AC)								
AC (Type A)	TONNE	1	0.2	0.200	0.48	$45	$21.60	
		Total Depth=	0.2		Total Cost per square meter =		$21.60	**Recommended for T3**
Alternative 2								
AC (Type A)	TONNE	1	0.11	0.110	0.264	$45	$11.88	
AB (Class 3)	M^3	1	0.215	0.215	0.215	$32	$6.88	
		Total Depth=	0.325		Total Cost per square meter =		$18.76	**Recommended for T2 & T4**
Alternative 3								
AC (Type A)	TONNE	1	0.11	0.110	0.264	$45	$11.88	
CTB (A)	M^3	1	0.14	0.140	0.14	$150	$21.00	
		Total Depth=	0.25		Total Cost per square meter =		$32.88	

PAVEMENT STRUCTURAL SECTION ECONOMIC ANALYSIS

T5 LINE

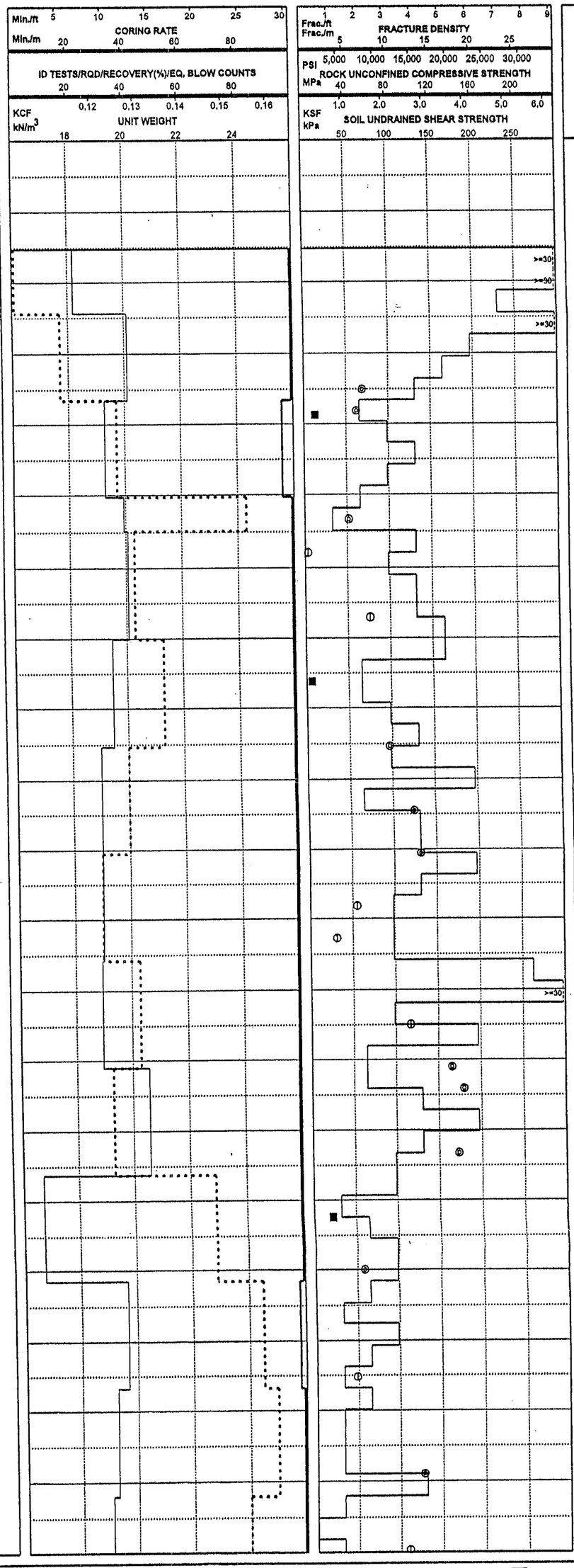
Description	Unit	Total Area m^2	Depth m	Volume m^3	Quantity	Unit Price	Total
Alternative 1 (Full Depth AC)							
AC (Type A)	TONNE	1	0.275	0.275	0.66	$45	$29.70
		Total Depth=	0.275		Total Cost per square meter =		$29.70
Alternative 2							
AC (Type A)	TONNE	1	0.15	0.150	0.36	$45	$16.20
AB (Class 3)	M^3	1	0.345	0.345	0.345	$32	$11.04
		Total Depth=	0.495		Total Cost per square meter =		$27.24
Alternative 3							
AC (Type A)	TONNE	1	0.15	0.150	0.36	$45	$16.20
CTB (A)	M^3	1	0.23	0.230	0.23	$150	$34.50
		Total Depth=	0.38		Total Cost per square meter =		$50.70

Recommended
Note: The extra depth of Alt. 2 will reduce the amount of embankment.

PROJECT NO: 98-42-0055		START DATE: 12/2/99		DRILLER: PC Exploration	
BORING: 99-161 (Yerba Buena Island)		COMPLETION DATE: 12/8/99		DRILLING METHOD: Rotary Sample Boring (Wet)	

Coordinates: E1836181 N647434
CA State Plane Zone 3, NAD83, Meters

ELEVATION, m.	DEPTH, m.	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
			GROUND ELEVATION: 18.6m (MSL)	
18	1		ARTIFICIAL FILL (af) Silt Fine SAND (SM), dense to very dense, light yellowish brown, dry -with decomposed rocks, wood chips, and roots (1.5m)	I
17	2	100-0	FRANCISCAN FORMATION (Jkf) SANDSTONE (Rx), light brown, decomposed to intensely weathered, very soft and moderately soft, poorly to moderately indurated, intensely fractured -fractures are slightly rough to smooth, with thin to moderately thin clay fillings and black oxidation -light brown to brown, moderately weathered, moderately hard, moderately indurated, below 2.4m	II
16	3	100-17	-healed fractures, quartz/calcite filled, with black staining, at 3.3m -moderately hard to hard, moderately fractured, dipping 25 to 70 degrees, below 3.7m -with fine to coarse grained siltstone clasts, 3.7m to 5.0m	
15	4	96-37	-fracture with 6mm thick clay filling, dipping 40 degrees, at 4.1m -fracture with 6mm thick clay filling, dipping 70 degrees, at 4.6m -intensely fractured zone, 4.7m to 4.9m -slightly weathered, hard, well indurated, very well sorted, 5.0m to 11.6m	
14	5	100-83	-slightly fractured, dipping 50 degrees, 5.0m to 5.5m -healed fracture, with calcite filling, offset 3mm, at 5.2m -with claystone clasts, 5.5m to 8.3m -healed fracture, with calcite filling, 4mm thick, dipping 75 degrees, at 5.8m	
13	6	100-43	-intensely fractured zone, clay filling at bottom up to 25mm thick, at 6.4m -light brown below 6.7m -intensely fractured zone at 6.8m -very hard below 7.0m	
12	7	100-53	-siltstone, grayish brown to brown, 8.3m to 8.8m -sub-vertical fracture, 8.6m to 8.9m -light brownish gray, intensely fractured, contains black and red staining, 8.8m to 3.5m -siltstone pockets, 13mm wide, at 9.1m	
11	8	100-40	-siltstone pockets, at 9.8m -claystone clasts 0.5mm, below 10.1m -very intensely fractured zone with angular fragments, 6mm to 50mm, at 10.6m -very intensely fractured zone at 10.8m	
10	9	100-30	-very intensely fractured zone at 11.5m -slightly weathered to fresh, light grayish brown to brown, very hard, moderately to intensely fractured, 11.6m to 17.7m -intensely fractured zone with orange oxidation, at 12.0m -siltstone, gray, dipping 40 degrees, at 12.3m	
9	10	100-43	-with calcite healed fractures and brown weathering rinds up to 25mm thick, 12.4m to 17.7m	
8	11			
7	12	100-33	-intensely fractured zone at 14.5m -with clean to very thin filling, 14.6m to 25.5m -moderately fractured, 14.6m to 16.2m -intensely fractured zone at 14.7m	
6	13			
5	14	100-69	-intensely fractured zone at 15.5m -sub-vertical fracture, 15.8m to 16.1m -fresh, slightly to moderately fractured, very well indurated, below 16.2m	
4	15			
3	16	98-85		
2	17			
1	18	100-90	-siltstone, dark gray, dipping 50 degrees, at 18.6m -healed fracture zone, intensely fractured, with calcite filling, at 19.1m -sub-vertical fracture, 19.4m to 20.1m	
0	19	100-80	-siltstone, 20.0m to 20.3m	
-1				



LOG OF BORING AND TEST RESULTS

BORING 99-161

SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

Report Date: 02/25/00

PROJECT NO: 98-42-0055
BORING: 99-161 (Yerba Buena Island)

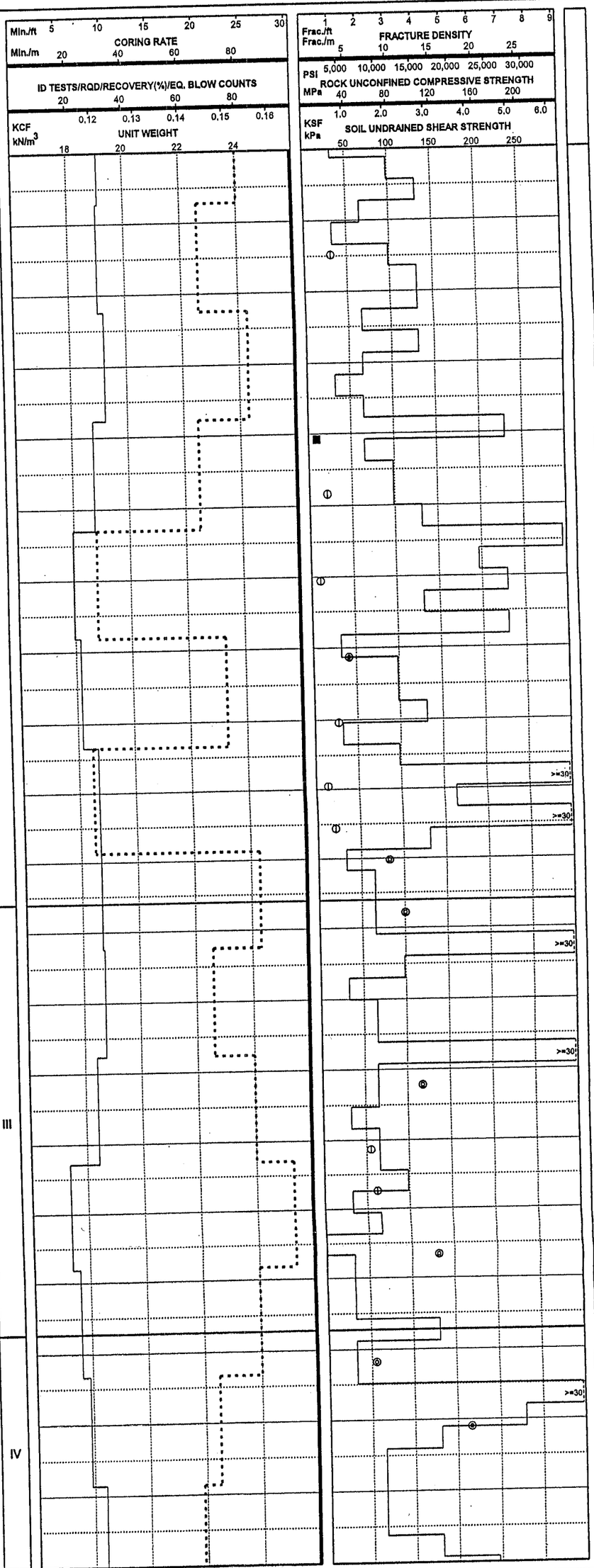
START DATE: 12/2/99
COMPLETION DATE: 12/8/99

DRILLER: PC Exploration
DRILLING METHOD: Rotary Sample Boring (Wet)

Coordinates: E1836181 N647434
CA State Plane Zone 3, NAD83, Meters

GROUND ELEVATION: 18.6m (MSL)

ELEVATION, m.	DEPTH, m.	SOIL TYPE	SAMPLER	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
					FRANCISCAN FORMATION (Jkf)	
				100-80	-healed fracture zone, dipping at 45 degrees, at 20.2m	
-2					-siltstone at 20.7m	
	21					
				100-66	-healed fracture zone, with 25mm thick calcite filling, weakened sandstone, at 21.8m	
-3						
	22				-claystone clasts aligned, dipping 70 degrees, at 22.2m -healed fractures, with calcite filling, dipping 70 to 80 degrees, at 22.4m	
-4					-siltstone, dipping 35 degrees, at 22.8m	
	23			100-83		
					-siltstone, 23.3m to 23.7m	
-5					-bedding dipping at 70 degrees, at 23.7m	
	24					
				100-65	-healed fractured zone, with calcite filling, at 24.7m	
-6					-intensely fractured zone at 24.9m	
	25				-siltstone, dipping 35 degrees, 25.0m to 25.5m	II
					-very intensely fractured zone at 25.5m	
-7					-intensely fractured zone, 25.5m to 26.8m	
	26			100-28		
-8					-interbedded sandstone and siltstone, very thinly bedded, dipping 30 degrees, 26.8m to 27.3m	
	27					
					-intensely fractured zone at 27.3m, and 27.6m	
-9				100-73	-fractures with very thin siltstone beds, at 27.8m	
	28				-healed fracture zone with sandstone and siltstone interbeds, 28.2m to 28.5m	
-10						
	29			100-25		
					-intensely fractured zone at 29.5m	
-11						
	30					
					(30.6m)	
-12				100-83	SILTSTONE (Rx), CLAYSTONE (Rx), and SANDSTONE (Graywacke) (Rx) [2:1:1]	
	31				-siltstone with a few claystone clasts, 30.6m to 31.2m -sandstone with many claystone clasts, at 30.8m -intensely fractured zone at 31.2m -fractures with clean to very thin fillings, below 31.2m	
-13					-claystone, black, fresh, moderately soft, intensely fractured, 31.2m to 31.5m	
	32			100-66	-thinly to very thinly bedded, fractures with thin clay filling, 31.5m to 32.2m -claystone, 32.2m to 32.5m -siltstone at 32.5m	
-14						
	33				-siltstone grading into sandstone, at 33.0m -siltstone dipping 45 degrees 33.1m to 33.2m -sandstone with claystone interbeds, 33.2m to 33.8m	
-15				100-80	-claystone, soft, intensely fractured, at 33.6m -claystone grading into siltstone, 33.8m to 34.1m	III
	34				-sandstone at 34.2m -siltstone, gray to dark gray, fresh, very hard, slightly fractured, 34.3m to 34.5m	
-16					-fractures are clean to very thin -grading into sandstone at 34.5m -siltstone, 34.6m to 35.0m	
	35			100-93		
-17					-grading into sandstone, 35.8m	
	36				-claystone clast, 25mm by 50mm, at 36.3m -very thinly bedded, beds offset by fractures 36.4m to 36.6m	
					(36.7m)	
-18				100-80	SANDSTONE (Rx) light gray, fresh, very hard, well indurated, massive, moderately to intensely fractured	
	37				-fractures are slightly rough to smooth, with very thin to moderately thin calcite filling -very thick, sub-vertical calcite filled fracture, 36.9m to 37.3m	
-19					-intensely fractured zone with moderately thin to very thin calcite fillings, 37.4m to 37.8m	
	38			100-65	-intensely fractured zone at 38.0m -healed fractures, with calcite filling, dipping 60 degrees, 38.2m to 38.5m	IV
-20						
	39				-interbedded siltstone and claystone, dipping 45 degrees, 39.3m to 39.8m	
				100-59		
-21						



LOG OF BORING AND TEST RESULTS

BORING 99-161

SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

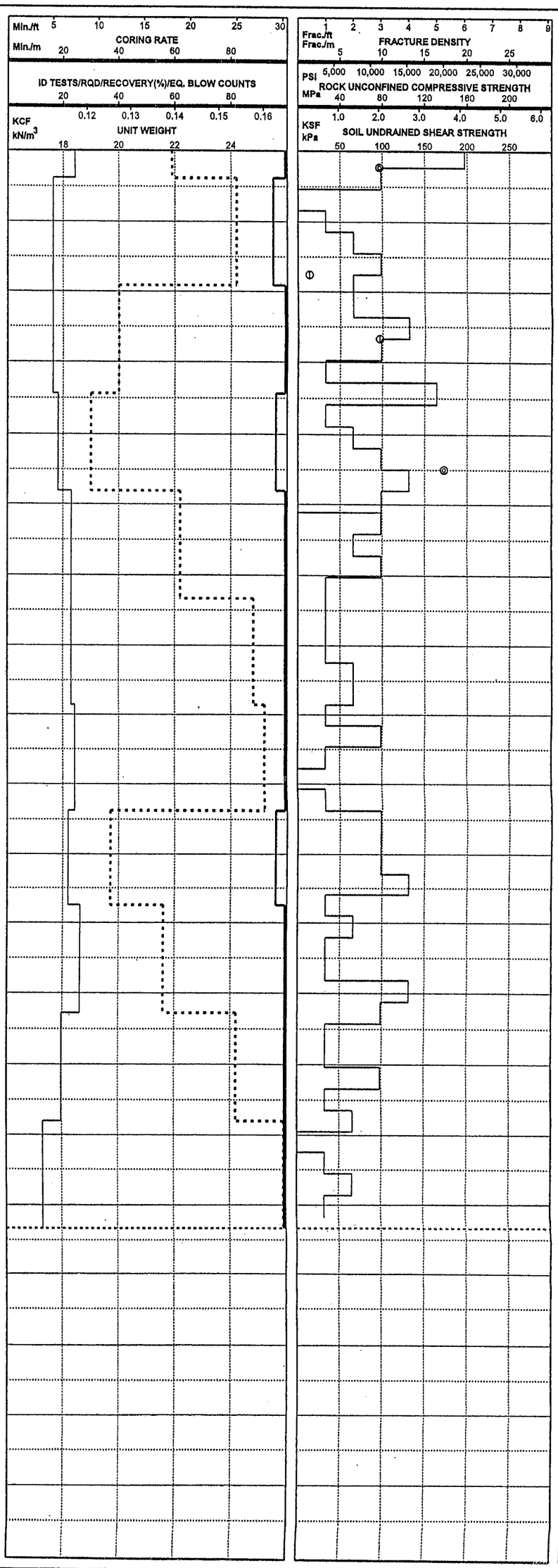
Report Date: 02/25/00

PROJECT NO: 98-42-0055	START DATE: 12/2/99	DRILLER: PC Exploration	
BORING: 99-161 (Yerba Buena Island)	COMPLETION DATE: 12/8/99	DRILLING METHOD: Rotary Sample Boring (Wet)	

Coordinates: E1836181 N647434
CA State Plane Zone 3, NAD83, Meters

GROUND ELEVATION: 18.6m (MSL)

ELEVATION, m.	DEPTH, m.	SOIL TYPE	SAMPLER	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
				100-59	SANDSTONE (Rx) light gray, fresh, very hard, well indurated, massive, moderately to intensely fractured -interbedded siltstone and claystone, 40.1m to 40.4m	IV
-22	41			95-82	-interbedded sandstone, siltstone, and claystone, dipping 50 to 60 degrees, 41.2m to 41.7m	
-23	42				-siltstone, 41.9m to 42.3m -with siltstone interbeds, 42.3m to 42.6m	
-24	43			100-40	-light gray with abundant calcite filled fractures, below 42.6m	
-25	44			96-30	-sub-vertical fracture with very thin calcite filling, 43.8m to 44.1m -interbedded sandstone, siltstone, and claystone, 44.3m to 44.8m	
-26	45				-moderately fractured, dipping 10 to 65 degrees, below 44.8m -interbedded sandstone, siltstone, and claystone, dipping 60 to 65 degrees, 45.2m to 46.1m	
-27	46			100-62		
-28	47				-moderately to slightly fractured, 46.3m to 49.4m	
-29	48			100-88	-interbedded sandstone, siltstone, and claystone, dipping at 65 degrees, 47.6m to 48.3m	
-30	49			100-92	-with calcite filled fractures, below 48.3m	
-31	50			96-37	-interbedded sandstone, siltstone, and claystone, 49.8m to 50.7m -healed fractures with very thin calcite filling, dipping 35 to 45 degrees, 50.3m to 51.0m	
-32	51					
-33	52			100-56	-laminated siltstone, and claystone, dipping 50 to 70 degrees, 51.7m to 52.1m -claystone, highly fractured, dipping 55 degrees, 52.1m to 52.4m -moderately thin, sub-vertical calcite healed fractures, 52.4m to 53.4m	
-34	53			100-82	-very intensely fractured zone, dipping 20 to 40 degrees, 53.0m to 53.2m -gradational contact to medium sandstone, at 53.1m -healed fracture zone at 53.5m	
-35	54				-slightly fractured, very hard, below 53.8m	
-36	55			100-100	-claystone, bedding dipping 55 degrees, 54.4m to 54.7m	
-37	56				TOTAL DEPTH: 55.3m BACKFILLED WITH: Cement Grout	
-38	57					
-39	58					
-40	59					
-41						



LOG OF BORING AND TEST RESULTS

BORING 99-161

SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

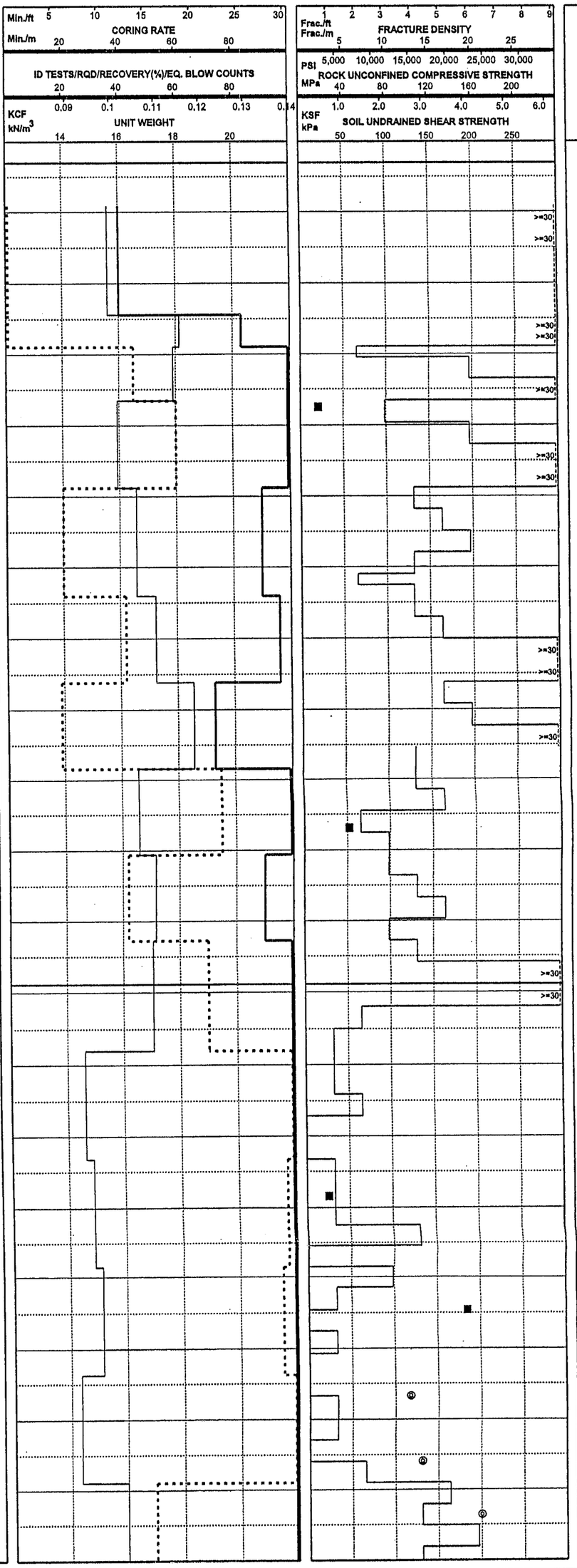
Report Date: 02/25/00

PROJECT NO:	98-42-0055	START DATE:	10/21/99	DRILLER:	Pitcher Drilling Co.
BORING:	99-165 (Yerba Buena Island Eastern Hill)	COMPLETION DATE:	10/28/99	DRILLING METHOD:	Rotary Sample Boring (Wet)

Coordinates: E1836104 N647410
CA State Plane Zone 3, NAD83, Meters

GROUND ELEVATION: 10.0m (MSL)

ELEVATION, m.	DEPTH, m.	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
10			ARTIFICIAL FILL (af) Silty Fine SAND (SM), loose, light brown, dry with medium grained sand (0.3m)	I
	1		FRANCISCAN FORMATION (Jkf) SANDSTONE (Graywacke) (Rx), light yellowish-brown, intensely weathered, soft, intensely fractured -siltstone, light brown, decomposed, very soft, bedding/fractures dipping 45 degrees, to 1.2m -fractures are thin, slightly rough, dipping 20 to 60 degrees, with oxidation	II
9		40-0		
8	2			
		83-0	-moderately weathered, moderately hard, 2.4m to 10.9m -very intensely fractured zone, with very thin clay filling, 2.7m to 2.9m	
7	3	100-45	-very intensely fractured zone, 6mm to 12mm angular rock fragments in clay, 3.0m to 3.2m -very intensely fractured zone, fractures dipping near vertical to 45 degrees, 3.4m to 3.5m	
			10/20/99 (4.0m)	
6	4	100-60	-with fractures dipping 80 to 90 degrees, with thin clay filling, 4.4m to 5.2m	
5	5		-most fractures with thin, discontinuous clay filling, below 4.9m	
		90-20	-siltstone, thinly bedded, brownish-gray, moderately weathered, smooth to slightly rough fractures with thin clay filling, 5.8m to 6.1m	
4	6		-with siltstone fragments, 2mm to 20mm diameter, yellow-brown, at 6.4m	
3	7	96-42	-siltstone, moderately weathered, moderately hard, 7.0m to 7.3m	
			-siltstone, dark gray, fractures dipping 30 and 60 degrees, at 7.6m	
2	8	73-19	-moderately fractured, below 7.9m -light gray-brown, 8.2m to 8.8m	
1	9		-intensely fractured zone with discontinuous clay filling, at 29.5 -light gray, below 9.1m	
		100-75	-siltstone, fracture/bedding dipping 60 degrees, dark gray, 9.9m to 10.4m	
0	10		-slightly weathered and hard, 10.4m to 11.3m	
		90-42		
-1	11		-fresh, below 11.3m (11.9m)	
-2	12	100-70	SILTSTONE (Rx) and SANDSTONE (Graywacke) (Rx) [1:1], dark gray to light gray, fresh, hard to very hard, very thinly to thinly bedded, bedding dipping 40 to 50 degrees, moderately fractured -fractures are smooth to moderately rough, dipping 40 to 45 degrees	III
-3	13		-intensely fractured zone at 12.0m -fractures smooth with thin calcite filling, below 13.4m	
		100-100		
-4	14			
-5	15	100-97		
			-sandstone, 15.5m to 15.8m	
-6	16		-sandstone, light gray, fresh, very hard, very slightly fractured, 16.3m to 18.6m -fractures are slightly rough, with very thin discontinuous calcite filling, dipping 45 to 55 degrees, 16.3m to 18.6m	
		100-95		
-7	17			
-8	18	100-100		
			-fractures are smooth to moderately rough, dipping 30 to 80 degrees, 18.6m to 18.9m -many healed fractures, nearly verticle, with calcite filling, below 18.9m	
-9	19		-sandstone, 19.2m to 19.4m	
		100-50	-bedding dipping 50 degrees, below 19.5m	



LOG OF BORING AND TEST RESULTS

BORING 99-165

SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

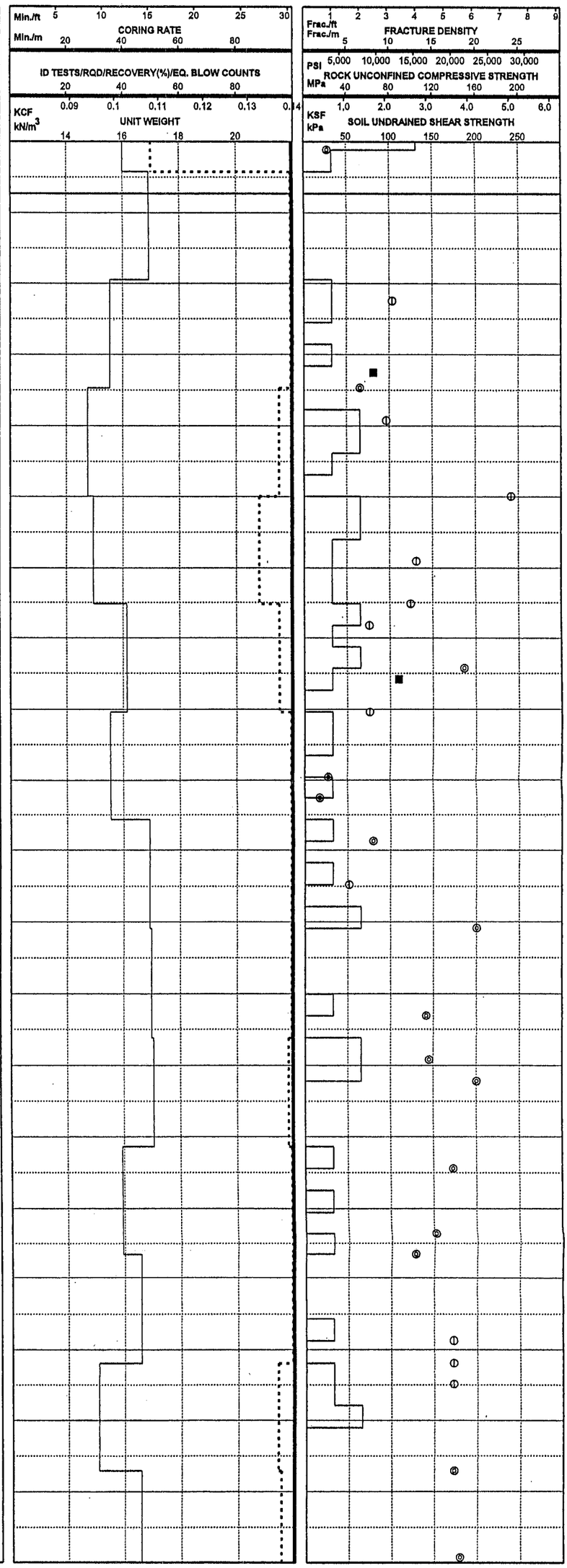
Report Date: 02/25/00

PROJECT NO:	98-42-0055	START DATE:	10/21/99	DRILLER:	Pitcher Drilling Co.
BORING:	99-165 (Yerba Buena Island Eastern Hill)	COMPLETION DATE:	10/28/99	DRILLING METHOD:	Rotary Sample Boring (Wet)

Coordinates: E1836104 N647410
CA State Plane Zone 3, NAD83, Meters

GROUND ELEVATION: 10.0m (MSL)

ELEVATION, m.	DEPTH, m.	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
-10		100-50	SILTSTONE (Rx) and SANDSTONE (Graywacke) (Rx) [1:1], dark gray to light gray, fresh, hard to very hard, very thinly to thinly bedded, bedding dipping 40 to 50 degrees, moderately fractured (20.7m)	III
-11	21	100-100	SANDSTONE (Graywacke) (Rx), light gray, fresh, very hard, very slightly fractured -fractures are slightly rough, with very thin discontinuous calcite filling, dipping 35 to 60 degrees -with healed fractures, very thin to thin, with calcite filling, 21.9m to 23.5m	IV
-12	22			
		100-100		
-13	23		-siltstone, bedding dipping 45 degrees, at 23.0m to 23.8m	
-14	24	100-95	-siltstone, bedding dipping 50 degrees, 24.2m to 24.5m	
-15	25		-fractures dipping 30 to 60 degrees, below 25.0m	
		100-88		
-16	26			
-17	27	100-95		
-18	28		-with siltstone clasts, 2mm to 5mm, 28.0m to 30.6m	
		100-100		
-19	29		-light greenish gray, 29.3m to 29.6m -siltstone clast, 45mm diameter at 29.4m -healed fracture zone, 29.6m to 30.2m	
-20	30	100-100		
-21	31		-healed fracture zone, 30.8m to 31.1m -slickensided fractures, dipping 20 to 35 degrees, at 30.9m	
		100-100		
-22	32		-healed and slickensided fracture, thick, with calcite filling, black staining and pyrite, dipping 70 degrees, at 32.3m -fractures dipping 45 to 60 degrees, below 32.6m	
-23	33	100-98		
-24	34			
-25	35	100-100		
-26	36			
		100-100		
-27	37		-gray, below 37.2m	
-28	38	100-94		
-29	39			
		100-95	-silty sandstone, dark gray, fractures dipping 40 to 45 degrees, 39.8m to 39.9m	



LOG OF BORING AND TEST RESULTS

BORING 99-165

SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

Report Date: 02/25/00

PROJECT NO: 98-42-0055
BORING: 98-311 (Yerba Buena Island)

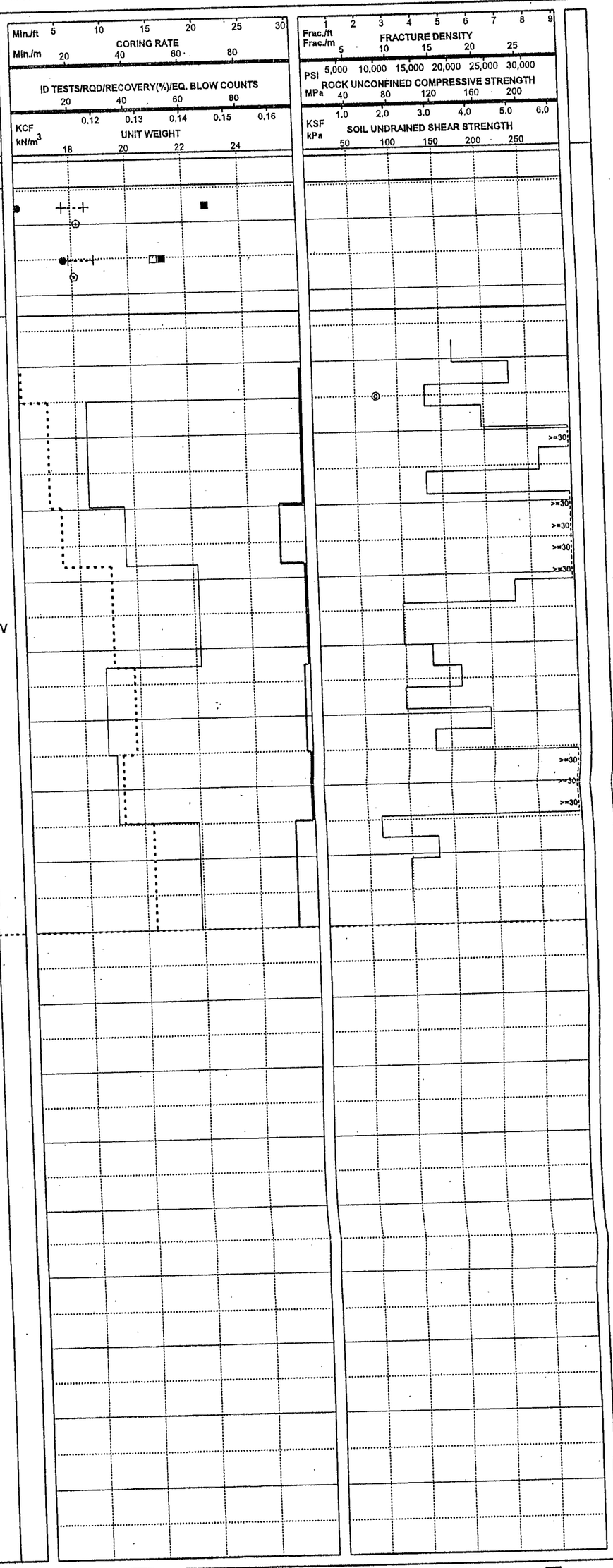
START DATE: 10/29/98
COMPLETION DATE: 10/30/98

DRILLER: Pitcher Drilling Co.
DRILLING METHOD: Rotary Sample Boring (Wet)

Coordinates: E1835992 N647159
CA State Plane Zone 3, NAD83, Meters

GROUND ELEVATION: 6.5m (MSL)

ELEVATION, m.	DEPTH, m.	SOIL TYPE	SAMPLER	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
					ARTIFICIAL FILL (af) (0.1m) PAVEMENT, Asphalt Concrete, 3 in thick	II
					Silty Fine SAND (SM), medium dense, dark brown and dark yellowish brown, moist (0.5m) -with roots and rock fragments	
	1			22	SEDIMENTARY DEPOSITS (Qa) Sandy Lean CLAY (CL), very stiff to hard, yellowish brown mottled with gray, moist -red yellowish brown, with gray streaks and dark red brown intersecting surfaces (possible decomposed bedrock), at 1.5m	III
	2			33	(2.3m)	
	3			100-0	FRANCISCAN FORMATION (Jkf) SANDSTONE (Graywacke) (Rx), yellowish brown to brown, moderately weathered -moderately hard, moderately indurated, with intersecting fractures, dipping 10 to 45 degrees, with smooth and planar oxidized surfaces -3mm thick clay-filled fractures, at 3.1m -intensely fractured at 3.5m -with intersecting fractures, dipping 45 to 60 degrees, with smooth and planar oxidized surfaces, below 5.0m	IV
	4			100-10		
	5			91-14	-intensely fractured, with black siltstone fragments aligned at 30 degrees, at 5.8m	
	6			100-31	Estimated ▽ (7.0m)	
	7				-with several elongated tubular voids, with fractures with rough surfaces dipping 45 to 60 degrees in area of voids, at 7.6m	
	8			98-38	-brown to grayish brown, slightly weathered, below 8.5m	
	9			100-33	-with fracture zone, at 9.2m -gray, slightly weathered to fresh, with quartz-healed fractures, below 9.5m	
	10			93-43	-siltstone, dipping 60 degrees, at 10.7m	
	11				TOTAL DEPTH: 11.0m BACKFILLED WITH: Cement Grout	



LOG OF BORING AND TEST RESULTS

BORING 98-311

SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

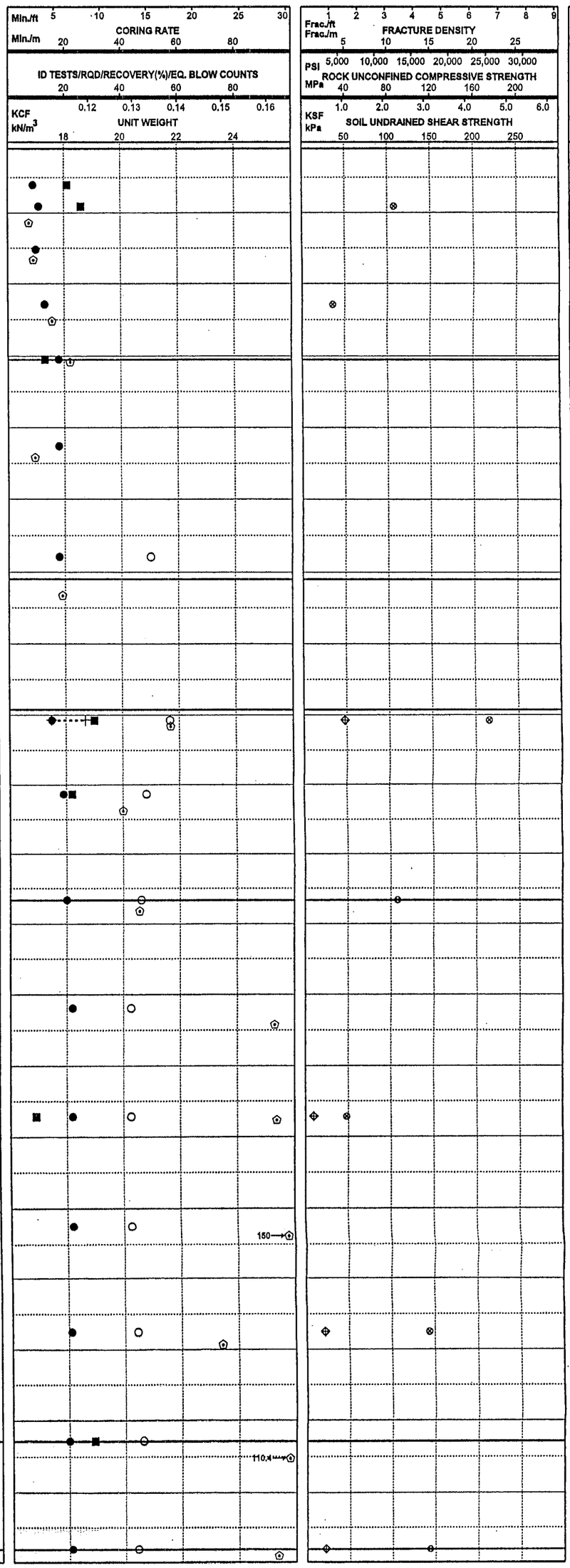
Report Date: 02/24/00

PROJECT NO:	98-42-0055	START DATE:	11/3/99	DRILLER:	Pitcher Drilling Co.
BORING:	99-312 (Yerba Buena Island)	COMPLETION DATE:	11/5/99	DRILLING METHOD:	Rotary Sample Boring (Wet)

Coordinates: E1836093 N647331
CA State Plane Zone 3, NAD83, Meters

GROUND ELEVATION: 7.3m (MSL)

ELEVATION, m.	DEPTH, m.	SOIL TYPE	SAMPLER	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
					ARTIFICIAL FILL (af) (0.1m)	I
					PAVEMENT, 75mm Asphalt Concrete over 12mm of Aggregate Base	
	1			12	Silty Fine SAND (SM), loose to medium dense, dark yellow brown, moist -with a trace of medium sand and pockets of light yellow brown silt, below 0.9m	II
				9	-with fine gravel, below 1.5m	
	2			25	-mottled with light yellow brown and with organics, below 2.3m (3.0m)	
	3			22	Fine SAND with silt and gravel (SP-SM), medium dense, dark yellow brown -gravel is fine to coarse, light gray sandstone, subangular to 35mm in diameter	III
	4			15		
	5				11/18/99 (5.5m)	
	6				(6.1m)	
				19	Fine to Medium SAND (SP), medium dense, black -with gravel and organic matter -petroleum odor at 6.4m	IV
	7				(7.9m)	
	8			91	SEDIMENTARY DEPOSITS (Qa) Clayey Fine to Medium SAND (SC), dense to very dense, light yellow brown mottled with red staining -moist with seams of black organic silt	V
	9			40		
	10				(10.7m)	
	11			73	Fine to Medium SAND with silt (SP-SM), very dense, light yellow brown	VI
	12			93	-with a few organics, below 12.2m -mottled with iron oxide staining at 12.2m	
	13			50/10cm	-yellowish brown below 13.7m	
	14			50/10cm		
	15			99/25cm	-mottled with iron oxide staining at 16.8m	
	16				(18.3m)	
	17			92/25cm	SAND with clay (SP-SC), very dense, yellowish brown mottled with light gray	VII
	18				(19.8m)	
	19			50/10cm	Fine to Medium SAND (SP), very dense, yellowish brown	VIII



LOG OF BORING AND TEST RESULTS

BORING 99-312

SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

Report Date: 02/24/00

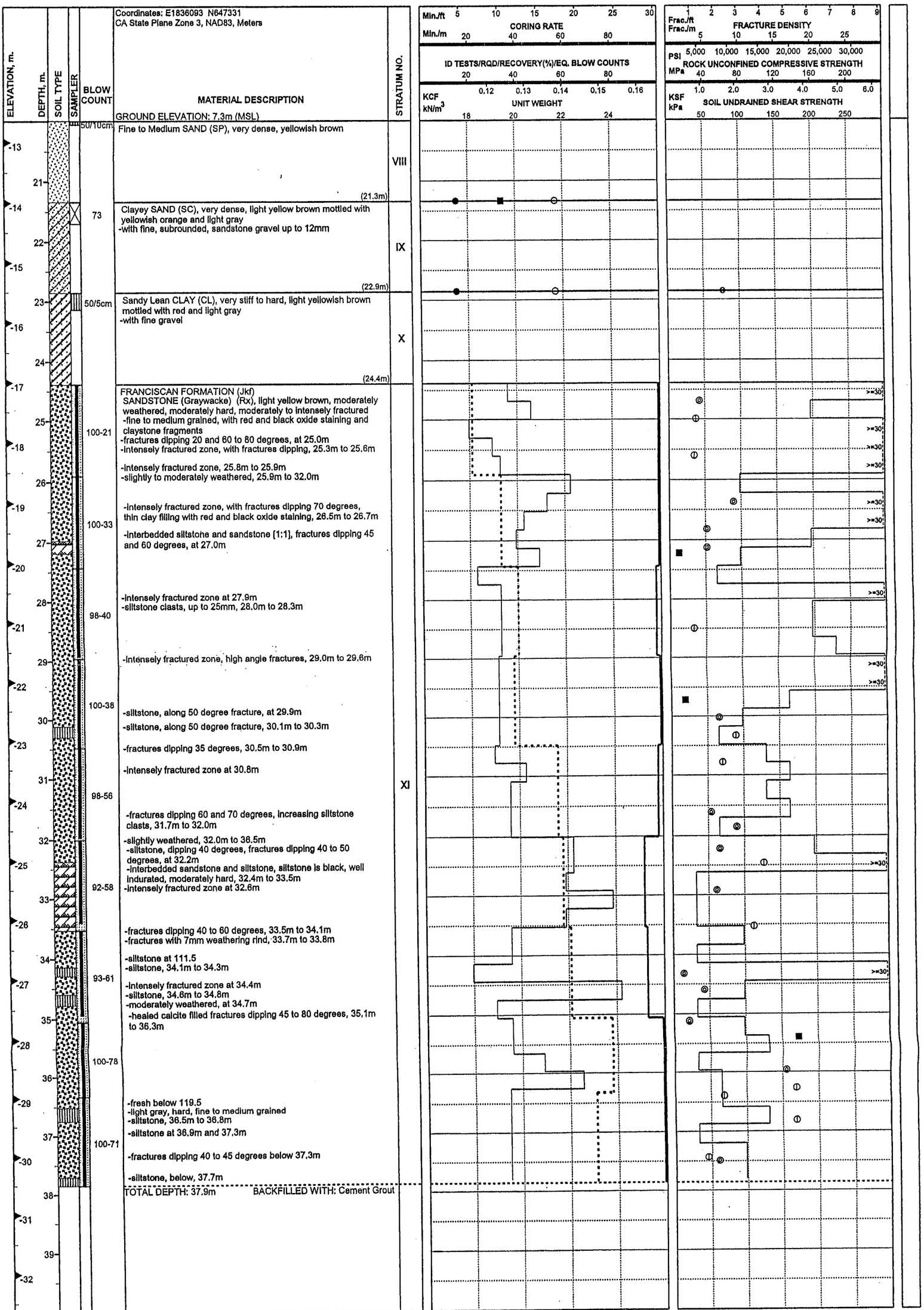
PROJECT NO:	98-42-0055	START DATE:	11/3/99	DRILLER:	Pitcher Drilling Co.
BORING:	99-312 (Yerba Buena Island)	COMPLETION DATE:	11/5/99	DRILLING METHOD:	Rotary Sample Boring (Wet)

Coordinates: E1836093 N647331
CA State Plane Zone 3, NAD83, Meters

GROUND ELEVATION: 7.3m (MSL)

Blow Count	Material Description	Stratum No.
50/10cm	Fine to Medium SAND (SP), very dense, yellowish brown (21.3m)	VIII
73	Clayey SAND (SC), very dense, light yellow brown mottled with yellowish orange and light gray -with fine, subrounded, sandstone gravel up to 12mm (22.9m)	IX
50/5cm	Sandy Lean CLAY (CL), very stiff to hard, light yellowish brown mottled with red and light gray -with fine gravel (24.4m)	X
100-21	FRANCISCAN FORMATION (Jkf) SANDSTONE (Graywacke) (Rx), light yellow brown, moderately weathered, moderately hard, moderately to intensely fractured -fine to medium grained, with red and black oxide staining and claystone fragments -fractures dipping 20 and 60 to 80 degrees, at 25.0m -intensely fractured zone, with fractures dipping, 25.3m to 25.6m -intensely fractured zone, 25.8m to 25.9m -slightly to moderately weathered, 25.9m to 32.0m	XI
100-33	-intensely fractured zone, with fractures dipping 70 degrees, thin clay filling with red and black oxide staining, 26.5m to 26.7m -interbedded siltstone and sandstone [1:1], fractures dipping 45 and 60 degrees, at 27.0m	
98-40	-intensely fractured zone at 27.9m -siltstone clasts, up to 25mm, 28.0m to 28.3m	
100-38	-intensely fractured zone, high angle fractures, 29.0m to 29.6m -siltstone, along 50 degree fracture, at 29.9m -siltstone, along 50 degree fracture, 30.1m to 30.3m -fractures dipping 35 degrees, 30.5m to 30.9m -intensely fractured zone at 30.8m	
98-56	-fractures dipping 60 and 70 degrees, increasing siltstone clasts, 31.7m to 32.0m -slightly weathered, 32.0m to 36.5m -siltstone, dipping 40 degrees, fractures dipping 40 to 50 degrees, at 32.2m -interbedded sandstone and siltstone, siltstone is black, well indurated, moderately hard, 32.4m to 33.5m	
92-58	-intensely fractured zone at 32.6m -fractures dipping 40 to 60 degrees, 33.5m to 34.1m -fractures with 7mm weathering rind, 33.7m to 33.8m	
93-61	-siltstone at 111.5 -siltstone, 34.1m to 34.3m -intensely fractured zone at 34.4m -siltstone, 34.6m to 34.8m -moderately weathered, at 34.7m -healed calcite filled fractures dipping 45 to 80 degrees, 35.1m to 36.3m	
100-78	-fresh below 119.5 -light gray, hard, fine to medium grained -siltstone, 36.5m to 36.8m -siltstone at 36.9m and 37.3m	
100-71	-fractures dipping 40 to 45 degrees below 37.3m -siltstone, below, 37.7m	

TOTAL DEPTH: 37.9m BACKFILLED WITH: Cement Grout



LOG OF BORING AND TEST RESULTS

BORING 99-312

SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

Report Date: 02/24/00

PROJECT NO: 98-42-0055
BORING: 99-313 (Yerba Buena Island)

START DATE: 11/11/99
COMPLETION DATE: 11/11/99

DRILLER: Pitcher Drilling Co.
DRILLING METHOD: Rotary Sample Boring (Wet)

Coordinates: E1835933 N647099
CA State Plane Zone 3, NAD83, Meters

GROUND ELEVATION: 48.7m (MSL)

Stratum No.	Material Description	Blow Count
I	ARTIFICIAL FILL (af) PAVEMENT, 127mm of Asphalt Concrete over Aggregate Base (0.3m)	
II	SEDIMENTARY DEPOSITS (Qa) Medium to Coarse SAND with gravel and silt (SW-SM), very dense, light gray, dry -gravel is sub-angular to sub-rounded -rock fragments up to 127mm, 0.9m to 2.1m (2.3m)	85/30cm
III	Fine GRAVEL with silt and sand (GW-GM), dense, light to dark gray -with fine to medium sand (4.6m)	75, 42
IV	Fine to Medium SAND (SP), very dense, yellowish brown, moist (6.1m)	69
V	Fine to Medium SAND with silt (SP-SM), very dense, reddish brown, moist -silty at 6.1m; Estimated ▽ (6.5m); -dense, silty fine to medium sand, at 9.1m (12.2m)	74, 50/10cm, 44, 50/15cm
VI	Clayey Fine SAND (SC), dense, light yellowish brown -with intensely weathered sandstone fragments and stiff clay, at 13.7m (15.2m)	38, 100/10cm
VII	Fine SAND with silt (SP-SM), very dense, light yellowish brown -weathered sandstone, extremely soft and friable	50/5cm

TOTAL DEPTH: 15.7m
BACKFILLED WITH: Cement Grout

Columns: ELEVATION, m. | DEPTH, m. | SOIL TYPE | SAMPLER | BLOW COUNT | STRATUM NO.

Charts: CORING RATE (Min./ft, Min./m); ID TESTS/RQD/RECOVERY(%)/EQ. BLOW COUNTS; UNIT WEIGHT (KCF, kN/m³); FRACTURE DENSITY (Frac./ft, Frac./m); ROCK UNCONFINED COMPRESSIVE STRENGTH (PSI, MPa); SOIL UNDRAINED SHEAR STRENGTH (KSF, kPa)

LOG OF BORING AND TEST RESULTS
BORING 99-313
SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

Report Date: 02/24/00

PROJECT NO: 98-42-0056
BORING: 99-401 (Yerba Buena Island)

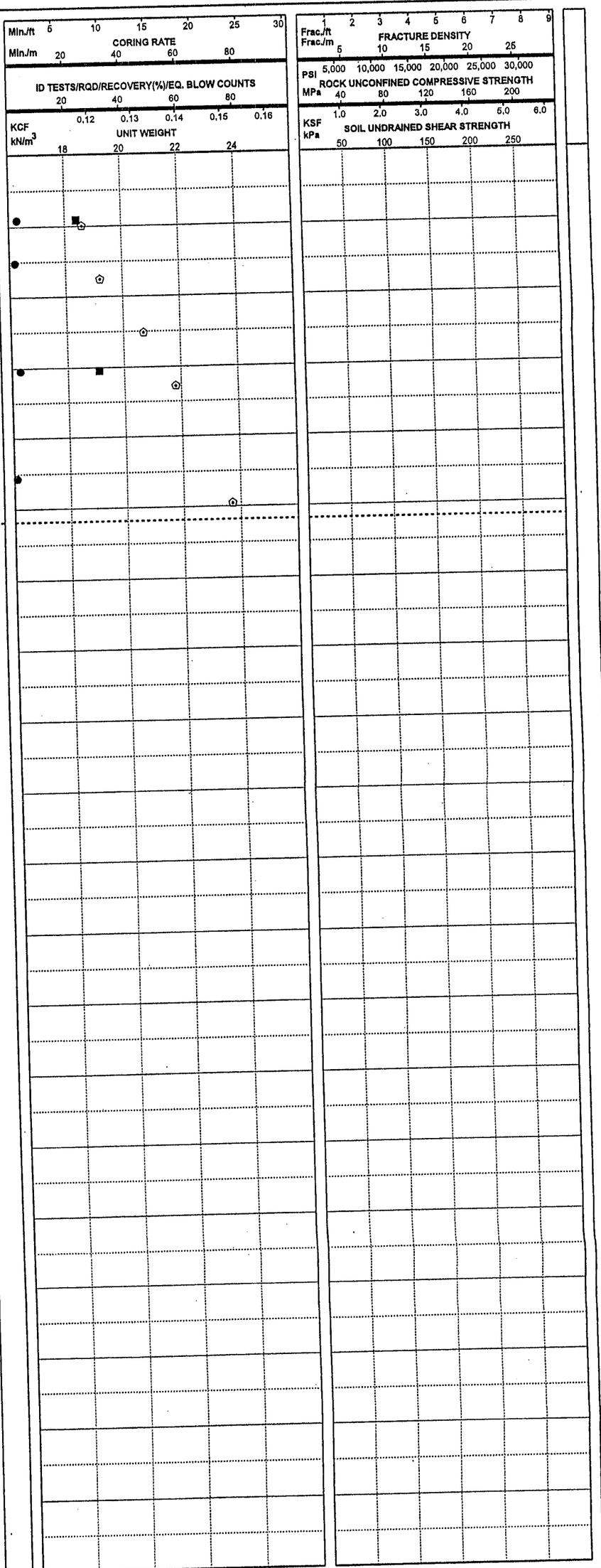
START DATE: 12/16/99
COMPLETION DATE: 12/16/99

DRILLER: PC Exploration
DRILLING METHOD: Rotary Sample Boring (Wet)

Coordinates: E1835862 N647202
CA State Plane Zone 3, NAD83, Meters

GROUND ELEVATION: 54.8m (MSL)

ELEVATION, m.	DEPTH, m.	SOIL TYPE	SAMPLER	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
					SEDIMENTARY DEPOSITS (Qa) Silty Fine SAND (SM), dense to very dense, light brown, dry -medium dense to 1.5m	I
54	1			26		
					-with some roots at 1.5m -with a trace of medium sand, below 1.5m	
53	2			32		
				47		
52	3			58		
51	4					
					-moist below 4.7m	
50	5			77		
					TOTAL DEPTH: 5.2m BACKFILLED WITH: Cement Grout	
49	6					
48	7					
47	8					
46	9					
45	10					
44	11					
43	12					
42	13					
41	14					
40	15					
39	16					
38	17					
37	18					
36	19					
35						



LOG OF BORING AND TEST RESULTS

BORING 99-401

SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

Report Date: 02/23/00

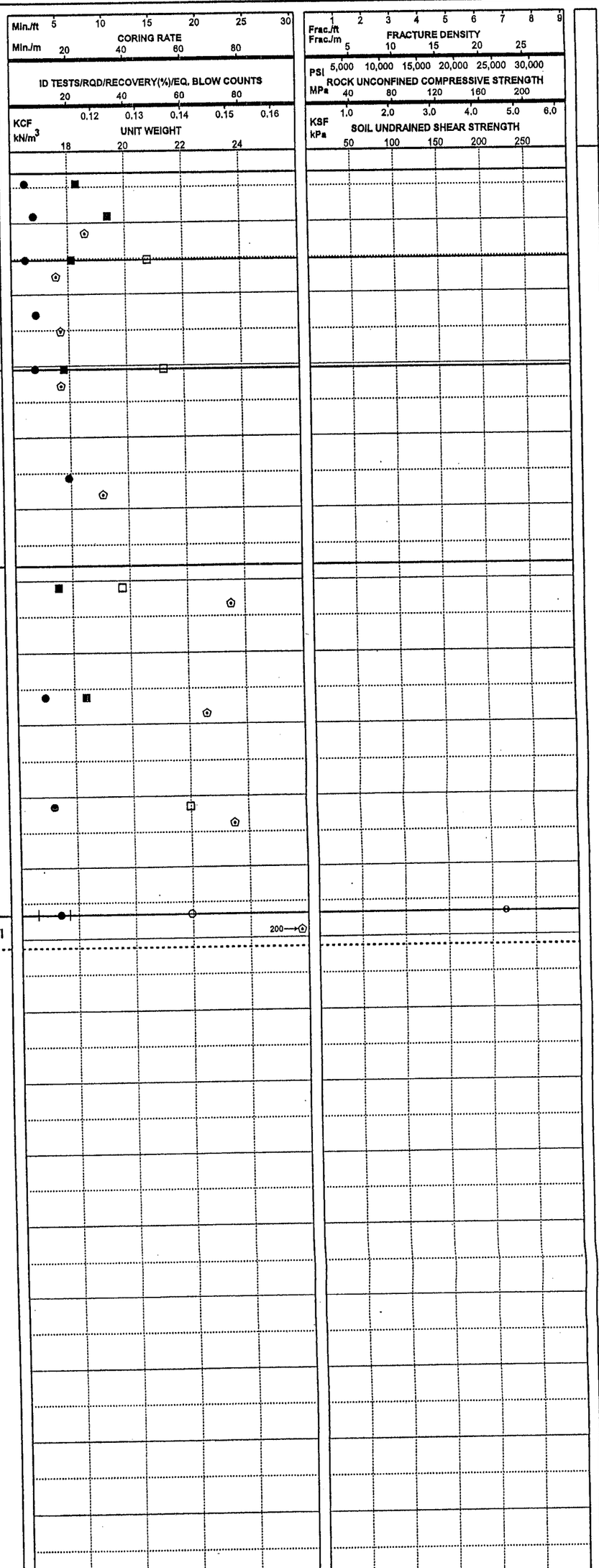
PROJECT NO:	98-42-0055	START DATE:	11/11/99	DRILLER:	Pitcher Drilling Co.
BORING:	99-402 (Yerba Buena Island)	COMPLETION DATE:	11/11/99	DRILLING METHOD:	Rotary Sample Boring (Wet)

Coordinates: E1835892 N647101
CA State Plane Zone 3, NAD83, Meters

GROUND ELEVATION: 52.6m (MSL)

Stratum No.	Material Description	Depth (m)	Blow Count
I	ARTIFICIAL FILL (af) PAVEMENT, 127mm of Asphalt Concrete over Aggregate Base -dense, light gray to light yellowish brown, dry, poorly sorted	(0.3m)	
II	Silty Fine SAND with gravel (SM), medium dense, reddish brown, moist -with a trace of fine to coarse sand, at 0.9m -25mm thick layer of angular gravel, at 1.1m -medium dense, moist, fine grained, with roots, 1.1m to 1.4m	(1.5m)	26
III	Silty Fine SAND with medium sand (SM), medium dense, reddish brown, moist -well sorted, with roots -with 13mm thick band of dark reddish brown, at 2.3m	(3.0m)	25 17
IV	Silty Fine SAND with medium sand (SM), very dense, reddish brown, moist -medium dense to dense to 5.0m	(5.8m)	27 31
V	SEDIMENTARY DEPOSITS (Qa) Silty Fine SAND with medium sand (SM), very dense, reddish brown, moist -with a trace of medium sand, mottled with light yellowish brown, -with few pockets of organic material, 7.6m to 8.1m -light yellowish brown, mottled with reddish brown, below 9.1m Estimated (9.7m)	(10.7m)	50/15cm 66 50/15cm
VI	Sandy SILT with clay (ML), very dense, light yellowish brown mottled with brownish red -with black streaks and pockets of cemented material, well sorted		50/10cm

TOTAL DEPTH: 11.1m BACKFILLED WITH: Cement Grout



LOG OF BORING AND TEST RESULTS

BORING 99-402

SFOBB East Span Seismic Safety Project

Earth Mechanics

FUGRO

Report Date: 02/24/00

PROJECT NO: 98-42-0056
BORING: 00-403 (Yerba Buena Island)

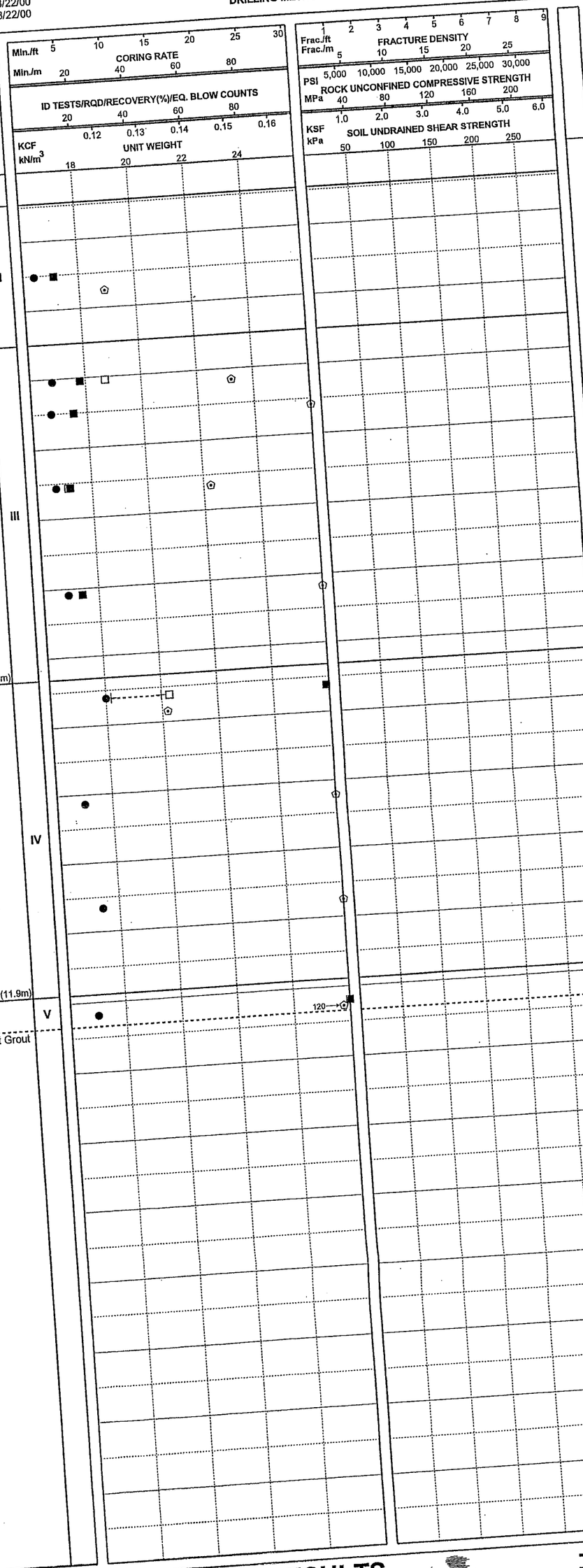
START DATE: 03/22/00
COMPLETION DATE: 03/22/00

DRILLER: PC Exploration
DRILLING METHOD: Rotary Sample Boring (Wet)

Coordinates: E1835914 N647018
CA State Plane Zone 3, NAD83, Meters

GROUND ELEVATION: 58.7m (MSL)

ELEVATION, m.	DEPTH, m.	SOIL TYPE	SAMPLER	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
					ARTIFICIAL FILL (Qaf) Asphalt Concrete over Aggregate Base (0.5m)	I
58	1				Silty Fine SAND (SM), dense to very dense, yellowish brown, damp -medium dense to 3.0m	II
57	2			29	-fine sand with silt at 1.5m (2.5m)	
56	3			77/20cm	SEDIMENTARY DEPOSITS Silty Fine SAND (SM), dense to very dense, yellowish brown, damp -with black rock fragments at 3.0m	III
55				50/15cm	-moist, below 3.5m	
54	4			50/15cm	-with red staining, below 4.6m	
53	5					
52	6			50/15cm	(7.3m)	
51	7			67	Lean CLAY (CL), very stiff, yellowish brown -dry, decomposed bedrock, with red staining -with sand below 8.0m	IV
50	8					
49	9			50/15cm		
48	10			50/15cm		
47	11				(11.9m)	
46	12			50/15cm	FRANCISCAN FORMATION (JKf) SILTSTONE (Rx), yellowish brown, intensely weathered	V
45	13				TOTAL DEPTH: 12.3m BACKFILLED WITH: Cement Grout	
44	14					
43	15					
42	16					
41	17					
40	18					
39	19					



LOG OF BORING AND TEST RESULTS

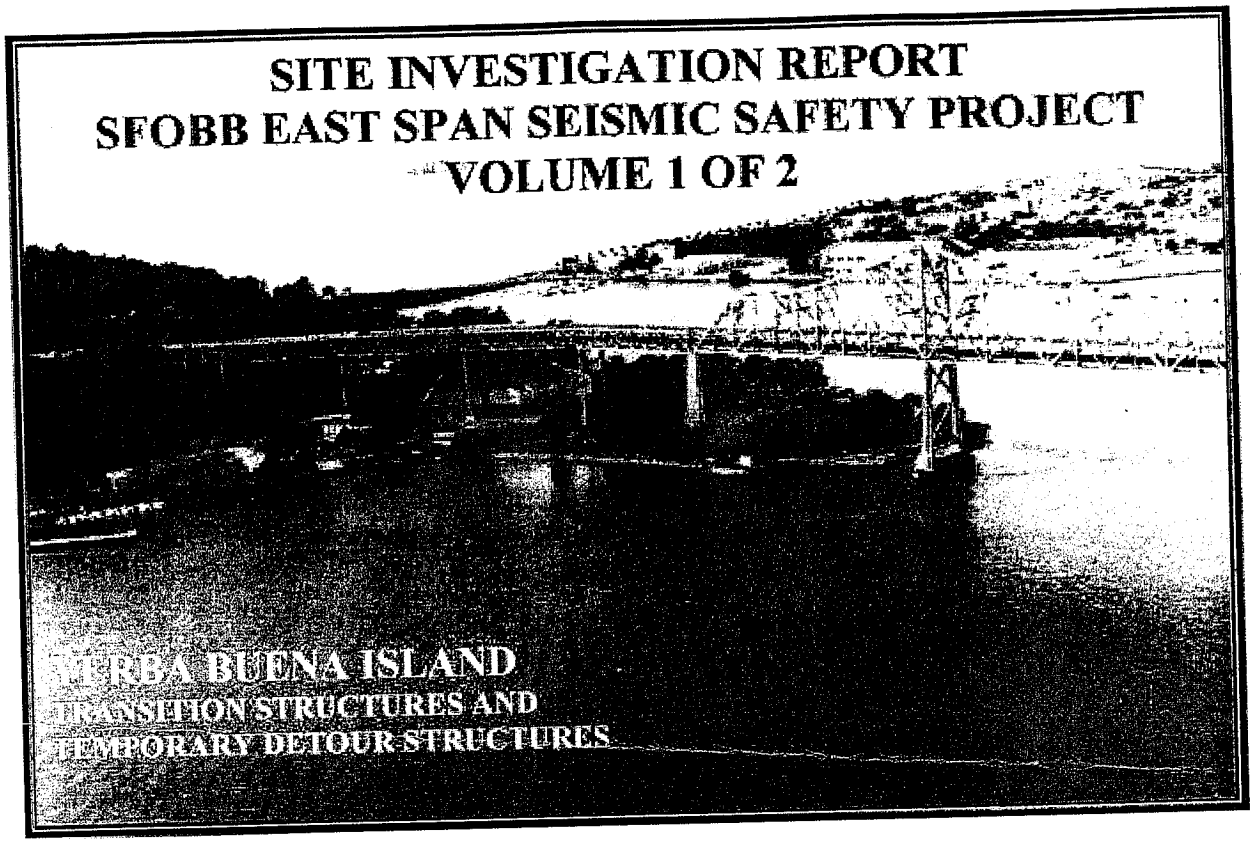
BORING 00-403

SFOBB East Span Seismic Safety Project

Earth Mechanics

Report Date: 04/17/00

SITE INVESTIGATION REPORT
SFOBB EAST SPAN SEISMIC SAFETY PROJECT
VOLUME 1 OF 2



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DISTRICT 4
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CONTRACT 43A0012
TASK ORDER NO. 04-012000-FC

JUNE 2001

Project No. E8000-06-13
June 29, 2001

California Department of Transportation - District 4
Division of Toll Bridge Program
Environmental Engineering Branch
111 Grand Avenue, 14th Floor
Post Office Box 23660
Oakland, California 94623-0660

Attention: Allen Baradar

Subject: SITE INVESTIGATION REPORT
SFOBB EAST SPAN SEISMIC SAFETY PROJECT
YERBA BUENA ISLAND
CONTRACT NO. 43A0012
TASK ORDER NO. 04-012000-FC

Dear Mr. Baradar:

In accordance with California Department of Transportation Contract No. 43A0012 and Task Order No. 04-012000-FC, Geocon Consultants, Inc. (Geocon) has performed environmental engineering services at the above-referenced project site. The project site consists of the land area of Yerba Buena Island beneath the East Span of the San Francisco-Oakland Bay Bridge on Interstate 80.

The accompanying report summarizes the services performed, including the advancement of soil borings, the collection of soil and groundwater samples, and chemical analyses.

If there are any questions concerning the contents of this report, or if Geocon may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

Matthew W. Hanko, REA
Senior Project Scientist

Richard W. Day, CEG, CHG
Regional Manager

MWH:RWD:mwh
(5) Addressee

SITE INVESTIGATION REPORT

SAN FRANCISCO-OAKLAND BAY BRIDGE (SFOBB)
INTERSTATE 80
YERBA BUENA ISLAND
SAN FRANCISCO COUNTY, CALIFORNIA

PREPARED FOR:

CALIFORNIA DEPARTMENT OF TRANSPORTATION
DISTRICT 4
DIVISION OF TOLL BRIDGE PROGRAM
111 GRAND AVENUE
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JUNE 2001

REPORT LIMITATIONS

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

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

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

GEOCON CONSULTANTS, INC.

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Senior Project Scientist

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STATE OF CALIFORNIA
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CALIFORNIA DEPARTMENT OF TRANSPORTATION
DIVISION OF TOLL BRIDGE PROGRAM - ENVIRONMENTAL ENGINEERING BRANCH

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LIST OF ACRONYMS

40 CFR	Chapter 40 of the Code of Federal Regulations
AHVOCs	Aromatic Halogenated-volatile Organic Compounds
ATL	Advanced Technology Laboratories
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
bgs	Below ground surface
BRAC	Base Realignment and Closure
Department	California Department of Transportation
CCR	California Code of Regulations
CEG	Certified Engineering Geologist
DDD	Dichlorodiphenyl dichloroethane
DDE	Dichlorodiphenyl dichloroethylene
DDT	Dichlorodiphenyl trichloroethane
EDB	Ethylene Dibromide
ELAP	Environmental Laboratory Accreditation Program
EPA	United States Environmental Protection Agency
Geocon	Geocon Environmental Consultants, Inc.
GPS	Global Positioning System
I-80	Interstate 80
IR	Installation Restoration
IRP	Installation Restoration Program
LDR	Land Disposal Restriction
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
mm	Millimeters
NAVSTA TI	Naval Station Treasure Island
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PE	Professional Engineer
ppt	parts per thousand
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
RCRA	Resource, Conservation, and Recovery Act
REA	Registered Environmental Assessor
RG	Registered Geologist
SFOBB	San Francisco-Oakland Bay Bridge
STLC	Soluble Threshold Limit Concentration
TCLP	Toxicity Characteristics Leaching Procedure
TO	Task Order

TPHd	Total Petroleum Hydrocarbons as diesel
TPHg	Total Petroleum Hydrocarbons as gasoline
TPHmo	Total Petroleum Hydrocarbons as motor oil
TTLC	Total Threshold Limit Concentration
ug/kg	micrograms per kilogram
ug/l	micrograms per liter
UCL	Upper Confidence Limit
UST	Underground Storage Tank
UTS	Universal Treatment Standard
VOCs	Volatile Organic Compounds
WET	Waste Extraction Test
WQO	Water Quality Objective
YBI	Yerba Buena Island

EXECUTIVE SUMMARY

In accordance with California Department of Transportation (Department) Contract No. 43A0012 and Task Order (TO) No. 04-012000-FC, Geocon Consultants, Inc. as performed a chemical evaluation of materials that will be excavated for a Department construction project at the San Francisco-Oakland Bay Bridge (SFOBB) Interstate 80 (I-80) East Span on Yerba Buena Island (YBI) in San Francisco County, California. The work has been performed in response to The Department proposal to replace the SFOBB East Span, located between YBI and the SFOBB Toll Plaza. The preferred replacement alternative is to construct a new bridge on an alignment that varies from 0 to 350 meters north of the existing alignment. The bridge will transition from a double-deck viaduct at YBI to two parallel bridge decks, supported by a combination of suspension and skyway designs (transition structures), to the existing touchdown area. In addition, temporary structures (detour structures) are required to shift traffic from the existing structure while the transition structures are being built. The area investigated included the area of each footprint for each pier that will be constructed for the proposed structures (Bent).

The purpose of the scope of work outlined in the Geocon *Site Investigation Workplan* dated January 2001 for TO No. 04-012000-FC was to chemically characterize soil and groundwater for potential contaminants that may be encountered during construction activities. This work was accomplished through the advancement of soil borings and the collection and analysis of soil and groundwater samples. The investigative results will be used by The Department to evaluate health and safety issues, appropriate soil re-use and disposal criteria, discharge requirements for groundwater removed from excavations, and groundwater isolation measures to prevent cross-contamination of water-bearing zones during pile and tie down installation.

HISTORICAL USE

Historical use information regarding YBI was obtained from the Clayton Environmental Consultants *Phase I Site Assessment San Francisco-Oakland Bay Bridge Yerba Buena Island Parcel Acquisition Project* dated December 31, 1996 (Phase I Report). The Navy has occupied YBI since 1898. Other cohabitating occupants of YBI since the Navy's occupation have included the United States Army and the United States Coast Guard. The Navy owned and occupied all of the adjacent man-made Treasure Island and a portion of YBI. In 1947, the occupied portions were designated collectively as NAVSTA TI, which has remained operational since its conception. In 1993, the Base Realignment and Closure (BRAC) Commission designated NAVSTA TI for closure in 1997. Within the boundaries of the proposed work area, four Installation Restoration (IR) Sites have been

identified by Installation Restoration Program (IRP) investigations. According to the Phase I Report, the IR Sites have been identified as follows:

- IR Site 8 – Located on Army Point (extreme eastern point of the island), the Army Point Sludge Disposal Area was reportedly used for drying of sludge from the wastewater treatment plant on Treasure Island between 1968 and 1976. The ultimate disposition of the sludge once it was dried was not disclosed; however, it was reported that IR Site 8 was not used for the disposal of the sludge. Based on the remedial investigation, there was no evidence of contaminants typically associated with sludge disposal in the area. As a result of a subsequent human health and ecological risk assessments, IR Site 8 was recommended for no action.
- IR Site 11 – Located on the south side of the eastern tip of YBI is a portion of land and former marsh area measuring approximately 61 meters by 183 meters known as the YBI Landfill. Based on previously performed remedial investigations and human health and ecological risk assessments, this site was recommended for further investigation due to the presence of elevated concentrations of lead, beryllium, polycyclic aromatic hydrocarbons (PAHs), and pesticides.
- IR Sites 28 and 29 consist of the soils beneath and surrounding the on- and off-ramps on the east and west side of the YBI tunnel and existing viaduct of the SFOBB. These soils are suspected of containing impacts by aerially deposited lead from both historical vehicle fuel emissions and structure painting and maintenance. Based on the RI and human health and ecological risk assessment, there is potential for risk to human health and ecological receptors.

In addition to the IR sites, the following underground storage tanks (USTs) and fuel line have been identified in the area impacted by the bridge project.

- A diesel UST was formerly located on the south side of Building 270. Building 270 is depicted in Figure 2b. The UST was removed in 1990. Soil and groundwater investigations have reported some free product floating on groundwater and diesel concentrations in groundwater up to 1,000 milligrams per liter (mg/L). The contaminated groundwater plume was reported to extend approximately 270 feet to the southwest of Building 270.
- Two inactive underground fuel pipelines, which provided fuel to the Coast Guard area, ran north to south across the eastern end of YBI, terminating in the vicinity of Building 270. The pipelines were reportedly removed in 1998.

Two existing structures consisting of a concrete Imhoff tank (above ground tank) and sewage lift station located near IR Site 11. The Imhoff tank is believed to be a wastewater settling tank for sanitary waste stream. Formerly in the area of the Imhoff tank and sewage lift station, buildings identified as a fire station, a gasoline filling station, a sawmill, an incinerator, and a storage unit were present. The disposition of two USTs that were associated with the former gasoline filling station was not reported.

SUMMARY OF ANALYTICAL DATA

Petroleum Hydrocarbons and AHVOCs in Soil

Total petroleum hydrocarbons as motor oil (TPHmo) and total petroleum hydrocarbons as diesel (TPHd) were detected in soil samples throughout the site. The laboratory analytical data indicated that the reported TPHmo and TPHd often were hydrocarbons that fall within the diesel and/or motor oil range but do not match either chromatographic pattern. It is likely that some of the hydrocarbon compounds detected were not petroleum based. However, distinct TPHmo and TPHd contaminants were present in soil samples collected from borings located at Bents EB6R, EB7L, EB7R, EB8L (each in the vicinity of Building 270), EB13L, EB14R (in the vicinity of the waste water lift station, and W5LC (in the vicinity of Building 213). Total petroleum hydrocarbons as gasoline (TPHg) was detected in 7 of 121 soil samples collected from borings in the vicinity of building 270 (EB6R) and near the area of the former waste water lift station (EB13L and EB14R) at concentrations that ranged from 5.4 milligrams per kilogram (mg/kg) to 2,200 mg/kg.

The range of TPHd concentrations in the vicinity of Building 270, Building 213, and the former wastewater lift station were from 4.8 mg/kg to 15,000 mg/kg, and the range of TPHmo was from 3.2 mg/kg to 9,700 mg/kg. Typically the higher concentrations were present in soil samples collected near the soil water interface; thus, resulting from a smearing effect from impacted groundwater.

TPHg was reported in soil samples that contained high concentrations of TPHd (those Bent locations identified above), and Aromatic Halogenated Volatile Organic Compounds (AHVOCs) were detected at low concentrations only in the presence of TPHg.

One soil sample was collected from boring W5LC at the soil-water interface (9.1 meter below ground surface). Contaminants present in this sample included 220 mg/kg of TPHg, 8,000 mg/kg of TPHd, 5,500 mg/kg of TPHmo, 4-isopropyltoluene (650 micrograms per kilogram [ug/kg]), isopropylbenzene (500 ug/kg), n-butylbenzene (1,900 ug/kg), n-propylbenzene (800 ug/kg), and naphthalene (12,000 ug/kg). No other boring in the vicinity of Bent W5L was advanced to the soil-water interface; however, it is likely that soil conditions at other Bents in the vicinity will be of similar quality.

Due to the depth of the potential petroleum-contaminated soil on most of the site, these contaminants would only be encountered during pile installation. However, excavations for some pile caps at lower elevations of the site near Building 270 and the former waste water lift station may also be of sufficient depth to encounter petroleum-contaminated soil. These soils should be removed from the site to an appropriate landfill or treated prior to reuse. The foundations affected potentially extend

from Bent W7 to Bent W4 on the transition structure alignment and from Bent EB4 to Bent EB17 and from Bent WB13 to Bent WB18 on the detour structure alignment.

Organochlorine Pesticides and PCBs in Soil

A total of 132 soil samples were analyzed for organochlorine pesticides and polychlorinated biphenyls (PCBs), of which, pesticides were present in 17 samples and PCBs were present in four samples.

The pesticides detected included DDT and its metabolites DDE and DDD, Endosulfan I, Aldrin, beta-BHC, and delta-BHC. DDT was the only pesticide that was greater than the respective Universal Treatment Standard (UTS). The UTS for DDT is 870 ug/kg and the maximum DDT concentration was 1,100 ug/kg in sample WB7L at 0.3 meters below ground surface (bgs). This was the only DDT detection greater than the UTS.

Pesticide concentrations exceeded Total Threshold Limit Concentration (TTLC) in only one sample, WB7L at 0.3 meters bgs. The TTLC for DDT and its metabolites is 1,000 ug/kg. The cumulative DDT and metabolite concentration in sample WB7L at 0.3 meters is 1,810 ug/kg.

Widespread accumulations of pesticides are not indicated by the analysis results. However, excavated material represented by sample WB7L at 0.3 meters bgs would be characterized as non-Resource, Conservation and Recovery Act (non-RCRA) hazardous. Since the concentrations of DDT, DDE, and DDD are less than 10 times the respective UTS, treatment prior to land disposal is not required.

The PCB Aroclors detected in soil were present at concentrations less than the respective TTLCs and UTSs.

Title 22 Metals and pH in Soil

A total of 138 discrete soil samples and 13 composite soil samples were analyzed for Title 22 metals, and an additional 387 discrete and 72 composite soil samples were analyzed for total lead only. Thus, 525 lead analytical results were obtained from discrete soil samples. Title 22 Metals were not detected at total concentrations greater than respective TTLC values, except lead; and metals with concentrations that exceeded 10 times the STLC included barium, chromium, copper, and lead. The barium, chromium, and copper values that exceeded 10 times the Soluble Threshold Limit Concentration (STLC) were each present in one respective discrete soil sample at boring location

EB14R. Lead concentrations in discrete soil samples that exceeded the TTLC or 10 times the STLC were present in 152 soil samples.

- The soluble barium, chromium, and copper concentrations did not exceed their respective STLC values.
- A total of 525 discrete soil samples and 85 composite soil samples were analyzed for lead. Of the 525 discrete samples analyzed for lead, 136 had lead concentrations that were equal to or greater than 50 mg/kg and 16 had concentrations that were equal to or greater than 1,000 mg/kg. A total of 98 Water Extraction Test (WET) analyses for lead was performed on discrete soil samples where lead concentrations were greater than 50 mg/kg, of which, 45 of the analytical results demonstrated concentrations that were equal to or greater than the STLC value for lead of 5.0 mg/L. A total of 38 Toxicity Characteristic Leaching Procedure (TCLP) analyses were performed for discrete soil samples where the total lead concentration exceeded 1,000 mg/kg and/or the WET result exceeded 5.0 mg/L, and only two results exceeded the TCLP value for lead of 5 mg/L. A statistical analysis for the lead data was performed for discrete samples across the entire site. 90% Upper confidence Levels (UCLs) for the total lead means ranged from 453 mg/kg at the surface to 69 mg/kg at 2 feet bgs. The statistical analysis is included as Appendix D.
- 29 soil samples that had total lead concentrations greater than 50 mg/kg were analyzed for pH. The pH ranged from 5.34 to 9.05.

Lead was the only metal detected at concentrations above regulatory thresholds. Concentrations that exceed typical naturally occurring levels are generally confined to unpaved areas within 0.9 meters bgs. The exception to this trend is within the area of the former wastewater lift station (IR Site 11) where higher concentrations were detected at depths of 1.5 and 3.4 meters. With the exception of the contaminated material at locations EB14R and EB15L (adjacent to the former waste water lift station), excavated material with lead contamination would be characterized as non-RCRA hazardous. Excavated material with lead contamination at locations EB14R and EB15L would be characterized as RCRA hazardous.

There were a total of 18 borings where discrete and composite samples were analyzed at similar depths for total lead. Comparison of the composite with the corresponding discrete sample results indicate that high concentrations in one or two of the samples caused the some of the composite sample concentrations to exceed regulatory thresholds. This occurred at W7E, W3R, W3L, W5R, and W9L.

Discrete sample analysis performed at locations where composite samples were analyzed indicate that segregating excavated materials within paved and unpaved areas at Pier W5R will result in the characterization of less material as non-RCRA hazardous.

PAHs in Soil

A total of 120 discrete soil samples and 16 composite soil samples were analyzed for PAHs. Of the 120 discrete soil samples analyzed for PAHs: 59 samples had non-detectable concentrations and 61 samples had detectable concentrations of PAHs above the respective laboratory reporting limit, with five samples containing concentrations that exceeded respective UTS. None of the PAH concentrations that exceeded the UTS were present at concentrations greater than 10 times the respective UTS; thus, there should be no Land Disposal Restriction (LDR) for soil containing PAHs. Composite soil sample results for PAHs indicated that PAHs detected were less than the UTS. The PAH concentrations in all remaining soil samples were present at concentrations less than the UTSs and generally less than 1 mg/kg. The 5 boring locations that had detectable concentrations of PAHs greater than the UTSs are borings WB7L, EB8L, EB14R, W4R, and W5LC.

Groundwater Analytical Data

Groundwater was encountered in eight boreholes locations (EB6R, EB7L, EB8L, EB9L, EB10R, EB13L, EB14R, and W5L). TPHd was present in groundwater at all sampled locations. The areas where groundwater was encountered include the following:

- Eastbound detour Bents in the vicinity of and within the influence of the former diesel UST release at Building 270 (EB6R, EB7R, EB8L, EB9L, and EB10R),
- In the vicinity of the former waste water lift station (EB13L and EB14R), and
- In the vicinity of Building 213 the current fire station for YBI and Treasure Island (W5L).

Borings W4LC and W4LD were advanced to approximately 6 meters bgs to bedrock and saturated conditions were not encountered; however, petroleum hydrocarbon odors were noted in soil immediately above the termination depths where it was not present in the soil profile above that point. The TPHd odor at depth indicates that TPHd impacted groundwater has had a historical presence in the area of exploration. It is possible that TPHd impacted groundwater encountered near Building 213 may be connected to the historical groundwater impacts in the vicinity of borings W4LC and W4LD; thus, demonstrating a diesel plume that may impact other Bents in the vicinity.

TPHd concentrations ranged from 3.1 mg/L (EB9L) to 1,200 mg/L (EB7R). TPHg was also present in five of the six groundwater samples analyzed at concentrations that ranged from 0.12 mg/L (EB7R) to 0.57 mg/L (W5LC); however, the laboratory reported the TPHg as gasoline range organics and indicated that where TPHg was detected, hydrocarbons were within the gasoline range, but do not match the gasoline pattern.

Volatile Organic Compounds (VOCs) were only present in the groundwater sample (W5LC) and were inclusive of benzene (0.88 micrograms per liter [ug/L]), total xylenes (2.14 ug/L), 1,2,4-trimethylbenzene (6.3 ug/L), and naphthalene (39 ug/L). Semi-Volatile Organic Compounds (SVOCs) were present in three of the eight samples analyzed (EB8L, EB13L, and W5LC) inclusive of 2-methylnaphthalene (max. 68 ug/L), phenanthrene (max. 93 ug/L), and fluorene (max. 11 ug/L). The compounds 2-methylnaphthalene and phenanthrene are also classified as PAHs. The Water Quality Objective (WQO) for PAHs is a cumulative total for all PAHs with no target concentrations for specific PAHs. Thus, the WQO for cumulative PAH is 15 ug/L. Therefore groundwater in the vicinity of EB8L, EB13L, and W5LC have PAH concentrations that exceed the WQOs.

The groundwater analyses indicate widespread petroleum contamination affecting a large portion of the project area, potentially extending from Bent W7 to Bent W4 on the transition structure alignment and from Bent EB4 to Bent EB15 and from Bent WB13 to Bent WB18 of the detour structure alignment.

The Title 22 dissolved metals were analyzed for in three samples from Bents W5L, EB13L and EB14R. Title 22 metals arsenic, chromium, copper, lead, and nickel, are present at concentrations exceeding the WQOs for surface water with a salinity greater than 5 parts per thousand (ppt). Mercury was not detected above the laboratory reporting limit, of 0.004 mg/L, however the listed WQOs for the 4-day and 1-hour averages are 0.000025 mg/L and 0.0021 mg/L, respectively. Therefore, mercury concentrations could not be compared with its WQOs. Other dissolved metals were not detected at concentrations greater than the 4-day or 1-hour average WQOs.

If dewatering is to be conducted during construction activities, then it is recommended that confirmation sampling of groundwater from the excavation be performed before dewatering operations commence. If elevated results are confirmed, then the discharge must be managed such that it will conform to the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) WQOs or conditions of applicable general permits for groundwater discharges.

In addition, at locations where pile installation will involve passing through more than one water-bearing zone, the pile type or installation technique should result in isolation of the pile excavation from the impacted groundwater.

Based on groundwater analytical data, groundwater encountered during construction may require treatment for elevated metals, TPHg, TPHd, and TPHmo. Granular activated carbon filtration would be the recommended treatment method for petroleum hydrocarbons. Geocon recommends that, when practical, engineering controls should be utilized to minimize the volume of extracted groundwater.

The highest metal concentration was 4.1 mg/L of lead at location EB14R, which coincides with an unusually high soluble lead concentration in the soil sample. Further investigation may be warranted at this location to determine the nature of the lead compounds present.

SITE INVESTIGATION REPORT

1.0 INTRODUCTION

This Site Investigation Report presents the results of a limited subsurface soil and groundwater investigation performed at the subject site. This Site Investigation Report was prepared under California Department of Transportation (Department) Contract No. 43A0012 and Task Order (TO) No. 04-012000-FC.

The work performed for this investigation took place in San Francisco County, California at the San Francisco-Oakland Bay Bridge (SFOBB) Interstate 80 (I-80) East Span on Yerba Buena Island (YBI). The investigation focused on: 1) the land area in the shadow of the existing bridge where new piers will be constructed; and 2) the location of the new access roadways. The project location is depicted on the attached Vicinity Map, Figure 1.

The Navy formerly occupied portions of YBI and all of Treasure Island, collectively known as Naval Station Treasure Island (NAVSTA TI). Portions of the investigation area are located within the former NAVSTA TI boundary and United States Coast Guard boundary where former NAVSTA TI operations have resulted in hazardous materials impacts to the soil and groundwater.

1.1 Proposed Improvements and Project Description

The Department proposes to replace the SFOBB East Span between YBI and the SFOBB Toll Plaza, in San Francisco and Alameda Counties. The preferred replacement alternative is to construct a new bridge on an alignment that varies from 0 to 350 meters north of the existing alignment. The bridge will transition from a double-deck viaduct at YBI to two parallel bridge decks (transition structures), supported by a combination of suspension and skyway designs, to the existing Oakland touchdown area. In addition, temporary structures (detour structures) are required to shift traffic from the existing structure while the transition structures are being built. The foundations for the transition and detour structures on YBI will consist of cast-in-place piles with pile caps and footings with bedrock tie downs.

1.2 Purpose

The purpose of the scope of work outlined in the Geocon *Site Investigation Workplan* dated January 2001 for TO No. 04-012000-FC was to chemically characterize soil and groundwater for potential contaminants that may be encountered during construction activities. This work was accomplished through the advancement of soil borings and the collection and analysis of soil and groundwater

samples. The soil boring locations are depicted on Figures 2a through 2d. The investigative results will be used by The Department to evaluate health and safety issues, appropriate soil re-use and disposal criteria, discharge requirements for groundwater removed from excavations, and groundwater isolation measures to prevent cross-contamination of water-bearing zones during pile and tie down installation.

2.0 BACKGROUND

The following section presents a brief historical use perspective of YBI.

2.1 Historical Use

Historical use information regarding YBI was obtained from the Clayton Environmental Consultants *Phase I Site Assessment San Francisco-Oakland Bay Bridge Yerba Buena Island Parcel Acquisition Project* dated December 31, 1996 (Phase I Report). The Navy has occupied YBI since 1898. Other cohabitating occupants of YBI since the Navy's occupation have included the United States Army and the United States Coast Guard. The Navy owned and occupied all of the adjacent man-made Treasure Island and a portion of YBI. In 1947, the occupied portions were designated collectively as NAVSTA TI, which has remained operational since its conception. In 1993, the Base Realignment and Closure (BRAC) Commission designated NAVSTA TI for closure in 1997. Within the boundaries of the proposed work area, four Installation Restoration (IR) Sites have been identified by Installation Restoration Program (IRP) investigations. According to the Phase I Report, the IR Sites have been identified as follows:

- IR Site 8 – Located on Army Point (extreme eastern point of the island), the Army Point Sludge Disposal Area was reportedly used for drying of sludge from the wastewater treatment plant on Treasure Island between 1968 and 1976. The ultimate disposition of the sludge once it was dried was not disclosed; however, it was reported that IR Site 8 was not used for the disposal of the sludge. Based on the remedial investigation, there was no evidence of contaminants typically associated with sludge disposal in the area. As a result of a subsequent human health and ecological risk assessments, IR Site 8 was recommended for no action.
- IR Site 11 – Located on the south side of the eastern tip of YBI is a portion of land and former marsh area measuring approximately 61 meters by 183 meters known as the YBI Landfill. Based on previously performed remedial investigations and human health and ecological risk assessments, this site was recommended for further investigation due to the presence of elevated concentrations of lead, beryllium, polycyclic aromatic hydrocarbons (PAHs), and pesticides.
- IR Sites 28 and 29 consist of the soils beneath and surrounding the on- and off-ramps on the east and west side of the YBI tunnel and existing viaduct of the SFOBB. These soils are suspected of containing impacts by aerially deposited lead from both historical vehicle fuel emissions and structure painting and maintenance. Based on the RI and human health and ecological risk assessment, there is potential for risk to human health and ecological receptors.

In addition to the IR sites, the following underground storage tanks (USTs) and fuel line have been identified in the area impacted by the bridge project.

- A diesel UST was formerly located on the south side of Building 270. Building 270 is depicted in Figure 2b. The UST was removed in 1990. Soil and groundwater investigations have reported some free product floating on groundwater and diesel concentrations in groundwater up to 1,000 milligrams per liter (mg/L). The contaminated groundwater plume was reported to extend approximately 270 feet to the southwest of Building 270.
- Two inactive underground fuel pipelines, which provided fuel to the Coast Guard area, ran north to south across the eastern end of YBI, terminating in the vicinity of Building 270. The pipelines were reportedly removed in 1998.

Two existing structures consisting of a concrete Imhoff tank (above ground tank) and sewage lift station located near IR Site 11. The Imhoff tank is believed to be a wastewater settling tank for sanitary waste stream. Formerly in the area of the Imhoff tank and sewage lift station, buildings identified as a fire station, a gasoline filling station, a sawmill, an incinerator, and a storage unit were present. The disposition of two USTs that were associated with the former gasoline filling station was not reported.

2.3 Contaminants of Concern

The primary contaminants of concern at the subject site are (1) lead due to vehicle emissions, lead-based paint debris from existing structures, and from NAVSTA TI landfill activities; and (2) total petroleum hydrocarbons due to fuel transmission and storage activities. In addition to lead and petroleum hydrocarbons, select soil and groundwater samples were analyzed for the following list of compounds due to prior and current industrial and NAVSTA TI activities.

- Title 22 metals
- PAHs (soil samples only) and other Semi-Volatile Organic Compounds (SVOCs) (groundwater samples only)
- Aromatic Halogenated Volatile Organic Compounds (AHVOCs) (soil samples only)
- Organochlorine Pesticides (soil samples only)
- Polychlorinated Biphenyls (PCBs) (soil samples only)

2.4 Hazardous Waste Determination Criteria

Regulatory criteria to classify a waste as Resource, Conservation, and Recovery Act (RCRA) hazardous and non-RCRA hazardous for handling and disposal purposes are contained in the *California Code of Regulations (CCR)*, Title 22, Division 4.5, Chapter 11, Article 3, Chapter 40 of the Code of Federal Regulations (40 CFR), Chapter 1, Part 261. For a waste containing metals, the

waste is classified as non-RCRA when: 1) the total metal content exceeds its Total Threshold Limit Concentration (TTLC); or 2) the soluble metal content exceeds its Soluble Threshold Limit Concentration (STLC) based on Waste Extraction Test (WET) analysis. A material is classified as RCRA hazardous when the soluble metal content exceeds the Federal Regulatory Level based on Toxicity Characteristic Leaching Procedure (TCLP) testing.

State and/or federal regulatory levels have also been established for select pesticides, Volatile Organic Compounds (VOCs), SVOCs, and PAHs. Currently, regulatory criteria for the classification of wastes containing petroleum hydrocarbons have not been promulgated.

The above regulatory criteria are based on toxicity. Wastes may also be classified as hazardous based on other criteria such as corrosivity and ignitability. However, for the purposes of this investigation, toxicity (e.g., concentration) is the primary factor considered for waste classification since waste generated during the construction activities would not likely warrant testing for corrosivity, ignitability or other criteria.

Waste that is classified as either non-RCRA hazardous or RCRA hazardous requires management as a hazardous waste. According to 40 CFR 268.49, soil containing listed wastes or exhibiting a characteristic of a hazardous waste are subject to Land Disposal Restrictions (LDRs) and must undergo treatment to reduce the contaminant concentration by 90 percent. If the 90 percent reduction would result in a concentration less than 10 times the Universal Treatment Standard (UTS), treatment to achieve a concentration of less than 10 times the UTS does not have to be performed. In effect, if the contaminant concentration in soil does not exceed 10 times the UTS, treatment prior to land disposal is not required.

3.0 SCOPE OF SERVICES

Geocon performed the following scope of services that included site meetings, on-site fieldwork, laboratory analyses, and preparation of this Site Investigation Report.

3.1 Pre-Field Activities

- Conducted the pre-work site visit in January 2001. The Department representatives Gabriel Tcruz and Geocon representative Richard Day attended the meeting. The pre-work meeting was performed to locate and inspect the work areas, and to discuss logistics (e.g.; soil sampling methodologies). During this meeting, the Department and Geocon contract managers executed the Site Visit Checklist, Completion Schedule, and Notice to Proceed.
- Prepared a health and safety plan for the proposed field activities. The health and safety plan provided guidelines on the use of personal protective equipment and the health and safety procedures implemented during the field activities.
- Obtained a Department encroachment permit (Permit No. 0401-NSV0126) to perform the field activities within The Department right-of-way included as Appendix A; and obtained permission to enter United States Navy and United States Coast Guard properties.
- Contacted the local public utilities via Underground Service Alert and hired a private utility locator to perform a utility survey to attempt to delineate subsurface public and private utilities and conduits in proximity to the boring locations.
- Retained the services of Gregg Drilling, a Department-approved and California-licensed driller, to perform the drilling work; Advanced Technology Laboratories (ATL), a California-certified hazardous materials testing laboratory (ELAP No.: 1838), to perform soil and groundwater analyses; and Cruz Brothers Subsurface Locators, Inc. to locate underground utilities in the vicinity of the boring locations.

3.2 Field Activities

The fieldwork for this project was performed under the direct supervision of Geocon's field supervisor and/or project manager.

- Utilized a Global Positioning System (GPS) unit to locate each boring. Borings were located based on landmarks in the absence of adequate satellite connections.
- Prior to drilling, a utility survey was performed by Cruz Brothers Subsurface Locators, Inc. to identify and delineate potential underground utilities and structures at all designated hollow stem auger boring locations.
- 142 borings were advanced using a hand auger, direct push, or a hollow stem auger rig at the subject site. The boring locations and identifications are depicted on Figures 2a through 2d. The boring locations were categorized into two investigation units as follows:
    - Transition Structures (W2 through W11 and W7E through W10E)
    - Detour Structures (WB1 through W22 and EB1 through EB17)
- Soil samples were collected from the borings at the depths shown in Tables 2 through 5.

- Groundwater samples were collected from borings EB6R, EB7R, EB8L, EB9L, EB10R, EB13L, EB14R, and W5LC.
- Soil and groundwater samples were containerized, labeled, placed in a cooler with ice, and transported to ATL in Signal Hill, California for chemical analyses under standard chain-of-custody procedures.
- The borings were logged by Geocon personnel under the supervision of a California Certified Engineering Geologist (CEG) using the Unified Soil Classification System. Boring logs are included as Appendix B.
- Prior to, and following each use of the sampling equipment, the equipment was decontaminated with an Alconox wash solution, rinsed with tap water, and a final rinse with distilled water. Where hollow-stem auger drilling was utilized, steam-cleaned hollow-stem auger flights were used. Sufficient quantities of auger flights were delivered to the site so that there was no reuse of the flights.
- Upon completion of the soil sampling with the direct push rig, the borings were backfilled with Portland Cement grout. Shallow hand auger borings were backfilled with the soil cuttings with the exception of those hand auger borings advanced in the vicinity of the YBI Department Maintenance Station. For those hand auger borings, the boreholes were backfilled with Portland Cement grout. For each boring advanced through a paved surface, the boreholes are capped with concrete.
- Soil cuttings and decontamination water generated during the field activities were placed in US Department of Transportation-approved drums, labeled, and stored in a secure area adjacent to a bridge pier near Building 213 (firehouse) pending analysis and disposal.

4.0 INVESTIGATIVE METHODS

The rationale and method of investigation for the boring advancement, sampling procedures and protocols, and laboratory analyses are discussed below.

4.1 Soil Sampling

The boring locations, soil boring identification, the soil and groundwater sampling frequency, and the analytical program were specified by The Department's Division of Toll Bridge Program, Environmental Engineering Branch personnel. The boring locations were chosen to fall within the limits of planned excavation for the detour and transition structures. The soil sampling intervals were selected systematically with denser spacing at shallow depths where lead deposits are generally found. At large foundation locations, samples were composited by depth to obtain a representative sample of the material to be excavated.

Coordinates for the boring locations were derived from the Department provided CADD files and an attempt was made to locate the designated borings with a Trimble Pathfinder GPS unit prior to advancing borings. The accuracy of the GPS unit was within one meter of horizontal delineation. The GPS unit receives global positioning information from a network of satellites. Due to interference from the existing SFOBB blocking adequate satellite connection with the GPS unit, many of the boring locations were not located with the GPS unit. Those borings not located with the GPS unit were located based on landmarks. A summary of the GPS surveyed coordinates is presented in Table 1.

Some boring locations, sample depths, and laboratory analysis deviated from the TO protocol with concurrence by the Department contract manager. Some soil samples designated in the TO were not collected from various borings due to refusal (e.g.; encountered bedrock). Some boring locations were eliminated due to restrictions of the terrain or structures. In some cases for the transition structure locations, one boring was advanced to represent a portion or all of a transition structure footing area.

Soil borings and soil sampling were performed at various locations by one of three methods:

- A stainless steel hand auger was used to advance borings. Soil samples to be analyzed for target analytes other than metals, and all surface soil samples were retrieved utilizing a slide hammer equipped sample bucket lined with one 152.4-millimeter (mm) long by 50.8-mm diameter (6-inch long by 2-inch diameter) stainless steel sample tube to facilitate sample handling and storage. For all soil samples that were to be analyzed for metals only, the soil samples were collected from the auger bucket and placed into sealed plastic bags.
- A truck-mounted Geoprobe sampling system was used to advance borings, and soil samples were retained in acetate liners to facilitate sample handling and storage.

- A truck-mounted hollow-stem auger drilling rig was used to advance borings, and soil samples were collected utilizing an 0.45-meter (18-inch) California Modified Split Spoon sample bucket lined with three 152.4-mm by 50.8-mm stainless steel sample tubes to facilitate sampling handling and storage.

The sleeve sections from the Geoprobe sampling system and stainless steel sample tubes from the slide hammer and split spoon samplers were fitted with Teflon® sheets on each end, and secured with plastic caps. All samples were labeled, placed in a chilled cooler, and transported to ATL using standard chain-of-custody procedures.

At all boring locations, borings were advanced until refusal was encountered or to the designated termination depth. The borings ranged in depth from 0.3 to 9.1 meters (1 to 30 feet) below ground surface (bgs). The actual sampling depths for each boring are presented in Tables 2 through 5.

Quality assurance/quality control (QA/QC) procedures provided during the field activities included cleansing/rinsing of the sampling equipment and the use of pre-cleaned augers/samplers at each boring location. Cleansing/rinsing of the sampling equipment was performed prior to the collection of each soil sample by washing the equipment with an Alconox wash solution followed by tap water and deionized water rinses.

4.3 Groundwater Sampling

Groundwater was encountered at a depth of approximately 2.4 meter (8 feet) bgs in the vicinity of the Building 270 (EB6 through EB10) and at approximately 9.5 meters (31 feet) in the vicinity of the existing firehouse (Building 213) (W5LC). At each boring, groundwater sampling was accomplished by placing a 19-mm (3/4-inch) diameter polyvinyl chloride (PVC) slotted casing to the termination depth of the open borehole and used as a temporary casing. The groundwater samples were collected from within the temporary casing using pre-cleaned disposable bailers. Groundwater samples were placed in appropriate laboratory-provided containers, labeled, placed in a chilled cooler, and transferred to ATL under standard chain-of-custody procedures. The PVC casing was removed following sample collection. The boreholes were then abandoned by grouting with neat cement and capped with concrete where appropriate.

4.4 Laboratory Analyses

Soil samples were submitted to the laboratory for the following analyses:

- Title 22 metals following United States Environmental Protection Agency (EPA) Test Method 6010/7471

- AHVOCs following EPA Test Method 8021B (with the exception of the 0.2-m surface samples)
- Single Element (Lead) following EPA Test Method 6010
- PAHs following EPA Test Method 8310
- Organochlorine Pesticides and PCBs following EPA Test Method 8080/8081
- Total Petroleum Hydrocarbons as gasoline (TPHg) following modified EPA Test Method 8015
- Total Petroleum Hydrocarbons as diesel (TPHd) and as motor oil (TPHmo) following modified EPA Test Method 8015B

In addition to the above analyses, soil samples that exhibited a total metal concentration greater than ten times its respective STLC value were subsequently analyzed for the appropriate soluble metal via WET analyses. Those samples that contained soluble lead concentrations greater than 5.0 mg/L or total lead concentrations greater than 1,000 milligrams per kilogram (mg/kg) were analyzed by TCLP. The TCLP was not performed on samples with WET results less than 5.0 mg/L. Selective soil samples were also analyzed for pH.

The following analyses were conducted on various groundwater samples:

- AHVOCs following EPA Test Method 8021B
- TPHg following modified EPA Test Method 8015
- TPHd and TPHmo following modified EPA Test Method 8015B
- Dissolved Title 22 metals following EPA Test Method 6010/7471
- SVOCs following EPA Test Method 8270

The water samples analyzed for dissolved Title 22 metals were filtered by the analytical laboratory upon receipt, prior to preservation.

QA/QC procedures were performed for each method of analysis with specificity for each analyte listed in the test method's QA/QC. The laboratory QA/QC procedures included the following:

- One method blank for every ten samples, batch of samples, or type of matrix, whichever was more frequent.
- One sample analyzed in duplicate for every ten samples, batch of samples, or type of matrix, whichever was more frequent.
- One spiked sample for every ten samples, batch of samples, or type of matrix, whichever was more frequent, with the spike made at ten times the detection limit or at the analyte level.

Prior to submitting the soil and groundwater samples to the laboratory, the chain-of-custody documentation was reviewed for accuracy and completeness. The laboratory reports were also reviewed for accuracy and consistency with the chain-of-custody documentation. In addition, the laboratory QA/QC summary reports were reviewed to determine if the laboratory results are within tolerance control limits. Based upon this review process, the data quality appears to be adequate.

5.0 INVESTIGATION RESULTS

The investigation results from the soil and groundwater sampling are discussed below.

5.1 Soil

A summary of the analytical laboratory test results for TPHg, TPHd, TPHmo, AHVOCs, Organochlorine Pesticides, and PCBs is presented in Table 2, and Figures 3 and 4 depict a distribution of the contaminants in soil. Table 3 summarizes the analytical laboratory test results for total Title 22 metals. Table 4 contains a summary of the analytical laboratory test results for PAHs and Figure 5 depicts the distribution of PAHs in soil at concentrations that match or exceed UTSs. Table 5 summarizes the analytical laboratory test results for lead as: Total, WET, and TCLP and also presents the pH results for soil. The distribution of lead in soil as Total, WET, and TCLP are presented on Figure 6. Copies of the laboratory reports and chain-of-custody documentation for the soil samples are included in Appendix C.

5.1.1 Petroleum Hydrocarbons and AHVOCs

A total of 121 soil samples were analyzed for TPHg, 147 analyzed for TPHd, 98 analyzed for TPHmo, and 152 analyzed for AHVOCs. Of the soil samples subjected to TPHg, TPHd, TPHmo, and AHVOCs laboratory analyses:

- TPHg was present in 7 of 121 samples analyzed at concentrations ranging from 5.4 mg/kg (EB13L at 3.3 meters bgs) to 2,200 mg/kg (EB8L at 1.2 meters bgs).
- TPHd was detected in 121 of 147 soil sample analyzed. TPHd was most commonly reported at concentrations of less than 100 mg/kg and frequently the laboratory indicated that samples contain hydrocarbons that fall within the diesel range but do not match the diesel pattern. The maximum TPHd concentration was 15,000 mg/kg in sample EB8L at a depth of 1.2 meters bgs. The higher TPHd concentrations that did fall within the diesel range and match the diesel pattern were detected in borings EB6R, EB7L, EB7R, EB8L, EB13L, EB14R, and W5LC.
- TPHmo was present in 72 of 98 soil samples analyzed. TPHmo was most commonly detected at concentrations less than 100 mg/kg. The maximum TPHmo concentration was 9,700 mg/kg in sample EB14R at a depth of 3.3 meters;
- AHVOCs were present in 11 of 152 soil samples analyzed. Dichlorodifluoromethane was present at the detection limit (50 micrograms per kilogram [ug/kg]) in 8 of the soil samples. Other AHVOCs detected included ethylbenzene and xylenes in two soil samples, EB8L at 1.2 meters bgs and W4R at 7 meters bgs; and
- The most highly impacted sample was collected from boring W5LC at the soil-water interface (9.1 meter bgs). Contaminants present in this sample included 220 mg/kg of TPHg, 8,000 mg/kg of TPHd, 5,500 mg/kg of TPHmo, and 4-isopropyltoluene (650 ug/kg),

isopropylbenzene (500 ug/kg), n-butylbenzene (1,900 ug/kg), n-propylbenzene (800 ug/kg), and naphthalene (12,000 ug/kg).

The laboratory reported that the majority of the detected concentrations of TPHd and TPHmo did not match the diesel or motor oil pattern; however the quantitation is based on the respective diesel or motor oil standard.

5.1.2 Organochlorine Pesticides and PCBs

A total of 132 soil samples were analyzed for organochlorine pesticides and PCBs. Of the 132 soil samples subjected to laboratory analyses, pesticides were present in 17 samples and PCBs were present in four samples. The most common pesticide detected was DDT and its metabolites DDE and DDD. The cumulative concentration of DDT and its metabolites ranged from 4.5 ug/kg in sample W8E at the surface to 1,810 ug/kg in sample WB7L at 0.3 meters bgs.

Other pesticides detected included Endosulfan I present in three soil samples, with a maximum concentration of 320 ug/kg. Aldrin (4.4 ug/kg), beta-BHC (6.4 ug/kg), and delta-BHC (3.5 ug/kg) were all detected in one soil sample.

The PCBs detected included Aroclor 1254 at 370 ug/kg in EB12L at the surface; Aroclor 1260 at 65 ug/kg and 240 ug/kg in EB14L at 0.3 meters bgs and 1.52 meters bgs, respectively, and Aroclor 1262 at 45 ug/kg in W4RC at the surface.

5.1.3 Title 22 Metals and pH

A total of 138 discrete soil samples and 13 composite soil samples were analyzed for Title 22 metals. Title 22 metals were not detected at total concentrations greater than respective TTLC, with the exception of lead concentrations in 16 samples. Four metals (barium, chromium, copper, and lead) were present at concentrations exceeding 10 times their respective STLC value. Barium was present in a composite soil sample W3RA/C at 0.6 meters bgs at a concentration of 1,100 mg/kg. The discrete sample analytical results from borings A and C indicated that the respective barium concentration in each was 820 mg/kg and 72 mg/kg. Chromium was present in W4R at 1.5 meters bgs (60 mg/kg). Copper was present in the soil sample collected from EB14R at 1.5 meters bgs (790 mg/kg). Each of the soil samples that contained barium, chromium, and copper that exceeded 10 times the STLC were analyzed by the WET. None of the barium, chromium, and copper WET analytical results exceeded respective STLC values.

An additional 387 discrete soil samples and 72 composite soil samples were analyzed for total lead only. Thus, a total of 525 discrete and 85 composite soil samples have laboratory analytical results for

lead. Of the 525 discrete samples analyzed for lead, 136 had lead concentrations that were equal to or greater than 50 mg/kg and 16 that were equal to or greater than 1,000 mg/kg. A total of 98 WET analyses for lead were performed on discrete soil samples where total lead concentrations were greater than 50 mg/kg, of which, 45 of the analytical results demonstrated soluble lead concentrations that were equal to or greater than the STLC value for lead of 5.0 mg/L. A total of 38 TCLP analyses were performed for discrete samples where the total lead concentration exceeded 1,000 mg/kg and/or the WET result exceeded 5.0 mg/L; only two results exceeded the TCLP value for lead of 5 mg/L.

There were a total of 18 borings where discrete and composite samples were analyzed at similar depths. Comparison of the composite with the corresponding discrete sample results indicates that high concentrations in one or two of the samples caused some of the composite sample concentrations to exceed regulatory thresholds. This occurred at W7E, W3R, W3L, W5R, and W9L.

29 soil samples that had total lead concentrations greater than 50 mg/kg were analyzed for pH. The pH ranged from 5.34 to 9.05.

5.1.4 PAHs

A total of 120 discrete soil samples and 16 composite soil samples were analyzed for PAHs. Of the 120 soil samples analyzed for PAHs: 61 samples had detectable concentrations of PAHs above the respective laboratory reporting limit. Five samples contained concentrations of various PAHs that exceeded the respective UTS concentration including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, benzo(ghi)perylene, fluoranthene, naphthalene, phenanthrene, and pyrene. The PAH concentrations in all remaining soil samples were present at concentrations less than the UTSs and generally less than 1 mg/kg. The five boring locations that had detectable concentrations of PAHs greater than the UTSs are borings WB7L, EB8L, EB14R, W4R, and W5L.

5.2 Groundwater

A total of eight grab groundwater samples were collected and submitted for analysis. A summary of analytical test results for TPHg, TPHd, TPHmo, AHVOCs, and SVOCs is presented in Table 6. Petroleum hydrocarbon, VOCS, and SVOC distribution in groundwater is presented in Figure 7. A summary of analytical laboratory test results for dissolved Title 22 metals is presented in Table 7. A summary of analytical laboratory test results for PAHs is presented in Table 8. Copies of the laboratory reports are presented in Appendix C.

The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), adopted by the California Regional Water Quality Control Board - San Francisco Bay Region on June 21, 1995, is the master policy document governing water quality regulation in the San Francisco Bay region. Water Quality Objectives (WQOs) for surface waters are presented in Section 3 of the Basin Plan.

The WQOs are divided into two categories, one for surface waters with salinity greater than 5 parts per thousand (ppt), and one for surface waters with salinity less than 5 ppt. Since groundwater generated during the construction actives would likely be discharged to the adjacent San Francisco Bay, the receiving water salinity would likely be greater than 5 ppt and therefore the first category will apply. The WQOs do not have concentration standards for petroleum hydrocarbons, VOCs and SVOCs for surface water bodies.

A total of three groundwater samples (EB13L, EB14R, and W5LC) were analyzed for dissolved Title 22 metals. The Title 22 dissolved metals arsenic, chromium, copper, lead, and nickel were present at concentrations exceeding the WQO for surface water exceeding a salinity of 5 ppt. While mercury was not detected above the laboratory reporting limit of 0.004 mg/L, the listed WQOs for the 4-day and 1-hour averages are 0.000025 mg/L and 0.0021 mg/L, respectively. Other dissolved metals were not detected at concentrations greater than the 4-day or 1-hour average WQOs.

TPHd was detected in each of the eight groundwater samples at concentrations ranging from 3.1 mg/L to 1,200 mg/L. TPHmo was analyzed for in one groundwater sample (W5LC) and detected at a concentration of 9.1 mg/L. TPHg was detected in five of the six samples analyzed for TPHg at concentrations ranging from 0.12 (EB7R) to 0.57 mg/L (W5LC). TPHg was reported by the laboratory as a gasoline range organic and reported that the samples where TPHg was reported contained hydrocarbons that are within the gasoline range, but do not match the gasoline pattern.

VOCs were present in one of the six groundwater samples analyzed (W5LC). The VOCs detected included benzene at 0.88 micrograms per liter (ug/L), xylenes at 2.40 ug/L, 1,2,4-trimethylbenzene at 6.3 ug/L, and naphthalene at 39 ug/L.

SVOCs were present in three of the eight samples analyzed for SVOCs. The maximum concentrations of SVOCs detected include 2-methylnaphthalene at 68 ug/L (W5LC), fluorene at 11 ug/L (W5LC), and phenanthrene at 93 ug/L (EB13L) were present.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The soil samples collected from the subject site exhibited detectable concentrations of:

- AHVOCs (dichlorodifluoromethane, ethylbenzene and total xylenes in two samples, and 4-isopropyltoluene, isopropylbenzene, n-butylbenzene, n-propylbenzene, and naphthalene in one sample);
- PAHs at concentrations equal to or greater than the respective UTS concentrations.
- Organochlorine Pesticides (DDT, DDE, and DDD, Endosulfan I, Aldrin, beta-BHC, and delta-BHC);
- PCBs (Aroclors 1254, 1260, and 1262);
- TPHg, TPHd and TPHmo; and
- Title 22 metals.

The groundwater samples collected from the subject site exhibited detectable concentrations of:

- TPHg, TPHd and TPHmo;
- VOCs;
- SVOCs; and
- Dissolved Title 22 metals - arsenic, chromium, copper, lead and nickel were each detected at concentrations exceeding the respective WQOs.

The following conclusions are presented based on a site wide distribution of contaminants of concern.

6.1 Petroleum Hydrocarbons and AHVOCs in Soil

TPHmo and TPHd were detected in soil samples throughout the site. The laboratory analytical data indicated that the reported TPHmo and TPHd often were hydrocarbons that fall within the diesel and/or motor oil range but do not match either chromatographic pattern. It is likely that some of the hydrocarbon compounds detected were not petroleum based. However, distinct TPHmo and TPHd contaminants were present in soil samples collected from borings located at Bents EB6R, EB7L, EB7R, EB8L (each in the vicinity of Building 270), EB13L, EB14R (in the vicinity of the waste water lift station, and W5LC (in the vicinity of Building 213). TPHg was detected in 7 of 121 soil samples collected from borings in the vicinity of building 270 (EB6R) and near the area of the former waste water lift station (EB13L and EB14R) at concentrations that ranged from 5.4 mg/kg to 2,200 mg/kg.

The range of TPHd concentrations in the vicinity of Building 270, Building 213, and the former waste water lift station was from 4.8 mg/kg to 15,000 mg/kg, and the range of TPHmo concentrations was

from 3.2 mg/kg to 9,700 mg/kg. Typically the higher concentrations of TPHmo and TPHd were present in soil samples that were collected near the soil/water interface. Contaminant concentrations (if present) in the shallow soil samples collected from above the soil-water interface were not indicative of a source area. Thus, high concentrations of TPHd and TPHmo in soil at the soil/water interface are most likely resulting from a smearing effect from impacted groundwater.

TPHg was reported in soil samples that contained high concentrations of TPHd (those Bent locations identified above), and AHVOCs were detected at low concentrations only in the presence of TPHg.

One soil sample was collected from boring W5LC at the soil water interface (9.1 meter bgs). Contaminants present in this sample included 220 mg/kg of TPHg, 8,000 mg/kg of TPHd, 5,500 mg/kg of TPHmo, 4-isopropyltoluene (650 ug/kg), isopropylbenzene (500 ug/kg), n-butylbenzene (1,900 ug/kg), n-propylbenzene (800 ug/kg), and naphthalene (12,000 ug/kg). No other boring in the vicinity of Bent W5L was advanced to the soil water interface; however, it is likely that soil conditions at other Bents in the vicinity will be of similar quality.

Due to the depth of the potential petroleum-contaminated soil on most of the site, these contaminants would only be encountered during pile installation. However, excavations for some pile caps at lower elevations of the site near Building 270 and the former waste water lift station may also be of sufficient depth to encounter petroleum-contaminated soil. These soils should be removed from the site to an appropriate landfill or treated prior to reuse. The foundations affected potentially extend from Bent W7 to Bent W4 on the transition structure alignment and from Bent EB4 to Bent EB17 and from Bent WB13 to Bent WB18 on the detour structure alignment.

6.2 Organochlorine Pesticides and PCBs in Soil

A total of 132 soil samples were analyzed for organochlorine pesticides and PCBs, of which, pesticides were present in 17 samples and PCBs were present in 4 samples.

The pesticides detected included DDT and its metabolites DDE and DDD, Endosulfan I, Aldrin, beta-BHC, and delta-BHC. DDT was the only pesticide detected at a concentration greater than its respective UTS. The UTS for DDT is 870 ug/kg and the maximum DDT concentration was 1,100 ug/kg in sample WB7L at 0.3 meters bgs. This was the only DDT detection greater than the UTS.

Pesticide concentrations exceeded TTLC in only one sample (WB7L at 0.3 meters bgs). The TTLC for DDT and its metabolites is 1,000 ug/kg. The cumulative DDT and metabolite concentration in sample WB7L at 0.3 meters is 1,810 ug/kg. Widespread accumulations of pesticides are not indicated by the analysis results. However, excavated material represented by sample WB7L at 0.3 meters bgs

would be characterized as non-RCRA hazardous. Since the concentrations of DDT, DDE, and DDD are less than 10 times the respective UTS, treatment prior to land disposal is not required.

The PCB Aroclors detected in soil were present at concentrations less than the respective TTLCs and UTSs.

6.3 Title 22 Metals and pH in Soil

A total of 138 discrete soil samples and 13 composite soil samples were analyzed for Title 22 metals, and an additional 387 discrete and 72 composite soil samples were analyzed for total lead only. Thus, 525 lead analytical results were obtained from discrete soil samples. Title 22 Metals were not detected at total concentrations greater than respective TTLC values, except lead; and metals with concentrations that exceeded 10 times the STLC included barium, chromium, copper, and lead. The barium, chromium, and copper values that exceeded 10 times the STLC were each present in one respective discrete soil sample at boring location EB14R. Lead concentrations in discrete soil samples that exceeded the TTLC or 10 times the STLC were present in 152 soil samples.

- The soluble barium, chromium, and copper concentrations did not exceed their respective STLC values.
- A total of 525 discrete soil samples and 85 composite soil samples were analyzed for total lead. Of the 525 discrete samples analyzed for lead, 136 had lead concentrations that were equal to or greater than 50 mg/kg and 16 that were equal to or greater than 1,000 mg/kg. A total of 98 WET analyses for lead were performed on discrete soil samples where lead concentrations were greater than 50 mg/kg, of which, 45 of the analytical results demonstrated soluble lead concentrations that were equal to or greater than the STLC value for lead of 5.0 mg/L. A total of 38 TCLP analyses were performed for discrete soil samples where the total lead concentration exceeded 1,000 mg/kg and/or the WET result exceeded 5.0 mg/L, and only two results exceeded the TCLP value for lead of 5 mg/L. A statistical analysis for the lead data was performed for discrete samples across the entire site. Calculated 90% UCLs for the total lead means ranged from 453 mg/kg at the surface to 69 mg/kg at 0.6 meter bgs. The statistical analysis is included as Appendix D.
- 29 soil samples that had total lead concentrations greater than 50 mg/kg were analyzed for pH. The pH ranged from 5.34 to 9.05.

Lead was the only metal detected at concentrations above regulatory thresholds. Concentrations that exceed typical naturally occurring levels are generally confined to unpaved areas within 0.9 meters bgs. The exception to this trend is within the area of the former wastewater lift station (IR Site 11) where higher concentrations were detected at depths of 1.5 and 3.4 meters. With the exception of the contaminated material at locations EB14R and EB15L (adjacent to the former waste water lift station), excavated material with lead contamination would be characterized as non-RCRA hazardous.

Excavated material with lead contamination at locations EB14R and EB15L would be characterized as RCRA hazardous.
There were a total of 18 borings where discrete and composite samples were analyzed at similar depths for total lead. Comparison of the composite with the corresponding discrete sample results indicates that high concentrations in one or two of the samples caused some of the composite sample concentrations to exceed regulatory thresholds. This occurred at W7E, W3R, W3L, W5R, and W9L.

Discrete sample analysis performed at locations where composite samples were analyzed indicate that segregating excavated materials within paved and unpaved areas at Pier W5R will result in the characterization of less material as non-RCRA hazardous.

6.4 PAHs

A total of 120 discrete soil samples and 16 composite soil samples were analyzed for PAHs. Of the 120 discrete soil samples analyzed for PAHs: 59 samples had non-detectable concentrations and 61 samples had detectable concentrations of PAHs above the respective laboratory reporting limit, with five samples containing concentrations of various PAHs that exceeded respective UTS. None of the PAH concentrations that exceeded the UTSs were present at concentrations greater than 10 times the respective UTS; thus, there should be no LDRs for soil containing PAHs. Composite soil sample results indicated that PAHs detected were less than the UTS. The PAH concentrations in all remaining soil samples were present at concentrations less than the UTSs and generally less than 1 mg/kg. The five boring locations that had detectable concentrations of PAHs greater than the UTSs are borings WB7L, EB8L, EB14R, W4R, and W5LC.

6.5 Groundwater

Groundwater was encountered in eight boreholes locations (EB6R, EB7L, EB8L, EB9L, EB10R, EB13L, EB14R, and W5L). TPHd was present in groundwater at all sampled locations. The areas where groundwater was encountered include the following:

- Eastbound detour Bents in the vicinity of and within the influence of the former diesel UST release at Building 270 (EB6R, EB7R, EB8L, EB9L, and EB10R),
- In the vicinity of the former waste water lift station (EB13L and EB14R), and
- In the vicinity of Building 213 the current fire station for YBI and Treasure Island (W5L).

Borings W4LC and W4LD were advanced to approximately 6 meters bgs to bedrock and saturated conditions were not encountered; however, petroleum hydrocarbon odors were noted in soil immediately above the termination depths where it was not present in the soil profile above that point. The odor at depth indicates that TPHd impacted groundwater has had a historical presence in the area

of exploration. It is possible that TPHd impacted groundwater encountered near Building 213 may be connected to the historical groundwater impacts in the vicinity of borings W4LC and W4LD; thus, demonstrating a diesel plume that may impact other Bents in the vicinity.

TPHd concentrations ranged from 3.1 mg/L (EB9L) to 1,200 mg/L (EB7R). TPHg was also present in five of the six groundwater samples analyzed at concentrations that ranged from 0.12 mg/L (EB7R) to 0.57 mg/L (W5LC); however, the laboratory reported the TPHg as gasoline range organics and indicated that where TPHg was detected, hydrocarbons were within the gasoline range, but do not match the gasoline pattern.

VOCs were only present in one groundwater sample (W5LC) and were inclusive of benzene (0.88 ug/L), total xylenes (2.14 ug/L), 1,2,4-trimethylbenzene (6.3 ug/L), and naphthalene (39 ug/L). SVOCs were present in three of the eight samples analyzed (EB8L, EB13L, and W5LC) inclusive of 2-methylnaphthalene (max. 68 ug/L), phenanthrene (max. 93 ug/L), and fluorene (max. 11 ug/L). The compounds 2-methylnaphthalene and phenanthrene are also classified as PAHs. The WQO for PAHs is a cumulative total for all PAHs with no target concentrations for specific PAHs. Thus, the WQO for cumulative PAH is 15 ug/L. Therefore groundwater in the vicinity of EB8L, EB13L, and W5LC have PAH concentrations that exceed the WQOs.

The groundwater analyses indicate widespread petroleum contamination affecting a large portion of the project area, potentially extending from Bent W7 to Bent W4 on the transition structure alignment and from Bent EB4 to Bent EB15 and from Bent WB13 to Bent WB18 of the detour structure alignment.

The Title 22 dissolved metals were analyzed for in three samples from Bents W5L, EB13L and EB14R. Title 22 metals arsenic, chromium, copper, lead, and nickel, are present at concentrations exceeding the WQOs for surface water with a salinity greater than 5 ppt. Mercury was not detected above the laboratory reporting limit, of 0.004 mg/L, however the listed WQOs for the 4-day and 1-hour averages are 0.000025 mg/L and 0.0021 mg/L, respectively. Therefore, mercury concentrations could not be compared with its WQOs. Other dissolved metals were not detected at concentrations greater than the 4-day or 1-hour average WQOs.

If dewatering is to be conducted during construction activities, then it is recommended that confirmation sampling of groundwater from the excavation be performed before dewatering operations commence. If elevated results are confirmed, then the discharge must be managed such that it will conform to Basin Plan WQOs or conditions of applicable general permits for groundwater discharges.

In addition, at locations where pile installation will involve passing through more than one water-bearing zone, the pile type or installation technique should result in isolation of the pile excavation from the impacted groundwater.

Based on groundwater analytical data, groundwater encountered during construction may require treatment for elevated metals, TPHg, TPHd, and TPHmo. Granular activated carbon filtration would be the recommended treatment method for petroleum hydrocarbons. Geocon recommends that, when practical, engineering controls should be utilized to minimize the volume of extracted groundwater.

The highest metal concentration was 4.1 mg/L of lead at location EB14R, which coincides with an unusually high soluble lead concentration in the soil sample. Further investigation may be warranted at this location to determine the nature of the lead compounds present.

TABLE 1
SUMMARY OF SAMPLE LOCATIONS
SFOBB EAST SPAN - YERBA BUENA ISLAND

Bent	Sample Location	Northing (m)	Easting (m)	Target Depth (m)	Target Depth (ft)	Sampling Method
WB Detour						
WB1	WB1	647,126.6	1,835,845.5	5.8	19	DP
WB2	WB2	647,134.1	1,835,850.7	5.2	17	DP
WB3	WB3	647,144.6	1,835,857.6	4.0	13	DP
WB4	WB4	647,159.1	1,835,869.5	2.4	8	DP
WB5L	WB5L	647,183.2	1,835,877.5	1.5	5	DP
WB5R	WB5R	647,178.1	1,835,887.5	1.2	4	DP
WB6L	WB6L	647,205.6	1,835,888.1	1.8	6	DP
WB6R	WB6R	647,200.6	1,835,898.3	1.5	5	DP
WB7L	WB7L	647,227.9	1,835,900.3	1.8	6	HA
WB7R	WB7R	647,222.1	1,835,910.0	1.8	6	HA
WB8L	WB8L	647,249.4	1,835,914.3	2.1	7	HA
WB8R	WB8R	647,242.8	1,835,923.5	1.5	5	HA
WB9L	WB9L	647,265.5	1,835,926.4	2.4	8	HA
WB9R	WB9R	647,258.1	1,835,935.4	1.8	6	HA
WB10L	WB10L	647,280.8	1,835,939.3	2.4	8	HA
WB10R	WB10R	647,273.7	1,835,948.0	2.4	8	HA
WB11L	WB11L	647,302.3	1,835,957.2	2.1	7	HA
WB11R	WB11R	647,295.2	1,835,966.0	1.8	6	HA
WB12L	WB12L	647,317.5	1,835,969.9	1.5	5	HA
WB12R	WB12R	647,310.7	1,835,978.8	1.5	5	HA
WB13L	WB13L	647,333.1	1,835,982.9	1.5	5	DP
WB13R	WB13R	647,325.8	1,835,991.4	1.5	5	DP
WB14L	WB14L	647,348.5	1,835,995.6	1.5	5	DP
WB14R	WB14R	647,341.3	1,836,004.5	1.2	4	DP
WB15L	WB15L	647,367.3	1,836,012.6	1.8	6	DP
WB15R	WB15R	647,359.3	1,836,020.8	1.8	6	DP
WB16L	WB16L	647,385.1	1,836,031.1	4.3	14	DP
WB16R	WB16R	647,375.9	1,836,038.4	4.6	15	DP
WB17L	WB17L	647,405.5	1,836,057.8	1.5	5	DP
WB17R	WB17R	647,396.2	1,836,064.1	1.5	5	DP
WB18L	WB18L	647,419.6	1,836,079.4	1.8	6	HA
WB18R	WB18R	647,415.1	1,836,082.3	1.8	6	HA
WB19L	WB19L	647,436.8	1,836,097.6	2.4	8	HA
WB19R	WB19R	647,432.2	1,836,101.1	2.4	8	HA
WB20	WB20	647,449.5	1,836,119.7	2.1	7	HA
WB21	WB21	647,461.9	1,836,135.0	1.2	4	DP
WB22	WB22	647,474.7	1,836,150.7	1.5	5	DP

TABLE 1
SUMMARY OF SAMPLE LOCATIONS
SFOBB EAST SPAN - YERBA BUENA ISLAND

Bent	Sample Location	Northing (m)	Easting (m)	Target Depth (m)	Target Depth (ft)	Sampling Method
EB Detour						
EB2L	EB2L	647,155.4	1,835,940.8	2.4	8	HA
EB2C	EB2C	647,146.2	1,835,946.7	2.4	8	HA
EB2R	EB2R	647,137.4	1,835,951.1	2.4	8	HA
EB3L	EB3L	647,169.0	1,835,962.2	2.4	8	HA
EB3C	EB3C	647,159.4	1,835,968.3	2.4	8	HA
EB3R	EB3R	647,151.7	1,835,973.6	2.4	8	HA
EB4L	EB4L	647,182.7	1,835,981.2	2.4	8	HA
EB4C	EB4C	647,174.6	1,835,988.1	3.7	12	DP
EB4R	EB4R	647,168.0	1,835,993.4	3.7	12	DP
EB5L	EB5L	647,206.9	1,836,007.8	4.9	16	DP
EB5C	EB5C	647,199.5	1,836,015.3	0.6	2	DP
EB5R	EB5R	647,194.6	1,836,020.8	1.2	4	DP
EB6L	EB6L	647,230.1	1,836,028.6	2.4	8	DP
EB6R	EB6R	647,220.9	1,836,041.6	1.2	4	DP
EB7L	EB7L	647,255.6	1,836,048.8	1.5	5	DP
EB7R	EB7R	647,246.5	1,836,060.5	1.5	5	DP
EB8L	EB8L	647,271.2	1,836,061.2	1.2	4	DP
EB8R	EB8R	647,262.4	1,836,071.6	0.9	3	DP
EB9L	EB9L	647,286.7	1,836,073.7	2.1	7	DP
EB9R	EB9R	647,278.7	1,836,084.3	1.5	5	DP
EB10L	EB10L	647,306.3	1,836,089.3	3.7	12	HA
EB10R	EB10R	647,298.7	1,836,098.6	2.4	8	DP
EB11L	EB11L	647,331.7	1,836,108.7	2.1	7	DP
EB11R	EB11R	647,324.4	1,836,118.0	3.4	11	HA
EB12L	EB12L	647,351.3	1,836,124.4	1.5	5	DP
EB12R	EB12R	647,344.2	1,836,133.2	1.5	5	HA
EB13L	EB13L	647,367.0	1,836,137.0	3.4	11	HA
EB13R	EB13R	647,359.6	1,836,145.4	1.5	5	HA
EB14L	EB14L	647,382.0	1,836,150.7	1.5	5	DP
EB14R	EB14R	647,374.1	1,836,158.7	0.9	3	DP
EB15L	EB15L	647,394.8	1,836,173.4	2.1	7	HA
EB15R	EB15R	647,389.9	1,836,177.5	1.8	6	HA
EB16	EB16	647,402.4	1,836,192.2	1.2	4	DP
EB17	EB17	647,413.4	1,836,214.4	2.1	7	DP

TABLE 1
SUMMARY OF SAMPLE LOCATIONS
SFOBB EAST SPAN - YERBA BUENA ISLAND

Bent	Sample Location	Northing (m)	Easting (m)	Target Depth (m)	Target Depth (ft)	Sampling Method
Transition Structure EB Onramp						
W7E				3.0	10	
	W7EA	647,234.2	1,835,997.1			DP
	W7EB	647,243.9	1,836,005.3			DP
	W7EC	647,231.4	1,836,000.2			DP
	W7ED	647,241.0	1,836,008.8			DP
W8E				9.8	32	
	W8EA	647,205.2	1,835,974.6			HA
	W8EB	647,215.0	1,835,983.2			HA
	W8EC	647,202.2	1,835,977.7			HA
	W8ED	647,212.0	1,835,986.1			HA
W9E				6.7	22	
	W9EA	647,180.0	1,835,956.1			HA
	W9EB	647,189.3	1,835,964.3			HA
	W9EC	647,177.4	1,835,958.6			HA
	W9ED	647,186.6	1,835,967.1			HA
W10E				7.3	24	
	W10EA	647,161.2	1,835,941.5			HA
	W10EB	647,166.2	1,835,945.4			HA
	W10EC	647,156.9	1,835,946.2			HA
	W10ED	647,161.9	1,835,950.5			HA

TABLE 1
SUMMARY OF SAMPLE LOCATIONS
SFOBB EAST SPAN - YERBA BUENA ISLAND

Bent	Sample Location	Northing (m)	Easting (m)	Target Depth (m)	Target Depth (ft)	Sampling Method
Transition Structure						
W2L				15.2	50	
	W2LA	647,510.9	1,836,205.3			HA
	W2LB	647,522.0	1,836,221.0			HA
	W2LC	647,495.4	1,836,216.2			DP
	W2LD	647,506.4	1,836,231.3			DP
W2R				12.2	40	
	W2RA	647,476.4	1,836,229.2			DP
	W2RB	647,486.9	1,836,245.1			DP
	W2RC	647,461.0	1,836,239.9			DP
	W2RD	647,471.5	1,836,255.5			DP
W3L				3.4	11	
	W3LA	647,463.5	1,836,145.3			DP
	W3LB	647,470.1	1,836,153.1			DP
	W3LC	647,450.4	1,836,156.3			DP
	W3LD	647,456.7	1,836,164.3			DP
W3R				3.0	10	
	W3RA	647,432.2	1,836,169.5			DP
	W3RB	647,438.5	1,836,177.4			DP
	W3RC	647,418.6	1,836,179.6			HA
	W3RD	647,424.8	1,836,187.8			HA
W4L				5.5	18	
	W4LA	647,412.5	1,836,089.7			HA
	W4LB	647,419.9	1,836,096.8			HA
	W4LC	647,400.4	1,836,101.8			DP
	W4LD	647,407.3	1,836,109.2			DP
W4R				7.3	24	
	W4RA	647,386.5	1,836,111.8			HA
	W4RB	647,393.2	1,836,119.9			HA
	W4RC	647,373.5	1,836,123.1			HA
	W4RD	647,380.0	1,836,130.8			HA
W5AL	W5AL	647,372.5	1,836,072.9	3.0	10	DP
W5AR	W5AR	647,382.5	1,836,062.4	3.4	11	DP

TABLE 1
SUMMARY OF SAMPLE LOCATIONS
SFOBB EAST SPAN - YERBA BUENA ISLAND

Bent	Sample Location	Northing (m)	Easting (m)	Target Depth (m)	Target Depth (ft)	Sampling Method
W5L				3.7	12	
	W5LA	647,360.8	1,836,041.5			DP
	W5LB	647,369.1	1,836,048.7			DP
	W5LC	647,349.5	1,836,054.4			DP
	W5LD					DP
W5R				4.3	14	
	W5RA	647,341.5	1,836,059.3			DP
	W5RB	647,350.1	1,836,068.6			DP
	W5RC	647,325.5	1,836,074.1			DP
	W5RD	647,333.7	1,836,083.0			DP
W6L				2.7	9	
	W6LA	647,307.7	1,836,000.1			DP
	W6LB	647,320.1	1,836,009.6			DP
	W6LC	647,298.6	1,836,012.5			DP
	W6LD	647,310.9	1,836,021.9			DP
W6C				3.7	12	
	W6CA	647,293.5	1,836,015.5			DP
	W6CB	647,304.5	1,836,026.8			DP
	W6CC	647,287.0	1,836,022.2			DP
	W6CD	647,297.7	1,836,033.4			DP
W6R				8.5	28	
	W6RA	647,285.1	1,836,026.9			DP
	W6RB	647,293.4	1,836,035.0			DP
	W6RC	647,282.0	1,836,030.1			DP
	W6RD	647,290.1	1,836,038.3			DP
W7L				4.3	14	
	W7LA	647,262.1	1,835,966.5			HA
	W7LB	647,271.2	1,835,974.3			HA
	W7LC	647,257.9	1,835,971.0			HA
	W7LD	647,267.1	1,835,979.0			HA
W7C				0.3	1	
	W7CA	647,253.6	1,835,976.4			HA
	W7CB	647,262.2	1,835,983.9			HA
	W7CC	647,246.4	1,835,984.5			HA
	W7CD	647,254.9	1,835,992.3			HA

TABLE 1
SUMMARY OF SAMPLE LOCATIONS
SFOBB EAST SPAN - YERBA BUENA ISLAND

Bent	Sample Location	Northing (m)	Easting (m)	Target Depth (m)	Target Depth (ft)	Sampling Method
W7R				5.8	19	
	W7RA	647,242.0	1,835,989.3			HA
	W7RB	647,250.7	1,835,997.1			HA
	W7RC	647,238.2	1,835,993.5			HA
	W7RD	647,247.1	1,836,001.3			DP
W8L				5.2	17	
	W8LA	647,234.9	1,835,941.0			HA
	W8LB	647,244.6	1,835,949.7			HA
	W8LC	647,230.5	1,835,946.4			HA
	W8LD	647,239.9	1,835,954.8			HA
W8C				0.3	1	
	W8CA	647,226.3	1,835,951.4			HA
	W8CB	647,235.7	1,835,959.5			HA
	W8CC	647,219.1	1,835,959.9			HA
	W8CD	647,227.9	1,835,967.7			HA
W8R				8.2	27	
	W8RA	647,214.3	1,835,965.0			HA
	W8RB	647,223.3	1,835,973.0			HA
	W8RC	647,210.6	1,835,969.6			HA
	W8RD	647,219.3	1,835,977.4			HA
W9L				3.4	11	
	W9LA	647,211.1	1,835,920.7			DP
	W9LB	647,220.5	1,835,929.0			DP
	W9LC	647,206.7	1,835,925.8			DP
	W9LD	647,216.0	1,835,934.2			DP
W9C				3.7	12	
	W9CA	647,202.9	1,835,930.0			HA
	W9CB	647,212.1	1,835,938.4			HA
	W9CC	647,195.0	1,835,939.0			HA
	W9CD	647,204.4	1,835,947.1			HA
W9R				6.7	22	
	W9RA	647,190.6	1,835,944.1			HA
	W9RB	647,200.0	1,835,952.2			HA
	W9RC	647,186.3	1,835,948.6			HA
	W9RD	647,195.8	1,835,956.9			HA

TABLE 1
SUMMARY OF SAMPLE LOCATIONS
SFOBB EAST SPAN - YERBA BUENA ISLAND

Bent	Sample Location	Northing (m)	Easting (m)	Target Depth (m)	Target Depth (ft)	Sampling Method
W10L				5.5	18	
	W10LA	647,192.5	1,835,906.3			DP
	W10LB	647,197.4	1,835,910.5			DP
	W10LC	647,188.3	1,835,910.9			DP
	W10LD	647,193.0	1,835,915.1			DP
W10C				3.0	10	
	W10CA	647,185.1	1,835,914.9			HA
	W10CB	647,189.8	1,835,918.9			HA
	W10CC	647,177.3	1,835,923.4			HA
	W10CD	647,182.1	1,835,927.5			HA
W10R				0.6	2	
	W10RA	647,173.1	1,835,928.3			DP
	W10RB	647,178.0	1,835,932.4			DP
	W10RC	647,169.0	1,835,932.8			DP
	W10RD	647,173.9	1,835,937.0			HA
W10AL				6.7	22	
	W10ALA	647,176.2	1,835,893.5			DP
	W10ALB	647,179.7	1,835,896.5			DP
	W10ALC	647,172.0	1,835,898.2			DP
	W10ALD	647,175.5	1,835,900.8			DP
W11R				9.8	32	
	W11RA	647,157.6	1,835,914.4			HA
	W11RB	647,161.3	1,835,917.7			HA
	W11RC	647,153.4	1,835,919.1			HA
	W11RD	647,156.9	1,835,922.5			DP

Notes:

Northing and Easting coordinates relative to North American Datum 1983 (NAD83)

m = meters

HA = Hand-Auger

DP = Direct=Push

TABLE 2
SUMMARY OF TPHg, TPHd, TPHmo, AHVOCs, PESTICIDES, AND PCBs
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	TPHg (mg/kg)	TPHd (mg/kg)	TPHmo (mg/kg)	AHVOCs (µg/kg)	Chlorinated Pesticides (µg/kg)	PCBs (µg/kg)
				Westbound Detour Structure				
WB2	WB2	0	---	---	---	---	---	---
	WB2	0.3	---	---	---	---	---	ND
	WB2	0.6	---	---	---	---	---	ND
	WB2	0.9	---	---	---	---	---	ND
WB3	WB3	0.3	<1.0	<1.0	<1.0	<50	ND	ND
	WB3	0.6	<1.0	<1.0	---	<50	ND	ND
	WB3	0.9	<1.0	<1.0	<1.0	<50	ND	ND
	WB3	1.5	<1.0	<1.0	<1.0	<50	ND	ND
WB5R	WB5R	0.3	<1.0	16**	---	<50	ND	ND
	WB5R	0.6	<1.0	4.3**	5.9	<50	ND	ND
	WB5R	0.9	<1.0	2.7**	---	<50	ND	ND
	WB5R	1.2	<1.0	2.0**	2.6	<50	ND	ND
WB7L	WB7L	0	---	18**	---	---	4,4-DDD=47 4,4-DDE=300 4,4-DDT=440	ND
	WB7L	0.3	<1.0	210*	330*	<50	4,4-DDD=180 4,4-DDE=530 4,4-DDT=1,100	ND
WB9R	WB9R	0	---	83	---	---	ND	ND
	WB9R	0.3	<1.0	430	640	<50	ND	ND
	WB9R	0.6	<1.0	4.6	---	<50	ND	ND
	WB9R	0.9	<1.0	6.5	11	dichlorodifluoro-methane=50	ND	ND
	WB9R	1.5	<1.0	11	19	<50	ND	ND
WB11L	WB11L	0	---	56**	---	---	4,4-DDT=35	ND
	WB11L	0.3	<1.0	2.8*	3.0*	ND	ND	ND
	WB11L	0.6	<1.0	<1.0	---	ND	ND	ND
	WB11L	0.9	<1.0	<1.0	<1.0	ND	ND	ND
	WB11L	1.5	<1.0	<1.0	<1.0	dichlorodifluoro-methane=50	ND	ND
WB13R	WB13R	0	---	550**	---	---	ND	ND
	WB13R	0.3	<1.0	17**	39	<50	ND	ND
	WB13R	0.6	<1.0	<1.0	---	<50	ND	ND
	WB13R	0.9	<1.0	<1.0	<1.0	<50	ND	ND
	WB13R	1.5	<1.0	<1.0	<1.0	<50	ND	ND

TABLE 2
SUMMARY OF TPHg, TPHd, TPHmo, AHVOCs, PESTICIDES, AND PCBs
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	TPHg (mg/kg)	TPHd (mg/kg)	TPHmo (mg/kg)	AHVOCs (µg/kg)	Chlorinated Pesticides (µg/kg)	PCBs (µg/kg)
WB15L	WB15L	0	---	280**	---	<50	ND	ND
	WB15L	0.3	<1.0	<1.0	---	---	ND	ND
	WB15L	0.6	<1.0	<1.0	---	---	ND	ND
	WB15L	0.9	<1.0	<1.0	<1.0	<50	ND	ND
WB17R	WB17R	0.3	<1.0	<1.0	<1.0	<50	ND	ND
	WB17R	0.6	<1.0	<1.0	---	<50	ND	ND
	WB17R	0.9	<1.0	<1.0	<1.0	<50	ND	ND
	WB17R	1.5	<1.0	<1.0	<1.0	<50	ND	ND
	WB17R	dup	---	---	---	<50	---	---
WB19L	WB19L	0	---	42	---	---	---	---
	WB19L	0.3	<1.0	33*	35*	<50	---	---
	WB19L	0.6	<1.0	29	---	<50	---	---
WB21	WB21	0	<1.0	18**	35	<50	4,4-DDE=5.5 4,4-DDT=9.9	ND
	WB21	0.3	<1.0	4.1**	7.3	<50	ND	ND
WB22	WB22	0	---	---	---	dichlorodifluoro-methane=50	ND	ND
				Eastbound Detour Structure				
EB2L	EB2L	0	---	7.2**	---	---	ND	ND
	EB2L	0.3	<1.0	3.4**	5.7	<50	ND	ND
	EB2L	0.6	<1.0	5.2**	---	<50	ND	ND
	EB2L	0.9	<1.0	4.6**	8.6	dichlorodifluoro-methane=50	ND	ND
	EB2L	1.5	<1.0	2.4**	4.4	<50	ND	ND
EB6R	EB6R	0.3	<1.0	22*	35*	<50	ND	ND
	EB6R	0.6	<1.0	5.0*	11*	<50	4,4'-DDE=4.8	ND
	EB6R	0.9	<1.0	110*	92*	<50	4,4'-DDD=6.5	ND
	EB6R	1.5	<1.0	13*	14*	<50	ND	ND
	EB6R	2.4	90	850	650	<50	ND	ND
EB7L	EB7L	0.3	---	7.1	---	---	---	---
	EB7L	0.6	---	10000	---	---	---	---
	EB7L	0.9	---	11000	---	---	---	---

TABLE 2
SUMMARY OF TPHg, TPHd, TPHmo, AHVOCs, PESTICIDES, AND PCBs
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	TPHg (mg/kg)	TPHd (mg/kg)	TPHmo (mg/kg)	AHVOCs (µg/kg)	Chlorinated Pesticides (µg/kg)	PCBs (µg/kg)
EB7R	EB7R	0	---	5.1	---	---	---	---
	EB7R	0.3	---	4.2	---	---	---	---
	EB7R	0.6	---	120**	---	---	---	---
	EB7R	0.9	---	53**	---	---	---	---
	EB7R	1.2	---	210	---	---	---	---
	EB7R	1.5	---	4500	---	---	---	---
EB8L	EB8L	0.3	<1.0	7.2	4.7	<50	ND	ND
	EB8L	0.6	<1.0	4.8	3.2	<50	ND	ND
	EB8L	0.9	<1.0	16	12	<50	ND	ND
	EB8L	1.2	2200	15000	8000	Ethylbenzene=69 p,m-Xylene=59	ND	ND
EB9L	EB9L	0.3	---	<1.0	---	---	---	---
	EB9L	0.6	---	<1.0	---	---	---	---
	EB9L	0.9	---	<1.0	---	---	---	---
	EB9L	1.5	---	<1.0	---	---	---	---
	EB9L	2.1	---	1700	---	---	---	---
EB9R	EB9R	0.3	---	<1.0	---	<50	---	---
	EB9R	0.6	---	1.4	---	<50	---	---
	EB9R	0.9	---	2.7**	---	<50	---	---
	EB9R	1.5	---	<1.0	---	<50	---	---
EB10L	EB10L	0	---	78**	---	<50	---	---
	EB10L	0.3	---	16**	---	<50	---	---
	EB10L	0.6	---	100**	---	<50	---	---
	EB10L	0.9	---	2.6**	---	<50	---	---
	EB10L	1.5	---	9.8**	---	<50	---	---
	EB10L	3.0	---	13**	---	<50	---	---
EB10R	EB10R	0	---	5.5**	---	---	ND	ND
	EB10R	0.3	<1.0	8.6**	20	<50	ND	ND
	EB10R	0.6	<1.0	360**	---	<50	ND	ND
	EB10R	0.9	<1.0	<1.0	<1.0	<50	ND	ND
	EB10R	1.5	<1.0	<1.0	2.4	<50	ND	ND
EB11L	EB11L	0	---	---	---	---	---	---
	EB11L	0.3	---	34**	---	<50	---	---
	EB11L	0.6	---	4.3	---	<50	---	---
	EB11L	0.9	---	1.8	---	<50	---	---
	EB11L	1.5	---	<1.0	---	<50	---	---
	EB11L	2.1	---	<1.0	---	<50	---	---

TABLE 2
SUMMARY OF TPHg, TPHd, TPHmo, AHVOCs, PESTICIDES, AND PCBs
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	TPHg (mg/kg)	TPHd (mg/kg)	TPHmo (mg/kg)	AHVOCs (µg/kg)	Chlorinated Pesticides (µg/kg)	PCBs (µg/kg)
EB12L	EB12L	0	---	340	---	---	ND	Aroclor 1254 =370
	EB12L	0.3	<1.0	5.9	9.2	<50	ND	ND
	EB12L	0.6	<1.0	<1.0	<1.0	<50	ND	ND
	EB12L	0.9	<1.0	<1.0	<1.0	<50	ND	ND
	EB12L	1.5	<1.0	<1.0	<1.0	<50	ND	ND
EB13L	EB13L	0	<1.0	---	3.2	---	---	---
	EB13L	0.3	<1.0	---	6.5	<50	---	---
	EB13L	0.6	<1.0	---	44	<50	---	---
	EB13L	0.9	<1.0	---	<1.0	<50	---	---
	EB13L	1.5	<1.0	52	---	<50	---	---
	EB13L	2.4	110	2700	---	<50	---	---
	EB13L	3.4	5.4	54	---	<50	---	---
EB14L	EB14L	0	<1.0	8.8	---	---	ND	ND
	EB14L	0.3	<1.0	140	---	<50	4,4'-DDD=140 4,4'-DDE=360 4,4'-DDT=590	Aroclor 1260 =240
	EB14L	0.6	<1.0	24	---	<50	ND	ND
	EB14L	0.9	<1.0	34	---	<50	ND	ND
	EB14L	1.5	<1.0	50**	---	<50	4,4'-DDD=17 4,4'-DDE=42 4,4'-DDT=64	Aroclor 1260 =65
EB14R	EB14R	0	<1.0	280**	---	---	ND	ND
	EB14R	0.3	<1.0	120**	280	<50	ND	ND
	EB14R	0.6	<1.0	33**	80	<50	ND	ND
	EB14R	0.9	<1.0	160**	270	<50	ND	ND
	EB14R	1.5	<1.0	240	260	<50	ND	ND
	EB14R	3.4	160	12000	9700	<50	ND	ND
EB16	EB16	0	---	140	---	---	---	---
	EB16	0.3	---	53	---	<50	---	---
	EB16	0.6	---	260	---	<50	---	---
	EB16	0.9	---	970**	---	<50	---	---
	EB16	1						
EB17	EB17	0	---	38**	---	---	ND	ND
	EB17	0.3	<1.0	11**	18	<50	ND	ND
	EB17	0.6	<1.0	3.2	2.1	<50	ND	ND
	EB17	0.9	<1.0	<1.0	1.7	<50	ND	ND

TABLE 2
SUMMARY OF TPHg, TPHd, TPHmo, AHVOCs, PESTICIDES, AND PCBs
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	TPHg (mg/kg)	TPHd (mg/kg)	TPHmo (mg/kg)	AHVOCs (µg/kg)	Chlorinated Pesticides (µg/kg)	PCBs (µg/kg)
				Transition Structure Eastbound Off-ramp				
W8E	W8EC	0	---	---	---	---	4,4-DDT = 4.5 Endosulfan I = 5.2	ND
	W8EC	0.3	<1.0	<1.0	<1.0	<50	ND	ND
	W8EC	0.6	---	---	---	<50	ND	ND
	W8ED	0	---	---	---	---	4,4-DDD = 100 4,4-DDT = 270 Endosulfan I = 320	ND
	W8ED	0.3	<1.0	3.1*	4.6*	<50	ND	ND
	W8ED	0.6	---	---	---	<50	---	ND
W10E	W10ED	0	---	---	---	---	ND	ND
	W10ED	0.3	<1.0	68*	110*	<50	4,4-DDT=21	ND
	W10ED	0.6	---	---	---	<50	ND	ND
	W10ED	0.9	<1.0	110*	170*	dichlorodifuoro-methane=50	ND	ND
	W10ED	1.5	<1.0	81*	130*	<50	4,4-DDT=9.9	ND
	W10EA,B,C	0	---	---	---	---	4,4'-DDD=6.3 4,4'-DDT=25	ND
	W10EA,B,C	0.3	<1.0	4.1*	7.4*	<50	ND	ND
	W10EA,B,C	0.6	<1.0	98*	120*	<50	ND	ND
	W10EA,B,C	0.9	<1.0	69*	84*	<50	4,4'-DDT=7.8	ND
	W10EA,B	1.5	<1.0	29*	30*	dichlorodifuoro-methane=50	4,4'-DDD=13 4,4'-DDT=18	ND
	W10EA,B	2.7/3.5	<1.0	4.9*	5.4*	<50	ND	ND
				Transition Structures				
W2L	W2LC	0.6	<1.0	<1.0	1.6	<50	ND	ND
	W2LC,D	0	<1.0	8.7**	17	<50	4,4-DDD=11 4,4-DDE=47 4,4-DDT=70	ND
	W2LC,D	0.3	<1.0	29**	62	dichlorodifuoro-methane=50	4,4-DDD=11 4,4-DDE=51 4,4-DDT=85	ND
W2R	W2RA	0.3	---	---	---	<50	---	---
	W2RA,B	0	---	---	---	<50	---	---

TABLE 2
SUMMARY OF TPHg, TPHd, TPHmo, AHVOCs, PESTICIDES, AND PCBs
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	TPHg (mg/kg)	TPHd (mg/kg)	TPHmo (mg/kg)	AHVOCs (µg/kg)	Chlorinated Pesticides (µg/kg)	PCBs (µg/kg)
W3L	W3LA,B,C,D	0	---	---	---	<50	---	---
	W3LA,B,D	0.3	---	---	---	<50	---	---
W3R	W3RA,B,C,D	0	---	---	---	---	ND	ND
	W3RA,B,C,D	0.3	<1.0	8.3	14*	<50	ND	ND
	W3RA,C	0.6	---	4.4**	---	<50	ND	ND
	W3RA,C	dup	---	---	---	<50	---	---
W4R	W4RA	0	---	170**	---	---	ND	ND
	W4RA	0.3	<1.0	31	52	<50	ND	ND
	W4RA	0.6	<1.0	3.1	3.8	<50	ND	ND
	W4RA	0.9	<1.0	<1.0	2.3*	<50	ND	ND
	W4RA	1.5	<1.0	62	140	<50	ND	ND
	W4RA	7.0	170	1800	960	p,m-Xylene=200 o-Xylene=280	ND	ND
	W4RB	0	---	61**	---	---	---	---
	W4RB	0.3	<1.0	130**	410	<50	---	---
	W4RB	0.6	<1.0	<1.0	<1.0	<50	---	---
	W4RB	0.9	<1.0	<1.0*	<1.0*	<50	---	---
	W4RB	1.5	<1.0	<1.0	<1.0	<50	---	---
	W4RB	7.3	10	450	310	<50	---	---
	W4RC	0	---	36**	---	---	4,4'-DDT=44	Aroclor 1262 =45
	W4RC	0.3	<1.0	<1.0	<1.0	<50	ND	ND
	W4RC	0.6	<1.0	19	30	<50	ND	ND
	W4RC	0.9	<1.0	62**	110	<50	ND	ND
	W4RC	1.5	<1.0	67	110	<50	ND	ND
	W4RD	0	<1.0	140**	230	<50	4,4'-DDT=12	ND
	W4RD	0.3	<1.0	13**	18	<50	ND	ND
	W4RD	0.6	<1.0	17**	26	<50	ND	ND
	W4RD	0.9	<1.0	32**	47	<50	ND	ND
	W4RD	1.5	<1.0	220**	390	<50	ND	ND
	W4RD	2.1	<1.0	120**	170	<50	ND	ND
W5L	W5LC	9.1	220	8000	5500	4-Isopropyltoluene=650 Isopropylbenzene=500 n-Butylbenzene=1900 n-Propylbenzene=800 Naphthalene=12000	---	---

TABLE 2
SUMMARY OF TPHg, TPHd, TPHmo, AHVOCs, PESTICIDES, AND PCBs
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	TPHg (mg/kg)	TPHd (mg/kg)	TPHmo (mg/kg)	AHVOCs (µg/kg)	Chlorinated Pesticides (µg/kg)	PCBs (µg/kg)
W6L	W6LC,B,D	0	---	1,800**	---	---	ND	ND
	W6LA,B,C,D	0.3	<1.0	45	76*	<50	ND	ND
	W6LA,B,C,D	0.6	<1.0	2.1	2.7*	<50	ND	ND
	W6LA,B,C,D	0.9	<1.0	4.3	5.9*	<50	ND	ND
	W6LA,B,D	1.5	<1.0	2.2	2.5*	<50	ND	ND
	W6LA,B,D	dup	---	---	---	<50	---	---
W9	W9C	0	---	15**	---	---	ND	ND
	W9C	0.3	<1.0	6.5**	10	ND	Aldrin=4.4 beta-BHC=6.4 delta-BHC=3.5 EndosulfanI=4.2	ND
	W9C	0.6	<1.0	41**	---	ND	ND	ND
	W9C	0.9	<1.0	26**	39	dichlorodi-flouromethane=50	ND	ND
	W9C	1.5	<1.0	60**	110	ND	ND	ND
W11R	W11RB	0	---	2.0**	---	---	ND	ND
	W11RB	0.3	<1.0	<1.0	<1.0	<50	ND	ND
	W11RB	0.6	<1.0	<1.0	---	<50	ND	ND
	W11RB	0.9	<1.0	<1.0	<1.0	<50	ND	ND
	W11RB	1.5	<1.0	<1.0	<1.0	<50	ND	ND

*	Sample contain hydrocarbons that fall within the diesel and/or motor oil range but does not match either pattern.
**	Sample contain hydrocarbons that are heavier than diesel pattern.
<	Analyte was not detected above the stated laboratory reporting limit
---	Not Analyzed
AHVOCs	Aromatic Halogenated Volatile Organic Compounds
dup	Duplicate sample analysis
PCBs	Polychlorinated Biphenyls
ND	No analytes were reported above the laboratory reporting limit
TPH	Total Petroleum Hydrocarbons as g=gasoline, d=diesel, mo=motor oil
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram

TABLE 3
SUMMARY OF TITLE 22 METALS ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
								Westbound Detour Structure											
WB5R	WB5R	0.3	0.50	3.5	30	<0.15	<0.15	22	4.5	6.0	7.0	<0.10	2.0	16	<0.25	<0.15	<0.25	16	17
	WB5R	0.6	1.0	3.5	36	<0.15	<0.15	24	5.0	5.0	2.5	<0.10	2.5	22	<0.25	<0.15	0.42	17	15
	WB5R	0.9	0.50	4.5	38	<0.15	<0.15	24	3.5	5.5	2.0	<0.10	2.0	16	<0.25	<0.15	0.49	18	16
	WB5R	1.2	94	72	92	58	54	76	48	79	100	<0.10	38	80	98	34	63	74	78
re-run	WB5R	1.2	0.5	3.5	34	<0.15	<0.15	26	5	6.5	2	<0.10	<0.25	20	<0.25	<0.15	<0.25	18	18
WB7L	WB7L	0.3	0.50	3.0	84	<0.15	<0.15	18	3.0	9.5	38	<0.10	2.5	15	<0.25	0.36	0.50	12	40
	WB7L	0.6	0.49	5.0	150	<0.15	<0.15	28	4.5	18	90	<0.10	2.0	21	<0.25	0.50	0.50	20	76
WB9R	WB9R	0	0.50	3.0	43	<0.15	<0.15	24	3.5	7.0	21	<0.10	2.5	20	<0.25	<0.15	<0.15	16	31
	WB9R	0.3	0.44	3.5	66	<0.15	<0.15	24	4.0	14	180	<0.10	2.5	22	<0.25	<0.15	<0.25	18	60
	WB9R	0.6	0.46	3.0	20	<0.15	<0.15	22	2.5	5.0	4.0	<0.10	2.0	20	<0.25	<0.15	<0.25	14	20
	WB9R	0.9	0.34	15	22	<0.15	<0.15	24	3.0	6.0	3.5	<0.10	2.5	24	<0.25	<0.15	<0.15	16	22
	WB9R	2	0.50	3.5	23	<0.15	<0.15	24	3.5	6.0	7.5	<0.10	2.5	25	<0.25	<0.15	<0.25	16	22
	WB9R	2	0.50	3.0	41	<0.15	<0.15	21	2.5	6.5	35	0.54	2.5	21	<0.25	<0.15	0.33	14	29
WB11L	WB11L	0	0.50	2.5	63	<0.15	<0.15	21	3.5	12	110	<0.10	2.5	16	<0.25	0.19	0.50	12	96
	WB11L	0.3	<0.25	2.5	81	<0.15	<0.15	17	3.5	11	33	<0.10	2.0	17	<0.25	<0.15	<0.25	12	100
	WB11L	0.6	0.48	2.5	98	<0.15	<0.15	20	3.5	7.0	13	<0.10	2.0	16	<0.25	<0.15	0.48	12	28
	WB11L	0.9	<0.25	3.0	40	<0.15	<0.15	15	2.5	5.0	2.0	<0.10	1.0	16	<0.25	0.33	0.28	9.5	29
	WB11L	1.5	<0.25	2.0	26	<0.15	<0.15	13	2.5	4.0	2.0	<0.10	0.50	15	<0.25	0.27	0.49	9.0	110
	WB11L	2.1	0.50	3.0	42	<0.15	<0.15	18	3.0	6.0	10	<0.10	1.5	18	<0.25	0.40	<0.25	12	58
WB13R	WB13R	0	<0.25	6.5	300	<0.15	<0.15	20	8.5	23	180	<0.10	4.0	32	<0.25	<0.15	0.50	21	150
	WB13R	0.3	<0.25	4.0	210	<0.15	<0.15	16	6.5	9.0	21	0.13	3.5	16	<0.25	<0.15	1.0	18	28
	WB13R	0.6	0.28	3.0	27	<0.15	<0.15	17	4.0	5.5	2.0	<0.10	2.0	20	<0.25	<0.15	<0.25	13	12
	WB13R	0.9	0.26	4.5	30	<0.15	<0.15	18	4.0	6.0	2.0	<0.10	1.5	21	<0.25	<0.15	0.50	13	13
	WB13R	2	<0.25	2.5	29	<0.15	<0.15	14	3.0	4.5	1.5	<0.10	1.5	18	<0.25	<0.15	<0.25	10	10
WB15L	WB15L	0	0.26	4.5	200	<0.15	<0.15	19	6.5	11	16	<0.10	4.0	29	<0.25	<0.15	0.50	18	34
	WB15L	0.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	WB15L	0.6	4.5	15	26	<0.15	<0.15	19	3.0	6.0	2.5	<0.10	2.5	16	<0.25	<0.15	0.34	15	16
	WB15L	0.9	<0.25	3.0	26	<0.15	<0.15	21	3.0	4.5	2.0	<0.10	2.5	18	<0.25	<0.15	<0.25	16	20
	WB15L	2	0.48	3.0	72	<0.15	<0.15	22	3.5	5.5	2.5	<0.10	3.0	18	<0.25	<0.15	0.44	14	23

TABLE 3
SUMMARY OF TITLE 22 METALS ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
WB17R	WB17R	0.3	<0.25	3.0	78	<0.15	<0.15	21	3.0	5.5	2.5	<0.10	2.5	16	<0.25	<0.15	<0.25	13	22
	WB17R	0.6	0.50	2.5	38	<0.15	<0.15	16	2.5	4.5	1.5	<0.10	2.0	15	<0.25	<0.15	<0.25	12	17
	WB17R	0.9	0.50	2.5	32	<0.15	<0.15	19	3.0	4.5	2.0	<0.10	2.5	17	<0.25	0.26	0.46	14	20
	WB17R	2	0.50	4.0	52	<0.15	<0.15	29	4.5	5.5	2.5	<0.10	3.0	20	<0.25	<0.15	0.50	21	22
WB19L	WB19L	0	1.5	10	200	<0.15	<0.15	26	9.5	28	100	<0.10	10	29	<0.25	<0.15	1.0	34	120
	WB19L	0.3	1.0	8.5	200	0.29	<0.15	21	4.5	12	18	<0.10	7.5	19	<0.25	<0.15	0.44	36	36
	WB19L	0.6	1.0	8.0	220	0.29	<0.15	18	4.5	16	25	<0.10	7.5	18	<0.25	<0.15	0.50	34	38
WB21	WB21	0	0.50	5.0	750	<0.15	<0.15	15	11	18	120	<0.10	4.0	20	<0.25	<0.15	0.50	28	50
	WB21	0.3	0.46	5.0	860	<0.15	<0.15	12	11	13	14	<0.10	4.0	18	<0.25	<0.15	1.0	28	38
WB22	WB22	0	0.47	5.0	220	<0.15	<0.15	16	10	26	48	<0.10	3.5	35	<0.25	<0.15	0.50	24	50
						Eastbound Detour Structure													
EB2L	EB2L	0	1.0	6.0	210	<0.15	<0.15	20	4.0	38	3800	<0.10	4.0	23	<0.25	0.36	1.0	27	190
	EB2L	0.3	0.50	30	88	<0.15	<0.15	20	3.5	10	9.0	<0.10	2.0	17	<0.25	<0.15	0.50	14	57
	EB2L	0.6	0.50	4.0	130	<0.15	<0.15	22	4.0	81	91	<0.10	2.0	20	<0.25	<0.15	0.50	16	100
	EB2L	0.9	0.28	4.5	57	<0.15	<0.15	24	3.5	6.5	3.0	<0.10	1.5	22	<0.25	0.21	<0.25	16	26
	EB2L	1.5	0.47	3.0	29	<0.15	<0.15	20	3.5	5.5	2.5	<0.10	2.0	19	<0.25	<0.15	0.39	16	20
EB6R	EB6R	0.3	1.0	40	150	<0.15	<0.15	30	10	34	48	<0.10	4.0	35	0.38	<0.15	1.0	32	70
	EB6R	0.6	0.37	4.5	64	<0.15	<0.15	13	4.0	10	14	<0.10	1.5	16	<0.25	<0.15	0.39	12	26
	EB6R	0.9	1.0	8.0	180	<0.15	<0.15	32	9.0	24	48	<0.10	4.0	34	<0.25	<0.15	0.50	32	57
	EB6R	1.5	1.0	8.0	170	<0.15	<0.15	32	10	26	140	<0.10	4.0	37	<0.25	<0.15	0.50	36	73
	EB6R	2.4	<0.25	3.0	62	<0.15	<0.15	8.5	5.0	9.5	5.5	<0.10	1.5	17	<0.25	<0.15	0.50	9.5	20
EB8L	EB8L	0.3	0.50	4.0	54	<0.15	<0.15	30	5.5	7.0	11	<0.10	2.0	30	<0.25	<0.15	0.50	22	25
	EB8L	0.6	0.50	4.0	48	<0.15	<0.15	30	6.0	6.5	5.5	<0.10	2.5	32	<0.25	<0.15	0.39	22	22
	EB8L	0.9	0.50	5.5	87	<0.15	<0.15	47	8.0	9.0	6.0	<0.10	3.5	44	<0.25	<0.15	0.41	36	30
	EB8L	1	0.50	4.5	72	<0.15	<0.15	28	5.5	9.0	46	<0.10	2.5	26	<0.25	0.29	<0.25	20	40
EB10R	EB10R	0	0.30	8.0	46	<0.15	<0.15	18	3.5	15	60	<0.10	1.0	18	<0.25	<0.15	0.48	10	51
	EB10R	0.3	0.32	2.0	27	<0.15	<0.15	13	3.5	6.5	34	<0.10	1.0	15	<0.25	<0.15	0.42	10	37
	EB10R	0.6	<0.25	2.0	48	<0.15	<0.15	14	3.0	7.0	120	<0.10	1.0	14	<0.25	<0.15	0.50	10	64
	EB10R	0.9	0.29	2.5	96	<0.15	<0.15	18	8.0	5.0	5.5	<0.10	2.0	22	0.50	<0.15	0.50	12	19
	EB10R	2	0.44	5.0	250	<0.15	<0.15	16	12	16	9.5	<0.10	3.5	24	0.37	<0.15	1.5	20	36

TABLE 3
SUMMARY OF TITLE 22 METALS ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
EB12L	EB12L	0	0.50	3.0	160	<0.15	<0.15	11	3.0	20	80	<0.10	2.5	11	0.37	<0.15	0.30	7.5	110
	EB12L	0.3	0.36	12.0	33	<0.15	<0.15	9.5	2.0	3.0	12	<0.10	1.0	9.5	0.32	<0.15	0.43	6.5	13
	EB12L	0.6	<0.25	1.5	26	<0.15	<0.15	9.0	2.0	2.5	9.0	<0.10	0.50	9.0	0.47	<0.15	0.50	7.0	10
	EB12L	0.9	<0.25	2.0	79	<0.15	<0.15	26	7.0	8.0	3.5	<0.10	2.0	29	<0.25	0.50	0.50	23	18
	EB12L	1.5	<0.25	2.0	30	<0.15	<0.15	16	4.5	4.0	2.0	<0.10	1.5	22	0.40	0.39	0.50	12	13
EB14R	EB14R	0	0.36	3.5	94	<0.15	<0.15	17	5.5	47	410	<0.10	3.0	20	0.50	1.0	0.50	15	210
	EB14R	0.3	0.50	5.5	34	<0.15	<0.15	18	6.0	12	140	<0.10	4.0	15	0.43	0.50	1.0	21	62
	EB14R	0.6	<0.25	3.0	80	<0.15	<0.15	15	6.0	18	110	<0.10	2.0	20	<0.25	0.50	0.50	16	78
	EB14R	0.9	2.0	18	140	<0.15	<0.15	17	6.5	110	1500	<0.10	10	18	<0.25	2.0	4.0	14	640
	EB14R	1.5	0.50	13	170	<0.15	<0.15	22	6.0	*790/7.4*	2600	0.40	8.5	57	0.50	1.0	1.5	12	1400
	EB14R	3.4	<0.25	4.0	78	<0.15	<0.15	10	4.0	28	580	0.18	1.5	14	<0.25	<0.15	<0.25	9.5	240
EB17	EB17	0	0.50	6.5	150	<0.15	<0.15	18	4.5	190	1900	<0.10	4.5	20	0.50	0.35	1.0	13	740
	EB17	0.3	0.50	5.5	100	<0.15	<0.15	27	6.0	20	350	<0.10	2.5	30	<0.25	<0.15	0.50	18	130
	EB17	0.6	0.50	4.0	54	<0.15	<0.15	28	5.5	7.5	7	<0.10	2.0	36	<0.25	<0.15	0.50	16	20
	EB17	0.9	0.50	4.5	66	<0.15	<0.15	28	7.5	10	20	<0.10	2.0	43	0.50	<0.15	0.47	19	34
Transition Structure Eastbound Off-ramp																			
W8E	W8EC	0	0.41	5.0	90	<0.15	<0.15	30	7.5	10	30	<0.10	4.0	30	<0.25	<0.15	0.50	20	29
	W8EC	0.3	<0.25	3.0	92	<0.15	<0.15	11	8.5	9.5	8.0	<0.10	3.0	20	<0.25	<0.15	0.50	14	29
	W8EC	0.6	0.30	2.0	72	<0.15	<0.15	6.5	4.5	6.0	6.0	<0.10	2.0	9.5	<0.25	<0.15	0.35	11	20
	W8ED	0	0.50	3.0	60	<0.15	<0.15	22	4.5	22	580	<0.10	2.0	24	<0.25	<0.15	<0.25	15	94
	W8ED	0.3	0.50	3.0	53	<0.15	<0.15	24	5.0	12	35	2.0	<0.10	24	<0.25	<0.25	0.34	16	23
	W8ED	0.6	<0.25	3.5	52	<0.15	<0.15	27	5.5	9.5	23	<0.10	2.5	29	<0.25	<0.15	0.32	18	22
W10E	W10EA,B,C	0.9	0.50	29	51	<0.15	<0.15	22	4.0	120	26	<0.10	3.5	21	<0.25	<0.15	0.47	15	26
	W10EA,B	2	0.36	3.0	36	<0.15	<0.15	21	4.0	7.0	12	<0.10	1.5	20	<0.25	<0.15	<0.25	15	18
	W10EA,B	2.7/3.0	0.35	3.0	32	<0.15	<0.15	23	4.0	5.5	2.5	<0.10	1.5	22	<0.25	<0.15	<0.25	15	16
Transition Structures																			
W2R	W2RA	0	0.50	4.5	82	<0.15	<0.15	28	6.0	32	94	<0.10	<0.25	28	>0.25	1.5	<0.25	20	88
	W2RA	0.3	0.5	7.5	86	<0.15	<0.15	23	6.5	27	160	<0.10	0.26	32	<0.25	<0.15	<0.25	18	57
	W2RB	0	0.50	5.5	77	<0.15	<0.15	24	7.5	28	60	<0.10	<0.25	30	<0.25	0.34	<0.25	19	76

TABLE 3
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SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
W2L	W2LC	0	0.50	4.5	99	<0.15	<0.15	20	7.0	39	110	<0.10	0.50	24	<0.25	0.50	<0.25	18	150
	W2LC	0.3	0.50	6.0	110	<0.15	<0.15	16	10	20	10	<0.10	0.29	22	<0.25	<0.15	<0.15	24	44
	W2LC	0.6	0.50	9.0	200	<0.15	<0.15	25	18	25	10	<0.10	<0.25	44	<0.25	<0.15	<0.25	28	52
	W2LC	0.6	0.50	5.5	170	<0.15	<0.15	18	10	16	8.5	<0.10	4.5	36	<0.25	<0.15	1.0	21	44
	W2LD	0	0.48	4.0	92	<0.15	<0.15	26	6.5	12	46	<0.10	<0.25	28	<0.25	<0.15	<0.15	22	36
	W2LD	0.3	0.40	4.0	82	<0.15	<0.15	27	6.5	9.5	20	0.11	<0.25	27	<0.25	<0.15	<0.25	22	30
	W2LC,D	0	0.50	4.5	140	<0.15	<0.15	24	12	16	38	<0.10	3.5	31	<0.25	<0.15	0.50	22	48
	W2LC,D	0.3	0.50	4.5	140	<0.15	<0.15	16	11	17	52	<0.10	4.0	24	<0.25	<0.15	1.0	20	58
W3R	W3RA	0	0.44	4.5	200	0.19	<0.15	12	7.0	12	7.0	<0.10	<0.25	14	<0.25	<0.15	<0.25	25	26
	W3RA	0.3	0.26	5.5	330	0.36	<0.15	10	12	10	6.5	<0.10	<0.25	16	<0.25	<0.15	<0.25	24	28
	W3RA	0.6	0.33	5.5	820	0.3	<0.15	10	9.0	10	7.0	<0.10	<0.25	18	<0.25	<0.15	<0.25	22	30
	W3RB	0	0.25	2.0	120	<0.15	<0.15	6.0	3.0	9.5	17	<0.10	<0.25	8.5	<0.25	<0.15	<0.25	12	18
	W3RB	0.3	0.34	4.5	260	<0.15	<0.15	14	7.5	9	7	<0.10	<0.25	15	<0.25	<0.15	<0.25	23	26
	W3RC	0	0.5	4.5	97	<0.15	<0.15	21	5.5	20	280	<0.10	<0.25	20	<0.25	<0.15	<0.25	26	74
	W3RC	0.3	1.0	5.5	83	<0.15	<0.15	25	7.0	22	140	<0.10	<0.25	22	<0.25	<0.15	<0.25	30	64
	W3RC	0.6	0.50	6.5	72	0.37	<0.15	19	12	15	44	<0.10	<0.25	20	<0.25	<0.15	<0.25	36	43
	W3RD	0	0.33	3.5	100	<0.15	<0.15	16	7.0	11	130	<0.10	<0.25	16	<0.25	0.15	<0.25	24	46
	W3RD	0.3	0.50	6.0	45	0.41	<0.15	18	8.0	11	22	<0.10	<0.25	24	<0.25	<0.15	<0.25	34	36
	W3RA,B,C,D	0	0.28	3.0	130	<0.15	<0.15	17	5.5	20	300	<0.10	2.5	18	<0.25	<0.15	0.50	24	330
	W3RA,B,C,D	0.3	0.31	3.5	180	0.25	<0.15	12	6.5	13	7.0	<0.10	3.0	13	<0.25	<0.15	0.50	24	27
	W3RA,C	0.6	0.48	4.0	1100/*<17*	0.28	<0.15	11	8.0	9.5	6.5	<0.10	3.5	14	<0.25	<0.15	0.50	26	25
W3L	W3LA	0	0.5	4.5	240	<0.15	<0.15	10	14.0	14	7	<0.10	<0.25	15	<0.25	<0.15	<0.25	18	35
	W3LA	0.3	0.50	6.5	370	<0.15	<0.15	14	17	18	9	<0.10	<0.25	20	<0.25	<0.15	<0.25	28	46
	W3LB	0	0.5	5.5	220	<0.15	<0.15	17	8.5	18	30	<0.10	<0.25	22	<0.25	<0.15	<0.25	24	54
	W3LC	0	1.0	5.0	200	<0.15	<0.15	15	10	15	34	<0.10	<0.25	18	<0.25	<0.15	<0.25	25	65
	W3LC	0.3	0.50	5.0	170	<0.15	<0.15	12	14	14	20	<0.10	<0.25	16	<0.25	<0.15	<0.25	24	44
	W3LD	0	2.5	6.0	160	<0.15	<0.15	19	11	20	170	<0.10	<0.25	22	<0.25	<0.15	<0.25	28	210
	W3LD	0.3	2.5	5.0	160	<0.15	<0.15	10	11	12	26	<0.10	0.26	15	<0.25	<0.15	<0.25	21	60

TABLE 3
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Sample ID	Boring ID	Sample Depth (meters)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
W4R	W4RA	0	0.50	7.5	530	<0.15	<0.15	42	8.0	65	20	<0.10	4.0	31	<0.25	<0.15	0.50	23	36
	W4RA	0.3	0.50	4.0	60	<0.15	<0.15	24	4.5	11	57	<0.10	2.0	18	<0.25	<0.15	0.502	22	50
	W4RA	0.6	0.26	3.0	42	<0.15	<0.15	18	3.0	4.0	2.5	<0.10	3.0	12	0.50	2.0	1.0	16	15
	W4RA	0.9	0.40	12	18	<0.15	<0.15	10	1.5	2.5	1.5	<0.10	1.0	7.0	<0.25	1.0	<0.25	8.0	7.5
	W4RA	1.5	0.50	2.5	77	<0.15	<0.15	18	4.5	8.0	24	<0.10	1.5	14	0.46	<0.15	0.50	15	38
	W4RA	7.0	1	6.0	89	<0.15	<0.15	36	6.5	8.0	3.5	<0.10	5.5	46	<0.25	<0.15	0.50	26	24
	W4RB	0	0.50	6.0	76	<0.15	<0.15	22	5.0	19	340	<0.10	0.50	18	<0.25	2.5	<0.25	26	56
	W4RB	0.3	0.50	4.5	110	<0.15	<0.15	25	6.5	15	44	<0.10	<0.25	22	<0.25	0.17	<0.25	22	74
	W4RB	0.6	0.50	6.0	100	<0.15	<0.15	34	7.5	9	3.0	<0.10	<0.25	36	<0.25	<0.15	<0.25	24	21
	W4RB	0.9	0.50	6.5	100	<0.15	<0.15	34	8.5	12	3.5	<0.10	<0.25	44	<0.25	<0.15	<0.25	26	27
	W4RB	1.5	0.50	7.0	130	<0.15	<0.15	*60/<0.20*	10	12	4.5	<0.10	<0.25	38	<0.25	<0.15	<0.25	36	29
	W4RB	7.3	0.50	10	250	<0.15	<0.15	29	18	29	9.0	<0.10	<0.25	52	<0.25	<0.15	<0.25	31	64
	W4RC	0	0.50	4.5	77	<0.15	<0.15	24	4.0	22	400	<0.10	2.5	21	<0.25	0.17	<0.25	20	130
	W4RC	0.3	0.46	3.5	43	<0.15	<0.15	28	4.5	6.5	2.5	<0.10	2.0	29	<0.25	<0.15	0.32	18	20
	W4RC	0.6	0.39	2.0	36	<0.15	<0.15	16	3.5	6.5	68	<0.10	1.5	20	<0.25	1.5	1.0	11	28
	W4RC	0.9	<0.25	2.0	40	<0.15	<0.15	17	4.0	5.5	26	<0.10	1.5	20	0.29	0.30	0.50	12	22
	W4RC	2	<0.25	2.0	40	<0.15	<0.15	18	4.0	6.0	16	<0.10	1.5	23	0.27	<0.15	0.50	12	19
	W4RD	0	0.50	4.5	76	<0.15	<0.15	20	4.0	18	290	<0.10	4.0	20	<0.25	<0.15	0.37	18	180
	W4RD	0.3	0.50	5.5	160	<0.15	<0.15	20	4.5	9.0	130	<0.10	4.0	22	<0.25	<0.15	0.50	18	98
	W4RD	0.6	0.50	3.5	54	<0.15	<0.15	18	2.5	6.5	64	<0.10	3.0	15	<0.25	<0.15	0.28	14	61
	W4RD	0.9	0.50	5.0	130	<0.15	<0.15	24	6.5	7.5	26	<0.10	5.0	22	<0.25	<0.15	0.50	22	36
	W4RD	1.5	1.0	9.0	210	<0.15	<0.15	18	7.5	32	82	<0.10	7.0	31	<0.25	<0.15	1.0	24	86
	W4RD	2.1	0.50	7.0	100	<0.15	<0.15	19	4.5	20	100	<0.10	5.5	21	<0.25	<0.15	0.50	20	70
W5L	W5LC	9.1	0.49	5.0	58	<0.15	<0.15	42	5.0	10	2.5	<0.10	<0.25	32	<0.25	<0.15	<0.25	24	23
W6L	W6LC,B,D	0	0.50	6.0	370	<0.15	<0.15	21	10	16	20	<0.10	4.5	32	<0.25	<0.15	1.0	26	36
	W6LA,B,C,D	0.3	0.41	2.0	42	<0.15	<0.15	19	4.0	5.5	3.0	<0.10	2.0	19	<0.25	<0.15	0.34	13	50
	W6LA,B,C,D	0.6	0.39	2.0	29	<0.15	<0.15	20	3.5	4.5	2.0	<0.10	1.5	19	<0.25	<0.15	<0.25	12	12
	W6LA,B,C,D	0.9	<0.25	2.0	29	<0.15	<0.15	18	3.5	4.5	1.5	<0.10	2.0	20	<0.25	<0.15	0.44	12	12
	W6LA,B,C	1.5	<0.25	2.0	30	<0.15	<0.15	18	3.5	5.0	2.0	<0.10	1.5	20	<0.25	<0.15	<0.25	12	13
W9	W9C	0	0.50	3.5	44	<0.15	<0.15	20	5.0	8.0	15	<0.10	2.5	18	<0.25	<0.15	0.50	16	40
	W9C	0.3	0.47	3.5	68	<0.15	<0.15	22	5.0	7.5	29	<0.10	2.5	20	<0.25	<0.15	0.50	16	48
	W9C	0.6	0.35	3.5	44	<0.15	<0.15	22	6.0	7.0	12	<0.10	2.5	20	<0.25	<0.15	0.26	16	40
	W9C	0.9	0.43	2.5	40	<0.15	<0.15	21	4.5	6.0	8.5	<0.10	2.0	19	<0.25	<0.15	0.28	15	26
	W9C	2	0.34	3.0	62	<0.15	<0.15	22	5.5	8.5	10	<0.10	2.0	20	<0.25	<0.15	0.50	16	27

TABLE 3
SUMMARY OF TITLE 22 METALS ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
W11R	W11RB	0	0.50	4.0	68	<0.15	<0.15	22	4.0	5.5	4.0	<0.10	3.0	20	<0.25	<0.15	1.0	15	23
	W11RB	0.3	0.50	4.0	34	<0.15	<0.15	22	3.5	5.0	2.5	<0.10	3.0	20	<0.25	<0.15	0.41	16	21
	W11RB	0.6	0.50	34	22	<0.15	<0.15	24	3.0	4.5	2.5	<0.10	2.0	18	<0.25	<0.15	0.40	18	20
	W11RB	0.9	1.0	3.5	22	<0.15	<0.15	20	3.5	4.0	2.0	<0.10	2.0	18	<0.25	<0.15	0.33	14	15
	W11RB	1.5	0.50	2.0	20	<0.15	<0.15	16	2.5	3.5	1.5	<0.10	1.5	16	<0.25	<0.15	0.38	12	12
	W11RB	3.7	0.50	2.5	15	<0.15	<0.15	18	2.5	3	1.5	<0.10	1.5	14	<0.25	<0.15	<0.25	14	10

Note: *2.5/3.2* = Italics equal Waste Extraction Test (WET) data reported in milligrams per Liter (mg/L).
< Analyte was not detected above the stated laboratory reporting limit
--- Not Analyzed
All total metal data is reported in milligrams per kilogram (mg/kg)

TABLE 4
SUMMARY OF PAH ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Chrysene	Dibenzo(a,h) anthracene	Indeno(1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
									Westbound Detour Structure									
WB3	WB3	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB3	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB3	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB3	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
WB5R	WB5R	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB5R	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB5R	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB5R	1.2	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
WB7L	WB7L	0.0	5.00	5.16	8.49	3.37	16.8	2.31	3.65	0.248	<0.020	2.70	2.71	38.7	0.233	0.104	4.67	26.9
	WB7L	0.3	<0.020	<0.020	0.034	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.076	<0.020	0.025	0.093	0.069
WB9R	WB9R	0.0	<0.010	<0.010	0.014	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.032	<0.010	0.031	0.028	0.029
	WB9R	0.3	<0.010	0.013	0.015	<0.010	<0.010	<0.010	<0.010	0.017	<0.010	<0.010	<0.010	0.052	0.010	0.013	0.069	0.035
	WB9R	0.6	0.034	0.057	0.073	0.028	0.046	0.023	0.047	0.066	<0.010	0.017	0.026	0.238	0.051	0.078	0.330	0.184
	WB9R	0.9	<0.010	0.014	0.018	<0.010	<0.010	<0.010	0.010	0.012	<0.010	<0.010	<0.010	0.054	0.010	0.022	0.076	0.039
	WB9R	1.5	0.035	0.046	0.057	0.022	0.036	0.018	0.038	0.066	<0.010	0.020	0.024	0.203	0.062	0.081	0.289	0.154
WB11L	WB11L	0.0	<0.010	0.015	0.016	<0.010	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	<0.010	0.034	<0.010	<0.010	0.032	0.029
	WB11L	0.3	<0.010	0.013	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.023	<0.010	<0.010	0.023	0.022
	WB11L	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB11L	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB11L	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
WB13R	WB13R	0.0	<0.010	<0.010	0.031	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB13R	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB13R	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB13R	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB13R	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
WB15L	WB15L	0.0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB15L	0.3																
	WB15L	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB15L	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

TABLE 4
SUMMARY OF PAH ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Chrysene	Dibenzo(a,h) anthracene	Indeno(1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
WB17R	WB17R	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB17R	0.6	0.015	0.040	0.028	0.011	0.019	0.011	0.030	<0.010	<0.010	<0.010	0.026	0.015	<0.010	<0.010	<0.010	0.023
	WB17R	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	WB17R	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
WB19L	WB19L	0.0	0.032	0.039	0.048	0.020	0.028	0.037	0.033	0.041	<0.010	0.017	0.027	0.164	0.03	0.024	0.224	0.116
	WB19L	0.3	0.066	0.075	0.097	0.038	0.047	0.042	0.053	0.129	0.021	0.056	0.038	0.357	0.109	0.138	0.572	0.249
	WB19L	0.6	0.097	0.096	0.117	0.051	0.058	0.054	0.074	0.172	0.029	0.076	0.055	0.453	0.129	0.174	0.663	0.324
WB21	WB21	0.0	0.106	0.237	0.383	0.124	0.123	<0.020	0.202	0.324	<0.020	0.052	0.042	1.08	0.236	0.291	1.55	0.762
	WB21	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Eastbound Detour Structure																		
EB2L	EB2L	0.0	0.011	0.026	0.026	<0.010	0.019	0.032	0.031	<0.010	<0.010	<0.010	0.040	0.030	<0.010	<0.010	0.028	0.035
	EB2L	0.3	<0.010	0.019	0.025	<0.010	0.015	<0.010	0.018	<0.010	<0.010	<0.010	0.016	0.038	<0.010	<0.010	0.045	0.041
	EB2L	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	EB2L	0.9	0.032	0.037	0.052	<0.010	0.040	0.031	0.036	0.028	<0.010	<0.010	0.026	0.147	<0.010	0.052	0.202	0.104
	EB2L	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.013	<0.010	0.012	0.019	<0.010
EB6R	EB6R	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	EB6R	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	EB6R	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	EB6R	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	EB6R	2.4	<0.010	<0.010	<0.010	<0.010	0.182	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
EB8L	EB8L	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.013	<0.010
	EB8L	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	EB8L	0.9	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	<0.010	0.011	0.011
	EB8L	1.2	7.68	<0.010	<0.010	<0.010	9.43	<0.010	<0.010	1.16	<0.010	<0.010	<0.010	0.429	13.0	<0.010	27.8	0.444
EB10R	EB10R	0.0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	<0.010	<0.010	<0.010
	EB10R	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	EB10R	0.6	0.026	0.044	0.035	0.015	0.024	0.018	0.035	<0.010	<0.010	0.013	0.025	0.077	<0.010	<0.010	0.053	0.098
	EB10R	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	EB10R	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

TABLE 4
SUMMARY OF PAH ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Chrysene	Dibenzo(a,h) anthracene	Indeno(1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
EB12L	EB12L	0.0	0.072	0.106	0.204	0.083	0.143	<0.010	0.097	<0.010	<0.010	<0.010	0.056	0.338	<0.010	0.101	0.264	0.278
	EB12L	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	EB12L	0.6	0.011	0.021	0.025	<0.010	0.013	0.016	0.02	<0.010	<0.010	<0.010	0.017	0.031	<0.010	<0.010	0.018	0.030
	EB12L	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	<0.010
	EB12L	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
EB14R	EB14R	0.3	0.040	0.058	0.087	0.033	0.056	<0.010	0.046	0.101	<0.010	0.057	<0.010	0.315	0.071	0.108	0.478	0.240
	EB14R	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	EB14R	0.9	<0.010	0.025	0.047	0.013	<0.010	<0.010	0.039	<0.010	<0.010	<0.010	<0.010	0.042	<0.010	<0.010	0.062	0.045
	EB14R	1.5	<0.010	0.022	0.027	<0.010	0.016	<0.010	0.03	<0.010	<0.010	<0.010	0.017	0.023	<0.010	0.012	0.030	0.031
	EB14R	3.4	6.87	<0.010	<0.010	<0.010	4.43	<0.010	<0.010	0.615	<0.010	0.104	<0.010	0.445	<0.010	0.053	0.774	0.521
EB16	EB16	0.0	0.023	0.052	0.064	0.025	0.030	<0.010	0.048	0.033	<0.010	0.022	0.031	0.154	0.027	0.107	0.182	0.119
	EB16	0.3	0.017	0.033	0.047	0.016	0.032	<0.010	0.031	0.021	<0.010	0.012	0.026	0.099	0.011	0.056	0.107	0.081
	EB16	0.6	0.065	0.102	0.133	0.052	0.096	0.07	0.097	0.114	<0.010	0.027	0.059	0.355	0.074	0.094	0.468	0.295
	EB16	0.9	<0.010	<0.010	0.024	<0.010	0.029	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
EB17	EB17	0.0	0.050	0.117	0.150	0.052	0.092	0.086	0.112	0.031	<0.010	0.046	0.093	0.263	0.030	0.028	0.269	0.238
	EB17	0.3	0.014	0.038	0.047	0.017	0.021	0.021	0.036	<0.010	<0.010	<0.010	0.032	0.057	<0.010	<0.010	0.044	0.060
	EB17	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	EB17	0.9	0.020	0.021	0.025	0.010	0.019	<0.010	0.013	0.018	<0.010	0.013	<0.010	0.100	0.018	<0.010	0.141	0.069
Transition Structure Eastbound Off-ramp																		
W8E	W8EC	0.0	<0.010	0.011	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W8EC	0.3	<0.010	0.010	0.011	<0.010	<0.010	<0.010	<0.010	0.015	<0.010	<0.010	<0.010	0.047	0.016	0.01	0.079	0.029
	W8EC	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W8ED	0.0	0.015	0.210	0.263	0.111	0.146	0.067	0.150	0.322	<0.010	0.085	0.131	0.938	0.236	0.281	1.35	0.667
	W8ED	0.3	0.127	0.217	0.294	0.125	0.148	0.093	0.184	0.383	<0.010	0.082	0.105	0.984	0.26	0.266	1.44	0.702
	W8ED	0.6	0.079	0.117	0.150	0.062	0.081	0.064	0.102	0.143	<0.010	0.040	0.076	0.233	0.114	0.116	0.642	0.334
Transition Structures																		
W2L	W2LC	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W2LC,D	0.0	0.015	0.027	0.030	0.012	0.020	<0.010	0.016	0.010	<0.010	<0.010	0.012	0.079	<0.010	<0.010	0.082	0.071
	W2LC,D	0.3	0.032	0.046	0.074	0.035	0.038	0.039	0.115	0.036	<0.010	<0.010	0.110	0.103	0.036	0.028	0.153	0.071
W3R	W3RA,B,C,D	0.0	0.083	0.140	0.218	0.078	0.090	<0.010	<0.010	0.301	<0.010	0.120	<0.010	0.784	0.264	0.413	1.11	0.579

TABLE 4
SUMMARY OF PAH ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Chrysene	Dibenzo(a,h) anthracene	Indeno(1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
	W3RA,B,C,D	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W3RA,C	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
W4R	W4RA	0.0	<0.010	<0.010	0.039	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.016	<0.010	<0.010	0.039	0.016
	W4RA	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W4RA	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W4RA	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W4RA	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	<0.010
	W4RA	7.0	3.42	<0.010	<0.010	<0.010	4.52	<0.010	<0.010	0.714	<0.010	0.227	<0.010	0.377	1.54	<0.010	15.4	0.47
	W4RB	0.0	0.277	0.318	0.411	0.173	0.262	0.181	0.233	0.422	<0.050	0.212	0.119	1.45	0.415	0.428	2.11	0.934
	W4RB	0.3	<0.010	0.010	0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.017	<0.010	<0.010	0.021	0.019
	W4RB	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W4RB	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W4RB	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W4RB	7.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.052	<0.010	<0.010	<0.010	0.053	0.167	0.240	1.76	0.063
	W4RC	0.0	0.073	0.093	0.118	0.047	0.081	0.039	0.056	0.137	<0.010	0.046	0.024	0.479	0.102	0.089	0.564	0.364
	W4RC	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W4RC	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W4RC	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W4RC	1.5	<0.010	0.017	0.024	<0.010	0.012	<0.010	0.016	0.021	<0.010	0.011	0.014	0.077	0.023	0.033	0.123	0.058
	W4RD	0.0	0.358	0.344	0.415	0.182	0.389	0.200	0.188	0.369	<0.010	0.189	0.095	2.07	0.252	0.283	2.03	1.62
	W4RD	0.3	<0.010	0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.017	<0.010	<0.010	0.011	0.019
	W4RD	0.6	0.078	0.100	0.100	0.041	0.071	0.039	0.070	0.019	<0.010	0.043	0.052	0.255	0.019	<0.010	0.247	0.255
	W4RD	0.9	<0.010	0.02	0.026	<0.010	<0.010	<0.010	0.018	<0.010	<0.010	<0.010	0.015	0.032	<0.010	<0.010	0.024	0.035
	W4RD	1.5	0.010	0.042	0.072	0.016	0.036	<0.010	0.032	<0.010	<0.010	<0.010	0.030	0.090	<0.010	0.040	0.082	0.107
	W4RD	2.1	<0.010	0.018	0.120	0.033	0.286	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.018	<0.010	<0.010	0.118	0.027
W5L	W5LC	9.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.220	<0.010	0.305	<0.010	6.81	14.8	0.382
W6L	W6LB,C,D	0.0	0.163	<0.010	0.063	<0.010	0.127	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W6LA,B,C,D	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W6LA,B,C,D	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W6LA,B,C,D	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W6LA,B,C	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
W9	W9C	0.0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.037	<0.010	<0.010
	W9C	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W9C	0.6	<0.010	0.010	0.015	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.046	<0.010	0.032	0.063	0.034

TABLE 4
SUMMARY OF PAH ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Boring ID	Sample Depth (meters)	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Chrysene	Dibenzo(a,h) anthracene	Indeno(1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
	W9C	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	<0.010	0.014	<0.010
	W9C	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
W10E	W10ED	0.0	0.012	0.029	0.043	0.017	0.025	<0.010	0.030	0.012	<0.010	<0.010	0.024	0.112	<0.010	0.033	0.145	0.088
	W10ED	0.3	0.021	0.037	0.059	0.023	0.034	0.030	0.036	0.031	<0.010	<0.010	0.025	0.162	0.030	0.051	0.217	0.120
	W10ED	0.6	0.016	0.032	0.046	0.017	0.023	0.023	0.033	0.019	<0.010	<0.010	0.022	0.123	0.014	0.035	0.158	0.098
	W10ED	0.9	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.028	<0.010	<0.010	0.032	0.018
	W10ED	1.5	0.013	0.023	0.033	0.012	0.021	<0.010	0.021	0.022	<0.010	0.012	0.014	0.081	0.019	0.026	0.115	0.059
	W10EA,B,C	0.0	0.079	0.142	0.185	0.082	0.086	0.080	0.118	0.166	<0.010	<0.010	0.071	0.625	0.148	0.216	0.902	0.452
	W10EA,B,C	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W10EA,B,C	0.6	0.011	0.019	0.022	<0.010	0.016	<0.010	0.017	0.016	<0.010	<0.010	0.011	0.071	0.012	0.017	0.096	0.051
	W10EA,B,C	0.9	<0.010	0.018	0.023	0.010	0.012	0.01	0.016	0.017	<0.010	<0.010	0.010	0.079	0.014	0.022	0.121	0.056
	W10EA,B	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	0.016	<0.010
	W10EA,B	2.7 and 3.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
W11R	W11RB	0.0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W11RB	0.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W11RB	0.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W11RB	0.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	W11RB	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

Note: All data is reported in milligram per kilogram (mg/kg)
< Analyte was not detected above the stated laboratory reporting limit

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
		Westbound Detour Structures				
WB1	WB1	0.3	<5	---	---	---
	WB1	0.6	<5	---	---	---
	WB1	0.9	<5	---	---	---
	WB1	1.5	<5	---	---	---
	WB1	4.3	<5	---	---	---
WB2	WB2	0.3	<5	---	---	---
	WB2	0.6	<5	---	---	---
	WB2	0.9	<5	---	---	---
WB3	WB3	0.3	<5	---	---	---
	WB3	0.6	<5	---	---	---
	WB3	0.9	<5	---	---	---
	WB3	1.5	<5	---	---	---
	WB3	1.2	<5	---	---	---
WB4	WB4	0.0	10	---	---	---
	WB4	0.3	29	---	---	---
	WB4	0.6	<5	---	---	---
	WB4	0.9	<5	---	---	---
	WB4	1.5	<5	---	---	---
	WB4	2.4	<5	---	---	---
WB5L	WB5L	0.3	<5	---	---	---
	WB5L	0..6	<5	---	---	---
	WB5L	0.9	<5	---	---	---
	WB5L	1.5	<5	---	---	---
WB5R	WB5R	0.3	7.0	---	---	---
	WB5R	0.6	2.5	---	---	---
	WB5R	0.9	2.0	---	---	---
	WB5R	1.2	100	0.47	---	---
	WB5R	1.2 re-run	2	---	---	---
WB6L	WB6L	0.3	<5	---	---	---
	WB6L	0.6	<5	---	---	---
	WB6L	0.9	<5	---	---	---
	WB6L	1.5	<5	---	---	---
	WB6L	1.8	<5	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
WB6R	WB6R	0.3	<5	---	---	---
	WB6R	0.6	<5	---	---	---
	WB6R	0.9	<5	---	---	---
	WB6R	1.5	<5	---	---	---
WB7L	WB7L	0.0	38	---	---	---
	WB7L	0.3	90	0.4*	---	---
WB7R	WB7R	0.0	18	---	---	---
	WB7R	0.3	29	---	---	---
	WB7R	0.6	<5	---	---	---
	WB7R	0.9	<5	---	---	---
	WB7R	1.5	<5	---	---	---
	WB7R	1.8	53	0.5*	---	6.42
WB8L	WB8L	0.0	94	<10	---	---
	WB8L	0.3	67	0.1*	---	7.15
	WB8L	0.6	47	---	---	---
	WB8L	0.9	61	0.4*	---	---
WB8R	WB8R	0.0	11	---	---	---
	WB8R	0.3	10	---	---	---
	WB8R	0.6	<5	---	---	---
	WB8R	0.9	44	---	---	---
WB9L	WB9L	0.0	110	5*	---	5.63
	WB9L	0.3	26	---	---	---
	WB9L	0.6	27	---	---	---
	WB9L	0.9	47	---	---	---
WB9R	WB9R	0.0	21	---	---	---
	WB9R	0.3	180	1*	---	---
	WB9R	0.6	4.0	---	---	---
	WB9R	0.9	3.5	---	---	---
	WB9R	1.5	7.5	---	---	---
	WB9R	1.8	35	---	---	---
WB10L	WB10L	0.0	290	6*	---	---
	WB10L	0.3	98	0.6*	---	6.04
	WB10L	0.6	46	---	---	---
	WB10L	0.9	8.7	---	---	---
	WB10L	1.5	7.1	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
WB10R	WB10R	0.0	8.4	---	---	---
	WB10R	0.3	140	0.8*	---	---
	WB10R	0.6	20	---	---	---
	WB10R	0.9	35	---	---	---
	WB10R	1.5	6.1	---	---	---
WB11L	WB11L	0.0	110	8.0	<0.15	---
	WB11L	0.3	33	---	---	---
	WB11L	0.6	13	---	---	---
	WB11L	0.9	2.0	---	---	---
	WB11L	1.5	2.0	---	---	---
	WB11L	2.1	10	---	---	---
WB11R	WB11R	0.0	46	---	---	---
	WB11R	0.3	<5	---	---	---
	WB11R	0.6	<5	---	---	---
	WB11R	0.9	<5	---	---	---
	WB11R	1.5	<5	---	---	---
	WB11R	1.8	<5	---	---	---
WB12L	WB12L	0.0	<5	---	---	---
	WB12L	0.3	120	6.8	0.28	---
	WB12L	0.6	78	6.1	0.36	---
	WB12L	0.9	230	14	0.46	---
	WB12L	1.5	<5	---	---	---
WB12R	WB12R	0.0	6.6	---	---	---
	WB12R	0.3	1000	---	0.6	---
	WB12R	0.6	32	---	---	---
	WB12R	0.9	20	---	---	---
	WB12R	1.5	8.7	---	---	---
WB13L	WB13L	0.0	28	---	---	---
	WB13L	0.3	10	---	---	---
	WB13L	0.6	6.0	---	---	---
	WB13L	0.9	5.3	---	---	---
	WB13L	1.5	<5	---	---	---
WB13R	WB13R	0.0	180	11	0.28	6.70
	WB13R	0.3	21	---	---	---
	WB13R	0.6	2.0	---	---	---
	WB13R	0.9	2.0	---	---	---
	WB13R	1.5	1.5	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
WB14L	WB14L	0.0	8.3	---	---	---
	WB14L	0.3	13	---	---	---
	WB14L	0.6	<5	---	---	---
	WB14L	0.9	<5	---	---	---
	WB14L	1.5	<5	---	---	---
WB14R	WB14R	0.0	<5	---	---	---
	WB14R	0.3	<5	---	---	---
	WB14R	0.6	<5	---	---	---
	WB14R	0.9	<5	---	---	---
	WB14R	1.5	<5	---	---	---
WB15L	WB15L	0.0	16	---	---	---
	WB15L	0.3	---	---	---	---
	WB15L	0.6	2.5	---	---	---
	WB15L	0.9	2.0	---	---	---
	WB15L	1.5	---	---	---	---
	WB15L	1.8	2.5	---	---	---
WB15R	WB15R	0.0	14	---	---	---
	WB15R	0.3	<5	---	---	---
	WB15R	0.6	<5	---	---	---
	WB15R	1.8	5.7	---	---	---
WB16L	WB16L	0.0	54	1*	---	7.69
	WB16L	0.3	310	1*	---	---
	WB16L	0.6	560	2*	---	---
	WB16L	0.9	360	1*	---	8.90
WB16R	WB16R	0.0	---	---	---	---
	WB16R	0.3	9.3	---	---	---
	WB16R	0.6	<5	---	---	---
	WB16R	0.9	<5	---	---	---
	WB16R	4.6	<5	---	---	---
WB17L	WB17L	0.3	<5	---	---	---
	WB17L	0.6	16	---	---	---
	WB17L	0.9	<5	---	---	---
	WB17L	1.5	<5	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
WB17R	WB17R	0.3	2.5	---	---	---
	WB17R	0.6	1.5	---	---	---
	WB17R	0.9	2.0	---	---	---
	WB17R	1.5	2.5	---	---	---
WB18L	WB18L	0.0	68	2.6	---	---
	WB18L	0.3	74	3.8	---	---
WB18R	WB18R	0.0	47	---	---	---
WB19L	WB19L	0.0	100	2.8	---	---
	WB19L	0.3	18	---	---	---
	WB19L	0.6	25	---	---	---
WB19R	WB19R	0.0	65	2.5	---	---
	WB19R	0.3	27	---	---	---
	WB19R	0.6	78	3.5	---	---
WB20	WB20	0.0	82	0.48	---	---
	WB20	0.3	5.9	---	---	---
WB21	WB21	0.0	120	6*	---	---
	WB21	0.3	14	---	---	---
WB22	WB22	0.0	48	---	---	---
			Eastbound Detour Structures			
EB2L	EB2L	0.0	3800	---	---	---
	EB2L	0.3	9.0	---	---	---
	EB2L	0.6	91	8.1	0.36	---
	EB2L	0.9	3.0	---	---	---
	EB2L	1.5	2.5	---	---	---
EB2R	EB2R	0.0	37	---	---	---
Set 1	EB2R	0.3	120	5.0	0.73	5.34
	EB2R	0.6	74	2.5	---	---
	EB2R	0.9	9.9	---	---	---
	EB2R	1.5	<5	---	---	---
	EB2R	2.4	<5	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
EB2R	EB2R	0.0	480	27	<0.15	4.88
Set 2	EB2R	0.3	130	3.0	---	---
	EB2R	0.6	61	2.5	---	---
	EB2R	0.9	41	---	---	---
	EB2R	1.5	33	---	---	---
	EB2R	2.4	14	---	---	---
EB2C	EB2C	0.0	49	---	---	---
	EB2C	0.3	140	5.5	0.60	---
	EB2C	0.6	73	2.5	---	---
	EB2C	0.9	16	---	---	---
	EB2C	1.5	<5	---	---	---
	EB2C	2.4	6.0	---	---	---
EB3C	EB3C	0.0	53	2.5	---	---
	EB3C	0.3	60	2.2	---	---
	EB3C	0.6	<5	---	---	---
	EB3C	0.9	5.6	---	---	---
	EB3C	1.5	6.3	---	---	---
	EB3C	2.4	<5	---	---	---
EB4L	EB4L	0.0	47	---	---	---
	EB4L	0.3	14	---	---	---
	EB4L	0.6	9.5	---	---	---
EB4R	EB4R	0.3	32	---	---	---
	EB4R	0.6	49	---	---	---
	EB4R	0.9	98	330	---	7.48
	EB4R	1.5	<5	---	---	---
	EB4R	3.7	5.7	---	---	---
EB5L	EB5L	0.0	110	13	0.30	7.10
	EB5L	0.3	290	7.8	---	---
	EB5L	0.6	8.1	---	---	---
	EB5L	0.9	30	---	---	---
	EB5L	1.5	30	---	---	---
	EB5L	4.0	<5	---	---	---
EB5C	EB5C	0.0	37	---	---	---
	EB5C	0.3	96	2.9	---	---
	EB5C	0.6	75	6.4	0.47	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
EB5R	EB5R	0.0	140	6.2	---	---
	EB5R	0.3	120	5.4	0.52	---
	EB5R	0.6	130	5.3	---	7.44
	EB5R	0.9	99	5.8	---	---
	EB5R	1.2	75	4.0	---	---
EB6L	EB6L	0.0	38	---	---	---
	EB6L	0.3	29	---	---	---
	EB6L	0.6	15	---	---	---
	EB6L	0.9	15	---	---	---
EB6R	EB6R	0.3	48	---	---	---
	EB6R	0.6	14	---	---	---
	EB6R	0.9	48	---	---	---
	EB6R	1.5	140	4.6	---	---
	EB6R	2.4	5.5	---	---	---
EB7L	EB7L	0.3	<5	---	---	---
	EB7L	0.6	8.6	---	---	---
	EB7L	0.9	<5	---	---	---
EB7R	EB7R	0.0	<5	---	---	---
	EB7R	0.3	<5	---	---	---
	EB7R	0.6	550	0.95	0.22	9.01
	EB7R	0.9	40	---	---	---
	EB7R	1.2	<5	---	---	---
	EB7R	1.5	16	---	---	---
EB8L	EB8L	0.3	11	---	---	---
	EB8L	0.6	5.5	---	---	---
	EB8L	0.9	6.0	---	---	---
	EB8L	1.2	46	---	---	---
EB8R	EB8R	0.0	<5	---	---	---
	EB8R	0.3	170	10	0.32	---
	EB8R	0.6	41	---	---	---
	EB8R	0.9	19	---	---	---
EB9L	EB9L	0.3	110	5.5	---	---
	EB9L	0.6	<5	---	---	---
	EB9L	0.9	<5	---	---	---
	EB9L	1.5	6.9	---	---	---
	EB9L	2.1	<5	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
EB9R	EB9R	0.3	39	---	---	---
	EB9R	0.6	<5	---	---	---
	EB9R	0.9	5.9	---	---	---
	EB9R	1.5	6.6	---	---	---
EB10L	EB10L	0.0	260	8.0	0.9	6.45
	EB10L	0.3	27	---	---	---
	EB10L	0.6	20	---	---	---
	EB10L	0.9	67	3.1	---	---
	EB10L	1.5	20	---	---	---
	EB10L	3.1	97	11	0.44	---
EB10R	EB10R	0.0	60	2.4	---	---
	EB10R	0.3	34	---	---	---
	EB10R	0.6	120	0.74	---	8.83
	EB10R	0.9	5.5	---	---	---
	EB10R	1.5	9.5	---	---	---
EB11L	EB11L	0.3	<5	---	---	---
	EB11L	0.6	<5	---	---	---
	EB11L	0.9	<5	---	---	---
	EB11L	1.5	<5	---	---	---
	EB11L	2.1	<5	---	---	---
EB11R	EB11R	0.0	290	0.87	---	---
	EB11R	0.3	94	0.88	---	---
	EB11R	0.6	140	6.1	---	---
	EB11R	0.9	230	9.0	0.40	9.05
	EB11R	1.5	71	7.8	---	---
EB12L	EB12L	0.0	80	0.52	---	---
	EB12L	0.3	12	---	---	---
	EB12L	0.6	9.0	---	---	---
	EB12L	0.9	3.5	---	---	---
	EB12L	1.5	2.0	---	---	---
EB12R	EB12R	0.0	15	---	---	---
	EB12R	0.3	<5	---	---	---
	EB12R	0.6	<5	---	---	---
	EB12R	0.9	9.2	---	---	---
	EB12R	1.5	9.2	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
EB13L	EB13L	0.0	140	3.2	---	8.38
	EB13L	0.3	18	---	---	---
	EB13L	0.6	110	4.2	---	---
	EB13L	0.9	<5	---	---	---
	EB13L	1.5	110	3.4	---	---
	EB13L	3.4	45	---	---	---
EB13R	EB13R	0.0	200	12	---	7.51
	EB13R	0.3	120	1.5	---	---
	EB13R	0.6	220	5.8	1.0	---
	EB13R	0.9	11	---	---	---
	EB13R	1.5	1700	---	---	---
EB14L	EB14L	0.0	49	---	---	---
	EB14L	0.3	420	---	1.5	---
	EB14L	0.6	78	3.3	---	---
	EB14L	0.9	91	3.3	---	---
	EB14L	1.5	500	19	1.0	7.77
EB14R	EB14R	0.0	410	74	0.81	---
	EB14R	0.3	140	0.47	---	---
	EB14R	0.6	110	0.56	---	---
	EB14R	0.9	1500	---	---	---
	EB14R	1.5	2600	---	---	---
	EB14R	3.4	580	240	8.4	8.96
EB15L	EB15L	0.0	160	3.3	---	---
	EB15L	0.3	850	---	18	7.18
	EB15L	0.6	610	97	0.52	---
	EB15L	0.9	4100	---	---	---
EB15R	EB15R	0.0	660	---	<0.15	---
	EB15R	0.3	680	130	0.21	---
	EB15R	0.6	1800	---	---	---
	EB15R	0.9	410	42	1.9	---
	EB15R	1.5	1400	---	---	---
EB16	EB16	0.0	49	---	---	---
	EB16	0.3	27	---	---	---
	EB16	0.6	330	17	0.44	---
	EB16	0.9	240	17	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
EB17	EB17	0.0	1900	---	---	---
	EB17	0.3	350	3.9	<0.15	---
	EB17	0.6	7.0	---	---	---
	EB17	0.9	20	---	---	---
		Transition Structure Eastbound off-ramp				
W7E	W7EC	0.0	340	---	---	---
	W7EC	0.3	56	---	---	---
	W7EC	0.6	52	---	---	---
	W7EC	3.1	<5	---	---	---
	W7ED	0.0	12	---	---	---
	W7ED	0.3	160	---	---	---
	W7ED	0.6	25	---	---	---
	W7EC,D	0.0	790	---	0.46	7.42
	W7EC,D	0.3	120	6.2	---	---
	W7EC,D	0.6	69	2.1	---	---
	W7EC,D	0.9	68	2.0	---	7.44
	W7EC,D	1.5	9.4	---	---	---
W8E	W8EC	0.0	30	---	---	---
	W8EC	0.3	8.0	---	---	---
	W8EC	0.6	6.0	---	---	---
	W8ED	0.0	580	34	<0.15	7.11
	W8ED	0.3	35	---	---	---
	W8ED	0.6	23	---	---	---
W9E	W9EC	0.0	42	---	---	---
	W9EC	0.3	21	---	---	---
	W9EC	0.6	9.5	---	---	---
	W9EC	0.9	27	---	---	---
W10E	W10ED	0.0	41	---	---	---
	W10ED	0.3	43	---	---	---
	W10ED	0.6	7.1	---	---	---
	W10ED	0.9	22	---	---	---
	W10ED	1.5	34	---	---	---
	W10EA,B,C	0.0	170	3.6	---	---
	W10EA,B,C	0.3	<5	---	---	---
	W10EA,B,C	0.6	27	---	---	---
	W10EA,B,C	0.9	26	---	---	---
	W10EA,B	1.5	12	---	---	---
	W10EA,B	2.7, 3.1	2.5	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
			Transition Structures			
W2L	W2LC	0.0	110	---	---	---
	W2LC	0.3	10	---	---	---
	W2LC	0.6	10	---	---	---
	W2LC	0.6	8.5	---	---	---
	W2LD	0.0	46	---	---	---
	W2LD	0.3	20	---	---	---
	W2LC,D	0.0	38	---	---	---
	W2LC,D	0.3	52	<10	---	6.24
W2R	W2RA	0.0	94	---	---	---
	W2RA	0.3	24	---	---	---
re-run	W2RA	0.3	160	---	---	---
	W2RB	0.0	60	---	---	---
	W2RA,B	0.0	50	5.5	0.22	---
W3L	W3LA	0.0	7.0	---	---	---
	W3LA	0.3	9.0	---	---	---
	W3LB	0.0	30	---	---	---
	W3LC	0.0	34	---	---	---
	W3LC	0.3	20	---	---	---
	W3LD	0.0	170	---	---	---
	W3LD	0.3	26	---	---	---
	W3LA,B,C,D	0.0	96	<10	---	---
	W3LA,C,D	0.3	14	---	---	---
W3R	W3RA	0.0	7.0	---	---	---
	W3RA	0.3	6.5	---	---	---
	W3RA	0.6	7.0	---	---	---
	W3RB	0.0	17	---	---	---
	W3RB	0.3	7.0	---	---	---
	W3RC	0.0	280	---	---	---
	W3RC	0.3	140	---	---	---
	W3RC	0.6	44	---	---	---
	W3RD	0.0	130	---	---	---
	W3RD	0.3	22	---	---	---
	W3RA,B,C,D	0.0	300	14	0.92	---
	W3RA,B,C,D	0.3	7.0	---	---	---
	W3RA,C	0.6	6.5	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
W4L	W4LA	0.0	63	---	---	---
	W4LA	0.3	50	---	---	---
	W4LA	0.6	5.0	---	---	---
	W4LB	0.0	200	13	---	---
	W4LB	0.3	37	---	---	---
	W4LB	0.6	26	---	---	---
	W4LB	0.9	32	---	---	---
	W4LC	0.0	<5	---	---	---
	W4LC	0.3	200	---	---	---
	W4LC	0.6	55	---	---	---
	W4LD	0.0	10	---	---	---
	W4LD	0.3	74	---	---	---
	W4LD	0.6	<5	---	---	---
	W4LA,C,D	0.0	40	---	---	---
	W4LA,C,D	0.3	240	6.9	0.36	---
	W4LA,C,D	0.6	<5	---	---	---
	W4LA,C,D	0.9	<5	---	---	---
	W4LA,C,D	1.5	<5	---	---	---
	W4LC,D	3.7, 2.1	<5	---	---	---
W4R	W4RA	0.0	20	---	---	---
	W4RA	0.3	57	1.5	---	---
	W4RA	0.6	2.5	4.3	---	---
	W4RA	0.9	1.5	---	---	---
	W4RA	1.5	24	---	---	---
	W4RA	7.0	3.5	---	---	---
	W4RB	0.0	340	22	1.2	---
	W4RB	0.3	44	---	---	---
	W4RB	0.6	3.0	---	---	---
	W4RB	0.9	3.5	---	---	---
	W4RB	1.5	4.5	---	---	---
	W4RB	7.3	9.0	---	---	---
	W4RC	0.0	400	24	0.76	6.01
	W4RC	0.3	2.5	---	---	---
	W4RC	0.6	68	4.3	---	---
	W4RC	0.9	26	---	---	---
	W4RC	1.5	16	---	---	---
	W4RD	0.0	290	22	0.52	---
	W4RD	0.3	130	4.4	---	7.75
	W4RD	0.6	64	2.7	---	---
	W4RD	0.9	26	---	---	---
	W4RD	1.5	82	3.5	---	---
	W4RD	2.1	100	2.2	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
W5AL	W5AL	0.0	8.0	---	---	---
	W5AL	0.3	<5	---	---	---
	W5AL	0.6	<5	---	---	---
	W5AL	0.9	<5	---	---	---
	W5AL	1.5	<5	---	---	---
	W5AL	3.1	25	---	---	---
W5L	W5LB	0.0	33	---	---	---
	W5LB	0.3	<5	---	---	---
	W5LB	0.6	<5	---	---	---
	W5LC	0.0	15	---	---	---
	W5LC	0.3	<5	---	---	---
	W5LC	0.6	<5	---	---	---
	W5LC	9.1	2.5	---	---	---
	W5LD	0.0	44	---	---	---
	W5LD	0.3	<5	---	---	---
	W5LD	0.6	13	---	---	---
	W5LB,C,D	0.0	26	---	---	---
	W5LB,C,D	0.3	<5	---	---	---
	W5LB,C,D	0.6	<5	---	---	---
	W5LB,C,D	0.9	<5	---	---	---
	W5LB,C,D	1.5	<5	---	---	---
	W5LB,C,D	3.7	<5	---	---	---
W5R	W5RA	0.0	44	---	---	---
	W5RA	0.3	<5	---	---	---
	W5RA	0.6	<5	---	---	---
	W5RB	0.0	20	---	---	---
	W5RB	0.3	<5	---	---	---
	W5RB	0.6	14	---	---	---
	W5RC	0.0	1300	---	---	---
	W5RC	0.3	760	---	---	---
	W5RC	0.6	81	---	---	---
	W5RD	0.0	1300	---	---	---
	W5RD	0.3	1800	---	---	---
	W5RD	0.6	120	---	---	---
	W5RA,B,C,D	0.0	480	---	2.8	7.55
	W5RA,B,C,D	0.3	1100	---	1.2	---
	W5RA,B,C,D	0.6	95	2.6	---	---
	W5RA,B,C,D	0.9	15	---	---	---
	W5RA,B,C,D	1.5	33	---	---	---
	W5RA,B,C,D	4.3, 4.3, 2.9, 3.7	90	1.5	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
W6L	W6LA	0.3	18	---	---	---
	W6LA	0.6	21	---	---	---
	W6LB	0.0	33	---	---	---
	W6LB	0.3	18	---	---	---
	W6LB	0.6	20	---	---	---
	W6LC	0.0	16	---	---	---
	W6LC	0.3	19	---	---	---
	W6LC	0.6	<5	---	---	---
	W6LD	0.0	25	---	---	---
	W6LD	0.3	19	---	---	---
	W6LD	0.6	<5	---	---	---
	W6LB,C,D	0.0	20	---	---	---
	W6LA,B,C,D	0.3	3.0	---	---	---
	W6LA,B,C,D	0.6	2.0	---	---	---
	W6LA,B,C,D	0.9	1.5	---	---	---
	W6LA,B,D	1.5	2.0	---	---	---
	W6LA,B,C,D	2.7	<5	---	---	---
W6C	W6CA	0.0	19	---	---	---
	W6CA	0.3	<5	---	---	---
	W6CB	0.3	<5	---	---	---
	W6CB	0.6	<5	---	---	---
	W6CC	0.6	11	---	---	---
	W6CA,B	0.3	5.2	---	---	---
	W6CA,B	0.6	<5	---	---	---
	W6CA,B	0.9	<5	---	---	---
	W6CA,B	1.5	<5	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
W6R	W6RA	0.0	120	---	---	---
	W6RA	0.3	110	---	---	---
	W6RA	0.6	10	---	---	---
	W6RB	0.0	280	---	---	---
	W6RB	0.3	270	---	---	---
	W6RB	0.6	51	---	---	---
	W6RC	0.0	980	---	---	---
	W6RC	0.3	67	---	---	---
	W6RC	0.6	220	---	---	---
	W6RD	0.0	200	---	---	---
	W6RD	0.3	120	---	---	---
	W6RD	0.6	95	---	---	---
	W6RA,B,C,D	0.0	350	53	0.98	---
	W6RA,B,C,D	0.3	120	6.8	---	---
	W6RA,B,C,D	0.6	120	3.9	---	8.38
	W6RA,B,C,D	0.9	71	3.4	---	---
	W6RA,B,C,D	1.5	27	---	---	---
	W6RA,B	5.2, 3.1	43	---	---	---
W7L	W7LA	0.6	<5	---	---	---
	W7LC	0.6	34	---	---	---
	W7LD	0.0	320	---	---	---
	W7LD	0.6	8.2	---	---	---
	W7LA,C,D	0.0	580	---	1.0/0.76	---
	W7LA,C,D	0.3	200	32	0.79	---
	W7LA,C,D	0.6	20	---	---	---
	W7LA,C,D	0.9	21	---	---	---
	W7LA,C,D	1.5	54	18	0.33	---
	W7LC,D	3.1, 2.4	21	---	---	---
W7C	W7C	0.0	<5	---	---	---
	W7C	0.3	<5	---	---	---
W7RA/B	W7RA/B	0.0	<5	---	---	---
	W7RA/B	0.3	<5	---	---	---
	W7RA/B	0.6	<5	---	---	---
	W7RA/B	0.9	170	9.8	<0.15	---
	W7RA/B	1.5	43	---	---	---
	W7RA/B	2.1	7.8	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
W7R	W7RC	0.3	<5	---	---	---
	W7RC	0.6	<5	---	---	---
	W7RD	0.3	8.7	---	---	---
	W7RD	0.6	5.3	---	---	---
	W7RC,D	0.3	5.1	---	---	---
	W7RC,D	0.6	<5	---	---	---
	W7RC,D	0.9	<5	---	---	---
	W7RC,D	1.5	<5	---	---	---
	W7RC,D	5.8, 4.9	<5	---	---	---
W8L	W8LA	0.0	600	---	---	---
	W8LB	0.0	<5	---	---	---
	W8LC	0.0	510	---	---	---
	W8LD	0.0	2300	---	---	---
	W8LA,B,C,D	0.0	1200	---	0.90	---
	W8LA,B,C,D	0.3	75	0.05*	---	---
	W8LA,B,C,D	0.6	25	---	---	---
	W8LA,B,C,D	0.9	7.9	---	---	---
	W8LA,B,C,D	1.5	21	---	---	---
	W8LA,C,D	3.1, 3.1, 2.7	24	---	---	---
W8C	W8C	0.0	3000	---	---	---
	W8C	0.3	22	---	---	---
W8R	W8R	0.0	3900	---	---	---
	W8R	0.3	150	18	0.56	---
	W8R	0.6	14	---	---	---
	W8R	0.9	52	1.8	---	---
	W8R	1.5	38	---	---	---
W9L	W9LB	0.3	12	---	---	---
	W9LB	0.6	30	---	---	---
	W9LC	0.0	1200	---	---	---
	W9LC	0.3	130	---	---	---
	W9LD	0.0	18	---	---	---
	W9LD	0.3	12	---	---	---
	W9LC,D	0.0	270	13	---	---
	W9LB,C,D	0.3	7.1	---	---	---
	W9LB,C,D	0.6	15	---	---	---
	W9LB,D	0.9	13	---	---	---
	W9LB,D	1.5	10	---	---	---
	W9LB,D	3.4, 2.1	10	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
W9C	W9C	0.0	15	---	---	---
	W9C	0.3	29	---	---	---
	W9C	0.6	12	---	---	---
	W9C	0.9	8.5	---	---	---
	W9C	1.5	10	---	---	---
W9R	W9RC	0.0	20	---	---	---
	W9RC	0.3	9.8	---	---	---
	W9RC	0.6	5.7	---	---	---
W10L	W10LA	0.9	<5	---	---	---
	W10LA	1.5	<5	---	---	---
	W10LA	3.1	<5	---	---	---
	W10LB	0.0	370	24	<0.15	---
	W10LB	0.9	<5	---	---	---
	W10LB	1.5	<5	---	---	---
	W10LB	3.1	<5	---	---	---
	W10LA,B	0.3	<5	---	---	---
	W10LA,B	0.6	<5	---	---	---
W10C	W10CB	0.3	6.7	---	---	---
	W10CB	0.6	<5	---	---	---
	W10CB	0.9	<5	---	---	---
	W10CB	1.5	<5	---	---	---
	W10CB	3.1	<5	---	---	---
	W10CD	0.0	30	---	---	---
	W10CD	0.3	21	---	---	---
	W10CD	0.6	8.3	---	---	---
	W10CD	0.9	<5	---	---	---
	W10CD	1.5	<5	---	---	---
	W10CD	3.1	550	0.70	<0.15	---
	W10CB,D	0.0	14	---	---	---
W10R	W10RB	0.0	8.0	---	---	---
	W10RA,B	0.3	6.7	---	---	---
	W10RA,B	0.6	17	---	---	---

TABLE 5
SUMMARY OF LEAD: TOTAL, WET, and TCLP with pH
ANALYTICAL RESULTS - SOIL
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Bent ID	Boring ID	Sample Depth (meters)	Total Lead (mg/kg)	WET (mg/L)	TCLP (mg/L)	pH
W10AL	W10ALA	0.3	<5	---	---	---
	W10ALA	0.6	<5	---	---	---
	W10ALB	0.3	12	---	---	---
	W10ALB	0.6	<5	---	---	---
	W10ALA,B	0.3	<5	---	---	---
	W10ALA,B	0.6	<5	---	---	---
	W10ALA,B	0.9	<5	---	---	---
	W10ALA,B	1.5	<5	---	---	---
	W10ALA,B	4.3, 2.7	<5	---	---	---
W11R	W11RB	0.0	4.0	---	---	---
	W11RB	0.3	2.5	---	---	---
	W11RB	0.6	2.5	---	---	---
	W11RB	0.9	2.0	---	---	---
	W11RB	1.5	1.5	---	---	---
	W11RB	3.7	1.5	---	---	---

WET	Waste Extraction Test
TCLP	Toxic Characteristic Leaching Procedure
mg/kg	milligrams per kilogram
mg/L	milligrams per Liter
<	Analyte was not detected above the stated laboratory reporting limit
---	Not Analyzed
dup	duplicate sample analysis
*	The results for EPA 6010 (WET Lead) were J-flagged. The MDL is 0.001 mg/L

TABLE 6
SUMMARY OF TPHg, TPHd, TPHmo, AHVOCs, SVOCs
ANALYTICAL RESULTS - WATER
SFOBB EAST SPAN ON YBI, SAN FRANCISCO COUNTY

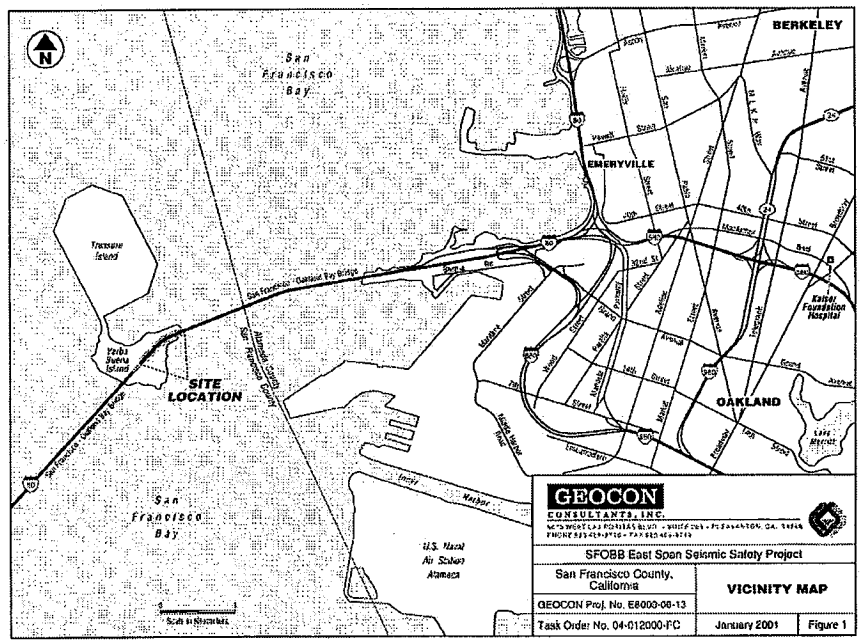
Sample ID	TPHg (mg/L)	TPHd (mg/L)	TPHmo (mg/L)	VOCs (µg/L)	SVOC (µg/L)
			Eastbound Detour Structures		
EB6R	<0.050*	160	---	<5.0	ND
EB7R	0.12*	1200	---	<5.0	ND
EB8L	0.3*	44	---	<5.0	2-Methylnaphthalene=13 Phenanthrene=12
EB9L	---	3.1	---	---	ND
EB10R	---	5.6	---	---	ND
EB13L	0.33*	36	---	<5.0	Phenanthrene=93
EB14R	0.48*	440	---	<5.0	ND
			Transition Structures		
W5LC	0.57	13	9.1	Benzene=0.88 m,p-Xylene = 0.80 o-Xylene=1.6 1,2,4-Trimethylbenzene=6.3 Naphthalene=39	2-Methylnaphthalene=68 Fluorene=11 Naphthalene=31 Phenanthrene=11

mg/L	milligrams per Liter
µg/L	micrograms per Liter
---	Not Analyzed
VOCs	Volatile Organic Compounds
ND	No analytes were reported above laboratory reporting limit
TPH	Total Petroleum Hydrocarbons as g=gasoline, d=diesel, mo=motor oil
SVOCs	Semi-Volatile Organic Compounds
*	Samples contain hydrocarbons within the Gasoline range, but do not match the Gasoline pattern. Quantitation is based on a Gasoline standard.

TABLE 7
SUMMARY OF TITLE 22 METALS ANALYTICAL RESULTS
ANALYTICAL RESULTS - GROUNDWATER
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

Sample ID	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
Transition Structures																	
W5L	0.010	0.22	2.5	<0.0030	<0.0030	1.2	0.34	0.27	0.10	<0.0040	<0.0050	1.4	<0.0050	<0.0030	<0.0050	0.66	0.71
Eastbound Detour Structures																	
EB13L	0.0093	0.010	0.67	<0.0010	<0.0030	<0.0030	0.0036	0.040	0.14	<0.0040	0.010	<0.0030	0.0079	0.0096	<0.0050	0.0041	0.21
EB14R	0.010	0.030	1.1	<0.0010	<0.0030	0.050	0.010	0.29	4.1	<0.0040	0.010	0.040	0.0060	0.010	<0.0050	0.040	2.4

Note: All data is reported in milligrams per Liter
< Analyte was not detected above the stated laboratory reporting limit



GEOCON
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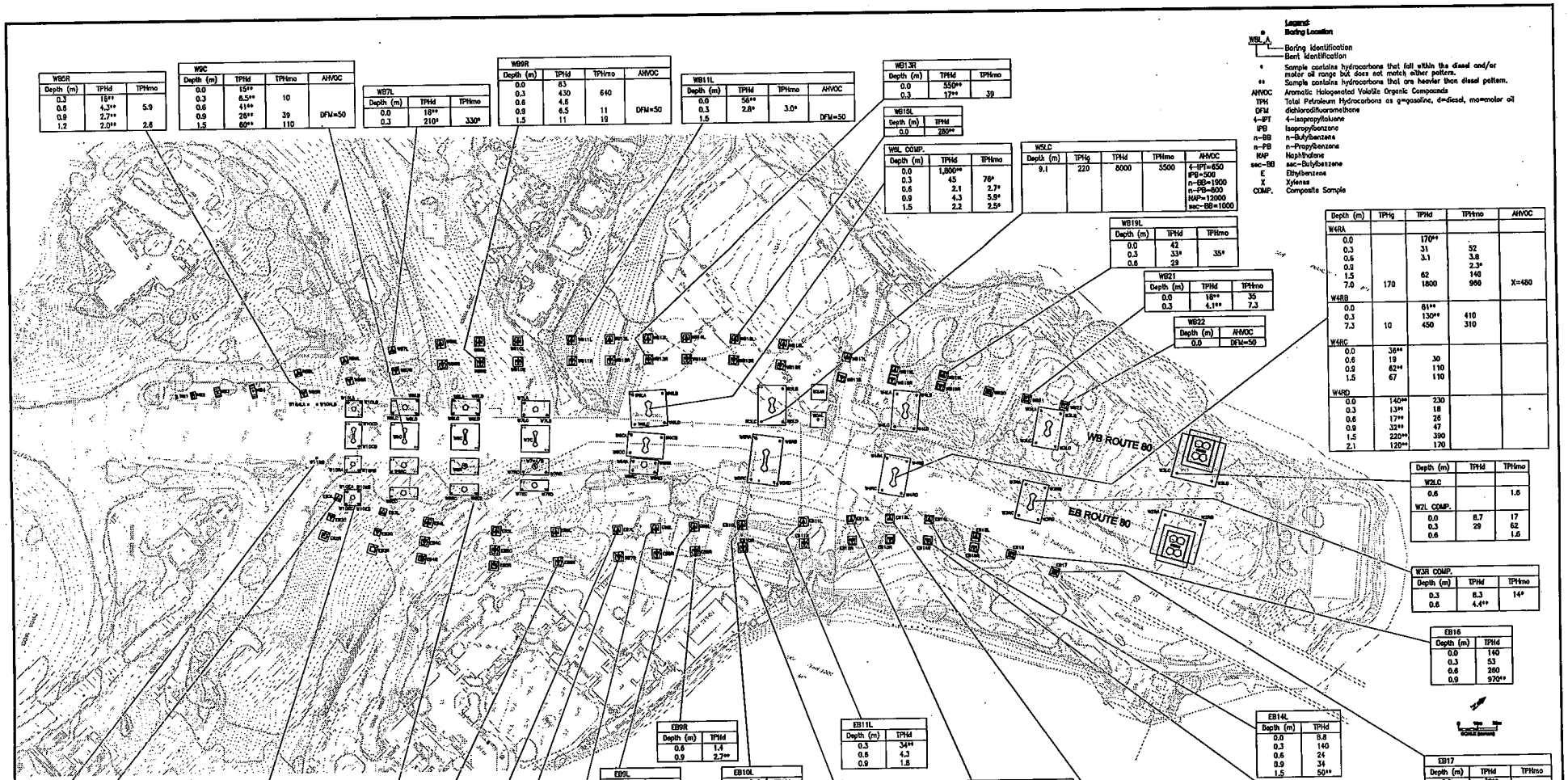
SFOBB East Span Seismic Safety Project

San Francisco County, California	VICINITY MAP
GEOCON Proj. No. E8000-06-13	
Task Order No. 04-012000-FC	January 2001 — Figure 1

GEOCON
CONSULTANTS INC.
5675 W. LAS POSITAS BLVD, SUITE 205 - PLEASANTON, CA 94588
PHONE 925 460-9700 - FAX 925 460-9702

SFOBB East Span Seismic Safety Project

San Francisco County, California	Yerba Buena Island Detour Structure and Transition Structure Sample Locations
GEOCON Proj. No. S8000-06-19	
Task Order No. 04-012000-PO	May 2001 — Figure 2



Legend:
Boring Location

WBL_A
- Boring Identification
- Bent Identification

* Sample contains hydrocarbons that fall within the diesel and/or motor oil range but does not match either pattern.
** Sample contains hydrocarbons that are heavier than diesel pattern.
AHVOC Aromatic Halogenated Volatile Organic Compounds
TPH Total Petroleum Hydrocarbons as g=gasoline, d=diesel, mo=motor oil
DFM dichlorodifluoromethane
4-IPT 4-Isopropyltoluene
IPB Isopropylbenzene
n-BB n-Butylbenzene
n-PB n-Propylbenzene
NAP Naphthalene
sec-BB sec-Butylbenzene
E Ethylbenzene
X Xylenes
COMP. Composite Sample

W95R		
Depth (m)	TPHd	TPHmo
0.3	15**	
0.6	4.3**	5.9
0.9	2.7**	
1.2	2.0**	2.6

W9C			
Depth (m)	TPHd	TPHmo	AHVOC
0.0	15**		
0.3	6.5**	10	
0.6	41**		
0.9	26**	39	DFM=50
1.5	60**	110	

W87L		
Depth (m)	TPHd	TPHmo
0.0	18**	
0.3	210*	330*

W89R			
Depth (m)	TPHd	TPHmo	AHVOC
0.0	83		
0.3	430	640	
0.6	4.6		
0.9	6.5	11	DFM=50
1.5	11	19	

WB11L			
Depth (m)	TPHd	TPHmo	AHVOC
0.0	56**		
0.3	2.8*	3.0*	
1.5			DFM=50

WB13R		
Depth (m)	TPHd	TPHmo
0.0	550**	
0.3	17**	39

WB15L	
Depth (m)	TPHd
0.0	280**

WBL COMP.		
Depth (m)	TPHd	TPHmo
0.0	1,800**	
0.3	45	76*
0.6	2.1	2.7*
0.9	4.3	5.9*
1.5	2.2	2.5*

W5LC					
Depth (m)	TPHg	TPHd	TPHmo	AHVOC	
9.1	220	8000	3500	4-IPT=650 IPB=500 n-BB=1900 n-PB=800 NAP=12000 sec-BB=1000	

WB19L		
Depth (m)	TPHd	TPHmo
0.0	42	
0.3	33*	35*
0.6	29	

WB21		
Depth (m)	TPHd	TPHmo
0.0	18**	35
0.3	4.1**	7.3

WB22	
Depth (m)	AHVOC
0.0	DFM=50

Depth (m)	TPHg	TPHd	TPHmo	AHVOC
W4RA				
0.0		170**		
0.3		31	52	
0.6		3.1	3.6	
0.9			2.3*	
1.5		62	140	
7.0	170	1800	960	X=480
W4RB				
0.0		61**		
0.3		130**	410	
7.3	10	450	310	
W4RC				
0.0	36**			
0.6	19	30		
0.9	62**	110		
1.5	67	110		
W4RD				
0.0	140**	230		
0.3	13**	18		
0.6	17**	26		
0.9	32**	47		
1.5	220**	390		
2.1	120**	170		

Depth (m)	TPHd	TPHmo
W2LC		
0.6		1.6
W2L COMP.		
0.0	8.7	17
0.3	29	62
0.6		1.6

W3R COMP.		
Depth (m)	TPHd	TPHmo
0.3	8.3	14*
0.6	4.4**	

EB16	
Depth (m)	TPHd
0.0	140
0.3	53
0.6	260
0.9	970**

EB14L	
Depth (m)	TPHd
0.0	8.8
0.3	140
0.6	24
0.9	34
1.5	50**

EB17		
Depth (m)	TPHd	TPHmo
0.0	38**	
0.3	11**	18
0.6	3.2	2.1
0.9		1.7

EB14R			
Depth (m)	TPHg	TPHd	TPHmo
0.0		280**	
0.3		120**	280
0.6		33**	80
0.9		160**	270
1.5		240	260
3.3	150	12000	9700

EB13L			
Depth (m)	TPHg	TPHd	TPHmo
0.0			3.2
0.3			6.5
0.6			44
1.5		52	
2.4	110	2700	
3.3	5.4	54	

EB12L		
Depth (m)	TPHd	TPHmo
0.0	340	
0.3	5.9	9.2

EB11L	
Depth (m)	TPHd
0.3	34**
0.6	4.3
0.9	1.8

EB10R		
Depth (m)	TPHd	TPHmo
0.0	5.5**	
0.3	8.6**	20
0.6	360**	
1.5		2.4

EB10L	
Depth (m)	TPHd
0.0	78**
0.3	18**
0.6	100**
0.9	2.5**
1.5	9.8**
3.0	13**

EB9R	
Depth (m)	TPHd
0.6	1.4
0.9	2.7**

EB9L	
Depth (m)	TPHd
2.1	1700

EB8L				
Depth (m)	TPHg	TPHd	TPHmo	AHVOC
0.3		7.2	4.7	
0.6		4.8	3.2	
0.9		16	12	
1.2	2200	15000	8000	E=69; X=59

EB7R	
Depth (m)	TPHd
0.0	5.1
0.3	4.2
0.6	120**
0.9	53**
1.2	210
1.5	4500

W11RB	
Depth (m)	TPHd
0.0	2.0**

Depth (m)	TPHd	TPHmo	AHVOC
W10ED			
0.3	68*	110*	
0.9	110*	170*	DFM=50
1.5	81*	130*	
W10E COMP.			
0.3	4.1*	7.4*	
0.6	98*	120*	
0.9	69*	84*	DFM=50
1.5	29*	30*	
2.7,3.5	4.9*	5.4*	

W9ED		
Depth (m)	TPHd	TPHmo
0.3	3.1*	4.6*

EB8R			
Depth (m)	TPHg	TPHd	TPHmo
0.3		22*	35*
0.6		5.0*	11*
0.9		110*	92*
1.5		13*	14*
2.4	90	850	650

EB7L	
Depth (m)	TPHd
0.3	7.1
0.6	10000
0.9	11000

EB2L			
Depth (m)	TPHd	TPHmo	AHVOC
0.0	7.2**		
0.3	3.4**	5.7	
0.6	5.2**		
0.9	4.6**	8.6	DFM=50
1.5	2.4**	4.4	

Notes: 1. Petroleum hydrocarbon results reported in milligrams per kilogram (mg/kg), AHVOC results reported in micrograms per kilogram (ug/kg).
2. Only the contaminants detected above laboratory reporting limits are reported.

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SFOBB East Span Seismic Safety Project

San Francisco County, California

GEOCON Proj. No. 02000-06-13

Task Order No. 04-012000-PC

Petroleum Hydrocarbon and AHVOC Distribution in Soil

May 2001

Figure 3

Legend:
Boring Location
W8L A — Boring Identification / Bent Identification
PCBs Polychlorinated Biphenyls
COMP. Composite Sample

Notes: 1. Results reported in micrograms per kilogram (ug/kg).
2. Only the contaminants detected above laboratory reporting limits are reported.

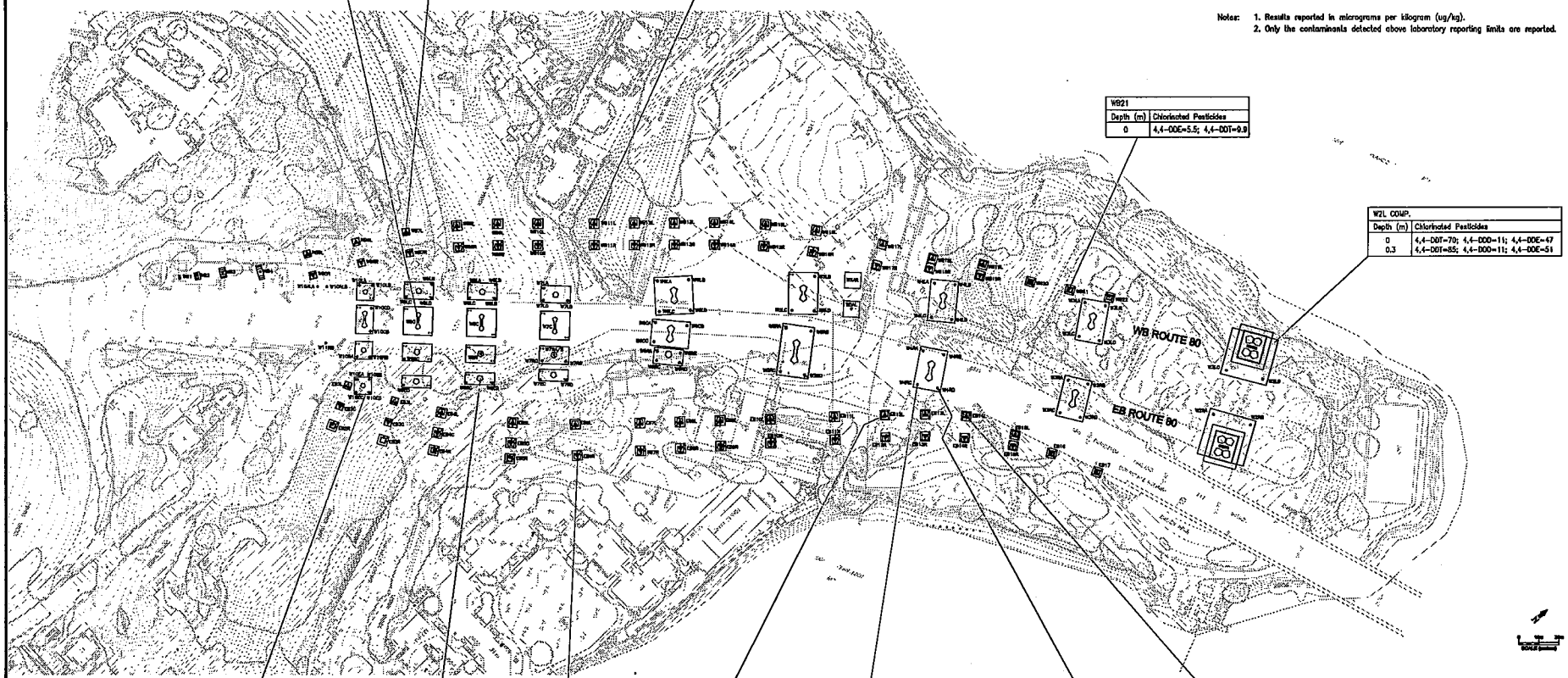
W9C	
Depth (m)	Chlorinated Pesticides
0.3	Aldrin=4.4; beta-BHC=6.4; delta-BHC=3.5; Endosulfan I=4.2

W97L	
Depth (m)	Chlorinated Pesticides
0	4,4-DDD=47; 4,4-DDE=300; 4,4-DDT=440
0.3	4,4-DDD=180; 4,4-DDE=530; 4,4-DDT=1,100

W811L	
Depth (m)	Chlorinated Pesticides
0	4,4-DDT=35

W921	
Depth (m)	Chlorinated Pesticides
0	4,4-DDE=5.5; 4,4-DDT=9.9

W2L COMP.	
Depth (m)	Chlorinated Pesticides
0	4,4-DDT=70; 4,4-DDD=11; 4,4-DDE=47
0.3	4,4-DDT=85; 4,4-DDD=11; 4,4-DDE=51



Depth (m)	Chlorinated Pesticides
W10ED	
0.3	4,4-DDT=21
1.5	4,4-DDT=9.9
W10E COMP.	
0	4,4-DDT=25; 4,4-DDD=6.3
0.9	4,4-DDT=18
1.5	4,4-DDT=18; 4,4-DDD=13

Depth (m)	Chlorinated Pesticides
W8EC	
0	4,4-DDT = 4.5; Endosulfan I = 5.2
W8ED	
0	4,4-DDD=100; 4,4-DDT=270; Endosulfan I=320

EB9R	
Depth (m)	Chlorinated Pesticides
0.6	4,4-DDE=4.8
0.9	4,4-DDD=6.5

EB12L	
Depth (m)	PCBs
0	Aroclor 1254 =370

W4RC		
Depth (m)	Chlorinated Pesticides	PCBs
0	4,4-DDT=44	Aroclor 1262 =45

W4RD	
Depth (m)	Chlorinated Pesticides
0	4,4-DDT=12

EB14L		
Depth (m)	Chlorinated Pesticides	PCBs
0.3	4,4-DDD=140; 4,4-DDE=360; 4,4-DDT=590	Aroclor 1260 =240
1.5	4,4-DDD=17; 4,4-DDE=42; 4,4-DDT=54	Aroclor 1260 =65

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San Francisco County, California

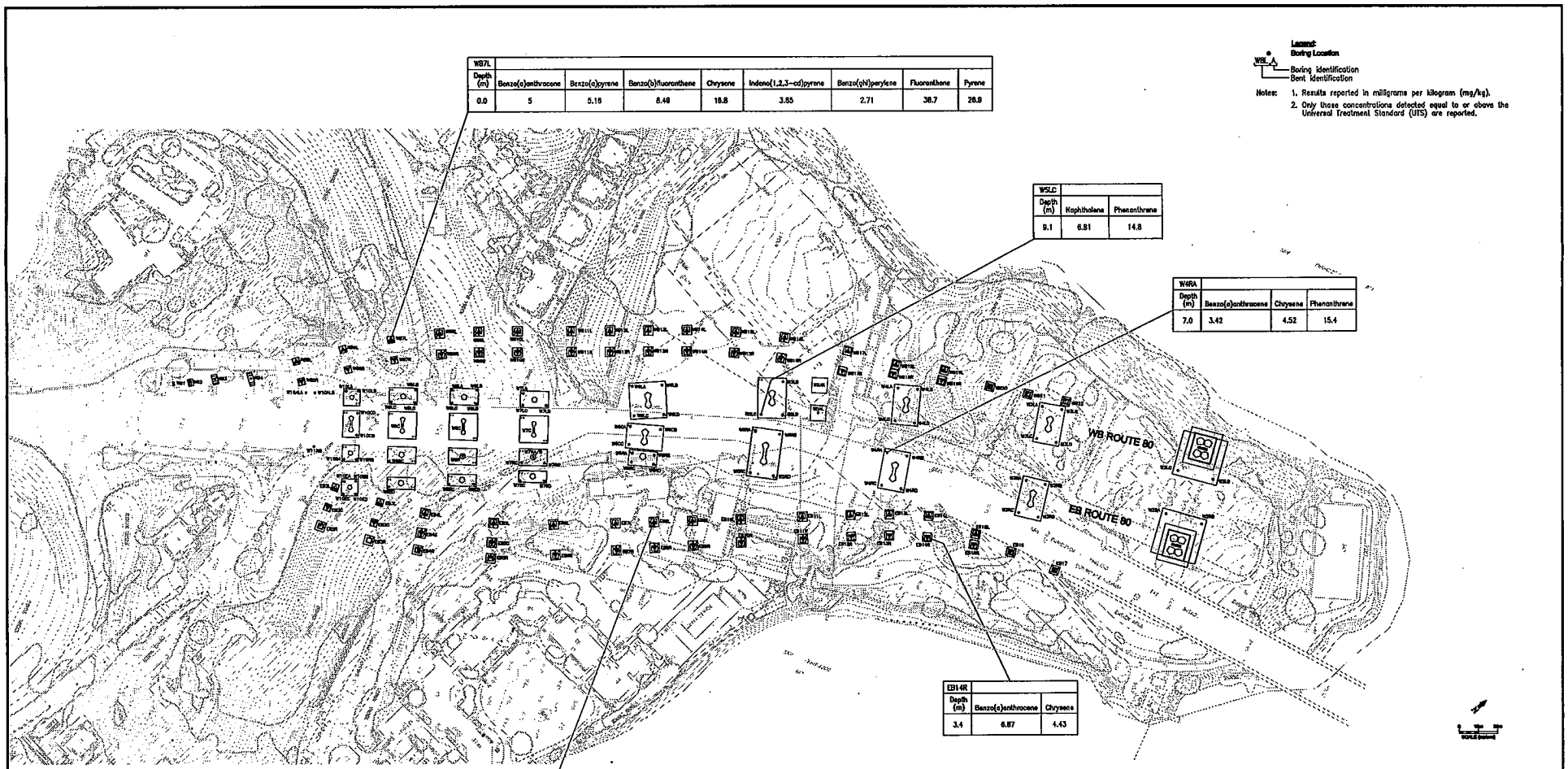
GEOCON Proj. No. 08000-08-13

Task Order No. 04-012000-PO

Chlorinated Pesticides and PCB Distribution in Soil

May 2001

Figure 4



Legend:
Boring Location
Boring Identification
Bent Identification

Notes:
1. Results reported in milligrams per kilogram (mg/kg).
2. Only those concentrations detected equal to or above the Universal Treatment Standard (UTS) are reported.

W87L								
Depth (m)	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Chrysene	Indeno(1,2,3-cd)pyrene	Benzo(g,h)perylene	Fluoranthene	Pyrene
0.0	5	5.16	6.49	16.8	3.55	2.71	36.7	26.9

W5LC		
Depth (m)	Naphthalene	Phenanthrene
9.1	6.81	14.8

W4RA			
Depth (m)	Benzo(a)anthracene	Chrysene	Phenanthrene
7.0	3.42	4.52	15.4

EB14R		
Depth (m)	Benzo(a)anthracene	Chrysene
3.4	6.87	4.43

EB8L				
Depth (m)	Benzo(a)anthracene	Chrysene	Fluorene	Phenanthrene
1.2	7.68	9.43	13	27.8

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8FOBB East Span Seismic Safety Project

San Francisco County, California

Polynuclear Aromatic Hydrocarbon Distribution in Soil

GEOCON Proj. No. S8000-06-13

Task Order No. 04-012000-PC

May 2001

Figure 8

Legend:
Boring Location

WBL-A
- Boring Identification
- Bent Identification

(m)	Depth in meters	mg/kg	milligrams per kilogram
WET	Waste Extraction Test	mg/L	milligrams per Liter
TCLP	Toxic Characteristic Leaching Procedure	<	Analyte was not detected above the stated laboratory reporting limit
Pb	Lead	*	The results for EPA 5010 (WET Lead) were J-flagged. The MDL is 0.001 mg/L
		COMP.	Composite Sample

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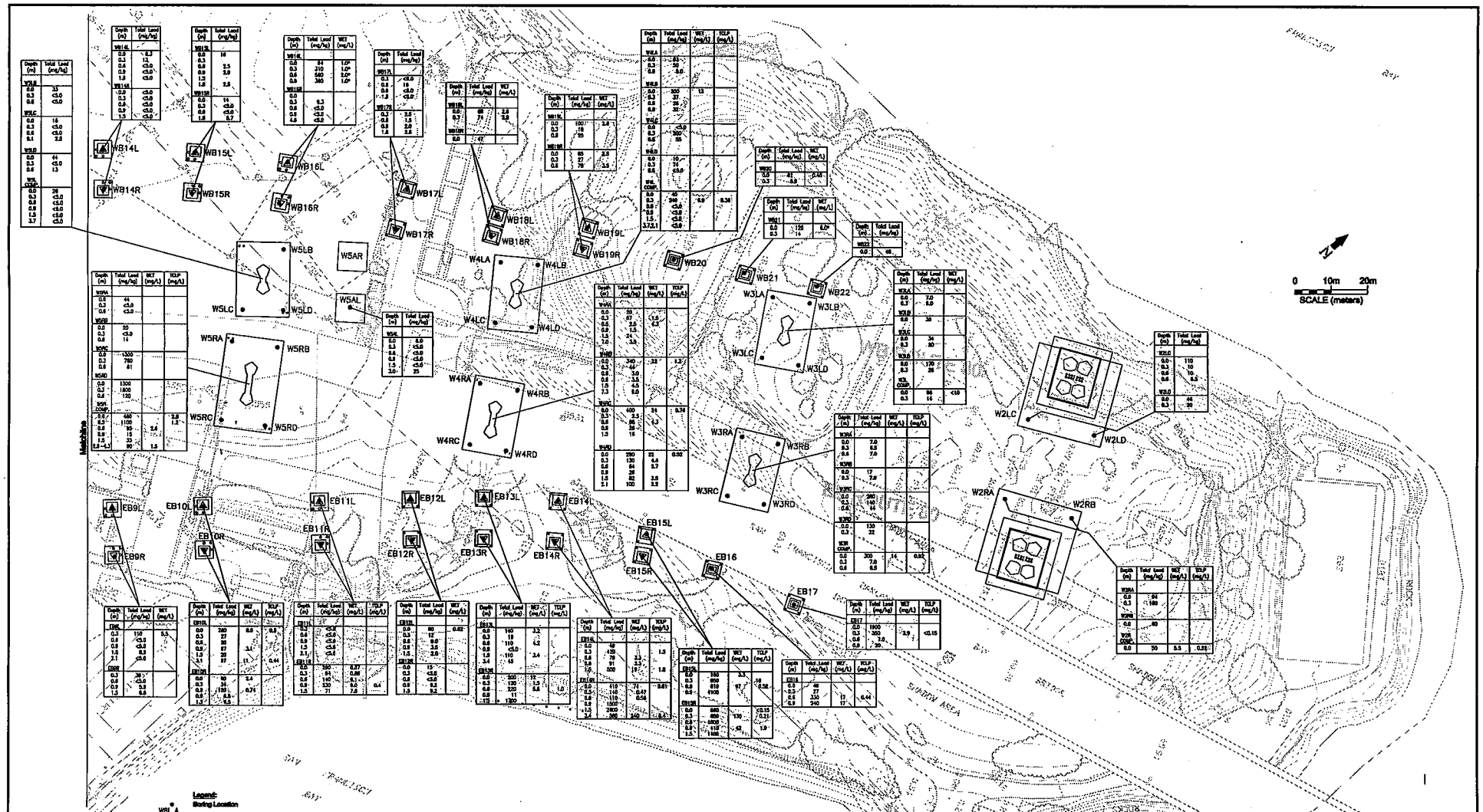
[illegible]

SFOBB East Span Seismic Safety Project

San Francisco County, California	Lead Distribution in Soil
GEOCON Proj. No. 08000-06-18	
Task Order No. 04-012000-PC	May 2001 — Figure 8A



Legend:

Boring Location

WBL — Boring Identification
A — Bent Identification

(m) Depth in meters
WET Waste Extraction Test
TCLP Toxic Characteristic Leaching Procedure
Pb Lead
mg/kg milligrams per kilogram
mg/L milligrams per Liter
< Analyte was not detected above the stated laboratory reporting limit
* The results for EPA 6010 (WET Lead) were J-flagged. The MDL is 0.001 mg/L.
COMP. Composite Sample

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8FOBB East Span Seismic Safety Project

San Francisco County, California

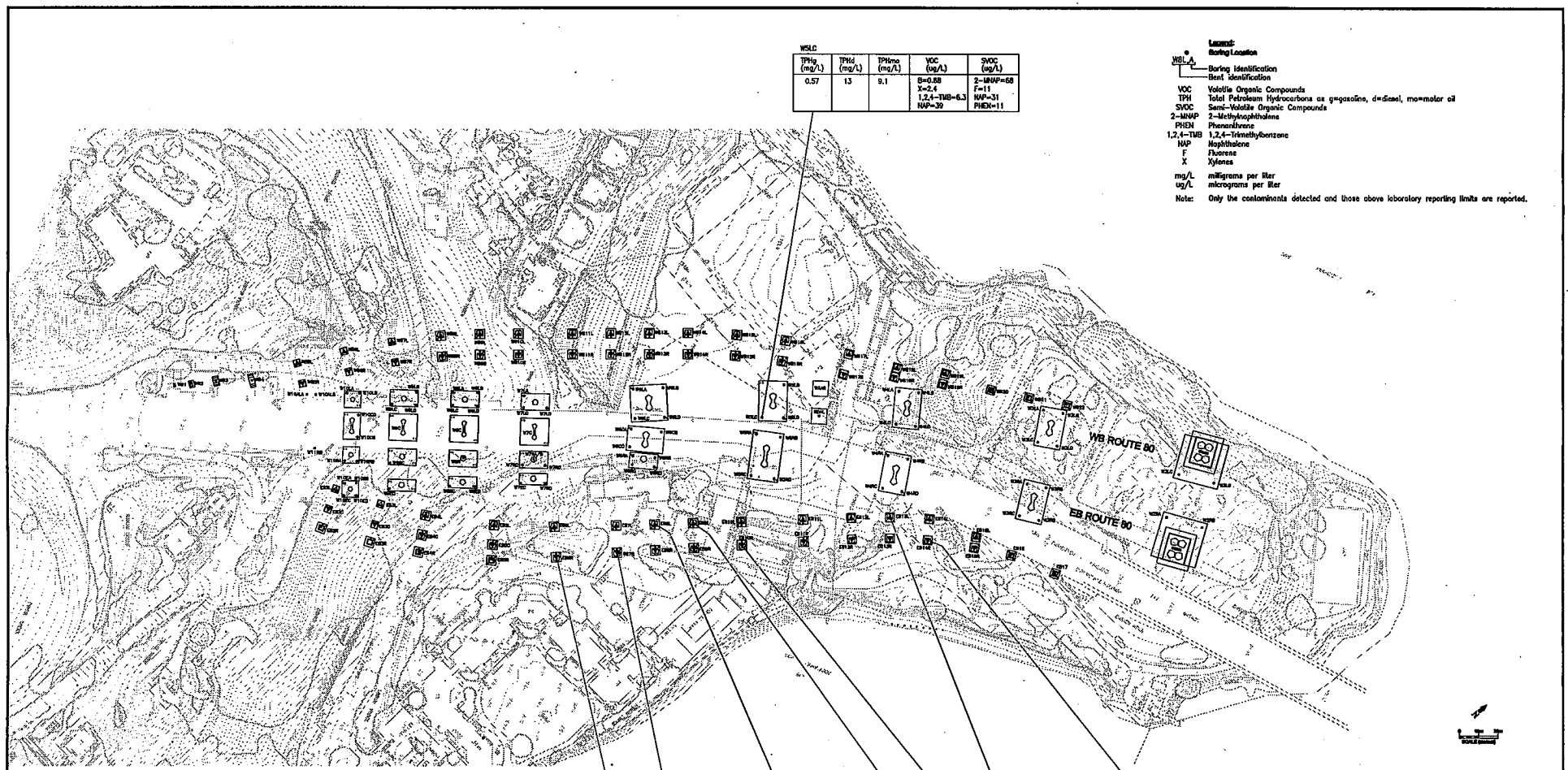
Lead Distribution in Soil

GEOCON Proj. No. 08000-05-19

Task Order No. 04-013000-FC

May 2001

Figure 08



Legend:

Boring Location

WB1_A
- Boring Identification
- Bent Identification

VOC	Volatile Organic Compounds
TPH	Total Petroleum Hydrocarbons as g=gasoline, d=diesel, mo=motor oil
SVOC	Semi-Volatile Organic Compounds
2-MNAP	2-Methylnaphthalene
PHEN	Phenanthrene
1,2,4-TMB	1,2,4-Trimethylbenzene
NAP	Naphthalene
F	Fluorene
X	Xylenes
mg/L	milligrams per liter
ug/L	micrograms per liter

Note: Only the contaminants detected and those above laboratory reporting limits are reported.

W5LC

TPHg (mg/L)	TPHd (mg/L)	TPHmo (mg/L)	VOC (ug/L)	SVOC (ug/L)
0.57	13	9.1	B=0.88 X=2.4 1,2,4-TMB=6.3 NAP=39	2-MNAP=68 F=11 NAP=31 PHEN=11

EB6R

TPHd (mg/L)
160

EB7R

TPHg (mg/L)	TPHd (mg/L)
0.12	1200

EB8L

TPHg (mg/L)	TPHd (mg/L)	SVOC (ug/L)
0.30	44	2-MNAP=13 PHEN=12

EB9L

TPHd (mg/L)
3.1

EB10R

TPHd (mg/L)
5.8

EB13L

TPHg (mg/L)	TPHd (mg/L)	SVOC (ug/L)
0.33	36	PHEN=93

EB14R

TPHg (mg/L)	TPHd (mg/L)
0.48	440

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SFOBB East Span Seismic Safety Project

San Francisco County, California

Petroleum Hydrocarbon Distribution in Groundwater

GEOCON Proj. No. S8000-06-13

Task Order No. 04-012000-PC | May 2001 | Figure 7

APPENDIX A

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

ENCROACHMENT PERMIT

TR-0120

Permit No.	0401-NSV0126
Dist/Co/Rte/PM	04-SF-80-7.8/9.7
Date	March 8, 2001
Fee Paid	$
Deposit	$
Performance Bond Amount (1)	
Payment Bond Amount (2)	
Bond Company	
Bond Number (1)	
Bond Number (2)	

In compliance with (*Check one*):

☒ Your application of January 10, 2001

☐ Utility Notice No. _____ of _____

☐ Agreement No. _____ of _____

☐ R/W Contract No. _____ of _____

TO: Geocon Consultants, Inc.
5673 W. Las Positas Blvd., Suite 205
Pleasanton, CA 94588

Attn: Matt Hanko
Phone: (925) 469-9750

, **PERMITTEE**

and subject to the following, **PERMISSION IS HEREBY GRANTED** to:

Drill holes and collect soil samples for the hazardous waste investigation under Task Order # 04-012000-FC for Caltrans Contract # 43A0012, Project EA 012000, on State Highway 04-SF-80, Post Miles 7.8/8.7, at Yerba Buena Island, in the City and County of San Francisco.

Two days before work is started under this permit, notice shall be given to, and approval of construction details, operations, public safety, and traffic control shall be obtained from State Representative Dean Drablos, 380 Foster City Blvd., Foster City, 94404, 415-330-6537, weekdays, between 7:30 AM and 4:00 PM.

Immediately following completion of the work permitted herein, the permittee shall fill out and mail the Notice of Completion attached to this permit.

Certain details of work authorized hereby are shown on plans submitted with this application and/or as directed by the State's Representative.

The following attachments are also included as part of this permit (*Check applicable*):

☒ Yes	☐ No	General Provisions
☐ Yes	☒ No	Utility Maintenance Provisions
☐ Yes	☒ No	Special Previsions
☐ Yes	☒ No	A Cal-OSHA permit required prior to beginning work: # _____

In addition to fee, the permittee will be billed actual costs for:

☐ Yes	☒ No	Review
☐ Yes	☒ No	Inspection
☒ Yes	-------	Field Work

(If any Caltrans effort expended)

☐ Yes ☒ No The information in the environmental documentation has been reviewed and considered prior to approval of this permit.

This permit is void unless the work is completed before September 30, 2001.

This permit is to be strictly construed and no other work other than specifically mentioned is hereby authorized.

No project work shall be commenced until all other necessary permits and environmental clearances have been obtained.

APPROVED:

HARRY Y. YAHATA, District Director

BY:

S. S. NOZZARI, District Permit Engineer

Geocon Consultants, Inc.
0401-NSV0126
March 8, 2001

In addition to the attached General Provisions, Form TR-0045 (Rev. 8/98), the following special provisions are also applicable:

All utility work shall be performed in accordance with the Department of Transportation Encroachment Permit Utility, Tree Trimming, and Tree Removal Provisions dated August 1, 1998.

Permittee shall furnish, place and maintain required signs, safety equipment, and traffic control and warning devices in accordance with the Manual of Traffic Controls published by the Department of Transportation.

All personnel shall wear hard hats and orange vests, shirts or jackets as appropriate.

Permittee shall abide by San Francisco Department of Public Works construction barrier order.

Unless specifically authorized in this permit, survey markings within the right-of-way shall be temporary. Paint used for markings shall be water soluble and other markers shall be removed upon completion of survey.

Contractor shall verify where all utilities are located prior to drilling.

Boring holes shall be backfilled in accordance with State standards and as directed by the State Representative.

APPENDIX B

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB1 DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				30 CM ASPHALT CONCRETE		
		WB1-1		**ALLUVIUM** Dense, wet, yellowish brown, fine grained SAND	SP	
		WB1-2				
1		WB1-3				
		WB1-4				
2						
3						
4						
				REFUSAL - BORING TERMINATED AT 4.27 METERS		

Figure A1, Log of Boring WB1, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	**BORING NO. WB2** DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.15 METERS ASPHALT CONCRETE		
		WB2-1		**FILL** SAND, large chunks of debris fill		
		WB2-2		**ALLUVIUM** Dense, brown SAND	SP	
		WB2-3		REFUSAL - BORING TERMINATED AT APPROXIMATELY 0.91 METERS		

Figure A2, Log of Boring WB2, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB3 DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.30 METERS ASPHALT CONCRETE		
		WB3-1		**Very dense, moist, light brown, fine grained SAND**		
		WB3-2			SP	
1		WB3-3				
		WB3-4				
2						
3						
				BORING TERMINATED AT 4.27 METERS		

Figure A3, Log of Boring WB3, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB5L DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.15 METERS ASPHALT CONCRETE		
		WB5L-1		Dense, moist, light brown SAND		
		WB5L-2			SP	
1		WB5L-3				
		WB5L-5		BORING TERMINATED AT 1.52 METERS		

Figure A4, Log of Boring WB5L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB5R DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.30 METERS ASPHALT CONCRETE		
		WB5R-1		Very dense, lightly moist, yellowish brown, very fine SAND		
		WB5R-2			SP	
1		WB5R-3				
		WB5R-4		BORING TERMINATED AT 1.22 METERS		

Figure A5, Log of Boring WB5R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB6L DATE DRILLED 2/1/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.15 METERS ASPHALT CONCRETE		
		WB6L-1		Loose, dry, light brown (10 YR 4/2), fine to medium SAND		0
		WB6L-2			SP	0
1		WB6L-3				0
		WB6L-5				
		WB6L-6		BORING TERMINATED AT 1.83 METERS		

Figure A6, Log of Boring WB6L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. WB6R

DATE DRILLED 2/1/01 WATER LEVEL (ATD) _____

EQUIPMENT HAND-AUGER DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
				0.15 METERS ASPHALT CONCRETE		
		WB6R-1		Loose, dry, light brown (10 YR 4/2), fine to medium SAND		0
		WB6R-2			SP	0
1		WB6R-3				0
		WB6R-5		BORING TERMINATED AT 1.52 METERS		

Figure A7, Log of Boring WB6R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB13L DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		WB13L-0		0.15 METERS ASPHALT CONCRETE		
		WB13L-1		Dry, light brown (10YR 5/3), fine to medium SAND	SP	
		WB13L-2				
1		WB13L-3				
		WB13L-5		BORING TERMINATED AT 1.52 METERS		

Figure A8, Log of Boring WB13L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB13R DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		WB13R-0		0.15 METERS ASPHALT CONCRETE		
		WB13R-1		Slightly moist, light brown (10 YR 5/3), fine to medium SAND	SP	0
		WB13R-2				
1		WB13R-4				
		WB13R-5		BORING TERMINATED AT 1.52 METERS		0

Figure A9, Log of Boring WB13R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB14L DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		WB14L-0		0.15 METERS ASPHALT CONCRETE		
				0.15 METERS GRAVEL SANDSTONE		
		WB14L-1		Light brown (10YR 4/2), fine to medium SAND	SP	
		WB14L-2				
1		WB14L-3				
		WB14L-5		BORING TERMINATED AT 1.52 METERS		

Figure A11, Log of Boring WB14L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB14R DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		WB14R-0		0.15 METERS ASPHALT CONCRETE		
		WB14R-1		Slightly moist, light brown (10YR 5/3), fine to medium SAND	SP	
		WB14R-2				
1		WB14R-3				
		WB14R-5		BORING TERMINATED AT 1.52 METERS		

Figure A10, Log of Boring WB14R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB15L DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		WB15L-0		**0.15 METERS ASPHALT CONCRETE**		
		WB15L-1		Loose, dry, light brown and dark brown (10YR 5/3 to 10YR 3/2) SAND	SP	
		WB15L-2				
1		WB15L-3				
		WB15L-5				
		WB15L-6		BORING TERMINATED AT 1.83 METERS		

Figure A13, Log of Boring WB15L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB15R DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		WB15R-0		**0.15 METERS ASPHALT CONCRETE**		
		WB15R-1		Loose, moist to saturated, dark brown (10 YR 3/2), fine to medium SAND	SP	
		WB15R-2				
1		WB15R-2				
		WB15R-5				
		WB15R-6		BORING TERMIANTED AT 1.83 METERS		

Figure A12, Log of Boring WB15R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB16L DATE DRILLED 1/23/01 WATER LEVEL (ATD) EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		WB16L-0		**TOPSOIL**	SM	
		WB16L-1		Loose, damp, black Silty SAND	SM	
		WB16L-2		Loose, dry to damp, light brown, fine Silty SAND		
1		WB16L-3				
				BORING TERMINATED AT 1.83 METERS		

Figure A14, Log of Boring WB16L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. WB16R

DATE DRILLED 1/29/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
				0.15 METERS ASPHALT		
				GRAVEL- BASE MATERIAL		
		WB16R-1		Loose, slightly moist, dark brown (10YR 3/2), fine to medium SAND		0
		WB16R-2			SP	
1		WB16R-3				
		WB16R-5				0
2						
						0
3						
4						
		WB16R-15		BORING TERMINATED AT 4.57 METERS		

Figure A15, Log of Boring WB16R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. WB17L

DATE DRILLED 1/29/01 WATER LEVEL (ATD) _____

EQUIPMENT HAND-AUGER DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
				0.15 METERS ASPHALT CONCRETE		
				GRAVEL - BASE ROCK		
		WB17L-1		Loose, slightly moist, light brown (10YR 5/3) SAND		
		WB17L-2				
1		WB17L-3			SP	
		WB17L-5		BORING TERMINATED AT 1.52 METERS		

Figure A16, Log of Boring WB17L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. WB17R

DATE DRILLED 1/29/01 WATER LEVEL (ATD) _____

EQUIPMENT HAND-AUGER DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
				0.15 METERS ASPHALT CONCRETE		
				0.15 METERS GRAVEL		
		WB17R-1		Loose, dry, light brown (10YR 5/3), fine to medium SAND		
		WB17R-2				
1		WB17R-3			SP	
		WB17R-5		BORING TERMINATED AT 1.52 METERS		

Figure A17, Log of Boring WB17R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB21 DATE DRILLED 1/23/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		WB21-0		TOPSOIL	SM	
				Loose, damp, black Silty SAND		
		WB21-1		WEATHERED SANDSTONE		
				BORING TERMINATED AT 0.3 METERS		

Figure A18, Log of Boring WB21, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. WB22 DATE DRILLED 1/23/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		WB22-0		**0.07 METERS TOPSOIL** Loose, damp, black Silty SAND **WEATHERED SANDSTONE** BORING TERMINATED AT 0.30 METERS	SM	

Figure A19, Log of Boring WB22, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB4C DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB4C-0		Moist, dark brown Sandy CLAY with coarse gravel	ML	
		EB4C-1		SANDSTONE GRAVEL	GM	
				REFUSAL - BORING TERMINATED AT 0.46 METERS		

Figure A72, Log of Boring EB4C, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. EB4L

DATE DRILLED 1/29/01 WATER LEVEL (ATD) _____

EQUIPMENT HAND-AUGER DRILLER GEOCON

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		EB4L-0		Moist, dark brown Sandy CLAY some fine gravel	ML	
		EB4L-1				
		EB4L-2		Yellowish brown, Silty Gravelly SANDSTONE BORING TERMINATED AT 0.61 METERS		

Figure A71, Log of Boring EB4L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB4R DATE DRILLED 1/30/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.15 METERS ASPHALT		
		EB4R-1		Loose, dry, brown (10YR 4/2), fine Gravelly SAND with coarse angular gravel.	SP	0
		EB4R-2				
1		EB4R-3				0
		EB4R-5		Loose, slightly moist, brown (10YR 4/2) Clayey SAND	SM	
2						
3						0
		EB4R-12				
				BORING TERMINATED AT 3.66 METERS		

Figure A70, Log of Boring EB4R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB5C DATE DRILLED 1/30/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB5C-0		Loose, brown, fine SAND	SP	
		EB5C-1				
		EB5C-2		BORING TERMINATED AT 0.61 METERS		

Figure A74, Log of Boring EB5C, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB5L DATE DRILLED 1/30/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB5L-0		Brown SAND with 1-inch gravel	SP	
		EB5L-1		Loose, slightly moist, light brown SAND		
		EB5L-2			SP	
1		EB5L-3				
		EB5L-5				
2						
3						
				Hard GRAVEL	GM	
		EB5L-13		BORING TERMINATED AT 3.96 METERS		

Figure A73, Log of Boring EB5L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB5R DATE DRILLED 1/30/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB5R-0		Loose, dry, light brown SAND	SP	
		EB5R-1				
		EB5R-2				
1						
		EB5R-4		BORING TERMINATED AT 1.22 METERS		

Figure A75, Log of Boring EB5R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB6L DATE DRILLED 1/30/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
1		EB6L-0 EB6L-1 EB6L-2 EB6L-3		Very dry, light brown, fine Gravelly SAND with big chunkc of gravel and rock	SW	
				BORING TERMINATED AT 1.07 METERS		

Figure A76, Log of Boring EB6L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. EB6R

DATE DRILLED 1/30/01 WATER LEVEL (ATD) 2.4'

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
				0.3 METERS ASPHALT		
		EB6R-1		Dense, moist, brown (10YR 4/3) SAND with 1 to 5 inch gravel	SW	
		EB6R-2				
1		EB6R-3				
		EB6R-4				
2				- gray sand with strong diesel odor		
		EB6R-8		Saturated GRAVEL	GP	
3				BORING TERMINATED AT 3.05 METERS		

Figure A77, Log of Boring EB6R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB7L DATE DRILLED 1/30/01 WATER LEVEL (ATD) 1.2' EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.075 METERS ASPHALT Loose, moist, dark gray SAND		
		EB7L-1			SP	
		EB7L-2		- strong diesel odor		
1		EB7L-3				
		EB7L-4		∇		
2						
3						
				BORING TERMINATED AT 3.05 METERS		

Figure A79, Log of Boring EB7L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. EB7R

DATE DRILLED 1/30/01 WATER LEVEL (ATD) 1.8'

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		EB7R-0		Loose, moist, brown (10YR 4/3) SAND with gravel	SW	
		EB7R-1				
		EB7R-2				
1		EB7R-3		Loose, very moist, gray (10YR 3/0) SAND, strong diesel odor	SP	
		EB7R-4				
2				∇		
3				BORING TERMINATED AT 3.05 METERS		

Figure A78, Log of Boring EB7R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB8L DATE DRILLED 1/30/01 WATER LEVEL (ATD) 1.2' EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.075 METERS ASPHALT Loose, moist, gray (10YR 3/1) fine SAND	SP	
		EB8L-1				
		EB8L-2				
1		EB8L-3		- dark gray with strong diesel odor		
		EB8L-4		∇		
2						
3						
				BORING TERMINATED AT 3.66 METERS		

Figure A80, Log of Boring EB8L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB8R DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB8R-0		Dry, light brown Sandy GRAVEL	SW	
		EB8R-1				
		EB8R-2		Loose, moist, light brown fine SAND	SP	
		EB8R-3		BORING TERMINATED AT 0.91 METERS		

Figure A81, Log of Boring EB8R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. EB9L

DATE DRILLED 1/30/01 WATER LEVEL (ATD) 1.8'

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		EB9L-1		0.075 METERS CONCRETE Loose, moist, light brown (10 YR 4/2), fine SAND	SP	
		EB9L-2				
1		EB9L-3		Loose, moist, light brown (10Yr 4/2) Silty SAND		
		EB9L-5			SM	
2		EB9L-7				
				- dark gray, slight petroleum odor Saturated Sandy gravel with coarse 1-inch gravels	GP	
3						
				BORING TERMINATED AT 3.66 METERS		

Figure A83, Log of Boring EB9L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB9R DATE DRILLED 1/30/01 WATER LEVEL (ATD) 2.1' EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.15 METERS ASPHALT		
		EB9R-1		Loose, dark brown (10YR 3/2) SAND with coarse gravel	SP	
		EB9R-2				
1		EB9R-3				
		EB9R-5				
2				∇ - slight petroleum odor		
				BORING TERMINATED AT 2.44 METERS		

Figure A82, Log of Boring EB9R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB10L DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB10L-0		Dense, dry, brown SAND with one-inch gravels	SW	
		EB10L-1				
		EB10L-2				
1		EB10L-3		Loose, moist, dark brown, fine SAND	SP	
		EB10L-5				
2						
3		EB10L-10		BORING TERMINATED AT 3.05 METERS		

Figure A84, Log of Boring EB10L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. EB10R

DATE DRILLED 1/31/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		EB10R-0		Loose, slightly moist, dark brown (10YR 3/2), fine grained Gravelly SAND	SW	
		EB10R-1		Loose, slightly moist, brown (10YR 4/3), fine to medium SAND	SP	
		EB10R-2				
1		EB10R-3		Coarse GRAVEL with sand	GP	
		EB10R-5				
2				Saturated GRAVEL with strong diesel odor	GW	
3				BORING TERMINATED AT 3.05 METERS		

Figure A85, Log of Boring EB10R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB11L DATE DRILLED 1/31/01 WATER LEVEL (ATD) EQUIPMENT HAND-AUGER DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.075 METERS ASPHALT		
		EB11L-1		Loose, slightly moist, light brown (10YR 4/2), fine to medium SAND	SP	
		EB11L-2				
1		EB11L-3				
		EB11L-5				
2						
		EB11L-7		BORING TERMINATED AT 2.13 METERS		

Figure A86, Log of Boring EB11L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB12L DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB12L-0		0.15 METERS CONCRETE		
		EB12L-1		Loose, slightly moist, light brown (10YR 4/2), fine to medium SAND	SP	
		EB12L-2				
1		EB12L-3				
		EB12L-5		BORING TERMINATED AT 1.52 METERS		

Figure A87, Log of Boring EB12L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. EB13L

DATE DRILLED 1/31/01 WATER LEVEL (ATD) 3.1'

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		EB13L-0		Dry, fine to coarse Sandy GRAVEL	GW	
		EB13L-1				
		EB13L-2				
1		EB13L-3				
				Loose, slightly moist, dark brown (10YR 3/2), fine SAND		
		EB13L-5			SP	
2				Moist, dark gray (10YR 3/1), fine to medium Gravelly SAND with fine gravels, strong petroleum odor		
		EB13L-9			SW	
3				- saturated at 3.05 meters		
		EB13L-12				
				Loose, saturated, light brown (10YR 4/2), fine to medium SAND	SP	
4						
				BORING TERMINATED AT 4.27 METERS		

Figure A88, Log of Boring EB13L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. EB13R

DATE DRILLED 2/1/01 WATER LEVEL (ATD) _____

EQUIPMENT HAND-AUGER DRILLER GEOCON

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		EB13R-0		**FILL**		
				Slightly moist, light brown, SAND with rock and concrete		
		EB13R-1		Dense, dry, fine SAND with one-inch gravels	SW	
		EB13R-2				
1		EB13R-3				
		EB13R-5		BORING TERMINATED AT 1.52 METERS		

Figure A89, Log of Boring EB13R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB14L DATE DRILLED 1/31/01 WATER LEVEL (ATD) EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB14L-0		Loose, dry, light brown (10YR 4/2), fine to medium SAND	SP	
		EB14L-1				
		EB14L-2				
1		EB14L-3				
		EB14L-5		BORING TERMINATED AT 1.52 METERS		

Figure A90, Log of Boring EB14L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. EB14R

DATE DRILLED 1/31/01 WATER LEVEL (ATD) 2.7'

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		EB14R-0		Dense, slightly moist, brown (10YR 4/3), fine Gravelly SAND	SW	
		EB14R-1				
		EB14R-2				
1		EB14R-3				
		EB14R-5				
2						
				∇		
3						
		EB14R-12				
4						
				BORING TERMINATED AT 4.27 METERS		

Figure A91, Log of Boring EB14R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB15L DATE DRILLED 2/1/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB15L-0		Loose, dry, brown SAND	SP	
		EB15L-1		Very dense, dry, brown SAND	SP	
		EB15L-2				
		EB15L-3		BORING TERMINATED AT 0.91 METERS		

Figure A92, Log of Boring EB15L, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB15R DATE DRILLED 2/1/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB15R-0		Loose, dry, brown SAND	SP	
		EB15R-1		Very dense, dry, brown SAND	SP	
		EB15R-2				
1		EB15R-3				
		EB15R-5		BORING TERMINATED AT 1.52 METERS		

Figure A93, Log of Boring EB15R, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB16 DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB16-0		Loose, dry, dark brown (10YR 3/2), fine SAND	SP	
		EB16-1				
		EB16-2		Dense, dry, light brown (10YR 3/2), SAND with gravel	SW	
1		EB16-3				
2						
				REFUSAL - BORING TERMINATED AT 2.74 METERS		

Figure A94, Log of Boring EB16, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. EB17 DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		EB17-0		Dense, dry, light brown (10YR 4/2) fine Gravelly SAND	SW	
		EB17-1				
		EB17-2				
1		EB17-3				
				SANDSTONE		
				REFUSAL - BORING TERMINATED AT 1.68 METERS		

Figure A95, Log of Boring EB17, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W2LC DATE DRILLED 1/23/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W2LC-0 1145 W2LC-1 1147 W2LC-2 1148		**0.15 METERS TOP SOIL** Loose, damp, black Silty SAND **WEATHERED SANDSTONE**	SM	
1				BORING TERMINATED AT 0.76 METERS		
2						

Figure A20, Log of Boring W2LC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W2LD DATE DRILLED 1/23/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W2LD-0 W2LD-1		**0.15 METERS TOP SOIL** Loose, damp, black Silty SAND **WEATHERED SANDSTONE** BORING TERMINATED AT 0.46 METERS	SM	

Figure A21, Log of Boring W2LD, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W2RA DATE DRILLED 1/23/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W2RA-0 1130 W2RA-1		**0.15 METERS TOP SOIL** GRAVEL **WEATHERED SANDSTONE** BORING TERMINATED AT 0.46 METERS		

Figure A22, Log of Boring W2RA, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W2RB DATE DRILLED 1/23/01 WATER LEVEL (ATD) _____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W2RB-0		**FILL** Sandy GRAVEL BORING TERMINATED AT 0.30 METERS	GS	

Figure A23, Log of Boring W2RB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W2RC DATE DRILLED 1/23/01 WATER LEVEL (ATD) _____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.06 METERS ASPHALT WEATHERED SANDSTONE		
				NO SAMPLE RECOVERY - BORING TERMINATED AT 0.61 METERS		

Figure A24, Log of Boring W2RC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W3LA DATE DRILLED 1/23/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W3LA-0 1013 W3LA-1 1014 W3LA-2 1015		**TOP SOIL** Loose, damp, black Silty SAND (rods gray) **WEATHERED SANDSTONE**	SM	
				BORING TERMINATED AT 0.61 METERS		

Figure A25, Log of Boring W3LA, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W3LB DATE DRILLED 1/23/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W3LB-0 1010		**TOP SOIL** Loose, damp, black Silty SAND **WEATHERED SANDSTONE** BORING TERMINATED AT 0.15 METERS	SM	

Figure A26, Log of Boring W3LB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W3LC DATE DRILLED 1/23/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W3LC-0 1030 W3LC-1		**TOP SOIL** Loose, damp, black Silty SAND **WEATHERED SANDSTONE** BORING TERMINATED AT 0.30 METERS	SM	

Figure A27, Log of Boring W3LC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W3LD DATE DRILLED 1/23/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
1		W3LD-0 1000 W3LD-1 1001		**TOP SOIL** Loose, damp, black, Silty SAND roots and grass **WEATHERED SANDSTONE**	SM	
				BORING TERMINATED AT 1.37 METERS		

Figure A28, Log of Boring W3LD, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W3RA DATE DRILLED 1/23/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W3RA-0 1225		ASPHALT	SM	
		W3RA-1 1226		Loose, damp, black Silty SAND FILL		
		W3RA-2 1226		WEATHERED SANDSTONE BORING TERMINATED AT 0.61 METERS		

Figure A29, Log of Boring W3RA, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W3RB DATE DRILLED 1/23/01 WATER LEVEL (ATD) EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W3RB-0 W3RB-1		0.06 METERS ASPHALT FILL Black Silty SAND WEATHERED SANDSTONE BORING TERMINATED AT 0.3 METERS	SM	

Figure A30, Log of Boring W3RB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W3RC DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W3RC-0		Moist, dark brown Silty SAND with roots and leaf debris	SM	
		W3RC-1				
		W3RC-2		Dry, yellowish brown SAND and SANDSTONE fragments		
				BORING TERMINATED AT 0.76 METERS		

Figure A32, Log of Boring W3RC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W3RD DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W3RD-0 W3RD-1		Loose, slightly moist, brown SAND	SP	
		W3RD-2		SANDSTONE BORING TERMINATED AT 0.61 METERS		

Figure A31, Log of Boring W3RD, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W4LA DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W4LA-0		Loose, moist, dark brown, Silty SAND	SM	
		W4LA-1		Dense, damp, yellowish brown, Clayey SAND with sandstone fragments	SC	
		W4LA-2		Dense, damp, yellowish brown, Silty SAND with some clay and coarse gravel	SM	
1		W4LA-3		- clay content and moisture content decrease with depth		
		W4LA-5		Dense, dry, yellowish brown, Silty SAND and gravel	SM	
				REFUSAL - BORING TERMINATED AT 2.68 METERS		

Figure A38, Log of Boring W4LA, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W4LB DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W4LB-0		Dense, damp, dark brown, Silty SAND with some roots	SM	
		W4LB-1		Dense, dry, light yellowish brown, fine SAND with some gravel	SM	
		W4LB-2				
1		W4LB-3				
				- no sample		
				REFUSAL - BORING TERMINATED AT 1.37 METERS		

Figure A39, Log of Boring W4LB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W4LC DATE DRILLED 1/23/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W4LC-0 W4LC-1		TOP SOIL Loose, damp, black Silty SAND Moderately dense, damp, red brown, fine SAND	SM SP	
		W4LC-2 W4LC-3				
1						
		W4LC-5		Dense, damp, red-brown, fine Clayey SAND	SC	
2						
3						
		W4LC-12		REFUSAL - BORING TERMINATED AT 3.66 METERS		

Figure A34, Log of Boring W4LC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. W4LD

DATE DRILLED 1/23/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W4LD-0		**TOP SOIL**		
		W4LD-1		Loose, damp, black Silty SAND	SM	
				Moderately dense, damp, red-brown fine SAND	SP	
		W4LD-2				
		W4LD-3				
1						
		W4LD-5				
				Dense, damp, red-brown, fine Clayey SAND		
2						
		W4LD-7			SC	
				BORING TERMINATED AT 2.44 METERS		

Figure A33, Log of Boring W4LD, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. W4RA

DATE DRILLED 1/31/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W4RA-0		7.5 CM ASPHALT		
				Loose, slightly moist, brown (10YR 4/3), fine SAND	SP	
		W4RA-1				
		W4RA-2				
1		W4RA-3				
		W4RA-5		Stiff, slightly moist, brown (10YR 4/3), Sandy SILT	SM	
2						
3						
4						
5						
6				Dense, slightly moist, dark gray (10YR 3/1) SAND, strong petroleum odor	SP	
		W4RA-22				

Figure A34, Log of Boring W4RA, page 1 of 2

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W4RA DATE DRILLED 1/31/01 WATER LEVEL (ATD) _____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				REFUSAL - BORING TERMINATED AT 7.01 METERS		

Figure A35, Log of Boring W4RA, page 2 of 2

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W4RB DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W4RB-0		**FILL** Loose, moist, dark brown, SAND with brick fragments	SP	
		W4RB-1				
		W4RB-2		- trace fine to medium gravel		
1		W4RB-3		- some yellowish brown sandstone fragments, clay content increases, brick in shoe		
2						
				BORING TERMINATED AT 2.55 METERS		

Figure A35, Log of Boring W4RB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W4RC DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W4RC-0		**FILL**	SP	
		W4RC-1		Loose, moist, dark brown, fine to medium SAND with some silt and roots		
		W4RC-2		Loose, damp, yellowish brown, fine SAND with trace gravel	SP	
1		W4RC-3		REFUSAL - BORING TERMINATED AT 1.05 METERS		

Figure A36, Log of Boring W4RC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W4RD DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W4RD-0		**0.15 METERS ASPHALT**		
		W4RD-1		Loose, moist, light brown, fine to medium SAND	SP	
		W4RD-2				
1		W4RD-3		GRAVEL - SANDSTONE		
		W4RD-5			GP	
2		W4RD-7				
				REFUSAL - BORING TERMINATED AT 2.44 METERS		

Figure A37, Log of Boring W4RD, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. W5AL

DATE DRILLED 1/23/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W5AL-0 W5AL-1 W5AL-2 W5AL-3		3.7 CM ASPHALT Loose, damp, reddish brown, fine SAND with some silt	SM	
1						
		W5AL-4				
2						
				Loose, damp, black, fine SAND with some silt		
3		W5AL-5			SM	
				BORING TERMINATED AT 3.05 METERS		

Figure A44, Log of Boring W5AL, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W5LA DATE DRILLED 1/24/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W5LA-0 W5LA-1 W5LA-2		7.5 CM ASPHALT WEATHERED SANDSTONE		
1				Loose, damp, reddish brown, fine SAND	SP	
				BORING TERMINATED AT 1.22 METERS DUE TO PIPE		

Figure A45, Log of Boring W5LA, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. W5LB

DATE DRILLED 1/24/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W5LB-0		0.037 METERS ASPHALT		
		W5LB-1		Fill	SM	
		W5LB-2		Loose, damp, black, Silty SAND		
		W5LB-3		Loose, damp, reddish brown, fine, poorly graded SAND	SP	
1						
		W5LB-5				
2						
3						
		W5LB-10				
				BORING TERMINATED AT 3.66 METERS		

Figure A46, Log of Boring W5LB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W5LC DATE DRILLED 1/24/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W5LC-0		0.05 METERS ASPHALT		
		W5LC-1		Fill	SM	
		W5LC-2		Loose, Dry, black, Silty SAND		
		W5LC-3		Loose, damp, reddish brown, fine, poorly graded SAND	SP	
1						
		W5LC-5				
2						
3						
		W5LC-12				
				BORING TERMINATED AT 3.66 METERS		

Figure A47, Log of Boring W5LC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W5LD DATE DRILLED 1/24/01 WATER LEVEL (ATD) EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W5LD-0 0800		0.05 METERS ASPHALT	SM	
		W5LD-1 0801		FILL Loose, dry, black, Silty SAND		
		W5LD-2 0803		Loose, damp, red-brown, fine SAND, poorly sorted	SP	
1		W5LD-3 0805				
		W5LD-5 0815				
2						
3						
		W5LD-12 0819		BORING TERMINATED AT 3.66 METERS		

Figure A48, Log of Boring W5LD, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. W5RA

DATE DRILLED 1/23/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W5RA-0		0.075 METERS ASPHALT		
		W5RA-1		Loose, moist, black, Silty SAND	SM	
		W5RA-2		Loose, damp, reddish brown, fine poorly graded SAND	SP	
		W5RA-3				
1						
		W5RA-5				
2				Soft, damp, black CLAY	CL	
				Loose, damp, reddish brown, fine, poorly graded SAND		
3					SP	
4						
		W5RA-6				
				BORING TERMINATED AT 4.27 METERS		

Figure A40, Log of Boring W5RA, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. W5RB

DATE DRILLED 1/23/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W5RB-0		0.075 METERS ASPHALT	SM	
		W5RB-1		FILL		
		W5RB-2		Loose, damp, brown, Silty SAND	SP	
		W5RB-3		Loose, damp, reddish brown, fine, poorly graded SAND		
1						
		W5RB-5				
2						
3						
4						
		W5RB-14		BORING TERMINATED AT 4.27 METERS		

Figure A41, Log of Boring W5RB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	WEST BOURGAULT

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W5RC DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W5RC-0		Loose, damp, dark brown, fine, Silty SAND	SM	
		W5RC-1				
		W5RC-2		Moderately dense, damp, yellowish brown to brown, fine SAND	SP	
1		W5RC-3				
		W5RC-5				
2				- moisture content increases to wet		
3		W5RC-9.5				
				BORING TERMINATED AT 3.05 METERS		

Figure A43, Log of Boring W5RC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. W5RD

DATE DRILLED 1/29/01 WATER LEVEL (ATD) _____

EQUIPMENT HAND-AUGER DRILLER GEOCON

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W5RD-0		Loose, damp, dark brown, Silty SAND with roots	SM	
		W5RD-1		Moderately dense, damp, dark yellowish brown, fine Silty SAND	SM	
		W5RD-2				
1		W5RD-3		Dense, damp, dark yellowish brown, fine SAND	SP	
		W5RD-5				
2						
3						
		W5RD-12		BORING TERMINATED AT 3.66 METERS		

Figure A42, Log of Boring W5RD, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. W6CA

DATE DRILLED 1/29/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W6CA-0		0.15 METERS ASPHALT		
				FILL		
		W6CA-1		Crushed rock - SANDSTONE	GP	
		W6CA-2		Loose, slightly moist, light brown (10YR 5/3), fine to medium SAND		0
1		W6CA-3				
		W6CA-5			SP	0
2						
3						
		W6CA-12				
				BORING TERMINATED AT 3.66 METERS		0

Figure A53, Log of Boring W6CA, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. W6CB

DATE DRILLED 1/29/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
				0.15 METERS ASPHALT		
				FILL	GP	
		W6CB-1		Crushed rock - SANDSTONE		
		W6CB-2		Loose, slightly moist, light brown (10YR 5/3) medium to fine grain SAND		0
1		W6CB-3			SP	
		W6CB-5				0
2						
3						
		W6CB-12		BORING TERMINATED AT 3.66 METERS		0

Figure A54, Log of Boring W6CB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W6LA DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.15 METERS ASPHALT		
		W6LA-1		Loose, slightly moist, light brown (10 YR 5/3), fine to medium SAND	SP	
		W6LA-2				
1		W6LA-3				
		W6LA-5				
2						
		W6LA-9				
				BORING TERMINATED AT 2.74 METERS		

Figure A50, Log of Boring W6LA, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W6LB DATE DRILLED 1/29/01 WATER LEVEL (ATD) EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W6LB-0		0.15 METERS ASPHALT		
		W6LB-1		Loose, dry, light brown (10YR 5/3), fine to medium SAND	SP	0
		W6LB-2				
1		W6LB-3				
		W6LB-5				
2						
		W6LB-9		BORING TERMINATED AT 2.74 METERS		0

Figure A51, Log of Boring W6LB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. W6LC

DATE DRILLED 1/29/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W6LC-0		0.15 METERS ASPHALT		
		W6LC-1		Loose, slightly moist, light brown (10YR 5/3), fine to medium SAND	SP	0
		W6LC-2				
1		W6LC-3				
		W6LC-5				
2						
		W6LC-9		BORING TERMINATED AT 2.74 METERS		0

Figure A52, Log of Boring W6LC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

BORING NO. W6LD

DATE DRILLED 1/29/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W6LD-0		0.15 METERS ASPHALT		
				GRAVEL - SANDSTONE		
		W6LD-1		Loose, moist, light brown (10YR 5/3), fine to medium SAND		
		W6LD-2			SP	0
1		W6LD-3				
		W6LD-5				
2						
		W6LD-9		BORING TERMINATED AT 2.74 METERS		0

Figure A49, Log of Boring W6LD, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W6RA DATE DRILLED 1/30/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W6RA-0		Slightly moist, yellow SAND	SP	
		W6RA-1		Loose, moist, yellow, very fine SAND		
		W6RA-2			SP	
1		W6RA-3		Loose, very dry, yellow, very fine SAND	SP	
		W6RA-5				
2						
3						
4						
5						
		W6RA-17		BORING TERMINATED AT 5.18 METERS		

Figure A56, Log of Boring W6RA, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

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PROJECT NO. E8000-06-13

BORING NO. W6RB

DATE DRILLED 1/30/01 WATER LEVEL (ATD) _____

EQUIPMENT HAND-AUGER DRILLER GEOCON

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W6RB-0		Slightly moist, yellow, very fine SAND	SP	
		W6RB-1		Dry, yellow SAND		
		W6RB-2			SP	
1		W6RB-3				
		W6RB-5				
2						
3		W6RB-10		BORING TERMINATED AT 3.05 METERS		

Figure A57, Log of Boring W6RB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W6RC DATE DRILLED 1/30/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W6RC-0		Loose, dry, brown, fine SAND	SP	
		W6RC-1		Loose, moist, brown, very fine SAND		
		W6RC-2			SP	
1		W6RC-3				
				- turns brown with big fragmented rock		
		W6RC-5		BORING TERMINATED AT 1.52 METERS		

Figure A58, Log of Boring W6RC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

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PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W6RD DATE DRILLED 1/30/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W6RD-0		Loose, dry, brown SAND	SP	
		W6RD-1		Loose, moist, brown, very fine SAND		
		W6RD-2			SP	
1		W6RD-3				
				- turns yellowish with chunks of fragemented rock		
		W6RD-5		BORING TERMINATED AT 1.52 METERS		

Figure A55, Log of Boring W6RD, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

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PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W7EC DATE DRILLED 1/30/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W7EC-0		Loose, moist, dark brown (10YR 3/2), fine SAND with 1-inch gravel	SW	
		W7EC-1		Loose, slightly moist, light brown (10YR 4/2) SAND		
		W7EC-2			SP	
1						
		W7EC-3				
2						
3		W7EC-10		BORING TERMINATED AT 3.05 METERS		

Figure A60, Log of Boring W7EC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

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PROJECT NO. E8000-06-13

BORING NO. W7RC

DATE DRILLED 1/30/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
				0.30 METERS ASPHALT		
		W7RC-1		Loose, slightly moist, light brown (10YR 4/2) fine to medium SAND	SP	0
		W7RC-2				0
1		W7RC-3				0
		W7RC-5				0
2						
3						
				- becomes dense		
4						
5						
		W7RC-19		- becomes wet		0
				BORING TERMINATED AT 5.79 METERS		

Figure A59, Log of Boring W7RC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

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PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W7RD DATE DRILLED 1/30/01 WATER LEVEL (ATD) ____ EQUIPMENT GEOPROBE DRILLER GREGG DRILLING	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.15 METERS ASPHALT		
				0.15 METERS GRAVEL BASE MATERIAL	GP	
		W7RD-1		Dry, light brown (10YR 4/2), fine to medium SAND		
		W7RD-2			SP	0
1		W7RD-3				
		W7RD-5				
2						
3						
						0
4						
		W7RD-16		BORING TERMINATED AT 4.88 METERS		

Figure A61, Log of Boring W7RD, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: MATT HANKO

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PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W8EC DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W8EC-0		Wet, dark brown, Clayey GRAVEL some sand	GC	
		W8EC-1		Moist, dark brown, medium to fine Sandy GRAVEL, some clay	GP	
		W8EC-2		BORING TERMINATED AT 0.61 METERS		

Figure A63, Log of Boring W8EC, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W8ED DATE DRILLED 1/29/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W8ED-0 W8ED-1		Very dark brown Silty SAND and roots Loose, yellowish brown, fine SAND, trace fine gravel	SP	
		W8ED-2		BORING TERMINATED AT 0.61 METERS		

Figure A62, Log of Boring W8ED, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

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PROJECT NO. E8000-06-13

BORING NO. W9LB

DATE DRILLED 2/1/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
				0.15 METERS ASPHALT		
				ROAD BASE		
		W9LB-1		Dense, dry, light brown (10YR 4/2) Sandy GRAVEL	GP	0
		W9LB-2				
1		W9LB-3		Loose, dry, light brown (10YR 4/2) fine to medium SAND	SP	0
		W9LB-5				0
2						
3						
		W9LB-11				0
				BORING TERMINATED AT 3.66 METERS		

Figure A64, Log of Boring W9LB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W10ALA DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.30 METERS ASPHALT BASE		
		W10ALA-1		BIG ROCK AND GRAVEL WITH SAND	GP	
		W10ALA-2				
1		W10ALA-3		Dense, moist, light brown, fine SAND	SP	
		W10ALA-5				
2						
3						
4						
		W10ALA-14		BORING TERMINATED AT 4.27 METERS		

Figure A67, Log of Boring W10ALA, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

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PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W10ALB DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.30 METERS ASPHALT BASE		
		W10ALB-1		Loose, dry, brown SAND	SP	
		W10ALB-2				
1		W10ALB-3				
		W10ALB-5				
2						
		W10ALB-9		BORING TERMINATED AT 2.74 METERS		

Figure A68, Log of Boring W10ALB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION:	NA	ENGINEER/GEOLOGIST:	TRAVIS MILLS

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PROJECT NO. E8000-06-13

BORING NO. W10CD

DATE DRILLED 2/1/01 WATER LEVEL (ATD) _____

EQUIPMENT GEOPROBE DRILLER GREGG DRILLING

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	SOIL DESCRIPTION	SOIL (USCS)	HEADSPACE (PPM)
		W10CD-0		**FILL** Loose, fine Sandy GRAVEL	GP	
		W10CD-1				
		W10CD-2		Loose, slightly moist, light brown (10YR 4/2) SAND	SP	
1		W10CD-3				
		W10CD-5				
2						
3		W10CD-10		BORING TERMINATED AT 3.05 METERS		

Figure A66, Log of Boring W10CD, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA

ENGINEER/GEOLOGIST: MATT HANKO

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W10LA DATE DRILLED 1/31/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
				0.30 METERS ASPHALT AND BASE		
		W10LA-1		Dense, light brown, fine grained SAND	SP	
		W10LA-2				
1		W10LA-3				
		W10LA-5				
2				- turned reddish		
		W10LA-10				
3				BORING TERMINATED AT 3.05 METERS		

Figure A65, Log of Boring W10LA, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

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PROJECT NO. E8000-06-13

DEPTH IN METERS	PENETRAT. RESIST. BLOWS/FT.	SAMPLE NO.	LITHOLOGY	BORING NO. W11RB DATE DRILLED 2/1/01 WATER LEVEL (ATD) ____ EQUIPMENT HAND-AUGER DRILLER GEOCON	SOIL (USCS)	HEADSPACE (PPM)
				SOIL DESCRIPTION		
		W11RB-0		DECORATIVE LAVA ROCK COVER	GP	
				Dense, dry, light brown SAND	SP	
		W11RB-1				
		W11RB-2				
1		W11RB-3				
		W11RB-5				
2						
				- becomes dark brown		
3						
		W11RB-12		BORING TERMINATED AT 3.66 METERS		

Figure A69, Log of Boring W11RB, page 1 of 1

ENV_NO_WELL YERBA.GPJ 04/10/01

BORING ELEVATION: NA	ENGINEER/GEOLOGIST: TRAVIS MILLS

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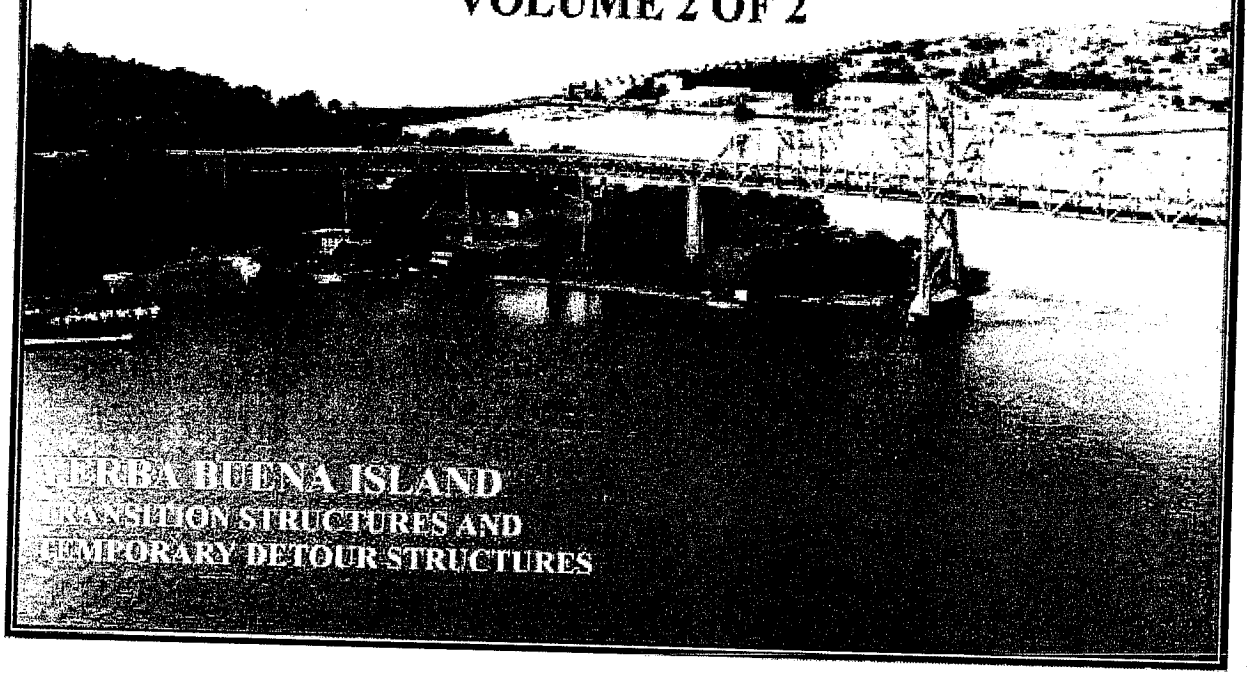
SITE INVESTIGATION REPORT
SFOBB EAST SPAN SEISMIC SAFETY PROJECT
VOLUME 2 OF 2



PREPARED FOR:

CALIFORNIA DEPARTMENT OF TRANSPORTATION
DISTRICT 4
DIVISION OF TOLL BRIDGE PROGRAM
111 GRAND AVENUE
OAKLAND, CALIFORNIA

Caltrans

PREPARED BY:

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AND

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2356 RESEARCH DRIVE
LIVERMORE, CALIFORNIA

GEOCON

CONTRACT 43A0012
TASK ORDER NO. 04-012000-FC

JUNE 2001

APPENDIX C

Laboratory reports and chain-of-custody documentation are available for review at the District 4 office, 111 Grand Avenue, Oakland, California 94612, (510) 286-5636. There are approximately 2000 sheets.

APPENDIX D

APPENDIX D

STATISTICAL EVALUATION FOR LEAD DETECTED IN SOIL SAMPLES

D.1 Statistical Evaluation for Lead Detected in Soil Samples

Statistical methods were applied to the total lead data to evaluate: 1) the distribution of total lead concentrations for each sampling depth; 2) the upper one-sided confidence limits (UCLs) of the true means of the total lead concentrations for each sampling depth; and 3) if an acceptable correlation between total and soluble lead concentrations exists that would allow the prediction of soluble lead concentrations based on calculated UCLs. The statistical methods used are provided in *Statistical Methods for Environmental Pollution Monitoring*, by Richard Gilbert and *Statistics and Data Analysis in Geology*, by John Davis.

D.1.1 Distribution of Total Lead Concentrations

The presence of non-detects and/or low concentrations in total lead data sets can strongly skew sample data towards low values. In these cases, the data is often lognormally distributed and classical statistical methods do not work properly since they assume that the data exhibit an underlying normal distribution. Consequently, it is necessary to evaluate the distributions of the total and lead data sets to apply the appropriate methods when determining the UCLs on the true total lead means. When evaluating the distribution of total lead concentrations, each sampling depth was treated as a separate data set.

To obtain a visual impression of the shape of the total lead data sets (i.e., sampling depths), histograms were constructed to show the frequency of total lead concentrations (x_i) and the frequency of the natural log transformed total lead concentrations ($y_i = ln(x_i)$). The histograms are presented as a portion of Appendix D. In general, the histograms indicate, qualitatively, that the soil samples collected from the surface appear to be lognormally distributed. Histograms for the other non-transformed data sets do not appear to be any more or less skewed than the natural log transformed total lead data sets.

As a more quantitative procedure, *D'Agostinos Test*, as described in Gilbert (pgs. 160-162), was used to test the null hypothesis of underlying normal or lognormal distributions, or in other words, to test if either the non-transformed total lead data sets or the natural log-transformed total lead data sets are normally distributed. *The W Test* was performed on each data set at the a? = 0.02 significance level and indicated the following in the table below:

Sampling Interval	Distribution
Surface	May be lognormal not normal (Assume lognormal)
0.3 meter (1.0 foot) bgs	May be lognormal not normal (Assume lognormal)
0.6 meter (2.0 feet) bgs	May be lognormal not normal (Assume lognormal)
0.9 meter (3 feet) bgs	Neither normal nor lognormal (Assume normal)
1.5 meters (5 feet) bgs	Neither normal nor lognormal (Assume normal)

Consequently, the total lead concentrations for soil samples collected from the surface and depths of 0.3 and 0.6 meter (1 and 2 feet) bgs were assumed to be lognormally distributed. The remaining data sets were assumed to be normally distributed. The data used and the calculations for *D'Agostinos Test* are summarized as a portion of Appendix D.

D.1.2 Calculating the UCLs for the True Mean

The upper one-sided 90% and 95% confidence limits (UCLs) of the true mean are defined as the values that, when calculated repeatedly for randomly drawn subsets of site data, equal or exceed the true mean 90% and 95% of the time, respectively. Statistical confidence limits are the classical tool for addressing uncertainties of a distribution mean. The UCLs of the true mean concentration are used as the mean concentrations because it is not possible to know the true mean due to the essentially infinite number of soil samples that could be collected from the site. The UCLs therefore account for uncertainties due to limited sampling data. As data become less limited at a site, uncertainties decrease and the UCLs move closer to the true mean.

Procedures for obtaining the UCLs on the true mean for normal and lognormal distributions were used as described in Gilbert. UCLs were calculated for each sampling depth and are summarized in the table below:

Sampling Interval	90% UCL	95% UCL	Distribution Theory
Surface	453 mg/kg	513 mg/kg	Lognormal
0.3 meter (1.0 foot) bgs	143 mg/kg	160 mg/kg	Lognormal
0.6 meter (2.0 feet) bgs	69 mg/kg	78 mg/kg	Lognormal
0.9 meter (3 feet) bgs	189 mg/kg	211 mg/kg	Normal
1.5 meters (5 feet) bgs	203 mg/kg	225 mg/kg	Normal

D.1.3 Correlation of Total and Soluble Lead

Total and corresponding soluble (WET) lead concentrations are bivariate data with a linear structure. This linear structure should allow for the prediction of soluble lead (WET) concentrations based on the UCLs calculated in above in Section D.1.2.

To estimate the degree of interrelation between total and corresponding soluble (WET) lead values (x and y, respectively), the *correlation coefficient [r]* is used (see Davis pg. 40). The correlation coefficient is a ratio that ranges from +1 to –1. A *correlation coefficient* of +1 indicates a perfect direct relationship between two variables; a *correlation coefficient* of -1 indicates that one variable changes inversely with relation to the other. Between the two extremes is a spectrum of less-than-perfect relationships, including zero, which indicates the lack of any sort of linear relationship at all.

The *correlation coefficient* was calculated for 71 (x, y) data points and equaled 0.85. Note that two outliers (550, 0.95) and (550, 0.7) were omitted from the regression analysis. According the Department headquarters, a *correlation coefficient* greater than or equal to 0.8 is adequate evidence that an acceptable correlation exists. Consequently, since the *correlation coefficient* for the total and soluble lead data for the subject site is equal to 0.85, an acceptable correlation exists.

Since an acceptable correlation exists, it is possible to compute the line of dependence, or a best-fit line between the two variables (i.e., total and soluble lead [WET] concentrations). Following methods outlined in Davis (pg. 180), a least squares method was used to find the equation of a best-fit line (regression line) by forcing the y-intercept (b) equal to zero since that is a known data point. The equation of the regression line is $y = 0.0467(x)$.

This equation was used to estimate the expected soluble lead (WET) concentration for each representative total lead concentration using the UCLs calculated in Section D.1.2. Regression analysis results and a scatter plot depicting (x, y) data points along with the regression lines are included as a portion of Appendix D. In addition, the expected soluble lead concentrations are shown next to the UCLs in Table D1.

TABLE D1
LEAD STATISTICS
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

90% and 95% UCLs for a Lognormal Distribution and Their Predicted Soluble (WET) Lead Concentrations

Depth (feet bgs)	90% UCL* (mg/kg)	Predicted Soluble Lead (mg/l)	95% UCL** (mg/kg)	Predicted Soluble Lead (mg/l)
0	453	0	513	0
1	143	0.0	160	0.0
2	69	0.0	78	0.0
3	95	0.0	113	0.0
5	91	0.0	111	0.0

Notes:

* = 90% UCL applicable for land disposal characterization

** = 95% UCL applicable for risk based assessment

bgs = below the ground surface

mg/kg = milligrams per kilogram

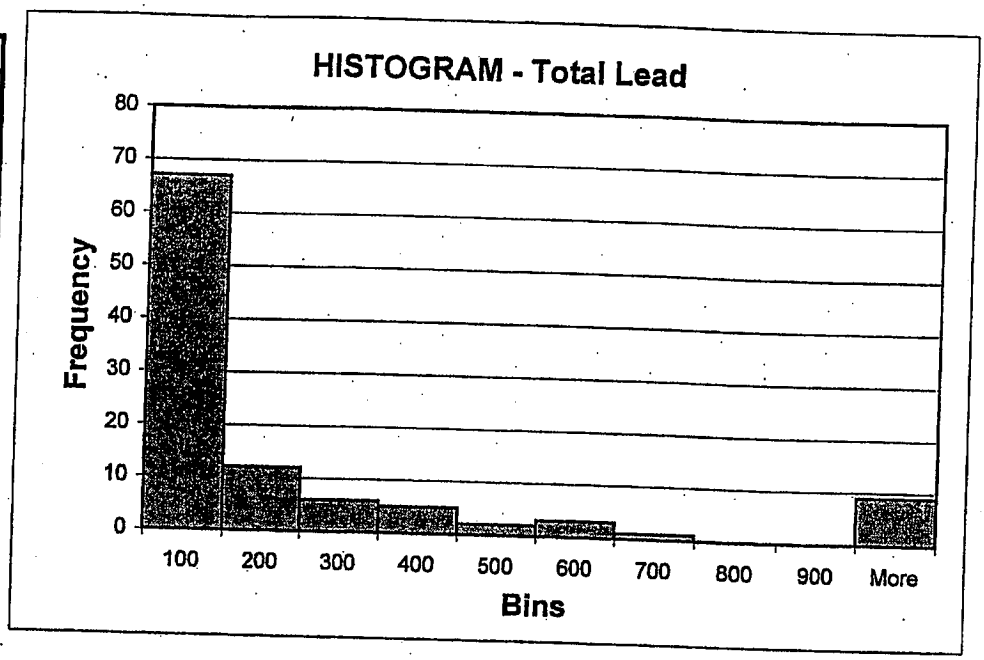
mg/l = miligrams per liter

Soluble lead concentrations were predicted using the equation of the regression line (y = 0.0467x).

TOTAL LEAD DISTRIBUTION
YBI - SURFACE SAMPLES

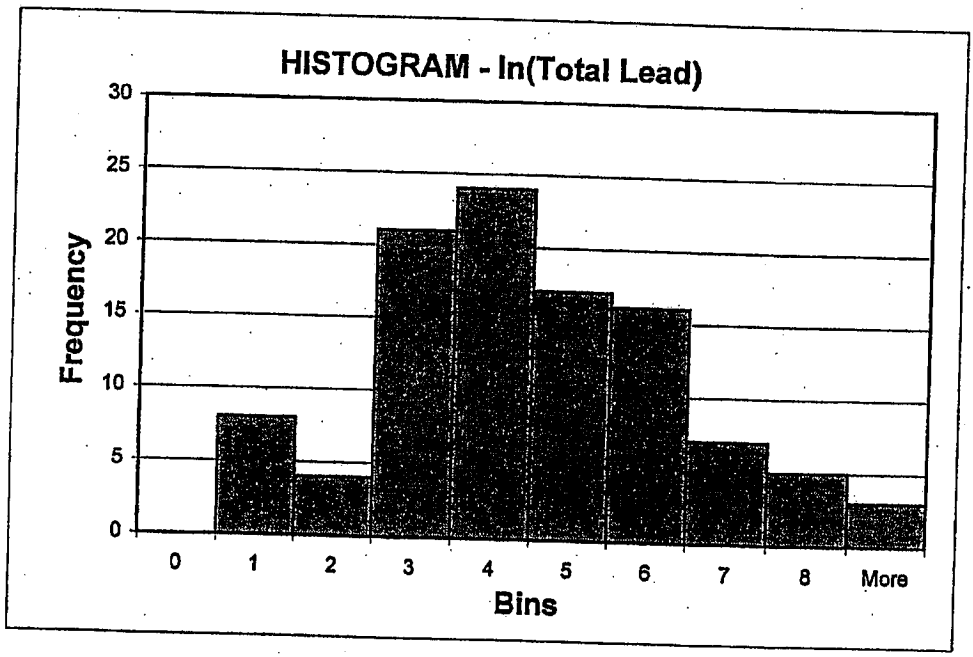
Total Lead

bins	frequency
100	67
200	12
300	6
400	5
500	2
600	3
700	1
800	0
900	0
More	9



ln(Total Lead)

bins	frequency
0	0
1	8
2	4
3	21
4	24
5	17
6	16
7	7
8	5
More	3



D'AGOSTINOS TEST FOR NON-TRANSFORMED TOTAL LEAD CONCENTRATIONS
Surface Samples - YBI

680/780 - NON TRANSFORMED

i	(x)	Ordered (x_i)	$(i-\beta)x_i$	$(x_i-X_{mean})^2$
1	94	2.5	-128.75	81577.15229
2	7.0	2.5	-126.25	81577.15229
3	7	2.5	-123.75	81577.15229
4	63	2.5	-121.25	81577.15229
5	20	2.5	-118.75	81577.15229
6	44.0	2.5	-116.25	81577.15229
7	20.0	2.5	-113.75	81577.15229
8	1300.0	2.5	-111.25	81577.15229
9	1300	4	-174	80722.55087
10	19.0	6.6	-280.5	79251.90172
11	600	7	-290.5	79026.84801
12	60	7	-283.5	79026.84801
13	17	8	-316	78465.61372
14	200	8	-308	78465.61372
15	340	8.3	-311.25	78297.63344
16	33	8.4	-306.6	78241.68001
17	33	10	-355	77349.14515
18	280	10	-345	77349.14515
19	980	11	-368.5	76793.91087
20	200	12	-390	76240.67658
21	2.5	14	-441	75140.20801
22	370	15	-457.5	74592.97372
23	8	15	-442.5	74592.97372
24	4	15	-427.5	74592.97372
25	340	16	-440	74047.73944
26	30	16	-424	74047.73944
27	42.0	17	-433.5	73504.50515
28	280	18	-441	72963.27087

680/780 - NON TRANSFORMED

D'Agostino's Test

Normal Test

X_{mean}	288.1
n	105
s	675.4397
D	0.168876
Y	[illegible]
β	52.5
SUM $[(i-\alpha)x_i]$	1257573
SUM $[(x_i-X_{mean})^2]$	47902966

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

let $\alpha = 0.02$ – for $n = 105$

$Y_{0.01} = -3.15$
$Y_{0.99} = 1.47$

Distribution is not normal since
$-38.69 < -3.15$

D'AGOSTINOS TEST FOR TRANSFORMED TOTAL LEAD CONCENTRATIONS
Surface Samples - YBI

680/780 - LN TRANSFORMED

i	(x)	Ordered (x_i)	$(i-\beta)x_i$	$(x_i-X_{mean})^2$
1	4.543295	0.916290732	-47.647118	10.05527193
2	1.94591	0.916290732	-46.730827	10.05527193
3	1.94591	0.916290732	-45.814537	10.05527193
4	4.143135	0.916290732	-44.898246	10.05527193
5	2.995732	0.916290732	-43.981955	10.05527193
6	3.78419	0.916290732	-43.065664	10.05527193
7	2.995732	0.916290732	-42.149374	10.05527193
8	7.17012	0.916290732	-41.233083	10.05527193
9	7.17012	1.386294361	-60.996952	7.295407743
10	2.944439	1.887069649	-81.143995	4.840994276
11	6.39693	1.945910149	-81.728226	4.585531689
12	4.094345	1.945910149	-79.782316	4.585531689
13	2.833213	2.079441542	-83.177662	4.031477957
14	5.298317	2.079441542	-81.09822	4.031477957
15	5.828946	2.116255515	-80.41771	3.884999054
16	3.496508	2.128231706	-78.744573	3.837931378
17	3.496508	2.302585093	-82.893063	3.185191627
18	5.63479	2.302585093	-80.590478	3.185191627
19	6.887553	2.397895273	-81.528439	2.854073497
20	5.298317	2.48490665	-82.001919	2.567650378
21	0.916291	2.63905733	-84.449835	2.097394115
22	5.913503	2.708050201	-83.949556	1.902317896
23	2.079442	2.708050201	-81.241506	1.902317896
24	1.386294	2.708050201	-78.533456	1.902317896
25	5.828946	2.772588722	-77.632484	1.728454199
26	3.401197	2.772588722	-74.859896	1.728454199
27	3.73767	2.833213344	-73.663547	1.572722328
28	5.63479	2.890371758	-72.259294	1.432626706
29	0.916291	2.890371758	-69.368922	1.432626706

680/780 - LN TRANSFORMED

D'Agostino's Test

Lognormal Test

X_{mean}	4.1
n	105
s	1.7927
D	0.28348
Y	0.4735
β	53
SUM $[(i-\alpha)x_i]$	5602.749
SUM $[(x_i-X_{mean})^2]$	337.4335

[illegible]	[illegible]	[illegible]
[illegible]	0.005	1.0995
[illegible]	0.01	0.99
[illegible]	0.025	0.975
[illegible]	0.05	0.95
[illegible]	0.1	0.9

let $\alpha = 0.02$ – for $n = 105$

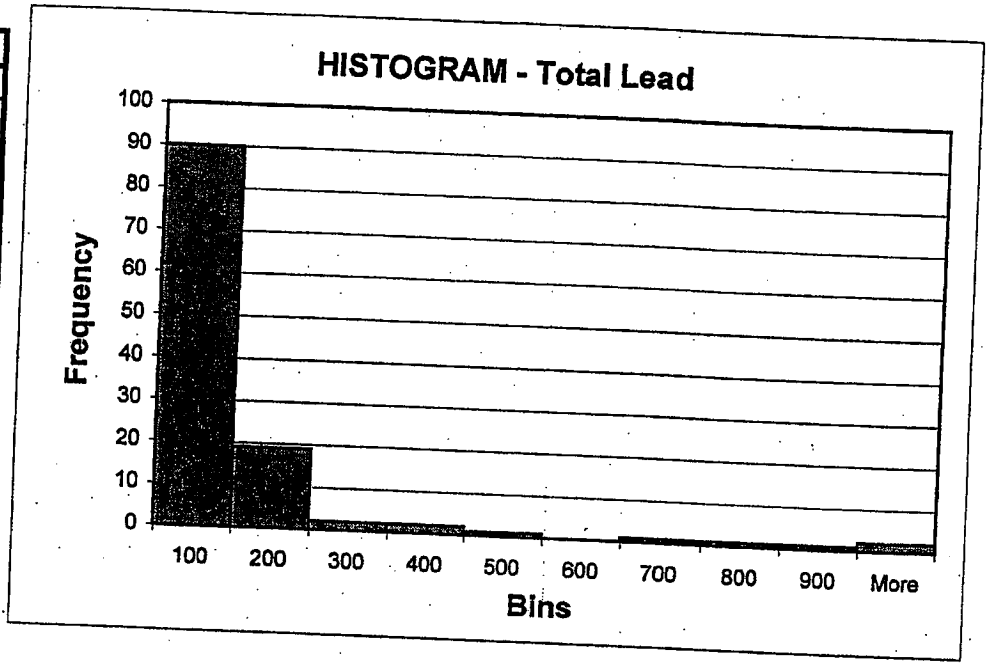
$Y_{0.01} = -3.15$
$Y_{0.99} = 1.47$

Distribution may be lognormal since
$-3.15 < 0.4735 < 1.47$

TOTAL LEAD DISTRIBUTION
YBI - 1 FOOT SAMPLES

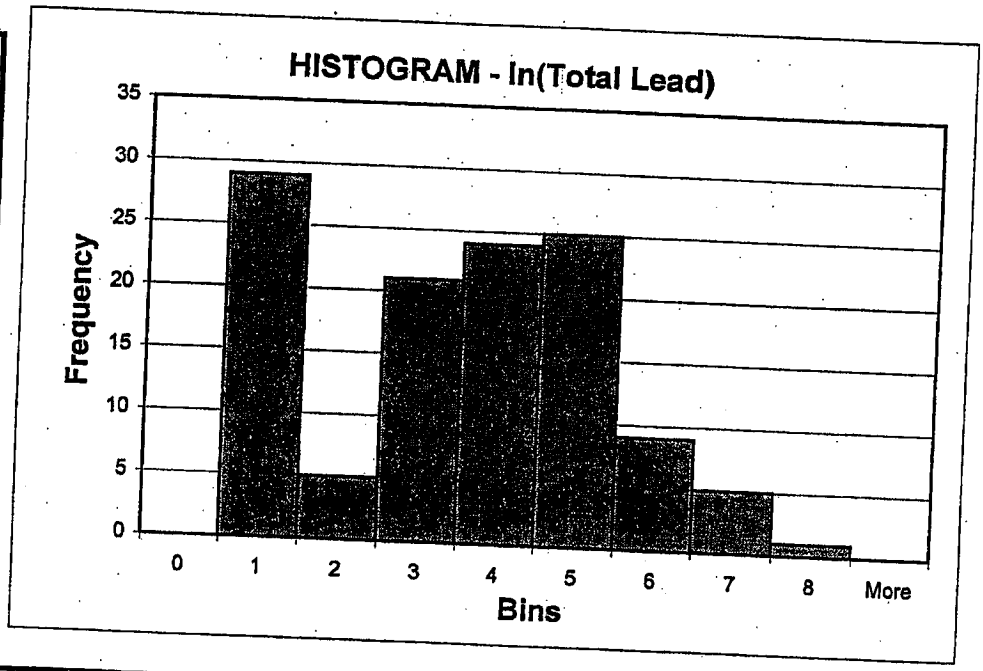
Total Lead

bins	frequency
100	90
200	19
300	2
400	2
500	1
600	0
700	1
800	1
900	1
More	2



ln(Total Lead)

bins	frequency
0	0
1	29
2	5
3	21
4	24
5	25
6	9
7	5
8	1
More	0



D'AGOSTINOS TEST FOR NON-TRANSFORMED TOTAL LEAD CONCENTRATIONS
1 foot Samples - YBI

680/780 - NON TRANSFORMED

I	(x)	Ordered (x_i)	$(i-\beta)x_i$	$(x_i-X_{mean})^2$
1	24	2.5	-146.25	8583.3218
2	6.5	2.5	-143.75	8583.3218
3	50	2.5	-141.25	8583.3218
4	57	2.5	-138.75	8583.3218
5	18	2.5	-136.25	8583.3218
6	2.5	2.5	-133.75	8583.3218
7	110.0	2.5	-131.25	8583.3218
8	2.5	2.5	-128.75	8583.3218
9	7	2.5	-126.25	8583.3218
10	37.0	2.5	-123.75	8583.3218
11	44	2.5	-121.25	8583.3218
12	3	2.5	-118.75	8583.3218
13	2.5	2.5	-116.25	8583.3218
14	2.5	2.5	-113.75	8583.3218
15	760	2.5	-111.25	8583.3218
16	1800	2.5	-108.75	8583.3218
17	18	2.5	-106.25	8583.3218
18	2.5	2.5	-103.75	8583.3218
19	270	2.5	-101.25	8583.3218
20	12	2.5	-98.75	8583.3218
21	6.7	2.5	-96.25	8583.3218
22	12	2.5	-93.75	8583.3218
23	2.5	2.5	-91.25	8583.3218
24	56	2.5	-88.75	8583.3218
25	8	2.5	-86.25	8583.3218
26	21	2.5	-83.75	8583.3218
27	140.0	2.5	-81.25	8583.3218
28	200	2.5	-78.75	8583.3218

680/780 - NON TRANSFORMED

D'Agostino's Test

Normal Test

X_{mean}	95.1
n	119
s	223.5492
D	0.161684
Y	[illegible]
β	59.5
SUM $[(i-\alpha)x_i]$	511838.4
SUM $[(x_i-X_{mean})^2]$	5946935

let $\alpha = 0.02$ – for n = 119

$Y_{0.01}$ approx. = -3.15
$Y_{0.99}$ approx. = 1.47

Distribution is not normal since
-43.80 < -3.15

D'AGOSTINOS TEST FOR TRANSFORMED TOTAL LEAD CONCENTRATIONS
1 foot Samples - YBI

680/780 - LN TRANSFORMED

i	(x)	Ordered (x_i)	$(i-\beta)x_i$	$(x_i-X_{mean})^2$
1	3.178054	0.916290732	-54.061153	4.99348713
2	1.871802	0.916290732	-53.144862	4.99348713
3	3.912023	0.916290732	-52.228572	4.99348713
4	4.043051	0.916290732	-51.312281	4.99348713
5	2.890372	0.916290732	-50.39599	4.99348713
6	0.916291	0.916290732	-49.4797	4.99348713
7	4.70048	0.916290732	-48.563409	4.99348713
8	0.916291	0.916290732	-47.647118	4.99348713
9	1.94591	0.916290732	-46.730827	4.99348713
10	3.610918	0.916290732	-45.814537	4.99348713
11	3.78419	0.916290732	-44.898246	4.99348713
12	0.916291	0.916290732	-43.981955	4.99348713
13	0.916291	0.916290732	-43.065664	4.99348713
14	0.916291	0.916290732	-42.149374	4.99348713
15	6.633318	0.916290732	-41.233083	4.99348713
16	7.495542	0.916290732	-40.316792	4.99348713
17	2.890372	0.916290732	-39.400501	4.99348713
18	0.916291	0.916290732	-38.484211	4.99348713
19	5.598422	0.916290732	-37.56792	4.99348713
20	2.484907	0.916290732	-36.651629	4.99348713
21	1.902108	0.916290732	-35.735339	4.99348713
22	2.484907	0.916290732	-34.819048	4.99348713
23	0.916291	0.916290732	-33.902757	4.99348713
24	4.025352	0.916290732	-32.986466	4.99348713
25	2.079442	0.916290732	-32.070176	4.99348713
26	3.044522	0.916290732	-31.153885	4.99348713
27	4.941642	0.916290732	-30.237594	4.99348713
28	5.298317	0.916290732	-29.321303	4.99348713
29	0.916291	0.916290732	-28.405013	4.99348713

680/780 - LN TRANSFORMED

D'Agostino's Test

Lognormal Test

X_{mean}	3.2
n	119
s	1.7017
D	0.283764
Y	0.607729
β	60
SUM $[(i-\alpha)x_i]$	6838.142
SUM $[(x_i-X_{mean})^2]$	344.604

0.01	0.005	0.95
0.02	0.01	0.9
0.05	0.025	0.775
0.1	0.05	0.25
0.2	0.1	0.9

let $\alpha = 0.02$ – for n = 119

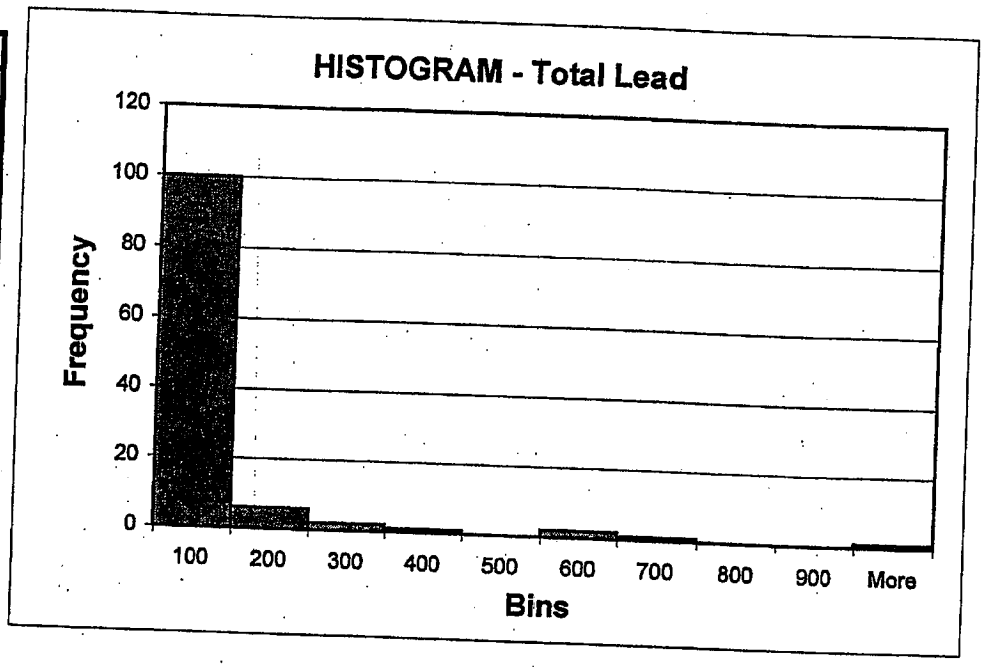
$Y_{0.01}$ approx. = -3.15
$Y_{0.99}$ approx. = 1.47

Distribution may be lognormal since
$-3.15 < 0.607 < 1.47$

TOTAL LEAD DISTRIBUTION
YBI - 2 FOOT SAMPLES

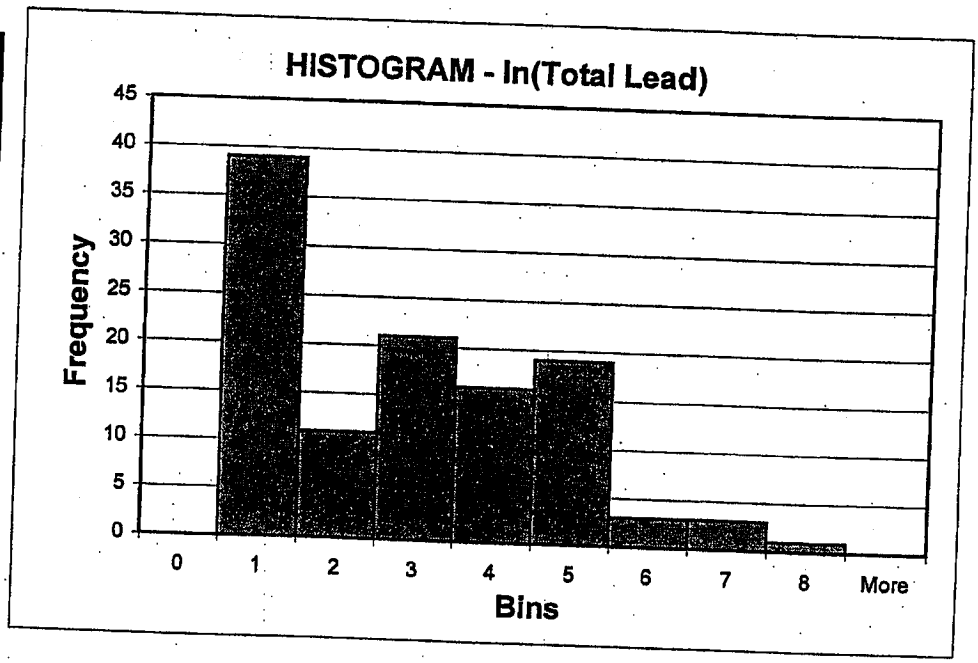
Total Lead

bins	frequency
100	100
200	6
300	2
400	1
500	0
600	2
700	1
800	0
900	0
More	1



ln(Total Lead)

bins	frequency
0	0
1	39
2	11
3	21
4	16
5	19
6	3
7	3
8	1
More	0



D'AGOSTINOS TEST FOR NON-TRANSFORMED TOTAL LEAD CONCENTRATIONS
2 foot Samples - YBI

NON TRANSFORMED

i	(x)	Ordered (x_i)	$(i-\beta)x_i$	$(x_i-X_{mean})^2$
1	7	1.5	-83.25	3635.983275
2	5.0	2	-109	3575.93416
3	3	2.5	-133.75	3516.385045
4	21	2.5	-131.25	3516.385045
5	10	2.5	-128.75	3516.385045
6	2.5	2.5	-126.25	3516.385045
7	2.5	2.5	-123.75	3516.385045
8	26.0	2.5	-121.25	3516.385045
9	3	2.5	-118.75	3516.385045
10	2.5	2.5	-116.25	3516.385045
11	20	2.5	-113.75	3516.385045
12	3	2.5	-111.25	3516.385045
13	51	2.5	-108.75	3516.385045
14	30	2.5	-106.25	3516.385045
15	2.5	2.5	-103.75	3516.385045
16	2.5	2.5	-101.25	3516.385045
17	2.5	2.5	-98.75	3516.385045
18	52	2.5	-96.25	3516.385045
19	6	2.5	-93.75	3516.385045
20	9.5	2.5	-91.25	3516.385045
21	8.5	2.5	-88.75	3516.385045
22	44	2.5	-86.25	3516.385045
23	55	2.5	-83.75	3516.385045
24	68	2.5	-81.25	3516.385045
25	2.5	2.5	-78.75	3516.385045
26	2.5	2.5	-76.25	3516.385045
27	14.0	2.5	-73.75	3516.385045
28	81	2.5	-71.25	3516.385045

NON TRANSFORMED

D'Agostino's Test

Normal Test

X_{mean}	61.8
n	113
s	192.6156
D	0.129317
Y	-54.1602
β	56.5
SUM $[(i-\alpha)x_i]$	318056.9
SUM $[(x_i-X_{mean})^2]$	4192386

[illegible]	[illegible]	[illegible]
0.01	0.001	0.99
0.02	0.01	0.98
0.05	0.025	0.95
0.1	0.05	0.9
0.2	0.1	0.8

let $\alpha = 0.02$ – for n = 119

$Y_{0.01}$ approx. = -3.15
$Y_{0.99}$ approx. = 1.47

Distribution is not normal since
-54.16 < -3.15

D'AGOSTINOS TEST FOR TRANSFORMED TOTAL LEAD CONCENTRATIONS
2 foot Samples - YBI

LN TRANSFORMED

i	(x)	Ordered (x_i)	$(i-\beta)x_i$	$(x_i-X_{mean})^2$
1	1.94591	0.405465108	-22.706046	4.670317972
2	1.609438	0.693147181	-38.123095	3.509664184
3	0.916291	0.916290732	-49.4797	2.723378608
4	3.044522	0.916290732	-48.563409	2.723378608
5	2.302585	0.916290732	-47.647118	2.723378608
6	0.916291	0.916290732	-46.730827	2.723378608
7	0.916291	0.916290732	-45.814537	2.723378608
8	3.258097	0.916290732	-44.898246	2.723378608
9	1.098612	0.916290732	-43.981955	2.723378608
10	0.916291	0.916290732	-43.065664	2.723378608
11	2.995732	0.916290732	-42.149374	2.723378608
12	0.916291	0.916290732	-41.233083	2.723378608
13	3.931826	0.916290732	-40.316792	2.723378608
14	3.401197	0.916290732	-39.400501	2.723378608
15	0.916291	0.916290732	-38.484211	2.723378608
16	0.916291	0.916290732	-37.56792	2.723378608
17	0.916291	0.916290732	-36.651629	2.723378608
18	3.951244	0.916290732	-35.735339	2.723378608
19	1.791759	0.916290732	-34.819048	2.723378608
20	2.251292	0.916290732	-33.902757	2.723378608
21	2.140066	0.916290732	-32.986466	2.723378608
22	3.78419	0.916290732	-32.070176	2.723378608
23	4.007333	0.916290732	-31.153885	2.723378608
24	4.219508	0.916290732	-30.237594	2.723378608
25	0.916291	0.916290732	-29.321303	2.723378608
26	0.916291	0.916290732	-28.405013	2.723378608
27	2.639057	0.916290732	-27.488722	2.723378608
28	4.394449	0.916290732	-26.572431	2.723378608
29	4.787492	0.916290732	-25.65614	2.723378608

LN TRANSFORMED

D'Agostino's Test

Lognormal Test

X_{mean}	2.6
n	113
s	1.6281
D	0.276731
Y	[illegible]
β	57
SUM $[(i-\alpha)x_i]$	5753.018
SUM $[(x_i-X_{mean})^2]$	299.5296

let $\alpha = 0.02$ – for n = 113

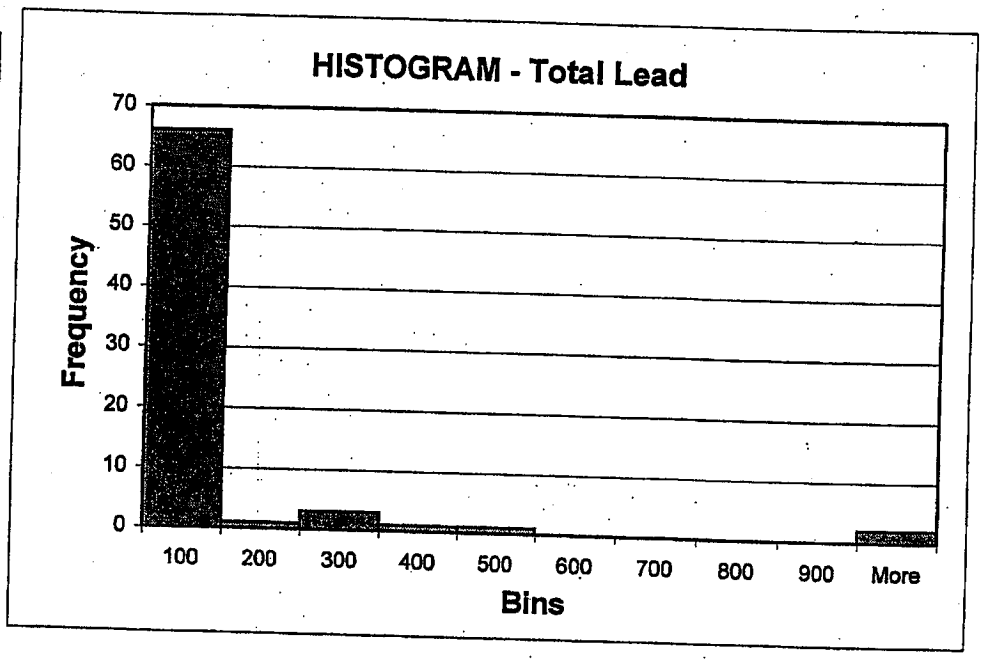
$Y_{0.01}$ approx. = -3.15
$Y_{0.99}$ approx. = 1.47

Distribution may be lognormal since
-3.15 < -1.90 < 1.47

TOTAL LEAD DISTRIBUTION
YBI - 3 FOOT SAMPLES

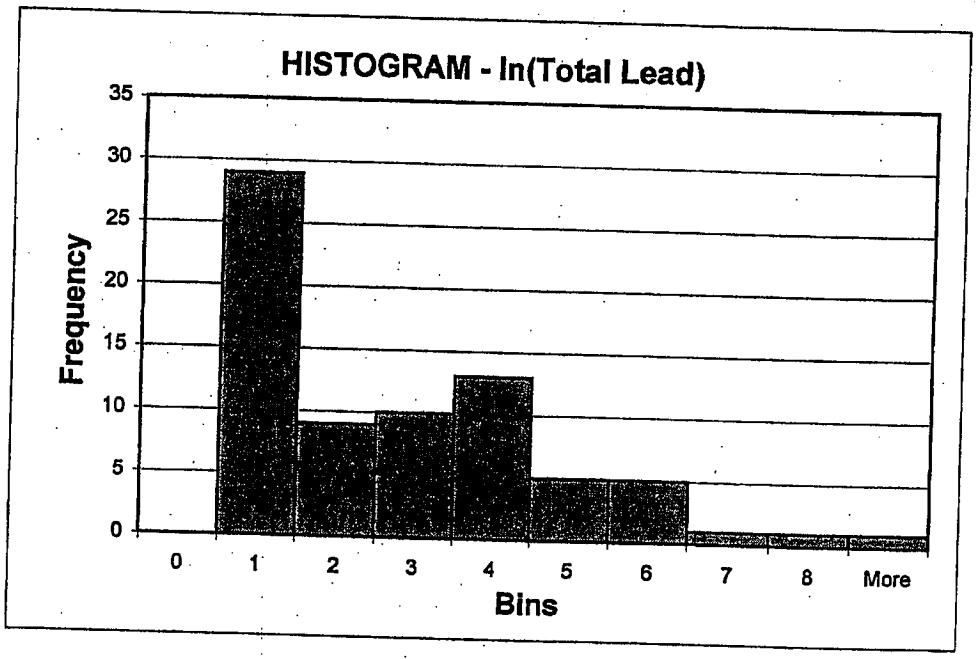
Total Lead

bins	frequency
100	66
200	1
300	3
400	1
500	1
600	0
700	0
800	0
900	0
More	2



ln(Total Lead)

bins	frequency
0	0
1	29
2	9
3	10
4	13
5	5
6	5
7	1
8	1
More	1



D'AGOSTINOS TEST FOR NON-TRANSFORMED TOTAL LEAD CONCENTRATIONS
3 foot Samples - YBI

NON TRANSFORMED

i	(x)	Ordered (x_i)	$(i-\beta)x_i$	$(x_i-X_{mean})^2$
1	1.5	1.5	-54	12467.23133
2	2.5	2.0	-70	12355.82457
3	32	2.0	-68	12355.82457
4	4	2.0	-66	12355.82457
5	3	2.0	-64	12355.82457
6	2.5	2.0	-62	12355.82457
7	2.0	2.0	-60	12355.82457
8	27.0	2.5	-72.5	12244.91782
9	26	2.5	-70	12244.91782
10	22.0	2.5	-67.5	12244.91782
11	26	2.5	-65	12244.91782
12	3	2.5	-62.5	12244.91782
13	2.5	2.5	-60	12244.91782
14	2.5	2.5	-57.5	12244.91782
15	2.5	2.5	-55	12244.91782
16	2.5	2.5	-52.5	12244.91782
17	2.5	2.5	-50	12244.91782
18	2	2.5	-47.5	12244.91782
19	2.5	2.5	-45	12244.91782
20	2.5	2.5	-42.5	12244.91782
21	2.5	2.5	-40	12244.91782
22	61	2.5	-37.5	12244.91782
23	44	2.5	-35	12244.91782
24	47	2.5	-32.5	12244.91782
25	3.5	2.5	-30	12244.91782
26	8.7	2.5	-27.5	12244.91782
27	35.0	2.5	-25	12244.91782
28	2	2.5	-22.5	12244.91782

NON TRANSFORMED

D'Agostino's Test

Normal Test

X_{mean}	113.2
n	74
s	502.1438
D	0.10165
Y	[illegible]
β	37
SUM $[(i-\alpha)x_i]$	279511.9
SUM $[(x_i-X_{mean})^2]$	18658978

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

let $\alpha = 0.02$ – for $n = 74$

$Y_{0.01}$ approx. = -3.29
$Y_{0.99}$ approx. = 1.31

Distribution is not normal since
-51.77 < -3.29

D'AGOSTINOS TEST FOR TRANSFORMED TOTAL LEAD CONCENTRATIONS
3 foot Samples - YBI

LN TRANSFORMED

i	(x)	Ordered (x_i)	$(i-\beta)x_i$	$(x_i-X_{mean})^2$
1	0.405465	0.405465108	-14.799476	4.168475229
2	0.916291	0.693147181	-24.606725	3.076524199
3	3.465736	0.693147181	-23.913578	3.076524199
4	1.252763	0.693147181	-23.220431	3.076524199
5	0.916291	0.693147181	-22.527283	3.076524199
6	0.916291	0.693147181	-21.834136	3.076524199
7	0.693147	0.693147181	-21.140989	3.076524199
8	3.295837	0.916290732	-27.030577	2.343528623
9	3.258097	0.916290732	-26.114286	2.343528623
10	3.091042	0.916290732	-25.197995	2.343528623
11	3.258097	0.916290732	-24.281704	2.343528623
12	0.916291	0.916290732	-23.365414	2.343528623
13	0.916291	0.916290732	-22.449123	2.343528623
14	0.916291	0.916290732	-21.532832	2.343528623
15	0.916291	0.916290732	-20.616541	2.343528623
16	0.916291	0.916290732	-19.700251	2.343528623
17	0.916291	0.916290732	-18.78396	2.343528623
18	0.693147	0.916290732	-17.867669	2.343528623
19	0.916291	0.916290732	-16.951379	2.343528623
20	0.916291	0.916290732	-16.035088	2.343528623
21	0.916291	0.916290732	-15.118797	2.343528623
22	4.110874	0.916290732	-14.202506	2.343528623
23	3.78419	0.916290732	-13.286216	2.343528623
24	3.850148	0.916290732	-12.369925	2.343528623
25	1.252763	0.916290732	-11.453634	2.343528623
26	2.163323	0.916290732	-10.537343	2.343528623
27	3.555348	0.916290732	-9.6210527	2.343528623
28	0.693147	0.916290732	-8.704762	2.343528623
29	0.916291	0.916290732	-7.7884712	2.343528623

LN TRANSFORMED

D'Agostino's Test

Lognormal Test

X_{mean}	2.4
n	74
s	1.7907
D	0.267907
Y	-4.07025
β	37.5
SUM $[(i-\alpha)x_i]$	2627.035
SUM $[(x_i-X_{mean})^2]$	237.2831

α = 0.01	Y = 0.005	Y = 0.995
α = 0.02	Y = 0.01	Y = 0.99
α = 0.05	Y = 0.025	Y = 0.975
α = 0.1	Y = 0.05	Y = 0.95
α = 0.15	Y = 0.075	Y = 0.925

let $\alpha = 0.02$ – for n = 74

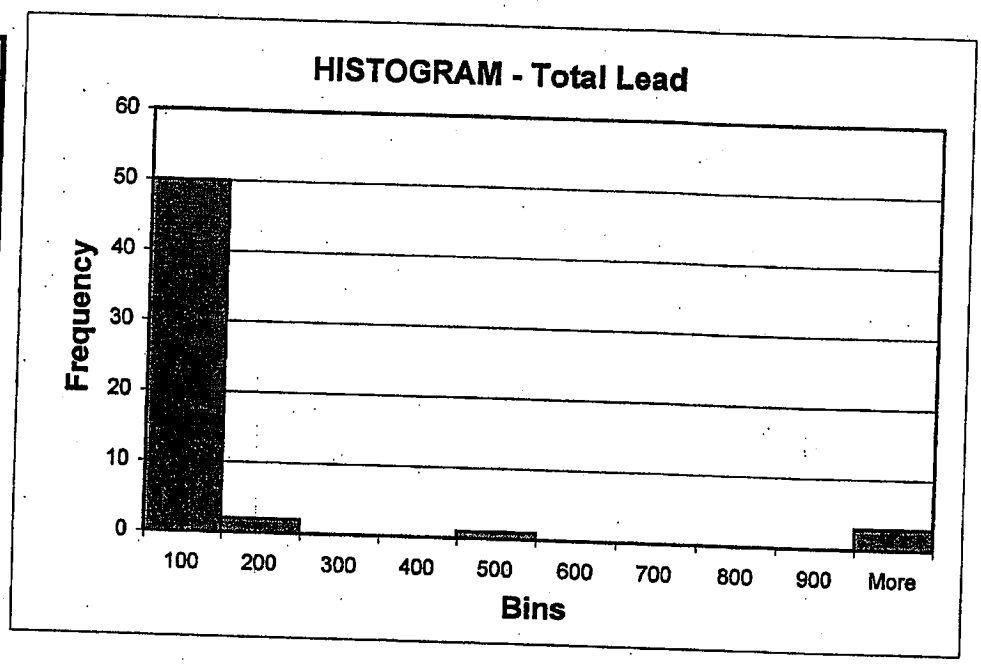
$Y_{0.01}$ approx. = -3.29
$Y_{0.99}$ approx. = 1.31

Distribution is not lognormal since
-4.07 < -3.29

TOTAL LEAD DISTRIBUTION
YBI - 5 FOOT SAMPLES

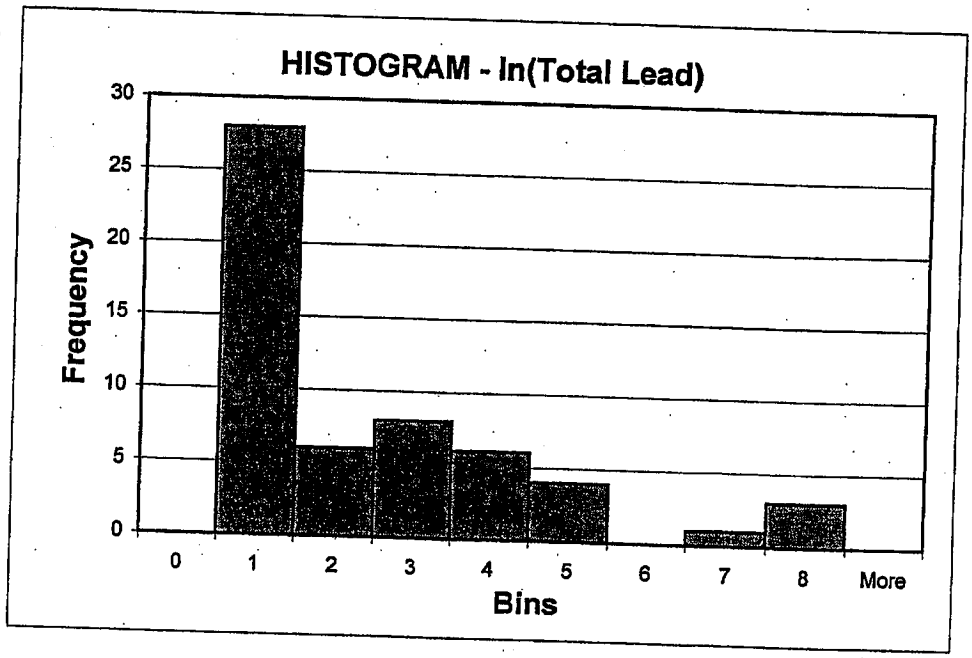
Total Lead

bins	frequency
100	50
200	2
300	0
400	0
500	1
600	0
700	0
800	0
900	0
More	3



ln(Total Lead)

bins	frequency
0	0
1	28
2	6
3	8
4	6
5	4
6	0
7	1
8	3
More	0



D'AGOSTINOS TEST FOR NON-TRANSFORMED TOTAL LEAD CONCENTRATIONS
5 foot Samples - YBI

NON TRANSFORMED

i	(x)	Ordered (x_i)	$(i-\beta)x_i$	$(x_i-X_{mean})^2$
1	24.0	1.5	-40.5	15280.49163
2	2.5	1.5	-39	15280.49163
3	5	2	-50	15157.12735
4	3	2	-48	15157.12735
5	3	2.5	-57.5	15034.26306
6	1.5	2.5	-55	15034.26306
7	16.0	2.5	-52.5	15034.26306
8	34.0	2.5	-50	15034.26306
9	82	2.5	-47.5	15034.26306
10	2.5	2.5	-45	15034.26306
11	3	2.5	-42.5	15034.26306
12	3	2.5	-40	15034.26306
13	2.5	2.5	-37.5	15034.26306
14	2.5	2.5	-35	15034.26306
15	2.5	2.5	-32.5	15034.26306
16	2.5	2.5	-30	15034.26306
17	2.5	2.5	-27.5	15034.26306
18	7.5	2.5	-25	15034.26306
19	7.1	2.5	-22.5	15034.26306
20	6.1	2.5	-20	15034.26306
21	2	2.5	-17.5	15034.26306
22	2.5	2.5	-15	15034.26306
23	2.5	2.5	-12.5	15034.26306
24	8.7	2.5	-10	15034.26306
25	2.5	2.5	-7.5	15034.26306
26	1.5	2.5	-5	15034.26306
27	2.5	2.5	-2.5	15034.26306
28	2.5	2.5	0	15034.26306

NON TRANSFORMED

D'Agostino's Test

Normal Test

X_{mean}	125.1
n	56
s	443.9192
D	0.129831
Y	-38.00969016
β	28
SUM $[(i-\alpha)x_i]$	180741.5
SUM $[(x_i-X_{mean})^2]$	11035598

[illegible]	[illegible]	[illegible]
[illegible]	0.005	0.995
[illegible]	0.01	0.99
[illegible]	0.025	0.975
[illegible]	0.05	0.95
[illegible]	0.1	0.9

let $\alpha = 0.02$ – for $n = 56$

$Y_{0.01}$ approx. = -3.44
$Y_{0.99}$ approx. = 1.14

Distribution is not normal since
-38.00 < -3.44

D'AGOSTINOS TEST FOR TRANSFORMED TOTAL LEAD CONCENTRATIONS
5 foot Samples - YBI

LN TRANSFORMED

I	(x)	Ordered (x_i)	$(i-\beta)x_i$	$(x_i-X_{mean})^2$
1	3.178054	0.405465108	-11.15029	3.187429175
2	0.916291	0.405465108	-10.744825	3.187429175
3	1.504077	0.693147181	-17.675253	2.242971097
4	0.916291	0.693147181	-16.982106	2.242971097
5	0.916291	0.916290732	-21.532832	1.624379941
6	0.405465	0.916290732	-20.616541	1.624379941
7	2.772589	0.916290732	-19.700251	1.624379941
8	3.526361	0.916290732	-18.78396	1.624379941
9	4.406719	0.916290732	-17.867669	1.624379941
10	0.916291	0.916290732	-16.951379	1.624379941
11	0.916291	0.916290732	-16.035088	1.624379941
12	0.916291	0.916290732	-15.118797	1.624379941
13	0.916291	0.916290732	-14.202506	1.624379941
14	0.916291	0.916290732	-13.286216	1.624379941
15	0.916291	0.916290732	-12.369925	1.624379941
16	0.916291	0.916290732	-11.453634	1.624379941
17	0.916291	0.916290732	-10.537343	1.624379941
18	2.014903	0.916290732	-9.6210527	1.624379941
19	1.960095	0.916290732	-8.704762	1.624379941
20	1.808289	0.916290732	-7.7884712	1.624379941
21	0.693147	0.916290732	-6.8721805	1.624379941
22	0.916291	0.916290732	-5.9558898	1.624379941
23	0.916291	0.916290732	-5.039599	1.624379941
24	2.163323	0.916290732	-4.1233083	1.624379941
25	0.916291	0.916290732	-3.2070176	1.624379941
26	0.405465	0.916290732	-2.2907268	1.624379941
27	0.916291	0.916290732	-1.3744361	1.624379941
28	0.916291	0.916290732	-0.4581454	1.624379941
29	0.916291	1.504077397	0.7520387	0.471591203

LN TRANSFORMED

D'Agostino's Test

Lognormal Test

X_{mean}	2.2
n	56
s	1.8282
D	0.24901
Y	-8.2567
β	28.5
SUM $[(i-\alpha)x_i]$	1427.637
SUM $[(x_i-X_{mean})^2]$	187.171

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

let $\alpha = 0.02$ – for $n = 56$

$Y_{0.01}$ approx. = -3.44
$Y_{0.99}$ approx. = 1.14

Distribution is not lognormal since
-8.26 < -3.44

SUPPLEMENTAL INVESTIGATION REPORT

YERBA BUENA ISLAND DUCT BANK
SAN FRANCISCO COUNTY, CALIFORNIA

PREPARED FOR:
CALIFORNIA DEPARTMENT OF TRANSPORTATION
DISTRICT 4
OFFICE OF ENVIRONMENTAL ENGINEERING
111 GRAND AVENUE
OAKLAND, CALIFORNIA

PREPARED BY:
GEOCON CONSULTANTS, INC.
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CALTRANS CONTRACT 04A1862
TASK ORDER NO. 68
EA No. 04-0120P1

GEOCON PROJECT NO. E8220-06-68

MARCH 2007

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REPORT LIMITATIONS

This report has been prepared exclusively for the State of California Department of Transportation (Caltrans) District 4. The information contained herein is only valid as of the date of the report, and will require an update to reflect additional information obtained.

This report is not a comprehensive site characterization and should not be construed as such. The findings as presented in this report are predicated on the results of the limited sampling and laboratory testing performed. In addition, the information obtained is not intended to address potential impacts related to sources other than those specified herein. Therefore, the report should be deemed conclusive with respect to only the information obtained. We make no warranty, express or implied, with respect to the content of this report or any subsequent reports, correspondence or consultation. Geocon strived to perform the services summarized herein in accordance with the local standard of care in the geographic region at the time the services were rendered.

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

GEOCON CONSULTANTS, INC

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CALIFORNIA DEPARTMENT OF TRANSPORTATION – DISTRICT 4
OFFICE OF ENVIRONMENTAL ENGINEERING – HAZARDOUS WASTE BRANCH

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EXECUTIVE SUMMARY

This Supplemental Investigation Report was prepared for the San Francisco-Oakland Bay Bridge (SFOBB) East Span Replacement Project in Oakland, California. The supplemental investigation was performed within the limits of the project to construct a temporary transition structure from the existing east span of the Oakland, San Francisco Bay Bridge to Yerba Buena Island. The temporary structure is required to carry traffic from the existing structure while the permanent transition structures are being built. This task order covers data gaps in chemical evaluation of materials that will be excavated to install an electrical duct bank in the area of the transition structures. The project location is depicted on the Vicinity Map, Figure 1.

The existing area is comprised of fill material imported to the site from various sources along with the rubbled remains of a concrete structure demolished and ground-up on site. A previous investigation did not collect samples in the current boring location areas due to access restrictions. The purpose of the services performed was to determine the chemical properties of the material that will be excavated for disposal characterization and safety hazard evaluation.

The following field activities were performed during the sampling efforts:

- Located boring positions utilizing Differential Global Positioning System (DGPS) equipment. The boring locations were selected by Caltrans and the boring coordinates were provided in the TO.
- Collected soil samples using hand augering and slide hammer equipment.
- Transported samples to a California-certified environmental laboratory.

The boreholes were advanced using hand auger equipment. Soil encountered during hand augering was generally gravelly silty sand, or fine silty sand. In the areas of borings DB2 through DB4, the upper 2.5 to 3 feet of material contained concrete debris ranging from sand to cobble size. The boring locations, as selected by Caltrans, are shown on the Site Plan, Figure 2. Boring coordinates are summarized in Table 1.

Laboratory analyses were performed under standard turnaround-times. The soil analytical test results are summarized in Tables 2, 3, and 4. Reproductions of the laboratory reports and chain-of-custody documentation are presented as Appendix A.

The laboratory analyses indicated the following:

- CAM 17 metals were not detected at concentrations exceeding their respective Total Threshold Limit Concentration (TTLC) values. In borings DB1 (0, 0.5, and 1.5 meters below ground surface (bgs)) and DB2 (0, 1 and 1.5 meters bgs), total lead was detected in soil samples ranging from 120 mg/kg to 740 mg/kg, exceeding ten times its Soluble Threshold Limit Concentration (STLC) value.
- WET analysis was conducted on six samples with total lead detected at concentrations greater than ten times its STLC (i.e., greater than 50 mg/kg). Results of the WET analyses ranged from 6.3 milligrams per liter (mg/l) to 41 mg/l.
- TCLP analysis was conducted on six samples with lead STLC results greater than 5.0 mg/l. Results of the TCLP analysis for each of the samples did not detect lead above the laboratory reporting limit of 1.2 mg/l.
- TPHg was not detected above the laboratory reporting limit of 1.0 mg/kg in the soil samples.
- TPHd was reported at concentrations ranging from 1.1 mg/kg to 640 mg/kg.
- TPHmo was reported at concentrations ranging from 1.2 mg/kg to 2,400 mg/kg.

Conclusions

Based on the lead results, soil in the vicinity of borings DB3 and DB4 will not be classified as hazardous with respect to lead content and can be reused or disposed as such. The soluble (WET) lead results for samples collected from borings DB1 and DB2 indicate that the upper 1.5 meters of soil in this area will be classified as a hazardous waste because the soluble (WET) lead results exceed the STLC value of 5 mg/l.

Based on the TPHd and TPHmo results, excavated soil from the upper 0.5 meters near boring DB4 may require offsite disposal at a Class II landfill.

The excavation contractor should implement appropriate health and safety measures as required by relevant regulations for construction activities scheduled to occur within the project boundaries.

YERBA BUENA ISLAND DUCT BANK SUPPLEMENTAL INVESTIGATION

1.0 INTRODUCTION

This Supplemental Investigation Report was prepared for the San Francisco-Oakland Bay Bridge (SFOBB) East Span Replacement Project in Oakland, California. This report documents the field observations, investigation sampling methods, and laboratory analytical data for a supplemental investigation of areas within the SFOBB East Span Replacement Project limits.

1.1 Site Location

This supplemental investigation was performed within the limits of the project to construct a temporary transition structure from the existing east span of the Oakland, San Francisco Bay Bridge to Yerba Buena Island. The temporary structure is required to carry traffic from the existing structure while the permanent transition structures are being built. This task order covers data gaps in chemical evaluation of materials that will be excavated to install an electrical duct bank in the area of the transition structures. The project location is depicted on the Vicinity Map, Figure 1.

1.2 Background

The existing area is comprised of fill material imported to the site from various sources along with the rubbled remains of a concrete structure demolished and ground-up on site. A previous investigation did not collect samples in the current boring location areas due to access restrictions.

1.3 Purpose

The purpose of the services performed was to determine the chemical properties of the material that will be excavated for disposal characterization and safety hazard evaluation.

2.0 SCOPE OF SERVICES

The following scope of services was performed:

2.1 Pre-Field Activities

- Reviewed the Health and Safety Plan, dated February 5, 2005, that was prepared for prior activities at site to provide guidelines on the use of personal protective equipment (PPE) and the health and safety procedures to be implemented during the proposed sampling activities.
- Marked boring locations in white paint and called Underground Service Alert (USA) 48 hours prior to the start of field activity.
- Retained Advanced Technology Laboratories, a Caltrans-approved, California-licensed laboratory accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) to provide laboratory analyses.

2.2 Field Activities

Mr. Chris Merritt and Mr. David Watts, under the responsible charge of Mr. Richard Day, performed the field investigation on December 7, 2006. Messrs. Day and Merritt are Professional Geologists in the State of California. The following field activities were performed during the sampling efforts:

- Located boring positions utilizing Differential Global Positioning System (DGPS) equipment. The boring locations were selected by Caltrans and the boring coordinates were provided in the TO.
- Collected soil samples using hand augering and slide hammer equipment.
- Transported samples to a California-certified environmental laboratory.

3.0 INVESTIGATIVE METHODS

3.1 Sampling Procedures

The boreholes were advanced using hand auger equipment. Field personnel collected soil samples using 2-inch by 6-inch stainless steel liners driven with a slide hammer sampler. After collection, sample liners selected for laboratory analysis had their ends covered with Teflon tape and secured with plastic end caps, were labeled, and placed in a cooler with ice. The boring locations, as selected by Caltrans, are shown on the Site Plan, Figure 2. Boring coordinates are summarized in Table 1.

Soil encountered during hand augering was generally gravelly silty sand, or fine silty sand. In the areas of borings DB2 through DB4, the upper 2.5 to 3 feet of material contained concrete debris ranging from sand to cobble size.

3.2 Laboratory Analyses

Laboratory analyses were performed under standard turnaround-time. Reproductions of the laboratory reports and chain-of-custody documentation are presented as Appendix A. The requested laboratory analyses were selected by Caltrans based on contaminant detections in previous investigations. The laboratory soil testing performed is summarized below:

- California Assessment Manual (CAM-17) Total Metals following EPA Method 6010B;
- Total Petroleum Hydrocarbons as gasoline (TPHg), as diesel (TPHd), and as motor oil (TPHmo) following Modified EPA Test Method 8015B;
- Soluble lead for select soil samples using the Waste Extraction Test (WET) method; and
- Soluble lead for select soil samples using the Toxicity Characteristic Leaching Procedure (TCLP) method.

3.3 Laboratory QA/QC

QA/QC procedures were performed for each method of analysis with specificity for each analyte listed in the test method's QA/QC. The laboratory QA/QC procedures included the following:

- One method blank for every ten samples, batch of samples or type of matrix, whichever was more frequent.
- One sample analyzed in duplicate for every ten samples, batch of samples or type of matrix, whichever was more frequent.
- One spiked sample for every ten samples, batch of samples or type of matrix; whichever was more frequent, with spike made at ten times the detection limit or at the analyte level.

4.0 INVESTIGATIVE RESULTS

Laboratory analyses were performed under standard turnaround-times. The soil analytical test results are summarized in Tables 2, 3, and 4. Reproductions of the laboratory reports and chain-of-custody documentation are presented as Appendix A.

The laboratory analyses indicated the following:

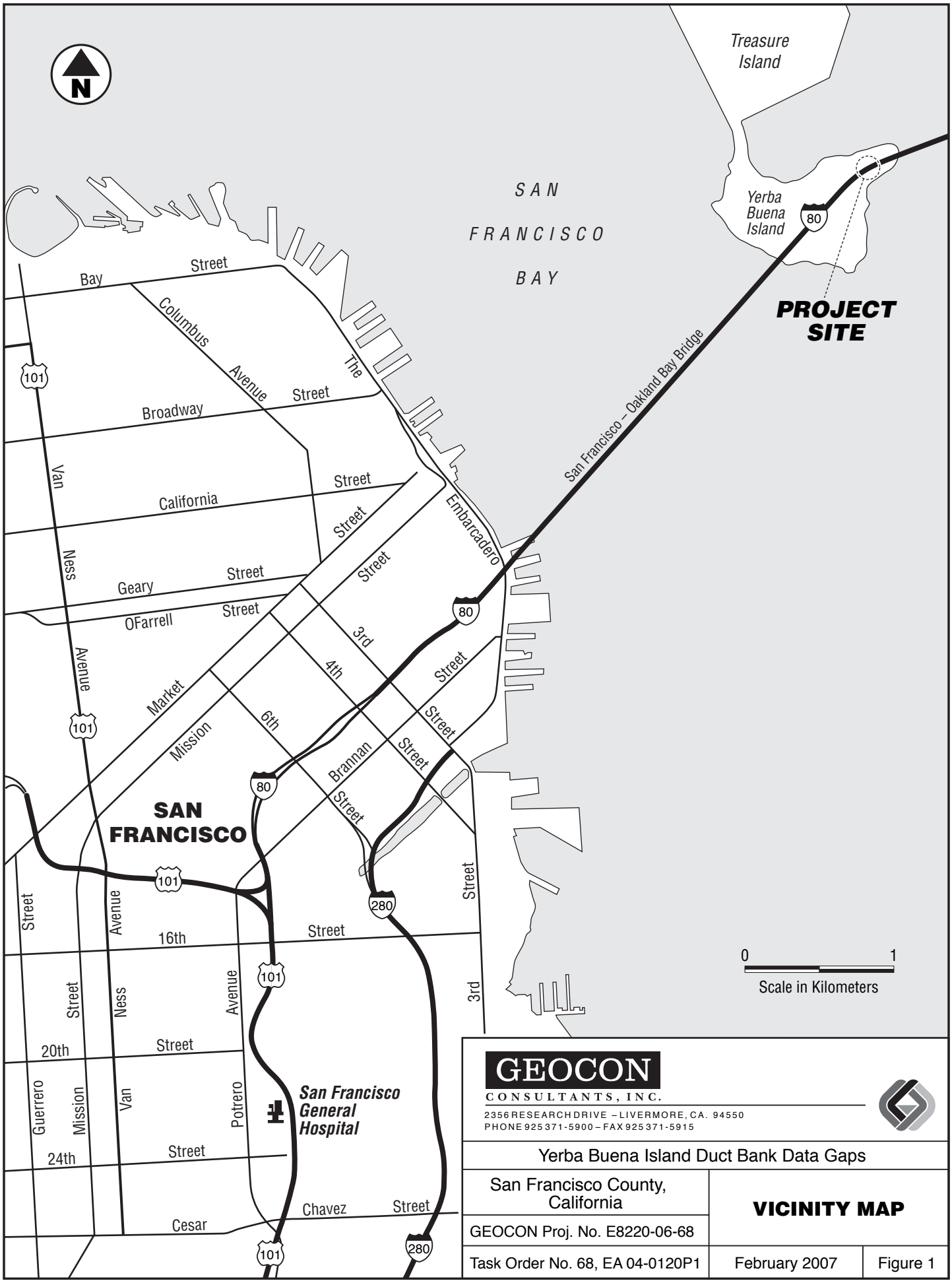
- CAM 17 metals were not detected at concentrations exceeding their respective Total Threshold Limit Concentration (TTLC) values. In borings DB1 (0, 0.5, and 1.5 meters below ground surface (bgs)) and DB2 (0, 1 and 1.5 meters bgs), total lead was detected in soil samples ranging from 120 mg/kg to 740 mg/kg, exceeding ten times its Soluble Threshold Limit Concentration (STLC) value.
- WET analysis was conducted on six samples with total lead detected at concentrations greater than ten times its STLC (i.e., greater than 50 mg/kg). Results of the WET analyses ranged from 6.3 milligrams per liter (mg/l) to 41 mg/l.
- TCLP analysis was conducted on six samples with lead STLC results greater than 5.0 mg/l. Results of the TCLP analysis for each of the samples did not detect lead above the laboratory reporting limit of 1.2 mg/l.
- TPHg was not detected above the laboratory reporting limit of 1.0 mg/kg in the soil samples.
- TPHd was reported at concentrations ranging from 1.1 mg/kg to 640 mg/kg.
- TPHmo was reported at concentrations ranging from 1.2 mg/kg to 2,400 mg/kg.

5.0 CONCLUSIONS

Based on the lead results, soil in the vicinity of borings DB3 and DB4 will not be classified as hazardous with respect to lead content and can be reused or disposed as such. The soluble (WET) lead results for samples collected from borings DB1 and DB2 indicate that the upper 1.5 meters of soil in this area will be classified as a hazardous waste because the soluble (WET) lead results exceed the STLC value of 5 mg/l.

Based on the TPHd and TPHmo results, excavated soil from the upper 0.5 meters near boring DB4 may require offsite disposal at a Class II landfill.

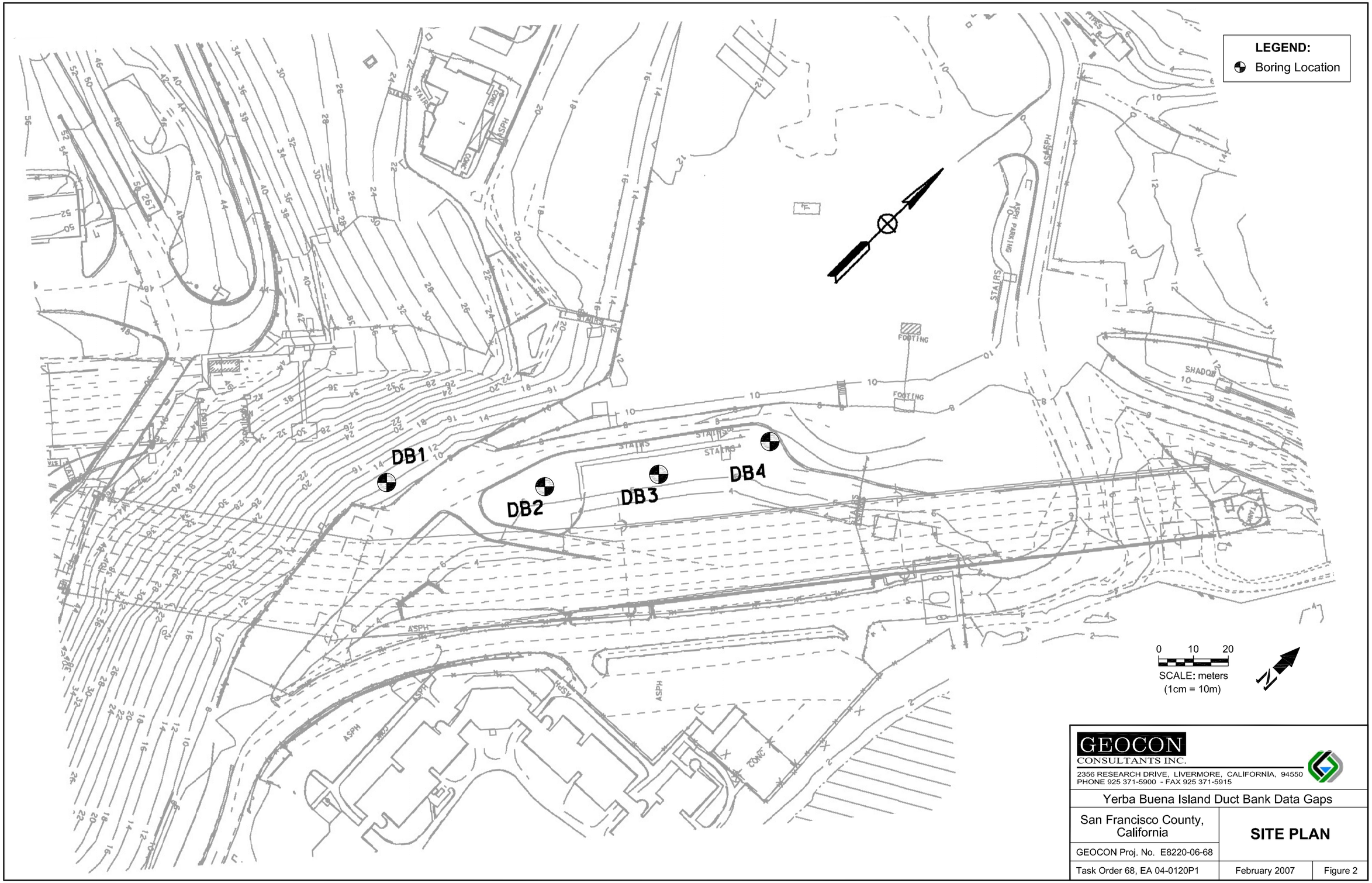
The excavation contractor should implement appropriate health and safety measures as required by relevant regulations for construction activities scheduled to occur within the project boundaries.



GEOCON
CONSULTANTS, INC.
2356 RESEARCH DRIVE – LIVERMORE, CA. 94550
PHONE 925 371-5900 – FAX 925 371-5915

Yerba Buena Island Duct Bank Data Gaps

San Francisco County, California	**VICINITY MAP**	
GEOCON Proj. No. E8220-06-68		
Task Order No. 68, EA 04-0120P1	February 2007	Figure 1



GEOCON
CONSULTANTS INC.
2356 RESEARCH DRIVE, LIVERMORE, CALIFORNIA, 94550
PHONE 925 371-5900 - FAX 925 371-5915

Yerba Buena Island Duct Bank Data Gaps

San Francisco County, California

SITE PLAN

GEOCON Proj. No. E8220-06-68

Task Order 68, EA 04-0120P1 | February 2007 | Figure 2

SITE0207

TABLE 1
Boring Coordinates
YBI Duct Bank

Boring	Northing	Easting
DB1	647,216.3	1,835,987.1
DB2	647,247.5	1,836,020.0
DB3	647,273.1	1,836,040.6
DB4	647,302.3	1,836,056.5

Northing and Easting in meters, NAD 83 (Zone 3)

TABLE 2
Summary of Total Metal Results
YBI Duct Bank

Sample ID	Sample Depth (m)	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
DB1-0	0	0	<2.0	<1.0	72	<1.0	<1.0	32	6.4	18	650	<1.0	33	<1.0	<1.0	<1.0	23	74	<0.10
DB1-0.5	0.5	1.6	<2.0	<1.0	53	<1.0	<1.0	32	6.1	17	290	<1.0	31	<1.0	<1.0	<1.0	22	63	<0.10
DB1-1.0	1	3.3	<2.0	<1.0	59	<1.0	<1.0	33	7.8	8.8	3.0	<1.0	36	<1.0	<1.0	<1.0	25	33	<0.10
DB1-1.5	1.5	4.9	<2.0	<1.0	53	<1.0	<1.0	29	5.7	19	740	<1.0	30	<1.0	<1.0	<1.0	20	83	<0.10
DB2-0	0	0	<2.0	2.9	98	<1.0	<1.0	60	11	26	110	<1.0	66	<1.0	<1.0	<1.0	30	60	<0.10
DB2-0.5	0.5	1.6	<2.0	3.3	96	<1.0	<1.0	44	14	36	25	<1.0	58	<1.0	<1.0	<1.0	34	59	<0.10
DB2-1.0	1	3.3	<2.0	13	80	<1.0	<1.0	31	6.3	22	620	<1.0	30	<1.0	<1.0	<1.0	25	62	<0.10
DB2-1.5	1.5	4.9	<2.0	6.1	58	<1.0	<1.0	34	7.1	12	120	<1.0	34	<1.0	<1.0	<1.0	25	37	<0.10
DB2-2.0	2	6.6	<2.0	1.5	56	<1.0	<1.0	32	6.8	9.6	16	<1.0	35	<1.0	<1.0	<1.0	23	26	<0.10
DB2-2.5	2.5	8.2	<2.0	<1.0	59	<1.0	<1.0	35	6.9	9.5	9.3	<1.0	36	<1.0	<1.0	<1.0	24	26	<0.10
DB3-0	0	0	<2.0	<1.0	56	<1.0	<1.0	51	9.4	11	6.9	<1.0	47	<1.0	<1.0	<1.0	37	28	<0.10
DB3-0.5	0.5	1.6	<2.0	1.8	99	<1.0	<1.0	39	9.2	23	14	<1.0	38	<1.0	<1.0	<1.0	31	42	0.12
DB3-1.0	1	3.3	<2.0	<1.0	48	<1.0	<1.0	50	8.3	9.7	3.0	<1.0	40	<1.0	<1.0	<1.0	36	21	<0.10
DB3-1.5	1.5	4.9	<2.0	<1.0	51	<1.0	<1.0	53	8.9	10	2.7	<1.0	39	<1.0	<1.0	<1.0	40	22	<0.10
DB3-2.0	2	6.6	<2.0	<1.0	69	<1.0	<1.0	44	7.7	10	23	<1.0	30	<1.0	<1.0	<1.0	32	31	<0.10
DB3-2.5	2.5	8.2	<2.0	1.4	78	<1.0	<1.0	51	9.3	15	11	<1.0	35	<1.0	<1.0	<1.0	40	32	<0.10

TABLE 2
Summary of Total Metal Results
YBI Duct Bank

Sample ID	Sample Depth (m)	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
DB4-0	0	0	<2.0	<1.0	86	<1.0	<1.0	23	6.1	13	16	<1.0	26	<1.0	<1.0	<1.0	34	34	<0.10
DB4-0.5	0.5	1.6	<2.0	2.0	96	<1.0	<1.0	24	5.8	22	9.0	<1.0	26	<1.0	<1.0	<1.0	29	35	<0.10
DB4-1.0	1	3.3	<2.0	1.4	73	<1.0	<1.0	36	9.2	9.3	3.7	<1.0	35	<1.0	<1.0	<1.0	26	22	<0.10
DB4-1.5	1.5	4.9	<2.0	1.1	57	<1.0	<1.0	34	7.7	8.9	3.6	<1.0	36	<1.0	<1.0	<1.0	25	23	<0.10
DB4-2.0	2	6.6	<2.0	1.3	72	<1.0	<1.0	32	6.8	7.4	6.9	<1.0	30	<1.0	<1.0	<1.0	24	24	<0.10

Notes:

Results are shown in milligrams per kilogram

< = Not detected above the laboratory reporting limit

TABLE 3
Summary of Lead Results
YBI Duct Bank

Sample I.D.	Sample Depth (m)	Sample Depth (ft)	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)
DB1-0	0	0	650	23	<1.2
DB1-0.5	0.5	1.6	290	20	<1.2
DB1-1.0	1	3.3	3.0	---	---
DB1-1.5	1.5	4.9	740	29	<1.2
DB2-0	0	0	110	6.3	<1.2
DB2-0.5	0.5	1.6	25	---	---
DB2-1.0	1	3.3	620	41	<1.2
DB2-1.5	1.5	4.9	120	12	<1.2
DB2-2.0	2	6.6	16	---	---
DB2-2.5	2.5	8.2	9.3	---	---
DB3-0	0	0	6.9	---	---
DB3-0.5	0.5	1.6	14	---	---
DB3-1.0	1	3.3	3.0	---	---
DB3-1.5	1.5	4.9	2.7	---	---
DB3-2.0	2	6.6	23	---	---
DB3-2.5	2.5	8.2	11	---	---
DB4-0	0	0	16	---	---
DB4-0.5	0.5	1.6	9.0	---	---
DB4-1.0	1	3.3	3.7	---	---
DB4-1.5	1.5	4.9	3.6	---	---
DB4-2.0	2	6.6	6.9	---	---

Notes:

WET = Waste Extraction Test using citric acid as the extraction fluid
TCLP = Toxicity Characteristic Leaching Procedure
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
< = Analyte was not detected above the stated laboratory reporting limit
--- = Not Analyzed

TABLE 4
Summary of Organic Results
YBI Duct Bank

Sample ID	Sample Depth (m)	Sample Depth (ft)	TPHd (mg/kg)	TPHmo (mg/kg)	TPHg (mg/kg)
DB1-0	0	0	110	210	---
DB1-0.5	0.5	1.6	130	270	<1.0
DB1-1.0	1	3.3	1.1	3.4	<1.0
DB1-1.5	1.5	4.9	240	490	<1.0
DB2-0	0	0	26	96	---
DB2-0.5	0.5	1.6	14	54	<1.0
DB2-1.0	1	3.3	30	75	<1.0
DB2-1.5	1.5	4.9	8.9	25	<1.0
DB2-2.0	2	6.6	1.3	3.6	<1.0
DB2-2.5	2.5	8.2	<1.0	2.8	<1.0
DB3-0	0	0	4.0	11	---
DB3-0.5	0.5	1.6	5.6	14	<1.0
DB3-1.0	1	3.3	<1.0	1.2	<1.0
DB3-1.5	1.5	4.9	<1.0	<1.0	<1.0
DB3-2.0	2	6.6	1.1	3.2	<1.0
DB3-2.5	2.5	8.2	1.5	4.4	<1.0
DB4-0	0	0	640	2,400	---
DB4-0.5	0.5	1.6	350	1,300	<1.0
DB4-1.0	1	3.3	15	26	<1.0
DB4-1.5	1.5	4.9	21	48	<1.0
DB4-2.0	2	6.6	27	54	<1.0

Notes:

TPHmo = Total Petroleum Hydrocarbons as motor oil
TPHd = Total Petroleum Hydrocarbons as diesel
TPHg = Total Petroleum Hydrocarbons as gasoline
--- = Not Analyzed
<= = Not detected above the laboratory reporting limit
mg/kg = milligrams per kilogram

APPENDIX A

December 20, 2006

Rick Day
Geocon Consultants, Inc.
2356 Research Drive
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

RECEIVED
DEC 28 2006
By

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 088420

RE: CALTRANS - YBI DUCT BANK, E8220-06-6

Attention: Rick Day

Enclosed are the results for sample(s) received on December 08, 2006 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

CLIENT: Geocon Consultants, Inc.
Project: CALTRANS - YBI DUCT BANK, E8220-06-68
Lab Order: 088420

CASE NARRATIVE

Analytical Comments for Method 7471

RPD for Duplicate (DUP) is outside criteria for sample 088420-021ADUP; however, the Laboratory Control Sample (LCS) validated the analytical batch.

Analytical Comments for Method 8015 (DRO/ORO)

Dilution was necessary for samples 088420-001A, 088420-002A, 088420-004A, 088420-005A, 088420-017A and 088420-018A, due to sample matrix.

Matrix Spike (MS) is outside recovery criteria for sample 088415-026AMS; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

RPD for Duplicate (DUP) is outside criteria for samples 088420-003ADUP and 088420-012ADUP; however, the Laboratory Control Sample (LCS) validated the analytical batch.

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB1-0
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 9:03:00 AM
Lab ID:	088420-001A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213E	QC Batch: 32085			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	ND	1.0		mg/Kg	1	12/13/2006
Barium	72	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	32	1.0		mg/Kg	1	12/13/2006
Cobalt	6.4	1.0		mg/Kg	1	12/13/2006
Copper	18	2.0		mg/Kg	1	12/13/2006
Lead	650	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	33	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	23	1.0		mg/Kg	1	12/13/2006
Zinc	74	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_BACK_061213C	QC Batch: 32131			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	110	10		mg/Kg	10	12/14/2006
ORO	210	10		mg/Kg	10	12/14/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213B	QC Batch: 32115			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB1-0.5
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 9:16:00 AM
Lab ID:	088420-002A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213E	QC Batch: 32085			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	ND	1.0		mg/Kg	1	12/13/2006
Barium	53	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	32	1.0		mg/Kg	1	12/13/2006
Cobalt	6.1	1.0		mg/Kg	1	12/13/2006
Copper	17	2.0		mg/Kg	1	12/13/2006
Lead	290	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	31	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	22	1.0		mg/Kg	1	12/13/2006
Zinc	63	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_BACK_061213C	QC Batch: 32131			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	130	10		mg/Kg	10	12/14/2006
ORO	270	10		mg/Kg	10	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212B	QC Batch: E06VS241			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213B	QC Batch: 32115			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB1-1.0
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 9:22:00 AM
Lab ID:	088420-003A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213E	QC Batch: 32085				PrepDate: 12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	ND	1.0		mg/Kg	1	12/13/2006
Barium	59	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	33	1.0		mg/Kg	1	12/13/2006
Cobalt	7.8	1.0		mg/Kg	1	12/13/2006
Copper	8.8	2.0		mg/Kg	1	12/13/2006
Lead	3.0	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	36	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	25	1.0		mg/Kg	1	12/13/2006
Zinc	33	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_BACK_061213C	QC Batch: 32131				PrepDate: 12/13/2006	Analyst: **CBR**
DRO	1.1	1.0		mg/Kg	1	12/14/2006
ORO	3.4	1.0		mg/Kg	1	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212B	QC Batch: E06VS241				PrepDate:	Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213B	QC Batch: 32115				PrepDate: 12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB1-1.5
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 9:47:00 AM
Lab ID:	088420-004A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213E	QC Batch: 32085			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	ND	1.0		mg/Kg	1	12/13/2006
Barium	53	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	29	1.0		mg/Kg	1	12/13/2006
Cobalt	5.7	1.0		mg/Kg	1	12/13/2006
Copper	19	2.0		mg/Kg	1	12/13/2006
Lead	740	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	30	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	20	1.0		mg/Kg	1	12/13/2006
Zinc	83	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_BACK_061213C	QC Batch: 32131			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	240	10		mg/Kg	10	12/14/2006
ORO	490	10		mg/Kg	10	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212A	QC Batch: E06VS242			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213B	QC Batch: 32115			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB2-0
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 8:55:00 AM
Lab ID:	088420-005A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213E	QC Batch: 32085				PrepDate: 12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	2.9	1.0		mg/Kg	1	12/13/2006
Barium	98	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	60	1.0		mg/Kg	1	12/13/2006
Cobalt	11	1.0		mg/Kg	1	12/13/2006
Copper	26	2.0		mg/Kg	1	12/13/2006
Lead	110	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	66	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	30	1.0		mg/Kg	1	12/13/2006
Zinc	60	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_BACK_061213C	QC Batch: 32131				PrepDate: 12/13/2006	Analyst: **CBR**
DRO	26	10		mg/Kg	10	12/14/2006
ORO	96	10		mg/Kg	10	12/14/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213B	QC Batch: 32115				PrepDate: 12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB2-0.5
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 10:04:00 AM
Lab ID:	088420-006A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213E	QC Batch: 32085			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	3.3	1.0		mg/Kg	1	12/13/2006
Barium	96	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	44	1.0		mg/Kg	1	12/13/2006
Cobalt	14	1.0		mg/Kg	1	12/13/2006
Copper	36	2.0		mg/Kg	1	12/13/2006
Lead	25	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	58	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	34	1.0		mg/Kg	1	12/13/2006
Zinc	59	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_BACK_061213C	QC Batch: 32131			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	14	1.0		mg/Kg	1	12/14/2006
ORO	54	1.0		mg/Kg	1	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212B	QC Batch: E06VS241			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213B	QC Batch: 32115			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB2-1.0
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 10:20:00 AM
Lab ID:	088420-007A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213E	QC Batch: 32085			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	13	1.0		mg/Kg	1	12/13/2006
Barium	80	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	31	1.0		mg/Kg	1	12/13/2006
Cobalt	6.3	1.0		mg/Kg	1	12/13/2006
Copper	22	2.0		mg/Kg	1	12/13/2006
Lead	620	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	30	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	25	1.0		mg/Kg	1	12/13/2006
Zinc	62	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_BACK_061213C	QC Batch: 32131			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	30	1.0		mg/Kg	1	12/14/2006
ORO	75	1.0		mg/Kg	1	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212B	QC Batch: E06VS241			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213B	QC Batch: 32115			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB2-1.5
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 10:34:00 AM
Lab ID:	088420-008A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213E	QC Batch: 32085			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	6.1	1.0		mg/Kg	1	12/13/2006
Barium	58	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	34	1.0		mg/Kg	1	12/13/2006
Cobalt	7.1	1.0		mg/Kg	1	12/13/2006
Copper	12	2.0		mg/Kg	1	12/13/2006
Lead	120	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	34	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	25	1.0		mg/Kg	1	12/13/2006
Zinc	37	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_BACK_061213C	QC Batch: 32131			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	8.9	1.0		mg/Kg	1	12/14/2006
ORO	25	1.0		mg/Kg	1	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061211C	QC Batch: E06VS240			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213B	QC Batch: 32115			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB2-2.5
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 11:21:00 AM
Lab ID:	088420-010A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213E	QC Batch: 32085			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	ND	1.0		mg/Kg	1	12/13/2006
Barium	59	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	35	1.0		mg/Kg	1	12/13/2006
Cobalt	6.9	1.0		mg/Kg	1	12/13/2006
Copper	9.5	2.0		mg/Kg	1	12/13/2006
Lead	9.3	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	36	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	24	1.0		mg/Kg	1	12/13/2006
Zinc	26	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_BACK_061213C	QC Batch: 32131			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	ND	1.0		mg/Kg	1	12/14/2006
ORO	2.8	1.0		mg/Kg	1	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061211C	QC Batch: E06VS240			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213B	QC Batch: 32115			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB3-0
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 8:49:00 AM
Lab ID:	088420-011A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213F	QC Batch: 32086			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	ND	1.0		mg/Kg	1	12/13/2006
Barium	56	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	51	1.0		mg/Kg	1	12/13/2006
Cobalt	9.4	1.0		mg/Kg	1	12/13/2006
Copper	11	2.0		mg/Kg	1	12/13/2006
Lead	6.9	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	47	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	37	1.0		mg/Kg	1	12/13/2006
Zinc	28	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_061213D	QC Batch: 32132			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	4.0	1.0		mg/Kg	1	12/14/2006
ORO	11	1.0		mg/Kg	1	12/14/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213C	QC Batch: 32116			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB3-0.5
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 10:22:00 AM
Lab ID:	088420-012A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213F	QC Batch: 32086			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	1.8	1.0		mg/Kg	1	12/13/2006
Barium	99	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	39	1.0		mg/Kg	1	12/13/2006
Cobalt	9.2	1.0		mg/Kg	1	12/13/2006
Copper	23	2.0		mg/Kg	1	12/13/2006
Lead	14	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	38	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	31	1.0		mg/Kg	1	12/13/2006
Zinc	42	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_061213D	QC Batch: 32132			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	5.6	1.0		mg/Kg	1	12/14/2006
ORO	14	1.0		mg/Kg	1	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212B	QC Batch: E06VS241			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213C	QC Batch: 32116			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	0.12	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB3-1.0
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 10:42:00 AM
Lab ID:	088420-013A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213F	QC Batch: 32086			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	ND	1.0		mg/Kg	1	12/13/2006
Barium	48	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	50	1.0		mg/Kg	1	12/13/2006
Cobalt	8.3	1.0		mg/Kg	1	12/13/2006
Copper	9.7	2.0		mg/Kg	1	12/13/2006
Lead	3.0	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	40	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	36	1.0		mg/Kg	1	12/13/2006
Zinc	21	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_061213D	QC Batch: 32132			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	ND	1.0		mg/Kg	1	12/13/2006
ORO	1.2	1.0		mg/Kg	1	12/13/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212A	QC Batch: E06VS242			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213C	QC Batch: 32116			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB3-1.5
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 10:57:00 AM
Lab ID:	088420-014A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213F	QC Batch: 32086			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	ND	1.0		mg/Kg	1	12/13/2006
Barium	51	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	53	1.0		mg/Kg	1	12/13/2006
Cobalt	8.9	1.0		mg/Kg	1	12/13/2006
Copper	10	2.0		mg/Kg	1	12/13/2006
Lead	2.7	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	39	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	40	1.0		mg/Kg	1	12/13/2006
Zinc	22	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_061213D	QC Batch: 32132			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	ND	1.0		mg/Kg	1	12/13/2006
ORO	ND	1.0		mg/Kg	1	12/13/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212B	QC Batch: E06VS241			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213C	QC Batch: 32116			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB3-2.0
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 11:35:00 AM
Lab ID:	088420-015A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213F	QC Batch: 32086			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	ND	1.0		mg/Kg	1	12/13/2006
Barium	69	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	44	1.0		mg/Kg	1	12/13/2006
Cobalt	7.7	1.0		mg/Kg	1	12/13/2006
Copper	10	2.0		mg/Kg	1	12/13/2006
Lead	23	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	30	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	32	1.0		mg/Kg	1	12/13/2006
Zinc	31	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_061213D	QC Batch: 32132			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	1.1	1.0		mg/Kg	1	12/14/2006
ORO	3.2	1.0		mg/Kg	1	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212B	QC Batch: E06VS241			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213C	QC Batch: 32116			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB3-2.5
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 11:38:00 AM
Lab ID:	088420-016A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213F	QC Batch: 32086			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	1.4	0.99		mg/Kg	1	12/13/2006
Barium	78	0.99		mg/Kg	1	12/13/2006
Beryllium	ND	0.99		mg/Kg	1	12/13/2006
Cadmium	ND	0.99		mg/Kg	1	12/13/2006
Chromium	51	0.99		mg/Kg	1	12/13/2006
Cobalt	9.3	0.99		mg/Kg	1	12/13/2006
Copper	15	2.0		mg/Kg	1	12/13/2006
Lead	11	0.99		mg/Kg	1	12/13/2006
Molybdenum	ND	0.99		mg/Kg	1	12/13/2006
Nickel	35	0.99		mg/Kg	1	12/13/2006
Selenium	ND	0.99		mg/Kg	1	12/13/2006
Silver	ND	0.99		mg/Kg	1	12/13/2006
Thallium	ND	0.99		mg/Kg	1	12/13/2006
Vanadium	40	0.99		mg/Kg	1	12/13/2006
Zinc	32	0.99		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_061213D	QC Batch: 32132			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	1.5	1.0		mg/Kg	1	12/14/2006
ORO	4.4	1.0		mg/Kg	1	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212B	QC Batch: E06VS241			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213C	QC Batch: 32116			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB4-0
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 8:38:00 AM
Lab ID:	088420-017A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213F	QC Batch: 32086			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	ND	1.0		mg/Kg	1	12/13/2006
Barium	86	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	23	1.0		mg/Kg	1	12/13/2006
Cobalt	6.1	1.0		mg/Kg	1	12/13/2006
Copper	13	2.0		mg/Kg	1	12/13/2006
Lead	16	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	26	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	34	1.0		mg/Kg	1	12/13/2006
Zinc	34	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_061213D	QC Batch: 32132			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	640	40		mg/Kg	20	12/14/2006
ORO	2400	40		mg/Kg	20	12/14/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213C	QC Batch: 32116			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB4-0.5
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 9:00:00 AM
Lab ID:	088420-018A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213F	QC Batch: 32086			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	2.0	1.0		mg/Kg	1	12/13/2006
Barium	96	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	24	1.0		mg/Kg	1	12/13/2006
Cobalt	5.8	1.0		mg/Kg	1	12/13/2006
Copper	22	2.0		mg/Kg	1	12/13/2006
Lead	9.0	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	26	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	29	1.0		mg/Kg	1	12/13/2006
Zinc	35	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_061213D	QC Batch: 32132			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	350	20		mg/Kg	20	12/14/2006
ORO	1300	20		mg/Kg	20	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061211B	QC Batch: E06VS239			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213C	QC Batch: 32116			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB4-1.0
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 9:36:00 AM
Lab ID:	088420-019A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213F	QC Batch: 32086			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	1.4	1.0		mg/Kg	1	12/13/2006
Barium	73	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	36	1.0		mg/Kg	1	12/13/2006
Cobalt	9.2	1.0		mg/Kg	1	12/13/2006
Copper	9.3	2.0		mg/Kg	1	12/13/2006
Lead	3.7	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	35	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	26	1.0		mg/Kg	1	12/13/2006
Zinc	22	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_061213D	QC Batch: 32132			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	15	1.0		mg/Kg	1	12/14/2006
ORO	26	1.0		mg/Kg	1	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061211C	QC Batch: E06VS240			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213C	QC Batch: 32116			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB4-1.5
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 9:55:00 AM
Lab ID:	088420-020A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP6_061213F	QC Batch: 32086			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/13/2006
Arsenic	1.1	1.0		mg/Kg	1	12/13/2006
Barium	57	1.0		mg/Kg	1	12/13/2006
Beryllium	ND	1.0		mg/Kg	1	12/13/2006
Cadmium	ND	1.0		mg/Kg	1	12/13/2006
Chromium	34	1.0		mg/Kg	1	12/13/2006
Cobalt	7.7	1.0		mg/Kg	1	12/13/2006
Copper	8.9	2.0		mg/Kg	1	12/13/2006
Lead	3.6	1.0		mg/Kg	1	12/13/2006
Molybdenum	ND	1.0		mg/Kg	1	12/13/2006
Nickel	36	1.0		mg/Kg	1	12/13/2006
Selenium	ND	1.0		mg/Kg	1	12/13/2006
Silver	ND	1.0		mg/Kg	1	12/13/2006
Thallium	ND	1.0		mg/Kg	1	12/13/2006
Vanadium	25	1.0		mg/Kg	1	12/13/2006
Zinc	23	1.0		mg/Kg	1	12/13/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_061213D	QC Batch: 32132			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	21	1.0		mg/Kg	1	12/14/2006
ORO	48	1.0		mg/Kg	1	12/14/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212B	QC Batch: E06VS241			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/12/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213C	QC Batch: 32116			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DB4-2.0
Lab Order:	088420	**Tag Number:**	
Project:	CALTRANS - YBI DUCT BANK, E8220-06	**Collection Date:**	12/7/2006 10:06:00 AM
Lab ID:	088420-021A	**Matrix:**	SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP5_061215A	QC Batch: 32087			PrepDate:	12/12/2006	Analyst: **RQ**
Antimony	ND	2.0		mg/Kg	1	12/15/2006
Arsenic	1.3	1.0		mg/Kg	1	12/15/2006
Barium	72	1.0		mg/Kg	1	12/15/2006
Beryllium	ND	1.0		mg/Kg	1	12/15/2006
Cadmium	ND	1.0		mg/Kg	1	12/15/2006
Chromium	32	1.0		mg/Kg	1	12/15/2006
Cobalt	6.8	1.0		mg/Kg	1	12/15/2006
Copper	7.4	2.0		mg/Kg	1	12/15/2006
Lead	6.9	1.0		mg/Kg	1	12/15/2006
Molybdenum	ND	1.0		mg/Kg	1	12/15/2006
Nickel	30	1.0		mg/Kg	1	12/15/2006
Selenium	ND	1.0		mg/Kg	1	12/15/2006
Silver	ND	1.0		mg/Kg	1	12/15/2006
Thallium	ND	1.0		mg/Kg	1	12/15/2006
Vanadium	24	1.0		mg/Kg	1	12/15/2006
Zinc	24	1.0		mg/Kg	1	12/15/2006
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC7_061213C	QC Batch: 32114			PrepDate:	12/13/2006	Analyst: **CBR**
DRO	27	1.0		mg/Kg	1	12/13/2006
ORO	54	1.0		mg/Kg	1	12/13/2006
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_061212A	QC Batch: E06VS242			PrepDate:		Analyst: **ML**
GRO	ND	1.0		mg/Kg	1	12/13/2006
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA5_061213D	QC Batch: 32117			PrepDate:	12/13/2006	Analyst: **EKS**
Mercury	ND	0.10		mg/Kg	1	12/13/2006

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories

Date: *20-Dec-06*

CLIENT: Geocon Consultants, Inc.
Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-32085** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71474**
Client ID: **PBS** Batch ID: **32085** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/13/2006** SeqNo: **1069701**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	ND	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID: **LCS-32085** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71474**
Client ID: **LCSS** Batch ID: **32085** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/13/2006** SeqNo: **1069702**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	51.462	2.0	50.00	0	103	80	120				
Arsenic	49.123	1.0	50.00	0	98.2	80	120				
Barium	51.816	1.0	50.00	0	104	80	120				
Beryllium	48.505	1.0	50.00	0	97.0	80	120				
Cadmium	50.101	1.0	50.00	0	100	80	120				
Chromium	50.721	1.0	50.00	0	101	80	120				
Cobalt	48.459	1.0	50.00	0	96.9	80	120				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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CLIENT: Geocon Consultants, Inc.
Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-32085** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71474**
Client ID: **LCSS** Batch ID: **32085** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/13/2006** SeqNo: **1069702**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Copper	52.215	2.0	50.00	0	104	80	120				
Lead	50.594	1.0	50.00	0	101	80	120				
Molybdenum	50.854	1.0	50.00	0	102	80	120				
Nickel	49.021	1.0	50.00	0	98.0	80	120				
Selenium	47.001	1.0	50.00	0	94.0	80	120				
Silver	50.044	1.0	50.00	0	100	80	120				
Thallium	49.637	1.0	50.00	0	99.3	80	120				
Vanadium	50.599	1.0	50.00	0	101	80	120				
Zinc	49.153	1.0	50.00	0	98.3	80	120				

Sample ID: **088420-010ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71474**
Client ID: **DB2-2.5** Batch ID: **32085** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/13/2006** SeqNo: **1069713**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0						0.8495	0	20	
Arsenic	0.853	1.0						0.4427	0	20	
Barium	55.862	1.0						59.44	6.20	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.087	1.0						0.07732	0	20	
Chromium	33.370	1.0						34.76	4.07	20	
Cobalt	6.791	1.0						6.906	1.68	20	
Copper	9.004	2.0						9.500	5.36	20	
Lead	8.216	1.0						9.272	12.1	20	
Molybdenum	ND	1.0						0	0	20	
Nickel	35.425	1.0						35.82	1.11	20	
Selenium	ND	1.0						0	0	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	23.702	1.0						24.35	2.72	20	
Zinc	25.176	1.0						26.26	4.21	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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CLIENT: Geocon Consultants, Inc.
Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **088420-010AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71474**
Client ID: **DB2-2.5** Batch ID: **32085** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/13/2006** SeqNo: **1069714**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	93.557	2.0	125.0	0.8495	74.2	24	110				
Arsenic	105.967	1.0	125.0	0.4427	84.4	61	104				
Barium	166.300	1.0	125.0	59.44	85.5	35	135				
Beryllium	106.723	1.0	125.0	0	85.4	64	104				
Cadmium	109.493	1.0	125.0	0.07732	87.5	65	106				
Chromium	142.714	1.0	125.0	34.76	86.4	47	122				
Cobalt	115.121	1.0	125.0	6.906	86.6	55	111				
Copper	132.003	2.0	125.0	9.500	98.0	52	132				
Lead	116.623	1.0	125.0	9.272	85.9	37	128				
Molybdenum	108.485	1.0	125.0	0	86.8	58	108				
Nickel	144.570	1.0	125.0	35.82	87.0	48	120				
Selenium	97.266	1.0	125.0	0	77.8	57	105				
Silver	113.285	1.0	125.0	0	90.6	44	116				
Thallium	103.002	1.0	125.0	0	82.4	55	103				
Vanadium	137.692	1.0	125.0	24.35	90.7	57	116				
Zinc	131.894	1.0	125.0	26.26	84.5	41	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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CLIENT: Geocon Consultants, Inc.
Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-32086** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71475**
Client ID: **PBS** Batch ID: **32086** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/13/2006** SeqNo: **1069716**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	0.031	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	ND	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID: **LCS-32086** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71475**
Client ID: **LCSS** Batch ID: **32086** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/13/2006** SeqNo: **1069717**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	50.174	2.0	50.00	0	100	80	120				
Arsenic	48.015	1.0	50.00	0	96.0	80	120				
Barium	51.092	1.0	50.00	0	102	80	120				
Beryllium	47.666	1.0	50.00	0	95.3	80	120				
Cadmium	49.401	1.0	50.00	0.03081	98.7	80	120				
Chromium	49.720	1.0	50.00	0	99.4	80	120				
Cobalt	47.457	1.0	50.00	0	94.9	80	120				
Copper	51.349	2.0	50.00	0	103	80	120				
Lead	49.951	1.0	50.00	0	99.9	80	120				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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CLIENT: Geocon Consultants, Inc.
Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-32086** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71475**
Client ID: **LCSS** Batch ID: **32086** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/13/2006** SeqNo: **1069717**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	49.801	1.0	50.00	0	99.6	80	120				
Nickel	48.032	1.0	50.00	0	96.1	80	120				
Selenium	45.673	1.0	50.00	0	91.3	80	120				
Silver	49.317	1.0	50.00	0	98.6	80	120				
Thallium	48.612	1.0	50.00	0	97.2	80	120				
Vanadium	49.533	1.0	50.00	0	99.1	80	120				
Zinc	48.043	1.0	50.00	0	96.1	80	120				

Sample ID: **088420-020ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71475**
Client ID: **DB4-1.5** Batch ID: **32086** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/13/2006** SeqNo: **1069728**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0						0	0	20	
Arsenic	1.086	1.0						1.131	4.12	20	
Barium	55.581	1.0						56.93	2.39	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.076	1.0						0.04903	0	20	
Chromium	33.581	1.0						34.20	1.82	20	
Cobalt	7.004	1.0						7.710	9.60	20	
Copper	8.195	2.0						8.861	7.81	20	
Lead	3.442	1.0						3.575	3.79	20	
Molybdenum	0.111	1.0						0.1365	0	20	
Nickel	33.515	1.0						35.61	6.05	20	
Selenium	ND	1.0						0	0	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	23.399	1.0						24.60	4.99	20	
Zinc	20.950	1.0						22.54	7.33	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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CLIENT: Geocon Consultants, Inc.
Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **088420-020AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71475**
Client ID: **DB4-1.5** Batch ID: **32086** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/13/2006** SeqNo: **1069729**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	87.363	2.0	125.0	0	69.9	24	110				
Arsenic	103.220	1.0	125.0	1.131	81.7	61	104				
Barium	162.662	1.0	125.0	56.93	84.6	35	135				
Beryllium	104.437	1.0	125.0	0	83.5	64	104				
Cadmium	106.995	1.0	125.0	0.04903	85.6	65	106				
Chromium	141.604	1.0	125.0	34.20	85.9	47	122				
Cobalt	113.036	1.0	125.0	7.710	84.3	55	111				
Copper	128.774	2.0	125.0	8.861	95.9	52	132				
Lead	108.319	1.0	125.0	3.575	83.8	37	128				
Molybdenum	105.148	1.0	125.0	0.1365	84.0	58	108				
Nickel	140.538	1.0	125.0	35.61	83.9	48	120				
Selenium	94.018	1.0	125.0	0	75.2	57	105				
Silver	96.463	1.0	125.0	0	77.2	44	116				
Thallium	100.336	1.0	125.0	0	80.3	55	103				
Vanadium	134.387	1.0	125.0	24.60	87.8	57	116				
Zinc	124.302	1.0	125.0	22.54	81.4	41	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-32087** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71602**
Client ID: **PBS** Batch ID: **32087** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/15/2006** SeqNo: **1071797**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	0.086	1.0									
Copper	ND	2.0									
Lead	ND	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID: **LCS-32087** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71602**
Client ID: **LCSS** Batch ID: **32087** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/15/2006** SeqNo: **1071798**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	49.157	2.0	50.00	0	98.3	80	120				
Arsenic	47.007	1.0	50.00	0	94.0	80	120				
Barium	48.974	1.0	50.00	0	97.9	80	120				
Beryllium	46.078	1.0	50.00	0	92.2	80	120				
Cadmium	47.293	1.0	50.00	0	94.6	80	120				
Chromium	49.882	1.0	50.00	0	99.8	80	120				
Cobalt	45.345	1.0	50.00	0.08559	90.5	80	120				
Copper	48.706	2.0	50.00	0	97.4	80	120				
Lead	46.891	1.0	50.00	0	93.8	80	120				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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CLIENT: Geocon Consultants, Inc.
Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-32087** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71602**
Client ID: **LCSS** Batch ID: **32087** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/15/2006** SeqNo: **1071798**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	48.230	1.0	50.00	0	96.5	80	120				
Nickel	46.329	1.0	50.00	0	92.7	80	120				
Selenium	45.152	1.0	50.00	0	90.3	80	120				
Silver	51.010	1.0	50.00	0	102	80	120				
Thallium	46.326	1.0	50.00	0	92.7	80	120				
Vanadium	48.280	1.0	50.00	0	96.6	80	120				
Zinc	46.030	1.0	50.00	0	92.1	80	120				

Sample ID: **088437-023ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71602**
Client ID: **ZZZZZZ** Batch ID: **32087** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/15/2006** SeqNo: **1071805**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	2.884	1.0						3.078	6.51	20	

Sample ID: **088437-023AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71602**
Client ID: **ZZZZZZ** Batch ID: **32087** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/15/2006** SeqNo: **1071806**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	64.383	2.0	125.0	0	51.5	24	110				
Arsenic	97.584	1.0	125.0	3.078	75.6	61	104				
Barium	193.080	1.0	125.0	103.4	71.8	35	135				
Beryllium	94.226	1.0	125.0	0.1074	75.3	64	104				
Cadmium	92.842	1.0	125.0	0.8376	73.6	65	106				
Chromium	106.214	1.0	125.0	11.16	76.0	47	122				
Cobalt	97.220	1.0	125.0	4.589	74.1	55	111				
Copper	106.284	2.0	125.0	8.075	78.6	52	132				
Lead	95.944	1.0	125.0	5.410	72.4	37	128				
Molybdenum	94.019	1.0	125.0	0	75.2	58	108				
Nickel	99.217	1.0	125.0	7.634	73.3	48	120				
Selenium	91.157	1.0	125.0	0	72.9	57	105				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **088437-023AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/12/2006** RunNo: **71602**
Client ID: **ZZZZZZ** Batch ID: **32087** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/15/2006** SeqNo: **1071806**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	88.374	1.0	125.0	0	70.7	44	116				
Thallium	80.028	1.0	125.0	0	64.0	55	103				
Vanadium	131.802	1.0	125.0	28.98	82.3	57	116				
Zinc	133.808	1.0	125.0	43.78	72.0	41	120				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **088420-010A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71459**
Client ID: **DB2-2.5** Batch ID: **32115** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069525**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10						0	0	20	

Sample ID: **088420-010A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71459**
Client ID: **DB2-2.5** Batch ID: **32115** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069526**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.082	0.10	0.8300	0	130	67	160				

Sample ID: **LCS-32115** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71459**
Client ID: **LCSS** Batch ID: **32115** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069528**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.829	0.10	0.8300	0	99.9	80	120				

Sample ID: **MB-32115** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71459**
Client ID: **PBS** Batch ID: **32115** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069529**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **088420-020A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71460**
Client ID: **DB4-1.5** Batch ID: **32116** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069540**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10						0	0	20	

Sample ID: **088420-020A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71460**
Client ID: **DB4-1.5** Batch ID: **32116** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069541**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.043	0.10	0.8300	0	126	67	160				

Sample ID: **LCS-32116** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71460**
Client ID: **LCSS** Batch ID: **32116** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069543**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.934	0.10	0.8300	0	112	80	120				

Sample ID: **MB-32116** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71460**
Client ID: **PBS** Batch ID: **32116** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069544**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **088420-021A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71461**
Client ID: **DB4-2.0** Batch ID: **32117** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069546**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.607	0.10						0.04387	173	20	R

Sample ID: **088420-021A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71461**
Client ID: **DB4-2.0** Batch ID: **32117** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069547**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.032	0.10	0.8300	0.04387	119	67	160				

Sample ID: **LCS-32117** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71461**
Client ID: **LCSS** Batch ID: **32117** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069555**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.785	0.10	0.8300	0	94.6	80	120				

Sample ID: **MB-32117** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71461**
Client ID: **PBS** Batch ID: **32117** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **12/13/2006** SeqNo: **1069556**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_DM LL

Sample ID: **MB-32114** SampType: **MBLK** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71584**
Client ID: **PBS** Batch ID: **32114** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/13/2006** SeqNo: **1071442**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	ND	1.0									
ORO	ND	1.0									

Sample ID: **LCS-32114** SampType: **LCS** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71584**
Client ID: **LCSS** Batch ID: **32114** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/13/2006** SeqNo: **1071443**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	17.287	1.0	33.00	0	52.4	38	112				

Sample ID: **088415-026AMS** SampType: **MS** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71584**
Client ID: **ZZZZZZ** Batch ID: **32114** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/13/2006** SeqNo: **1071444**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	1.459	1.0	33.00	1.372	0.266	25	109				S

Sample ID: **088415-026ADUP** SampType: **DUP** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71584**
Client ID: **ZZZZZZ** Batch ID: **32114** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/13/2006** SeqNo: **1071446**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	ND	1.0						1.372	0	30	
ORO	ND	1.0						3.714	0	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_DM LL

Sample ID: **MB-32131** SampType: **MBLK** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71672**
Client ID: **PBS** Batch ID: **32131** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/14/2006** SeqNo: **1072824**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	ND	1.0									
ORO	ND	1.0									

Sample ID: **LCS-32131** SampType: **LCS** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71672**
Client ID: **LCSS** Batch ID: **32131** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/14/2006** SeqNo: **1072825**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	18.576	1.0	33.00	0	56.3	38	112				

Sample ID: **088420-003AMS** SampType: **MS** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71672**
Client ID: **DB1-1.0** Batch ID: **32131** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/14/2006** SeqNo: **1072826**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	18.695	1.0	33.00	1.088	53.4	25	109				

Sample ID: **088420-003ADUP** SampType: **DUP** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71672**
Client ID: **DB1-1.0** Batch ID: **32131** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/14/2006** SeqNo: **1072828**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	1.277	1.0						1.088	16.0	30	
ORO	4.642	1.0						3.412	30.5	30	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_DM LL

Sample ID: **MB-32132** SampType: **MBLK** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71590**
Client ID: **PBS** Batch ID: **32132** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/13/2006** SeqNo: **1071542**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	ND	1.0									
ORO	ND	1.0									

Sample ID: **LCS-32132** SampType: **LCS** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71590**
Client ID: **LCSS** Batch ID: **32132** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/13/2006** SeqNo: **1071543**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	15.936	1.0	33.00	0	48.3	38	112				

Sample ID: **088420-012AMS** SampType: **MS** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71590**
Client ID: **DB3-0.5** Batch ID: **32132** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/13/2006** SeqNo: **1071544**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	20.576	1.0	33.00	5.565	45.5	25	109				

Sample ID: **088420-012ADUP** SampType: **DUP** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **12/13/2006** RunNo: **71590**
Client ID: **DB3-0.5** Batch ID: **32132** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **12/13/2006** SeqNo: **1071546**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	3.570	1.0						5.565	43.7	30	R
ORO	8.961	1.0						13.91	43.3	30	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **E121106MB2** SampType: **MBLK** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71408**
Client ID: **PBS** Batch ID: **E06VS239** TestNo: **EPA 8015B(M** Analysis Date: **12/11/2006** SeqNo: **1068501**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0									

Sample ID: **088420-004AMS** SampType: **MS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71408**
Client ID: **DB1-1.5** Batch ID: **E06VS239** TestNo: **EPA 8015B(M** Analysis Date: **12/11/2006** SeqNo: **1068503**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	3.017	1.0	5.000	0	60.3	34	150				

Sample ID: **E121106LCS3** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71408**
Client ID: **LCSS** Batch ID: **E06VS239** TestNo: **EPA 8015B(M** Analysis Date: **12/12/2006** SeqNo: **1068515**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	5.011	1.0	5.000	0	100	74	113				

Sample ID: **088420-018A** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71408**
Client ID: **DB4-0.5** Batch ID: **E06VS239** TestNo: **EPA 8015B(M** Analysis Date: **12/12/2006** SeqNo: **1069184**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	0.222	1.0						0.2200	0	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **E121106MB3** SampType: **MBLK** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71410**
Client ID: **PBS** Batch ID: **E06VS240** TestNo: **EPA 8015B(M** Analysis Date: **12/12/2006** SeqNo: **1068530**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0									

Sample ID: **088420-010AMS** SampType: **MS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71410**
Client ID: **DB2-2.5** Batch ID: **E06VS240** TestNo: **EPA 8015B(M** Analysis Date: **12/12/2006** SeqNo: **1068532**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.679	1.0	5.000	0.2560	88.5	34	150				

Sample ID: **E121106LCS5** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71410**
Client ID: **LCSS** Batch ID: **E06VS240** TestNo: **EPA 8015B(M** Analysis Date: **12/12/2006** SeqNo: **1068535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.850	1.0	5.000	0	97.0	74	113				

Sample ID: **088420-019A** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71410**
Client ID: **DB4-1.0** Batch ID: **E06VS240** TestNo: **EPA 8015B(M** Analysis Date: **12/12/2006** SeqNo: **1069243**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	0.230	1.0						0.2480	0	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **E121206MB1** SampType: **MBLK** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71453**
Client ID: **PBS** Batch ID: **E06VS241** TestNo: **EPA 8015B(M** Analysis Date: **12/12/2006** SeqNo: **1069344**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0									

Sample ID: **088420-020AMS** SampType: **MS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71453**
Client ID: **DB4-1.5** Batch ID: **E06VS241** TestNo: **EPA 8015B(M** Analysis Date: **12/12/2006** SeqNo: **1069346**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.397	1.0	5.000	0.2140	83.7	34	150				

Sample ID: **088420-009A** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71453**
Client ID: **DB2-2.0** Batch ID: **E06VS241** TestNo: **EPA 8015B(M** Analysis Date: **12/12/2006** SeqNo: **1069358**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	0.209	1.0						0.2110	0	30	

Sample ID: **E121206LCS1** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71453**
Client ID: **LCSS** Batch ID: **E06VS241** TestNo: **EPA 8015B(M** Analysis Date: **12/12/2006** SeqNo: **1069363**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.821	1.0	5.000	0	96.4	74	113				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT: Geocon Consultants, Inc.
Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **E121206MB2** SampType: **MBLK** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71431**
Client ID: **PBS** Batch ID: **E06VS242** TestNo: **EPA 8015B(M** Analysis Date: **12/12/2006** SeqNo: **1068885**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0									

Sample ID: **088465-005DMS** SampType: **MS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71431**
Client ID: **ZZZZZZ** Batch ID: **E06VS242** TestNo: **EPA 8015B(M** Analysis Date: **12/13/2006** SeqNo: **1068887**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	3.926	1.0	5.000	0.2100	74.3	34	150				

Sample ID: **E121206LCS3** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71431**
Client ID: **LCSS** Batch ID: **E06VS242** TestNo: **EPA 8015B(M** Analysis Date: **12/13/2006** SeqNo: **1068892**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	5.000	1.0	5.000	0	100	74	113				

Sample ID: **088420-013A** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **71431**
Client ID: **DB3-1.0** Batch ID: **E06VS242** TestNo: **EPA 8015B(M** Analysis Date: **12/13/2006** SeqNo: **1069333**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	0.216	1.0						0.2360	0	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#:

Logged By: W Date: 12/8/06

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: UPS

Sample Condition Upon Receipt:
1. CHILLED 11°C Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON
Attn: RICK DAY / CHRIS MERRITT
Address: 2356 RESEARCH DR
City LIVERMORE State CA Zip Code 94550
TEL: (925) 371-5900
FAX: ( ) 5915

Project Name: CALTRANS - YBI DUCT BANK Project #: E8220-06-68
Sampler: (Printed Name) D. WATTS / C. MERRITT (Signature) CM (FOR)

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
CHRIS MERRITT	12-7-06	UPS 1500	[illegible]	12/8/06	9:50

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: CM 12-7-06
Print Name Date
CM
Signature

Send Report To: Attn: A/A 1 Co: Address City State Zip

Bill To: Attn: A/A 1 Co: Address City State Zip

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal), 8015B (GRO) & 8020 (BTEX), 8015B (DRO) & MO, 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

Q A / Q C: RTNE ☐ CT ☑ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) & 8020 (BTEX)	8015B (DRO) & MO	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	DB 420 - 1	DB1-0	12-7-06	0903						X		X				X			E	1	TM	
	2	DB1-0.5		0916					X													
	3	DB1-1.0		0922					X													
	4	DB1-1.5		0947					X													
	5	DB2-0		0855																		
	6	DB2-0.5		1004					X													
	7	DB2-1.0		1020					X													
	8	DB2-1.5		1031					X													
	9	DB2-2.0		1104					X													
	10	DB2-2.5		1121					X													

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA Overn ☐ FEDEX ☐ Other: UPS

Sample Condition Upon Receipt: 1. CHILLED 11.8 Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 4. SEALED Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON
Attn: RICK DAY / CHRIS MERRITT
Address: SEE PAGE 1 ← →
City ~~State~~ Zip Code
TEL: ( )
FAX: ( )

Project Name: CALTRANS - YBI DUCTBANK Project #: E8220-06-68 Sampler: (Printed Name) D. WATTS / C. MERRITT (Signature) CM (FOR)

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
CHRIS MERRITT	12-7-06	1300	Mary	12/8/06	9:50

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: CM (Print Name) 12-7-06 (Date) CM (Signature)

Send Report To: Attn: _____ Co: SEE P1 Address _____ City _____ State _____ Zip _____

Bill To: Attn: _____ Co: SEE P1 Address _____ City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

QA/QC: RTNE ☐ CT ☑ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO)	8015B (DRO) PHC	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	08420 - 11	DB3-0	12-7-06	0849						X		X		X				E	1	T M		
	- 12	DB3-0.5		1022					X													
	- 13	DB3-1.0		1042					X													
	- 14	DB3-1.5		1057					X													
	- 15	DB3-2.0		1135					X													
	- 16	DB3-2.5		1138					X													
	- 17	DB4-0		0838																		
	- 18	DB4-0.5		0900					X													
	- 19	DB4-1.0		0936					X													
	- 20	DB4-1.5		0955					X													

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: UPS

Sample Condition Upon Receipt:
1. CHILLED 11.8 Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON
Attn: RICK DAY / CHRIS MERRITT
Address: SEE PAGE 1
City / State / Zip Code
TEL: ( )
FAX: ( )

Project Name: CALTRANS VBI DUCT BANK Project #: E8220-06-68 Sampler: (Printed Name) D. WATTS / C. MERRITT (Signature) CM (FOR)

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
CHRIS MERRITT	12-7-06	1PM 1500	Marg	12/8/06	9:30

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: CM 12-7-06 (Print Name / Date)
Signature: CM

Send Report To: Attn: _____ Co: SEE P1 Address _____ City _____ State _____ Zip _____

Bill To: Attn: _____ Co: SEE P1 Address _____ City _____ State _____ Zip _____

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX) + MO	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Type	PRESERVATION	REMARKS
	188420-21	DB4-2.0	12-7-06	1006					X	X		X		X				E	1	T M		

Q A / Q C: RTNE ☐ CT ☑ SWRCB ☐ Logcode ____ OTHER ____

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

January 15, 2007

Rick Day
Geocon Consultants, Inc.
2356 Research Drive
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

RECEIVED
JAN 18 2007
By

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 088420

RE: CALTRANS - YBI DUCT BANK, E8220-06-6

Attention: Rick Day

Enclosed are the results for sample(s) received on December 08, 2006 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT: Geocon Consultants, Inc.
Project: CALTRANS - YBI DUCT BANK, E8220-06-68
Lab Order: 088420

CASE NARRATIVE

Analytical Comments for Method 6010

Dilution was necessary for samples 088420-001A, 088420-002A, 088420-004A, 088420-005A, 088420-007A and 088420-008A, due to sample matrix.

Matrix Spike (MS) is outside recovery criteria for samples 088420-004AMS and 088420-008AMS; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

Date: *15-Jan-07*

CLIENT: Geocon Consultants, Inc. **Lab Order:** 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-68

Lab ID: 088420-001 **Collection Date:** 12/7/2006 9:03:00 AM
Client Sample ID: DB1-0 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC						
			WET/ EPA 6010B			
RunID: ICP5_070111D	QC Batch: R72839			PrepDate:		Analyst: **RQ**
Lead	23	1.0		mg/L	20	1/11/2007

Lab ID: 088420-002 **Collection Date:** 12/7/2006 9:16:00 AM
Client Sample ID: DB1-0.5 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC						
			WET/ EPA 6010B			
RunID: ICP5_070111D	QC Batch: R72839			PrepDate:		Analyst: **RQ**
Lead	20	1.0		mg/L	20	1/11/2007

Lab ID: 088420-004 **Collection Date:** 12/7/2006 9:47:00 AM
Client Sample ID: DB1-1.5 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC						
			WET/ EPA 6010B			
RunID: ICP5_070112E	QC Batch: R72896			PrepDate:		Analyst: **RQ**
Lead	29	1.0		mg/L	20	1/12/2007

Lab ID: 088420-005 **Collection Date:** 12/7/2006 8:55:00 AM
Client Sample ID: DB2-0 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC						
			WET/ EPA 6010B			
RunID: ICP5_070111D	QC Batch: R72839			PrepDate:		Analyst: **RQ**
Lead	6.3	1.0		mg/L	20	1/11/2007

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

Date: *15-Jan-07*

CLIENT: Geocon Consultants, Inc. **Lab Order:** 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-68

Lab ID: 088420-007 **Collection Date:** 12/7/2006 10:20:00 AM
Client Sample ID: DB2-1.0 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC						
				WET/ EPA 6010B		
RunID: ICP5_070111D	QC Batch: R72839			PrepDate:		Analyst: **RQ**
Lead	41	1.0		mg/L	20	1/11/2007

Lab ID: 088420-008 **Collection Date:** 12/7/2006 10:34:00 AM
Client Sample ID: DB2-1.5 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC						
				WET/ EPA 6010B		
RunID: ICP5_070111D	QC Batch: R72839			PrepDate:		Analyst: **RQ**
Lead	12	1.0		mg/L	20	1/11/2007

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT: Geocon Consultants, Inc.
Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **MB-32661A** SampType: **MBLK** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **72839**
Client ID: **PBS** Batch ID: **R72839** TestNo: **WET/ EPA 60** Analysis Date: **1/11/2007** SeqNo: **1091171**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-32661** SampType: **LCS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **72839**
Client ID: **LCSS** Batch ID: **R72839** TestNo: **WET/ EPA 60** Analysis Date: **1/11/2007** SeqNo: **1091172**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.999	0.050	1.000	0	99.9	85	115				

Sample ID: **088420-008ADUP** SampType: **DUP** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **72839**
Client ID: **DB2-1.5** Batch ID: **R72839** TestNo: **WET/ EPA 60** Analysis Date: **1/11/2007** SeqNo: **1091178**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	12.102	1.0						12.09	0.100	20	

Sample ID: **088420-008AMS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **72839**
Client ID: **DB2-1.5** Batch ID: **R72839** TestNo: **WET/ EPA 60** Analysis Date: **1/11/2007** SeqNo: **1091179**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	13.567	1.0	2.500	12.09	59.1	82	113				S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT: Geocon Consultants, Inc.
Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **MB-32685A** SampType: **MBLK** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **72896**
Client ID: **PBS** Batch ID: **R72896** TestNo: **WET/ EPA 60** Analysis Date: **1/12/2007** SeqNo: **1092152**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-32685** SampType: **LCS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **72896**
Client ID: **LCSS** Batch ID: **R72896** TestNo: **WET/ EPA 60** Analysis Date: **1/12/2007** SeqNo: **1092153**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.986	0.050	1.000	0	98.6	85	115				

Sample ID: **088420-004ADUP** SampType: **DUP** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **72896**
Client ID: **DB1-1.5** Batch ID: **R72896** TestNo: **WET/ EPA 60** Analysis Date: **1/12/2007** SeqNo: **1092155**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	30.072	1.0						29.01	3.59	20	

Sample ID: **088420-004AMS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **72896**
Client ID: **DB1-1.5** Batch ID: **R72896** TestNo: **WET/ EPA 60** Analysis Date: **1/12/2007** SeqNo: **1092156**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	27.477	1.0	2.500	29.01	-61.4	82	113				S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Diane Galvan

From: Chris Merritt [merritt@geoconinc.com]
Sent: Friday, December 29, 2006 10:20 AM
To: Diane Galvan
Subject: WETs, ATL Job 0088420, Geocon Job E8220-06-68 (Caltrans - YBI Duct Bank)

Need to run WET on DB1-0, DB1-0.5, DB1-1.5, DB2-0, DB2-1.0, and DB2-1.5.

Standard TAT at this point.

Thanks!

February 21, 2007

RECEIVED
FEB 26 2007
By

ACCREDITED IN ACCORDANCE WITH nelac

Rick Day
Geocon Consultants, Inc.
2356 Research Drive
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 088420

RE: CALTRANS - YBI DUCT BANK, E8220-06-6

Attention: Rick Day

Enclosed are the results for sample(s) received on December 08, 2006 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *21-Feb-07*

CLIENT: Geocon Consultants, Inc. **Lab Order:** 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-68

Lab ID: 088420-001 **Collection Date:** 12/7/2006 9:03:00 AM
Client Sample ID: DB1-0 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
EPA 3010A			**EPA 1311/ 7420**			
RunID: AA2_070220E	QC Batch: 33624			PrepDate:	2/20/2007	Analyst: **EKS**
Lead	ND	1.2		mg/L	1	2/20/2007 12:00 AM

Lab ID: 088420-002 **Collection Date:** 12/7/2006 9:16:00 AM
Client Sample ID: DB1-0.5 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
EPA 3010A			**EPA 1311/ 7420**			
RunID: AA2_070220E	QC Batch: 33624			PrepDate:	2/20/2007	Analyst: **EKS**
Lead	ND	1.2		mg/L	1	2/20/2007 12:00 AM

Lab ID: 088420-004 **Collection Date:** 12/7/2006 9:47:00 AM
Client Sample ID: DB1-1.5 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
EPA 3010A			**EPA 1311/ 7420**			
RunID: AA2_070220E	QC Batch: 33624			PrepDate:	2/20/2007	Analyst: **EKS**
Lead	ND	1.2		mg/L	1	2/20/2007 12:00 AM

Lab ID: 088420-005 **Collection Date:** 12/7/2006 8:55:00 AM
Client Sample ID: DB2-0 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
EPA 3010A			**EPA 1311/ 7420**			
RunID: AA2_070220E	QC Batch: 33624			PrepDate:	2/20/2007	Analyst: **EKS**
Lead	ND	1.2		mg/L	1	2/20/2007 12:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *21-Feb-07*

CLIENT: Geocon Consultants, Inc. **Lab Order:** 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-68

Lab ID: 088420-007 **Collection Date:** 12/7/2006 10:20:00 AM
Client Sample ID: DB2-1.0 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
EPA 3010A			**EPA 1311/ 7420**			
RunID: AA2_070220E	QC Batch: 33624			PrepDate:	2/20/2007	Analyst: **EKS**
Lead	ND	1.2		mg/L	1	2/20/2007 12:00 AM

Lab ID: 088420-008 **Collection Date:** 12/7/2006 10:34:00 AM
Client Sample ID: DB2-1.5 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
EPA 3010A			**EPA 1311/ 7420**			
RunID: AA2_070220E	QC Batch: 33624			PrepDate:	2/20/2007	Analyst: **EKS**
Lead	ND	1.2		mg/L	1	2/20/2007 12:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *21-Feb-07*

CLIENT: Geocon Consultants, Inc.
Work Order: 088420
Project: CALTRANS - YBI DUCT BANK, E8220-06-6

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_TC

Sample ID: MB-33624	SampType: MBLK	TestCode: 7420_TC	Units: mg/L	Prep Date: 2/20/2007	RunNo: 74838
Client ID: PBS	Batch ID: 33624	TestNo: EPA 1311/ 74	EPA 3010A	Analysis Date: 2/20/2007	SeqNo: 1124246

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: MB-33619A-TCLP	SampType: MBLK	TestCode: 7420_TC	Units: mg/L	Prep Date: 2/20/2007	RunNo: 74838
Client ID: PBS	Batch ID: 33624	TestNo: EPA 1311/ 74	EPA 3010A	Analysis Date: 2/20/2007	SeqNo: 1124247

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.063	0.25									

Sample ID: LCS-33624	SampType: LCS	TestCode: 7420_TC	Units: mg/L	Prep Date: 2/20/2007	RunNo: 74838
Client ID: LCSS	Batch ID: 33624	TestNo: EPA 1311/ 74	EPA 3010A	Analysis Date: 2/20/2007	SeqNo: 1124248

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.126	0.25	1.000	0	113	80	120				

Sample ID: 089429-067A-DUP	SampType: DUP	TestCode: 7420_TC	Units: mg/L	Prep Date: 2/20/2007	RunNo: 74838
Client ID: ZZZZZZ	Batch ID: 33624	TestNo: EPA 1311/ 74	EPA 3010A	Analysis Date: 2/20/2007	SeqNo: 1124259

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.456	1.2						0.4904	0	20	

Sample ID: 089429-067A-MS	SampType: MS	TestCode: 7420_TC	Units: mg/L	Prep Date: 2/20/2007	RunNo: 74838
Client ID: ZZZZZZ	Batch ID: 33624	TestNo: EPA 1311/ 74	EPA 3010A	Analysis Date: 2/20/2007	SeqNo: 1124260

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	13.831	1.2	12.50	0.4904	107	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Diane Galvan

From: Chris Giuntoli [giuntoli@geoconinc.com]
Sent: Thursday, February 15, 2007 2:09 PM
To: Diane Galvan
Subject: TCLPs for Workorder 088420

Hi Diane,

Per our conversation, for Workorder No. 088420 please run TCLPs for the six samples with WET lead results over 5 mg/l on a 48-hour TAT.

Thanks,

Chris

****
Chris Giuntoli, CAC, REA
Geocon Consultants, Inc.
2356 Research Drive
Livermore, California 94550
925-371-5900, ext. 205 (office)
925-371-5915 (fax)
925-525-4204 (mobile)
****

GEOPHYSICAL INVESTIGATION

Oakland – San Francisco Bay Bridge
Yerba Buena Island, California

GEO*Vision* Report No. 6488-01

Prepared for

Earth Mechanics, Inc.
17660 Newhope Street
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Fountain Valley, CA 92708

Prepared by

GEO*Vision* Geophysical Services
1151 Pomona Rd, Suite P
Corona, CA 92882
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November 2, 2006

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APPENDIX A GEOPHYSICAL TECHNIQUES FOR SHALLOW ENVIRONMENTAL INVESTIGATIONS

1 INTRODUCTION

A geophysical investigation was conducted from October 9-14, 2006 on Yerba Buena Island under the Oakland Bay Bridge between Oakland and San Francisco, California. The purpose of the investigation was to screen the accessible portions of the site for locatable underground utilities, reinforced concrete piles, and other buried infrastructure.

The geophysical survey was conducted in ten small areas of various dimensions and as well as a narrow alignment for a proposed utility duct. The locations and dimensions of the geophysical survey areas are shown in Figure 1. Surface metallic features that interfered with the geophysical survey included parked vehicles, construction equipment and related infrastructure, utility vaults, street lamps, and reinforced concrete.

Geophysical techniques used during this investigation included electromagnetic (EM), and ground penetrating radar (GPR) methods. EM equipment consisted of a Geonics EM-61 digital metal detector as well as various EM utility locators. GPR equipment consisted of a GSSI SIR-3000 with a 400 MHz antenna.

Geophysical techniques used during the investigation are discussed in Section 2. Field procedures are described in Section 3. Data processing is discussed in Section 4. Interpretation of data is provided in Section 5. A summary of geophysical survey is presented in Section 6, and our professional certification is presented in Section 7.

2 GEOPHYSICAL TECHNIQUES

This section presents background information on the EM and GPR methods used during this investigation. A description of the geophysical methods used during this investigation, common applications of the methods, photographs of the instruments, and example applications are included in Appendix A.

EM equipment used during this investigation consisted of a Geonics EM-61 digital metal detector and several EM utility locators. The EM-61 is a high-resolution, deep sensing, time domain EM metal detector. The EM-61 has a single transmitter and two receiver coils. The bottom coil is the transmitter during the current on-time and receiver during current off-time. The top-coil, mounted 40-cm above the bottom coil, is a receiver coil only. The transmitter and receiver electronics controls are mounted in a backpack and a hand-held data logger is used to store field measurements. During operation a half-duty cycle waveform is applied to the transmitter coil. During the off-time the receiver coils measure the decay of eddy currents, in millivolts (mV), produced in subsurface metallic objects by the pulsed primary EM field. The top coil is gained in such a manner that the instrument response to a metallic object lying on the surface will be approximately equal at both the top and bottom coils. The effects of surface debris can, therefore, be suppressed by calculating the differential response (subtraction of the bottom coil from top coil response). Positive EM-61 anomalies centered over the source are typically observed over buried metallic objects. Above ground metallic objects will often give rise to a negative differential response, as the top coil response is larger than the bottom coil response. The dimensions of an EM-61 anomaly over an object the size of a 550-gallon tank should be about 3-meters by 3-meters.

GPR equipment used during this investigation consisted of a Geophysical Survey Systems Inc. (GSSI) SIR-3000 GPR system with 400 MHz antenna. A GPR antenna transmits high-frequency EM waves into the ground. A portion of the energy is reflected back to the surface at the interface of two materials with different electrical properties and it is received at the antenna. High-amplitude, hyperbolic reflections are generally observed on GPR records over buried metallic objects. GPR depth penetration is a function of the electrical conductivity of subsurface soils and the center frequency of the antenna. Depth penetration is very limited in fine-grained soils such as clay. Low frequency antennas achieve greater depth penetration than high frequency antennas at the expense of resolution. At typical sites in California, depth penetration of a 400-MHz antenna is limited to about 1 to 1.75 meters.

EM utility location equipment used during this investigation included a Metrotech 810, Ditch Witch 950 and Fisher TW-6 High Frequency Metal Detector. These locators operate at different frequencies, and have different modes of operation and different transmission power levels, resulting in complimentary strengths and limitations.

The Metrotech 810 consists of a separate EM transmitter and receiver and is designed to accurately trace pipes and utility lines. The transmitter can be directly connected to pipes that surface, and the pipes can be then traced in conductive mode. Alternatively, the transmitter can be positioned on the surface over a pipe and the pipe traced in inductive mode. The Metrotech 810 (M810) operates at a frequency of 83 kHz and has a 250 mW transmitter. This system is

best suited for tracing pipes in inductive mode and the high frequency allows the signal to jump insulated joints and gaskets. The M810 is not particularly suited for isolating a particular pipe in congested areas.

The Ditch Witch model 950 consists of a handheld receiver with a matched 3W transmitter. This locator can be operated at different frequencies, including passive 60-Hz mode to locate live electrical lines, radio frequencies, and set frequencies such as 8 kHz or 32 kHz to locate lines the transmitter can be directly connected to. This enables the utility locator to isolate a particular utility line in congested areas such as common utility trenches or corridors.

The Fisher TW-6 deep-search metal detector is a frequency-domain instrument. It operates at a frequency of 82 kHz, with a horizontal transmitter-receiver separation of about 1m. The Fisher is useful for locating pipes and buried metallic objects. An audible tone is generated when the instrument passes over a buried metallic object. It is often used to relocate utility lines located by the EM-61. The utility lines are then traced using the Metrotech 810.

3 FIELD PROCEDURES

This section describes the field procedures used during the investigation, including site preparation, EM-61 and GPR survey procedures, and verification of geophysical anomalies.

3.1 Site Preparation

Before conducting the geophysical investigation, a 10- by 10-foot survey grid was established and marked with surveyor paint in each accessible survey area. The geophysical survey grid was not tied to the State Plane Coordinate System and is estimated to have an accuracy of about 2 feet. Obvious surface cultural features that could potentially affect the geophysical data (i.e. utility boxes, fences, buildings, and other surface metallic objects) were identified in the field and plotted onto a scaled, hand-drawn site map. A site map, provided by Earth Mechanics, Inc., showing the location of the geophysical survey area, and certain surficial features is presented as Figure 1. The base map provided was plotted in its original California State Plane, US Feet, coordinate system and not converted into metric format.

3.2 Geonics EM-61 Survey

The EM-61 was assembled and battery levels were checked and found to be within acceptable levels. The EM-61 digital data logger was then programmed with the appropriate file name, line number, start station, station increment, and direction. Changes in these parameters were made as necessary throughout the survey. EM-61 measurements were made at 2.5-foot intervals along S-N survey lines spaced 5 feet apart using the 10-foot grid points for spatial control. The EM-61 data were stored in a digital data logger along with line and station number. If an error was made acquiring a line, a note was made in the field log and the line repeated. EM-61 data were downloaded to a laptop computer at the end of the survey using the computer program DAT61W by Geonics Ltd.

3.3 GSSI SIR-3000 GPR Survey

GPR data were acquired with the SIR-3000 in areas where EM data was severely limited by the proximity to surface metallic objects, including the areas immediately adjacent to the construction equipment located at W5L and W6L/R. Additional GPR profiles were collected with the SIR-3000 over significant EM anomalies to better characterize their source and, if possible, depth and dimensions. GPR data were not acquired in areas inaccessible or unsafe to operate the equipment (such as sloped areas). GPR data were acquired semi-continuously (12 scans per foot), as a 400-MHz antenna was hand-towed along the survey lines. A survey wheel was used for spatial control. GPR data were viewed in real time on the SIR-3000 color monitor and saved to the instrument's hard disk for later archiving and processing, if necessary. All field copies of GPR data are retained in the project files. Fine-grained soils restricted the propagation of energy from the radar antenna, limiting its depth of penetration to 1.75 m or less in most of the survey area.

4 DATA PROCESSING

Color-enhanced contour maps of EM-61 data were generated using the Geosoft Oasis Montaj® geophysical mapping system. The maps were color-enhanced to aid in the interpretation of subtle anomalies. Prior to map generation, a number of preprocessing steps were completed and included:

- Backup of all original field data files to floppy disk.
- Correcting of all data acquisition errors (typically only deleting the first portion of a reacquired line, renaming lines incorrectly labeled, deleting additional readings outside the grid, etc.)
- Reformatting field data files to free format XYZ files containing line number, station, time (if applicable), and field measurements.
- Applying small adjustments to EM-61 station locations to compensate for data being recorded while the operator was walking.
- Merging of multiple data files into a single file and sorting, if necessary.

The output of the data preprocessing was a data file containing line and station number and the reading. These data files were imported into the Oasis Montaj® mapping system and the following data processing steps applied:

- Reformatting of data files to Oasis Montaj® format.
- Generating final map scale.
- Gridding data using down- and cross-line splines or minimum curvature.
- Masking grid in areas where data not acquired (i.e. around site perimeter or building).
- Applying Hanning filter to smooth the data, as necessary.
- Generating color zone file describing color for different data ranges.
- Contouring the data.
- Generating map surrounds (title block, legend, scale, color bar, north arrow, etc.)
- Annotating anomalies.
- Merging various plot files and plotting final map.
- Converting color contour maps to georeferenced .tiff fils for presentation on the AutoCAD sitemap (Figure 2).

GPR data were downloaded to a PC upon completion of the field investigation. Most GPR data were not processed during this investigation, rather interpretation was made from raw field records. All GPR data file names resulting from the various stages of processing were documented and data later archived. GPR data presented in this report were converted to bitmap format and input into graphic software for annotation and presentation.

5 INTERPRETATION

5.1 W7R

A color-enhanced contour map of the EM-61 bottom coil response is presented as Figures 2 and 4. The coordinates shown on these figures reference the relative geophysical coordinate system marked on the ground with surveyor's paint and converted into metric format. The color bar indicates the amplitude of the measured quantity with the magenta and cyan colors representing high and low amplitudes, respectively. The light orange, yellow and light green colors indicate average "background" values of the measured quantity. A combined interpretation of the geophysical data is summarized in Figure 3.

Many anomalies in the EM-61 data were field checked to determine if a source of metal at the surface caused the anomaly. Objects marked "SM" on the attached contour maps show anomalies that have a surface source. Surface metallic features that interfered with the geophysical survey included a chain-link fence and utility lids.

Utilities observed in the color-enhanced contour maps of the EM-61 data were verified using the EM utility locators and GPR. There is a utility corridor oriented approximately SW-NE along the southern portion of the survey area. This utility corridor consists of 3 or more detectable utilities. Where possible, these utilities were traced to a source (manhole or utility vault) for identification.

Example GPR profiles for this survey area are presented in Figures 5 and 6. Note that all utilities detected by the GPR method were located in the upper 0.5-0.75m of soil/fill material. There were several utilities not located using the EM utility locators that were imaged with the GPR only. These utilities may be non-metallic in nature (PVC, clay or plastic composite).

5.2 W6L and W6R

Due to the heavy concentration of surface metallic objects (rebar, "K-rails" and other metallic objects), the survey conditions for W6L/R were deemed unsuitable for gridded EM-61 and GPR data collection. GPR data was acquired where possible around the surface metal. An example GPR profile collected in this area is presented as Figure 7. All utilities detected by the GPR method were located in the upper 0.5-0.75m of soil/fill material. The EM utility locators were used to screen accessible areas for detectable utilities. Utilities located using GPR and EM utility locators were painted on the surface using surveyor's paint and transcribed onto the hand-drawn site maps. A combined interpretation is summarized in Figure 3.

5.3 W5L and W5R

A color-enhanced contour map of the EM-61 bottom-coil response is presented as Figures 2 and 8. The coordinates shown on these figures reference the relative geophysical coordinate system marked on the ground with surveyor's paint and converted into metric format. The color bar indicates the amplitude of the measured quantity with the magenta and cyan colors representing high and low amplitudes, respectively. The light orange, yellow and light green colors indicate

average "background" values of the measured quantity. A combined interpretation of the geophysical data is summarized in Figure 3.

Due to the slope along the northern portion of W5R and the pile cage, the entirety of the survey area was deemed inaccessible for a gridded EM-61 and GPR survey. Many anomalies in the magnetic and EM-61 data were field checked to determine if a source of metal at the surface caused the anomaly. Objects marked “SM” on the attached contour maps show anomalies that have a surface source. Surface metallic features that interfered with the geophysical survey included bridge supports, “K-rails” a rebar pile cage and construction equipment.

Utilities observed in the color-enhanced contour maps of the EM-61 data were verified using the EM utility locators and GPR. GPR data in the vicinity of W5L indicated the presence of highly unconsolidated fill material. Cobbles, construction debris and other isolated anomalies were observed in several GPR profiles. Example GPR profiles for this survey area are presented in Figures 9 and 10. These figures illustrate the complexity of the near-surface soils/ fill material.

There is one anomaly in the geophysical data requiring further discussion. This anomaly, labeled A-1 on the interpretation map (Figure 3), is located in the northern corner of W5L and is characterized by a high-amplitude EM-61 anomaly with no associated GPR anomaly. This indicates the source of the anomaly is deeper than the depth of penetration achievable by the GPR, approximately 1-1.75m. This anomaly does not have the signature expected for a utility and is interpreted as being caused by a buried utility vault, concrete structure or former retaining wall structure.

5.4 W4L and W4R

Dense vegetation and concentration of surface metallic objects (“K-rails”), rendered the survey conditions for W4L/R unsuitable for gridded EM-61 and GPR data collection. GPR data was acquired where possible around the perimeter of the survey area. An example GPR profile collected in this area is presented as Figure 11. All utilities detected by the GPR method were located in the upper 0.5-0.75m of soil/fill material. The EM utility locators were used to screen accesible areas for detectable utilities. Utilities located using GPR and EM utility locators were painted on the surface using surveyor’s paint and transcribed onto the hand-drawn site maps. A combined interpretation is summarized in Figure 3.

5.5 W3L

A color-enhanced contour map of the EM-61 bottom coil response is presented as Figures 2 and 12. The coordinates shown on these figures reference the relative geophysical coordinate system marked on the ground with surveyor’s paint and converted into metric format. The color bar indicates the amplitude of the measured quantity with the magenta and cyan colors representing high and low amplitudes, respectively. The light orange, yellow and light green colors indicate average "background" values of the measured quantity. A combined interpretation of the geophysical data is summarized in Figure 3.

Many anomalies in the magnetic and EM-61 data were field checked to determine if a source of metal at the surface caused the anomaly. Objects marked “SM” on the attached contour maps show anomalies that have a surface source. Surface metallic features that interfered with the geophysical survey included a portable toilet/trash bins and street lamps.

Utilities observed in the color-enhanced contour maps of the EM-61 data were verified using the EM utility locators and GPR. An example GPR profile collected in this area is presented as Figure 13. There is a utility located in the western portion of the survey area which appears to be a cut/abandoned utility. The utility is evident in the EM-61 data and was re-locatable with the EM utility locators, but signal was lost as this anomaly entered the vegetation to the south. An alternative explanation for this signal loss would be that the utility has a repaired segment with a non-metallic composition. However, this utility should have been within the depth range (upper 0.5m) for the GPR and was not observed in the “abandoned” section. This utility line appears to intersect a water line running approximately W-E along the paved road between W3L/R, where it was observed again with the EM-61, GPR, and EM utility locators.

5.6 W3R

A color-enhanced contour map of the EM-61 bottom coil response is presented as Figure 14. The coordinates shown on these figures reference the relative geophysical coordinate system marked on the ground with surveyor’s paint and converted into metric format. The steep slope area of W3R was not surveyed due to safety concerns. The color bar indicates the amplitude of the measured quantity with the magenta and cyan colors representing high and low amplitudes, respectively. The light orange, yellow and light green colors indicate average "background" values of the measured quantity. A combined interpretation of the geophysical data is summarized in Figure 3.

Utilities observed in the color-enhanced contour maps of the EM-61 data were verified using the EM utility locators and GPR. An example GPR profile collected in this area is presented as Figure 15. All utilities detected by the GPR method were located in the upper 0.5-0.75m of soil/fill material. The EM utility locators were used to screen these areas for detectable utilities. Utilities located using GPR and EM utility locators were painted on the surface using surveyor’s paint and transcribed onto the hand-drawn site maps.

5.7 East Tie-In Survey Area

A color-enhanced contour map of the EM-61 bottom coil response is presented as Figures 2 and 16. The coordinates shown on these figures reference the relative geophysical coordinate system marked on the ground with surveyor’s paint and converted into metric format. The steep slope area of the East Tie-in area was not surveyed due to safety concerns. The color bar indicates the amplitude of the measured quantity with the magenta and cyan colors representing high and low amplitudes, respectively. The light orange, yellow and light green colors indicate average "background" values of the measured quantity. A combined interpretation of the geophysical data is summarized in Figure 3.

Many anomalies in the EM-61 data were field checked to determine if a source of metal at the surface caused the anomaly. Objects marked "SM" on the attached contour maps show anomalies that have a surface source. Surface metallic features that interfered with the geophysical survey included a large track-mounted crane, construction equipment, bridge footings, a pump house, and construction debris.

The concentration of buried metallic objects observed in the EM-61 is evident on the color-enhanced contour map. These anomalies, labeled A-2 on the interpretation map (Figure 3), are located across most of the southern portion of the survey area and are characterized by a high-amplitude EM-61 anomaly. These anomalies are interpreted as being caused by buried metallic construction debris, possible reinforced concrete within the fill material. Supporting this interpretation is the GPR data collected in this survey area. Cobbles, construction debris and other isolated anomalies were observed in several GPR profiles. Example GPR profiles for this survey area are presented in Figure 17. This figure illustrates the complexity of the near-surface soils/ fill material.

Utilities observed in the color-enhanced contour maps of the EM-61 data were verified using the EM utility locators and GPR. Several utilities were located along the northern portion of the accessible area; interpretation is summarized in Figure 3.

5.8 Proposed Electrical Duct Alignment

GPR and EM utility locators were used to map locatable utilities along the proposed electrical duct alignment. Metallic pipes apparent from surface features such as manholes, valve boxes, pipe stickups, etc. were traced and marked by connecting directly to the utility and applying an 8 kHz signal. The matched frequency receiver was then used to delineate the surface trace of the pipe. Additionally, accessible manholes were opened and inspected for metal tracer wires. Tracer wires were connected to using a fiberglass rod connected to the M810 transmitter, whose matched receiver was used to locate the corresponding utility and mark its projection through the duct alignment.

The length of the duct alignment was scanned with the Ditchwitch 950 in passive 60Hz mode to locate any active electrical lines drawing a current. An operator scanned the alignment making several passes with a Fisher TW-6 deep search metal detector to locate metallic conduits that had no physical expression. Additionally, the alignment was swept with the M810 as one operator carried the transmitter while another operator carried the transmitter while walking the alignment in tandem. Additional perpendicular traverses were walked in tandem periodically along the duct.

GPR data were collected throughout the site semi-continuously along parallel and perpendicular profiles along the alignment in an attempt to delineate potential non-metallic lines. All GPR records were reviewed on site.

All utilities located by the geophysical survey were marked on the ground with surveyor's paint. Electric lines were marked in red, storm drains and sewer in green, water in blue and unknown

pipes in orange and/or pink. The locations of the pipes/utilities were also recorded on the site map.

6 SUMMARY

A geophysical survey was conducted under the Oakland Bay Bridge on Yerba Buena Island to determine the presence of locatable utilities and other detectable subsurface structures in ten small areas. The geophysical survey revealed the presence of many linear anomalies, interpreted as being utilities, and small point-source anomalies, interpreted as being buried metallic debris. The geophysical data also indicated the presence of one primary geophysical anomaly in the northwest corner of W5L. This anomaly appears to lie outside the footprint of the proposed expansion but should be uncovered to determine its source.

Numerous metallic anomalies interpreted as being caused by buried construction debris were also observed in the East Tie-In survey area.

The geophysical survey was designed to locate all buried metallic utilities, and metallic objects the size of a 500-gallon tank, or larger. It is our opinion that the geophysical survey was appropriately designed to locate all such objects less than about 8 feet deep; except in portions of the survey area where data was affected by subsurface utilities or surface metallic structures.

7 CERTIFICATION

All geophysical data, analysis, interpretations, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by a **GEO*Vision*** California Registered Geophysicist.

Prepared by

JB Shawver

11/2/06

JB Shawver
California Professional Geophysicist GP1058
GEO*Vision* Geophysical Services

Date

Reviewed and approved by

Antony J Martin

11/2/06

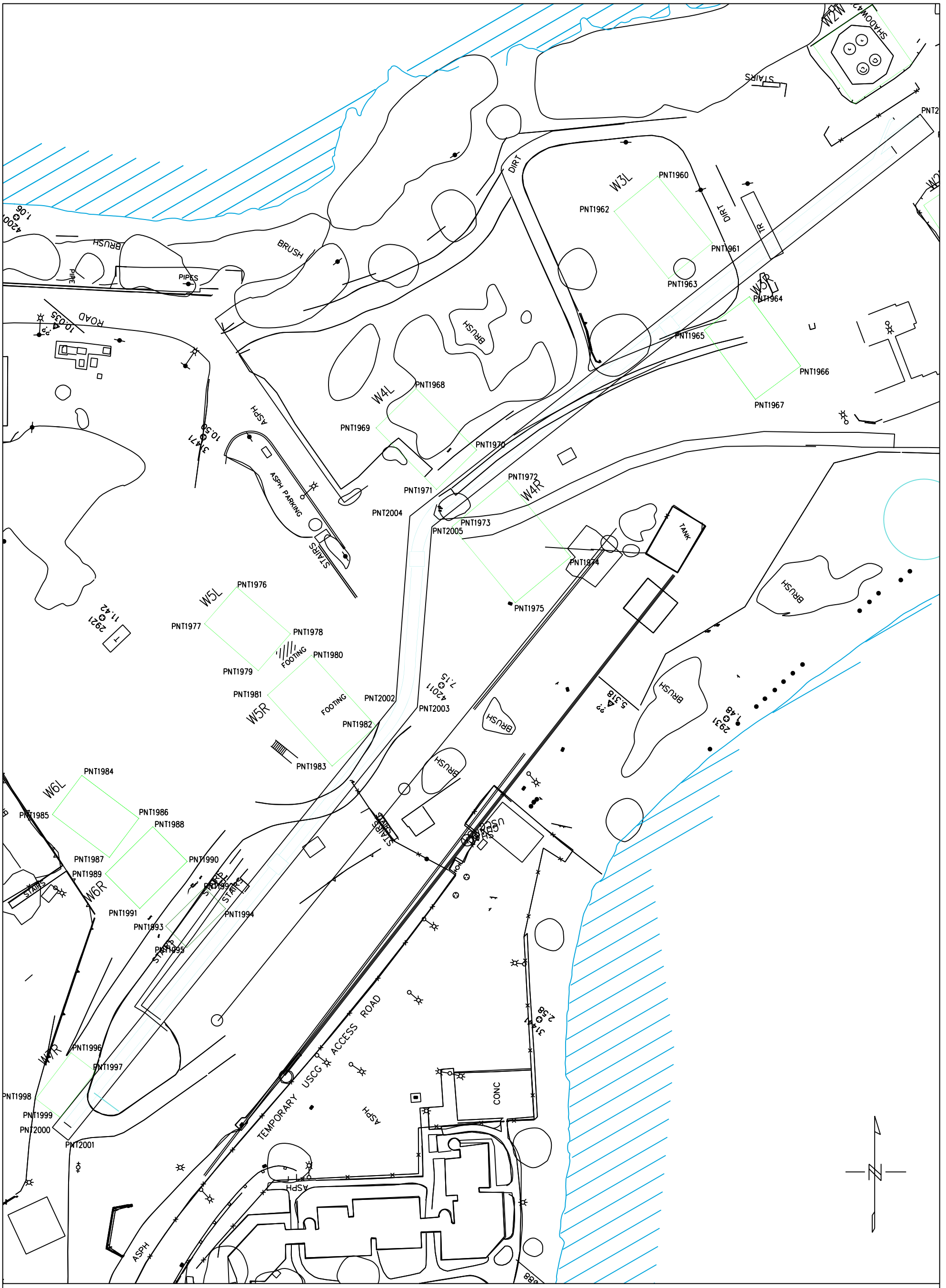
Antony J. Martin
California Professional Geophysicist GP989
GEO*Vision* Geophysical Services

Date

* This geophysical investigation was conducted under the supervision of a California Professional Geophysicist using industry standard methods and equipment. A high degree of professionalism was maintained during all aspects of the project from the field investigation and data acquisition, through data processing interpretation and reporting. All original field data files, field notes and observations, and other pertinent information are maintained in the project files and are available for the client to review for a period of at least one year.

  A professional geophysicist's certification of interpreted geophysical conditions comprises a declaration of his/her professional judgment. It does not constitute a warranty or guarantee, expressed or implied, nor does it relieve any other party of its responsibility to abide by contract documents, applicable codes, standards, regulations or ordinances.

FIGURES



LEGEND

BOUNDARY OF GEOPHYSICAL SURVEY AREAS

NOTE: BASE MAP PROVIDED BY EARTH MECHANICS, INC.

0 40 80 120
(feet)

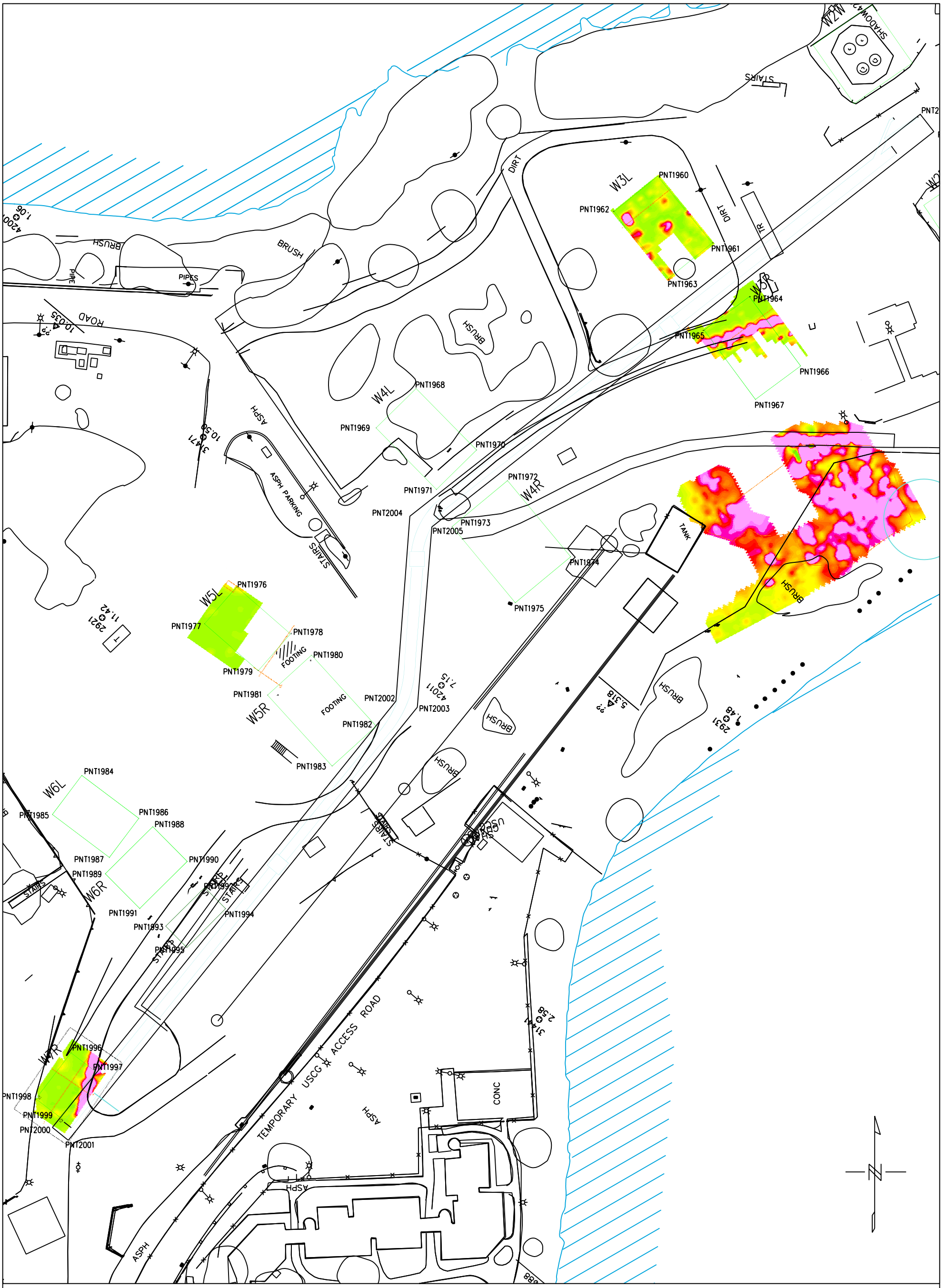
GEOVision geophysical services

Project #	6488
Date	Nov 02,2006
Developed by	J SHAWVER
Drawn by	T RODRIGUEZ
Approved by	
File	\\Geoserv\cad\6488\6488-dgn 2000.dwg

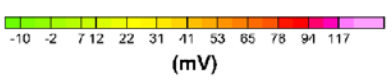
FIGURE – 1
SITE MAP

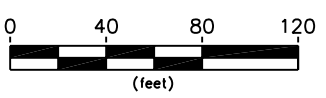
OAKLAND BAY BRIDGE
YERBA BUENA ISLAND, CALIFORNIA

EARTH MECHANICS, INC.



LEGEND





NOTE: BASE MAP PROVIDED BY EARTH MECHANICS, INC.

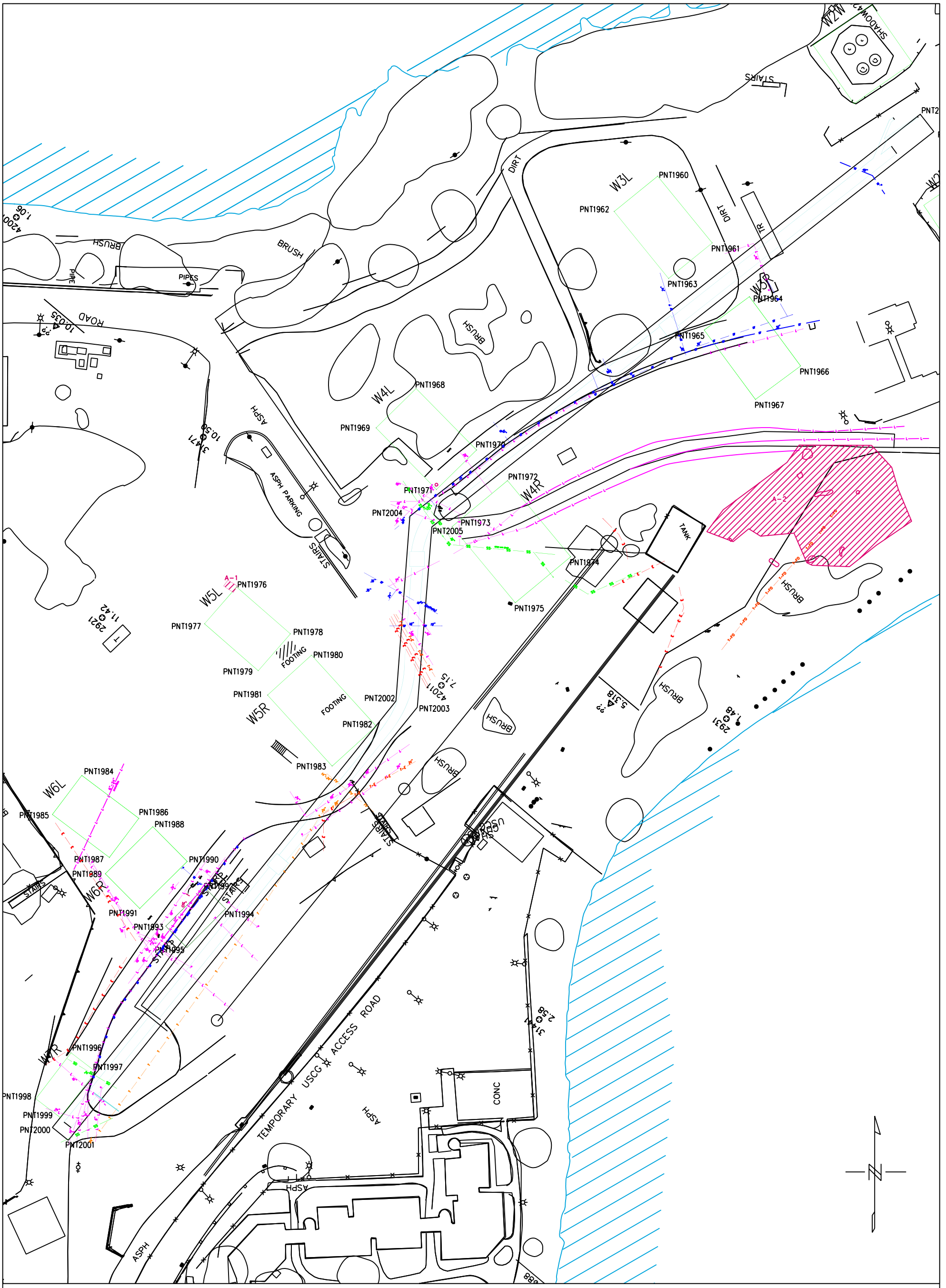
GEOVision geophysical services

Project #	6488
Date	Nov 02,2006
Developed by	J SHAWVER
Drawn by	T RODRIGUEZ
Approved by	
File	\\Geoserv\cad\6488\6488-dgn 2000.dwg

FIGURE – 2
SITE MAP WITH
EM–61 RESPONSE

OAKLAND BAY BRIDGE
YERBA BUENA ISLAND, CALIFORNIA

EARTH MECHANICS, INC.



LEGEND A-1 GPR ANOMALY DISCUSSED IN REPORT

UNDERGROUND CONDUIT WITH DEPTH WHERE AVAILABLE

- ELECTRIC
- MAIN ELECTRIC
- TELEPHONE / ELECTRIC
- TELEPHONE
- TELEPHONE / FIBER OPTIC
- TELEVISION
- STORM DRAIN
- SANITARY SEWER
- ABANDONED SEWER
- WATER
- POSSIBLE WATER
- UNKNOWN
- APPROXIMATE UNKNOWN

NOTE: BASE MAP PROVIDED BY EARTH MECHANICS, INC.

0 40 80 120 (feet)

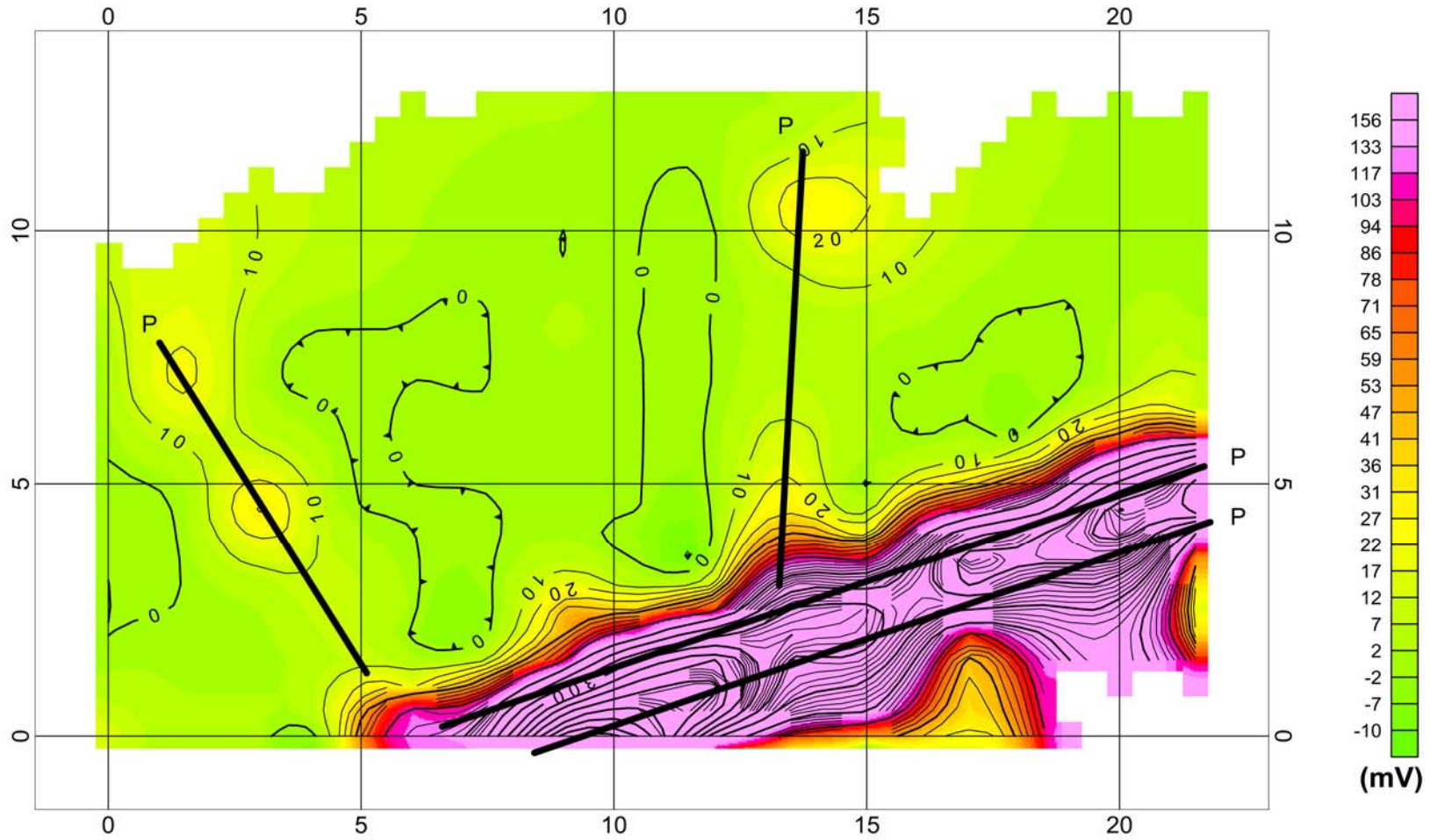
GEOVision geophysical services

Project #	6488
Date	Nov 02,2006
Developed by	J SHAWVER
Drawn by	T RODRIGUEZ
Approved by	
File	\\Geoserv\cad\6488\6488-dgn 2000.dwg

FIGURE – 3
SITE MAP WITH
GEOPHYSICAL INTERPRETATION

OAKLAND BAY BRIDGE
YERBA BUENA ISLAND, CALIFORNIA

EARTH MECHANICS, INC.



LEGEND

P PIPE OR UTILITY

2.5 0 2.5
meters

CONTOUR INTERVAL 10 mV

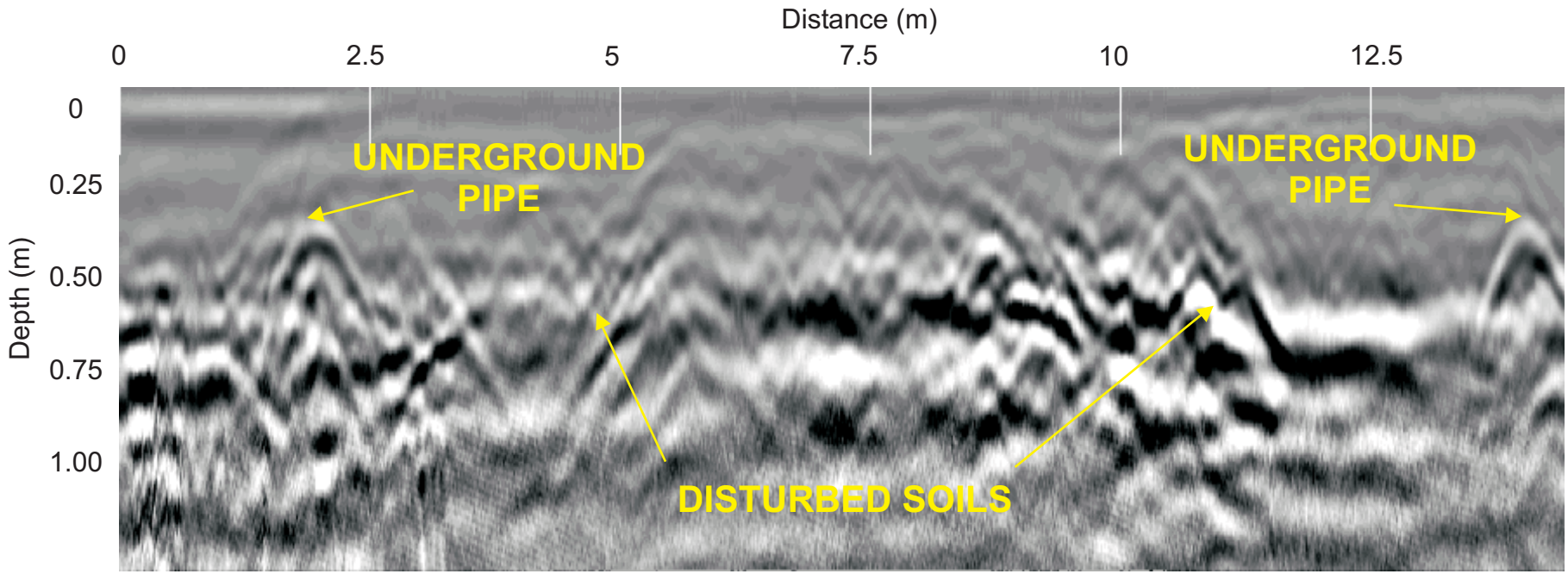
GEOVision geophysical services

FIGURE 4

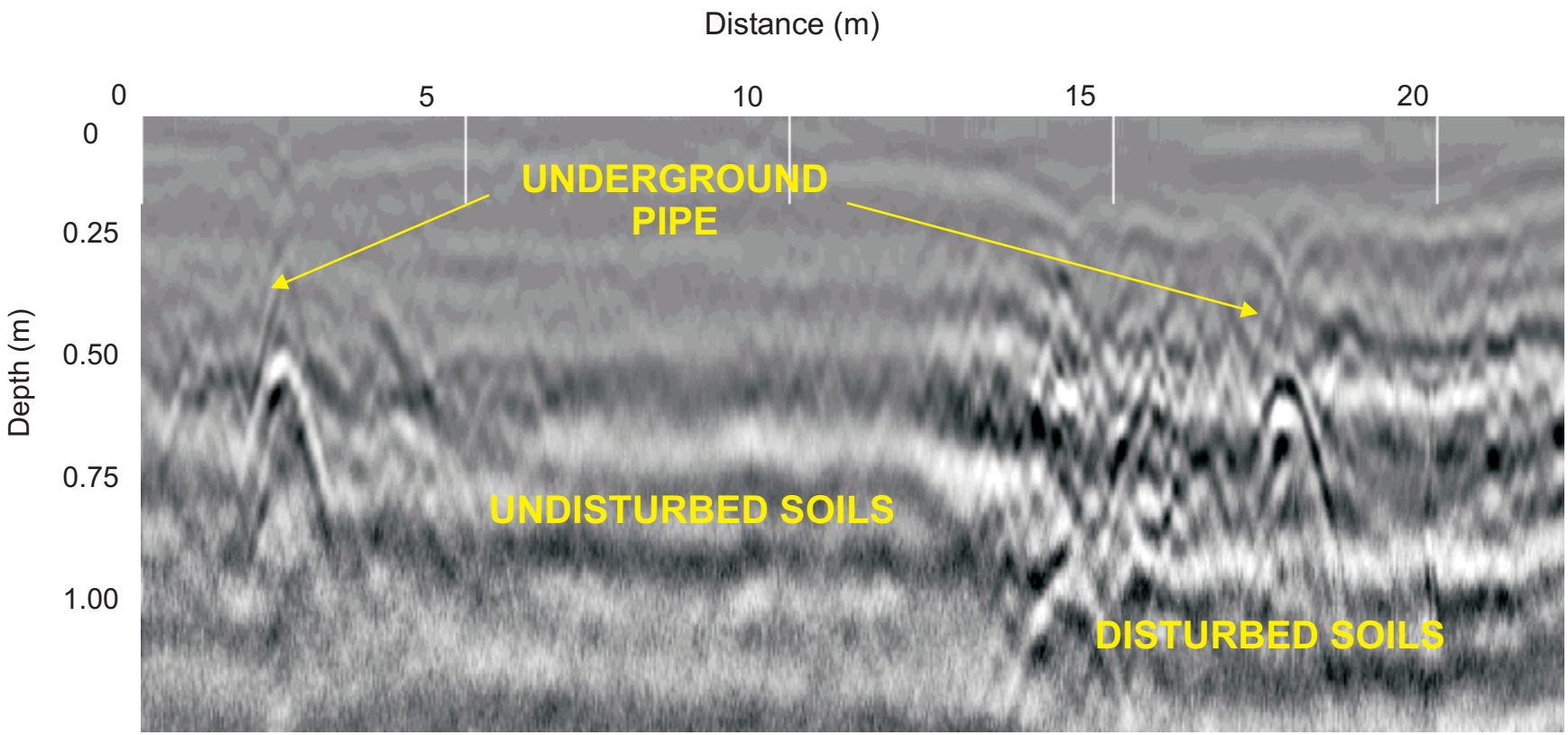
COLOR CONTOUR MAP
EM-61 BOTTOM COIL RESPONSE

SURVEY AREA W7R
OAKLAND-SAN FRANCISCO
BAY BRIDGE
YERBA BUENA ISLAND

PREPARED FOR EARTH MECHANICS, INC.

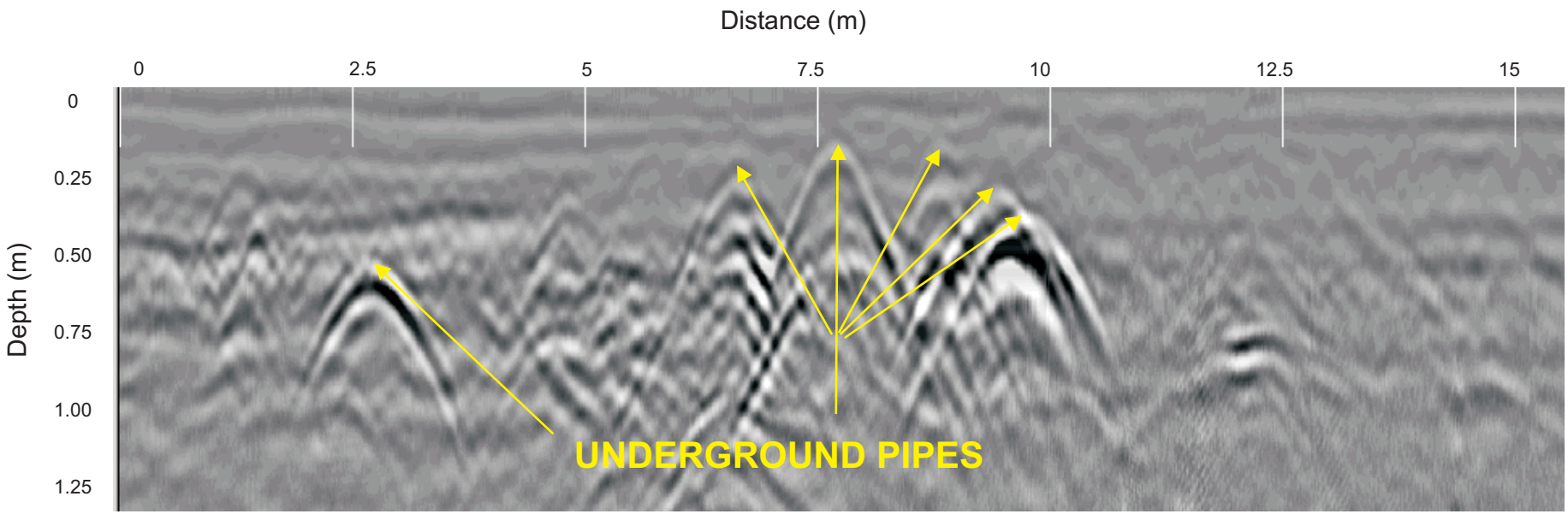


GEOVision geophysical services	FIGURE 5 EXAMPLE GPR PROFILE I-9.DZT
Project # 6488	SURVEY AREA W7R OBB PROJECT YERBA BUENA ISLAND, CALIFORNIA
Date: OCTOBER 31, 2006	
Drawn By: J SHAWVER	
Approved By:	PREPARED FOR EARTH MECHANICS, INC.
File C:\gvprojects\6488\GPR\F5.cdr	

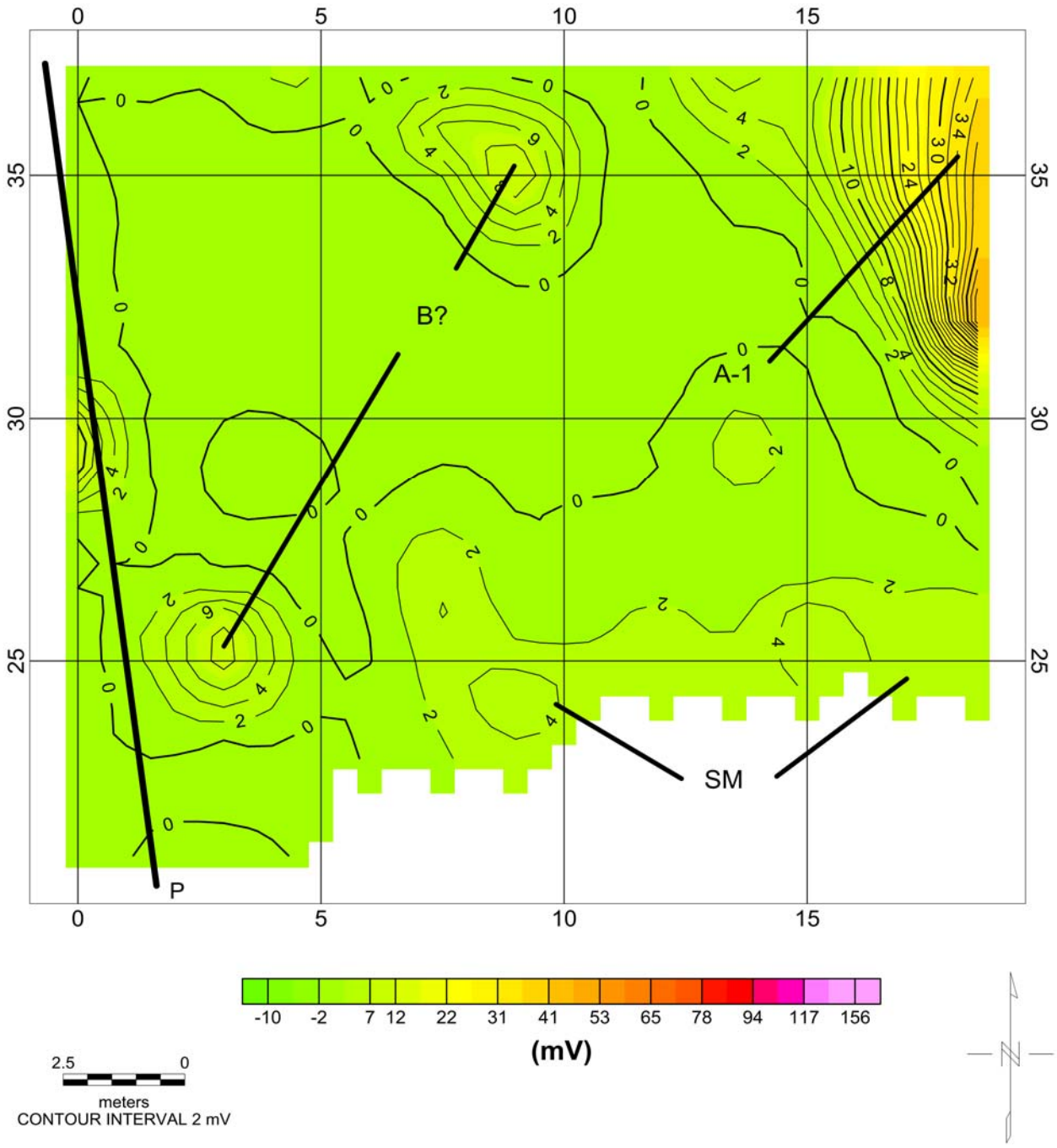


GEOVision geophysical services

Project # 6488	FIGURE 6 EXAMPLE GPR PROFILE I-20.DZT
Date: OCTOBER 31, 2006	SURVEY AREA W7R OBB PROJECT YERBA BUENA ISLAND, CALIFORNIA
Drawn By: J SHAWVER	
Approved By:	PREPARED FOR EARTH MECHANICS, INC.
File C:\gvprojects\6488\GPR\F6.cdr	



GEOVision geophysical services	FIGURE 7 EXAMPLE GPR PROFILE H-2.DZT
Project # 6488	SURVEY AREA W6L OBB PROJECT YERBA BUENA ISLAND, CALIFORNIA
Date: OCTOBER 31, 2006	
Drawn By: J SHAWVER	
Approved By:	PREPARED FOR EARTH MECHANICS, INC.
File C:\gvprojects\6488\GPR\F7.cdr	



LEGEND

SM SURFACE METALLIC OBJECT

P PIPE OR UTILITY

B SMALL BURIED METALLIC OBJECT

A-1 BURIED METALLIC ANOMALY DISCUSSED IN REPORT

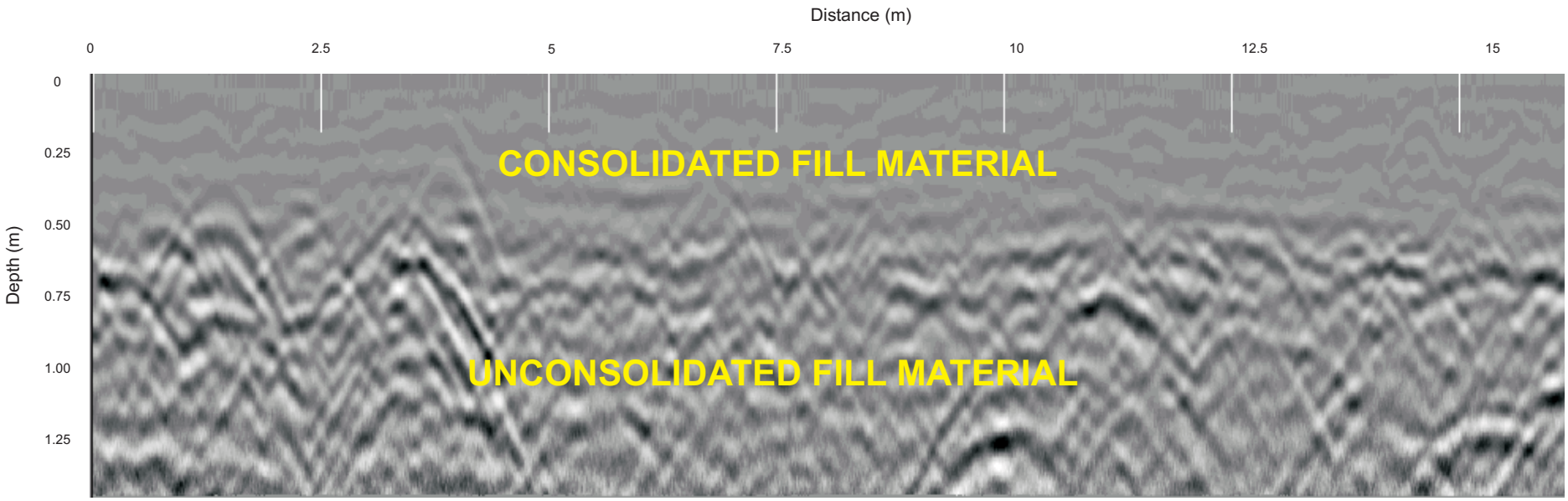
GEOVision geophysical services

FIGURE 8

COLOR CONTOUR MAP
EM-61 BOTTOM COIL RESPONSE

SURVEY AREA W5L
OAKLAND-SAN FRANCISCO
BAY BRIDGE
YERBA BUENA ISLAND

PREPARED FOR EARTH MECHANICS, INC.



GEOVision geophysical services	FIGURE 9 EXAMPLE GPR PROFILE G-14.DZT
Project # 6488	SURVEY AREA W5L OBB PROJECT YERBA BUENA ISLAND, CALIFORNIA
Date: OCTOBER 31, 2006	
Drawn By: J SHAWVER	
Approved By:	PREPARED FOR EARTH MECHANICS, INC.
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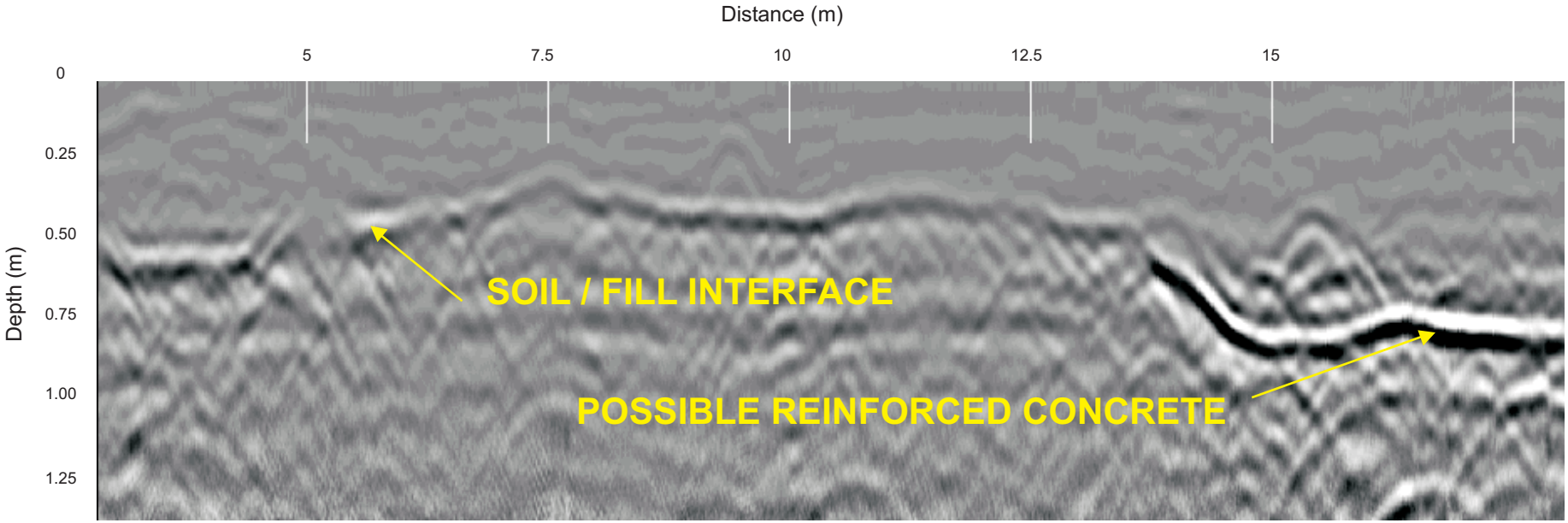

GEOVision geophysical services	FIGURE 10 EXAMPLE GPR PROFILE G-26.DZT
Project # 6488	SURVEY AREA W5L OBB PROJECT YERBA BUENA ISLAND, CALIFORNIA
Date: OCTOBER 31, 2006	
Drawn By: J SHAWVER	
Approved By:	PREPARED FOR EARTH MECHANICS, INC.
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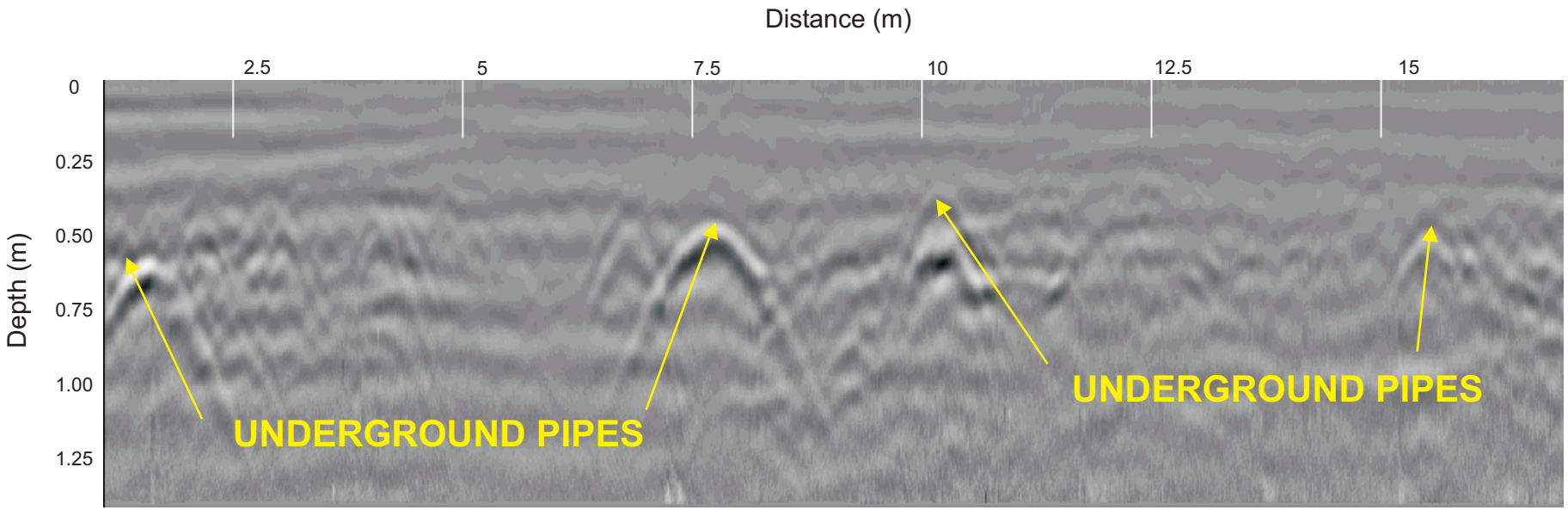
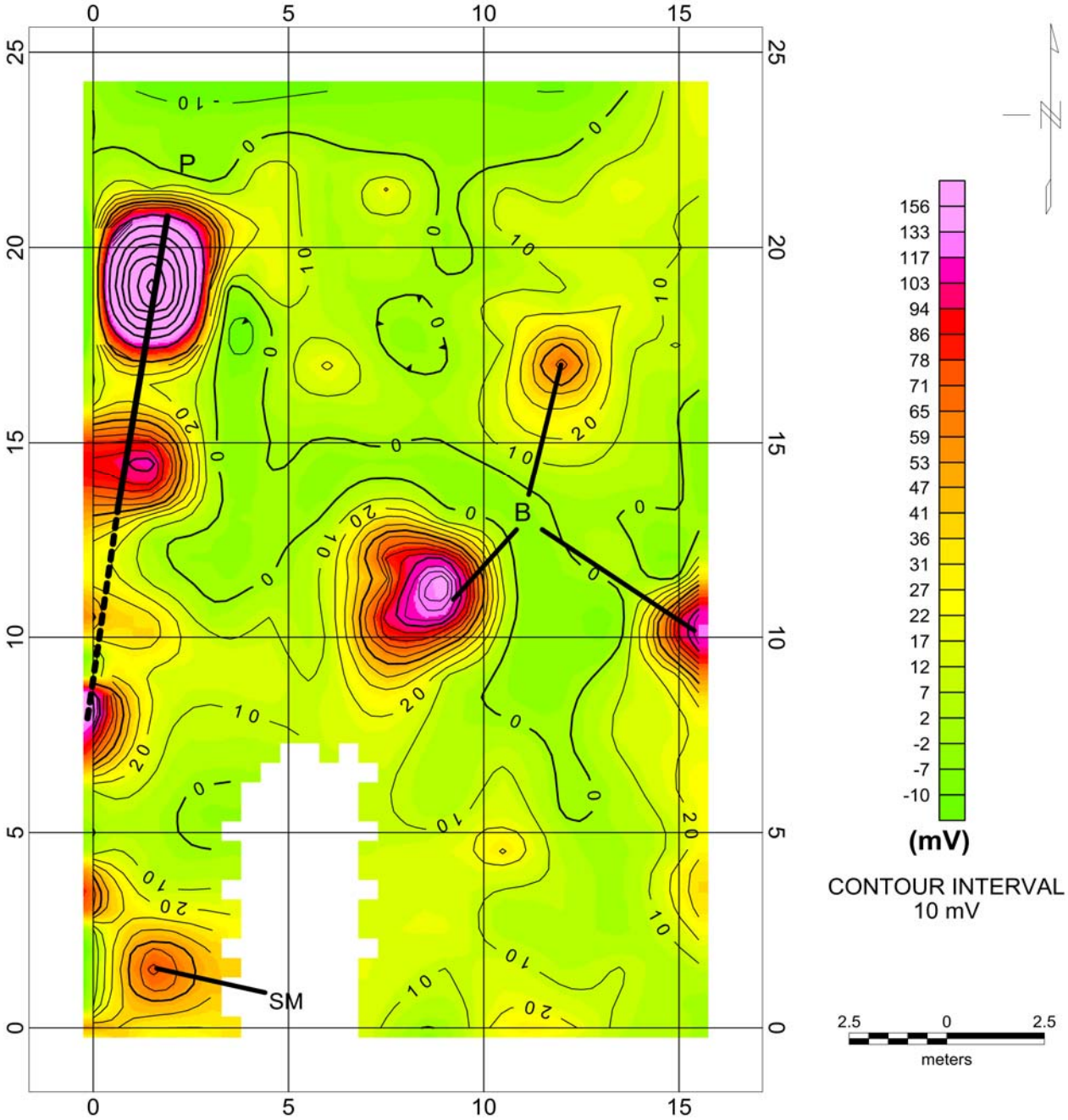


GEOVision geophysical services	FIGURE 11 EXAMPLE GPR PROFILE D-1.DZT
Project # 6488	SURVEY AREA W3L OBB PROJECT YERBA BUENA ISLAND, CALIFORNIA
Date: OCTOBER 31, 2006	
Drawn By: J SHAWVER	
Approved By:	PREPARED FOR EARTH MECHANICS, INC.
File C:\gvprojects\6488\GPR\F11.cdr	



LEGEND

SM SURFACE METALLIC OBJECT

P PIPE OR UTILITY

B SMALL BURIED METALLIC OBJECT

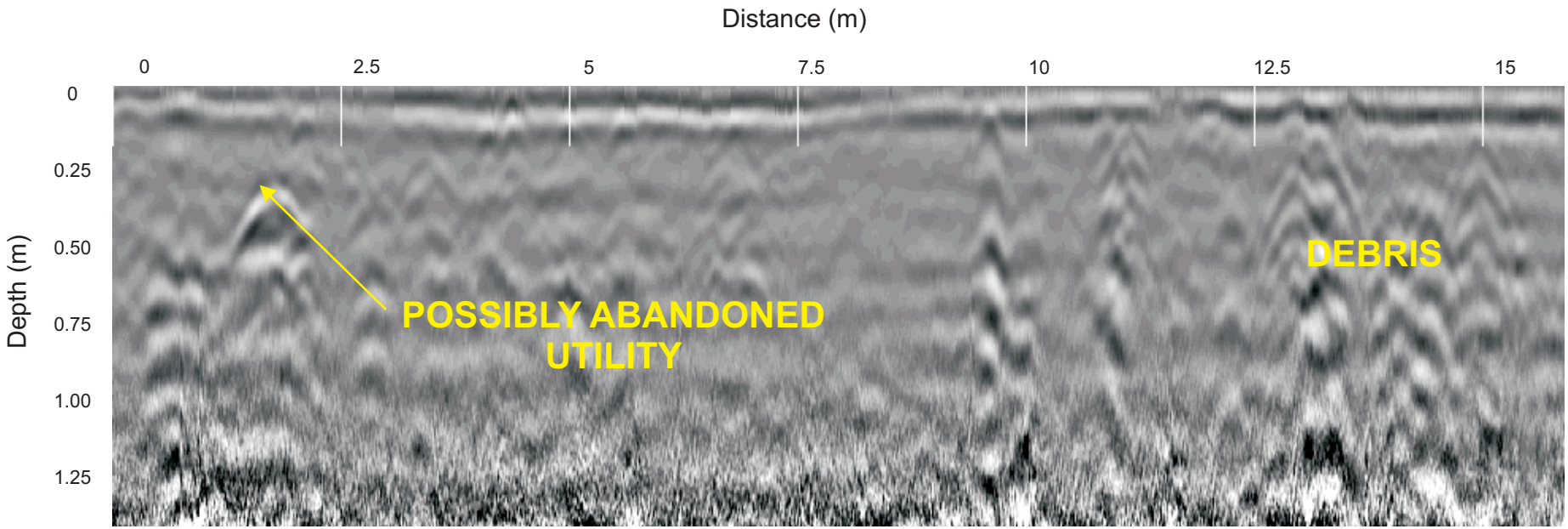
GEOVision geophysical services

FIGURE 12

COLOR CONTOUR MAP
EM-61 BOTTOM COIL RESPONSE

SURVEY AREA W3L
OAKLAND-SAN FRANCISCO
BAY BRIDGE
YERBA BUENA ISLAND

PREPARED FOR EARTH MECHANICS, INC.



GEOVision geophysical services	FIGURE 13 EXAMPLE GPR PROFILE A-12.DZT
Project # 6488	SURVEY AREA W3L OBB PROJECT YERBA BUENA ISLAND, CALIFORNIA
Date: OCTOBER 31, 2006	
Drawn By: J SHAWVER	
Approved By:	PREPARED FOR EARTH MECHANICS, INC.
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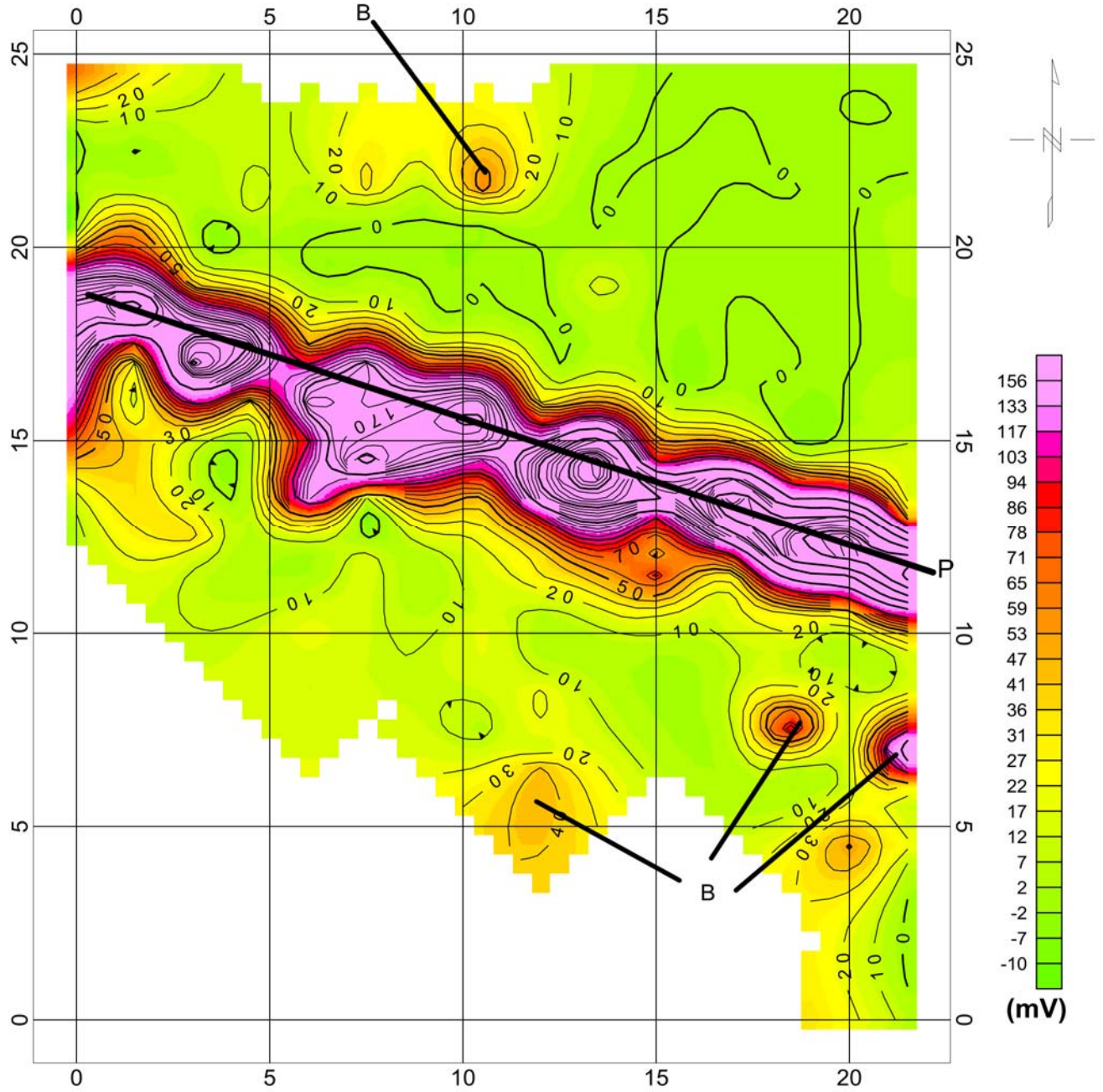


LEGEND

P PIPE OR UTILITY

B SMALL BURIED METALLIC OBJECT

2.5 0 2.5
meters
CONTOUR INTERVAL 10 mV

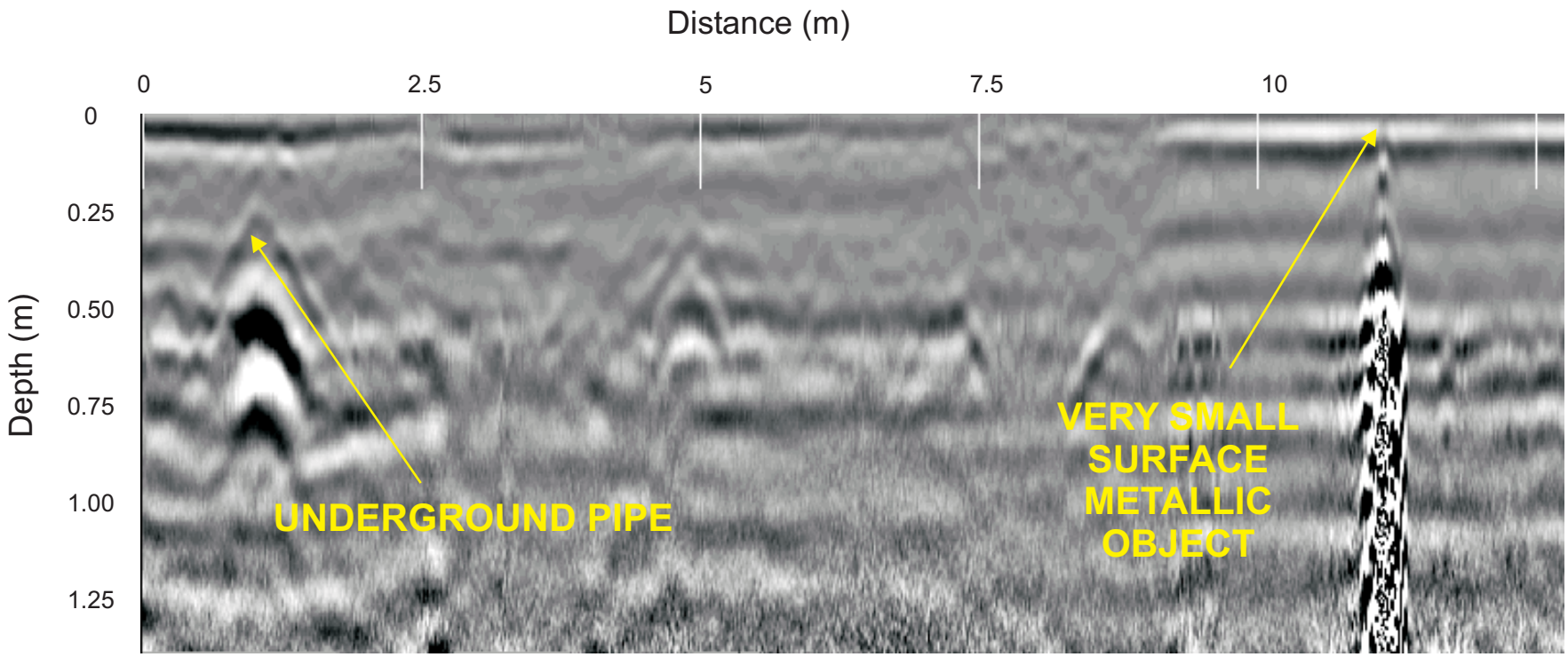
GEOVision geophysical services

FIGURE 14

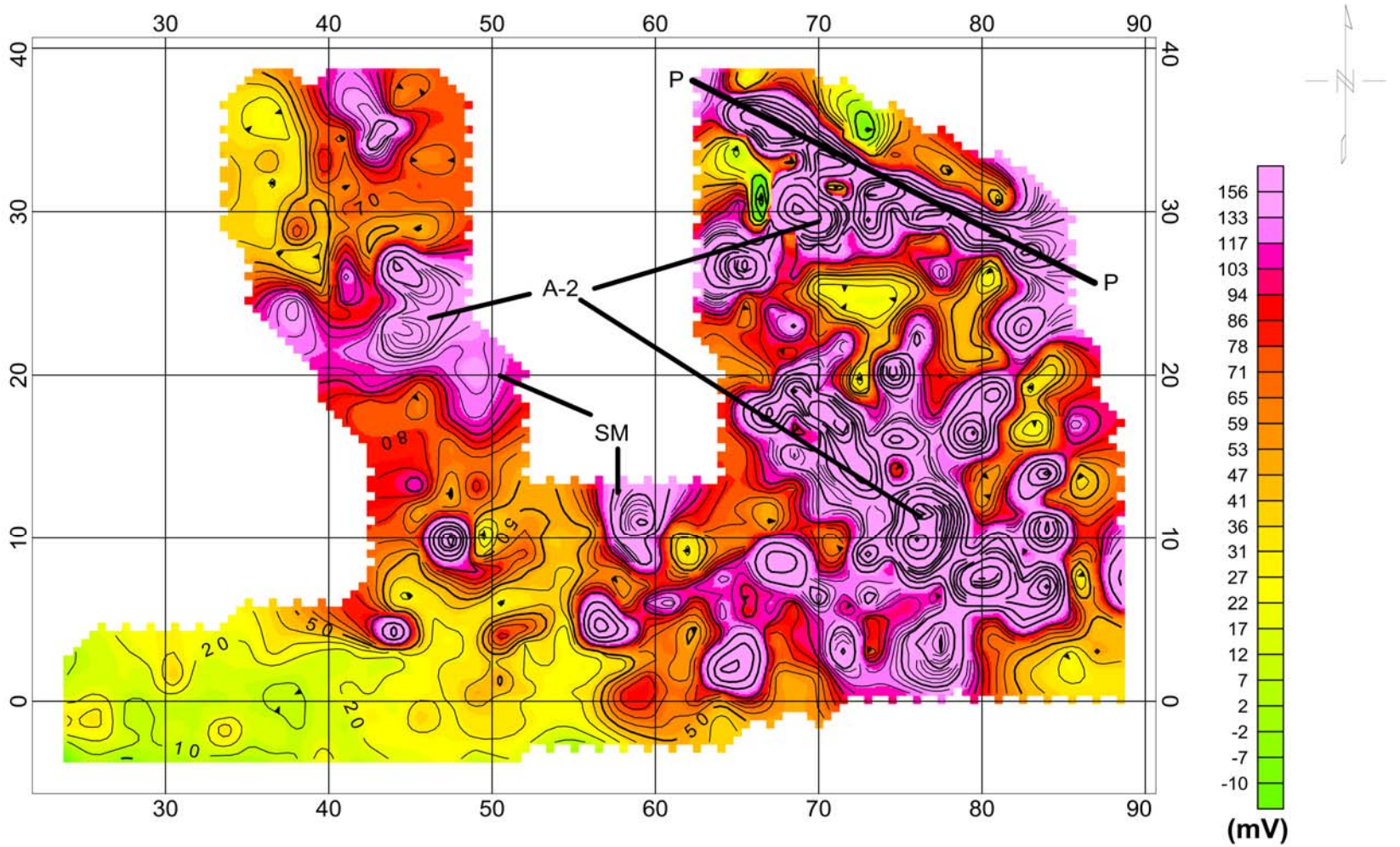
COLOR CONTOUR MAP
EM-61 BOTTOM COIL RESPONSE

SURVEY AREA W3R
OAKLAND-SAN FRANCISCO
BAY BRIDGE
YERBA BUENA ISLAND

PREPARED FOR EARTH MECHANICS, INC.



GEOVision geophysical services	FIGURE 15 EXAMPLE GPR PROFILE B-5.DZT
Project # 6488	SURVEY AREA W3R OBB PROJECT YERBA BUENA ISLAND, CALIFORNIA
Date: OCTOBER 31, 2006	
Drawn By: J SHAWVER	
Approved By:	PREPARED FOR EARTH MECHANICS, INC.
File C:\gvprojects\6488\GPR\F15.cdr	



LEGEND

SM SURFACE METALLIC OBJECT

P PIPE OR UTILITY

A-2 BURIED METALLIC ANOMALY DISCUSSED IN REPORT

5 0 5 10
meters

CONTOUR INTERVAL 10 mV

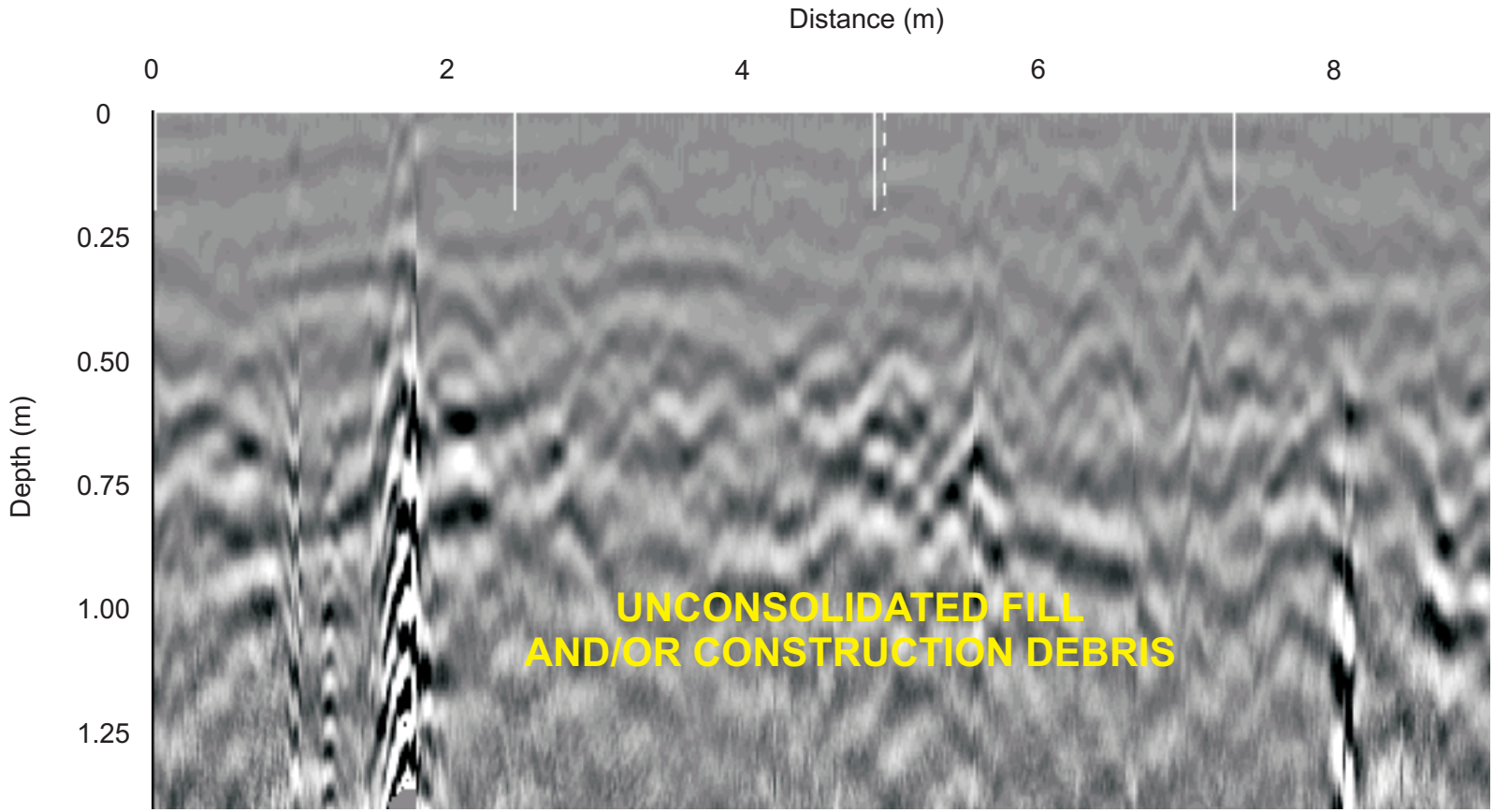
GEOVision geophysical services

FIGURE 16

COLOR CONTOUR MAP
EM-61 BOTTOM COIL RESPONSE

SURVEY AREA EAST TIE-IN
OAKLAND-SAN FRANCISCO
BAY BRIDGE
YERBA BUENA ISLAND

PREPARED FOR EARTH MECHANICS, INC.



GEOVision geophysical services	FIGURE 17 EXAMPLE GPR PROFILE K-7.DZT
Project # 6488	EAST TIE-IN SURVEY AREA OBB PROJECT YERBA BUENA ISLAND, CALIFORNIA
Date: OCTOBER 31, 2006	
Drawn By: J SHAWVER	
Approved By:	PREPARED FOR EARTH MECHANICS, INC.
File C:\gvprojects\6488\GPR\F17.cdr	

APPENDIX A

GEOPHYSICAL TECHNIQUES FOR SHALLOW ENVIRONMENTAL INVESTIGATIONS

GEOPHYSICAL TECHNIQUES FOR SHALLOW ENVIRONMENTAL INVESTIGATIONS

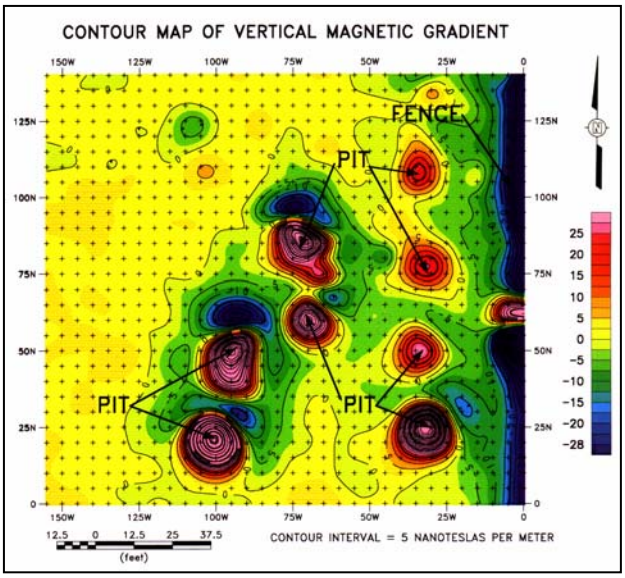
GEOVision
geophysical services
a division of Blackhawk Geometrics

MAGNETIC METHOD

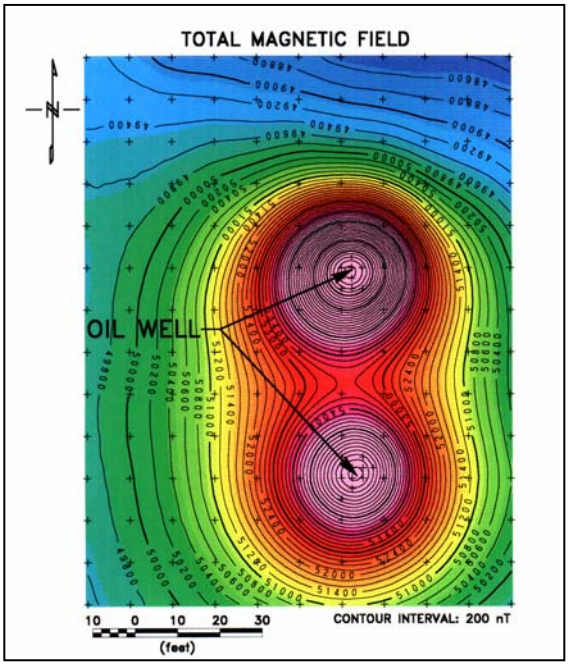
The magnetic method generally involves the measurement of the earth's magnetic field intensity or vertical gradient of the earth's magnetic field. Anomalies in the earth's magnetic field are caused by induced or remanent magnetism. Induced magnetic anomalies are the result of secondary magnetization induced in a ferrous body by the earth's magnetic field. The shape and amplitude of an induced magnetic anomaly is a function of the orientation, geometry, size, depth, and magnetic susceptibility of the body as well as the intensity and inclination of the earth's magnetic field in the survey area. The magnetic method is an effective way to search for small metallic objects, such as buried ordnance and drums, because magnetic anomalies have spatial dimensions much larger than those of the objects themselves. Typically, a single buried drum can be detected to a depth of about 10 feet. Larger metallic objects can often be located to greater depths. Induced magnetic anomalies over buried objects such as drums, pipes, tanks, and buried metallic debris generally exhibit an asymmetrical, south up/north down signature (positive response south of the object and negative response to the north).

Geometrics G858 Cesium Magnetic Gradiometer

Magnetic data is typically acquired along a grid with results being presented as color-enhanced contour maps generated by the Geosoft™ Mapping System or OASIS montaj. The approximate location and depth of magnetic objects can be calculated using the Geosoft™ UXO System.



Magnetic Survey to Locate Pits Containing Buried Metallic Containers



Magnetic Survey to Locate Abandoned Oil Wells

Magnetic surveys are typically conducted to:

- Locate abandoned steel well casings
- Locate buried tanks and pipes
- Locate pits and trenches containing buried metallic debris
- Detect buried unexploded ordnance (UXO)
- Map old waste sites and landfill boundaries
- Clear drilling locations
- Map basement faults and geology
- Investigate archaeological sites

ELECTROMAGNETIC METHODS

Electromagnetic (EM) methods typically applied to shallow environmental investigations include frequency domain EM methods, such as EM induction and EM utility location methods, time domain electromagnetic (TDEM) metal detection methods, and ground penetrating radar (GPR) methods.

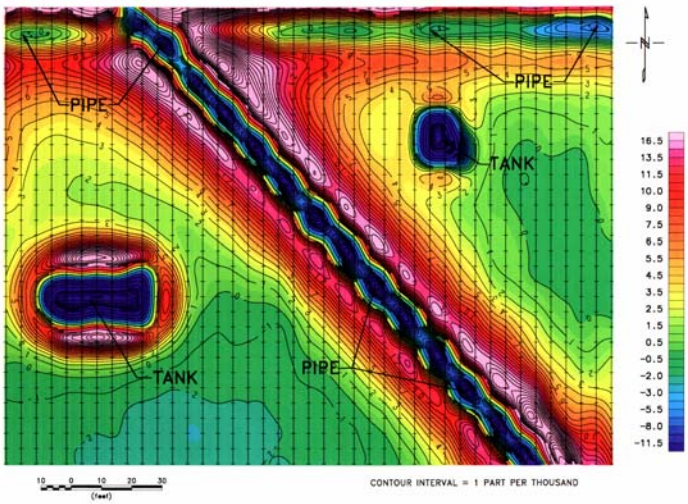
EM Induction Method

EM induction surveys are often conducted using the Geonics EM-31 terrain conductivity meter (EM-31). The EM-31 consists of a transmitter coil mounted at one end and a receiver coil mounted at the other end of a 3.7-meter long plastic boom. Electrical conductivity and in-phase component field strength are measured and stored along with line and station numbers in a digital data logger. In-phase component measurements generally only respond to buried metallic objects; whereas conductivity measurements also respond to conductivity variations caused by changes in soil type, moisture or salinity and the presence of nonmetallic bulk wastes. The EM-31 must pass over or immediately adjacent to a buried metallic object to detect it. Typical EM-31 anomalies over small, buried metallic objects consist of a negative response centered over the object and a lower amplitude positive response to the sides of the object. When the instrument boom is oriented parallel to long, linear conductors such as pipelines a strong positive response is observed. The EM-31 can explore to depths of about 6 meters, but is most sensitive to materials about 1 meter below ground surface. Single buried drums can typically be detected to depths of about 5 feet.

Geonics EM-31 Terrain Conductivity Meter

EM-31 surveys are typically conducted to:

- Locate buried tanks and pipes
- Locate pits and trenches containing metallic and/or nonmetallic debris
- Delineate landfill boundaries
- Delineate oil production sumps and mud pits
- Map conductive soil and groundwater contamination
- Map soil salinity in agricultural areas
- Characterize shallow subsurface hydrogeology
  - Map buried channel deposits
  - Locate sand and gravel deposits
  - Locate conductive fault and fracture zones



Geonics EM-31 Survey to Locate Underground Storage Tanks

EM Utility Location Methods

EM utility locators; such as the Metrotech 810, Metrotech 9890 and Radiodetection RD400, are designed to accurately trace metallic pipes and utility cables and clear drilling/excavation locations. These utility locators consist of a separate transmitter and a receiver. The transmitter emits a radio frequency EM field that induces secondary fields in nearby metallic pipes and cables. The receiver detects these fields and is used to accurately locate and trace the pipes, often to distances over 200 feet from the transmitter. Many of the utility locators have a passive 60Hz mode to locate live electrical lines. Modern utility locators are also capable of providing rough depth estimates of the pipes.

Metrotech EM Utility

TDEM Metal Detection Methods

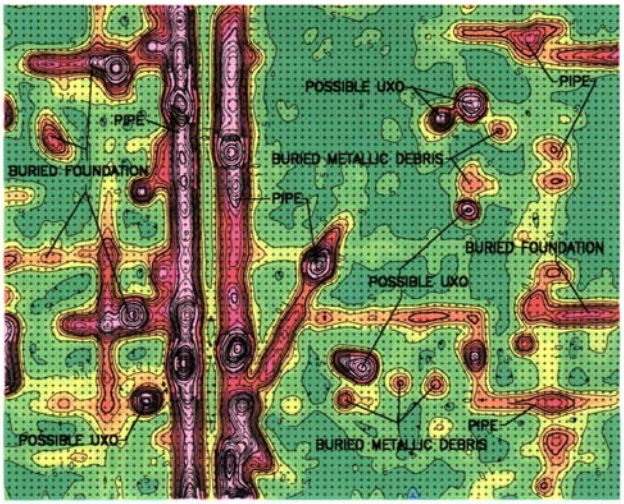
A Geonics EM-61 (EM-61) is a high sensitivity, time-domain, digital metal detector which is often used to detect both ferrous and non-ferrous metallic objects. It is designed specifically to locate buried metallic objects such as drums, tanks, pipes, UXO, and metallic debris and to be relatively insensitive to above ground structures such as fences, buildings, and vehicles.

Geonics EM-61 Digital Metal Detector

The EM-61 consists of two square, 1-meter coils, one mounted over the other and arranged on a hand-towed cart. The bottom coil acts as both a transmitter and receiver while the top coil is a receiver only. While transmitting the bottom coil generates a pulsed primary magnetic field, which induces eddy currents into nearby metallic objects. When the transmitter is in its off cycle both coils measure the decay of these eddy currents in millivolts (mV) with the results being stored in a digital data logger along with position information. The decay of the eddy currents is proportional to the size and depth of the metallic target. A symmetrical positive anomaly is recorded over metallic objects with the peak centered over the object. The signal from the top coil is amplified in such a way that both coils record effectively the same response for a metallic object on the surface and the top coil records a larger response for buried metallic objects. The response of near surface objects can, therefore, be suppressed by subtracting the lower coil response from the upper coil response (differential response).

In practice, the usable depth of investigation of the EM-61 depends on the size and shape of the object and the amount of above ground interference encountered at the site. A single buried drum can often be detected at a depth of about 10 feet.

Geonics EM-61 Survey to Map Subsurface Infrastructure and Potential UXO



GSSI SIR-10A GPR Unit

GPR Methods

Ground-penetrating radar (GPR) is a high-frequency electro-magnetic method commonly applied to a number of engineering and environmental problems.

A GPR system radiates short pulses of high-frequency EM energy into the ground from a transmitting antenna. This EM wave propagates into the ground at a velocity that is primarily a function of the relative dielectric permittivity of subsurface materials. When this wave encounters the interface of two materials having different dielectric properties, a portion of the energy is reflected back to the surface, where it is detected by a receiver antenna and transmitted to a control unit for processing and display.

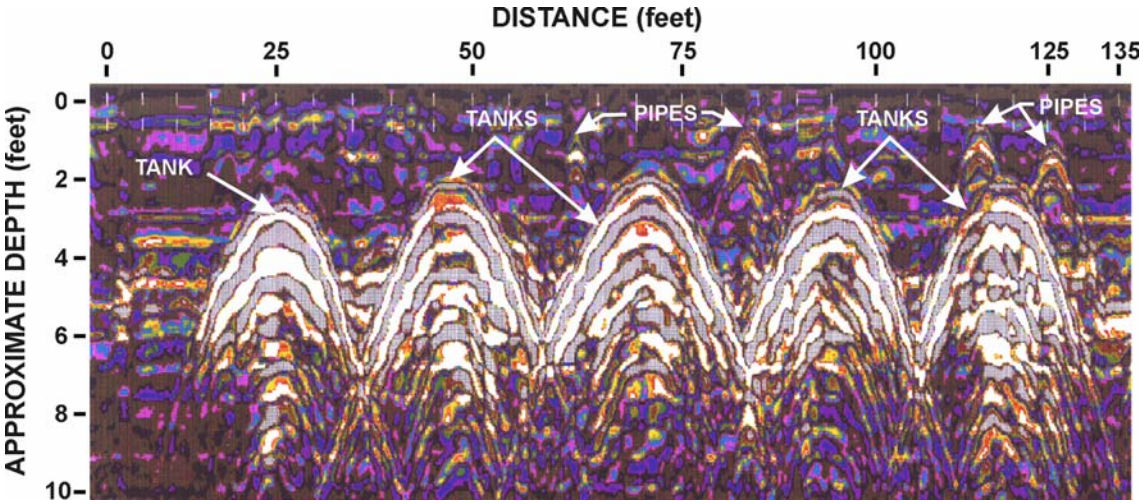
Depth penetration is a function of antenna frequency and the electrical conductivity of the soils in the survey area. Lower frequency antennas achieve greater depth penetration than higher frequency antennas, but have poorer spatial resolution. Conductive soils, such as clays, attenuate the radar waves much

more rapidly than resistive dry sand and rock. In many environments in California, depth penetration of 500 and 300 MHz antennas is limited to 3 to 5 feet. Depth penetration may be greater if shallow soils consist of clean sands and less if shallow soils consist of clay.

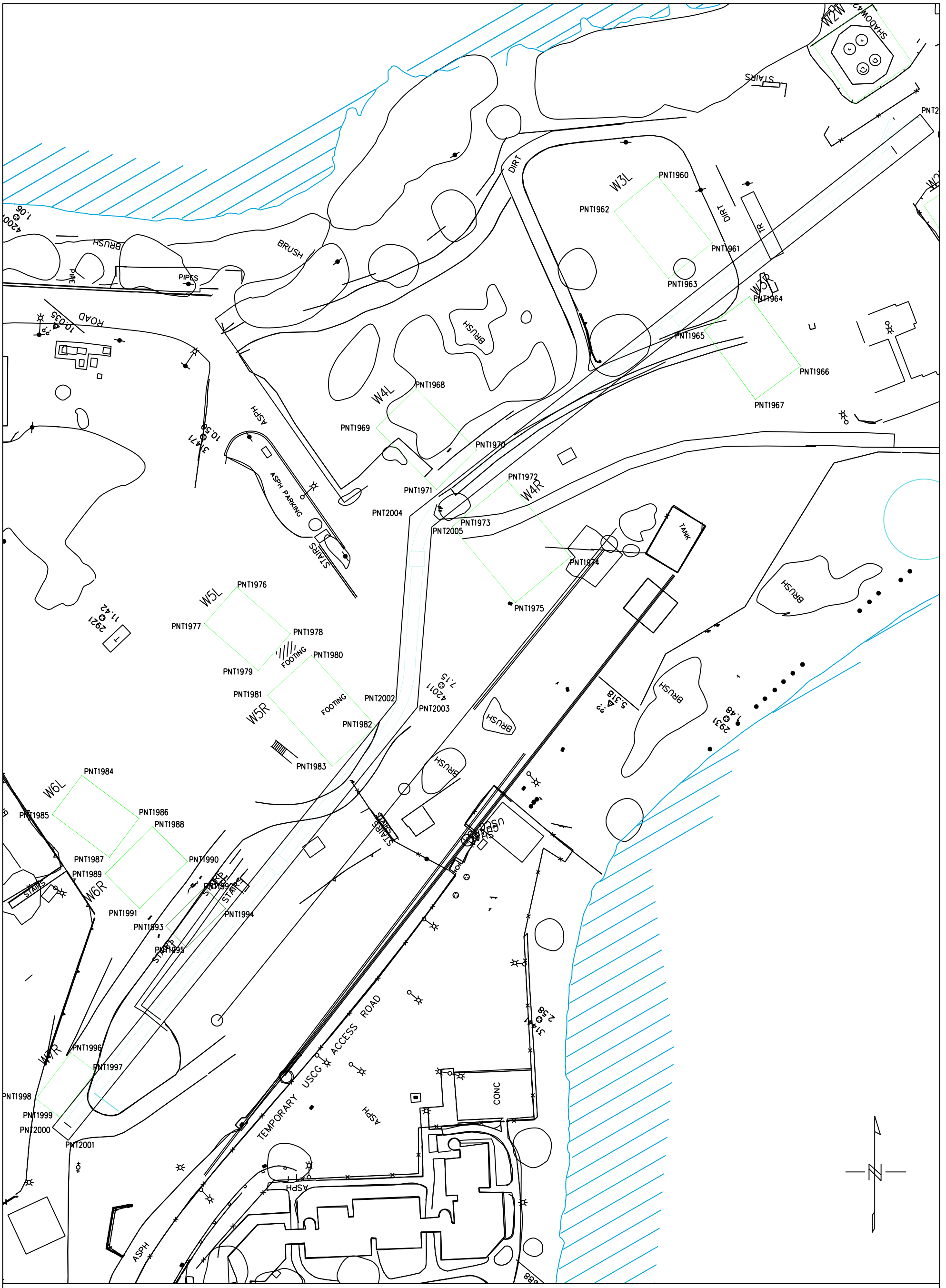
GPR surveys are typically conducted to:

- Locate and delineate underground storage tanks (metallic and non-metallic)
- Locate metallic and nonmetallic pipes and utility cables
- Map rebar in concrete structures
- Map landfill boundaries
- Delineate pits and trenches containing metallic and nonmetallic debris
- Delineate leach fields and industrial cribs
- Delineate previously excavated and backfilled areas
- Map shallow groundwater tables
- Map shallow soil stratigraphy
- Map shallow bedrock topography
- Map shallow subsurface voids and cavities
- Characterize archaeological sites

Geophysical Survey Systems Inc. (GSSI) SIR-2 or SIR-10 GPR systems with antennas in the frequency range of 50 to 1,000 MHz are often used during GPR investigations. Mala Geoscience and Sensors and Software, Ltd also manufacture GPR systems. GPR data is processed using a variety of software including the RADAN™ or GRADIX software packages by GSSI and Interpex Ltd., respectively.



GPR Survey to Locate Underground Storage Tanks



LEGEND

BOUNDARY OF GEOPHYSICAL SURVEY AREAS

NOTE: BASE MAP PROVIDED BY EARTH MECHANICS, INC.

0 40 80 120
(feet)

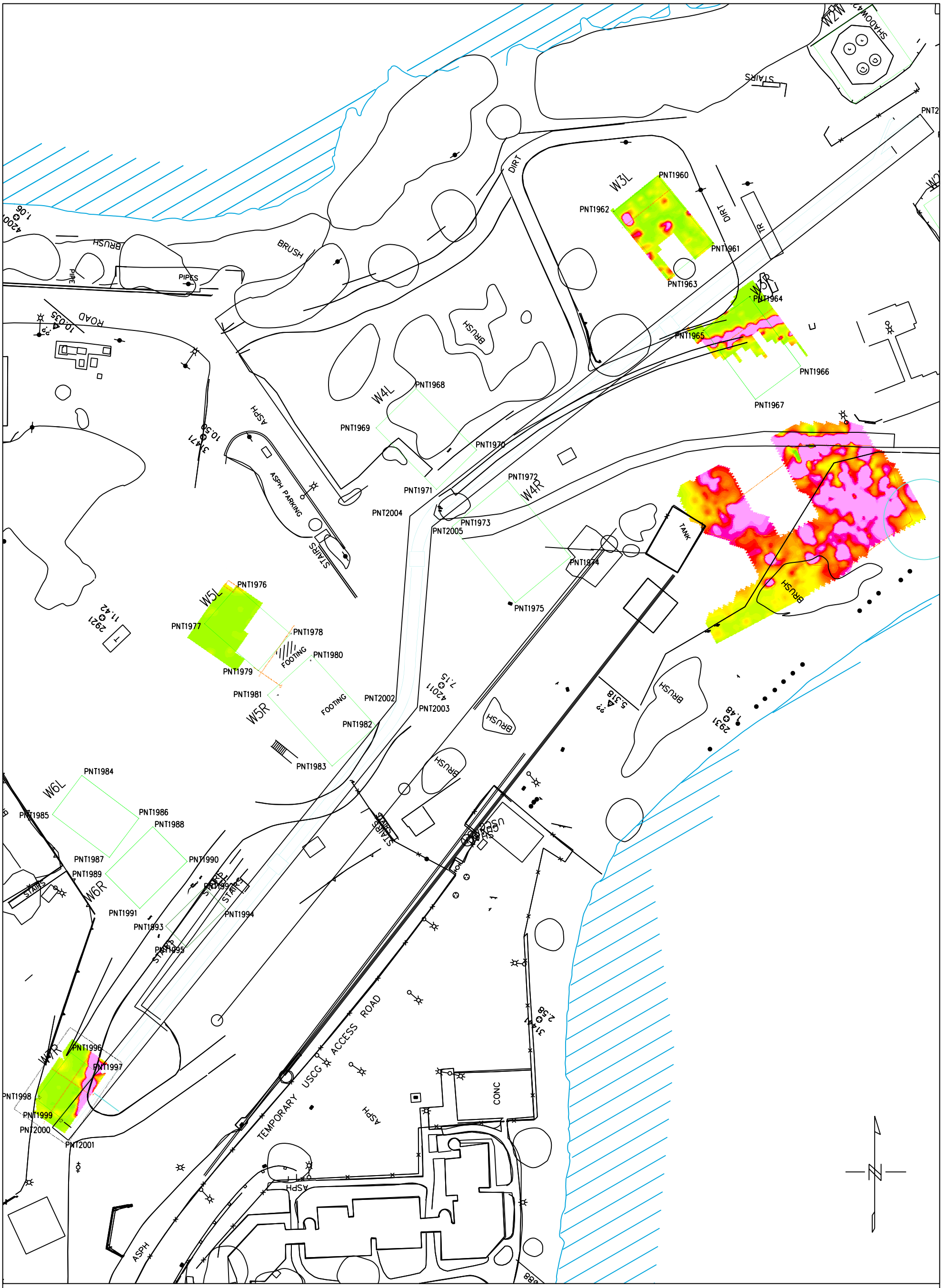
GEOVision geophysical services

Project #	6488
Date	Nov 02,2006
Developed by	J SHAWVER
Drawn by	T RODRIGUEZ
Approved by	
File	\\Geoserv\cad\6488\6488-dgn 2000.dwg

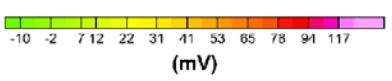
FIGURE – 1
SITE MAP

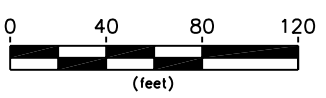
OAKLAND BAY BRIDGE
YERBA BUENA ISLAND, CALIFORNIA

EARTH MECHANICS, INC.



LEGEND





NOTE: BASE MAP PROVIDED BY EARTH MECHANICS, INC.

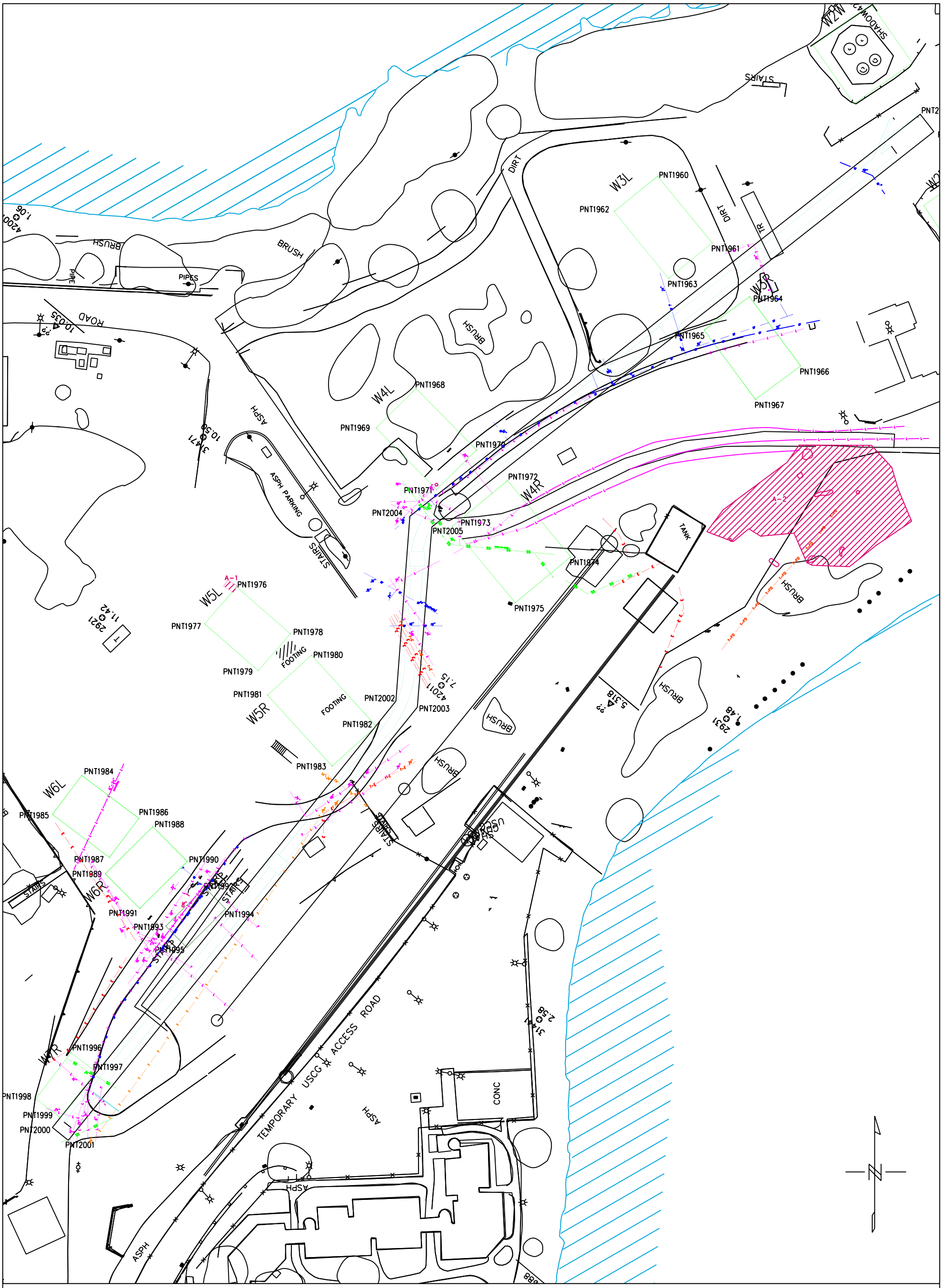
GEOVision geophysical services

Project #	6488
Date	Nov 02,2006
Developed by	J SHAWVER
Drawn by	T RODRIGUEZ
Approved by	
File	\\Geoserv\cad\6488\6488-dgn 2000.dwg

FIGURE – 2
SITE MAP WITH
EM–61 RESPONSE

OAKLAND BAY BRIDGE
YERBA BUENA ISLAND, CALIFORNIA

EARTH MECHANICS, INC.



LEGEND A-1 GPR ANOMALY DISCUSSED IN REPORT

UNDERGROUND CONDUIT WITH DEPTH WHERE AVAILABLE

- ELECTRIC
- MAIN ELECTRIC
- TELEPHONE / ELECTRIC
- TELEPHONE
- TELEPHONE / FIBER OPTIC
- TELEVISION
- STORM DRAIN
- SANITARY SEWER
- ABANDONED SEWER
- WATER
- POSSIBLE WATER
- UNKNOWN
- APPROXIMATE UNKNOWN

NOTE: BASE MAP PROVIDED BY EARTH MECHANICS, INC.

0 40 80 120 (feet)

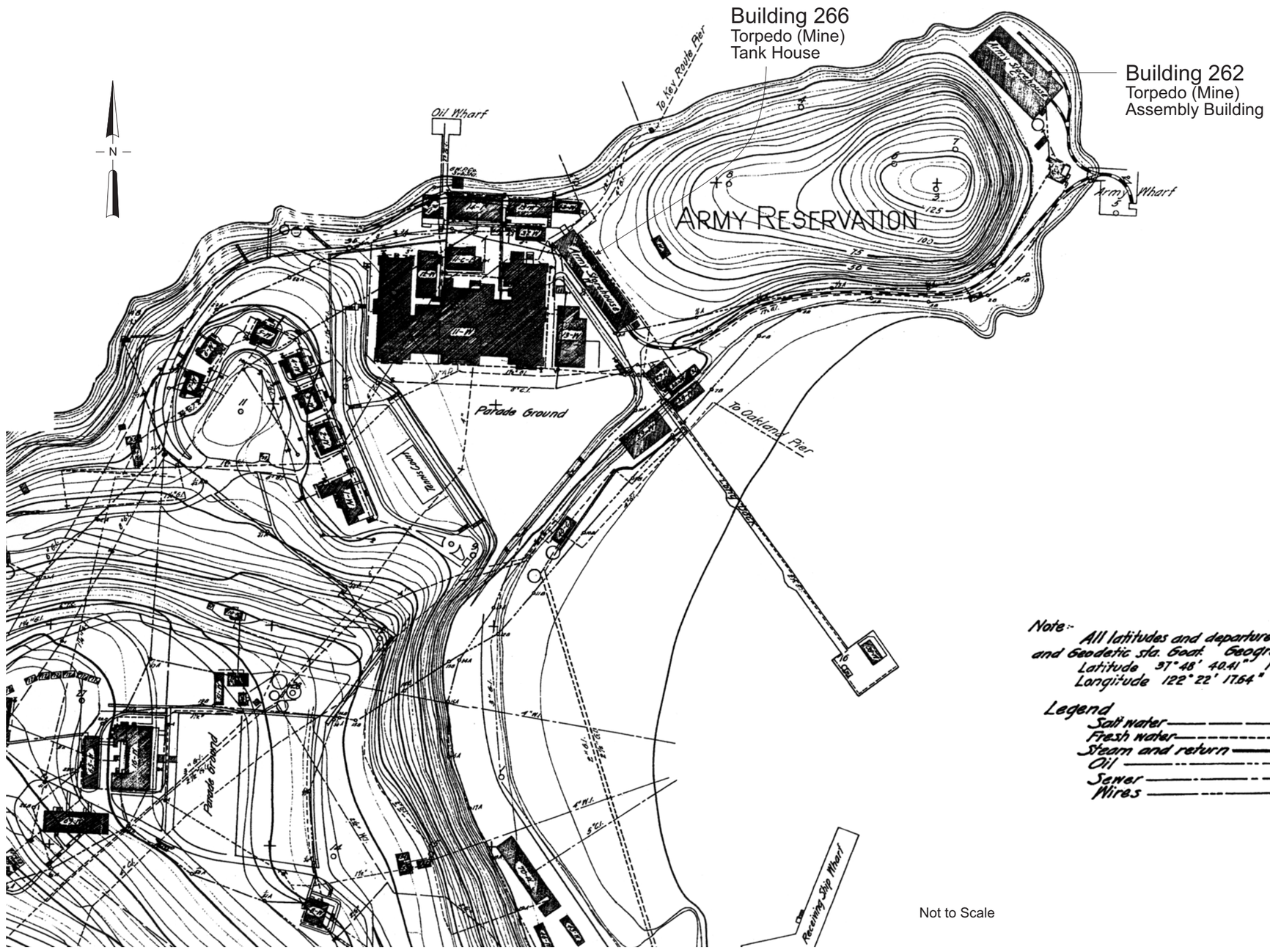
GEOVision geophysical services

Project #	6488
Date	Nov 02,2006
Developed by	J SHAWVER
Drawn by	T RODRIGUEZ
Approved by	
File	\\Geoserv\cad\6488\6488-dgn 2000.dwg

FIGURE – 3
SITE MAP WITH
GEOPHYSICAL INTERPRETATION

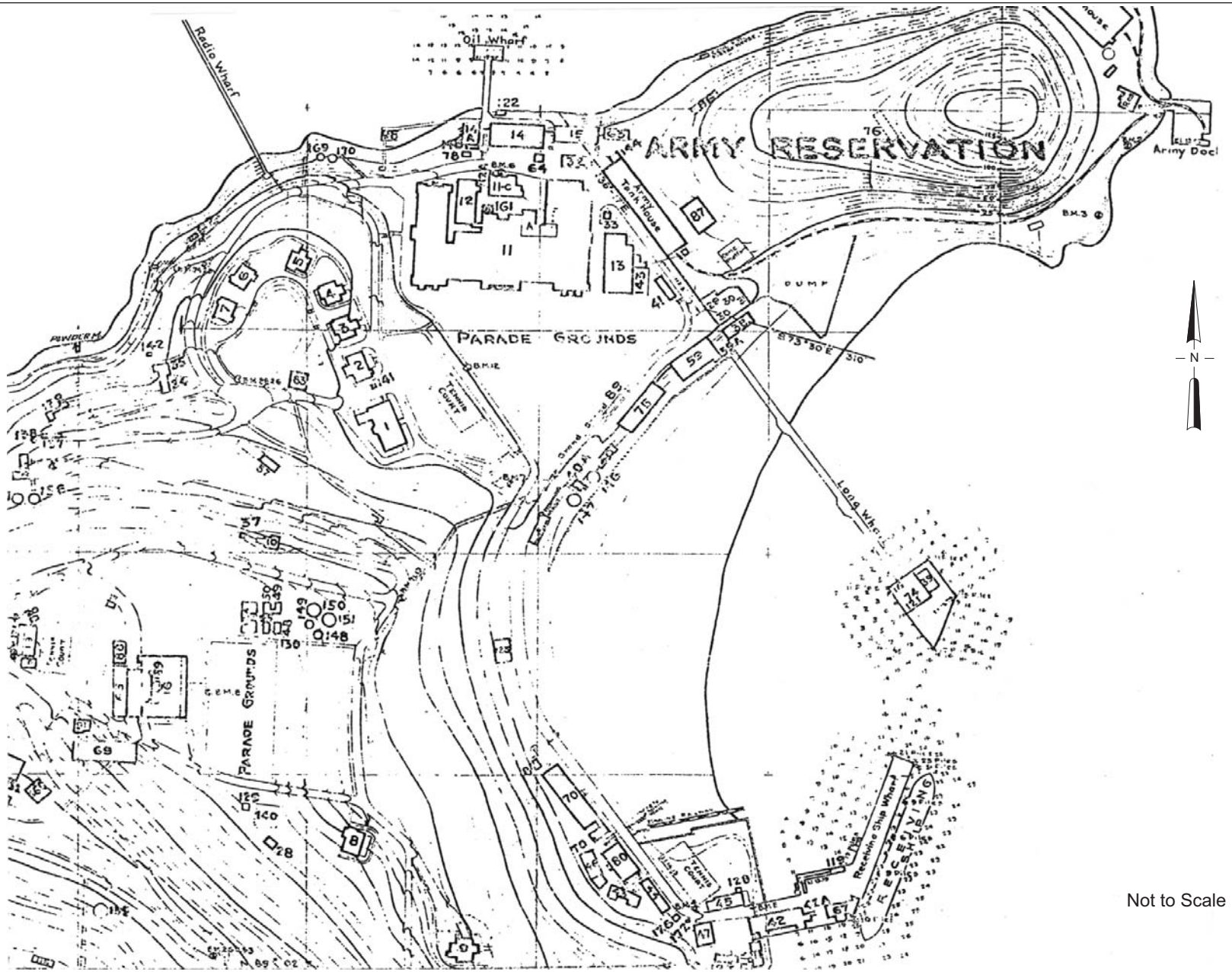
OAKLAND BAY BRIDGE
YERBA BUENA ISLAND, CALIFORNIA

EARTH MECHANICS, INC.



Not to Scale

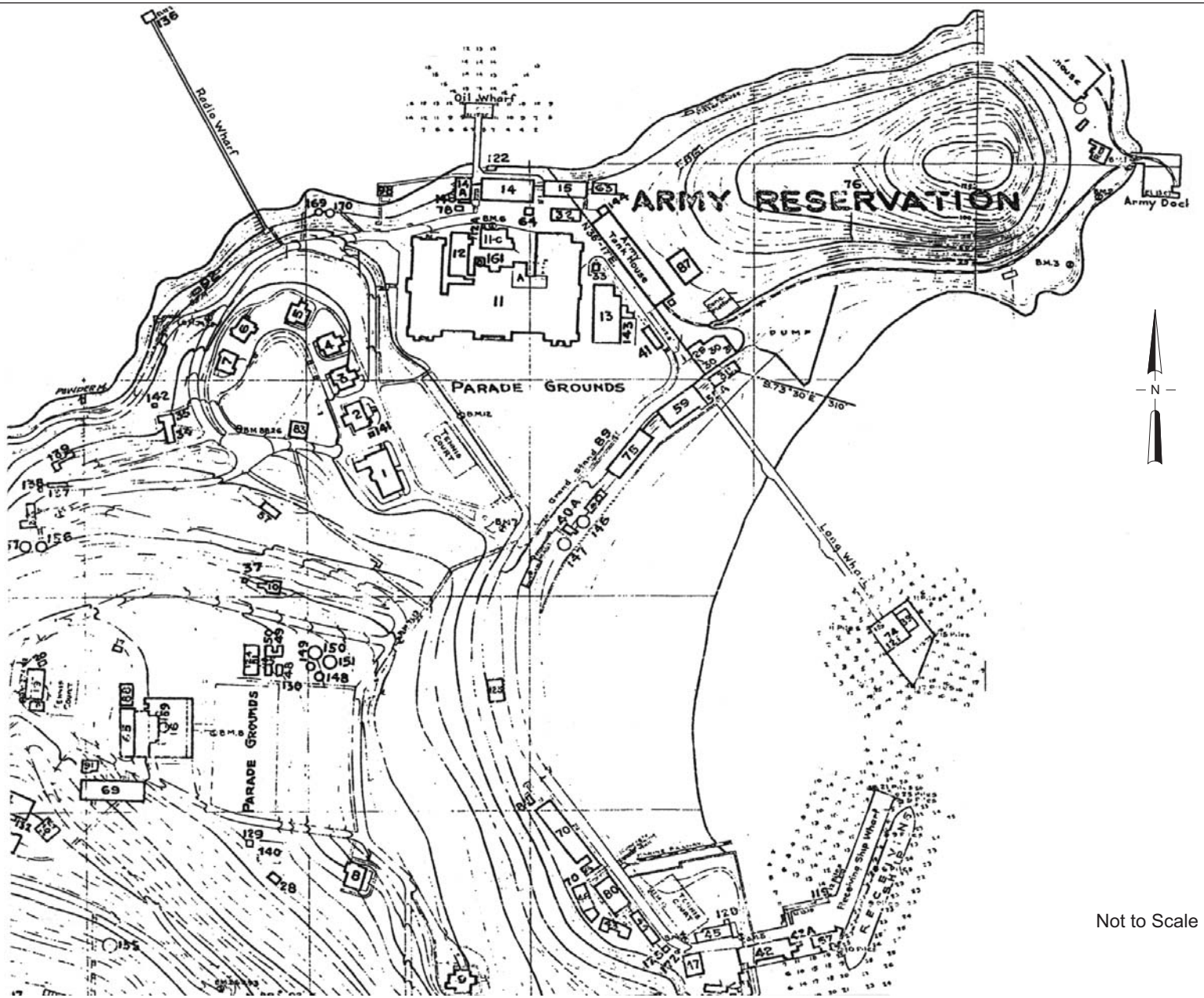
	San Francisco-Oakland Bay Bridge East Span Seismic Safety Project	PORTION OF 1917 MAP (U.S. Department of Navy, 1917)	Historic Map 2



Not to Scale

	San Francisco-Oakland Bay Bridge East Span Seismic Safety Project	PORTION OF 1925 MAP (U.S. Department of Navy, 1925)	Historic Map 3

971080NE-2020E/042398/gos



Not to Scale

	San Francisco-Oakland Bay Bridge East Span Seismic Safety Project	PORTION OF 1933 MAP (U.S. Department of Navy, 1933)	Historic Map 4

971080NE-2020E042398/gps

CONSTRUCTION VIBRATION MONITORING FIELD DATA FORM

Contract Number: _____

Contract Name: _____

Contractor: _____

Observer: _____

Seismograph Information

Manufacturer and Model: _____

Serial Number: _____

Current Calibration Date: _____

Monitoring Location

Building: _____

Address: _____

Sensor Location (describe location and attach sketch)

_____

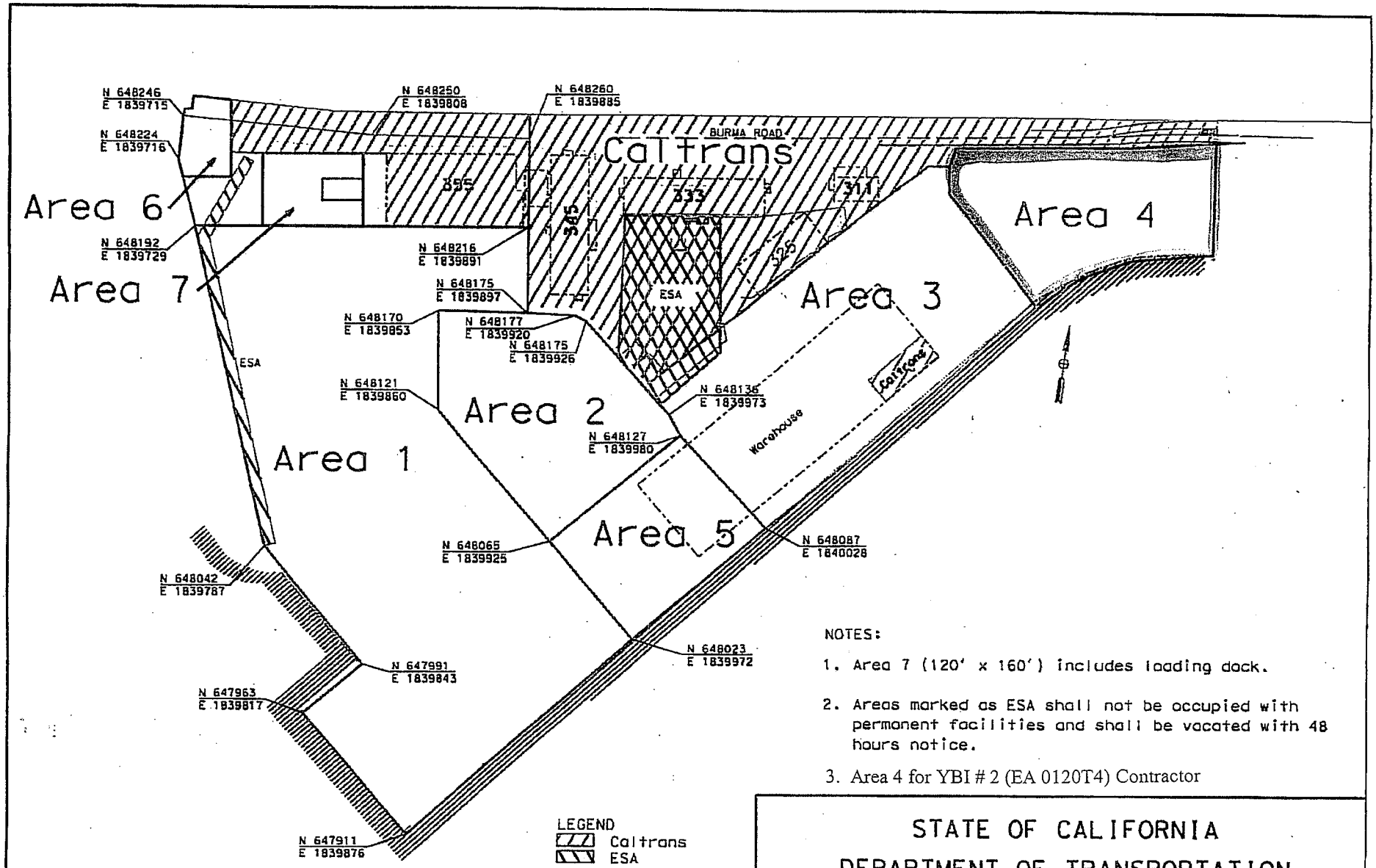
Data Collection: 1-minute ppv Strip Chart (attach data)

Monitoring Period (date and time) Start: _____ End: _____

Observed Events

Date	Time	Source of Vibration (e.g. demolition, pile driving, compaction, excavation, tracked vehicles, etc.)	Distance From Sensor (ft)	Peak Particle Velocity (in./sec)	Frequency (Hz)

Attach additional sheets as necessary



NOTES:

1. Area 7 (120' x 160') includes loading dock.
2. Areas marked as ESA shall not be occupied with permanent facilities and shall be vacated with 48 hours notice.
3. Area 4 for YBI # 2 (EA 0120T4) Contractor

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DISTRICT 4 TOLL BRIDGE PROGRAM

PIER 7-AREAS FOR CONTRACTOR'S USE

...\pier 7 leased area_Kobal112108 11/21/2008 3:53:35 PM

58277-2

Recorded at the request of:
State of California
Department of Transportation

After recording please return to:
State of California
Department of Transportation
P.O. Box 23440
Oakland, CA 94623-0440

COPY of Document Recorded
FEB 13 2002
on _____ as No. 2002072862
Has not been compared with Original.
ALAMEDA COUNTY RECORDER

QUITCLAIM EASEMENT DEED
(Temporary Construction Easement)

THIS QUITCLAIM EASEMENT DEED, made this 11th day of February, 200 2, by and between the UNITED STATES OF AMERICA, acting by and through the DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION ("Grantor"), and the STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION ("Grantee"):

WITNESSETH:

WHEREAS pursuant to Title 23, United States Code, Section 107 (d) and Section 317, whenever rights-of-way, including control of access, on the Interstate System are required over lands or interests in lands owned by the United States, the Secretary of Transportation may make such arrangements with the agency having jurisdiction over such lands as may be necessary to give the State or other person(s) constructing the projects on such lands adequate rights-of-way and control of access thereto from adjoining lands, and any such agency is directed to cooperate with the Secretary in this connection; and

This transfer is exempt from Recording Fees, pursuant to Section 27383, California Government Code; and is exempt from Document Transfer taxes, pursuant to Section 11922, California Revenue and Taxation Code; and is exempt from property taxation, pursuant to Section 202 and Division 1, Part 9, Chapter 4, California Revenue and Taxation Code. All correspondence pertaining to tax matters may be mailed to:

State of California
Department of Transportation
P.O. Box 23440
Oakland, CA 94623-0440

WHEREAS Grantee has filed an application with the Grantor under the provisions of Title 23, U.S.C. Section 107(d) and Section 317 and their implementing regulations at 23 C.F.R §710.601 for right-of-way for the construction of the San Francisco – Oakland Bay Bridge East Span Seismic Safety Project (hereafter "East Span Project") improvements to U.S. Interstate Highway 80 over lands or interests in lands owned by the United States; and

WHEREAS the right-of-way required by Grantee is a temporary interest in land (hereafter referred to as "Right-of-Way") and is located within federal lands commonly known as the Oakland Army Base (hereafter "Federal Property") in the City of Oakland, County of Alameda, State of California ; and

WHEREAS the Federal Property is under the jurisdiction of the United States of America, Department of Defense, Department of the Army (hereafter "Army"), and is currently undergoing the base realignment and closure process pursuant to provisions of the Defense Base Closure and Realignment Act of 1990, the Base Closure Community Assistance Act of 1994 and/or the Base Closure Community Redevelopment and Homeless Assistance Act of 1994, as amended (all collectively referred to as "BRAC"); and

WHEREAS the Army entered into a Master Lease (Lease No. DACA05-1-99-510) with Oakland Base Reuse Authority ("OBRA") leasing the Federal Property, including the property subject to this conveyance to OBRA, and such Master Lease reserves (under Article 14 thereof) to the United States, the right to enter upon and make use of the Federal Property for, and in connection with, any necessary or convenient governmental purposes; and

WHEREAS under State and Federal law, Grantee is responsible for the ownership, construction, operation and maintenance of National System of Interstate and Defense Highway facilities within the State of California; and

WHEREAS Grantor has determined that the Right of Way is required for the National System of Interstate and Defense Highways; has coordinated with the Federal agency of jurisdiction, including sending a formal written notice on August 6, 2001 to which no response was received; and has complied with all other applicable statutory and regulatory procedures.

NOW THEREFORE:

1. Grantor hereby conveys and quitclaims to Grantee, subject to recorded existing liens, leases, easements, and other encumbrances of record, a temporary construction easement ("TCE") for construction of the East Span Project, including but not limited to governmental, non-commercial harbor and port uses, over Parcel 1B. Parcel 1B is described in Exhibit A and depicted on Exhibit B, attached hereto and incorporated herein. This conveyance includes, and Grantor hereby conveys to Grantee, Grantor's right of entry under Article 14 of the Master Lease, identified above. This temporary construction easement shall include the right to develop

any facilities within Parcel 1B which would be desirable to utilize Parcel 1B for temporary construction purposes.

A. Grantor and Grantee acknowledge notice of the potential presence of hazardous substances within Parcel 1B, as reported in the DEPARTMENT OF THE ARMY BASEWIDE PRELIMINARY ASSESSMENT/SITE INSPECTION (PA/SI), OAKLAND ARMY BASE, OAKLAND, CALIFORNIA, dated February 24, 1998, as amended. Grantor hereby reserves to the Army, its successors, and/or assigns a right-of-entry and access to any and all portions of Parcel 1B for purposes of performing remediation or corrective activities relating to such hazardous substances, subject to the specific terms and conditions set forth hereafter in 1A(1)(2)(3)(4)(5) and (6). This reservation includes, but is not limited to, the right to perform investigations and surveys, drillings, excavation, borings, data and record compilations, as well as installation of monitoring wells, pumping wells, treatment facilities, meters, and other related items or activities (all collectively referred to as "Remediation"), Grantor also reserves to the Army, its successors, and/or assigns the right of access across Parcel 1B for ingress and egress to and from the Federal Property lying westerly of Parcel 1B. However, the foregoing right of entry and access onto Parcel 1B for Remediation and the foregoing right of access across Parcel 1B to and from the Federal Property lying westerly of Parcel 1B are subject to the following specific terms, conditions and rights of Grantee:

(1) The Army, its successors and/or assigns shall give Grantee's designee ("Construction Manager") reasonable notice, and in no event less than 24 hours written notice, prior to the date the Army, its successors and/or assigns desire access through Parcel 1B to the Federal Property lying westerly of Parcel 1B.

(2) The Army, its successors and/or assigns shall notify Grantee's designee ("Construction Manager"), in writing, at least 30 business days prior to the date the Army, its successors and/or assigns desires entry onto Parcel 1B for Remediation.

(3) The Construction Manager will cooperate with the Army, its successors and/or assigns to facilitate access over and/or entry within Parcel 1B for Remediation as provided for in section 1A(1) and 1A(2); however, the Construction Manager may, in his/her reasonable discretion, impose any additional conditions on the request for either (a) access through Parcel 1B or (b) entry onto Parcel 1B for Remediation, as are deemed necessary or prudent to Grantee to ensure that such access and/or Remediation do not (1) create safety hazards or (2) impede or delay the East Span Project construction work. (For example, Grantee may require that the Army, its successors and/or assigns, shall be accompanied by the Construction Manager at all times while transporting hazardous substances within or across Parcel 1B). Such additional conditions shall not unreasonably delay Remediation of Parcel 1B.

(4) If the Army, its successors and/or assigns desires to transport any hazardous material or substances within or across Parcel 1B, they shall provide Construction Manager two (2) days written notice, in addition to the one day written notice provided for in section 1A(1) above, of each such desired transport. Such notice shall include all relevant information concerning the nature of the transport including, but not limited to, the exact nature of the hazardous substances, the method(s) of transportation, safety procedures and precautions, verifications, etc to the Construction Manager's satisfaction. The Construction Manager, in his/her reasonable discretion, may impose any additional conditions on such request to ensure safe transport/access through the Parcel 1B.

(5) Nothing in this section shall be construed to prevent or limit the Construction Manager and the Army, its successors and/or assigns from mutually agreeing upon an access scheme for access to and across the Parcel 1B including but not limited to routes, methods, schedules, hazardous materials transport methods and verifications, etc.

(6) The Army's successors and/or assigns are solely liable for any and all damages, costs, charges, liability, expenses (hereafter collectively referred to as "Damage") arising out of or relating to their entry onto Parcel 1B, for any purpose whatsoever. However, the Army's successors and/or assigns shall not be liable for Damage caused by the active negligence of Grantee, nor shall they be liable for Damage caused by intentional misconduct by Grantee.

2. Grantee agrees and covenants that it shall maintain the Right-of-Way to acceptable standards of repair, orderliness, neatness, sanitation, and safety.

3. The TCE shall terminate when the interest conveyed hereby is no longer needed for the East Span Project and no later than on the date Grantee gives final acceptance to its contractor for all the work of Grantee's East Span Project. Notice of such termination shall be given by Grantee to Grantor and this TCE shall thereupon be extinguished. Prior to extinguishment and upon receipt of notice by Grantor, Grantee shall reasonably rehabilitate the area to at least the condition in which it was transferred. Grantee will prepare, execute and deliver to Grantor a quitclaim deed to release and extinguish the TCE over Parcel 1B in a timely manner.

4. Notices. Except as otherwise expressly provided herein, any notices given under this Grant Deed shall be effective only if in writing and given by delivering the notice in person, or by sending it first-class certified mail with return receipt requested, or by nationally recognized overnight courier that guarantees next-day delivery and provides a receipt therefor, with postage prepaid, addressed as follows (or such alternative address as may be provided in writing):

To Grantee:

State of California
Department of Transportation
District 4
111 Grand Avenue
Oakland, CA 94612
Attn: District Director

And to:

State of California
Department of Transportation
Legal Division
P.O. Box 7444
San Francisco, CA 94120-7444
Attn: Deputy Chief Counsel

To Grantor:

United States Department of Transportation
Federal Highway Administration
Administrator, California Division
980 Ninth Street, Suite 400
Sacramento, CA 95814-2724
Attn: Right-of Way Officer

Notices herein shall be deemed given and actual delivery completed three (3) days after the date when they shall have been mailed if sent by first-class certified mail; two (2) days after the date of mailing if sent by overnight courier; and actual delivery shall be deemed complete on the date of delivery if done by personal service at the business office listed above. All personal service shall be done during normal business hours.

5. Grantee agrees and covenants (a) that no person shall, on the grounds of race, color, national origin, sex, age, disability, or religion be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination with regard to the Grantee's operations, programs, or activities conducted on the Right of Way, and (b) that the Grantee shall use said Right of Way in compliance with all requirements imposed by or pursuant to Title VI of the Civil Rights Act of 1964 (42 U.S.C. Section 2000d to 2000d-4) and all applicable civil rights provisions of other Federal statutes.

6. Grantor and Grantee mutually understand and agree that this Quitclaim Easement Deed will be recorded and that the rights, obligations, covenants, and restrictions created by this Quitclaim Easement Deed shall run with the land and shall be binding upon Grantor and on Grantee and shall be binding on, and benefit and burden Grantor's and Grantee's successors, heirs, assigns, and lessees.

IN WITNESS WHEREOF, I, Michael G. Ritchie, Division Administrator, pursuant to delegations of authority from the Secretary of Transportation and the Federal Highway Administrator by virtue of authority in me vested by law, have hereunto subscribed my name as of the day and year first above written.

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

By _____
MICHAEL G. RITCHIE
California Division Administrator

THIS IS TO CERTIFY, that the State of California, acting by and through the Department of Transportation (pursuant to Government Code Section 27281), hereby accepts for public purposes the real property described in the within deed and agrees to itself, its successors and assigns forever to abide by the conditions set forth in said deed.

IN WITNESS WHEREOF, I have hereunto set my hand
this 13th day of FEBRUARY, 2002.

JEFF MORALES
Director
State of California
Department of Transportation

By _____
Attorney-in-Fact
R.A. Macpherson
Deputy District Director - Right of Way

APPROVED AS TO FORM AND PROCEDURE:
this 11th day of FEBRUARY, 2002.

State of California
Department of Transportation

By _____
Assistant Chief Counsel

STATE OF CALIFORNIA }
} ss.
COUNTY OF SACRAMENTO }

On this 11th day of FEBRUARY before me, MATTHEW L. GOETZ, the undersigned Notary Public, personally appeared MICHAEL G. RITCHIE personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity(ies), and that by his/~~her/their~~ signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the instrument.

MATTHEW L. GOETZ
COMM. 1253815
NOTARY PUBLIC - CALIFORNIA
ALAMEDA COUNTY
My Comm. Expires Feb. 17, 2004

WITNESS my hand and official seal.

Signature of Notary

STATE OF CALIFORNIA }
} ss.
COUNTY OF }

On this _____ day of _____ before me, _____, the undersigned Notary Public, personally appeared _____ personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature of Notary

EXHIBIT "A"

PARCEL 1B

That real property situated in the City of Oakland, County of Alameda, State of California, more particularly described as follows:

Beginning at the Westerly terminus of the course described as " N. 80 deg. 25' 12" E. - 4828.38 feet" in PARCEL "S" in the deed from the City of Oakland to the State of California, recorded February 17, 1942 in Book 4186, Page 156, Official Records of said county; thence along said course, North 81°36'36" East, 1365.71 feet; thence at right angles, South 08°23'24" East, 247.26 feet; thence South 81°36'27" West, 50.52 feet to the beginning of a tangent curve with a radius of 350.89 feet; thence along said curve to the left, through a central angle of 40°22'08", an arc length of 247.23 feet; thence South 41°14'19" West, 1337.21 feet; thence at right angles, North 48°45'41" West, 285.88 feet; thence at right angles, North 41°14'19" East, 126.94 feet; thence at right angles, North 48°45'41" West, 233.65 feet; thence at right angles, North 41°14'19" East, 10.00 feet; thence North 21°08'58" West, 640.10 feet; thence North 01°51'20" West, 122.25 feet to the general Southerly line of said PARCEL "S"; thence along last said line, North 88°08'40" East, 292.41 feet to the point of beginning.

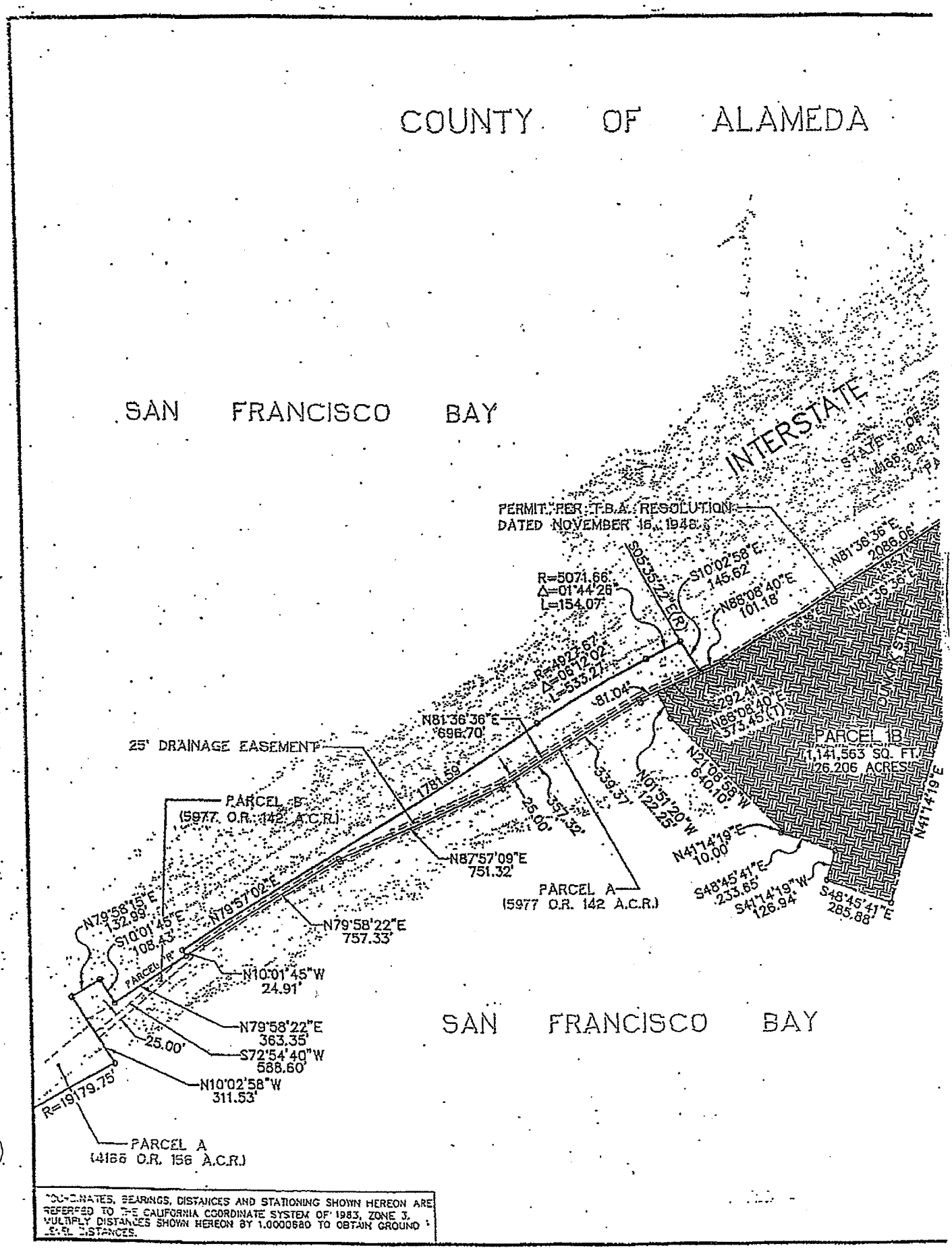
The bearings and distances used in the above description are based on the California Coordinate System of 1983, Zone 3. Multiply the above distances by 1.0000680 to obtain ground level distances.

This real property description has been prepared by me, or under my direction, in conformance with the Professional Land Surveyors Act.

Signature _____
Licensed Land Surveyor

Date 11/28/01

PROFESSIONAL LAND SURVEYOR
JERRY ZHONG
EXP. 12/31/05
NO. LS 7784
STATE OF CALIFORNIA



COORDINATES, BEARINGS, DISTANCES AND STATIONING SHOWN HEREON ARE REFERRED TO THE CALIFORNIA COORDINATE SYSTEM OF 1983, ZONE 3. MULTIPLY DISTANCES SHOWN HEREON BY 1.0000580 TO OBTAIN GROUND LEVEL DISTANCES.

SETTLEMENT AGREEMENT

REGARDING BURMA ROAD EASEMENT (Deed No. 2002072864, recorded 2/13/02 in the Official Records of Alameda County)
and
PIER 7 TEMPORARY CONSTRUCTION EASEMENT (Deed No. 2002072862, recorded 2/13/02 in the Official Records of Alameda County)
(OAKLAND ARMY BASE)

Between

CITY OF OAKLAND
OAKLAND REDEVELOPMENT AGENCY
OAKLAND BASE REUSE AUTHORITY
PORT OF OAKLAND

and

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DATED

April 18, 2002

Settlement Agreement
Regarding Burma Road Easement (Deed No. 2002072864)
And
Pier 7 Temporary Construction Easement (Deed No. 2002072862)
(Oakland Army Base)

THIS SETTLEMENT AGREEMENT is made this 18th day of April, 2002 (the "Execution Date"), by and between the City of Oakland, acting by and through its City Council and its Board of Port Commissioners, the Oakland Base Reuse Authority, and the Oakland Redevelopment Agency (collectively referred to herein as "Oakland") and the California Department of Transportation, a Department of the State of California ("Department"). Oakland and Department are collectively referred to herein as "Parties".

1. This Settlement Agreement sets forth certain of the Parties' respective obligations in connection with (a) lands commonly referred to as "Pier 7" or "220 Burma Road, Oakland, California, 94607", comprising approximately 1,141,563 square feet of land and the improvements thereon including but not limited to Building No. 160, all as more particularly described in Deed No. 2002072862, recorded on 2/13/02 in the Official Records of Alameda County ("Pier 7") and (b) a non-exclusive easement for ingress and egress to Pier 7 via Burma Road Deed No. 2002072864, recorded on 2/13/02 in the Official Records of Alameda County ("Burma Road"). Pier 7 and Burma Road are collectively referred to herein as the "Premises" and the Deeds specified above are collectively referred to herein as the "Easements" (each an "Easement"). In the event of any conflict between the terms of this Agreement and the Easements, this Agreement will control.

2. Department agrees to pay to Oakland the amount of $11.6 million within 30 days of execution of this Agreement, which represents an amount equivalent to the present value of an eight (8) year lease for the Premises commencing on April 18, 2002 through and including April 17, 2010. This payment is in settlement and compromise as set forth in Paragraph 11 below. In the event the Department ceases use of the Premises prior to April 17, 2010, Oakland will refund a pro rata share of said amount to the Department. Department shall pay on a monthly basis for all utilities used by the Department, or its agents, employees and contractors, and utility rates will be consistent with standard utility rates. Oakland agrees to cooperate with Department's installation of all necessary utility facilities as determined by Department. To the extent the Department's use of Burma Road causes damage to Burma road, Department will repair Burma Road, or any relocated or replacement roadway provided in accordance with Section 6 below, to the same condition that existed as of the Execution Date (as to Burma Road) or when made available under this Agreement (as to any relocated or replacement road), less reasonable wear and tear.

3. Department and Oakland agree to extend the terms of this Settlement Agreement in the event the Department's use of Pier 7 exceeds the eight year period defined above. Said extension may be for three additional years, at Department' sole option to be exercised by written notice delivered to Oakland no later than April 17, 2009, if required for the purpose of

completing the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. The notice will specify the desired extended term. The payment obligation pursuant to this Settlement Agreement for the year commencing April 18, 2010, and for each of the following two years, shall be $2,400,000 payable annually in advance.

4. Oakland represents that Pier 7 is currently in use as a functioning pier which is being used by a terminal operator under agreement with the Port of Oakland. Department agrees to accept the Premises on an "as is" basis, and agrees, at Department's sole cost and expense, to keep the Premises in the same or better condition than existed as of the Execution Date, less reasonable wear and tear, and to perform all maintenance and repairs, required as a result of the Department's use of the Premises including, but not limited to, the maintenance and repair of all buildings, pier or wharf facilities, utilities, structures, and asphalt and other ground covering surfaces (collectively referred to herein as "Improvements") required as a result of Department's use of the Premises, but excluding reasonable wear and tear. The Parties further agree that this "as is" condition of the Improvements will be conclusively evidenced in the following documents, to be completed within 30 days of the Execution Date, at Department's sole cost and expense, and otherwise to the satisfaction of the Parties:

a. An Environmental Baseline Survey ("EBS") which satisfies ASTM Phase II standards, and documents pre-existing environmental conditions and the existence of regulated building components requiring removal or abatement including without limitation lead-based paint, asbestos, equipment containing polychlorinated bi-phenols, underground tanks, and above-ground tanks; and

b. An Engineering Evaluation Study ("EES") which documents the conditions of all Improvements.

5. Upon the termination of Department's use of Pier 7 under this Agreement, and unless otherwise agreed to by the Parties, Department at its sole cost and expense shall restore Pier 7 to the condition that existed as of the Execution Date, less reasonable wear and tear over the period of the Department's occupancy.

6. Department expressly acknowledges that remediation of hazardous substances and regulated building components will occur during the term of this Agreement, and that Oakland or its assignee may perform such remediation activities (and redevelopment efforts, including without limitation improvements and replacements to and relocation of, roads and utilities). Department further agrees that such remediation activities will occur under the oversight of, and based on the agreements negotiated by and among, Oakland and third parties including, without limitation, the United States Department of the Army ("Army") and the California Department of Toxic Substances Control ("DTSC"). Department hereby consents to such activities on the schedule and in the manner specified by Oakland, provided that such remediation and redevelopment activities do not include any gap in Department's access to Pier 7 on a right-of-way providing an equivalent level of service to the level now existing on Burma Road. subject to the access conditions set forth in Paragraph 1 of each Easement Deed. Department further agrees, within 30 days following the execution of this Agreement, to submit a letter to DTSC that the Department does not object to the conveyance of the Oakland Army

Base ("OAB") from the Army to Oakland based on a Finding of Suitability for Early Transfer ("FOSET").

7. Department agrees to work with Oakland in good faith to provide for mutually-acceptable landscaping or other suitable screening conditions between Pier 7 and Interstate I-880, and between Pier 7 and other areas within the OAB. Department further agrees to implement Best Management Practices ("BMPs") to assure adequate dust control, debris management and disposal, and minimal impacts to OAB tenants and occupants.

8. Upon expiration of the eight year term or any extension under paragraph 2 above, Department shall quietly and peacefully remove itself and its property from Pier 7 and surrender the possession thereof to the then owner of Pier 7 in the condition specified in Section 5 above.

9. The Parties may modify this Agreement only by a written amendment signed by all Parties.

10. Department agrees to comply with all applicable legal requirements, including without limitation obtaining required permits and approvals from other public agencies in connection with its construction, access, maintenance, and other use of the Premises.

11. This Agreement satisfies claims made by Oakland against Department relating to the Easements in all complaints now on file in federal and state courts. In consideration of this Agreement, Oakland hereby consents to the grant of such Easements, and hereby recognizes that the Department has all rights necessary to use the property in accordance with such Easements and this Agreement. Department does not agree that Oakland's consent is necessary or appropriate under these circumstances, and Oakland does not agree that the Easements are valid. Nevertheless, the Parties agree to proceed with this Agreement notwithstanding their ongoing disputes on these issues. The Parties agree that this Agreement does not constitute a waiver or settlement of Oakland's claims in the pending federal and state court actions except for claims relating to Pier 7 and Burma Road. Within 30 days of the Execution Date, (a) Oakland agrees to file amended complaints in the pending federal and state court actions so as to exclude all claims relating to Pier 7 and Burma Road and (b) Oakland agrees to file a dismissal with prejudice as to all State and Federal Defendants with respect to all claims relating to Pier 7 and Burma Road. Department will not assign this Agreement.

12. Department acknowledges that Oakland has extended the terms of Marine Terminal Corporation's ("MTC") occupancy of Pier 7 to May 21, 2002. Department agrees that it shall use and occupy Pier 7 subject to the extended term of MTC's occupancy, and shall defend, indemnify and hold harmless Oakland from and against all claims from MTC arising out of Department's use or occupancy of the Premises.

13. The Parties acknowledge that Oakland intends to pursue an exchange of the public trust ("Trust Exchange"), under which the portion of OAB located West of Maritime Street ("West Maritime") is released from the public trust and the portion of OAB located East of Maritime Street ("East Maritime") is placed in the public trust. The Department will not assert a public trust interest with respect to the temporary rights encompassed within the Pier 7 easement.

14. This Agreement may be executed in two or more counterparts, each of which shall be an original. All executed counterparts together shall constitute one and the same instrument, and any signature pages may be assembled to form a single agreement. The Parties each will take such additional actions, and cooperate with each other, as may be reasonably necessary to effectuate the terms of this Agreement.

Executed on this ____ of April, 2002 by:

H. Paul Hensley, Deputy District Director
State of California Department of Transportation

Approved as to Form:
Antonio R. Anziano, Assistant Chief Counsel
State of California Department of Transportation

Tay Yoshitani
Executive Director
Port of Oakland

Approved as to Form and Legality:
David L. Alexander, Port Attorney
Port of Oakland

Exhibit "B"
Legal Description
Berth 7 Sub Lease Premises

All that certain real property situated within the Port Area of the City of Oakland, County of Alameda, State of California described as follows:

Parcel 1B as said parcel is described in that certain Quitclaim Deed, recorded February 13, 2002 as Document 20020723862, in the Office of the Recorder said Alameda County.

Containing 141,563 square feet (26.206 acres) more or less.

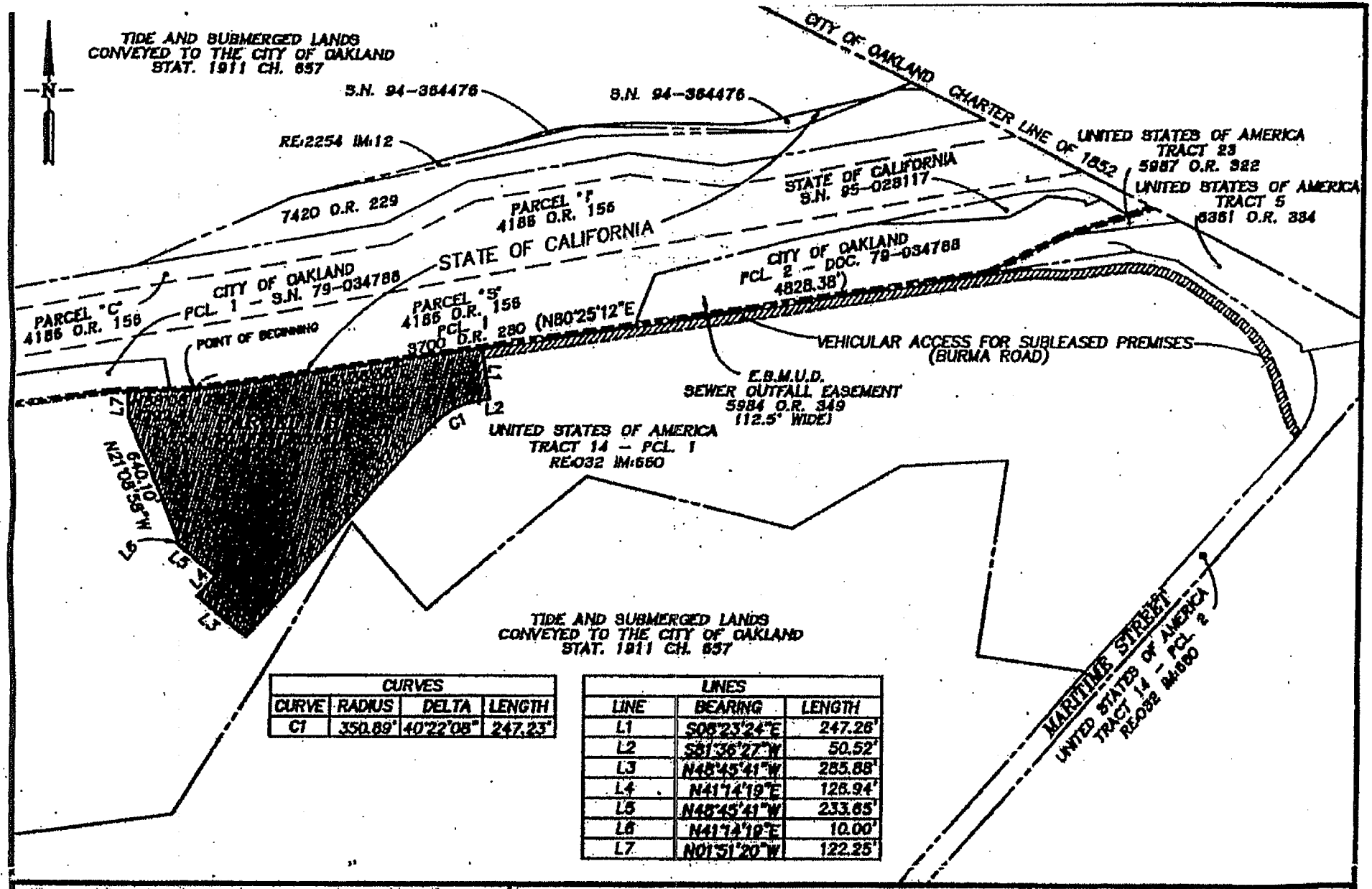
Together with vehicular access along Burma Road as it presently exists between the northwestern line of Maritime Street and the eastern line of said Parcel 1B.

This description and its accompanying plat were prepared by me or under my direction March 27, 2002.

John R. Monaghan, LS 6122
License Expires 3/31/06

3/27/02
Date

LICENSED LAND SURVEYOR
JOHN R. MONAGHAN
No 6122
Exp. 3/31/06
STATE OF CALIFORNIA



CURVES			
CURVE	RADIUS	DELTA	LENGTH
C1	350.89'	40°22'08"	247.23'

LINES		
LINE	BEARING	LENGTH
L1	S06°23'24"E	247.26'
L2	S81°36'27"W	50.52'
L3	N48°45'41"W	285.88'
L4	N41°14'19"E	126.94'
L5	N48°45'41"W	233.65'
L6	N41°14'19"E	10.00'
L7	N01°51'20"W	122.25'

PORT OF OAKLAND
LAND SURVEYS AND MAPPING
530 Water Street
Oakland, California

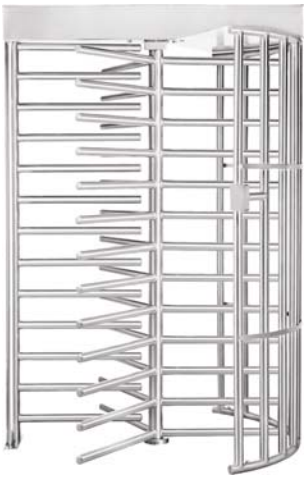
PLAT TO ACCOMPANY LEGAL DESCRIPTION

EXHIBIT B

BERTH 7 – SUBLEASE PREMISES
(PARCEL 1B~QUITCLAIM DEED DOC. 2002072862)

DRAWN BY: JRM	Field Bk:
CHECKED BY:	Wrk. Ord: 601132
SCALE: 1" = 600 '	Data File:
DATE: 3/12/02	Revision:1
SHEET 1 OF 2	Rev. date: 3/27/02
DRAWING FILE: EXHIBIT_A-1A_1B.DWG	
FILE LOC.> ..\TRANSBAY\103644.JRM	

INSTALLATION MANUAL



MST/MST-6X

CLST/CLST-6X

CPST/CPST-6X

MAXIMUM SECURITY TURNSTILES

This is the appropriate manual for MST-3/MST-6X; CLST-3/CLST-6X; CPST-3/CPST-6X turnstiles manufactured on or after October 1, 2010.

Turnstile Serial Number: _____

ALVARADO
12660 Colony Street, Chino CA 91710 – Phone: +1.909.591.8431 – Fax: +1.909.628.1403 – Email: information@alvaradomfg.com

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1.0 Safety

Safety Symbols Used In This Manual

The following symbols are used throughout the manual to highlight important information and potential risks when installing, servicing or using the turnstiles covered in this manual.

WARNING	**This symbol is used in this manual to warn installers and operators of potential harm. Please read these instructions very carefully.**
NOTE	**This symbol is used in this manual to designate useful information for the installer and operator. Please read these instructions very carefully.**
CAUTION	**This symbol is used in this manual to designate potential conditions that may pose a risk to pedestrians, personnel, property and equipment. Please read these instructions very carefully.**
	For questions, please contact Alvarado at (909) 591–8431, Monday – Friday 6:30am to 4:30 PST. Please read this manual completely before installing or operating products.

Important Operating Information

WARNING	**Always follow the installation and operating precautions, including the following:**

- Use only skilled individuals to install and service the turnstile.
- The turnstile is not a toy. Do not allow children to play on or near the turnstile. Do not allow horseplay near the turnstile.
- Follow a proper maintenance schedule using skilled individuals.
- Do not operate the turnstile if it has been damaged in any manner. Have a damaged turnstile repaired or adjusted by a skilled service person before placing back in use.
- Do not modify or alter the turnstile.
- Do not operate the turnstile unless the friction brake or self-centering mechanism is adjusted and operating correctly. Maintenance and adjustment information is contained in this manual.
- Use only Alvarado parts when repairing or maintaining the turnstile.
- In access control applications, train all personnel that will be using the turnstile in the proper method of operation. Ensure that new users are properly trained. (See the Turnstile Operation/User Instructions Section provided on page 36).

CE Compliance and Standards

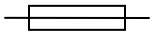
This page defines the product labels required for compliance with LA Electrical Testing Laboratory and International CE standards.

International CE standards:

a. Label (1) the Outlet Specification.

240V~, 1800W

b. Label (2) the Fuse Specification.



F1.0A, 240V

c. Label (3) the Warning, Risk of Electric Shock.

d. Label (4) the Caution, Risk of Danger.

e. Label (5) the Productive Conductor Terminal.

LA Electrical Testing Laboratory Standards:

Label Specifications:

a. Label (1) the Outlet Specification.

120V~, 1800 Watts Max.

b. Label (2) the Fuse Caution.

CAUTION: For continued protection, against risk of fire or shock, replace with the same type and rating fuse.

c. Label (3) the Warning, Risk of Electric Shock.

WARNING: Risk of electrical shock. Do not remove cover. Refer servicing to qualified service personnel.

d. Label (4) the Product Ground Terminal.

Ground Terminal: Connect the earth ground wire to the green ground screw.

2.0 Turnstiles Models

Alvarado Turnstiles in this manual come in the following configurations. Please read each model description carefully to make sure you understand the functionality of the turnstile you are installing.

MST-3 & CLST-3

Three-position key lock control allows turnstile to remain locked in both directions, unlocked in either direction or unlocked in both directions, non-electric.

MST-6X, CLST-6X & CPST-6X

Free rotating in the opposite direction. Electrically controlled in both directions.

Configurations and Descriptions of Common Terms

Fail Lock

Turnstile locks when power is removed (or lost). Turnstile will unlock when both power and an activation contact are supplied.

Fail Safe

Turnstile unlocks in the event of power loss. Turnstile will relock when power is supplied.

NOTE

Fail Lock and Fail Safe functionality are specified by direction. Turnstiles may be Fail Lock in one direction and Fail Safe in the other direction.

Activation

Alvarado's turnstile requires a momentary dry contact of 25 ms or greater. The turnstile does not buffer activations. Once activated, the turnstile will not accept another activation until either the turnstile arm is rotated or 20 seconds have passed.

Speed Control / Self-Centering

The speed control feature self-adjusts the tension to the user depending on the pushing force exerted. This feature provides an even rotation speed. Self-Centering spring tension and roto return time can be adjusted, as described in this manual.

Self-centering automatically returns the rotating section to the "home" position (one armset pointing directly at the center of the yoke). This is a standard feature.

Unlock Override

This option overrides the access control system allowing one or both directions of passage to be unlocked with a key. Locks are located on the underside of the top channel. When both directions have key overrides, the locks are keyed alike.

NOTE

For electrically controlled units, mechanical key overrides are intended for temporary use when the turnstile or access control system has malfunctioned. Mechanical key overrides should only be used under the direction of management and with the supervision of a gate attendant. In case of malfunction, have the access control system and/or the turnstile repaired immediately.

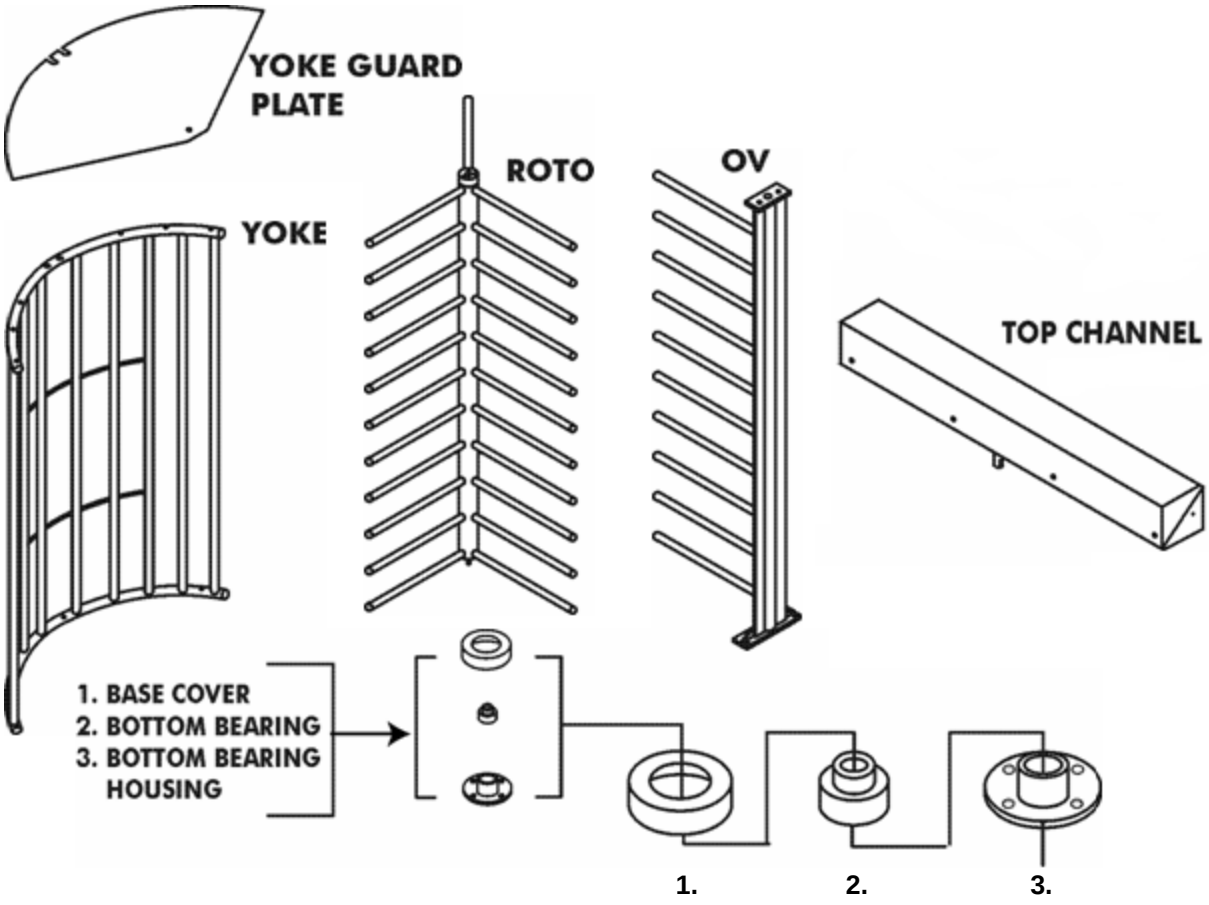
Timed Delay

An activation signal unlocks the turnstile for one entry. Once the turnstile is unlocked, the user is allowed a maximum of 20 seconds to pass through the turnstile.

If the turnstile is not rotated within the 20-second time frame allowed, the turnstile relocks.

Components Included With MST-3/MST-6X
The following components are included in the packaging:

1. Roto (39 arms)
2. Top Channel (Qty 1)
3. Yoke Guard Plate (Qty 1)
4. Yoke (Qty 1)
5. OV (Qty 1)
6. Base Package
   - Top Bearing Cover (Qty 1)
   - Bottom Bearing Housing (Qty 1)
   - Base Cover (Qty 1)
   - Bottom Bearing (Qty 1)
   - 10-32 x ½" Allen Head Screw (Qty 6)
   - ½ -13 x 1" Hex Head Cap Screw (HHCS) (Qty 3)
   - ½ -13 x 1½" HHCS (Qty 2)
   - ½ -13 x 2¾" HHCS (all thread) (Qty 2)
   - #10 x ¾" Pan Head Phillips Sheet Metal screw (Qty 10)
   - ½ - 13 Hex Nut (Qty 7)
7. Anchor Package
   - 3/8 Anchors (2" length) (Qty 12)
   - 3/8 –16 x 4½" HHCS (Qty 3)
   - 3/8 –16 x 2½" HHCS (Qty 12)
   - 3/8 Flat Washers (Qty 12)



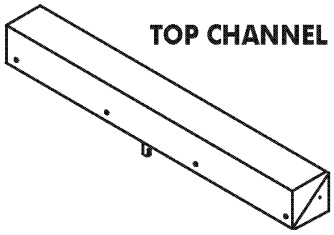
Components Included With CLST-3/CLST-6X and CPST-6X

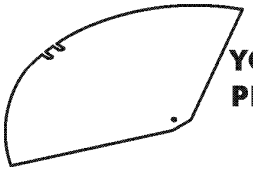
CLST and CPST have different OV and ROTO sections as shown below.

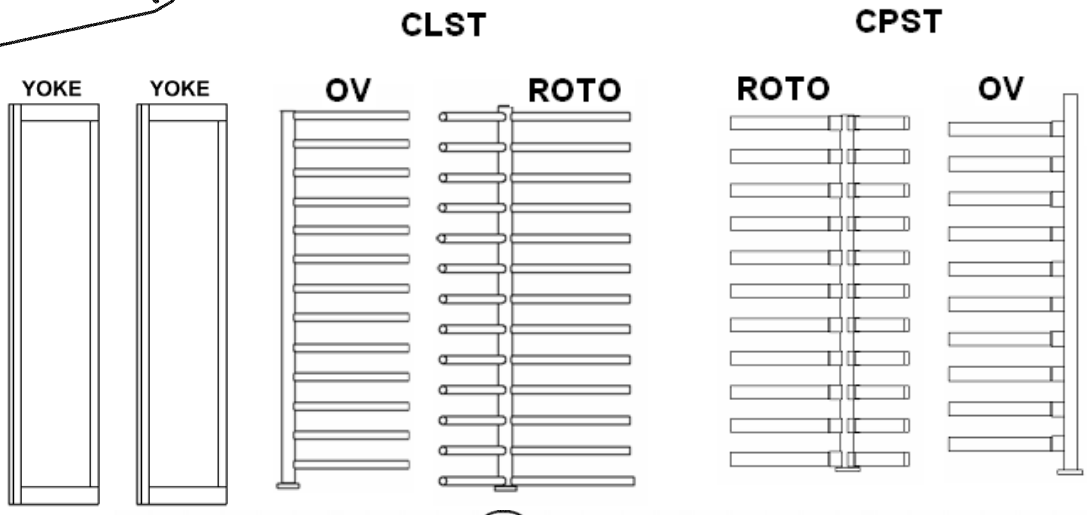
NOTE

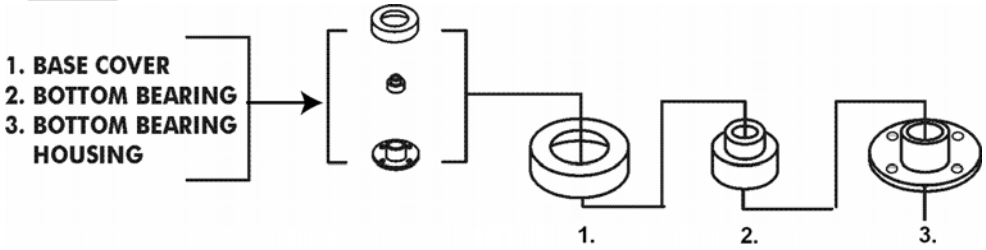
The following components are included in the packaging:

1. Roto (39 arms)
2. Top Channel (Qty 1)
3. Yoke Guard Plate (Qty 1)
4. Qty 2 each – Yoke Sections (Qty 1)
5. OV (Qty 1)
6. Base Package
   - Top Bearing Cover (Qty 1)
   - Bottom Bearing Housing (Qty 1)
   - Base Cover (Qty 1)
   - Bottom Bearing (Qty 1)
   - OV Base Cover (Qty 1)
   - 10-32 x ½" Allen Head Screw (Qty 6)
   - ½ -13 x 1" Hex Head Cap Screw (HHCS) (Qty 3)
   - ½ -13 x 1½" HHCS (Qty 3)
   - #10 x ¾" Pan Head Phillips Sheet Metal Screw (Qty 10)
   - 1/4-20 x 1" Mounting Screw (Qty 6)
   - ½ - 13 Hex Nut (Qty 6)
   - ½ Medium Split Lock Washer (Qty 6)
   - Aluminum Mounting Channels (Qty 8)
7. Anchor Package
   - 3/8 Anchors (2" length) (Qty 12)
   - 3/8 –16 x 2½" HHCS (Qty 12)
   - 3/8 Flat Washers (Qty 12)









3.0 Installation

Installation Considerations

Slab Installation Requirements
6’ x 6’ level concrete pad minimum thickness of 4” level solid concrete

NOTE	**Do not install turnstile on asphalt. Securing both ends of the turnstile top channel (and/or the center outside portion of the OV and Yoke) to a solid object such as framing or a fence post will reduce vibration during operation**

Overview of Installation

1. Determine turnstile installation location, considering turnstile dimensions, power requirements and activation wiring (if applicable).
2. Mark the installation location for the components using a chalk line.
3. Run turnstile power and activation wiring (if applicable).
4. Anchor turnstile components.
5. Secure top portion of turnstile if applicable (see above).
6. Connect power (if applicable).
7. Connect activation wiring (if applicable).

Tools Required

- Heavy Duty Drill or Roto Hammer
- Tape Measure
- 1/8 Allen Wrench
- Twist Drill
- Plumb Bob
- Torque Wrench
- Mallet
- 5/8” Concrete Drill Bit
- Torpedo Level
- #25 (0.1495”) Drill Bit
- Shop Vac
- 9/16” Combination Wrench
- Mobilgrease XHP 222 with Moly or equivalent
- Ratchet with 9/16” and 3/4” Socket
- Chalk line
- Safety Glasses

Turnstile Layout and Installation
(For all models)

1. Determine the location where the turnstile will be installed, taking into consideration the minimum height and width openings required (See the turnstile anchor and elevation view detailed drawings on pages 18, 19 & 20 for the minimum installation requirements). Once the installation location has been determined snap the centerline of the turnstile. The chalked centerline should be at least 6 feet in length. (**Figure 3.1**)

2. Using the turnstile anchoring view drawing on page 18, **for CPST refer to page 53**, mark the centerline locations (perpendicular to the turnstile centerline) for the roto centerline, the yoke centerline, and the OV centerline. For electrically controlled turnstiles (electric models ONLY) the power conduit stub up should be located at the intersection of the turnstile centerline and the OV section centerline **(Figure 3.2).**

3. Center the roto bottom bearing housing at the intersection of the turnstile and Roto centerlines. Mark the center location of the four anchor holes for the roto bearing housing **(Figure 3.3)**. Move the roto bottom bearing housing to the side and drill a 5/8" diameter hole at the center of each marked location. Drill each hole 3" deep. For terrazzo, ceramic tile, or brick veneer installations, add the thickness of the finished floor material to the anchor hole depth. For more information review the detailed drawings on pages 18, 19 & 20.

Figure 3.1 - Locating and marking the centerline of the turnstile.

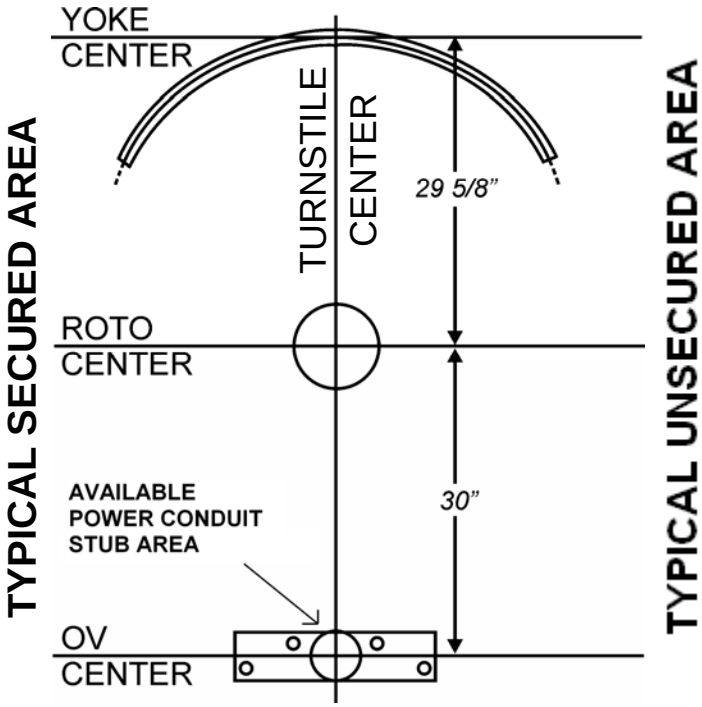


Figure 3.2 - Locating the yoke, Roto, and OV section centerline locations.

Installation of the Roto Bottom Bearing Housing
(For all models)

4. Vacuum out the holes thoroughly. If the holes are not clean, the anchors will not tighten.

5. Insert one anchor into each drilled hole. Ensure that the anchors are flush with the concrete floor. **(Figure 3.4)**

6. Place the roto bottom bearing housing back over the anchor holes and anchor it with four (4) each 3/8 - 16 x 2 ½" HHCS bolts and flat washers. Make sure that the housing is level. Shim as needed **(Figure 3.5)**.

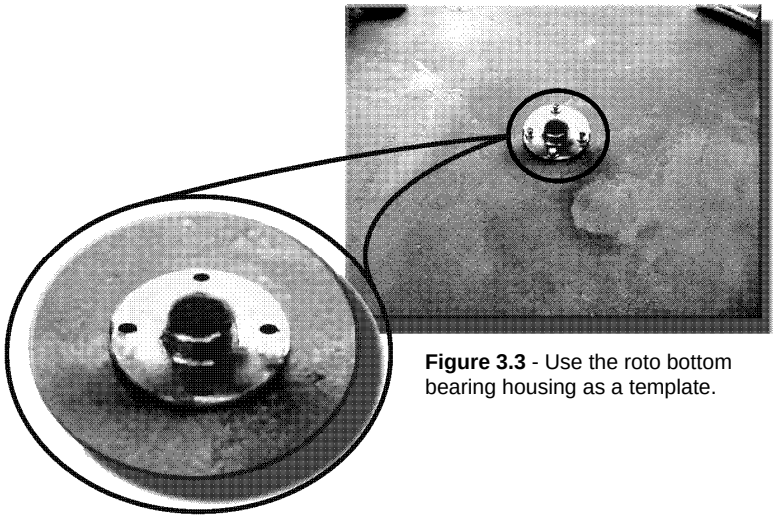
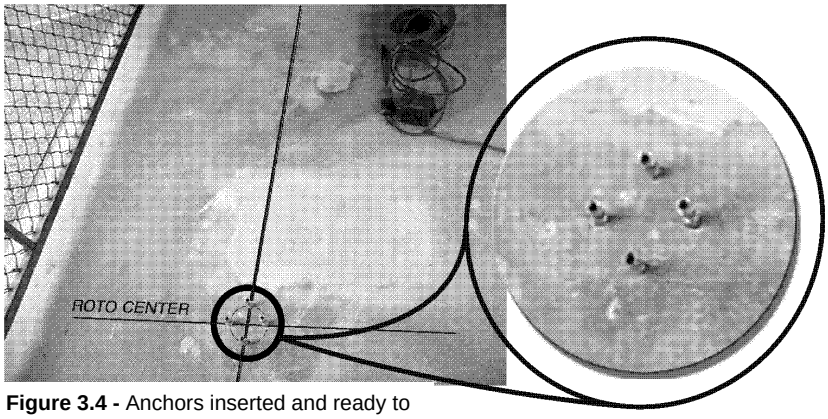


Figure 3.3 - Use the roto bottom bearing housing as a template.



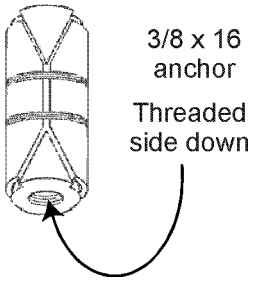


Figure 3.4 - Anchors inserted and ready to be tapped flush into the holes.

NOTE

Insert the anchors with the threads down.

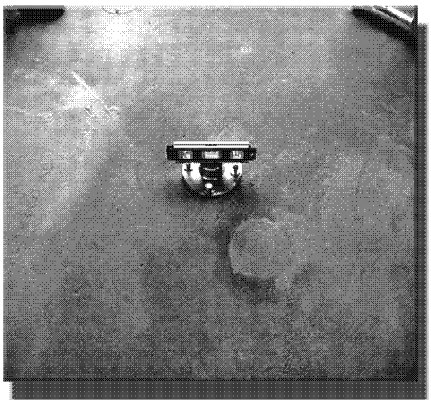


Figure 3.5 -Anchored and level roto bottom bearing housing.

NOTE

For CLST and CPST Models refer to attached Appendix A on page 48 for continued installation instructions that are specific for those models.

Installation of the Yoke
(For MST models)

7. Confirm the location of the center anchor bolt for the yoke section. This anchor will be located at the intersection of the turnstile and yoke centerlines. Drill a 5/8" diameter hole at the center of the marked anchor location. Drill the hole 3" deep. Vacuum out the hole thoroughly and insert one anchor into the drilled hole.

8. Move the yoke section into position so that the center anchor bolt can be installed.

9. Anchor the center of the yoke through the curved bottom yoke arm with one (1) each 3/8 - 16 x 4 ½" HHCS bolt and flat washer and hand tighten **(Figure 3.6)**.

10. Pivot the yoke about the center anchor bolt and measure the distance from the center of the roto bottom bearing housing to the center of each of the remaining two (outer) anchor holes in the curved bottom yoke arm. Continue to adjust the yoke position until the outer yoke anchor holes are equidistant from the center of the roto bottom bearing housing. This "squaring of the yoke" is necessary to ensure that the entrance and exit passage widths are equal **(Figure 3.7)**.

11. Mark the two outer yoke mounting holes.

12. Reposition the yoke section so that the outer anchor holes can be drilled.

13. Drill each hole 3" deep. Vacuum out the holes thoroughly and insert one anchor into each.

14. Reposition the yoke section so that the outer anchor bolts can be installed.

15. Anchor the yoke through the curved bottom yoke arm with two (2) each 3/8 - 16 x 4 ½" HHCS bolts and flat washers and hand tighten.

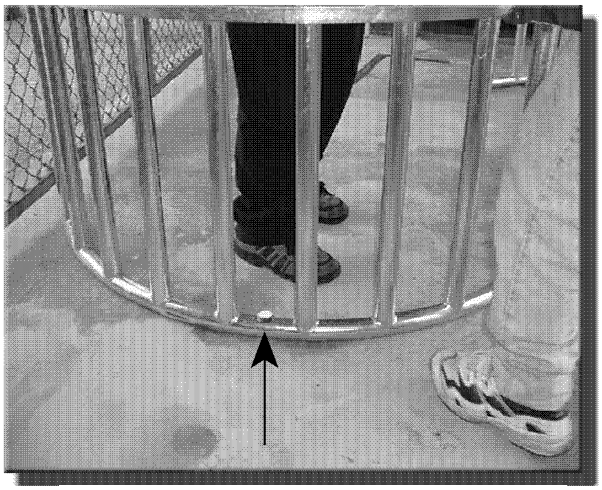


Figure 3.6 - Yoke mounted with the center bolt only.

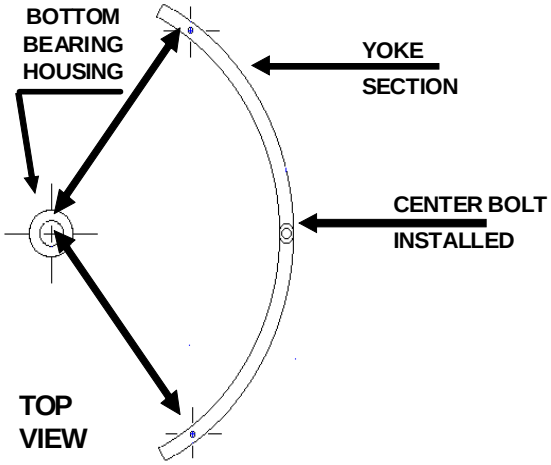
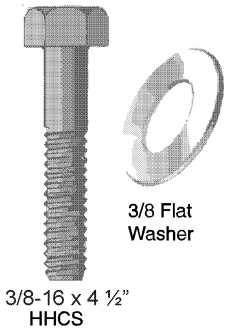


Figure 3.7 - "Squaring the yoke." The yoke should be positioned such that the center of the roto bottom bearing housing is equidistant to each of the outer yoke anchoring holes.



Installation of the OV Section
(For all models)

16. Using a torpedo level ensure that the yoke section installation is vertical. Shim as needed.

17. Center the OV section at the intersection of the turnstile and OV centerlines keeping the OV arms pointed towards the roto bottom bearing housing and parallel to the turnstile centerline (See **Figure 3.8**). For electrically controlled turnstiles (electric models ONLY) the power and, if applicable, the access control system wiring conduit stub ups should be centered within the vertical tube of the OV section.

18. Mark the center location of the four anchor holes for the OV section.

19. Move the OV to the side and drill a 5/8" diameter hole at the center of each marked location. Drill each hole 3" deep. Vacuum out the hole thoroughly and insert one anchor into each drilled hole.

20. Move the OV section back into position over the anchor locations. For electrically controlled turnstiles (electric models ONLY) feed the primary power and, if applicable, the access control system wires all the way through the vertical tube of the OV section.

21. Anchor the OV with four (4) each 3/8 - 16 x 2 ½" HHCS bolts and flat washers. Confirm that the OV installation is level and plumb using a torpedo level. Shim as needed.

22. Locate the base cover. Grease the interior portion of the roto bottom bearing housing. Slide the base cover over the roto bottom bearing housing. (See **Figure 3.9**)

Figure 3.8 - OV section anchored and level.

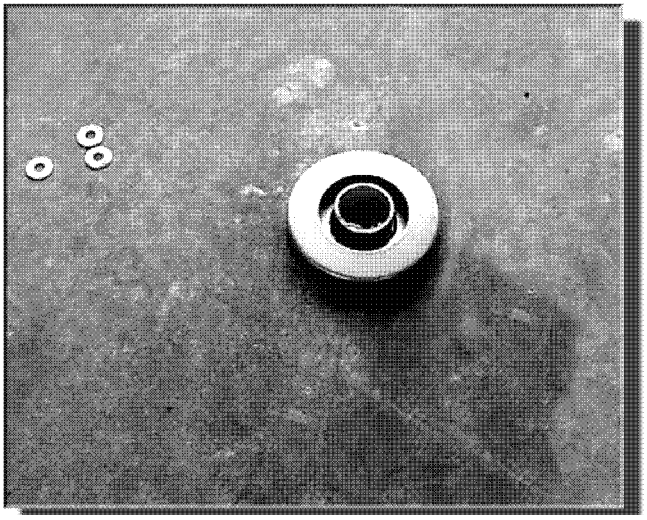


Figure 3.9 - Greased roto bottom bearing housing with base cover.

Installation of the Bottom Bearing
(For all models)

23. Locate the roto section and the bottom bearing. Seat the stem of the bottom bearing up into the bottom of the roto shaft. (See **Figure 3.10 and Figure 3.11**)

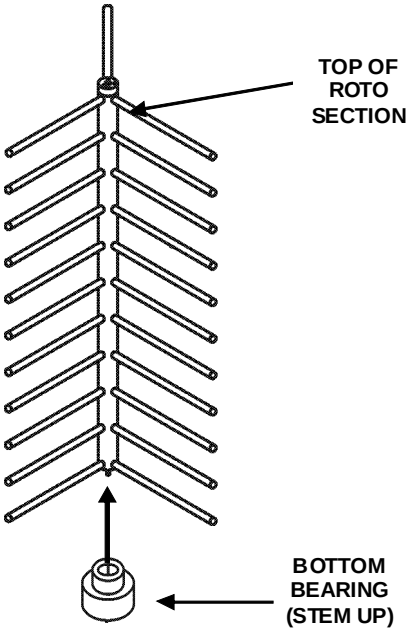


Figure 3.10 - Bottom bearing installation orientation.

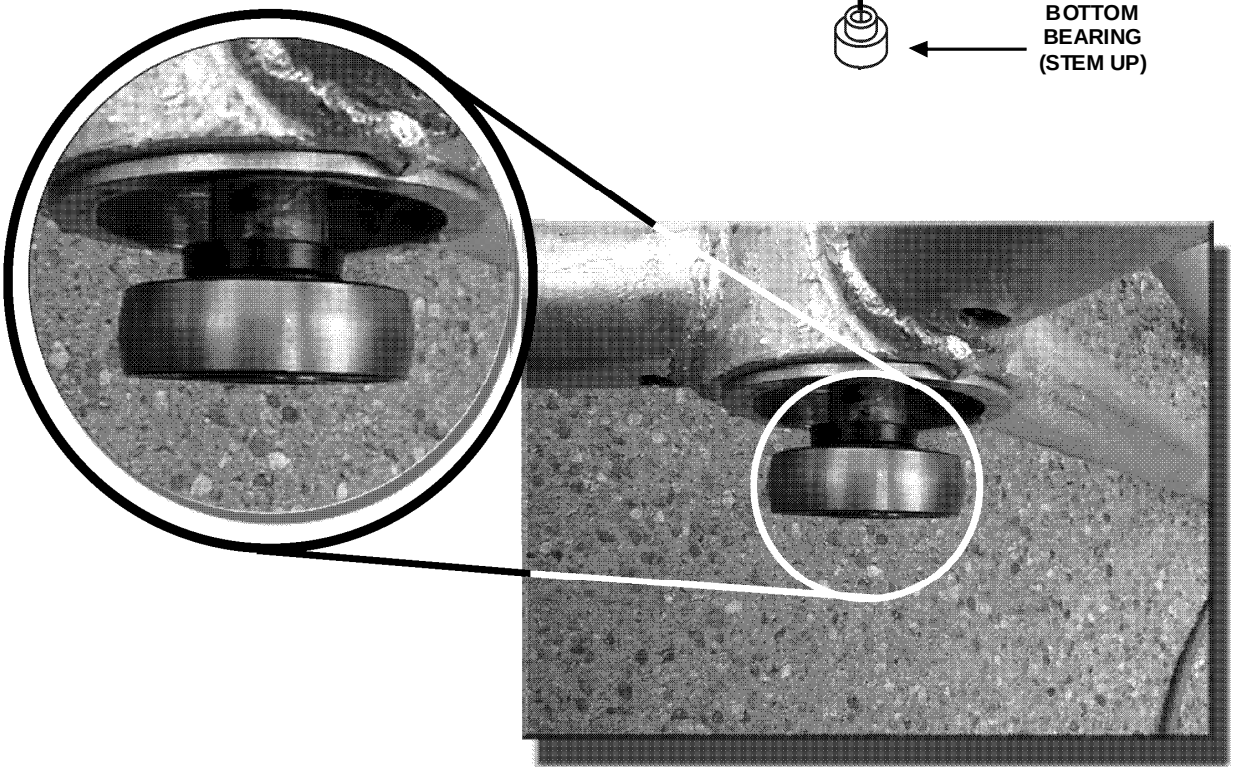


Figure 3.11 - Bottom bearing installed correctly.

Installation of the Roto Section
(For all models)

23. Apply a light coat of grease to the interior of the grooved cavity at the top of the roto section (See **Figure 3.12 and Figure 3.13**).

24. Locate the top channel and apply a light coat of grease to the splined top channel shaft.

NOTE **Greasing both the grooved roto cavity and the shaft will greatly simplify the upcoming installation step of sliding the top channel shaft into the roto (See Figure 13 & 14).**

---

25. Set the roto section (with the bottom bearing already installed) into the roto bottom bearing housing. With a helper supporting the roto section and holding it upright, confirm that the bearing turns freely and does not bind or stick.

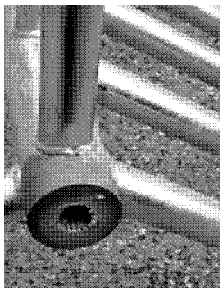


Figure 3.12 - Bottom bearing installed correctly.

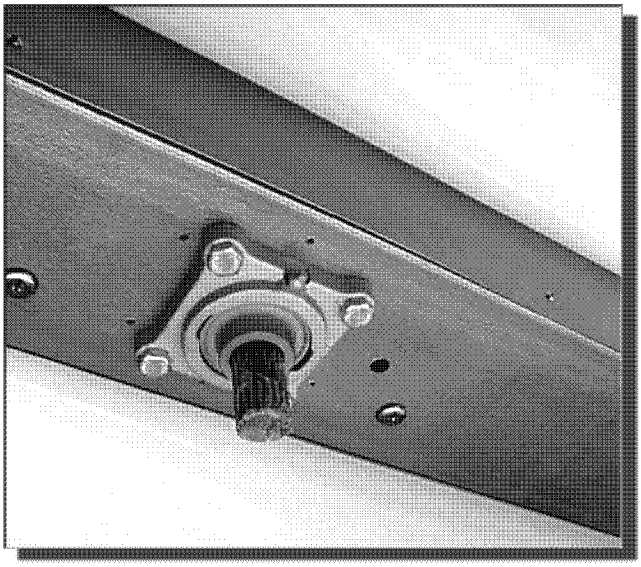


Figure 3.13 - Greased splined top channel shaft ready for installation.

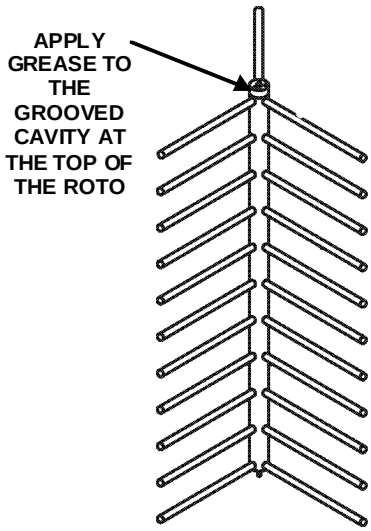


Figure 3.14 - Greased roto section ready for installation.

Installation of the Top Channel
(For all models)

26. With a helper supporting the roto section and holding it upright, raise the top channel up and over the yoke, roto, and OV sections. Align the splined top channel shaft above the roto section and carefully lower the top channel onto the yoke and the roto sections. (See **Figure 3.15a** and the note below)

27. Tighten the set screw found on top of the roto with an allen wrench. (**Figure 3.15b)**

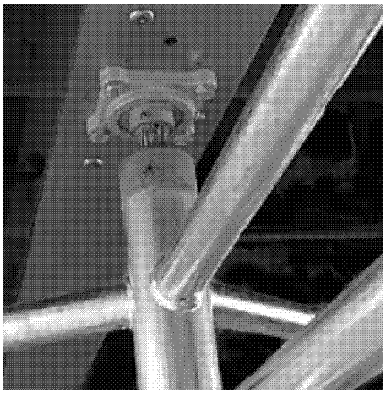


Figure 3.15a - The splined top channel shaft has been aligned and is being seated into the grooved cavity in the top of the roto section.

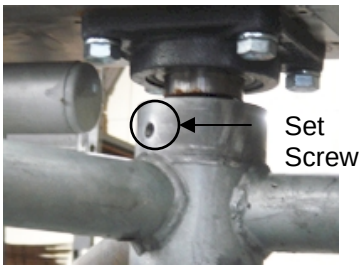
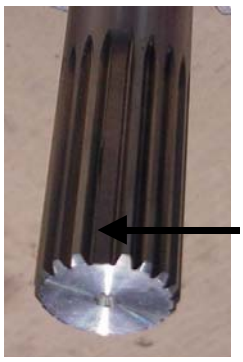


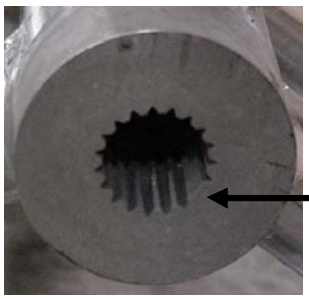
Figure 3.15b - Set screw on top of the roto.

NOTE

On the splined top channel shaft, one of the "valleys," or gaps between the splines, is not uniform and considerably larger that the others. In the grooved roto cavity, one of the "peaks," or ridges, is also not uniform and is considerably wider than the others. See the pictures below.



Location of the large "valley" on the splined shaft



Location of the wide "ridge" on the roto cavity

29. To correctly seat the top channel on top of the roto, the larger "ridge" in the roto cavity must be aligned with the larger "valley" on the top channel shaft. The correct placement will force the roto unit to be positioned with one set of arms pointing directly at the middle part of the yoke section.

30. Please be aware that this fit is often very tight. Use a mallet to seat the top channel and shaft while moving the roto.

WARNING

When using a mallet to seat the top channel and shaft, be careful to only hit the shaft in the center section. Hitting the friction brake mechanism or the self-centering mechanism will only damage these parts and will not aid in the installation.

Installation of Primary Power Control Wiring
(For all models)

29. Remove the four (4) each 10-32 x ½" round head socket cap screws from the top channel and remove the top channel cover.

30. If the turnstile uses an activation device that mounts to a plate or bracket on the yoke section (such as a card reader), run the associated wiring through the yoke using the pre-installed feeder wire. Feed the access control system wires through the openings in the top of the yoke section and into the inside of the top channel. (See **Figure 3.16 & 3.17**).

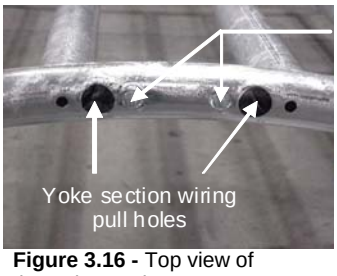


Figure 3.16 - Top view of the Yoke section.

Yoke Section to Top Channel mounting holes

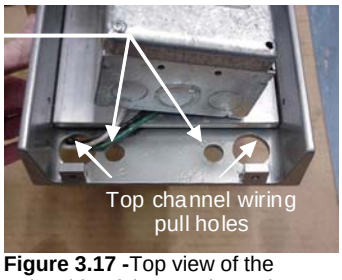


Figure 3.17 -Top view of the Yoke side of the top channel.

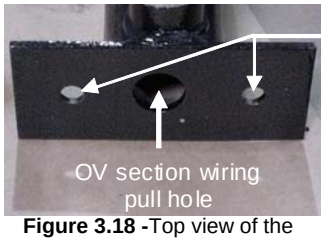


Figure 3.18 -Top view of the OV section.

OV Section to Top Channel mounting holes

Figure 3.19 - Top view of the OV side of the top channel.

31. Similarly run the primary power and any other wiring associated with the access control system through the vertical tube on the OV section. Feed these wires through the opening in the top of the OV section and into the inside of the top channel. (See **Figure 3.18 & 19**)

32. Mount the top channel to the yoke section using two (2) each ½ -13 x 2 ¾" HHCS bolts, lock washers and nuts. (The bolt locations are identified with white arrows in Figure 20) Do not tighten the bolts yet.

33. Attach the top channel to the OV section using two (2) each ½ -13 x 1½" HHCS, nuts and lock washers.

34. Slide the yoke guard plate, slotted and radiused end first, between the top channel and the yoke. Ensure that the feeder wire and/or any access control system wiring are not being pinched between the top channel, the yoke, and the yoke guard plate. Secure the yoke guard plate using one (1) each ½ -13 x 1" HHCS bolt, nut and lock washer. (The bolt location is identified with a black arrow in **Figure 3.20**)

Figure 3.20 - The bolt locations to mount the yoke section to the top channel are identified with white arrows. The bolt location to mount the yoke guard plate to the top channel is identified with a black arrow.

35. Tighten all of the anchoring bolts (11 bolts total) and all of the top channel mounting bolts (5 bolts total) to 20 ft-lbs. and check the plumb of the turnstile with a torpedo level. Shim the turnstile as necessary, then tighten the bolts securely (to approximately 40 ft-lbs.).

36. Mark at least six (6) mounting hole locations to mount the yoke guard plate to the curved top yoke arm. The mounting hole locations should be evenly distributed along the yoke guard plate (there should be a minimum of 3 mounting holes on each side of the top channel) to ensure that the yoke guard plate is

installed securely and level. Drill a .1495" diameter hole (using a #25 drill bit) in the locations marked. Drill the pilot hole through both the yoke guard plate and the curved top yoke arm. Attach the yoke guard plate to the curved top yoke arm with at least six (6) each #10 x ¾" pan head slotted sheet metal screws.

37. Attach the top bearing cover to the underside of the top channel with five (5) each 10-32 x ½" allen head screws. When properly installed the top bearing cover will mask the top of the roto and the splined top channel shaft.

38. For turnstiles without self-centering mechanisms, test the friction break mechanism. Hold the lock arm(s) open and rotating the roto section of the turnstile in the appropriate direction(s). There should be a small amount of drag (roughly 3 to 6 lbs.) as the roto section turns. If there is too much or too little resistance in the friction break mechanism, follow the instructions on page 40 to adjust the friction brake mechanism.

39. For turnstiles with self-centering mechanisms: A friction brake is not used on turnstiles with self-centering mechanisms. Self centering mechanisms are most commonly used in applications in which one turnstile direction is electrically controlled while the other turnstile direction is unlocked for free passage. The self-centering mechanism corrects an under (less than 90°) or over (more than 90°) rotation of the roto section in the free passage direction of the turnstile. When the self-centering mechanism is functioning correctly, the roto arms will automatically return to the "home" position, with one set of arms pointing toward the center of the yoke section. To test the self-centering mechanism, both over rotate and under rotate the turnstile roto section. Confirm that the roto section returns to the "home" position in both of these scenarios. If the roto section of the turnstile does not return to the "home" position, follow the instructions on page 40 to adjust the self-centering mechanism.

40. Reattach the top channel cover.

Stabilizing the Top Channel

41. To further stabilize and reduce vibration of the top channel during use, it is recommended that the top channel be secured to the fence line or other secure, stationary object near the turnstile.

42. The top channel can be further secured with the optional top channel stabilizing option. To install, insert the Alvarado supplied spacer between the top OV arm and the top channel. Secure the spacer and stabilize the top channel using the U-bolt, washers, and nuts provided.

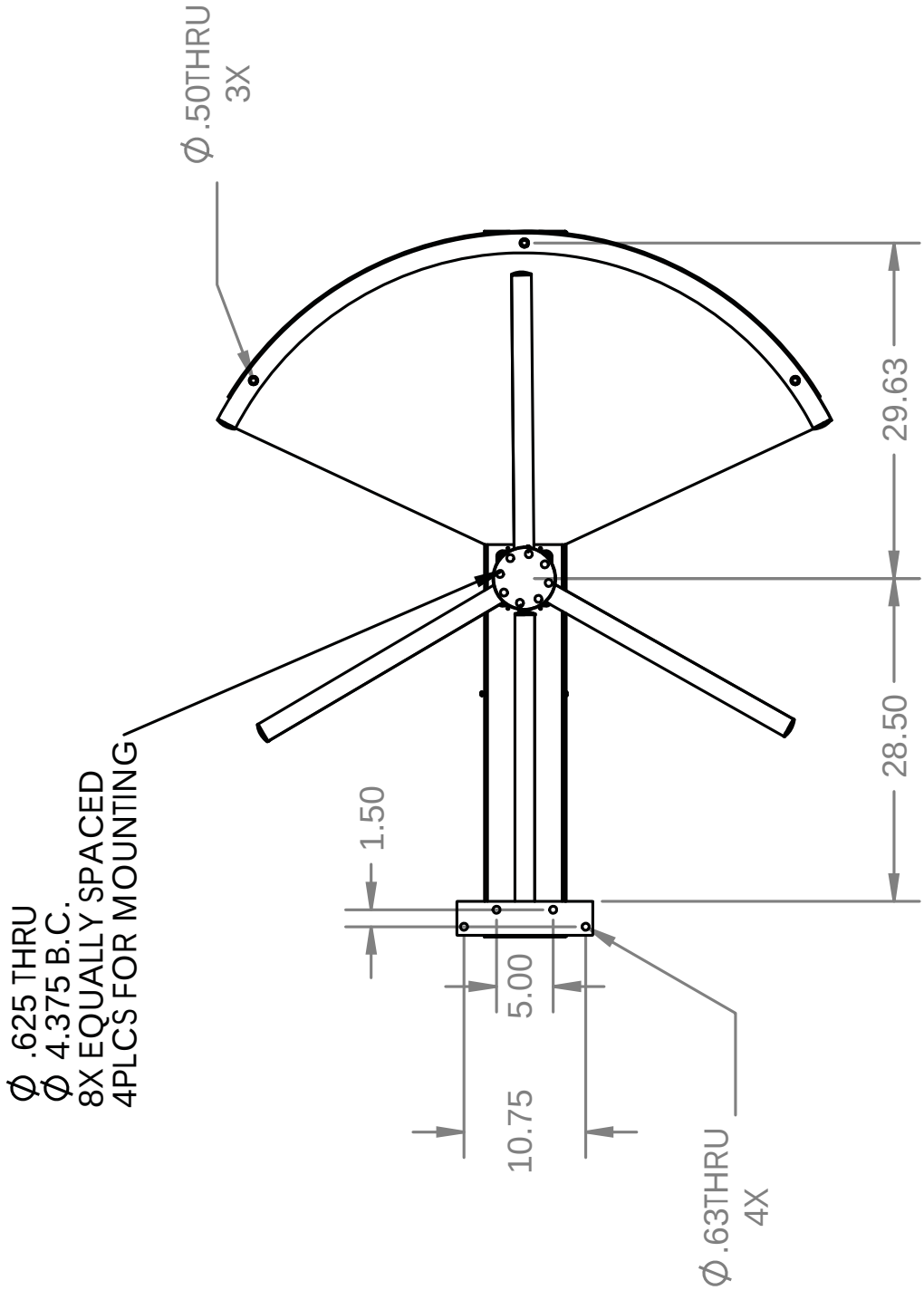
NOTE

For electric models (ends with 6X) primary power and control wires can be run through the vertical tube of the OV section. Conduit may also be brought to and directly attached to the top channel cover. See examples below:

Turnstile Anchor View
(For MST Models only)

NOTE

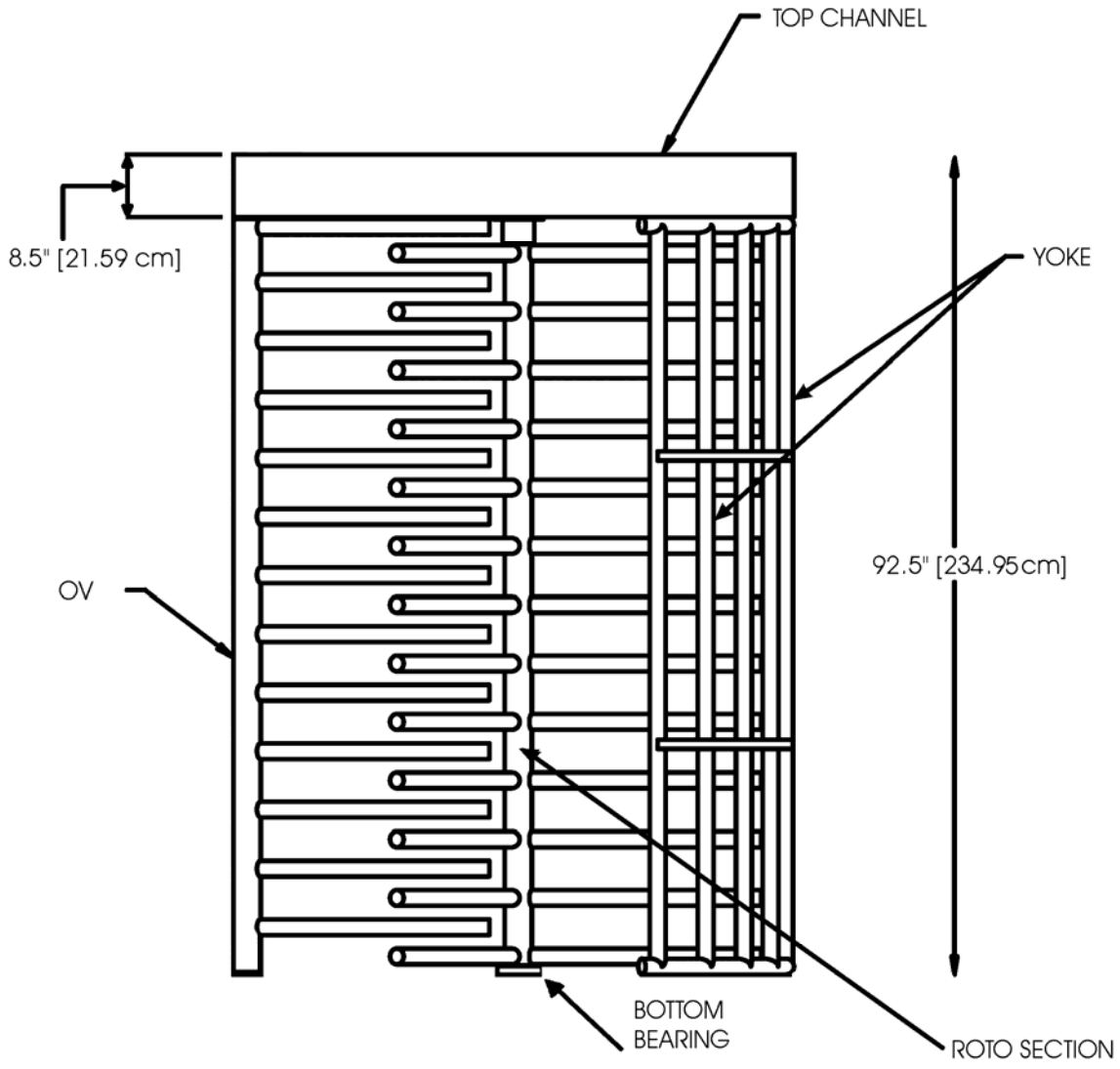
The minimum installation width required is 64”.



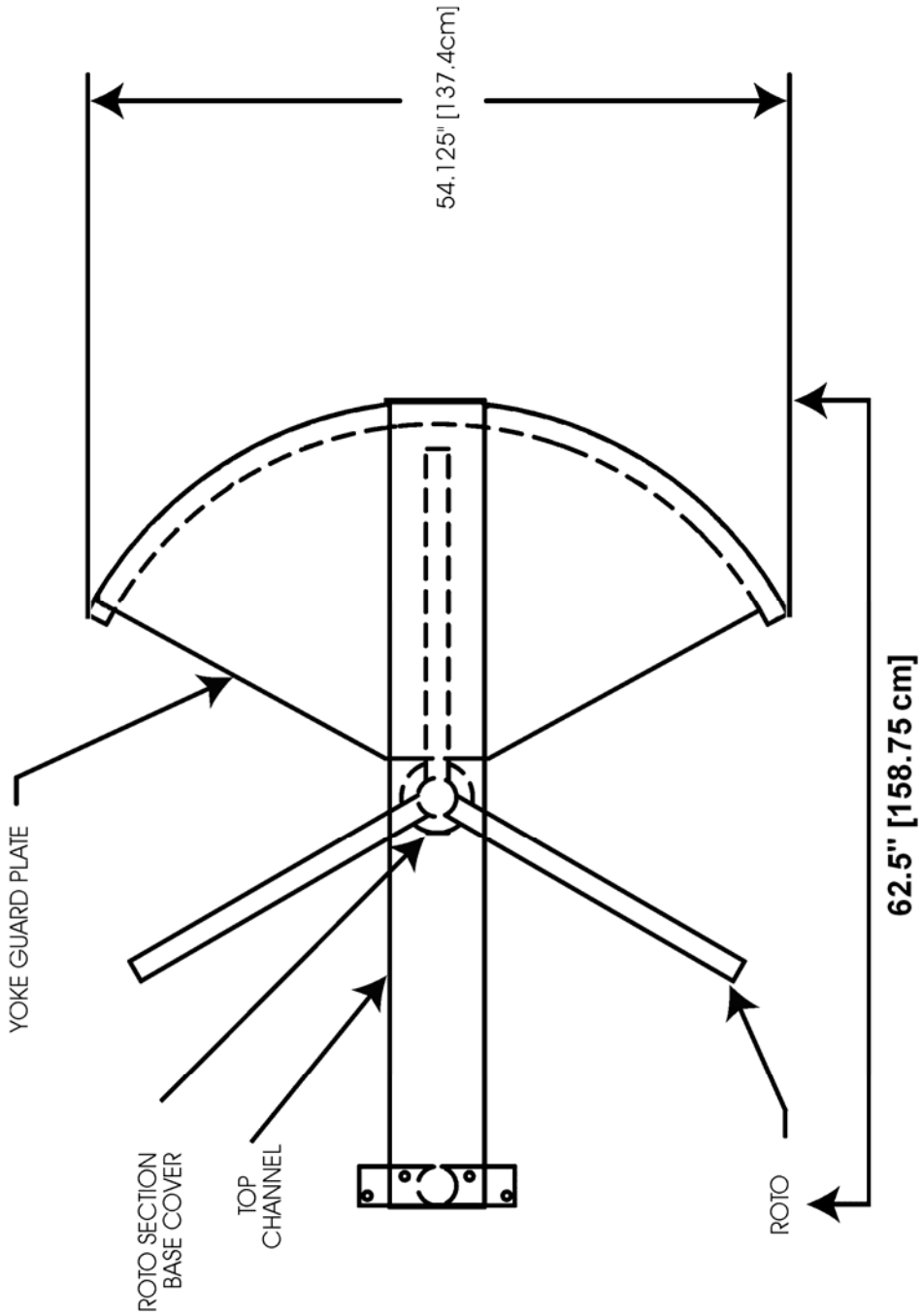
Turnstile Elevation View
(For MST Models only)

NOTE

The minimum installation height required is 95.5”. Viewed from the outer or unsecured side of the turnstile.



MST Turnstile Top View
(For MST Models only)



Electrical and Activation Wiring Instructions

Required Tools

- Wire Strippers
- Flat head screwdriver

WARNING

Use only skilled electricians to connect power to the unit. Before beginning installation, make sure the power to the unit is off.

Connect Primary Power

NOTE

Refer to the wiring diagram and schematic shown on page 24 for actual termination points for signal and power wiring.

---

1. Remove the Top Channel Inspection Cover.

2. Turn power off to control board by moving power toggle switch to off position.

3. Using a flathead screwdriver, unscrew the junction box cover to connect 110VAC/220VAC to the transformer/power switch box (**Figure 3.21**) per local electrical codes based on model received.

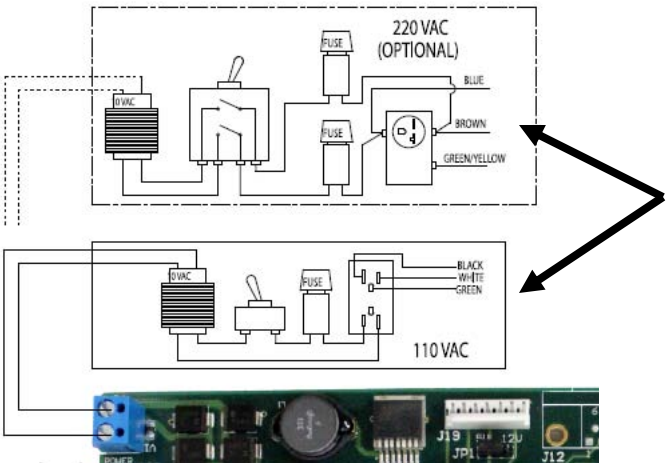


Figure 3.21 – Connect primary power.

Connect Activation Contacts and Turnstile Validation

4. Connect the access control system activation leads to the board. **Figure 3.22** depicts the ATC board how it arrives with out activation contacts and turnstile validation. Use the wiring schematic on page 24 to determine appropriate locations.

5. Review all electrical wiring and contacts for exposure to any metal parts that may lead to a short.

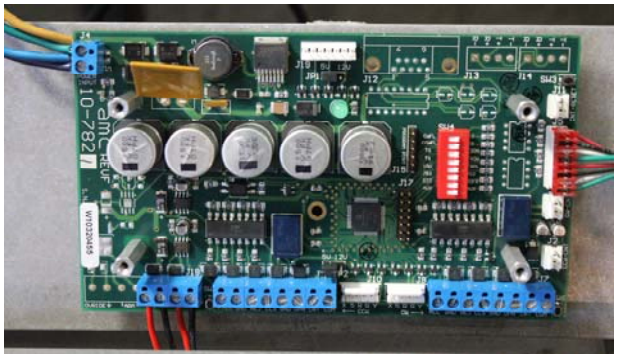


Figure 3.22 – Any connections related to added options or activations for the turnstile are not shown.

6. Manually rotate the turnstile and inspect the optical sensors for proper alignment and free rotation of the sensor feedback disk. (See **Figure 3.23**)

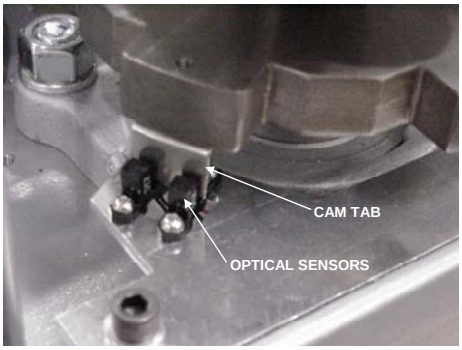


Figure 3.23 - Inspect the optical sensor for proper alignment by verifying that the cam tab freely passes through the optical sensor assembly. The cam tab should rotate freely between the sensors and should travel at approximately ¾ of the depth of the sensors. This setting is made at the factory but if alignment is upset during the shipping or installation process, loosen and adjust using the sensor mounting screws. Retighten screws after adjustment.

7. Check dip switches on SW4 for proper operation. Refer to the switch section on pages 29 through 31. SW4 switch sets Fail Lock/Fail Safe solenoid operation and time out function. These have been factory set and should not require changes.

8. Turn ON the primary power to the unit by moving power toggle switch to ON position. For both fail-lock and fail-safe units the turnstile should be locked in the controlled direction(s) when power is applied.

9. Turn the primary power OFF again. If the unit is fail-lock, confirm that the turnstile remains locked upon loss of power. If the unit is fail-safe, confirm that the turnstile unlocks upon loss of power. If the unit is fail-lock in one direction and fail-safe in the other direction, confirm that upon loss of power the turnstile remains locked in the fail-lock direction and unlocks in the fail-safe direction.

NOTE **Refer to channel configuration shown on page 32. For proper orientation of the solenoid for Fail-lock and Fail-safe operation.**

10. Turn the primary power ON again

11. Locate the Entry Activation Test Button(s) on the controller board inside the turnstile Top Channel. (*Test button locations are labeled SW6 & SW7 on the ATC control board. The test buttons are labeled on the wiring diagram on page 23 and Section 3 - Switches on page 29.*)

NOTE **Counter Clockwise (CCW) and Clockwise (CW) rotation is determined by viewing the rotation of the turnstile cam from above while the turnstile top channel cover is removed/open.**

12. Push the SW7 Activation Test Button for CCW. If the turnstile is functioning correctly the solenoid will energize/activate and the turnstile will unlock.

13. Rotate the Roto in the CCW direction. If functioning correctly, the turnstile will automatically relock.

14. Push the SW7 Activation Test Button again. Observe that the turnstile unlocks, but DO NOT rotate the turnstile arm.

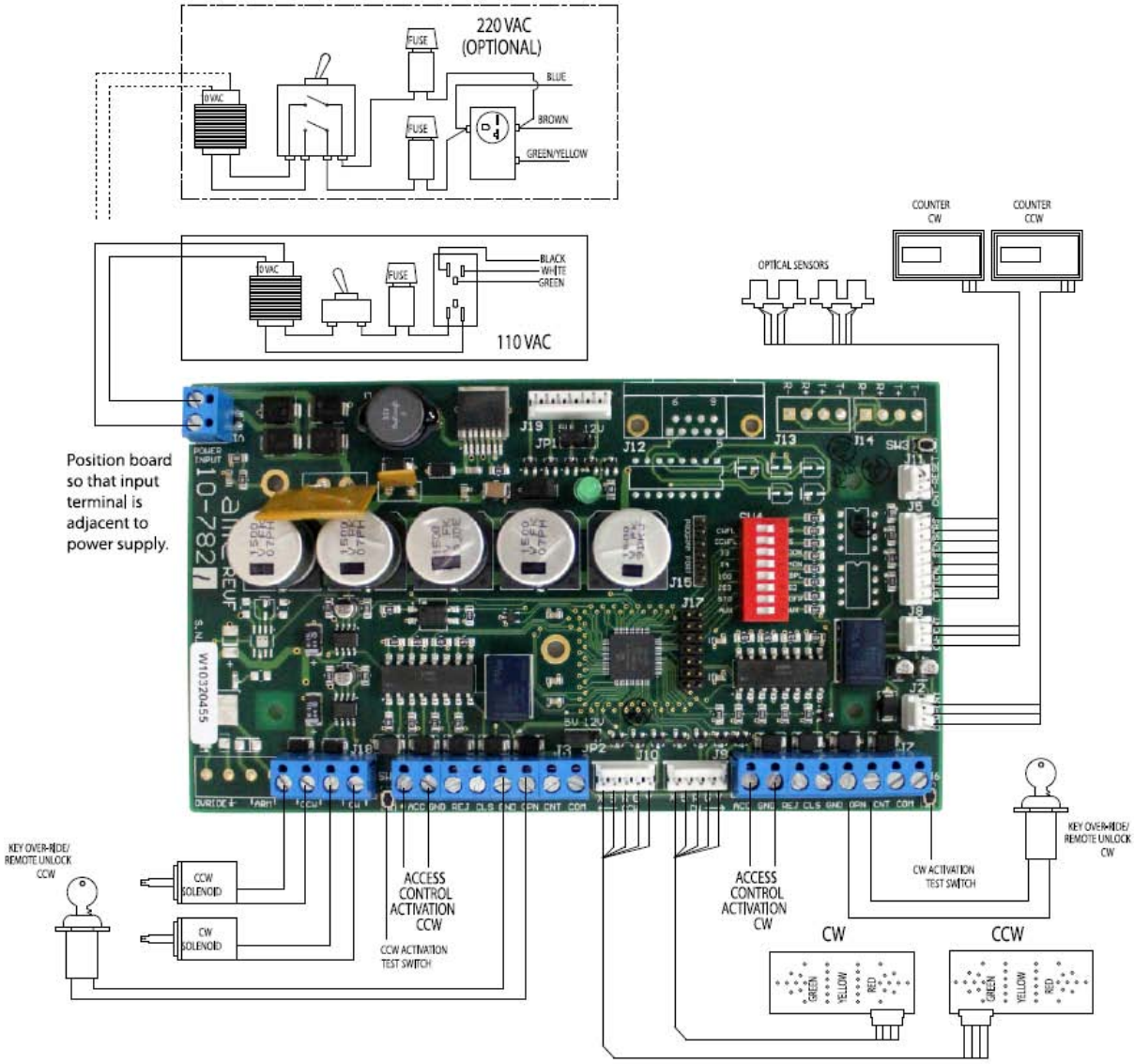
15. Wait for approximately 20 seconds. The unit will “time out” and relock after 20 seconds or the time configured on SW4 if functioning correctly.

16. Repeat steps 12 through 15 for the using the SW6 Activation Test Button for CW direction and confirm correct functionality using the SW6 activation test button.

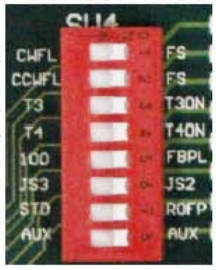
17. Re-attach the Top Channel Cover.

NOTE **Always test the turnstile after making adjustments to the timed delay feature on SW4. If the adjusted time duration is too short, the unit will relock too quickly and users will not be able to enter through the turnstile.**

Primary Power Wire Connection for 110 and 220 Options
10-7821 ATC Rev. F (12V) Wiring Schematic



SW4 Switch Settings

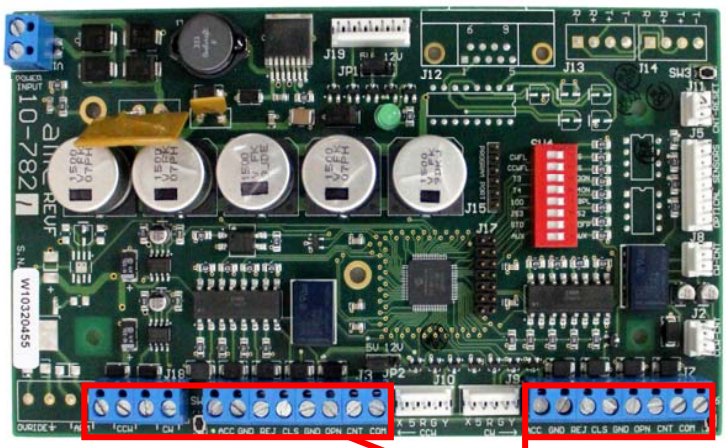


Clockwise Fail Lock	CWFL	FS	Clockwise Fail Safe
Counter Clockwise Fail Lock	CCWFL	FS	Counter Clockwise Fail Safe
Timer - see chart	T3	T30N	Timer - see chart
Timer - see chart	T4	T40N	Timer - see chart
Feedback Pulse - 100ms	100	FBPL	Feedback Pulse - 300ms
JS3 LED Option	JS3	JS2	JS2 LED Option
Std Optics	STD	ROFP	1st Sensor Optics
Not Used	AUX	AUX	Not Used

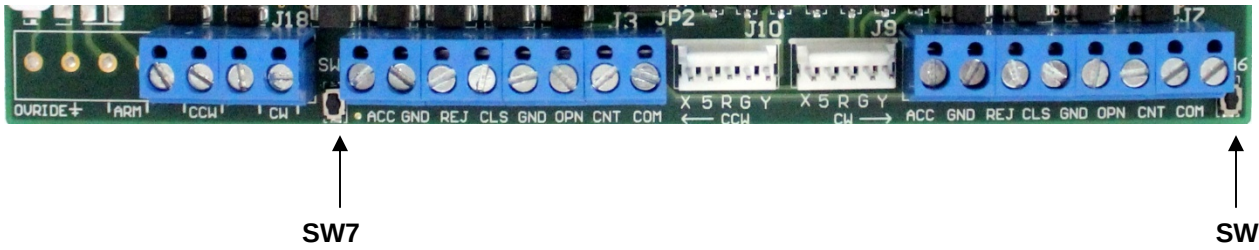
TIMED DELAY RESET TIMER

(Positions T3 and T4)	Switch	Setting
5 seconds	T3	ON
	T4	ON
10 seconds	T3	ON
	T4	OFF
15 seconds	T3	OFF
	T4	ON
20 seconds (Default Setting)	T3	OFF
	T4	OFF

Section 1 - ATC Controller Terminal Descriptions



ATC Controller Terminal

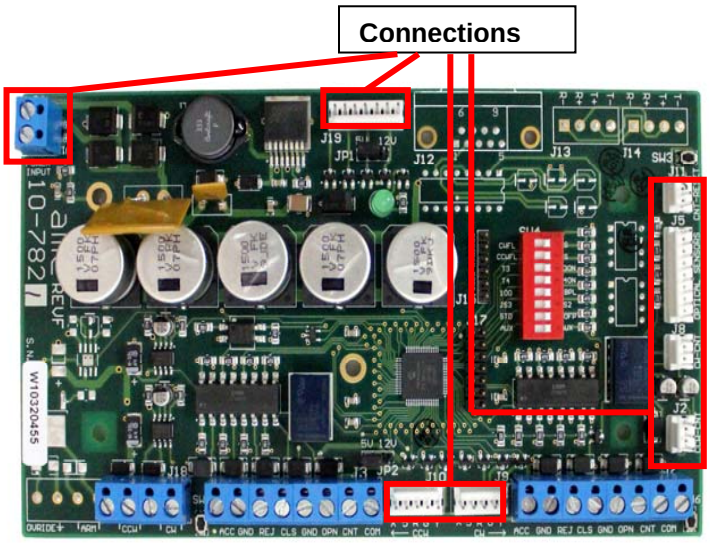


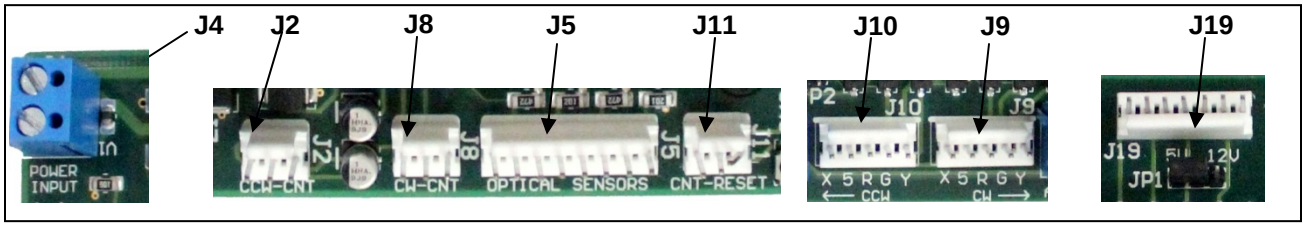
Board Location	*Name*	*Description*	*Explanation*
J18	**CCW**	Solenoid VDC wire connection - Left Hand/Counter Clockwise Direction	Connection for Counter Clockwise Solenoid. Universal polarity.
J18	**CCW**	Solenoid VDC wire connection - Left Hand/Counter Clockwise Direction	Connection for Counter Clockwise Solenoid. Universal polarity.
J18	**CW**	Solenoid VDC wire connection - Right Hand/ Clockwise Direction	Connection for Clockwise Solenoid. Universal polarity.
J18	**CW**	Solenoid VDC wire connection - Right Hand/ Clockwise Direction	Connection for Clockwise Solenoid. Universal polarity.
SW7	LH/CCW Entry Activation Test Button	Allows user to test turnstile activation - Left Hand/Counter Clockwise Direction	Depressing button simulates input to Location ACC, “Entry Accept”. If turnstile solenoid “fires” after depressing button AND relocks after a single rotation of the turnstile arm OR upon time out, the turnstile is functioning correctly in the Left Hand/Counter Clockwise Direction.

Board Location	Name	Description	Explanation
J3	**ACC** Entry Accept	"Card Authorized" input connection from the access control system - Left Hand/Counter Clockwise Direction	This connection is used to tell the turnstile to unlock. The ATC will accept a N/O dry contact signal of .25ms or longer from the access control system and allows one turnstile rotation before relocking.
J3	**GND** Ground	Ground wire connection from the access control system for ACC/REJ - Left Hand/Counter Clockwise Direction	Ground wire connection position for Entry Activation and Card Reject contact signal.
J3	**REJ** Entry Reject	"Card Unauthorized" input connection from the access control system - Left Hand/Counter Clockwise Direction	This connection is used to tell the turnstile to remain locked. The access control system has determined that the card presented is unauthorized for entry.
J3	**CLS** Close Passage	Connection for placing turnstile in always locked "CLOSED" configuration - Left Hand/Counter Clockwise Direction	Providing a continuous dry contact at this terminal places the turnstile in a locked "CLOSED" mode. This mode overrides the access control system operation. If a red entry light is installed (Location J10) it also will be illuminated continuously. Note: this connection is shown using a key switch in the schematic.
J3	**GND** Ground	Ground wire connection for "OPEN/CLOSE" Lane control - Left Hand/Counter Clockwise Direction	Ground wire connection for "OPEN/CLOSE" passage control.
J3	**OPN** Open Passage	Connection for placing turnstile in always unlocked "OPEN" configuration - Left Hand/Counter Clockwise Direction	Providing a continuous dry contact at this terminal places the turnstile in an unlocked "OPEN" mode. This mode overrides the access control system operation. If a green entry light is installed (Location J10), it will be illuminated green continuously. Note: this connection is shown using a key switch in the schematic.
J3	**CNT** Passage Count	Entry confirmation signal upon turnstile rotation - Left Hand/Counter Clockwise Direction	Outputs a dry contact upon rotation of the turnstile. This feature can be used to output a "count" signal to an external system such as Alvarado's GateWatch or to provide feedback to the access control system that a turnstile rotation has taken place.
J3	**COM** Passage Count	Entry confirmation signal upon turnstile rotation - Left Hand/Counter Clockwise Direction	Common dry contact connection for CNT count signal output. See J3 CNT description.
J7	**ACC** Entry Accept	"Card Authorized" input connection from the access control system - Right Hand/Clockwise Direction	This connection is used to tell the turnstile to unlock. The ATC will accept a N/O dry contact signal of .25ms or longer from the access control system and allows one turnstile rotation before relocking.
J7	**GND** Ground	Ground wire connection from the access control system for ACC/REJ - Left Hand/Counter Clockwise Direction	Ground wire connection position for Entry Activation and Card Reject contact signal.
J7	**REJ** Entry Reject	"Card Unauthorized" input connection from the access control system - Right Hand/Clockwise Direction	This connection is used to tell the turnstile to remain locked. The access control system has determined that the card presented is unauthorized for entry.

Board Location	Name	Description	Explanation
J7	**CLS** Close Passage	Connection for placing turnstile in always locked “CLOSED” configuration - Right Hand/Clockwise Direction	Providing a continuous dry contact at this terminal places the turnstile in a locked “CLOSED” mode. This mode overrides the access control system operation. If a red entry light is installed (Location J10) it also will be illuminated continuously. Note: this connection is shown using a key switch in the schematic.
J7	**GND** Ground	Ground wire connection for “OPEN/CLOSE” Lane control - Right Hand/Clockwise Direction	Ground wire connection for “OPEN/CLOSE” passage control.
J7	**OPN** Open Passage	Connection for placing turnstile in always unlocked “OPEN” configuration - Right Hand/Clockwise Direction	Providing a continuous dry contact at this terminal places the turnstile in an unlocked “OPEN” mode. This mode overrides the access control system operation. If a green entry light is installed (Location J10), it will be illuminated green continuously. Note: this connection is shown using a key switch in the schematic.
J7	**CNT** Passage Count	Entry confirmation signal upon turnstile rotation - Right Hand/Clockwise Direction	Outputs a dry contact upon rotation of the turnstile. This feature can be used to output a “count” signal to an external system such as Alvarado’s GateWatch or to provide feedback to the access control system that a turnstile rotation has taken place.
J7	**COM** Passage Count	Entry confirmation signal upon turnstile rotation - Right Hand/Clockwise Direction	Common dry contact connection for CNT count signal output. See J3 CNT description.
SW6	RH/CW Entry Activation Test Button	Allows user to test turnstile activation - Right Hand/Clockwise Direction	Depressing button simulates input to Location ACC, “Entry Accept”. If turnstile solenoid “fires” after depressing button AND relocks after a single rotation of the turnstile arm OR upon time out, the turnstile is functioning correctly in the Right Hand/Clockwise Direction.

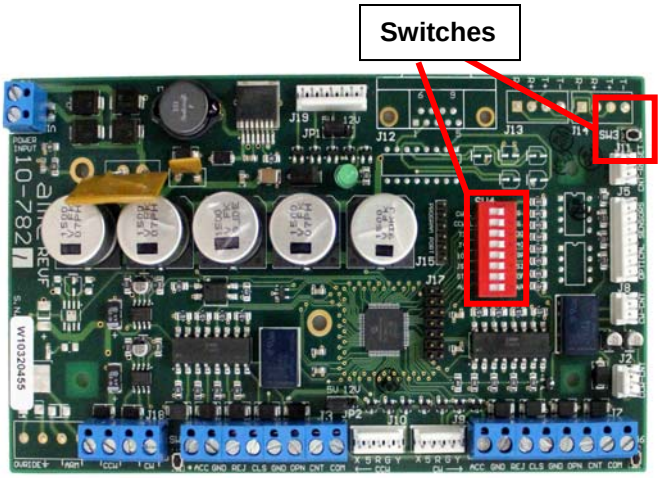
Section 2 - Connections



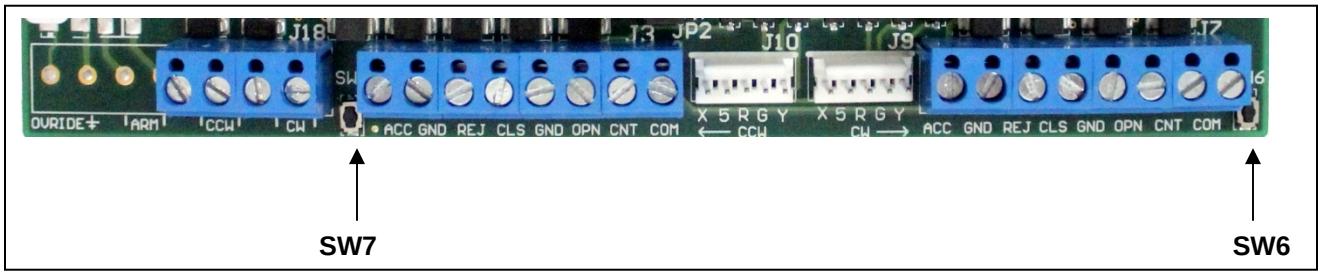


Board Location	***Name***	***Description***	***Explanation***
J2	CCW-CNT	Output of contact closure upon turnstile rotation – Left hand / Counter Clockwise Direction	Single throw, relay output for connection to Alvarado battery powered, digital counter.
J4	Power Input	Connection for low voltage power	The ATC will accept 10 VAC or 13.5 VDC power. If primary power is not run to the turnstile, low voltage power is connected here and the green ground wire must be grounded to the chassis.
J5	Optical Sensors	Connection for sensors	The ATC uses input from the sensors to provide rotation control functionality.
J8	CW-CNT	Output of contact closure upon turnstile rotation - Right Hand / Clockwise Direction	Single throw, relay output for connection to Alvarado battery powered, digital counter.
J9	X5RGY	Connection for Entry Lights - Left Hand/Counter Clockwise Direction	**OPTIONAL:** Support for 5 and 12 VDC LED lights. Use jumper JP2 to set voltage. If a red / green light board is used, the red light will be lit when the turnstile is powered and ready for card presentation. When a contact is provided to "Entry Accept" (Location ACC), the green light illuminates. The green light stays on for time out setting, or until the turnstile is rotated.
J10	X5RGY	Connection for Entry Lights - Right Hand/ Clockwise Direction	**OPTIONAL:** Support for 5 and 12 VDC LED lights. Use jumper JP2 to set voltage. If red /green light board is used, the red light will be lit when the turnstile is powered and ready for card presentation. When a contact is provided to "Entry Accept" (Location ACC), the green light illuminates. The green light stays on for time out setting, or until the turnstile is rotated.
J11	CNT-RESET	Connection for counter reset switch	N/O contact connection if blue counter wires are attached to J2 and/or J8 connections. A 3 position electrical key switch is connected here to provide a reset to the individuals counters.
J19		Connection for EL function light board	**OPTIONAL:** Support for 5 and 12 VDC LED lights. Use jumper JP1 to set voltage. If red/green end light boards are used, the green light signifies that the turnstile is ready to accept an activation for the direction shown. When the CLS and GND connection is closed, the red light will be illuminated and signifies that the turnstile will not accept an activation. Refer to description for CLS on J3 and J7.

Section 3 - Switches



Board Location	***Name***	***Description***	***Explanation***
SW3	Reset counters	Local Battery Counter Reset Switch	If blue counter wires are attached to the board, depressing this button will reset the counters. If two counters are installed and wired, both counters will be reset.
SW6	RH/CW Entry Activation Test Button	Allows user to test turnstile activation - Right Hand/Clockwise Direction	Depressing button simulates input to Location ACC, “Entry Accept”. If turnstile solenoid “fires” after depressing button AND relocks after a single rotation of the turnstile arm OR upon time out, the turnstile is functioning correctly in the Right Hand/Clockwise Direction.
SW7	LH/CCW Entry Activation Test Button	Allows user to test turnstile activation - Left Hand/Counter Clockwise Direction	Depressing button simulates input to Location ACC, “Entry Accept”. If turnstile solenoid “fires” after depressing button AND relocks after a single rotation of the turnstile arm OR upon time out, the turnstile is functioning correctly in the Left Hand/Counter Clockwise Direction.



SW4 Switch Settings

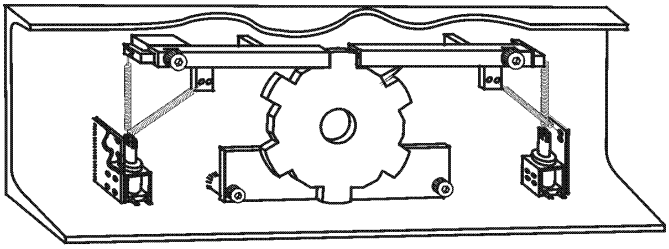
Explanation of switch positioned to left or OFF side	***Switch Position***	***Switch Position***	***Explanation of switch positioned to right or ON side***
Sets solenoid control for the Clockwise direction in fail lock configuration. Power is applied to solenoid upon activation signal to release lock arm for rotation.	**CWFL**	**FS**	Sets solenoid control for the Clockwise direction in fail safe configuration. Power is applied to solenoid for locked condition and removed upon activation signal to release lock arm for rotation. **Note**: Refer to channel configurations on page 32 for proper function.
Sets solenoid control for the Counter Clockwise direction in fail lock configuration. Power is applied to solenoid upon activation signal to release lock arm for rotation.	**CCWFL**	**FS**	Sets solenoid control for the Counter Clockwise direction in fail safe configuration. Power is applied to solenoid for locked condition and removed upon activation signal to release lock arm for rotation. **Note**: Refer to channel configurations on page 32 for proper function.
Adjustment control of the maximum throughput time allowed for an individual to completely travel through the turnstile before the turnstile automatically relocks. Used with switch position T4. Always test operation after adjusting to ensure that the set time allowed is compatible with the functionality required for the turnstile. Refer to the Entry Time Adjusting Control Switch Settings table below. (**Default**)	**T3**	**T3ON**	Adjustment control of the maximum throughput time allowed for an individual to completely travel through the turnstile before the turnstile automatically relocks. Used with switch position T4. Always test operation after adjusting to ensure that the set time allowed is compatible with the functionality required for the turnstile. Refer to the Entry Time Adjusting Control Switch Settings table below.
Adjustment control of the maximum throughput time allowed for an individual to completely travel through the turnstile before the turnstile automatically relocks. Used with switch position T3. Always test operation after adjusting to ensure that the set time allowed is compatible with the functionality required for the turnstile. Refer to the Entry Time Adjusting Control Switch Settings table below. (**Default**)	**T4**	**T4ON**	Adjustment control of the maximum throughput time allowed for an individual to completely travel through the turnstile before the turnstile automatically relocks. Used with switch position T3. Always test operation after adjusting to ensure that the set time allowed is compatible with the functionality required for the turnstile. Refer to the Entry Time Adjusting Control Switch Settings table below.

Explanation of switch positioned to left or OFF side	***Switch Position***	***Switch Position***	***Explanation of switch positioned to right or ON side***
Sets Length of time of contact closure on CNT and COM feedback to 100ms. (**Default**)	**100**	**FBPL**	Sets Length of time of contact closure on CNT and COM feedback to 300ms.
Sets operation for when a JS3 yellow / green / red light board is used. The yellow light is lit when the turnstile is powered and ready for card presentation. When a contact is provided to "Entry Accept" (Location ACC), the green light illuminates. The green light stays on for a user definable time, or until the turnstile is rotated (See the explanation provided for Switch SW4). When a contact is provided to "Entry Reject" (Location REJ), a Red light illuminates. The red light illuminates for 3 seconds. Requires light board connection to J9 and/or J10.	**JS3**	**JS2**	Sets operation for when a JS2 red / green light board is used. The red light will be lit when the turnstile is powered and ready for card presentation. When a contact is provided to "Entry Accept" (Location ACC), the green light illuminates. The green light stays on for 20 seconds, or until the turnstile is rotated. Requires light board connection to J9 and/or J10. (**Default**)
Sets operation to standard optical sensor configuration for passage feedback after second sensor detection. (**Default**)	**STD**	**ROFP**	Sets operation to custom optical sensor configuration for passage feedback on first sensor detection.
Not used (**Default**)	**AUX**	**AUX**	Not used

TIMED DELAY RESET TIMER (Positions T3 and T4)	**Switch**	**Setting**
5 seconds	T3	ON
	T4	ON
10 seconds	T3	ON
	T4	OFF
15 seconds	T3	OFF
	T4	ON
20 seconds (Default Setting)	T3	OFF
	T4	OFF

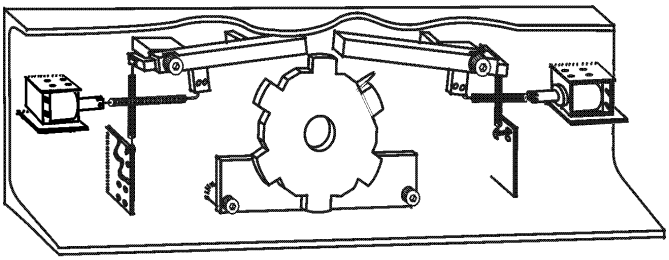
Channel Configurations for All Model Turnstiles

Fail Lock (Both Directions)
Controlled in both directions.



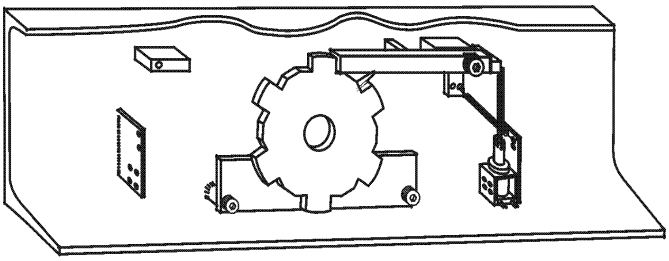
STATE SHOWN WITH POWER OFF

Fail Safe (Both Directions)
Controlled in both directions.



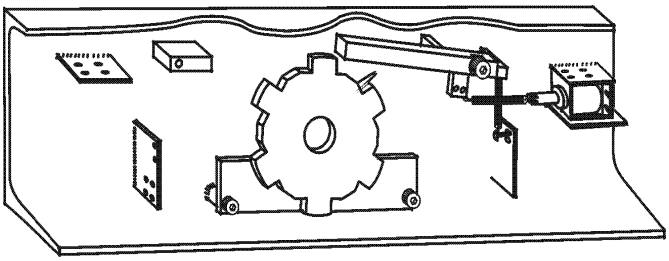
STATE SHOWN WITH POWER OFF

Clockwise Fail Lock
Controlled in clockwise direction
Unlocked in counterclockwise direction



STATE SHOWN WITH POWER OFF

Clockwise Fail Safe
Controlled in the clockwise direction
Unlocked in the counterclockwise direction



STATE SHOWN WITH POWER OFF

4.0 Maintenance

The frequency of interior maintenance will depend on how often the turnstile is used, the type of personnel using the turnstile and the environment. **Installed turnstiles should be inspected once during the first 30 days after installation.** Thereafter, follow the maintenance schedule below. This schedule is based on what we would call a typical installation – which is a temperate climate where weekly use is up to 7500 activations. If use exceeds this threshold, personnel are abusive to the turnstile or the turnstiles are installed in harsh outdoor environments (such as coastal areas, chemical or refinery plants, very hot or cold locations, or extremely dusty environments), consider increasing the frequency of maintenance to a level suitable for your application.

A Few Words about Finishes:
The finish on your turnstile will look better if it is maintained. The frequency of maintenance depends on three factors: (1) the installation location; (2) environmental factors; and (3) the customer's interest in how the turnstile looks. We suggest cleaning the exterior of the turnstile every three months.

Galvanized Finishes:
Hot-dipped galvanized coating is a sacrificial barrier. The zinc will "sacrifice" itself and will eventually disappear leaving base metal. When your turnstile arrives parts may be shiny and bright. The shiny look will fade quickly. This is normal. Parts of your turnstile may have a dull gray finish. During the galvanizing process zinc deposits may leave sharp deposits that users may find uncomfortable if they come in contact with these areas. Alvarado levels these sharp deposits and then applies an additional coat of galvanizing paint. This paint may leave a duller finish where it is applied. The difference in the finish look will go away shortly as the turnstile weathers.

As the zinc corrodes over time, it will leave a white corrosion, often called "white rust" on the surface. This is normal. Over time, as the zinc deteriorates and the underlying steel is exposed, it will leave a reddish-brown "red rust". Factors that determine the rate at which a galvanized finish deteriorates include exposure to chemicals, corrosive fumes, pollutants, moisture, soils, concrete, environment and contact with other metals. In addition, isolated areas of the underlying metal can be exposed if the zinc is scraped away during the installation process. Surface rust areas can be touched up with a cold galvanizing compound. There are may available. We have had good success with Clearco products: www.clearcoproducts.com.

Galvanized coatings can be cleaned with a neutral detergent, such as a car shampoo, clean warm water and a soft brush. Rinse the surface after cleaning. Abrasive cleaners, steel wool and chemical cleaning products should be avoided.

Stainless Steel Finishes:
Stainless steel will not "rust" as you think of regular steel rusting but stainless steel can be "contaminated" by carbon steel through direct contact or through environmental particles that land on the material. The rust you see is much like the rust in a stainless steel sink left by a wet cast iron pan. Stainless steel can also rust if the passive oxide layer of stainless steel is scratched. The exposed iron in the stainless steel can rust. Hard water can also leave spotting and staining on stainless steel.

Stainless steel benefits from cleaning. The method required depends on the frequency of maintenance and the level of cleaning required. You can start with a mild detergent and warm water. Rinse the surface thoroughly and towel dry to prevent water spots. Abrasive cleaners and any product containing bleach should not be used. Commercial stainless steel cleaners can also be used. Follow the directions carefully.

All stainless materials containing sufficient Chromium will benefit from passivation. This process rejuvenates very dirty or damaged finishes by accelerating the natural formation of the oxide film which gives stainless steel its corrosive resistance. We have had very good success with a citric acid product called CitriSurf: www.stellarsolutions.net.

Powdercoat Finishes:
To clean a powdercoat finish, wash the finish with a neutral detergent, such as a car shampoo, and rinse with clean water. In the event that the powdercoat finish is chipped, and bare metal is showing, seal the area as soon as possible. If the area is not sealed, the underlying metal will rust, which could eat away the powdercoat and cause flaking. Touch up paint is available from Alvarado.

Interior Maintenance

Interior maintenance of the turnstile requires the removal of the turnstile cover.
Tri-Flow refers to Tri-Flow Lubricant; Mobil refers to Mobil® XHP 222 with Moly; use only specified lubricants or approved equivalent.

Item/points of contact	Necessary Maintenance	Using Lubricant	Inspect every…	Replace every…
Lock Arms and Bolts	Check the Lock Arm(s) and the Lock Arm Bolt(s) (The lock arm bolt is also referred to as the "Stripper Bolt." Refer to item #3 in the Exploded View diagram and parts list pages). If the lock arm does not move freely, clean and oil the lock arm and bolt. If the lock arm bolt is loose, apply a thread locking compound to the threads, tighten and re-test. The lock arm should move freely, except for the pressure of the return spring.	Tri-Flow	6 Months	2 years
Springs	Inspect and replace worn or damaged springs. Lubricate spring contact points using a tube extension applicator. **Note:** It is acceptable to lubricate the contact point where the spring connects to the solenoid plunger, but do not lubricate the solenoid plunger arm. The solenoid is designed to operate "dry". **Note:** Use only Alvarado springs and only the springs designated for the location and use purpose. Turnstile springs **are not** interchangeable and should be used in designated locations only.	Tri-Flow	6 Months	1 year
Main Cam & Shaft Bearings	Lubricate the two grease nipples on the upper and lower top channel bearings.	Mobil	6 Months	As Required
Solenoids	Clean the solenoid plunger and solenoid cavity area using alcohol wipes and alcohol moistened Q-tips. **Do not oil the solenoid plunger.**	CLEAN using Alcohol ONLY	6 Months	2 years
Optical Sensor Assembly	Clean & inspect the alignment of the optical sensors. To clean, an alcohol moistened Q-tip works well. The cam tag should rotate freely between the sensors and should travel at approximately ¾ of the depth of the sensors. Loosen and adjust using the sensor mounting screws. Retighten.	None	6 Months	2 years
Electrical Wiring	Inspect all electrical wires and contacts for exposure to metal parts that may lead to a short.	None	6 Months	As Required
Self-Centering Mechanism	Clean and lubricate the two slide rods	Tri-Flow on "rod" Mobil on "bearings"	6 Months	As Required
Friction Brake Mechanism Maintenance	Check the brake tension on the Assembly by holding the lock arm(s) open (manually or by using the key override) and rotating the turnstile in the appropriate direction(s). There should be a small consistent drag (roughly 3 to 6 lbs.) during the rotation. To adjust the drag, unhook the two W Cam Follower Springs and rotate the screw to tighten or loosen the spring tension. Increasing the spring tension increases the brake tension. Decreasing the spring tension decreases the brake tension. If a more substantial adjustment is required, remove the cotter pin from the top of the brake unit. Rotate the tension adjustment clockwise to increase brake tension or counterclockwise to decrease the brake tension. Replace the cotter pin and re-test the turnstile after adjustment. Readjust if necessary.	None	6 months	As required

Adjustment & Lubrication

Lock Arms and Bolts

If the lock arm does not move freely, clean and oil the lock arm and bolt. Remove bolt. Apply Tri-Flo to bottom surface of lock arm and shoulder surface of bolt. If the lock arm bolt is loose, apply a thread locking compound such as Blue Loctite to the threads, tighten and re-test. The lock arm should move freely, except for the pressure of the return spring.

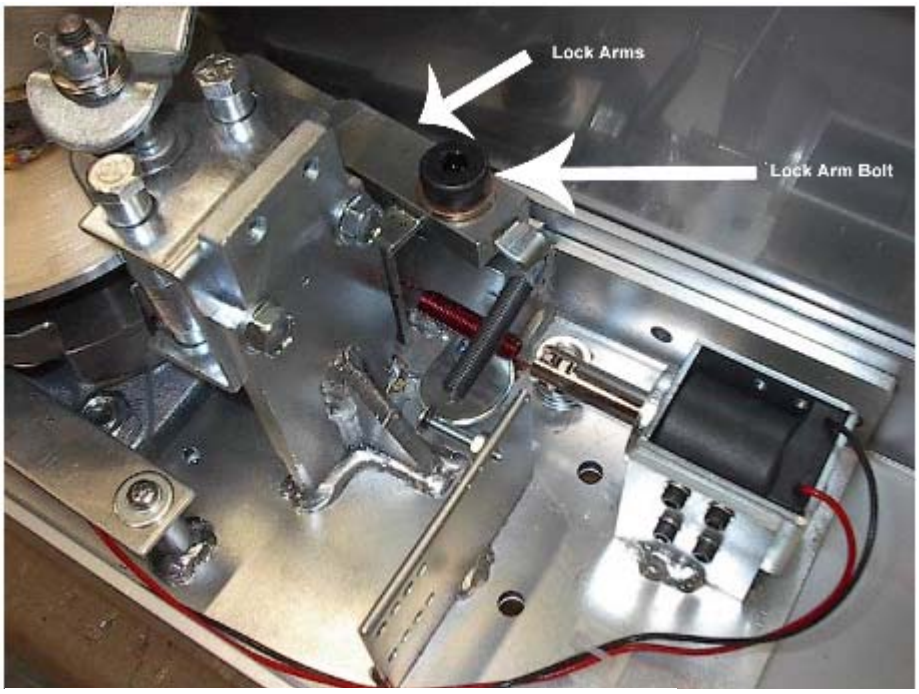


Figure 4.1 - Adjusting the Lock Arm Bolt

Lubricating the Springs:

Lubricate spring contact points with Tri-Flo using a tube extension applicator. Place lubricant on spring body by adding 1 drop on contact points.

DO NOT lubricate the Silver solenoid plunger arm.

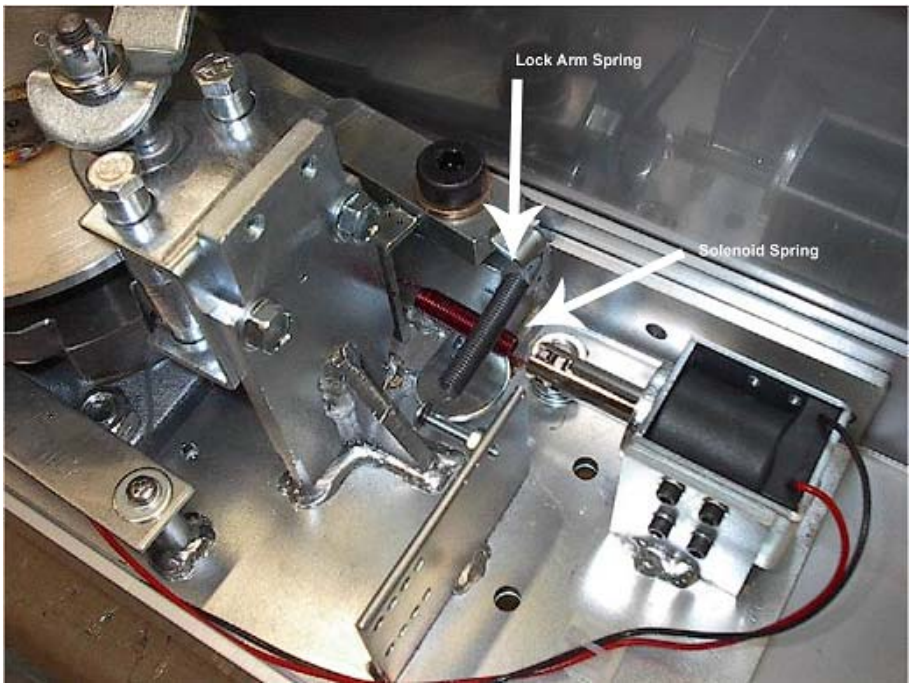


Figure 4.2 – Lubricating springs

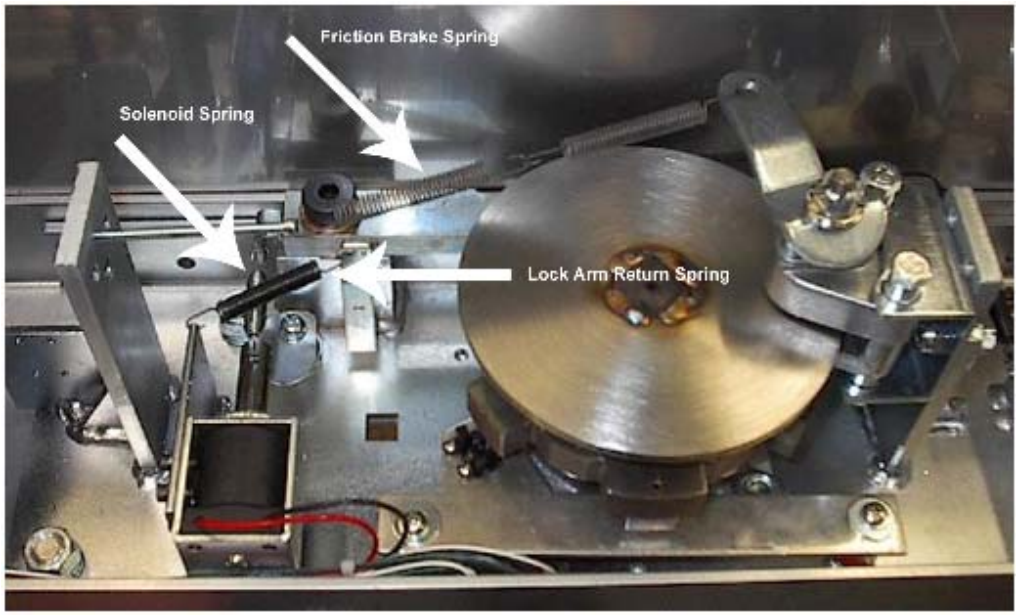


Figure 4.3 - Adjusting the Lock Arm Bolt

Lubricate spring contact points with Tri-Flo using a tube extension applicator. Lubricate spring body and contact points.

Shown to the left are the friction brake springs, solenoid spring and lock arm return spring. Apply lubricant to the contact points of these springs.

Main Cam & Shaft Bearings

Lubricate the two grease fittings on the upper and lower top channel bearings.

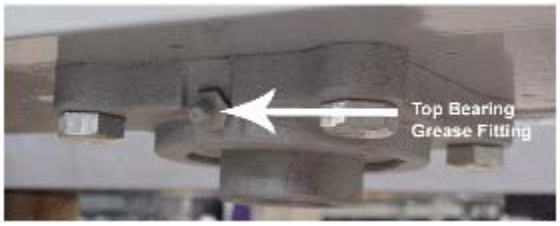


Figure 4.4 – Lubricating the bottom bearing of the top channel

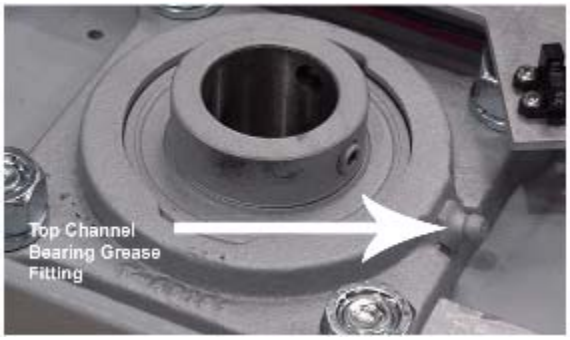


Figure 4.5 – Lubricating the top bearing and top channel

NOTE

Note that there is a bearing on both inside the top channel and the outside of the top channel on the bottom.

Optical Sensor Assembly

Inspecting the Optical Sensor for Proper Alignment:

Inspect the optical sensor for proper alignment by verifying that the cam tab freely passes through the optical sensor assembly. The cam tag should rotate freely between the sensors and should travel at approximately ¾ of the depth of the sensors. The sensor assembly should be set correctly from the factory but may need to be adjusted. Loosen the sensor assembly and adjust using the sensor mounting screws. Retighten screws after adjustment.

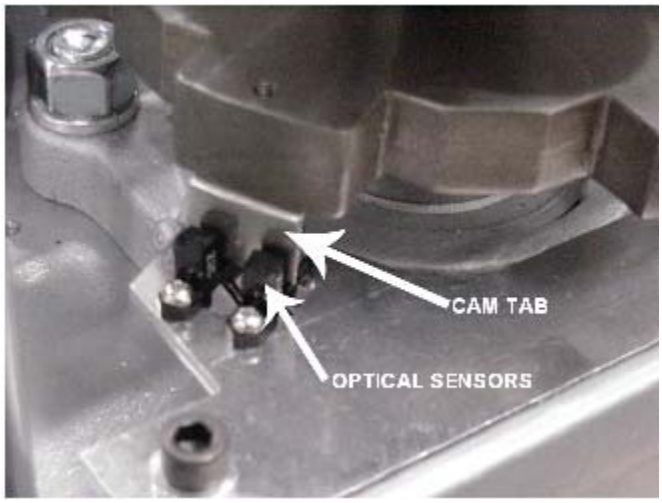


Figure 4.6 – Optical Sensor Assembly

Self-Centering Mechanism

Clean and lubricate the two slide rods.

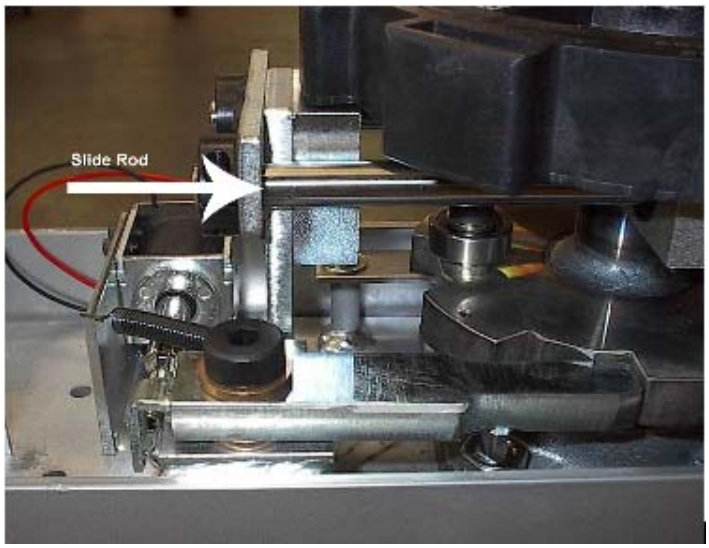


Figure 4.7 – Lubricating the Self-Centering Mechanism

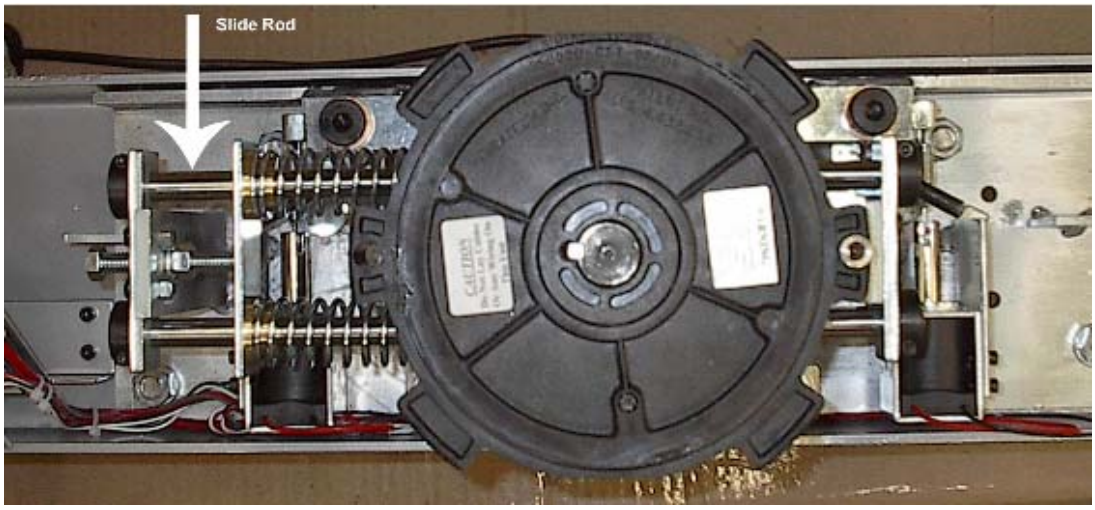


Figure 4.8

Friction Brake Mechanism

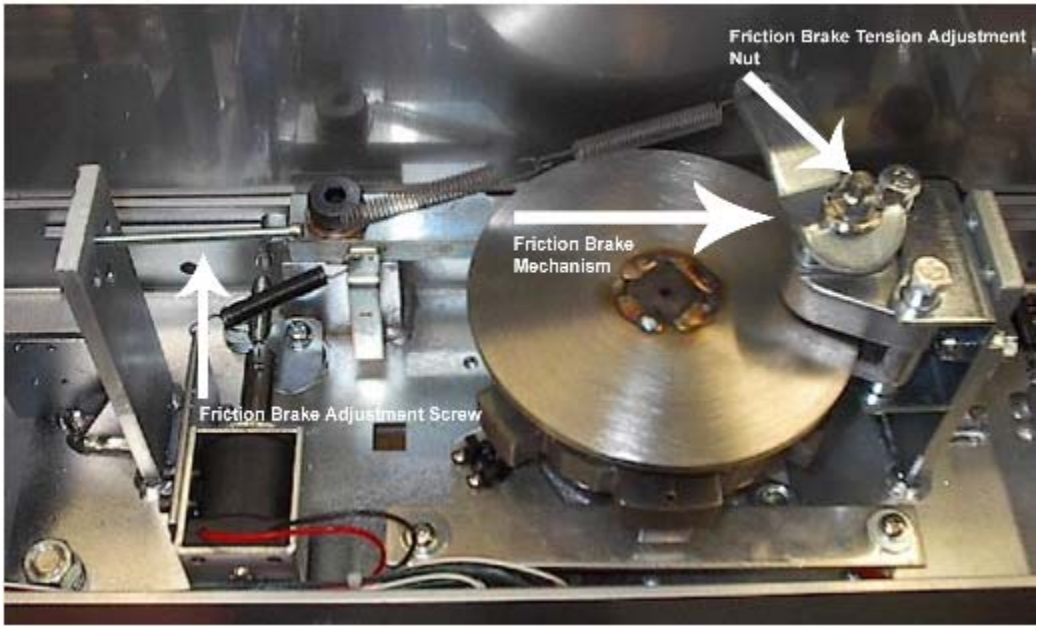


Figure 4.9 - Adjusting the Friction Brake Mechanism

To adjust the friction brake remove the friction brake springs and rotate the friction brake adjustment screw to tighten and increase the friction or loosen to decrease the friction.

If this adjustment is not sufficient, remove the cotter pin on the friction brake tension adjustment nut and rotate the tension adjustment nut clockwise to increase brake friction or counterclockwise to decrease the brake tension

Replace the cotter pin and re-test the turnstile after adjustment.

Turnstile operations and user instructions

Safety Instructions

- Always walk slowly through the turnstile
- Always use caution when using the turnstile
- Inform all users of the proper operation of the turnstile.

A turnstile is NOT a revolving door. In electrically controlled, access control applications (electric models only), the turnstile will unlock and allow only one entrance rotation of 120° per authorized activation. Once the turnstile is unlocked, the user has 20 seconds to enter the turnstile, rotate the arms, and walk through.

The following steps provide a guide to properly use the turnstile.

The turnstile should always be in the “Home” position before access is requested (i.e. an access control card is presented to the card reader). If the turnstile is not in the “Home” position, the user should manually reposition the Roto Section (the arms) to the “Home” position before requesting access. See **Figure 4.10.**

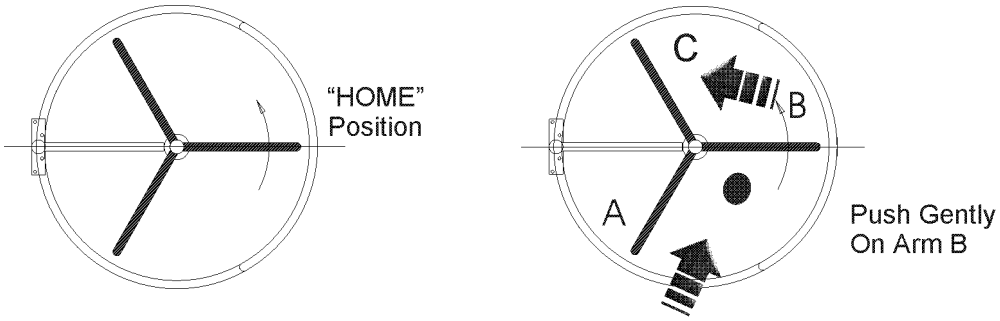


Figure 4.10 – Top view of turnstile showing home position and proper entry

2. Request access (i.e. present an access control card to the card reader) and activate the turnstile. Listen for the turnstile to unlock (the solenoid will "fire" and make a clicking sound) and (if applicable) look for the green light on the card reader display.

3. Immediately step into the turnstile as shown in **Figure 4.10**.

WARNING

Never grab Roto Arm Section "A" and pull it in front of you. Doing this will result in the Roto section stopping suddenly (after rotating 120°) before the user is all of the way through the turnstile.

---

4. Keeping your arms extended, gently push on Roto Arm Section "B" and slowly walk through the turnstile. Stay near the Yoke and take short steps. Once you have traveled through the passage area move out of the way of the turnstile arms.

WARNING

After the user has walked through the turnstile, the turnstile arms will continue to rotate, completing the 120° rotation. Taking long steps could cause the trailing arm section to strike the heels of the user as he or she exits the turnstile. Heel and arm guards are an option that can be purchased from Alvarado.

---

5. Step completely out of the turnstile.

Other Important Operational Considerations

Users should be made aware that they have a total of 20 seconds to pass through the turnstile before it automatically relocks.

WARNING

If the user does not complete his entry through the turnstile within the 20-second time frame allowed, the turnstile arms will stop suddenly, before the user is all the way through the turnstile.

Troubleshooting

Items to check first:

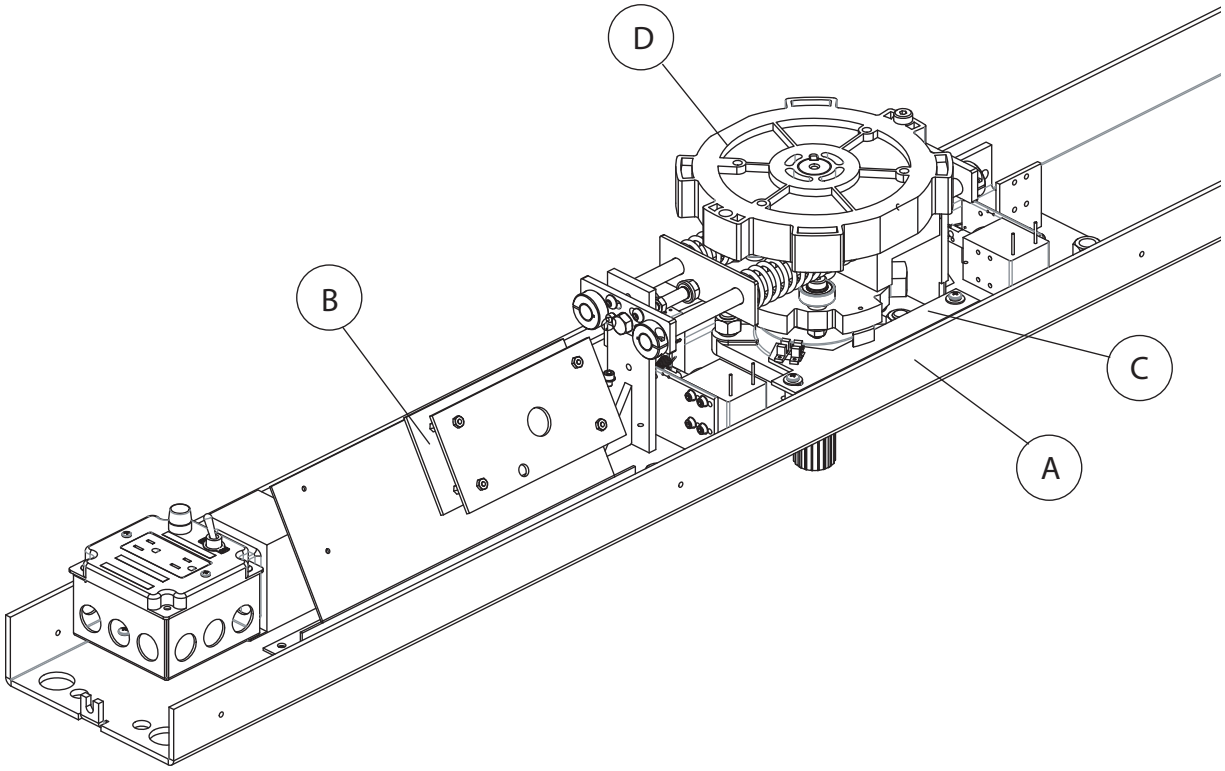
- Always check for and remove debris from the solenoid plunger and cavity area. An alcohol moistened Q-tip works well. DO NOT use water and DO NOT lubricate the solenoid plunger. It is designed to operate "dry".
- Check wiring for any loose connections. Use the wiring diagram for the turnstile model installed.
- **REMINDER:** T*he Entry Activation Test Button(s) on the turnstile control board are an excellent tool for testing the functionality of the turnstile independent from the control system.*

Symptom	***Possible Cause***	***Solution Steps***
Turnstile does not unlock	The turnstile is not powered (**Fail lock** units only)	1. Verify that 110 VAC is being provided to the turnstile. Test by plugging in a 110 VAC device into the junction box. 2. Confirm that the ON/OFF switch is ON. 3. Confirm that the fuse is good. 4. Confirm that the LED on the turnstile control board is on. If the LED is lit, verify the board is receiving 10 VAC from transformer.
		1. Test turnstile functionality independent from the access system using the Entry Activation Test Button(s) on the turnstile control board. If turnstile activates when appropriate button is pressed, the problem is generally the control lead connection or the access system is not providing a proper activation signal. 2. If turnstile does not activate when appropriate test button is pressed, verify power as described in section above. 3. If turnstile does activate when appropriate test button is pressed, ensure control leads are connected to the "Entry Accept" terminal(s). Follow the appropriate board wiring diagram supplied in this manual. 4. If leads are correct and secure, confirm that the access control system is providing an activation signal of 25ms or longer.
	A lock arm spring is missing, broken or worn out.	1. Replace the lock arm spring. **Note:** Turnstile springs are specifically designed for their purpose. Use only Alvarado springs and use only the springs designated for the location and use purpose. Springs are not interchangeable and should be used in designated locations only.
	The lock arm is sticking or binding in the locked position	1. Clean and lubricate the lock arms. Refer to the Maintenance section for lock arm cleaning instructions.
	The solenoid needs to be cleaned or is defective.	1. Clean the solenoid plunger and clean debris from the cavity area. Alcohol wipes and alcohol moistened Q-tips work well. 2. If solenoid appears clean or cleaning does not improve performance, replace the solenoid.
Turnstile does not relock	The turnstile is not powered (**Fail safe** units only)	1. Verify that 110 VAC is being provided to the turnstile. Test by plugging in a 110 VAC device into the junction box. 2. Confirm that the ON/OFF switch is ON. 3. Confirm that the fuse is good. 4. Confirm that the LED on the turnstile control board is on. If the LED is lit, verify the board is receiving approximately 10 VAC from the transformer.
	The optical sensor is obstructed, misaligned or damaged.	1. Inspect the optical sensor for proper alignment by verifying that the cam tab freely passes through the optical sensor assembly. See the Maintenance section below for instructions on adjustment. 2. Check the optical sensors for damage. If damaged, replace. 3. If optical sensor is not visibly damaged, clean the sensors using an alcohol moistened Q-tip.
	A lock arm spring is missing, broken or worn out.	1. Replace the lock arm spring. **Note:** Turnstile springs are specifically designed for their purpose. Use only Alvarado springs and use only the springs

		designated for the location and use purpose. Springs are not interchangeable and should be used in designated locations only.
	The lock arm is sticking or binding in the locked position	1. Clean and lubricate the lock arms. Refer to the Maintenance section for lock arm cleaning instructions.
	The solenoid needs to be cleaned or is defective.	1. Clean the solenoid plunger and clean debris from the cavity area. Alcohol wipes and alcohol moistened Q-tips work well. 2. If solenoid appears clean or cleaning does not improve performance, replace the solenoid.
The Roto does not turn smoothly	The Cam & Shaft Bearings need to be greased	1. Lubricate the two grease nipples on the upper and lower top channel bearings using recommended grease.
	The Bottom Bearing is installed upside down	Install the Bottom Bearing correctly. Refer to Installation of the OV and Bottom Bearing Assembly earlier in this manual.
	The friction brake mechanism is too tight	1. Adjust the friction brake. Refer to the Maintenance section for instructions on adjusting the friction brake mechanism.
	The Bottom Bearing needs to be replaced	1. Replace Bottom Bearing.
The solenoid plunger is sticking.	The solenoid needs to be cleaned or is defective	1. Clean the solenoid plunger and clean debris from the cavity area. Alcohol wipes and alcohol moistened Q-tips work well. 2. If solenoid appears clean or cleaning does not improve performance, replace the solenoid.
The Roto spins too quickly (Friction Brake Units)	The friction brake mechanism is too loose	1. Adjust the friction brake. Refer to the Maintenance section for instructions on proper adjustment of the friction brake mechanism.
The Roto spins too quickly (Self-Centering Units)	The self-centering mechanism is defective	1. Inspect the self-centering mechanism hardware. 2. Check the self-centering springs. 3. Call Alvarado technical support.
The Roto is hard to spin (Friction Brake Units)	The friction brake mechanism is too tight.	1. Adjust the friction brake. Refer to the Maintenance section for instructions on proper adjustment of the friction brake mechanism.
The Roto is hard to spin (Self-Centering Units)	The self-centering mechanism needs adjustment.	1. The user is pushing too hard on the turnstile arms. The speed control / self centering mechanism is designed to increase friction the harder the user pushes. Instruct the users to slow down their passage rate through the turnstile. 2. Adjust the speed control / self-centering mechanism. Refer to the Maintenance section for instructions on proper adjustment of the mechanism. **Note**: the speed control / self centering mechanism is designed to increase friction the harder the user pushes.
The Roto takes too long to settle (Self-Centering Units)	The self-centering mechanism needs adjustment.	1. Adjust the speed control / self-centering mechanism. Refer to the Maintenance section for instructions on proper adjustment of the mechanism.
The turnstile vibrates excessively	Anchoring or attachment hardware has loosened.	1. Check and tighten anchoring and attachment hardware.
	The friction brake is not properly adjusted.	1. Adjust the friction brake. Refer to the Maintenance section for instructions on proper adjustment of the friction brake mechanism.
	Application would benefit from securing turnstile and installing OV Stabilizing Bracket	1. Secure both ends of the Top Channel (and/or the center outside portion of the Yoke and OV) to a solid object. 2. Order and install an OV Stabilizing Bracket.
	Application would benefit from installation of Top Channel with speed control	1. Order and install a Top Channel with speed control.
	Users are moving through the turnstile with excessive force	1. Train and/or discipline users.

5.0 Replacement Parts/Spare Parts Kits

Channel Assembly/Exploded Parts view



MST-6X/CLST-6X/CPST-6X Sub Assemblies

A. Top Channel Sub Assembly

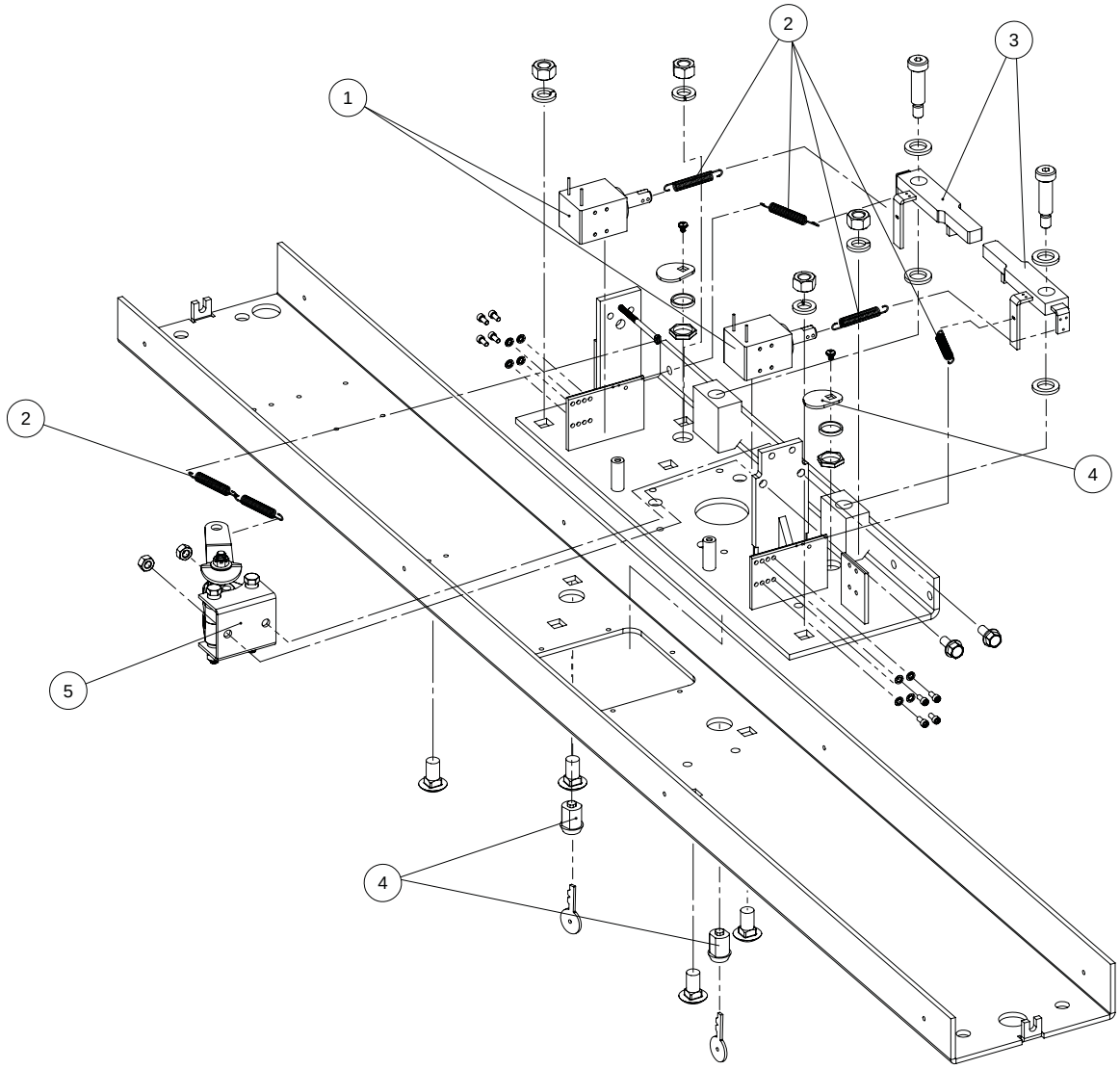
B. ATC Controller Board Sub Assembly

C. Opto Interrupter Mounting Plate Sub Assembly

D. Cam & Shaft Sub Assembly

A: MST-6X/CLST-6X/CPST-6X Top Channel Sub Assembly Details

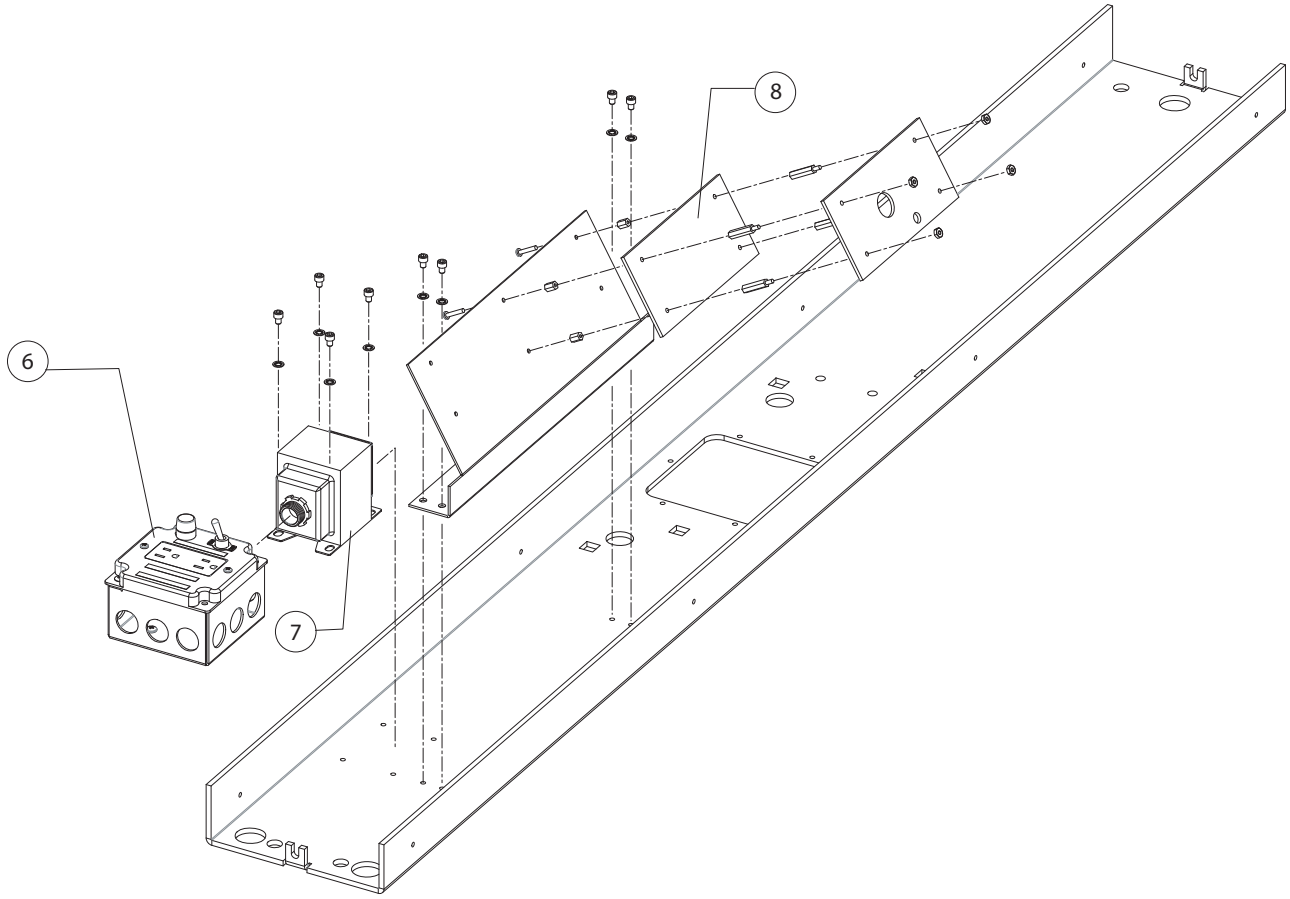
Number Shown on Diagram	Alvarado Spare Part Kit Number	Description
1	50-10-1070	Solenoid (12V DC) Kit
2	50-MST-S1	MST/MST-6X Spring Kit
3	50-MST-LA	MST/MST-6X Lock Arm Kit
4	11-9401C	Manual Key Override
5	50-04-2055	MST/MST-6X Brake Unit Kit



B: MST-6X/CLST-6X/CPST-6X Controller Board Sub Assembly

Number Shown on Diagram	Alvarado Spare Part Kit Number	Description
6	10-1317	Junction Box
7	10-3008A	Transformer
8	50-10-7821	ATC Rev. F (12V) Driver Board Kit

ATC Controller Board Sub Assembly Exploded View

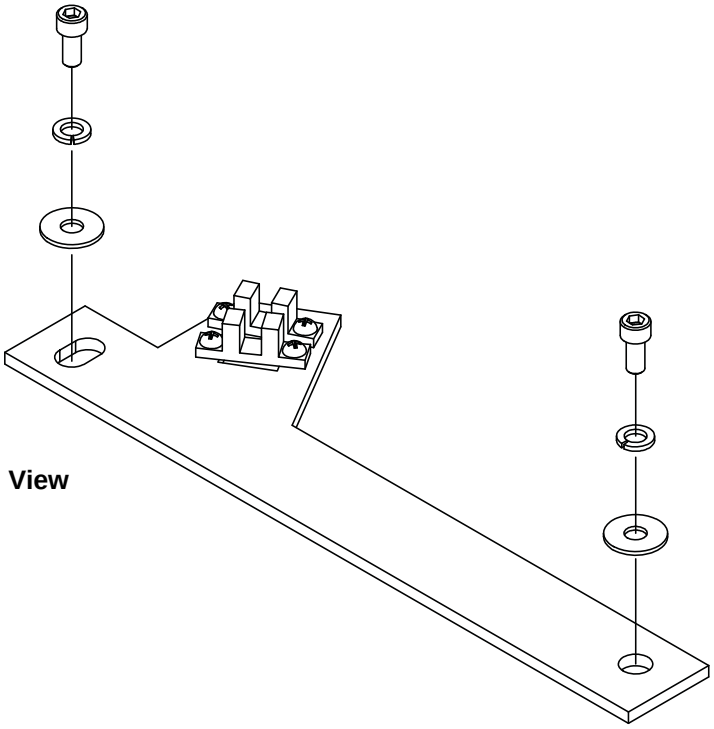


See Page 47 for description of components contained in part kits.

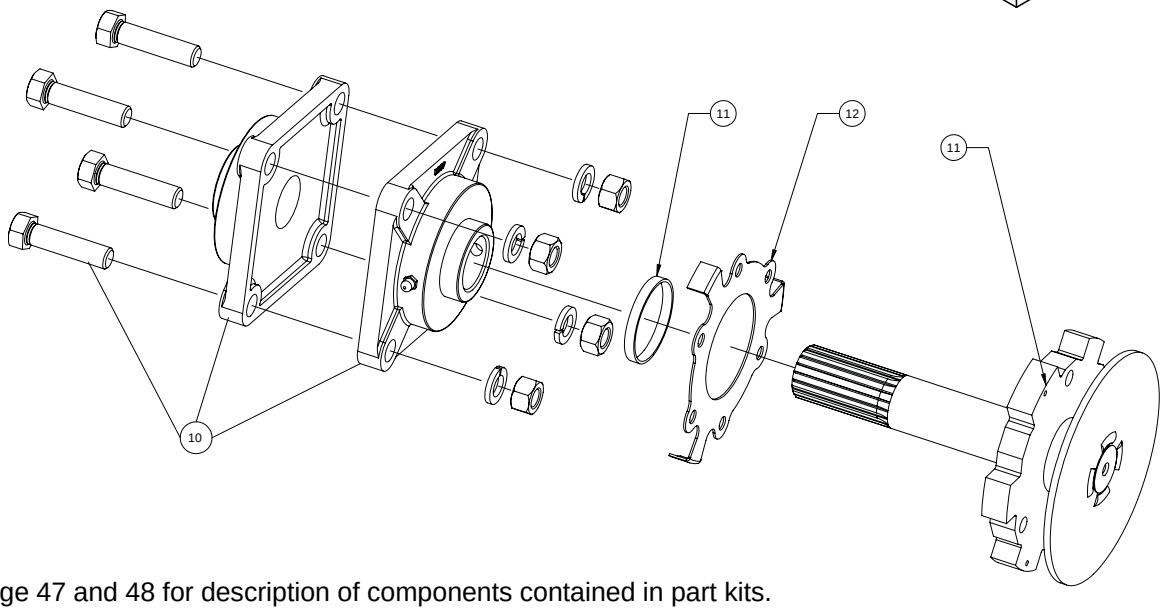
C: MST-6X/CLST-6X/CPST-6X Opto Interrupter Mounting Plate Sub Assembly

Number Shown on Diagram	Alvarado Spare Part Kit Number	Description
9	50-04-2058A	MST-6X Optical Sensor Assy. Kit
10	50-11-4010P	MST/MST-6X Top Bearing Kit
11	04-3401R	MST-6X Optical Cam & Shaft Assembly
12	50-04-2078	MST Optical Encoder Wheel

Opto Interrupter Mounting Plate Sub Assembly Exploded View



Cam & Shaft Sub Assembly Exploded View

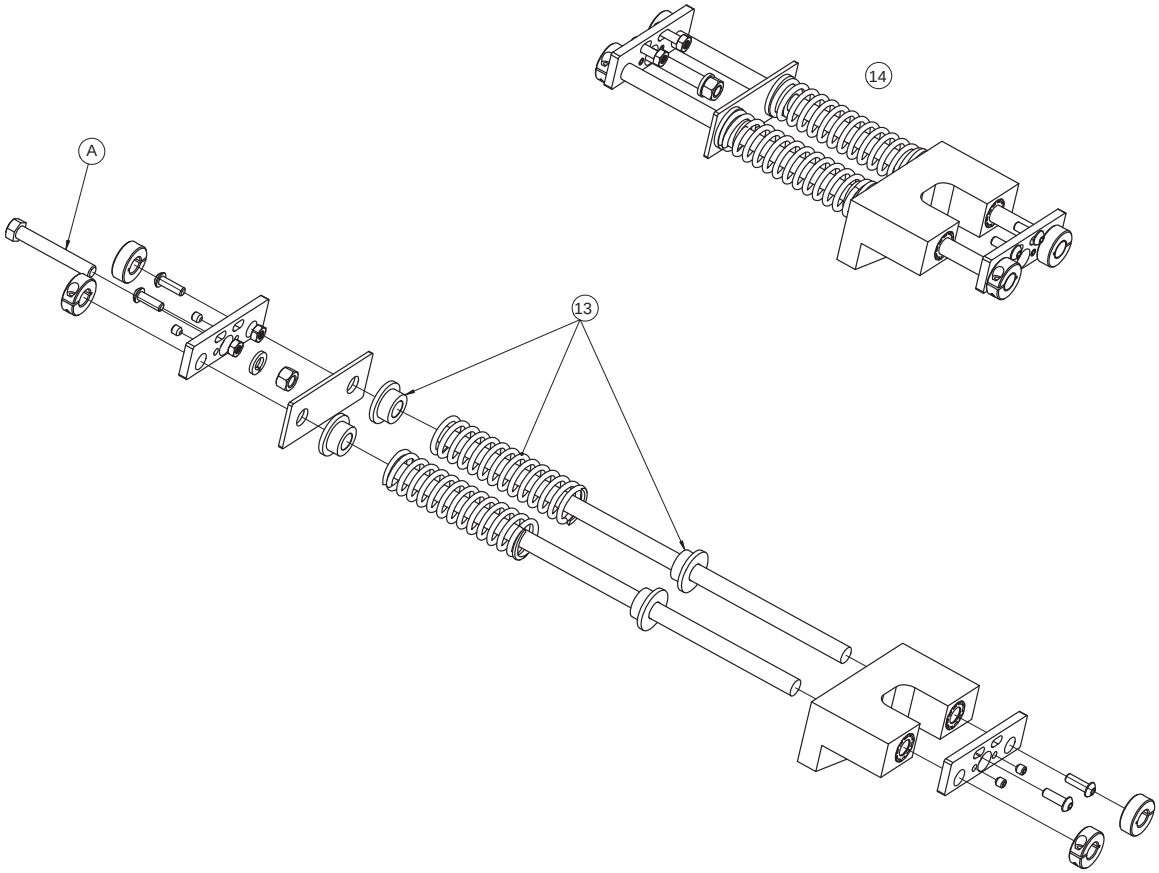


See Page 47 and 48 for description of components contained in part kits.

D: MST-6X/CLST-6X/CPST-6X Cam & Shaft Sub Assembly

Number Shown on Diagram	Alvarado Spare Part Kit Number	Description
13	15-1000	MST-SC SPRING & BUSHING KIT
14	04-8633	MST SELF-CENTERING ASSEMBLY
A	N/A	Adjustment Bolt

Self-Centering Mechanism Compression Spring Close-up

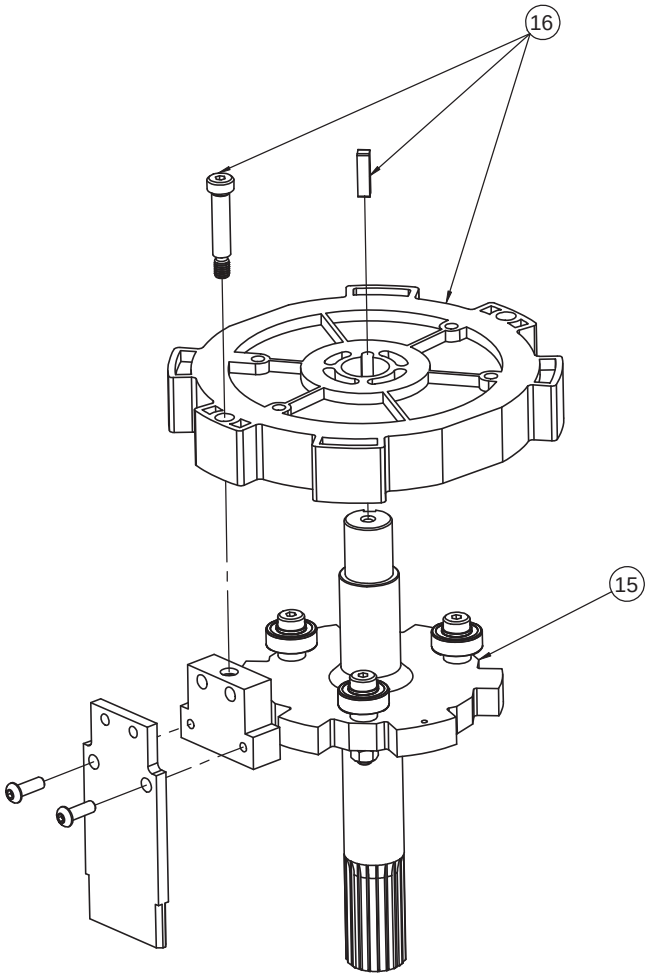


See Page 48 for the corresponding numbered parts listing.

D: MST-6X/CLST-6X/CPST-6X Cam & Shaft Assembly (continued)

Number Shown on Diagram	Alvarado Spare Part Kit Number	Description
15	04-8696R	MSTX-SC2 OPTICAL CAM & SHAFT
16	50-04-8693-2	MST Speed Governor Kit

Self-Centering Mechanism



See Page 48 for the corresponding numbered parts listing.

Description of Parts Included in Spare Part Kits

PART NUMBER SHOWN	KIT PART NUMBER	DESCRIPTION	Qty per turnstile	QTY Per Kit
1	50-10-1070	SOLENOID (12 VDC) KIT	1	
		Solenoid (12V DC)		2
		Screw, 8-32 X 3/8 SHCS-BLK OXIDE		8
		Lock-Washer, #8 Internal Tooth -Zinc		8
2	50-MST-S1	MST SPRING KIT	1	
		Screw, MST Brake Spring		1
		W Cam Follower Spring (Used on Brake Disc)		2
		MST Solenoid Return Spring		2
		MST **Fail-lock** Solenoid Spring		2
		MST **Fail-safe** Solenoid Spring (RED)		2
3	50-MST-BK	MST LOCK ARM, BOLT and BEARING KIT	1	
		Bolt, 5/8 x 1 1/2", Shoulder		2
		Bearing, Plain, 5/8 ID x 1/8 Thick		4
4	11-9401C	Manual Key Override	2	
5	50-04-2055	MSTX BRAKE UNIT KIT	1	
		MSTX BRAKE UNIT		1
		Screw, 5/16 - 18 X 1" Hex Head Cap Zinc		2
		Nut, Lock, 5/16 - 18 Zinc		2
		MST, Screw, Brake Spring		1
		W Cam Follower Spring		2
6	10-1317	110VAC Junction Box	1	
7	50-10-3008A	TRANSFORMER,110VAC-10.5VAC,KIT	1	
		TRANSFORMER T07046B		1
		8-32 X 3/8 SHCS-BLK OXIDE		4
		10-32 X 1/4 SHCS-PLAIN		4
		#8 INTERNL TOOTH LCKWSHER-ZINC		4
		#10 INTERNAL TOOTH LOCKWASHER		4
8	50-10-7821	MSTX (ATC) DRIVER BOARD KIT	1	
		MSTX (ATC) Driver Board		1
		Standoff, 6-32 x 1", Male Female		4
9	50-04-2058A	MSTX OPTICAL SENSOR ASSEMBLY KIT	1	
		MSTX OPTICAL SENSOR ASSEMBLY		1
		Screw, 1/4 - 20 x 5/8" SHCS		2
		Lock Washer, 1/4",		2
		Washer, 1/4" Flat		2
		Screw, 10-32 x 3/4" PHPMS		2
		Washer, #10 Flat		2
		Lock Washer, #10 Internal tooth		2

PART NUMBER SHOWN	KIT PART NUMBER	DESCRIPTION	Qty per turnstile	QTY Per Kit
10	50-11-4010P	MST/MSTX TOP BEARING KIT	1	
		MST/MSTX Top Bearing		2
		Screw, 1/2-13 X 2" Hex Head Cap - Zinc		4
		Nut, 1/2-13 Hex - Zinc		4
		Washer, Lock, 1/2" Med Split - Zinc		4
11	04-2069R	MSTX OPTICAL CAM & SHAFT	1	
		MSTX Optical Cam & Shaft		1
		Washer, Flat, 2 ½" OD		1
12	50-04-2078	MSTX, OPTICAL ENCODER WHEEL KIT	1	
		MSTX, Wheel, Encoder, Optical		1
		Nut, 5/16-18, Lock, Thin, ZINC		3
		Bolt, 5/16-18 X 7/8" BHSCS-B.O.		3
13	15-1000	MST-SC SPRING & BUSHING KIT	1	
		MST-SC2, Return Spring		2
		MST-SC2, Alignment Bushing, Spring		4
14	04-8633	MST SELF-CENTERING ASSEMBLY	1	
		MST-SC2 End Plate		2
		MST-SC2 Spring Plate		1
		Shaft		2
		MST-SC2 Centering Shoe Assembly		1
		Collar, 1/2" I.D.		4
		Alignment Bushing		4
		MST-SC2 Return Spring		2
		Screw, 1/4-20 x 3/4 BHSCS		4
		Set Screw, 1/4-28 x 1/4 Cup Point		4
		Screw, 3/8-16 x 2-1/2" HH Cap		1
		Nut, Hex 3/8-16		1
		Lock Washer, 3/8 Split		1
		Nut, Hex, 1/4"-20 -ZINC		2
15	04-8696R	MSTX-SC2, TANDEM OPTICAL CAM & SHAFT	1	
		MSTX-SC2, Optical Cam & Shaft		1
		Washer, Flat, 2 ½" OD		1
16	50-04-8693-2	MST SPEED GOVERNOR KIT	1	
		MST, Speed Governor, 250		1
		MST, Key, Speed Governor		1
		Bolt, 5/16-18 X 1-1/2", Shoulder		1

Appendix A: Yoke Installation for CPST and CLST

Layout of the Yoke

1. Determine the installation location for the Yoke. Identify the threaded aluminum block at the top of each section. (See **Figure A.1**).

2. Push the two sections together. (See **Figure A.2**). Adjust until the outer edges are equal distance from the center of the Roto Bottom Bearing Housing. This "squaring of the yoke" is necessary to ensure that the entrance and exit passage widths are equal (See **Figure A.2**).

3. Trace the entire outline of the yoke assembly. After marking, move the two sections to the side.

4. Locate the four (4) Yoke Mounting Channels. Position the channels within the traced outline marked as per instruction 3, above. Two channels should be positioned approximately 4" from each end of the assembly. The other two channels should be positioned inside the outer two channels. Position with the ground side of the channel facing out (away from the bottom bearing housing). (See **Figure A.3 and A.5**).

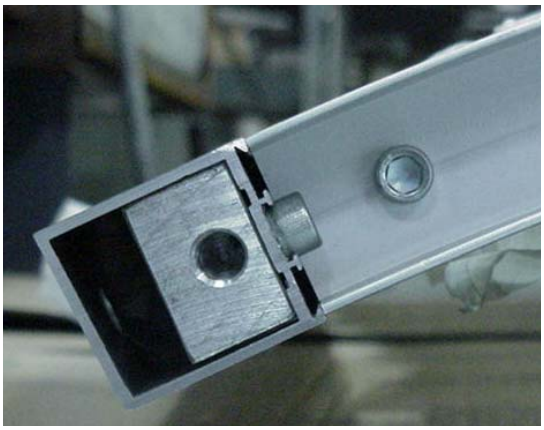


Figure A.1- View of the threaded aluminum block located at the top of each half yoke section.

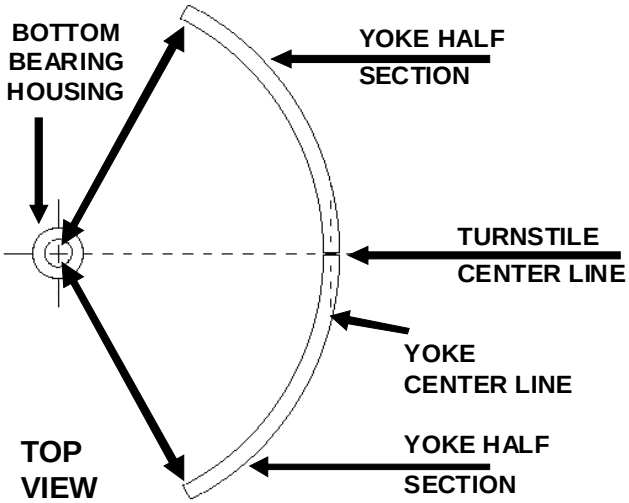


Figure A.2 - "Squaring the yoke." The yoke should be positioned such that the two half yokes are flush together at the intersection of the turnstile and yoke center lines and the center of the Roto Bottom Bearing Housing is equal distance to the outer edges of the yoke assembly.

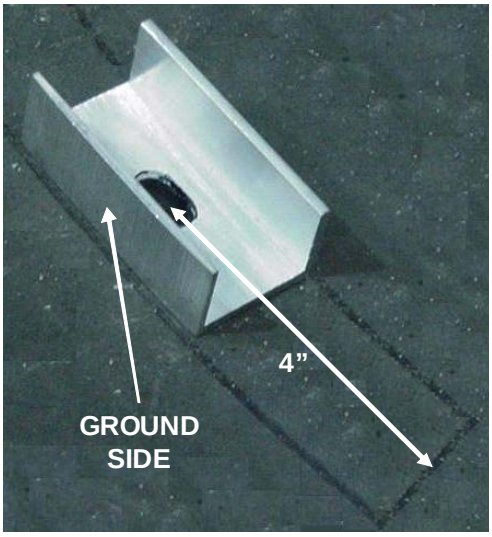


Figure A.3 - Placing the aluminum yoke mounting channels. One yoke mounting channel should be positioned 4" from each half yoke end with the ground side (curved side) of the channel facing out.

5. Mark four holes for the channels set them to the side. Confirm that the marked holes marked are equal distance from the bottom bearing housing (See **Figure A.4**).

6. Drill 3" deep holes and vacuum the holes thoroughly. Insert one anchor into each hole.

7. Reposition channels over the anchors (**Figure A.5**).

8. Anchor each channel with one (1) each 3/8 - 16 x 2 ½" HHCS bolt and flat washer and hand tighten.

9. Position the yoke sections on the channels (**Figure A.6**). Verify that the two sections are still flush together.

10. Remove the yoke sections. Tighten the channel anchor bolts to approximately 40 ft-lbs.

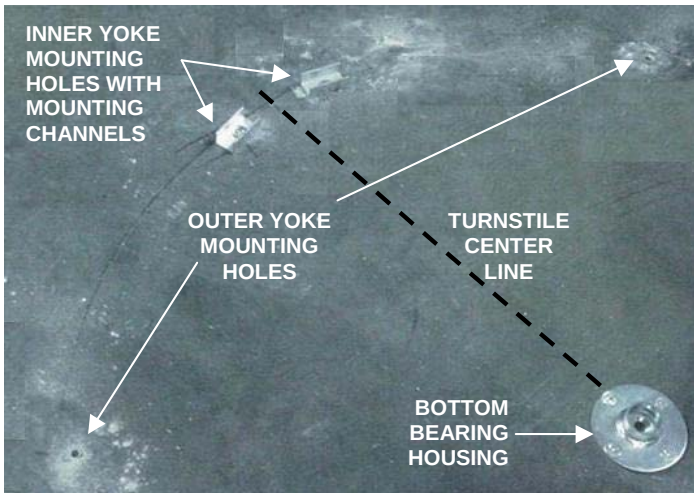


Figure A.4 - Each yoke mounting hole should be located approximately 29.5" from the center of the bottom bearing housing. The two outer yoke mounting holes should be positioned approximately 48" from each other (24" from the turnstile centerline. The two inner yoke mounting holes should be positioned approximately 8" from each other (4" from the turnstile centerline).

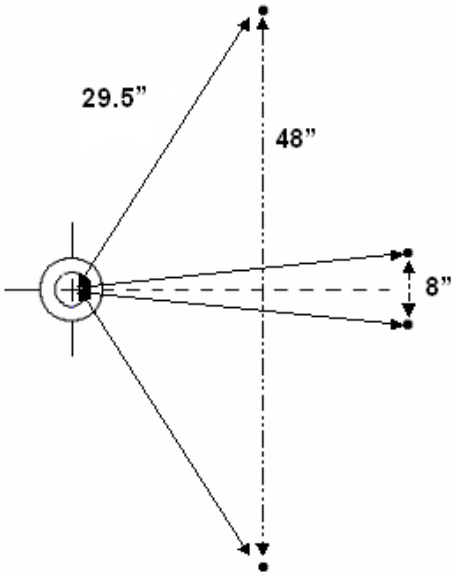


Figure A.5 - Anchoring the Yoke Mounting Channels.

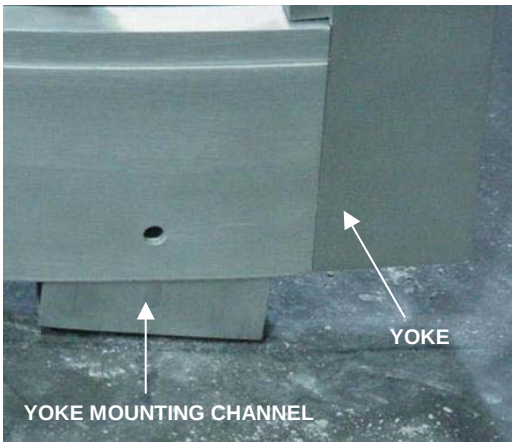
11. Reposition the yoke sections over the yoke mounting channels (See **Figure A.7**).

12. Ensure that the edges of each half section are positioned correctly and flush along the turnstile centerline.

13. Locate the two holes on the bottom of each yoke section. Secure each section to the Yoke Mounting Channel with a ¼-20 x 1" screw.

Figure A.6

Figure A.7 - Repositioning the half yoke sections on the Yoke Mounting Channels.



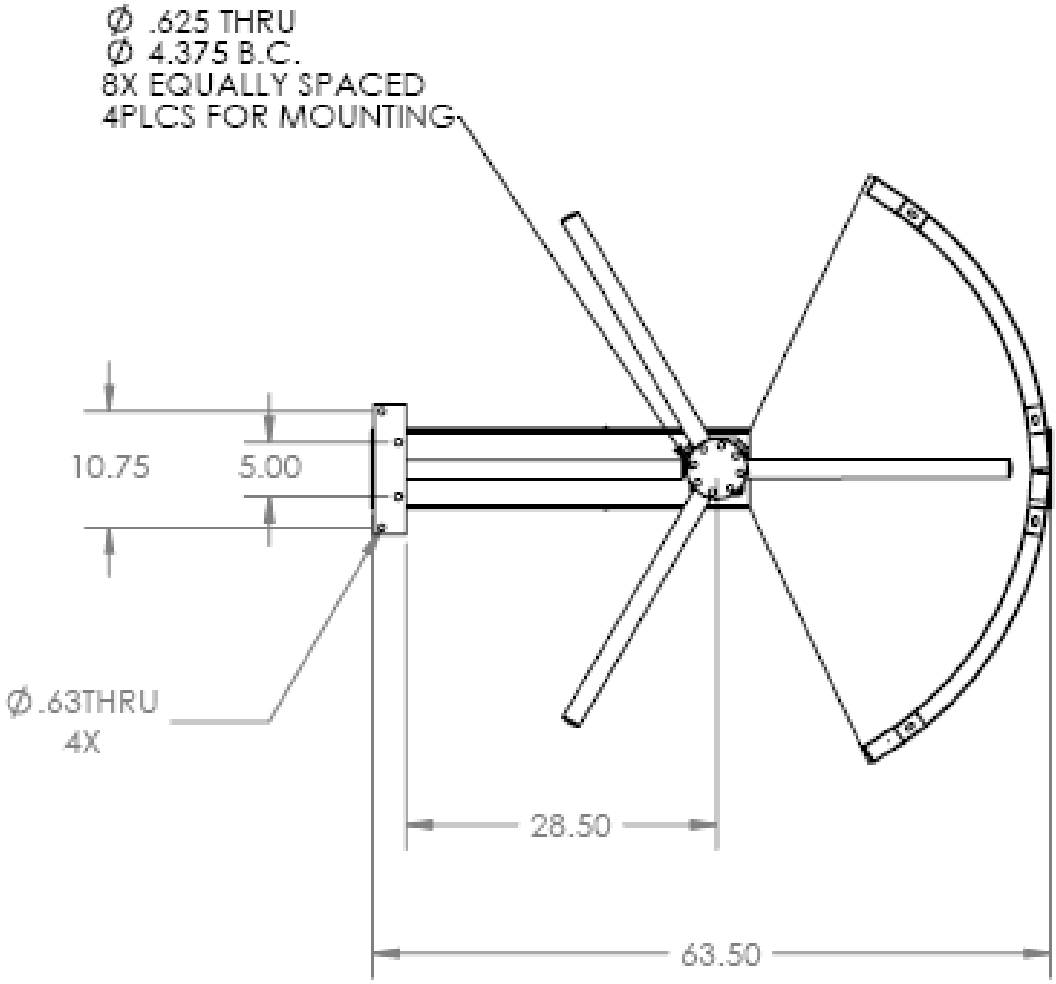
NOTE

Continue at "Installation of OV Section" at the beginning of this manual on page 11.

Turnstile Anchor View
(For CLST models only)

NOTE

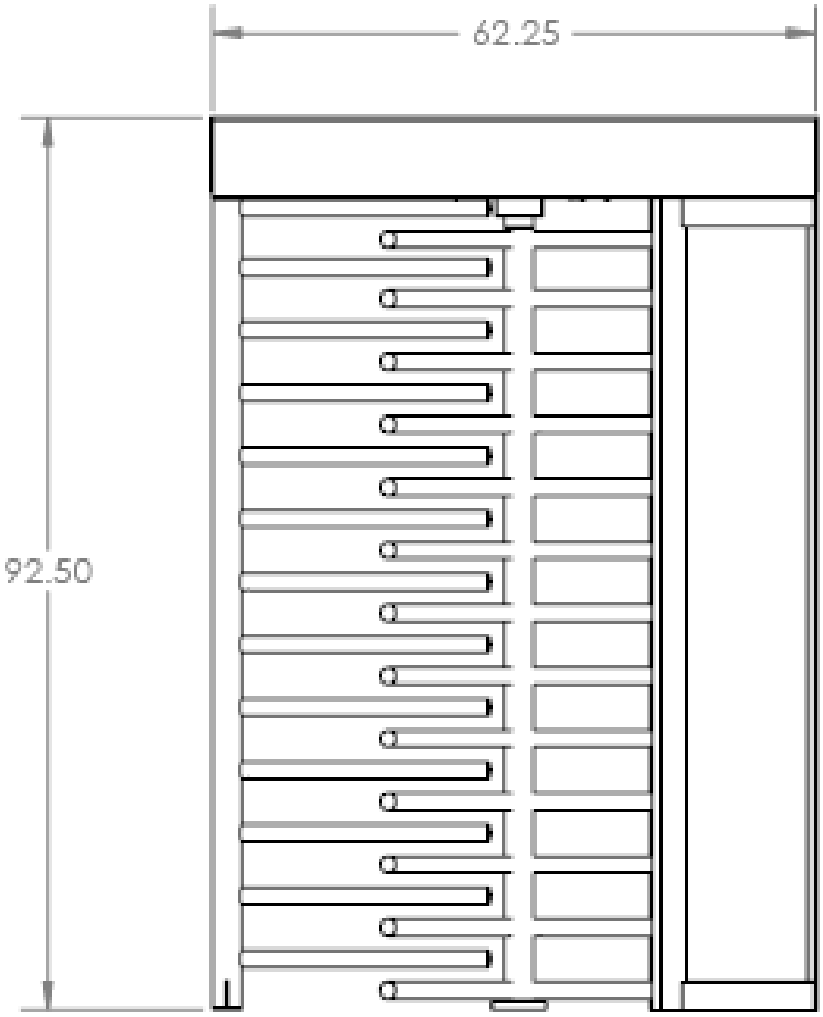
The minimum installation width required is 64”.



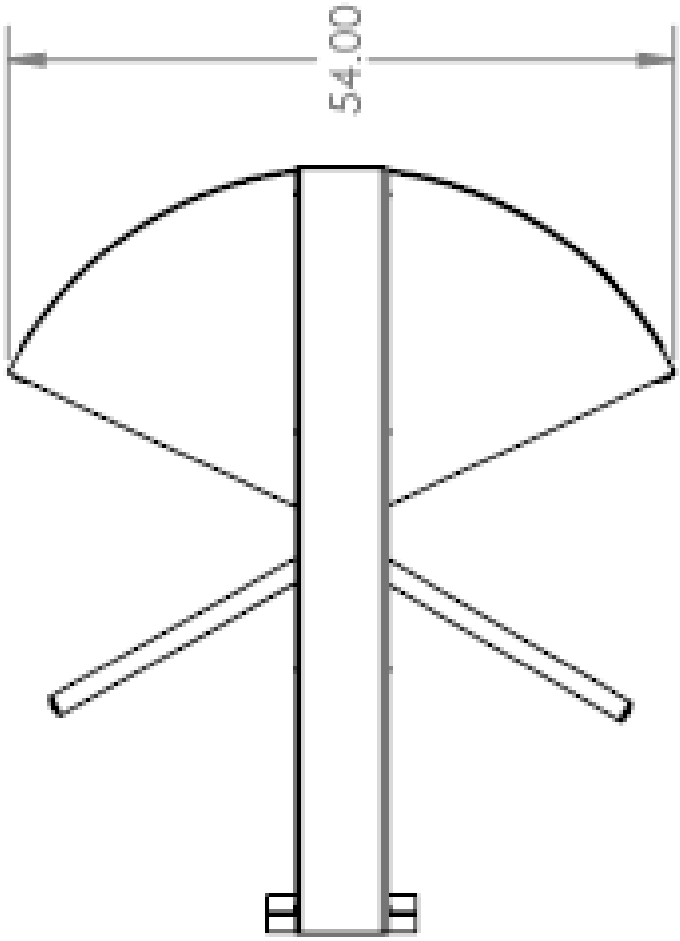
Turnstile Elevation View
(For CLST models only)

NOTE

The minimum installation height required is 95.5”. Viewed from the outer or unsecured side of the turnstile.



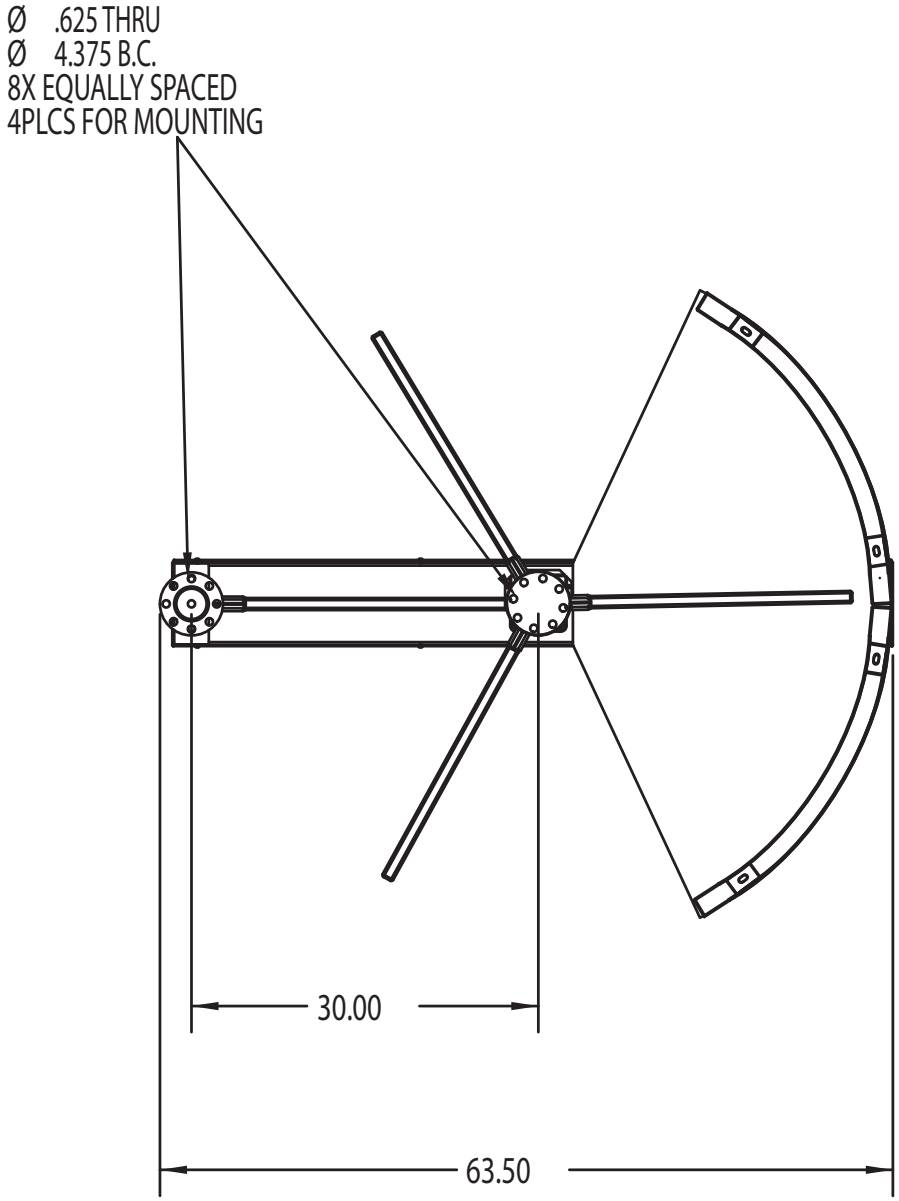
Turnstile Top View
(For CLST models only)



Turnstile Anchor View
(For CLST models only)

NOTE

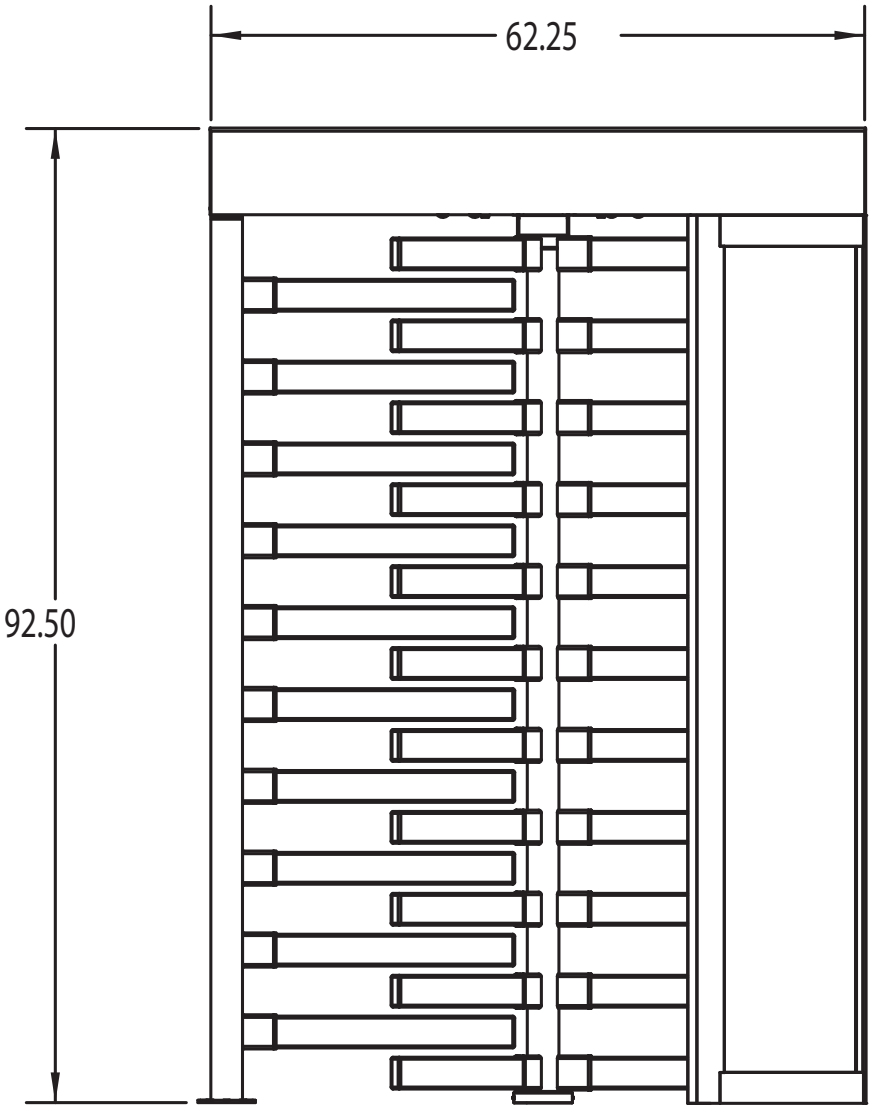
The minimum installation width required is 64”.



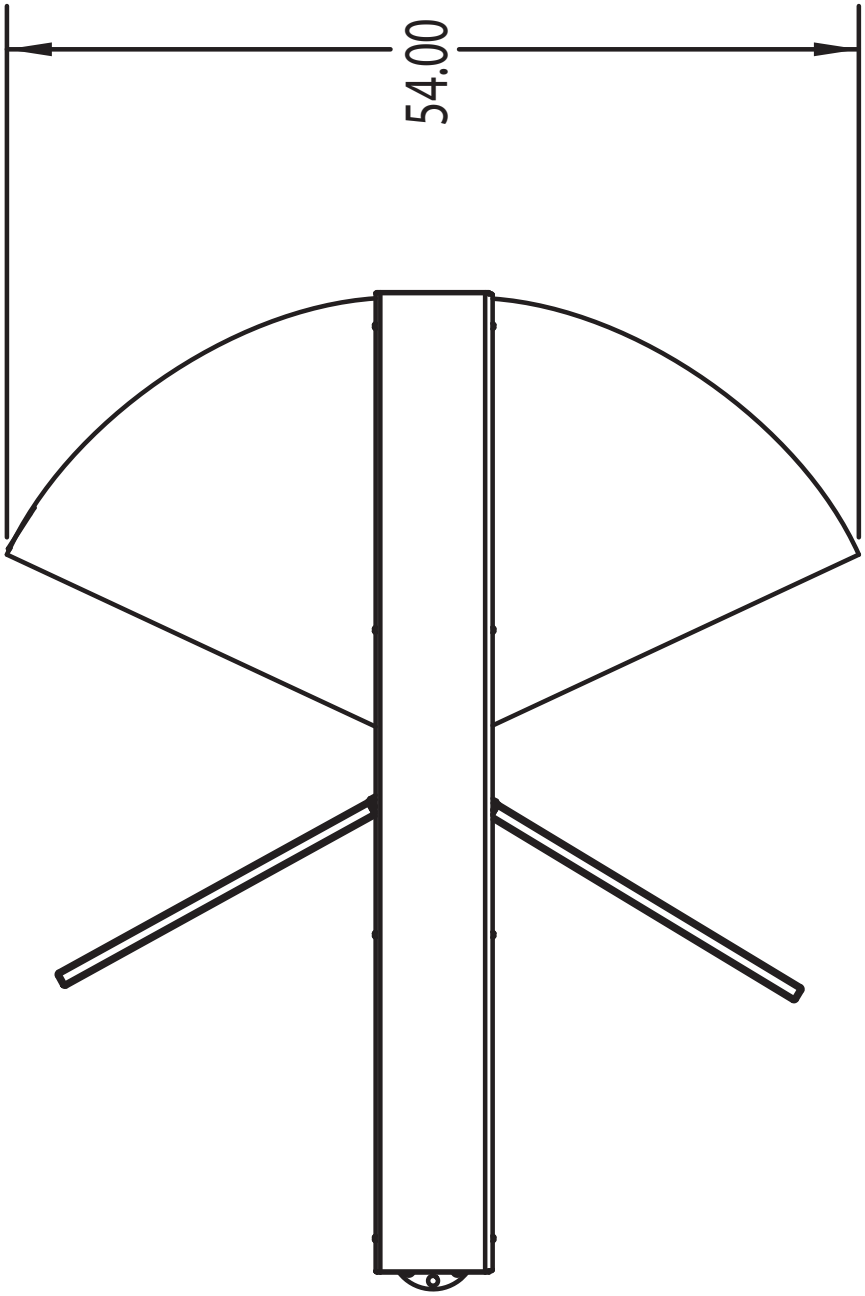
Turnstile Elevation View
(For CPST models only)

NOTE

The minimum installation height required is 95.5”. Viewed from the outer or unsecured side of the turnstile.



Turnstile Top View
(For CPST models only)



Appendix B: Technical Specifications

Dimensions	Unit Height: Unit Width: Unit Depth:	92.5” (2349 mm) 62.25” (1581mm) 54.125” (1375 mm)
Materials	Yoke (Curved Section) MST-3/MST-6X	Formed and welded cold rolled steel (or #304 stainless steel). A fully welded, continuous assembly. Consists of 10 pieces of vertically aligned 1 3/4” x 16-gauge tubing notched and welded to two curved, horizontal tubes bent to an inside radius of 28 3/4”. Two 3/16” x 1” straps are welded to the outside of the ten tubes for additional support. No external fasteners are used in the construction of the yoke.
	CLST-3/CLST-6X and CPST/CPST-6X	Two piece assembly consisting of 3/16” thick polycarbonate panel contained within an extruded aluminum frame. Each frame consists of two 1 3/4” wide vertical pieces and two 3 3/8” wide horizontal pieces bent to a centerline radius of 29 3/8”. The polycarbonate panel section also has a centerline radius of 29 3/8” and is securely contained within the inside perimeter of the frame. Available in #4 satin or powder coated **finish.**
	Yoke Guard Plate	Cold rolled steel (or #304 stainless steel). 16-gauge sheet bolted to the top of the channel / yoke assemblies.
	Roto (Rotating Section)	Formed and welded cold rolled steel (or #304 stainless steel). The Roto contains 13 arms per section for a total of 39 per Roto. Each arm is constructed from 1-¾” OD x 14-gauge tubing, notched and welded to a vertical 3” OD x 3/16” wall tube, and capped with either a 1-¾” OD x 10-gauge cap (powder coated or stainless steel finish unit) or a force fit, ribbed, plastic cap (galvanized finish unit). No external fasteners are used in the construction of the rotos. All exterior welds are ground smooth and polished.
	OV (Barrier Section) MST-3/MST-6X and CLST/CLST-6X	Formed and welded cold rolled steel (or #304 stainless steel). Consists of 13 1-¾” OD x 14-gauge tubing notched and welded at one end to a vertical 3” OD x 3/16” wall tubes, and capped with either a 1 ¾” OD x 10-gauge cap (powder coated or stainless steel finish unit) or a force fit, ribbed, plastic cap (galvanized finish unit). No external fasteners are used in the construction of the OV. All exterior welds are ground smooth and polished.
	CPST-3/CPST-6X	Formed and welded cold rolled steel (or #304 stainless steel). Consists of 10 arms constructed from 1” X 3” clear Lexgard®MP 1000 laminate with a Margard® surface, glued and press fit into a steel “boot” which is welded to a vertical 3” OD x 3/16” wall tube. No external fasteners are used in the construction of the OV. All exterior welds are ground smooth and polished. Polished to a #4 satin finish.
	Top Channel	Formed and welded 304 stainless steel. The “U” channel is composed of 7” wide 10-gauge steel with a 16-gauge cover. All exterior welds are ground smooth and polished. Houses the main control mechanism components.
Control Mechanism Components	Cam and Shaft Assemblies	The lobed cam is precision investment cast stainless steel welded to a splined shaft. The splined shaft fits into a reciprocal splined coupling in the top of the Roto, creating a solid non-slip connection between the parts.
	Top Bearing Assemblies	Each cam and shaft assembly rotates in a bearing assembly consisting of two fully protected precision bearings.

Mechanical Turnstile Control	The locking and unlocking of the unit is controlled with stainless steel lock arms that are moved into the appropriate locked or unlocked position by continuous duty rated solenoids and spring assemblies. There is one solenoid and spring assembly per lock arm, and one lock arm per direction, allowing for independent control of each rotational direction.
Opto Interrupter Rotation Wheel Assembly	This assembly consists of two opto-interrupters (small, industrial grade, transmit and receive LEDs), and a rotation wheel. As the turnstile arm is rotated, the rotation wheel passes between the two opto interrupters, signaling the Alvarado Turnstile Controller (ATC) that a turnstile rotation has occurred. The ATC uses this information to re-lock and provide access control functionality without the need for mechanical microswitches.

Electrical Components and Functionality

The following are the electrical requirements and standard functionality of the MST-6X/CLST-6X/CPST-6X

Power Supply	110 VAC, 60 Hz or 240 VAC, 50 Hz Low voltage primary power of 10.5 VAC or 13.5 VDC may also be supplied by connecting power directly to each ATC.
Power Rating	Maximum power consumption is 75 W per turnstile.
Operational Voltage	Primary power is stepped down and rectified for low voltage 12 VDC operation.
On/Off Switch	An on/off switch is located on each power junction box inside the MST-6X/CLST-6X/CPST-6X top channel. A visible green LED is illuminated on the ATC when the power is “on”.
Power Receptacles	The power junction box inside the MST-6X/CLST-6X/CPST-6X top channel includes two 110 VAC or one 220 VAC power receptacles providing a convenient way for installers or technicians to power tools or equipment they may need as they test or maintain the MST-6X/CLST-6X/CPST-6X in the field.
Surge Protection	Each ATC has line to line surge protection for single-phase low voltage AC input to 125 amps. Each ATC also contains a varister that switches to a high impedance state to protect the circuit in the event of a power surge.
Bi-directional Solenoid Drivers	Each ATC provides one solenoid driver per rotation direction.
Activation	Activation for either direction of operation is achieved by supplying a momentary dry contact of any duration to the ATC. A terminal strip connection is provided on the ATC for this purpose.
Timed Delay Auto Re-Lock	An activation signal unlocks the turnstile for one entry. Once the turnstile is unlocked, the user is allowed a maximum of 20 seconds to pass through the turnstile. If the turnstile arms are not rotated within the 20-second time frame allowed, the turnstile automatically relocks.
Field Activation Testing	Each ATC provides a field activation testing button, for each electrically controlled direction. This feature provides a simple way for installers to test the functionality of the MST-6X/CLST-6X/CPST-6X and isolate problems in the field.
Remote Unlocking	Each ATC accepts inputs from a continuous dry contact emitting device to bypass the access control system and allow the MST-

		6X/CLST-6X/CPST-6X to be remotely unlocked or "opened" in the electrically controlled direction(s). A terminal strip connection is provided on the ATC for this purpose.
Outputs	Terminal strip connections are provided for the following output signals:	
	Feedback / Turnstile Rotation Count	The ATC provides a double pole, single throw, relay in each direction of operation. This allows the ATC to provide a "feedback" signal in the form of a relay output to the access control provider or an external counting system. A terminal strip connection is provided on the ATC for this purpose.
Available Finishes	Galvanized	All exterior tubing and sheet metal surfaces receive a coating of hot molten zinc meeting ASTM Standards A123 through A153.
	Powder Coated	Available in a wide variety of colors. Sub-assemblies are sand blasted to prepare for the powder coating finish. The powder is electrostatically applied, then baked to assure proper curing and adhesion.
	Stainless Steel	All external fabricated materials are composed of #304 stainless steel (noted in the descriptions above as #304 SS) and polished to a #4 satin finish.
Shipping Details	MST-6X/CLST-6X/CPST-6X turnstiles are shipped in five main sections: the Top Channel, the Yoke section, the Roto, the OV, and the Yoke Guard Plate. Each section is fully fabricated as a sub-assembly for easy installation. Each MST-6X/CLST-6X/CPST-6X unit includes mounting hardware (anchors, bolts, washers, etc.) to mount the unit to a standard concrete pad. Alvarado ships products throughout the world.	
Installation Details	All MST-6X/CLST-6X/CPST-6X units must be installed on a firm foundation in a manner that allows the required power and activation signal cabling to be pulled into the top channel. The recommended platform is 72" square by 4" deep, level concrete. No embedded fasteners are needed for installation. Installation should be performed by a skilled installer following the manufacturer's directions and instructions (supplied with the turnstile).	
Approximate Weight	Approximately 720 lb. (327 Kg) per turnstile.	

Electrical Specifications

Power Rating:
MST-6X/CLST-6X/CPST-6X: 110-120VAC, 50-60Hz, AT 0.5 AMPS
220-240VAC, 50-60Hz, AT 0.25 AMPS

Minimum recommended Circuit Capacity
120VAC – 15 AMPS
240VAC – 6.5 AMPS

External Circuitry: External wiring should comply with all local electrical codes and regulations for the ratings listed above.

Circuit Bracker: A switch or circuit-breaker shall be included in the building installation and shall be in close proximity to the equipment and within easy reach of the operator. This switch or circuit breaker shall be marked as the disconnecting device for the equipment. Please ensure that protective earth is properly secured to the Protective Earth Terminal inside the Junction Box. *Follow all local electrical codes and regulations pertaining to your area.*

Environment:
Operating Temperature: 0-50 deg C
Storage Temperature: -30 – 60 deg C
RH: 0-90% (Non-condensing)

USER MANUAL STATEMENTS

Česky Czech	Alvarado Manufacturing Company na tímto prohlašuje, že tento Model MST je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 2004/108/EC - 2006/95/EC.
Dansk Danish	Undertegnede Alvarado Manufacturing Company erklærer herved, at følgende udstyr Model MST overholder de væsentlige krav og øvrige relevante krav i direktiv 2004/108/EF – 2006/95/EF
Deutsch German	Hiermit erklärt Alvarado Manufacturing Company, dass sich das Gerät Formen MST in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 2004/108/EG – 2006/95/EG befindet.
Eesti Estonian	Käesolevaga kinnitab Alvarado Manufacturing Company seadme Model MST vastavust direktiivi 2004/108/EU – 2006/95/EU põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
English	Hereby, Alvarado Manufacturing Company, declares that this Model MST is in compliance with the essential requirements and other relevant provisions of Directive 2004/108/EC – 2006/95/EC.
Español Spanish	Por medio de la presente Alvarado Manufacturing Company declara que el Modelo MST cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 2004/108/CE – 2006/95/CE.
Ελληνικη Greek	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Alvarado Manufacturing Company ΔΗΛΩΝΕΙ ΟΤΙμοντελο MST ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 2004/108/ΕΚ – 2006/95/ΕΚ.
Français French	Par la présente contrat Alvarado Manufacturing Company déclare que, Modelo MST est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 2004/108/CE – 2006/95/CE.
Italiano Italian	Con la presente Alvarado Manufacturing Company dichiara che questo Modello MST è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 2004/108/CE – 2006/95/CE.
Latviski Latvian	Ar šo Alvarado Manufacturing Company deklarē, ka model MST atbilst Direktīvas 2004/108/EK – 2006/95/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių Lithuanian	Šiuo Alvarado Manufacturing Company deklaruoja, kad šis model MST atitinka esminius reikalavimus ir kitas 2004/108/EB – 2006/95/EB Direktyvos nuostatas.
Nederlands [Dutch]	Hierbij verklaart Alvarado Manufacturing Company dat het toestel Voorbeeld MST in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 2004/108/EG – 2006/95/EG.
Malti [Maltese]	Hawnhekk, Alvarado Manufacturing Company, jiddikjara li dan model MST jikkonforma mal-htigijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 2004/108/EC – 2006/95/EC.
Magyar Hungarian	Alulírott, Alvarado Manufacturing Company nyilatkozom, hogy a Minta MST megfelel a vonatkozó alapvetõ követelményeknek és az 2004/108/EC – 2006/95/EC irányelv egyéb elõírásainak.
Polski Polish	Niniejszym Alvarado Manufacturing Company, że, Model MST jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 2004/108/EC – 2006/95/EC.
Português Portuguese	Alvarado Manufacturing Company declara que este Modelo MST está conforme com os requisitos essenciais e outras disposições da Directiva 2004/108/CE – 2006/95/CE..
Slovensko Slovenian	poučen Alvarado Manufacturing Company, da je ta Modelo MST v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 2004/108/ES – 2006/95/ES.
Slovensky Slovak	Alvarado Manufacturing Company týmto vyhlasuje, že model MST spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 2004/108/ES – 2006/95/ES.
Suomi Finnish	Alvarado Manufacturing company vakuuttaa täten että, Esikuvallinen MST tyyppinen laite on direktiivin 2004/108/EY – 2006/95/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Svenska Swedish	Härmed intygar Alvarado Manufacturing Company att denna Modell MST står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 2004/108/EC – 2006/95/EG.
Íslenska Icelandic	Hér með lýsir Alvarado Manufacturing Company yfir því að model MST er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 2004/108/CE – 2006/95/CE.
Norsk Norwegian	Alvarado Manufacturing Company erklærer herved at utstyret Modell MST er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 2004/108/EF – 2006/95/EF.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	1	79

INDEX OF SHEETS

Sheet No.	Description
1	Title and Location Map
2-3	Typical Cross Sections
4	Layouts
5	Profiles and Superelevation Diagram
6-14	Construction Details
15-20	Temporary Water Pollution Control Details
21-22	Erosion Control Plan and Details
23-27	Drainage Plan, Profiles, Details and Quantities
28-31	Sanitary Sewer Plans, Profiles, Details and Quantities
32-33	Utility Plan and Quantities
34-35	Stage Consturction and Traffic Handling Plans
36-38	Construction Area Signs
39-40	Pavement Delineation Plans and Quantities
41	Summary of Quantities
42-43	Sign Plans and Quantities
44-46	Retaining Wall Plans and Log of Test Borings
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STRUCTURE PLANS

71-79	Entrance Canopy Br No. 34-0006

THE STANDARD PLANS LIST APPLICABLE TO THIS CONTRACT IS INCLUDED IN THE NOTICE TO CONTRACTORS AND SPECIAL PROVISIONS BOOK.

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ADJACENT TO STATE HIGHWAY

IN THE CITY AND COUNTY OF SAN FRANCISCO AT YERBA BUENA ISLAND

To be supplemented by Standard Plans dated July, 1999

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LOCATION OF CONSTRUCTION
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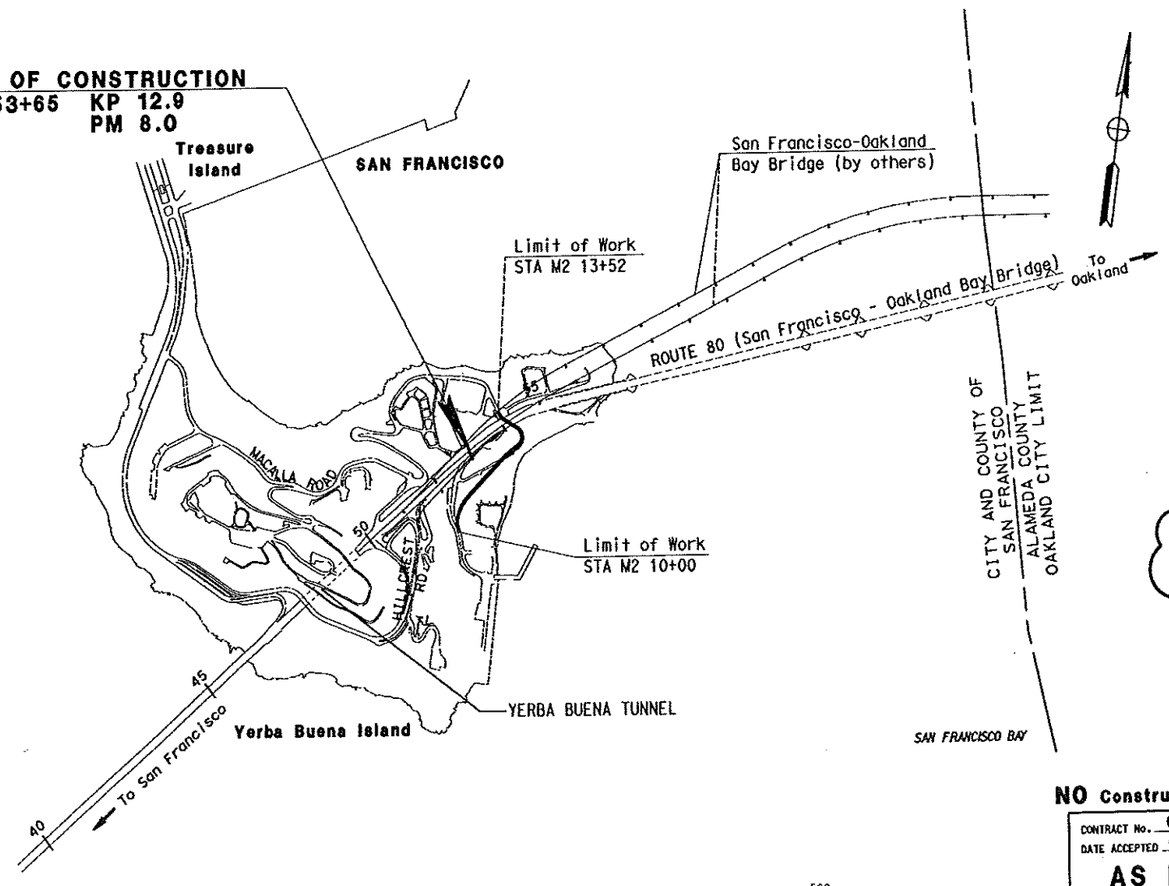
PM 8.0



AS-BUILT
DATE: 09/28/04
TYPE OF WORK: NOT AVAILABLE

Mark Aikawa 4/23/03
Project Engineer Date
Registered Civil Engineer

REGISTERED PROFESSIONAL ENGINEER
Mark Aikawa
No. C48099
Exp. 6/30/04
CIVIL
STATE OF CALIFORNIA

May 20, 2003
Plans Approval Date

NO Construction Changes

CONTRACT No. 04-0120Q4
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND ST., SUITE 700N
SAN FRANCISCO, CA 94107-1317

Contract No. 04-0120Q4

Approved as to "impact on State facilities and conformance with applicable State standards and practices and that technical oversight was performed as described in the California Department of Transportation A & E Consultant Service Manual.

PROJECT ENGINEER: MARK A. AIKAWA
UNDER OWNERSHIP: DEPT. OF TRANSPORTATION
APPROVAL: Bob Templeman
REGISTRATION NO.: C-38994
DATE: 4 23 03

The Contractor shall possess the Class (or classes) of license as specified in the "Notice to Contractors".

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SCALE IN METERS

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FORM DC-OE-93-PF (REV. 3/88)

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04	SF	80	12.9	2	79

Caltrans Metric

REGISTERED CIVIL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KAMAL ROHANI — No. C 62321 — Exp. 09/30/05 — CIVIL — STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 Second St., Suite 700N
San Francisco, CA 94107-1317

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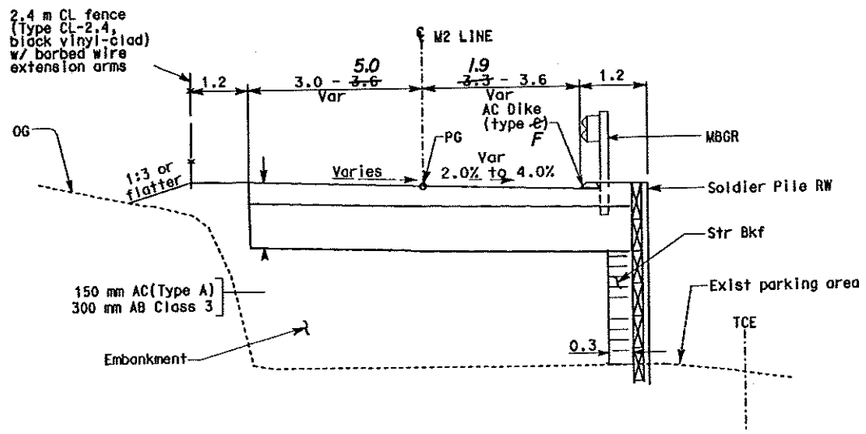
NOTES:

1. Dimensions of the stuctural section are subject to tolerances specified in standard specifications.
2. Superelevation as shown or as directed by the Engineer.
3. For location of AC Dike (Type C) see construction detail sheets.



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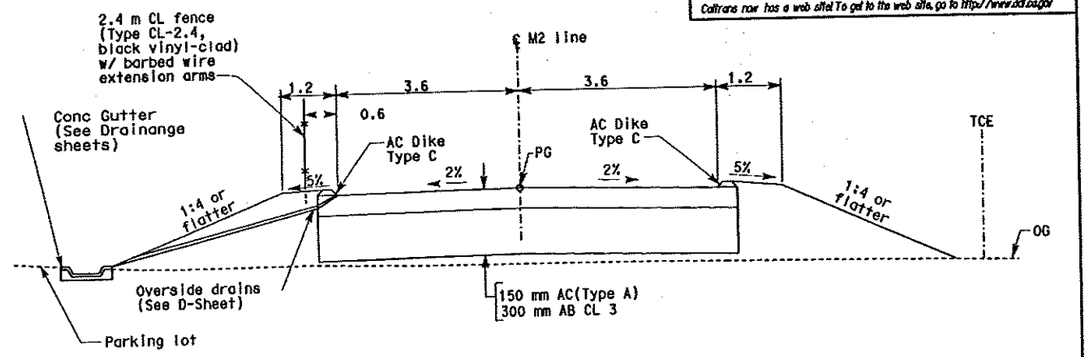

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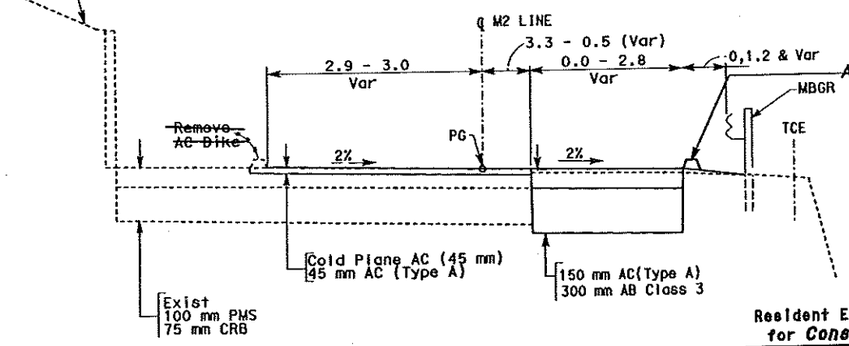

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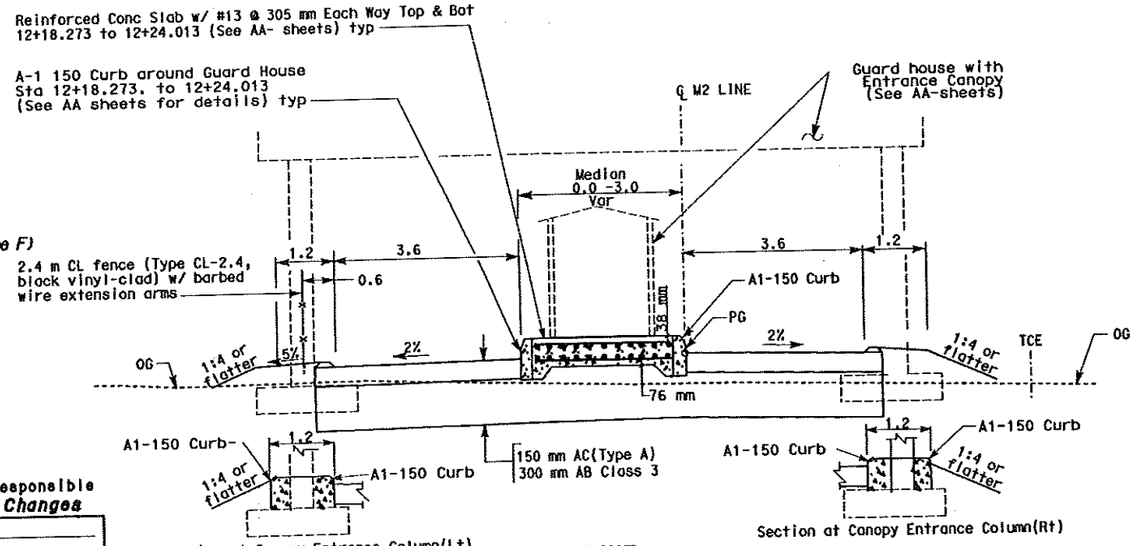

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Resident Engineer Responsible for *Construction Changes*

CONTRACT No. 04-0120Q4
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE — DATE 7/28/04
CHECKED BY R L — DATE 10/2004

TYPICAL CROSS SECTIONS

NO SCALE

X-1

DATE	REVISED BY	DATE	REVISED BY
3/03	KR	3/03	GVL

CALCULATED/DESIGNED BY — CHECKED BY

DESIGN OVERSIGHT — Bob Zandipour

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	3	79

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5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 Second St., Suite 700N
San Francisco, CA 94107-1317

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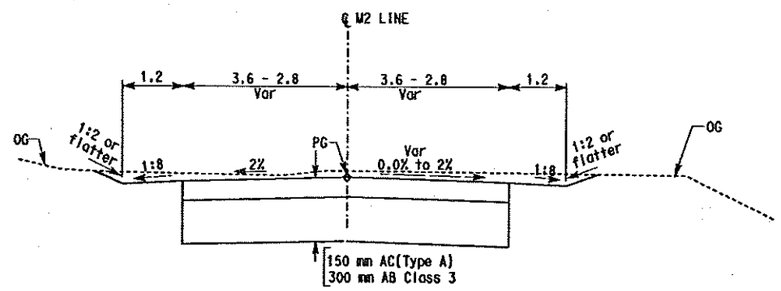

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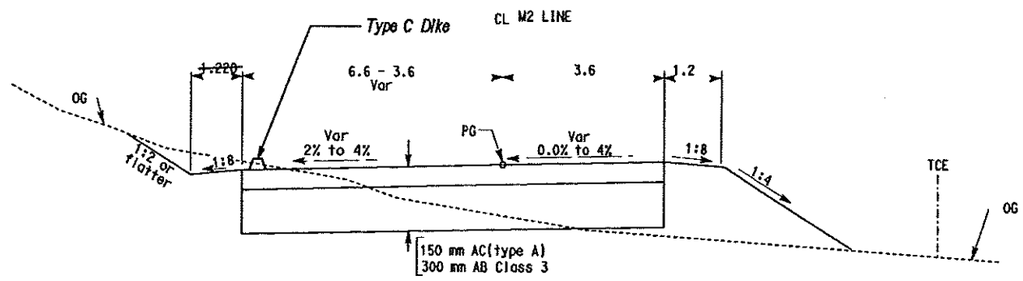

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Resident Engineer Responsible for *Construction Changes*

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE 7/28/04 DATE
CHECKED BY R L DATE 10/2004

TYPICAL CROSS SECTIONS

NO SCALE

X-2

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Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: KR
CHECKED BY: GVL

REVISED BY	DATE	DATE REVISED
	3/03	3/03

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DATE PLOTTED => 10-MAR-2005
TIME PLOTTED => 16:11

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CU 04251 EA 012001

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	4	79

REGISTERED CIVIL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KAMAL ROKHANI — No. C 62321 — Exp. 09/30/05 — CIVIL — STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 Second St., Su'te 700N
San Francisco, CA 9407-1317

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NOTES:

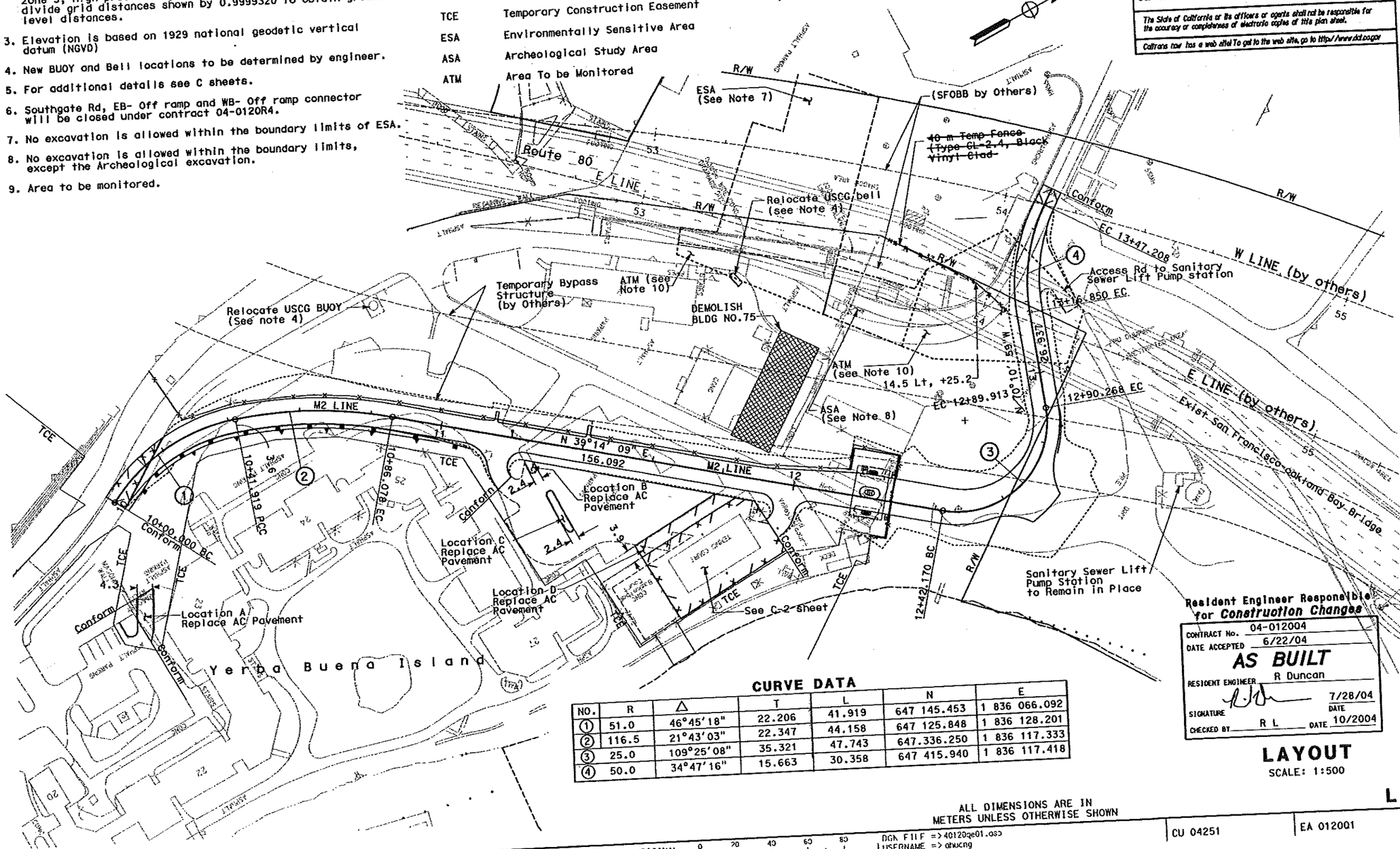
1. For complete Right of Way and accurate access data, see Right of Way record maps at district office.
2. Coordinates, distances and bearings are on CCS'83, zone 3, high precision geodetic network (1991.35 epoch). divide grid distances shown by 0.9999320 to obtain ground level distances.
3. Elevation is based on 1929 national geodetic vertical datum (NGVD)
4. New BUOY and Bell locations to be determined by engineer.
5. For additional details see C sheets.
6. Southgate Rd, EB- Off ramp and WB- Off ramp connector will be closed under contract 04-0120R4.
7. No excavation is allowed within the boundary limits of ESA.
8. No excavation is allowed within the boundary limits, except the Archeological excavation.
9. Area to be monitored.

ABBREVIATIONS:

SFOBB	San Francisco Oakland Bay Bridge
YPI	Yerba Buena Island
U.S.C.G.	United States Coast Guard
TCE	Temporary Construction Easement
ESA	Environmentally Sensitive Area
ASA	Archeological Study Area
ATM	Area To be Monitored

LEGEND:

- Demolish
- Cold Plane AC
- 45 mm AC Surfacing



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3	25.0	109°25'08"	35.321	47.743	647.336.250	1 836 117.333
4	50.0	34°47'16"	15.663	30.358	647 415.940	1 836 117.418

Resident Engineer Responsible for Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE — DATE 7/28/04
CHECKED BY R L — DATE 10/2004

LAYOUT

SCALE: 1:500

L-1

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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CU 04251 | EA 012001

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: KR — DATE: 3/03 — REVISED BY
CHECKED BY: GVL — DATE: 3/03 — REVISED

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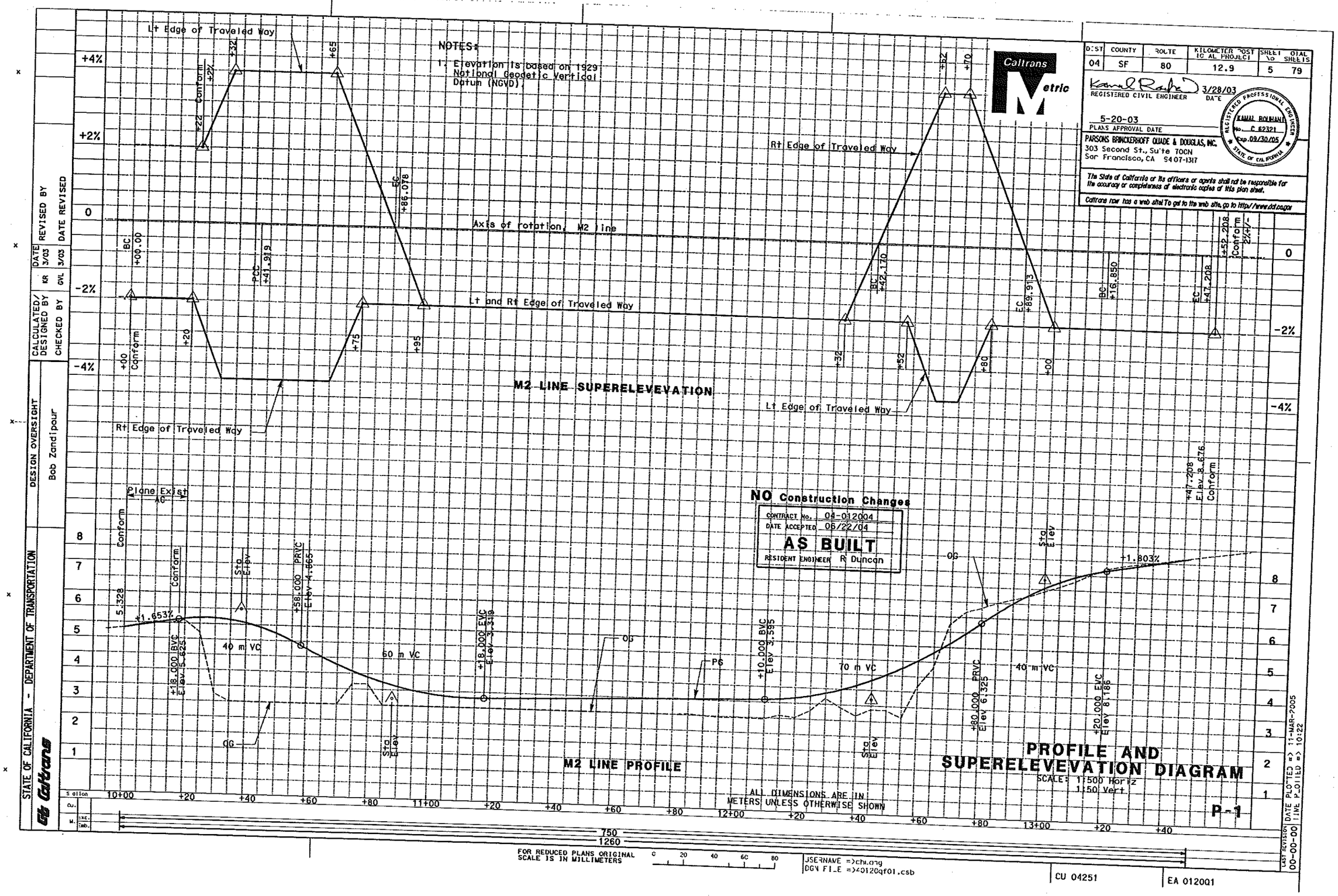
7/20/20



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7/20/2005

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	6	79

REGISTERED CIVIL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

KAMAL ROHANI No. C 62321 Exp. 09/30/05 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 Second St., Suite 700N
San Francisco, CA 94107-1317

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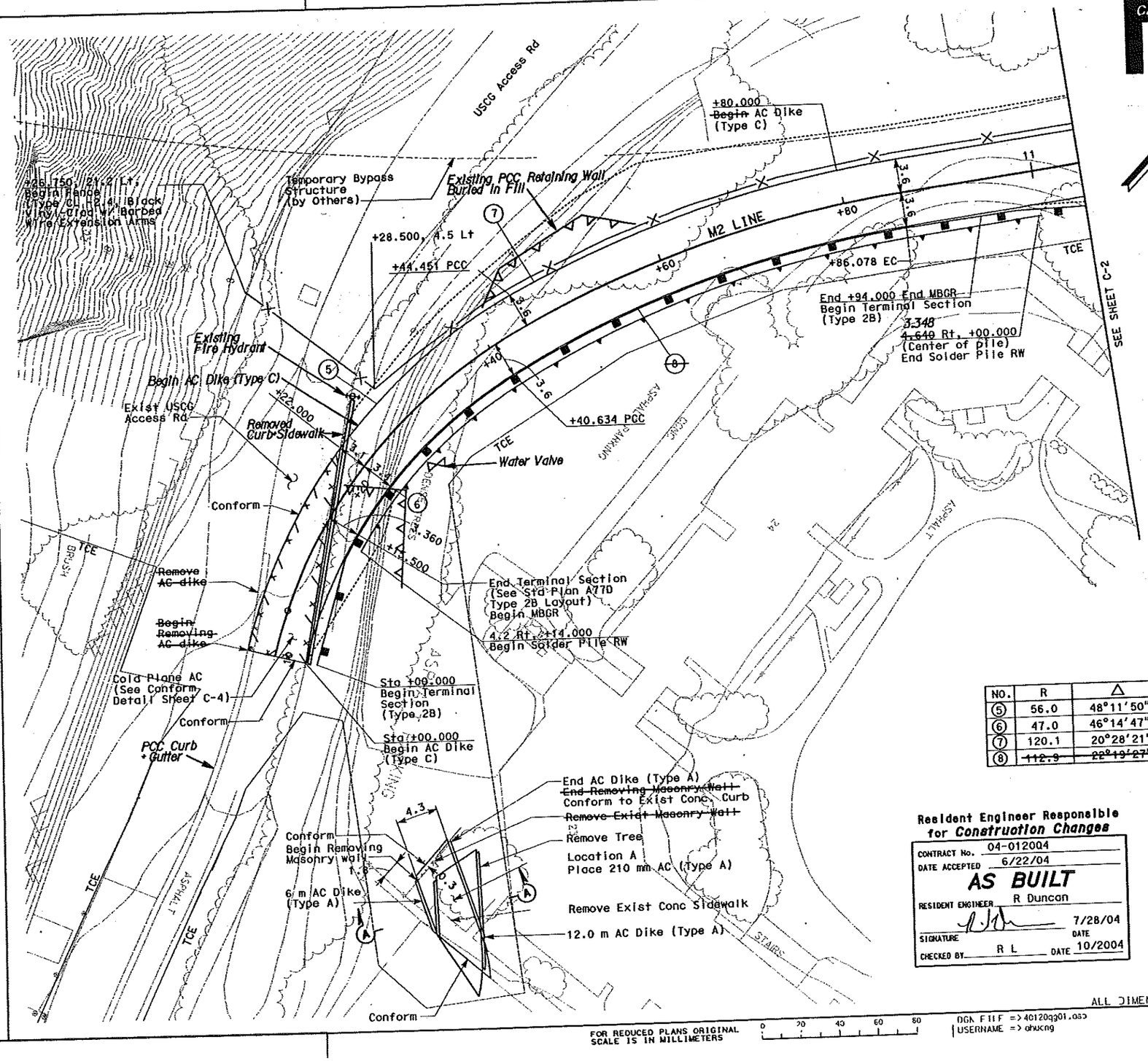

LEGEND:

Cold Plane AC
45 mm AC Surfacing

ABBREVIATIONS:

SFOBB	San Francisco Oakland Bay Bridge
YPI	Yerba Buena Island
U.S.C.G.	United States Coast Guard
TCE	Temporary Construction Easement
ESA	Environmentally Sensitive Area
ASA	Archeological Study Area
ATM	Area To be Monitored

CURVE DATA

NO.	R	Δ	T	L	N	E
5	56.0	48°11'50"	25.048	47.107	647 146.466	1 836 067.508
6	47.0	46°14'47"	20.070	37.936	647 145.018	1 836 065.151
7	120.1	20°28'21"	21.688	42.913	647 125.848	1 836 128.201
8	~~112.9~~	~~22°19'27"~~	22.277	43.989	647 125.848	1 836 128.201

Resident Engineer Responsible for *Construction Changes*

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE — DATE 7/28/04
CHECKED BY R L — DATE 10/2004

CONSTRUCTION DETAILS
PAVEMENT ELEVATIONS

SCALE: 1:200

C-1

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

DGN FILE => 40120qg01.dgn
USERNAME => ahuang

CU 04251 | EA 012001

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: KR — DATE REVISED: 3/03
CHECKED BY: GVL — DATE REVISED: 3/03

LAST REVISION 00-00-00 — DATE PLOTTED => 11-MAR-2005 — TIME PLOTTED => 10:23

7/20/200

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	7	79

REGISTERED CIVIL ENGINEER 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
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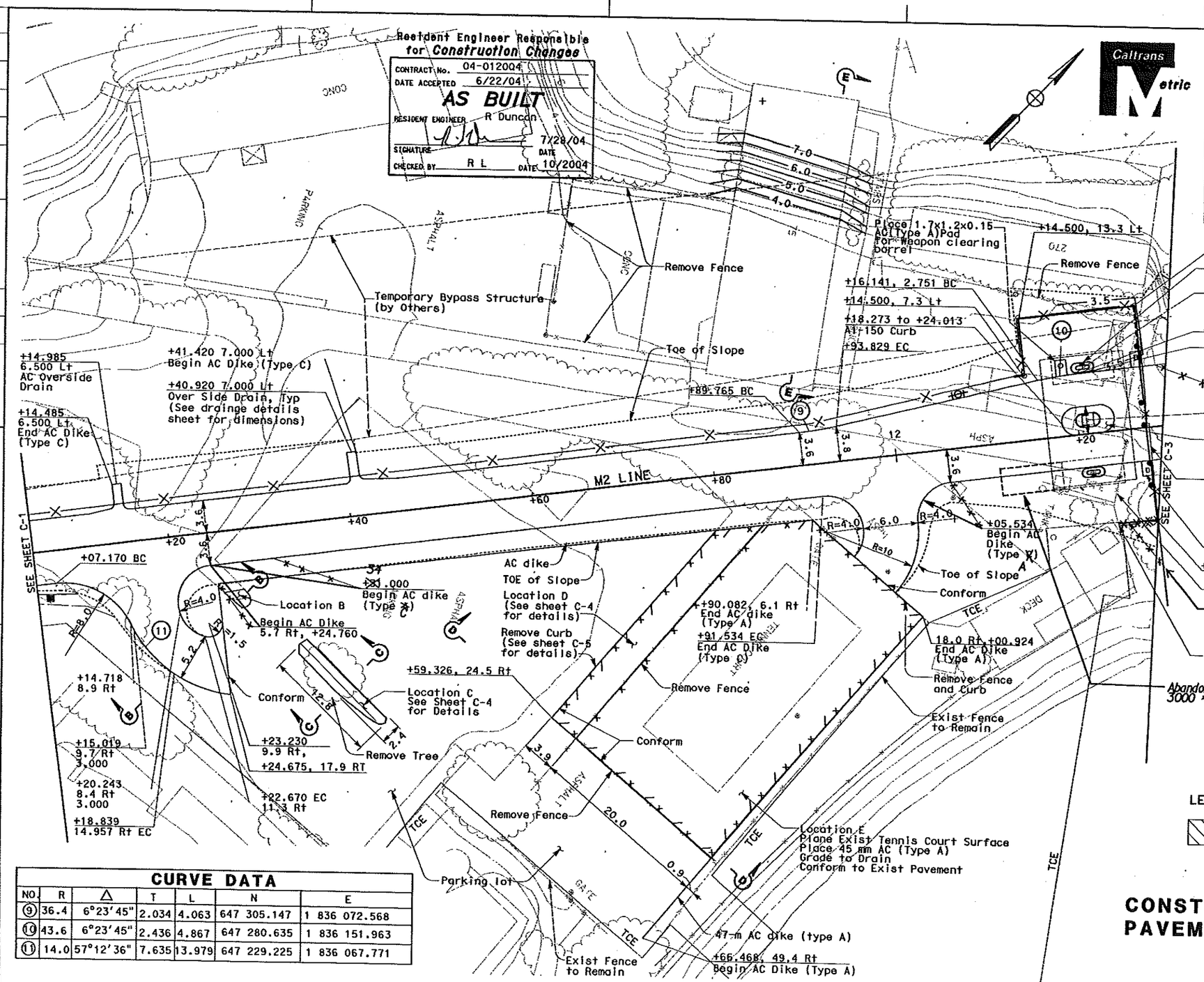
RESIDENT ENGINEER R Duncan
SIGNATURE 7/29/04 DATE
CHECKED BY R L DATE 10/2004



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11	14.0	57°12'36"	7.635	13.979	647 229.225	1 836 067.771

LEGEND:

Place 210 mm AC (Type A) at Locations A,B,C,D & E

CONSTRUCTION DETAILS PAVEMENT ELEVATIONS

SCALE: 1:200

C-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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CALCULATED/DESIGNED BY KR DATE 3/03
CHECKED BY CVL 3/03
REVISED BY DATE REVISED

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

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USERNAME => dhucng

CU 04251 EA 012001

LAST REVISION DATE PLOTTED => 11-MAR-2005
00-00-00 TIME PLOTTED => 10:39

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7/20/2005

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	8	79

REGISTERED CIVIL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KAMAL ROUHANI — No. C 62321 — Exp. 09/30/05 — CIVIL — STATE OF CALIFORNIA

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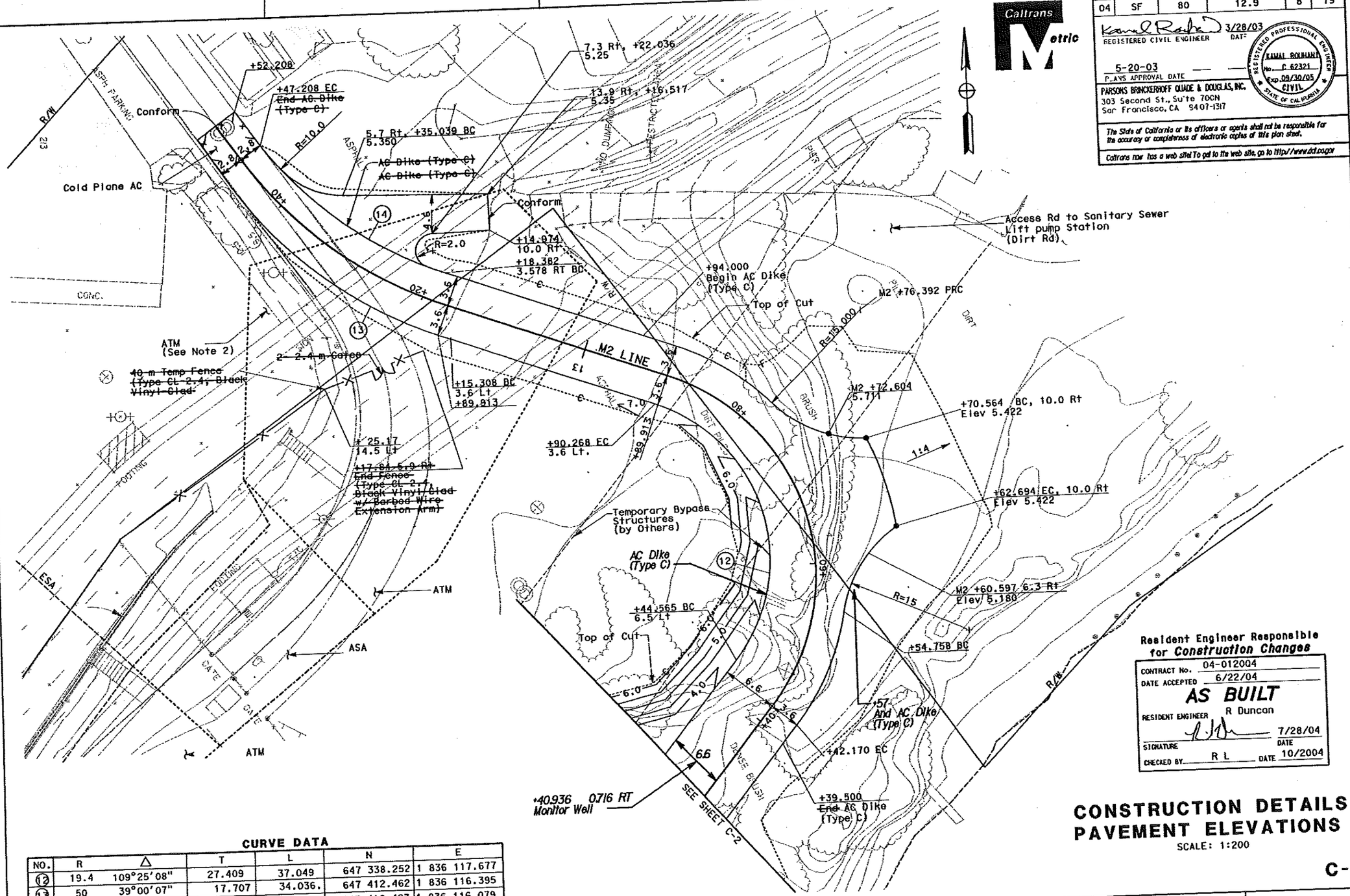

Resident Engineer Responsible for Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE — DATE 7/28/04
CHECKED BY R L — DATE 10/2004

CURVE DATA

NO.	R	Δ	T	L	N	E
12	19.4	109°25'08"	27.409	37.049	647 338.252	1 836 117.677
13	50	39°00'07"	17.707	34.036.	647 412.462	1 836 116.395
14	46.4	33°20'43"	13.896	27.004	647 416.423	1 836 116.079

CONSTRUCTION DETAILS
PAVEMENT ELEVATIONS

SCALE: 1:200

C-3

CALCULATED/DESIGNED BY KR — CHECKED BY CVL — DATE 3/03 — REVISED BY — DATE REVISED

DESIGN OVERSIGHT Bob Zandipour

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DGN FILE => 40120qg03.dgn
USERNAME => dhuang

CU 04251 — EA 012001

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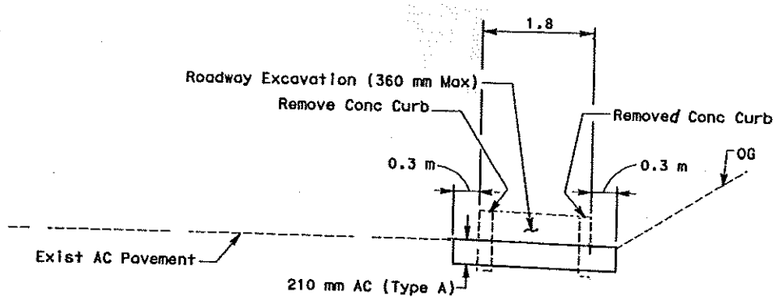
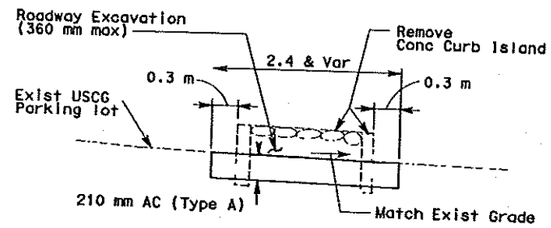
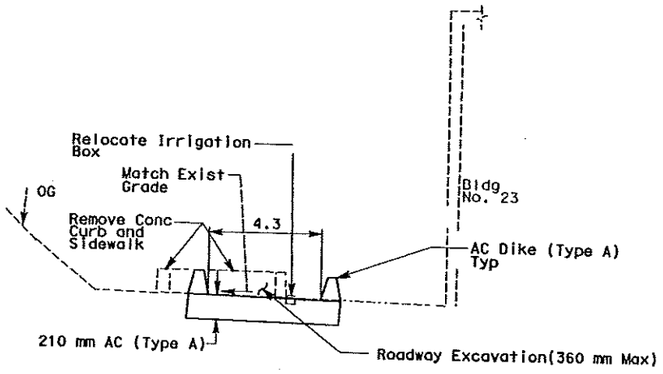
7/20/20



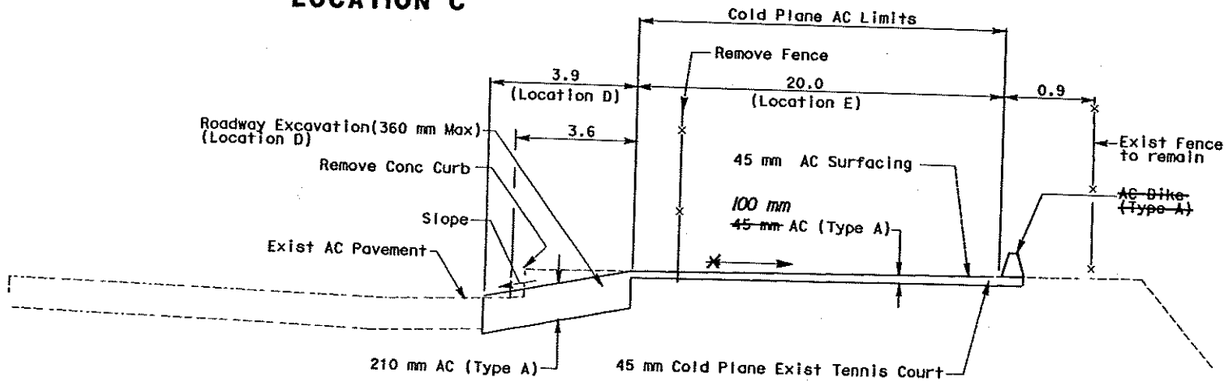
REPLACE AC PAVEMENT LOCATION B



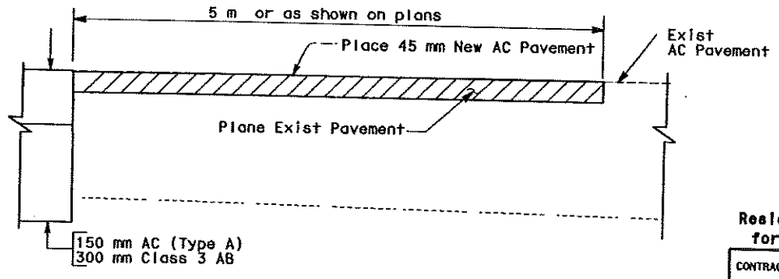
REPLACE AC PAVEMENT LOCATION C



REPLACE AC PAVEMENT LOCATION A

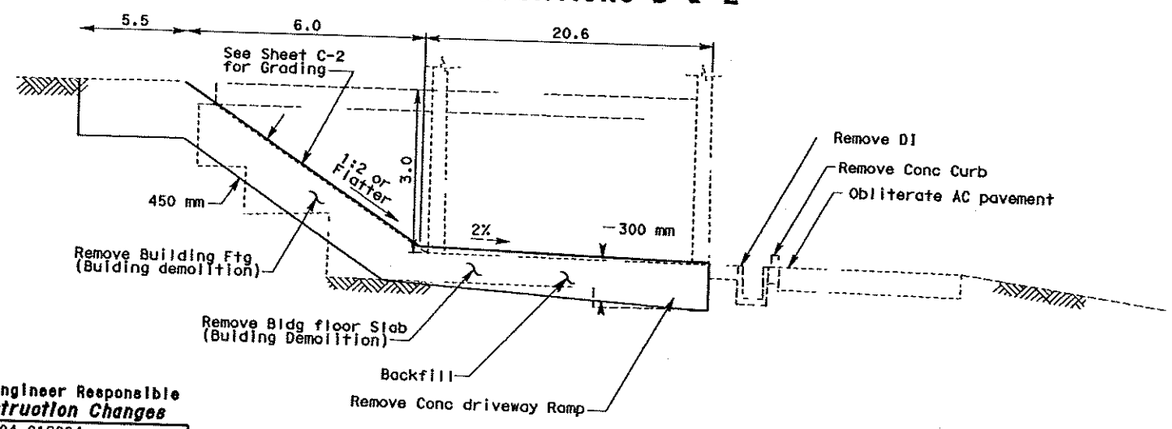


PARKING LOT LOCATIONS D & E



PAVEMENT CONFORM DETAIL

(NO SCALE)
At Sta M2 10+00
At Sta M2 13+52.208
At Tennis court



BUIDING No. 75 DEMOLITION & BACKFILL

Resident Engineer Responsible for Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE DATE 7/28/04
CHECKED BY R L DATE 10/2004

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

CONSTRUCTION DETAILS

NTS

C-4

DISTRICT	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	9	79

REGISTERED CIVIL ENGINEER 3/28/03 DATE
5-20-03 PLANS APPROVAL DATE
REGISTERED PROFESSIONAL ENGINEER KAMAL ROHHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA
PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 Second St., Suite 700N
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CHECKED BY	GVL	3/03	DATE REVISED

DESIGN OVERSIGHT Bob Zandipour

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DGN FILE => 40120qg04.dgn
USERNAME => ghucng

CU 04251 EA 0120Q1

LAST REVISION 00-00-00 DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 12:24

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7/20/2005

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	10	79

REGISTERED CIVIL ENGINEER — DATE 3/28/03

PLANS APPROVAL DATE 5-20-03

REGISTERED PROFESSIONAL ENGINEER — KAMAL ROHANI — No. C 62321 — Exp. 09/30/05 — CIVIL — STATE OF CALIFORNIA

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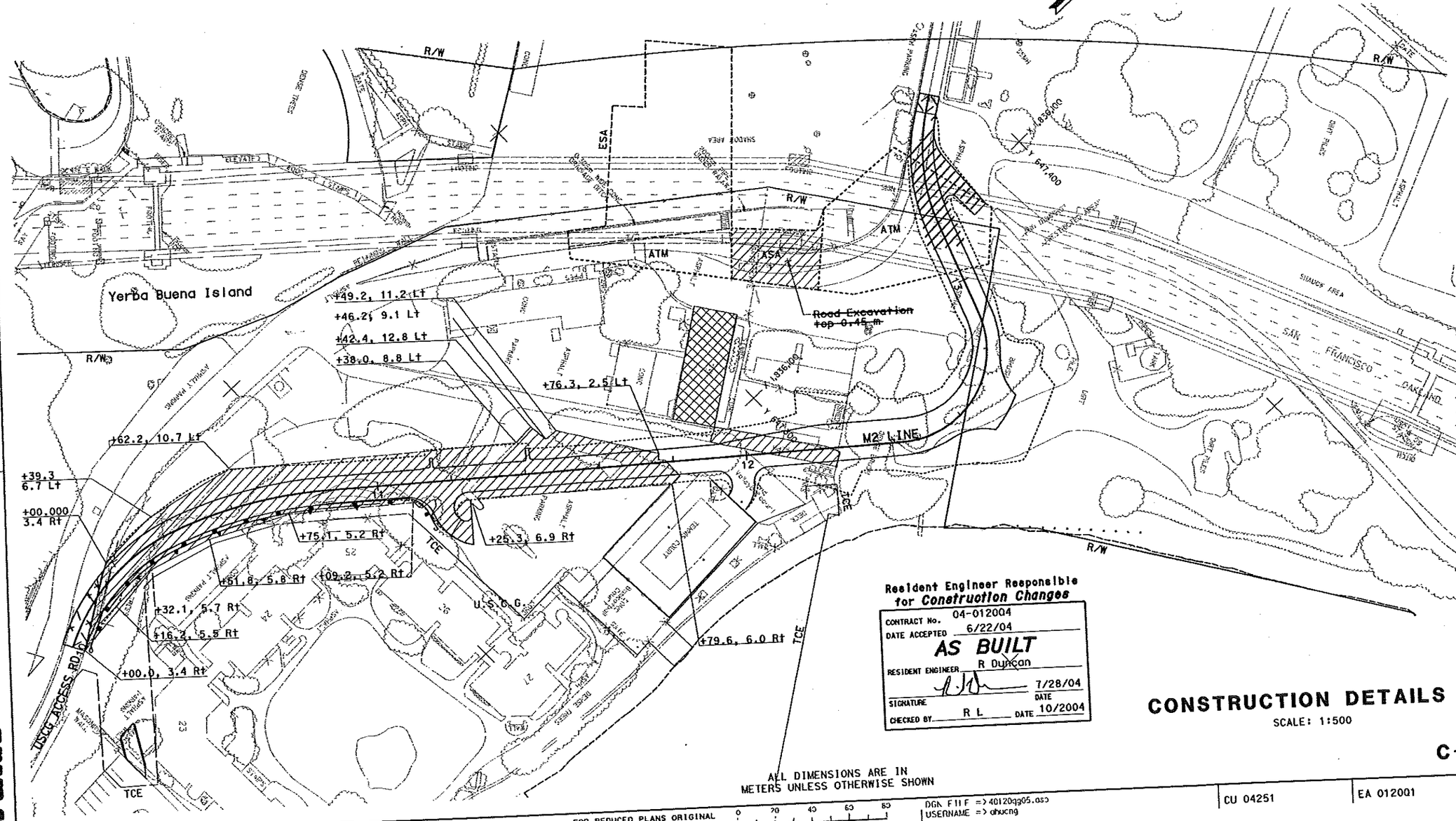
LEGEND:

- Obliterate Surfacing
- Demolish Building



Resident Engineer Responsible for Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE — DATE 7/28/04
CHECKED BY R L — DATE 10/2004

CONSTRUCTION DETAILS

SCALE: 1:500

C-5

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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DGN FILE => 40120qg05.dgn
USERNAME => ahucng

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CHECKED BY: GVL — DATE 3/03 — REVISED

7/20/20

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	11	79

REGISTERED CIVIL ENGINEER 3/28/03 DATE

PLANS APPROVAL DATE

KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA REGISTERED PROFESSIONAL ENGINEER

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
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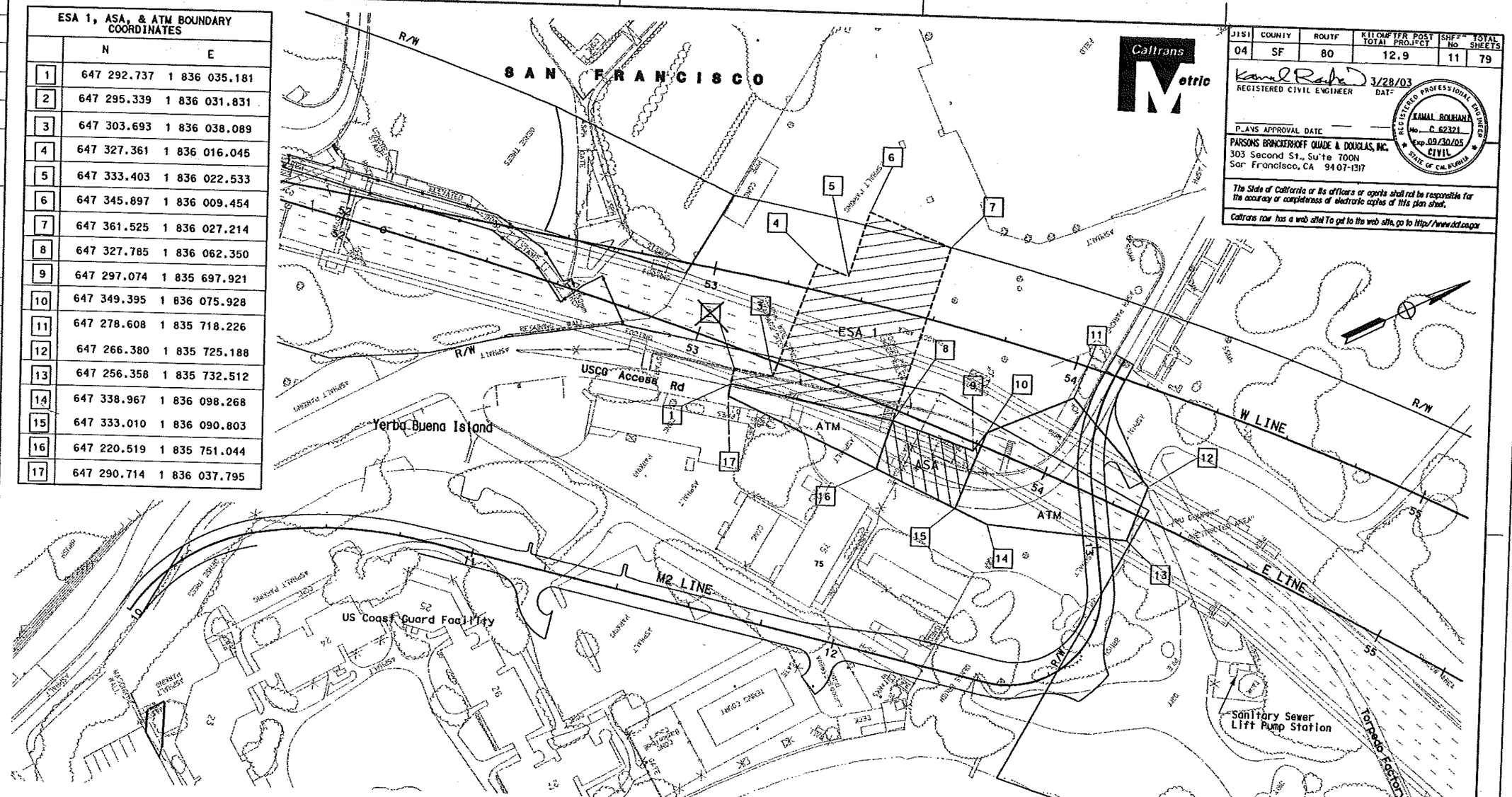
ESA 1, ASA, & ATM BOUNDARY COORDINATES		
	N	E
1	647 292.737	1 836 035.181
2	647 295.339	1 836 031.831
3	647 303.693	1 836 038.089
4	647 327.361	1 836 016.045
5	647 333.403	1 836 022.533
6	647 345.897	1 836 009.454
7	647 361.525	1 836 027.214
8	647 327.785	1 836 062.350
9	647 297.074	1 835 697.921
10	647 349.395	1 836 075.928
11	647 278.608	1 835 718.226
12	647 266.380	1 835 725.188
13	647 256.358	1 835 732.512
14	647 338.967	1 836 098.268
15	647 333.010	1 836 090.803
16	647 220.519	1 835 751.044
17	647 290.714	1 836 037.795



LEGEND:

- Environmentally Sensitive Area (ESA)
- Archeological Study Area (ASA)
- Area to be Monitored (ATM)

NOTES;

1. ESA
   -No excavation is allowed within the boundary limits.
2. ~~ASA~~
   ~~-Provide the top 0.45 m in depth of roadway excavation for the Archeological study.~~
3. ATM
   -Are to be monitored by the Archeologist during trench excavation.

Resident Engineer Responsible for *Construction Changes*

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE DATE 7/28/04
CHECKED BY R L DATE 10/2004

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CONSTRUCTION DETAILS ARCHEOLOGICAL STUDY AREA

SCALE: 1:500

C-6

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

DGN FILE => 40120qg06.dgn
USERNAME => ahucng

CU 04251 EA 012001

LAST REVISION 00-00-00, DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 10:5'

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DESIGN OVERSIGHT
Bob Zandipour

CALCULATED/DESIGNED BY KR DATE 3/03 REVISED BY
CHECKED BY CVL 3/03 DATE REVISED

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	12	79

REGISTERED CIVIL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

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San Francisco, CA 94107-1317

REGISTERED PROFESSIONAL ENGINEER — KAMAL ROUHIANI — No. C 62321 — Exp. 09/30/05 — CIVIL — STATE OF CALIFORNIA

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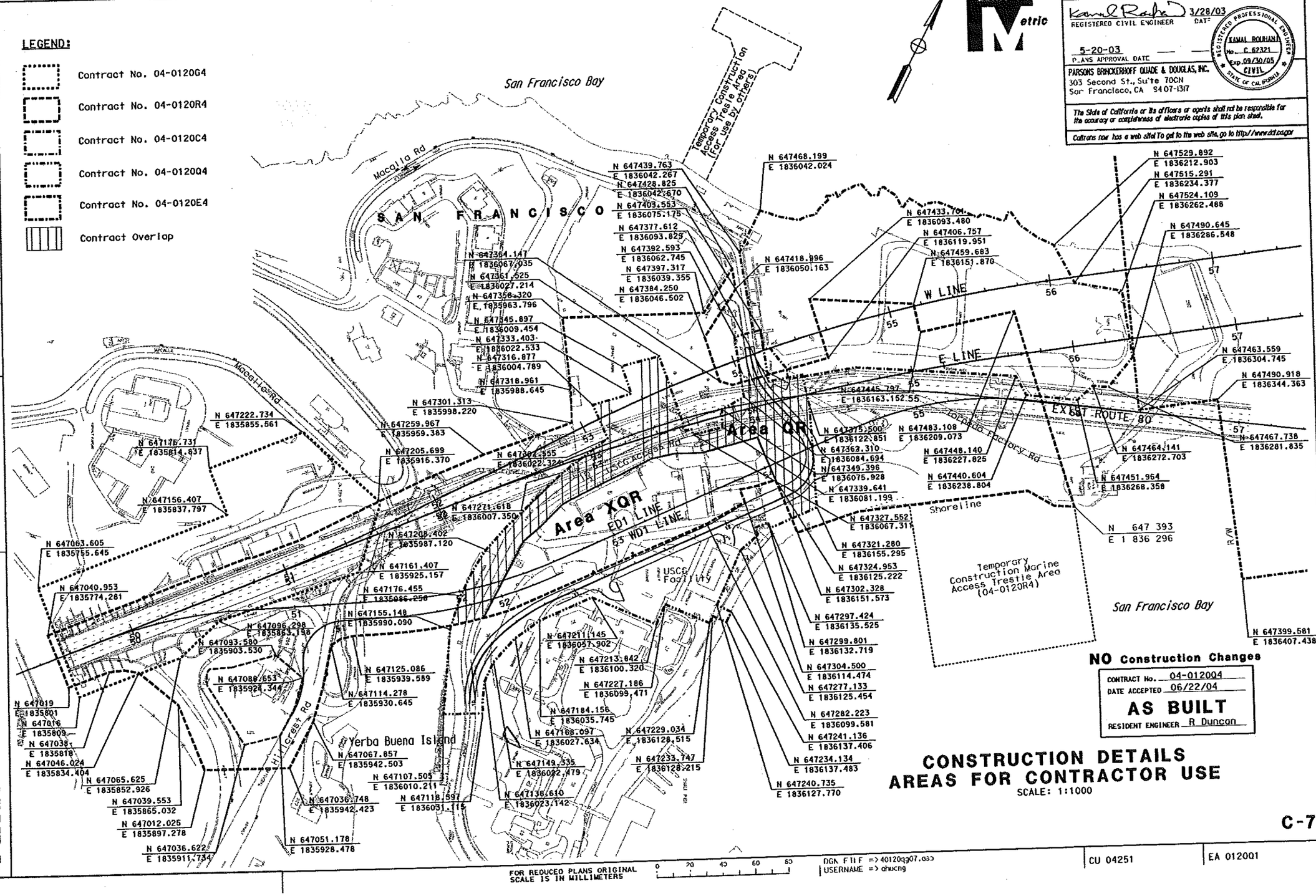
LEGEND:

- Contract No. 04-0120G4
- Contract No. 04-0120R4
- Contract No. 04-0120C4
- Contract No. 04-0120Q4
- Contract No. 04-0120E4
- Contract Overlap



NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

CONSTRUCTION DETAILS
AREAS FOR CONTRACTOR USE

SCALE: 1:1000

C-7

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS (0 20 40 60 80)

DGN FILE => 40120qg07.dgn
USERNAME => ghucng

CU 04251 | EA 0120Q1

LAST REVISION DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 10:55

DATE	REVISED BY	DATE	REVISED
3/03	KR	3/03	DVL

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CHECKED BY

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Caltrans

7/20/2005

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	13	79

Kamal Rouhani 3/28/03
REGISTERED CIVIL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

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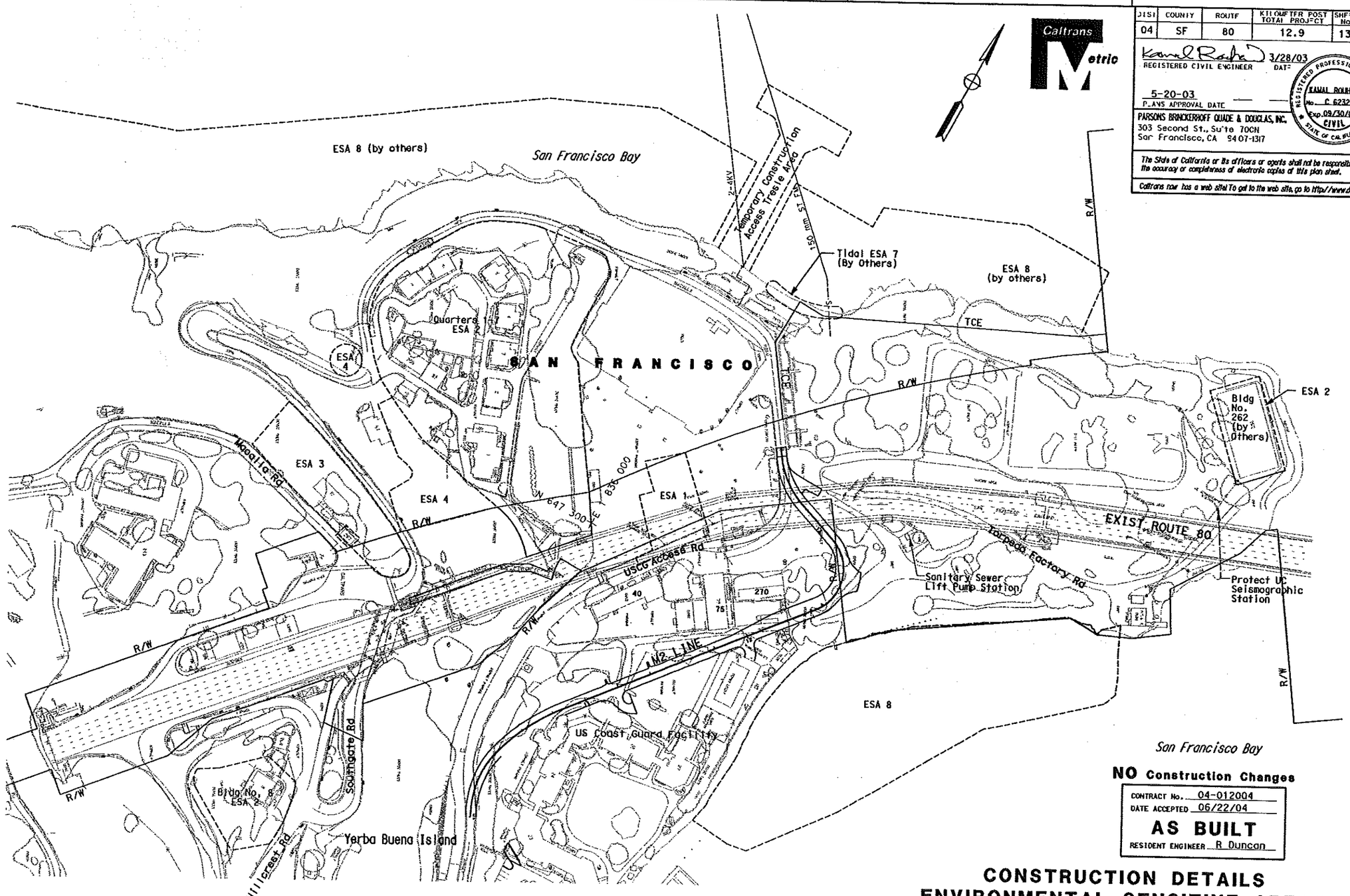

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

CONSTRUCTION DETAILS
ENVIRONMENTAL SENSITIVE AREAS

SCALE: 1:1000

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

C-8

	DATE	REVISED BY	DATE	REVISED
CALCULATED/DESIGNED BY	KR	3/03		
CHECKED BY	GVL	3/03		

DESIGN OVERSIGHT
Bob Zandipour

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LAST REVISION 00-00-00 DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 10:52

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	14	79

REGISTERED CIVIL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KAMAL ROHANI — No. C 62321 — Exp. 09/30/05 — CIVIL — STATE OF CALIFORNIA

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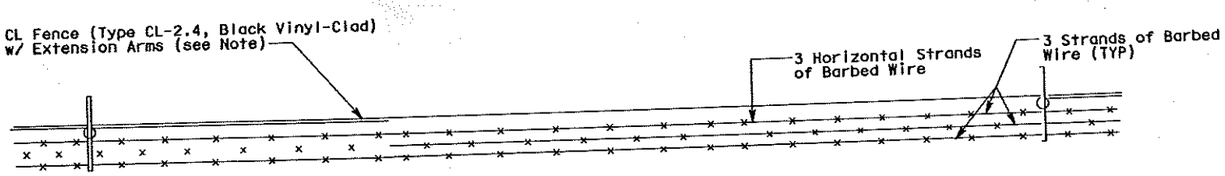
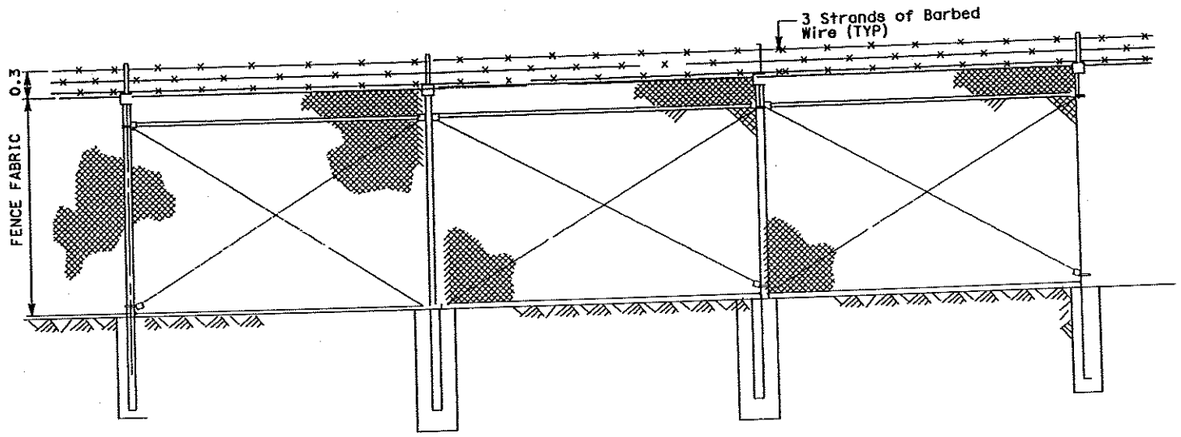


PLAN

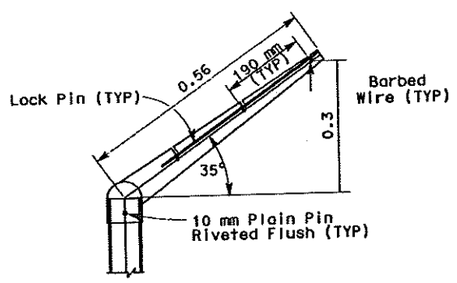


ELEVATION

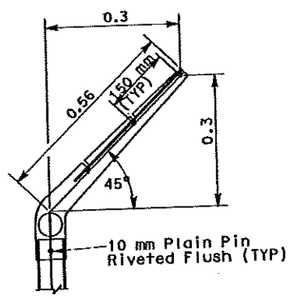
CHAIN-LINK FENCE (TYPE- 2.4, BLACK VINYL-CLAD) W/ BARBED WIRE EXTENSION ARMS

NOTE:

1. For Dimensions and details not shown see Std Plan A85.
2. For Sliding Gate details see AA- sheets.



CORNER POST



LINE POST

EXTENSION ARM DETAILS

NO Construction Changes
CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

CONSTRUCTION DETAILS
NO SCALE

C-9

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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DGN FILE => 40120qg09.dgn
USERNAME => dhucng

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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DESIGN OVERSIGHT
Bob Zandipour

CALCULATED/DESIGNED BY KR
CHECKED BY GVL
DATE REVISED BY 3/03
DATE REVISED 3/03

LAST REVISION 00-00-00
DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 10:53

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET TOTAL No SHEETS
04	SF	80	12.9	15 79

Caltrans Metric

CHIEF LANDSCAPE ARCHITECT

5-20-03
PLANS APPROVAL DATE

LICENSED LANDSCAPE ARCHITECT — 11-30-03 — STATE OF CALIFORNIA

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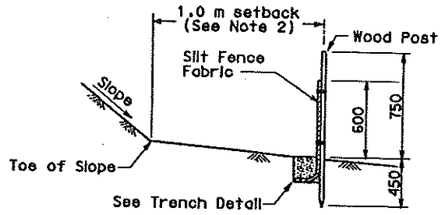
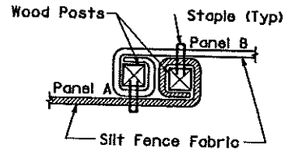


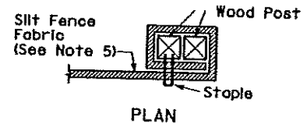
SECTION A-A

TEMPORARY SILT FENCE



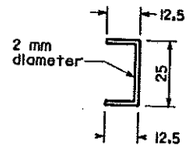
PLAN

POST AT JOINTS DETAIL



PLAN

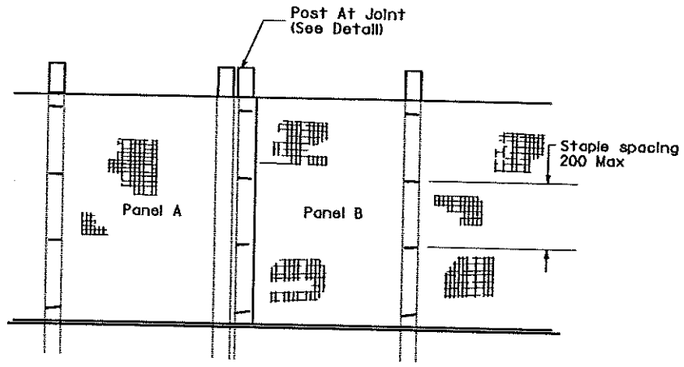
END POST DETAIL



STAPLE DETAIL
(See Note 6)

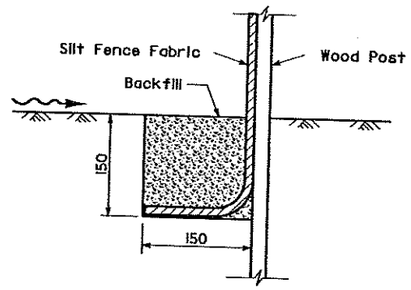
NOTES

1. The down stream end of the Temporary Silt Fence shall have the last 2.5 meters angled up slope.
2. Setback dimensions may vary to fit field conditions.
3. Posts to overlap and fence fabric to fold around each post one full turn.
4. Posts shall be driven tightly together to prevent potential flow-through of sediment at the joint. The tops of the posts shall be secured to each other with wire.
5. For each end post, fence fabric shall be folded around two posts one full turn and secured with 4 staples.
6. Minimum of 4 staples shall be installed per post. Dimensions shown are typical.
7. Maintenance openings shall be constructed in a manner to ensure that sediment is retained by the temporary silt fence.
8. Joint sections shall not be placed at sump locations.



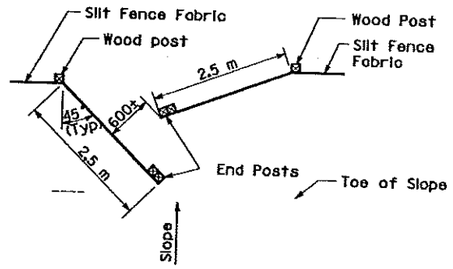
ELEVATION

SILT FENCE PANELS AT JOINTS



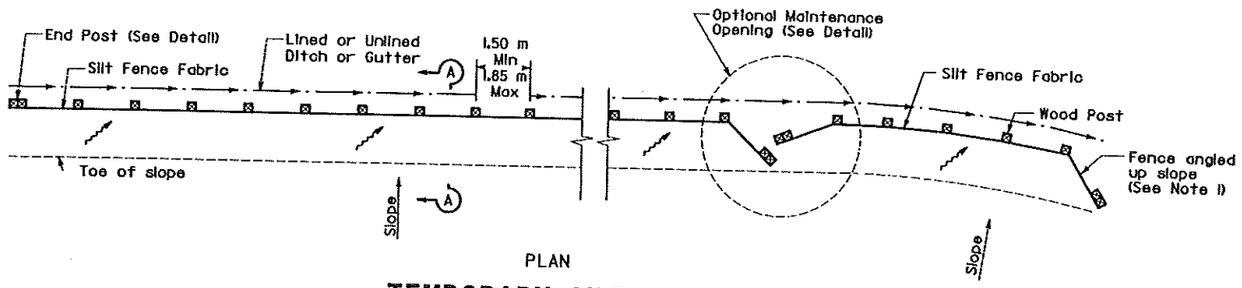
SECTION

TRENCH DETAIL



PLAN

OPTIONAL MAINTENANCE OPENING DETAIL



PLAN

TEMPORARY SILT FENCE

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE SHOWN

TEMPORARY WATER POLLUTION CONTROL DETAILS

NO SCALE

WPC-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans LANDSCAPE ARCHITECTURE

PROJECT LANDSCAPE ARCHITECT: DAVID W. YAM
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED

LAST REVISION 03-27-03 JATF P OTTFF => 11-MAR-2005 TIME PLOTTED => 10:54

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80
USERNAME => ohuang
DGN FILE => 40120qg10.dgn

CU 04343 | EA 012001

file://G:\Built-Design\04-0120Q4\As%20built%20Tiff\40120qg10.tif

7/20/2005

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	16	79

Caltrans Metric

LICENSED LANDSCAPE ARCHITECT
11-30-03
STATE OF CALIFORNIA

5-20-03
PLANS APPROVAL DATE

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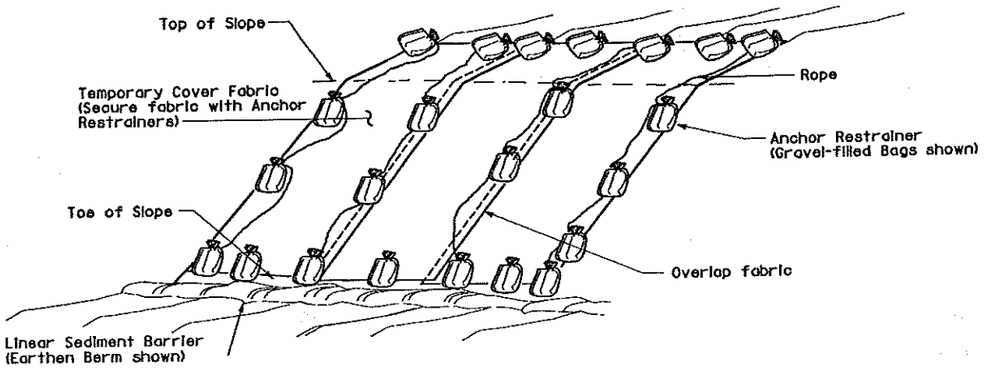
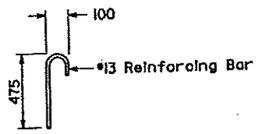
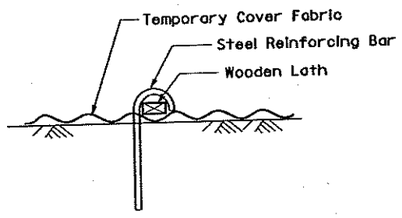


PERSPECTIVE

TEMPORARY COVER ON SLOPE

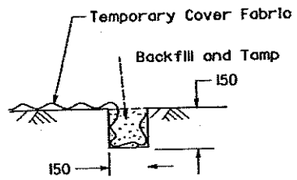


STEEL REINFORCING BAR DETAIL



SECTION

ANCHOR RESTRAINER
(Steel Bar and Wooden Lath)



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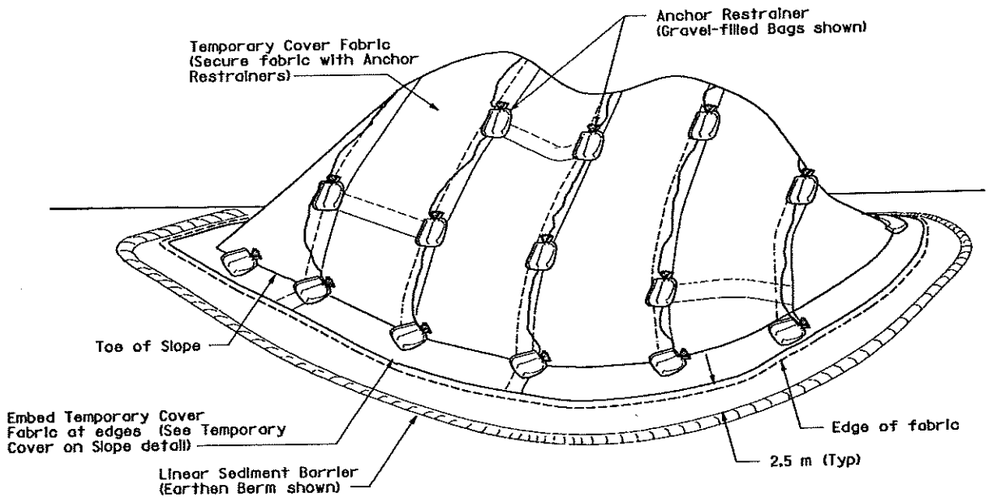
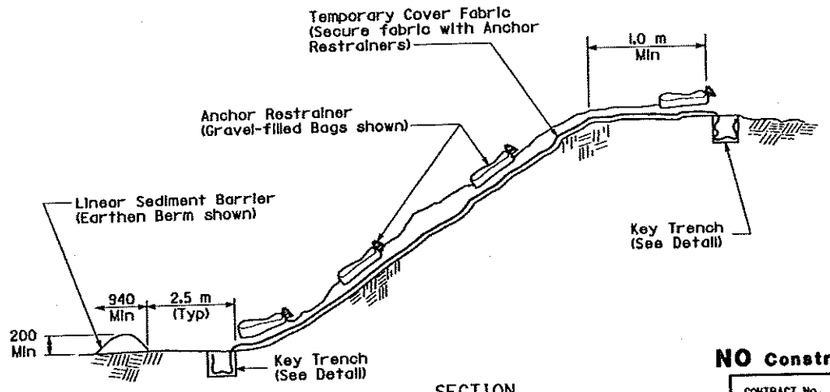
KEY TRENCH DETAIL



PERSPECTIVE

TEMPORARY COVER ON STOCKPILE



SECTION

TEMPORARY COVER ON SLOPE

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

TEMPORARY WATER POLLUTION CONTROL DETAILS

NO SCALE

WPC-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans LANDSCAPE ARCHITECTURE
PROJECT LANDSCAPE ARCHITECT DAVID W. YAM
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED

LAST REVISION 03-27-03 DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 10:35

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7/20/2005

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	17	79

Charles D. Smith 4/11/03
REGISTERED CIVIL ENGINEER

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Charles D. Smith No. 60751 Exp. 12/31/04 CIVIL STATE OF CALIFORNIA

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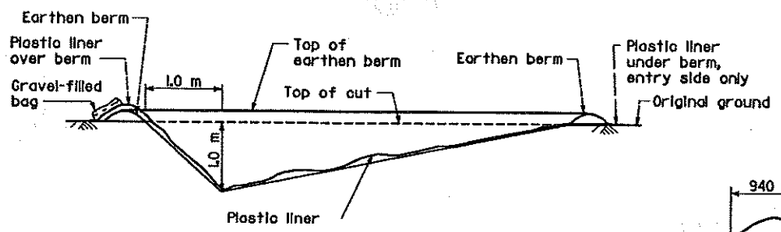
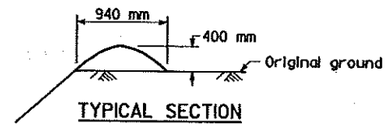
Caltrans Metric

NOTES

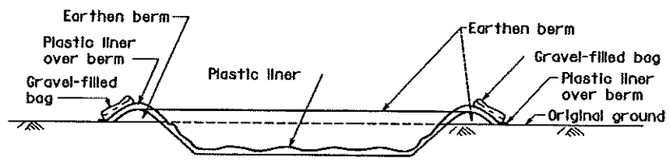
1. The concrete washout sign shall be installed within 10 meters of the temporary concrete washout facility.
2. Aggregate base (Class 3) shall be placed adjacent to the facility, as necessary, to prevent sediment tracking from the washout location.



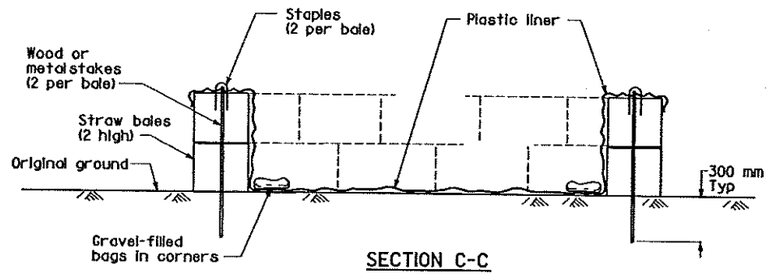
SECTION B-B



TYPICAL SECTION
EARTHERN BERM



SECTION A-A



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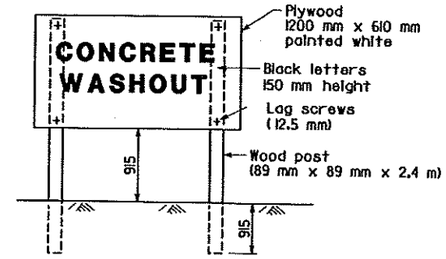
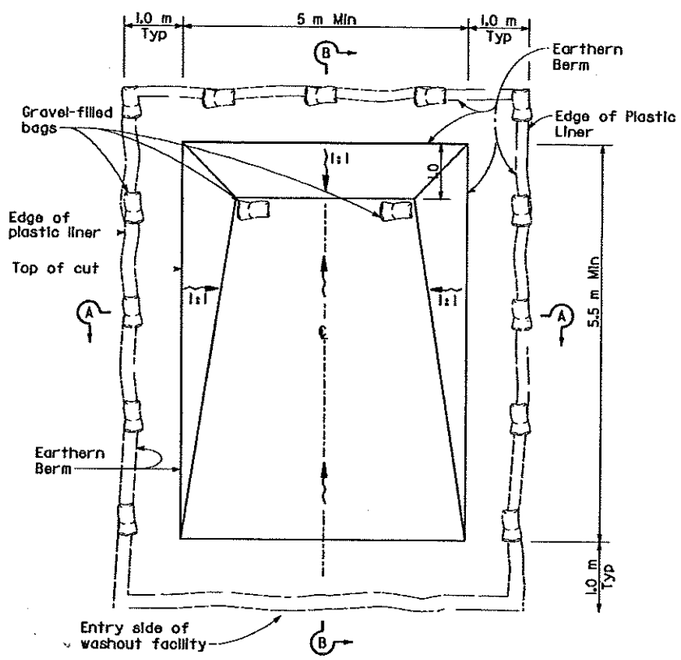
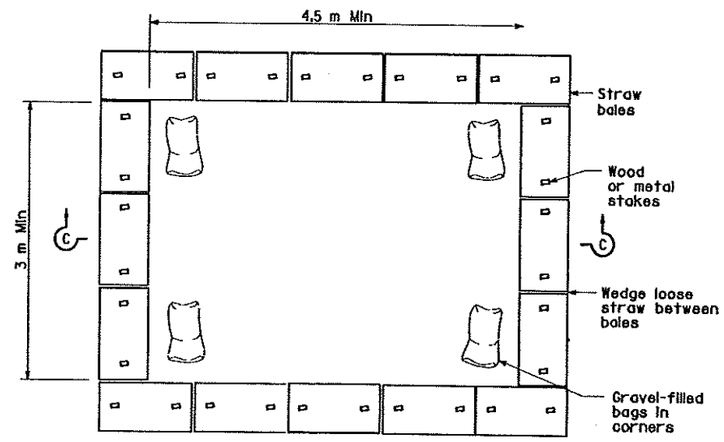


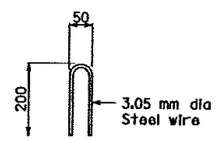
CONCRETE WASHOUT
SIGN DETAIL



PLAN
TEMPORARY CONCRETE WASHOUT FACILITY
(Below Grade)



PLAN
TEMPORARY CONCRETE WASHOUT FACILITY
(On Grade)



STAPLE DETAIL

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY CONCRETE WASHOUT FACILITY)

NO SCALE

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

WPC-3

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans ENVIRONMENTAL ENGINEERING
PROJECT ENVIRONMENTAL ENGINEER CHARLES D. SMITH
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
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LAST REVISION 00-00-00 DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 0:55

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USERNAME => ahucng
DGN FILE => 40120qg12.dgn

CU 04251 EA 012001

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	18	79

Charles D. Smith 4/11/03
REGISTERED CIVIL ENGINEER

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Charles D. Smith No. 60751 Exp. 12/31/04 CIVIL STATE OF CALIFORNIA

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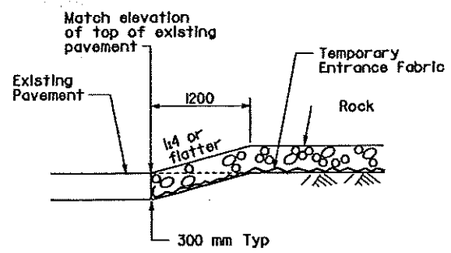
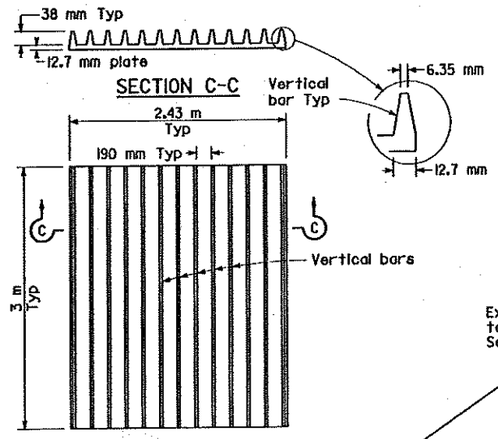
Caltrans Metric

NOTE

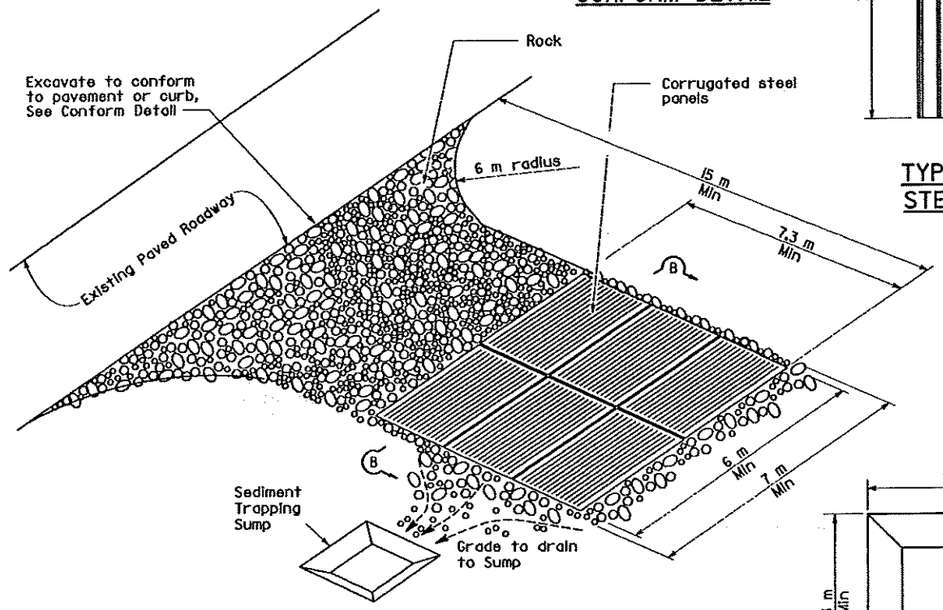
Exclude entrance fabric, rock, and sump for Type 2 if corrugated panels are installed on paved surface.



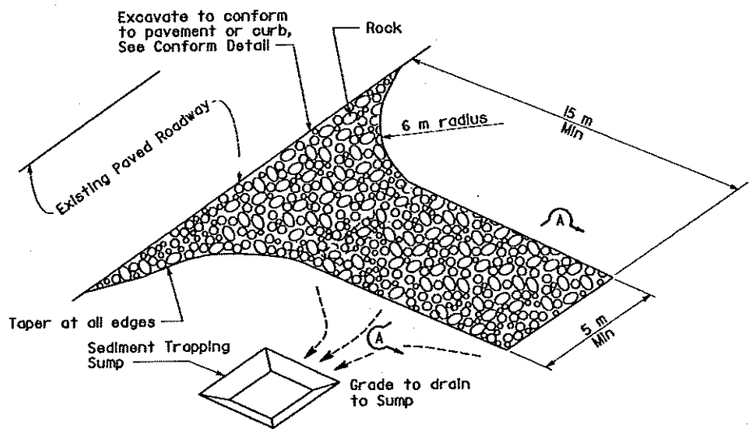
SECTION
CONFORM DETAIL



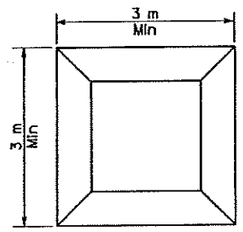
PLAN
TYPICAL CORRUGATED STEEL PANEL DETAIL



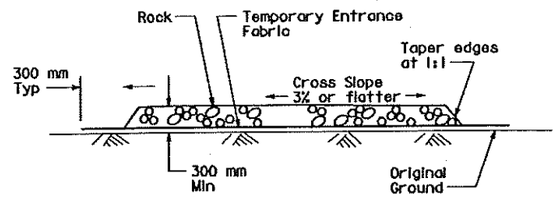
PERSPECTIVE
TEMPORARY CONSTRUCTION ENTRANCE (TYPE 2)



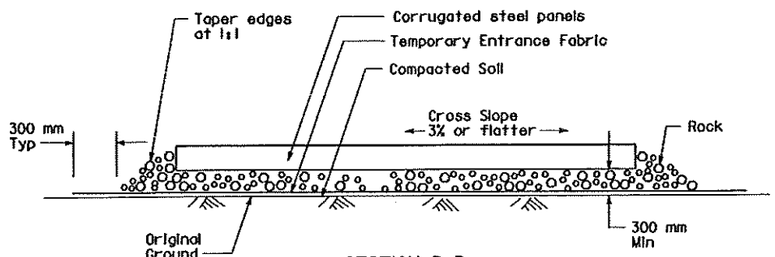
PERSPECTIVE
TEMPORARY CONSTRUCTION ENTRANCE (TYPE 1)



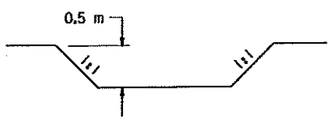
PLAN



SECTION A-A



SECTION B-B



ELEVATION
SEDIMENT TRAPPING SUMP

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY CONSTRUCTION ENTRANCE)

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

WPC-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
ENVIRONMENTAL ENGINEERING

PROJECT ENGINEER CHARLES D. SMITH

CALCULATED/DESIGNED BY | CHECKED BY

DATE | REVISED BY | DATE REVISED

LAST REVISION 00-00-00 DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 10:57

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USERNAME => ahucng
DGN FILE => 40120qg15.asb

CU 04251 | EA 012001

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	19	79

LICENSED LANDSCAPE ARCHITECT
5-20-03
PLANS APPROVAL DATE

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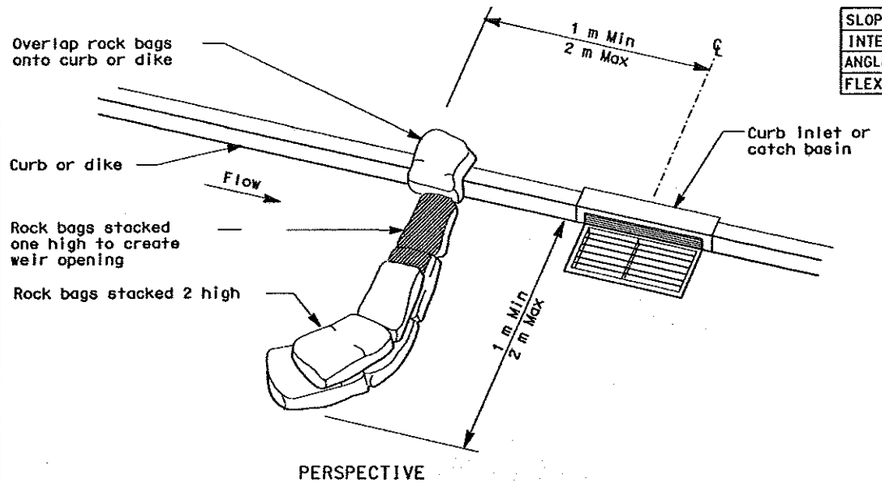
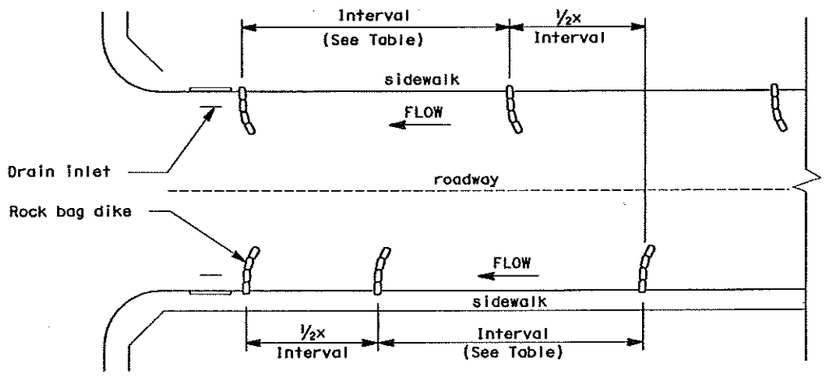


PERSPECTIVE



PLAN

ROCK BAG DIKE SPACING

SLOPE OF ROADWAY	INTERVAL (m)
10% or More	4
9.9% to 8.0%	7.5
7.9% to 6.0%	15
5.9% to 4.0%	22.5
3.9% to 1.0%	30
1.0% or Less	Only if erosion is prevalent

NOTES:

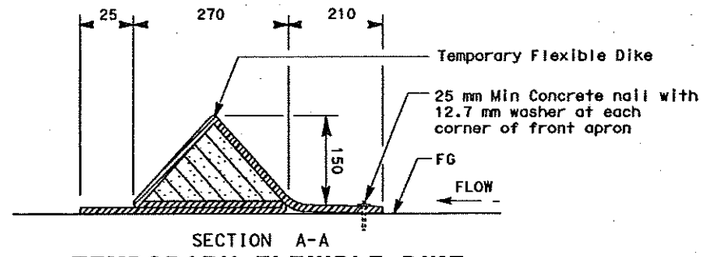
1. Construct on gently sloping streets where water can pond and allow sediment to separate out of suspension.
2. Place 2 layers of rock bags (except at weir opening). Overlap bags and pack tightly together to eliminate gaps.
3. Inspect and repair rock bag dikes after each storm event. Remove sediment before it reaches top of curb or top of rock bags.
4. Install a minimum of 3 rock bag dikes upstream of each drainage inlet to be protected.

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 2A)

(For paved areas exposed to traffic; physical barrier must be provided between traffic and the Drainage Inlet)

TEMPORARY FLEXIBLE DIKE

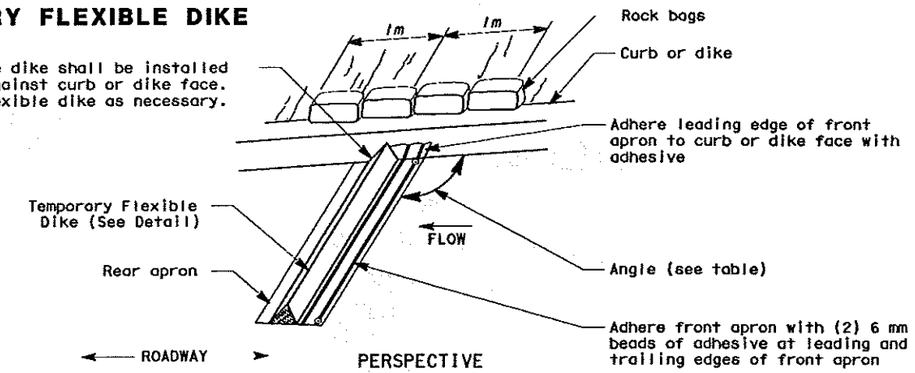
SLOPE OF ROADWAY	1%	2%	3%	4%	5%
INTERVAL (m)	15.24	10.67	9.14	7.62	6.10
ANGLE FROM FACE OF CURB	70°	70°	70°	45°	45°
FLEXIBLE DIKE LENGTH (m)	1.82	1.82	1.82	1.82	1.82



SECTION A-A

TEMPORARY FLEXIBLE DIKE

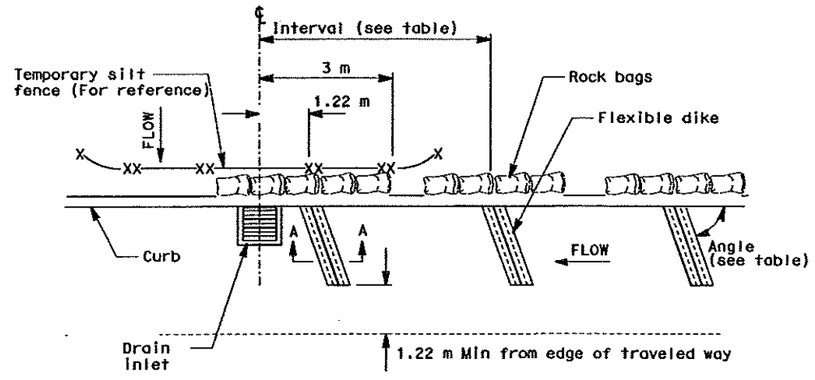
Flexible dike shall be installed flush against curb or dike face. Trim flexible dike as necessary.



PERSPECTIVE

NOTES:

1. Install a minimum of 3 flexible dikes upstream of each drainage inlet to be protected.



PLAN

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 2B)

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

TEMPORARY WATER POLLUTION CONTROL DETAILS

NO SCALE

WPC-5

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans LANDSCAPE ARCHITECTURE
PROJECT LANDSCAPE ARCHITECT DAVID W. YAM
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED

LAST REVISION DATE PLOTTED => 11-MAR-2005
04-02-03 TIME PLOTTED => 10:58

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80
USERNAME => ohuang
DGN FILE => 40120qg14.dgn

CU 04343 | EA 012001

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	20	79

LICENSED LANDSCAPE ARCHITECT

5-20-03
PLANS APPROVAL DATE

LICENSED LANDSCAPE ARCHITECT 11-30-03 STATE OF CALIFORNIA

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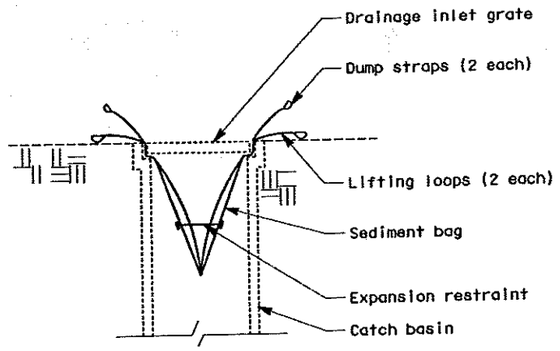
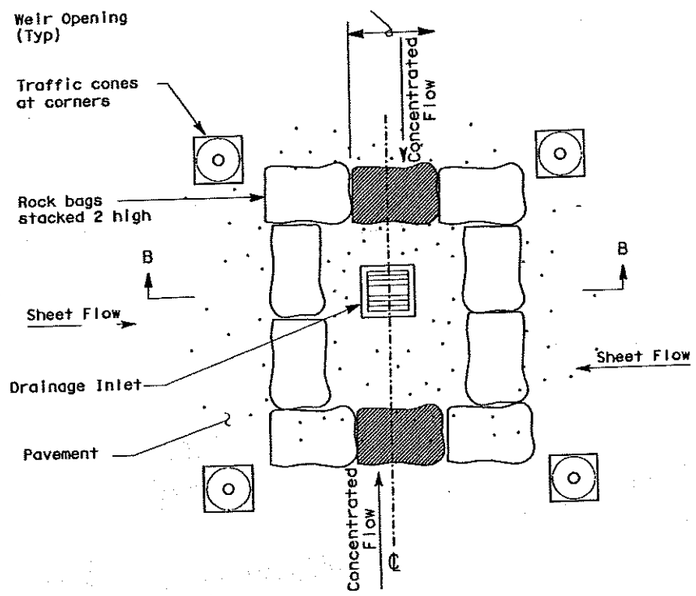
Caltrans Metric



SECTION

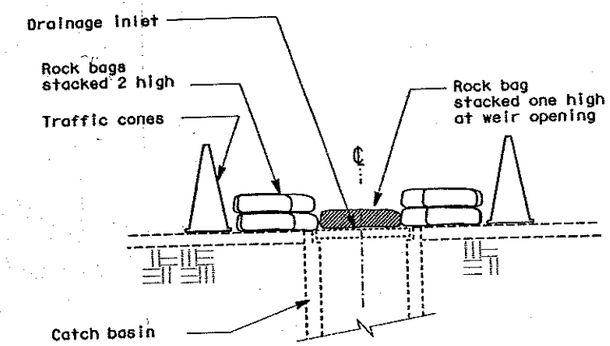
SEDIMENT CONTROL BAG



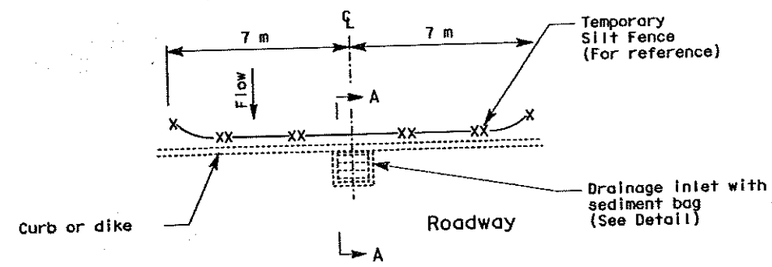
PLAN

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 4)

(For paved areas exposed to traffic; Physical barrier must be provided between traffic and the Drainage Inlet)

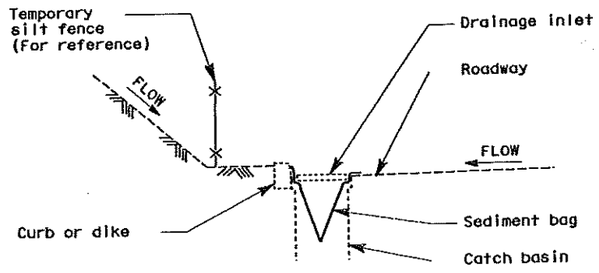


SECTION B-B



PLAN

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 3)



SECTION A-A

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

TEMPORARY WATER POLLUTION CONTROL DETAILS

NO SCALE

WPC-6

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans LANDSCAPE ARCHITECTURE

PROJECT LANDSCAPE ARCHITECT: DAVID W. YAM

CALCULATED/DESIGNED BY | DATE REVISED BY
CHECKED BY | DATE REVISED

LAST REVISION 04-02-03 DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 10:58

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => ahucng
DGN FILE => 40120qg15.dgn

CU 04343 | EA 012001

7/20/2005

file://G:\Built-Design\04-0120Q4\As%20built%20Tiff\40120qg15.tif

NOTES:

1. For complete R/W and accurate access data, see R/W record maps at district office.
2. This Plan accurate for Erosion Control work only.

ABBREVIATIONS:

R/W Right of Way

LEGEND:

Erosion Control Netting

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	21	79

LICENSED LANDSCAPE ARCHITECT

5-20-03

PLANS APPROVAL DATE

LICENSED LANDSCAPE ARCHITECT 11-30-03 STATE OF CALIFORNIA

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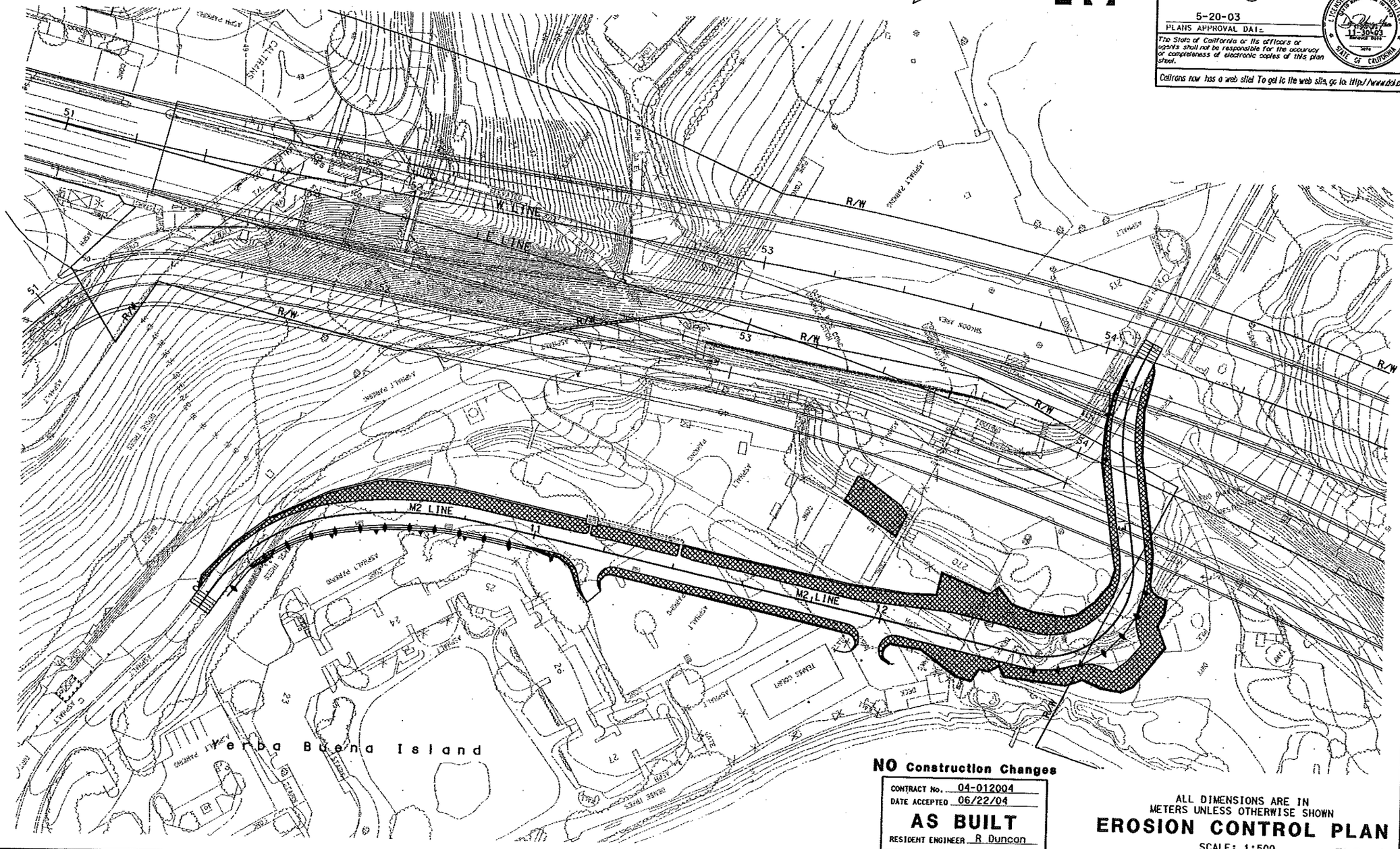

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

EROSION CONTROL PLAN

SCALE: 1:500

EC-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans LANDSCAPE ARCHITECTURE
PROJECT LANDSCAPE ARCHITECT DAVID W. YAM
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED

LAST REVISION 03-27-03 DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 11:00

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USERNAME => ohucng
DGN FILE => 40120qg16.dgn

CU 04343

EA 012001

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7/20/2005

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	22	79

Caltrans Metric

LICENSED LANDSCAPE ARCHITECT

5-20-03
PLANS APPROVAL DATE

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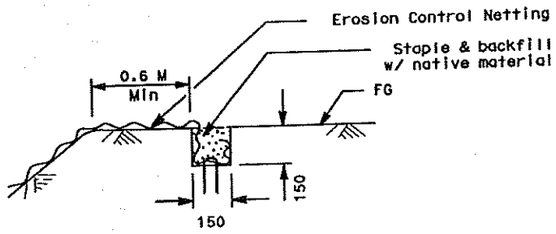
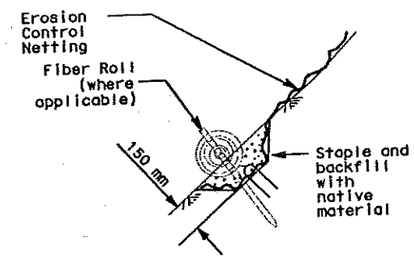


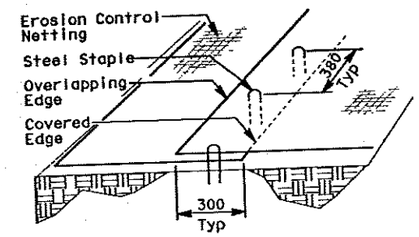
SECTION

KEY TRENCH AT SLOPE HINGE POINT

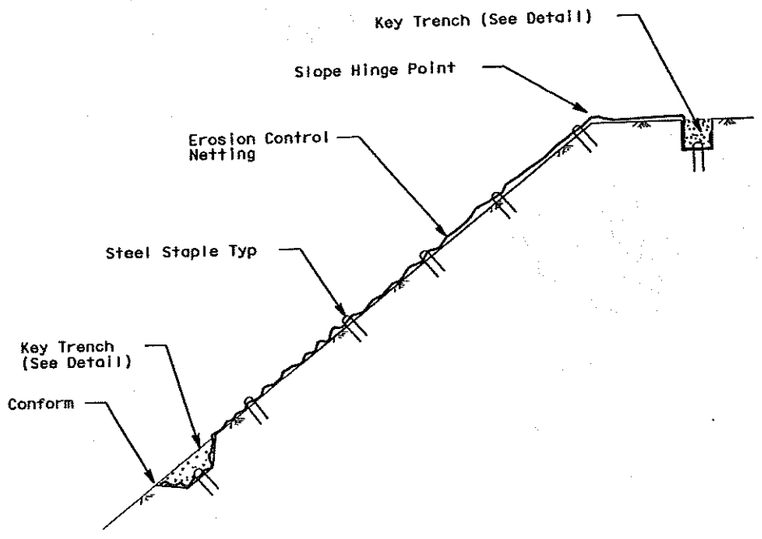


SECTION

KEY TRENCH AT CONFORM



NETTING OVERLAP and STAPLE PATTERN



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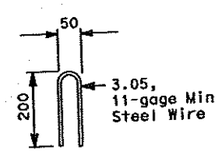
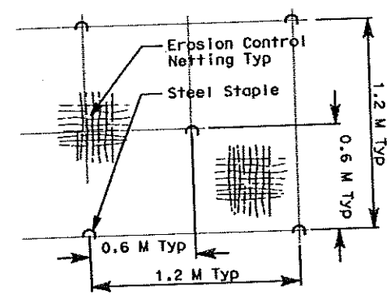
EROSION CONTROL NETTING



STAPLE DETAIL



STAPLE PATTERN

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

EROSION CONTROL DETAILS
NO SCALE
EC-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans LANDSCAPE ARCHITECTURE
PROJECT LANDSCAPE ARCHITECT DAVID W. YAM
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED

LAST REVISION DATE P OTTF> => 11-MAR-2005
03-27-03 TIME PLOTTED => 11:10

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USCRNAME => ohuang
DGN FILE => 40120qg17.dgn

CU 04343 | EA 012001

7/20/200

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	23	79

Kamal Rohani 3/28/03
REGISTERED CIVIL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 Second St., Suite 700N
San Francisco, CA 94107-1317

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Caltrans Metric

NOTES:

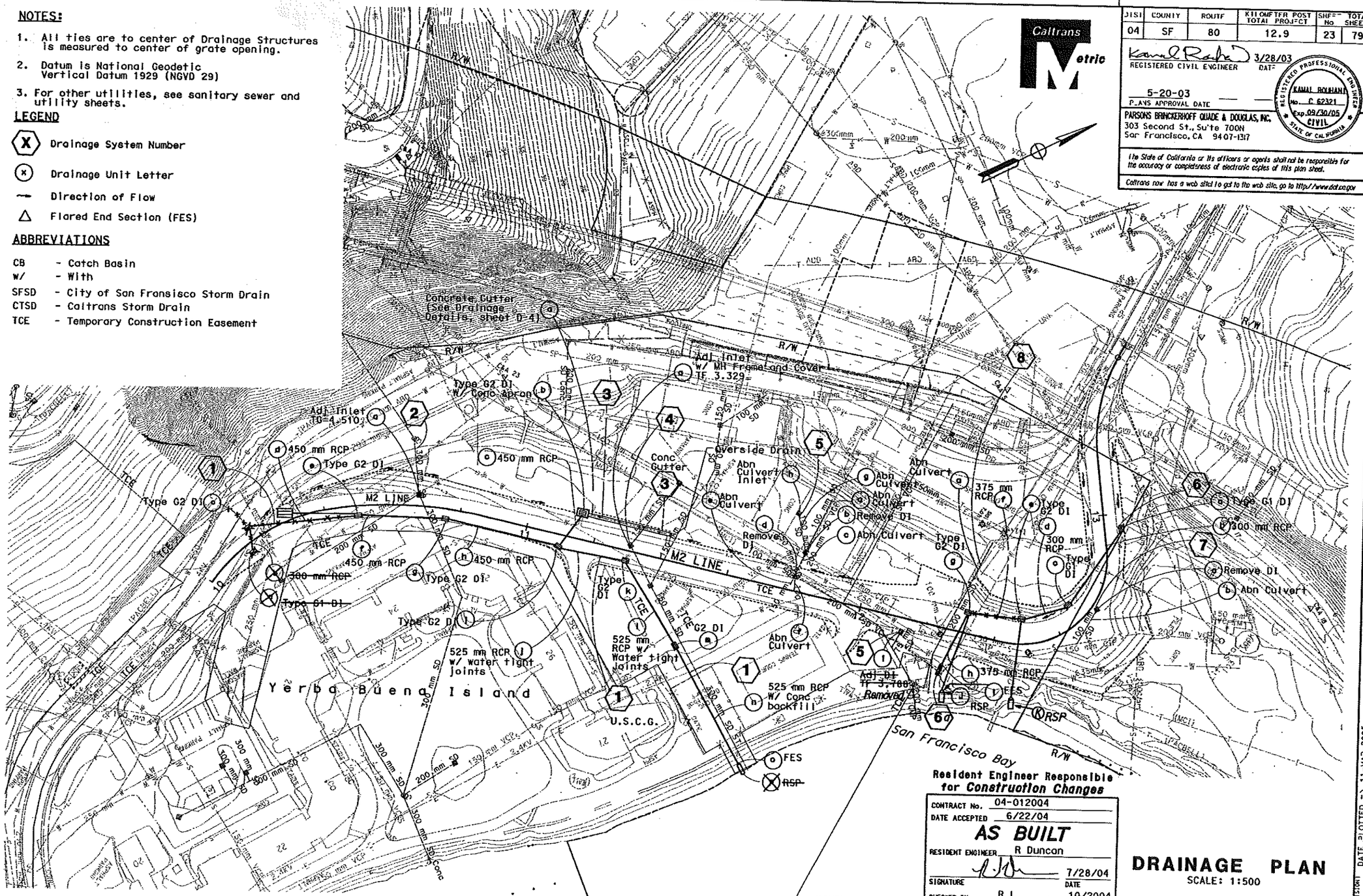
1. All ties are to center of Drainage Structures is measured to center of grate opening.
2. Datum is National Geodetic Vertical Datum 1929 (NGVD 29)
3. For other utilities, see sanitary sewer and utility sheets.

LEGEND

- (X) Drainage System Number
- (x) Drainage Unit Letter
- Direction of Flow
- △ Flared End Section (FES)

ABBREVIATIONS

CB	- Catch Basin
w/	- With
SFSD	- City of San Fransisco Storm Drain
CTSD	- Caltrans Storm Drain
TCE	- Temporary Construction Easement



Resident Engineer Responsible for Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE DATE 7/28/04
CHECKED BY R L DATE 10/2004

DRAINAGE PLAN

SCALE: 1:500

D-1

THIS PLAN ACCURATE FOR DRAINAGE WORK ONLY.

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

DGN FILE => 40120qi01.dgn
USERNAME => ghucng

CU 04251 | EA 012001

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: KR | DATE 3/03 | REVISED BY
CHECKED BY: GVL | 3/03 | DATE REVISED

LAST REVISION 00-00-00; DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 11:02

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7/20/2005

DIST	COUNTY	ROUTE	KILOMETER POST IC AL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	24	79

Caltrans Metric

REGISTERED CIVIL ENGINEER — 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KAMAL ROUHANI No. C 62321 Exp. 09/30/05 — STATE OF CALIFORNIA

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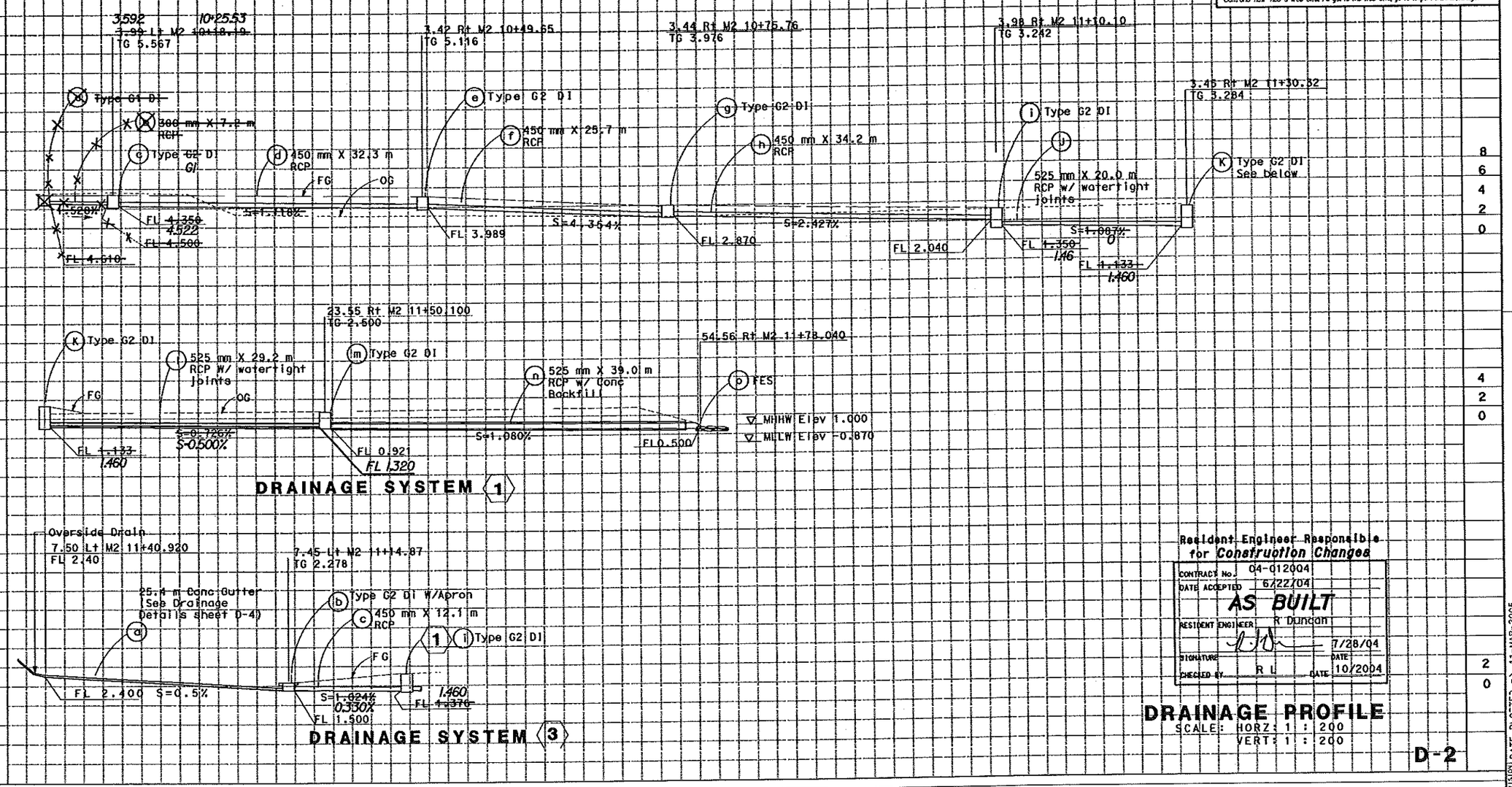
NOTES:

1. All ties are to center of Drainage Structure.
2. Cutoff wall for flared end sections are required where end section terminates.



Resident Engineer Responsible for Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE DATE 7/28/04
CHECKED BY R L DATE 10/2004

DRAINAGE PROFILE

SCALE: HORZ: 1 : 200
VERT: 1 : 200

D-2

DESIGN OVERSIGHT — Bob Zandipour

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

DATE	REVISED BY	DATE	REVISED BY
3/03	CVL	3/03	KR

CALCULATED/DESIGNED BY
CHECKED BY

LAST REVISION 00-00-00 — DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 11:03

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USERNAME => chi.ang
DGN FILE => 40120qi02.dgn

CU 04251 — EA 012001

DIST	COUNTY	ROUTE	KILOMETER POST IC AL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	25	79

Caltrans Metric

REGISTERED CIVIL ENGINEER 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
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San Francisco, CA 94107-1317

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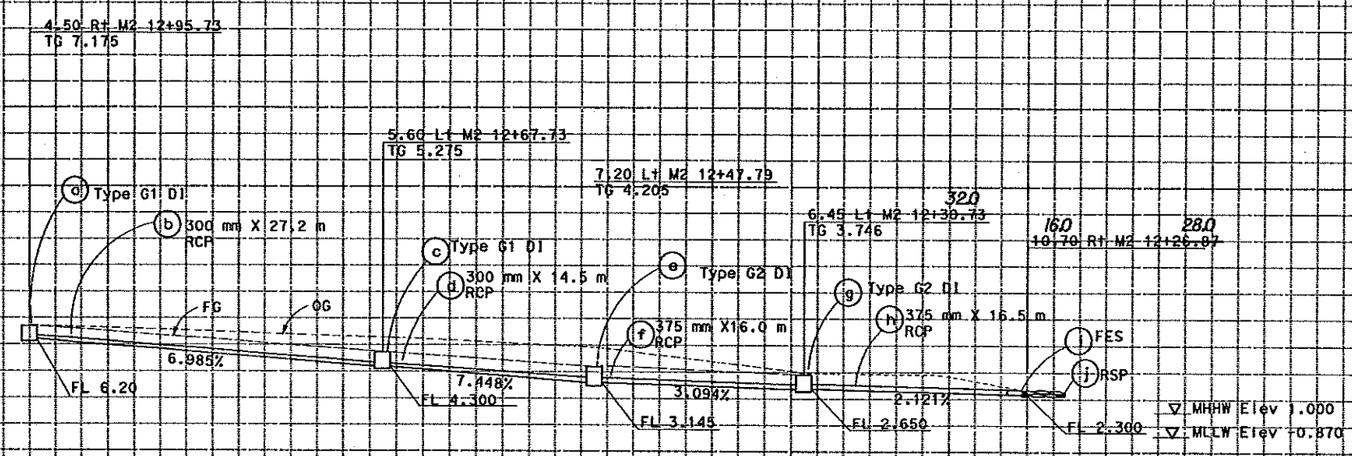
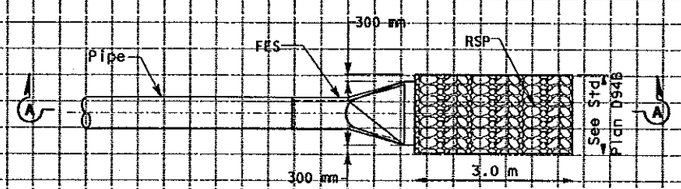
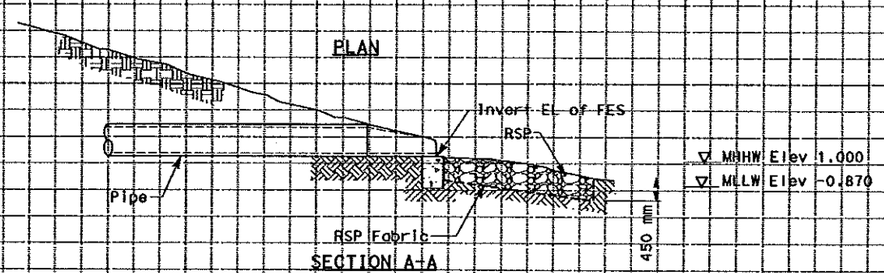


DRAINAGE SYSTEM

NOTES:
1. All ties are to center of Drainage Structure.



PLAN



SECTION A-A

ROCK SLOPE PROTECTION AT FES

NO SCALE

Overside Drain

Resident Engineer Responsible for Construction Changes

CONTRACT NO. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R. Dunger
SIGNATURE DATE 7/28/04
CHECKED BY R L DATE 10/2004

DRAINAGE PROFILE AND DETAILS

SCALE: HORZ: 1 : 200
VERT: 1 : 200

D-3

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT
Bob Zandipour

DATE	REVISED BY	DATE	REVISED
KR 3/03	CVL 3/03		

CALCULATED/DESIGNED BY
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DGN FILE =>40120qi03.dgn

CU 04251 EA 012001

LAST REVISION 00-00-00 DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 11:03

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7/20/2005

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	26	79

Caltrans Metric

REGISTERED CIVIL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KAMAL ROHANI — No. C 62321 — Exp. 09/30/05 — CIVIL — STATE OF CALIFORNIA

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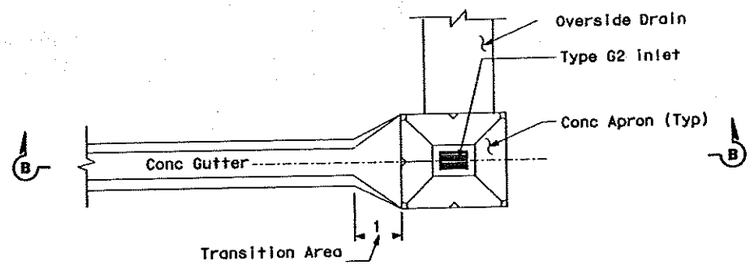
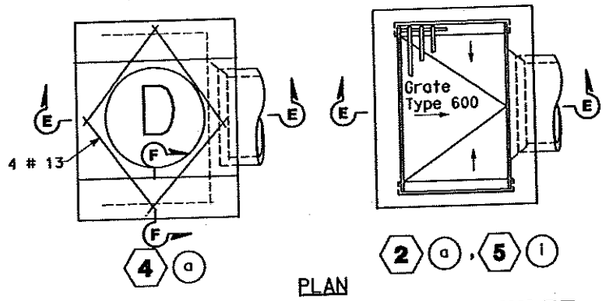


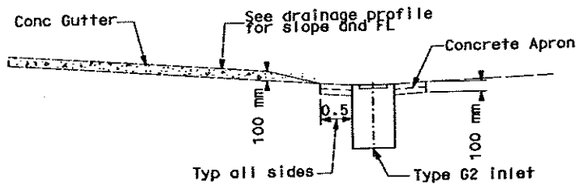
PLAN



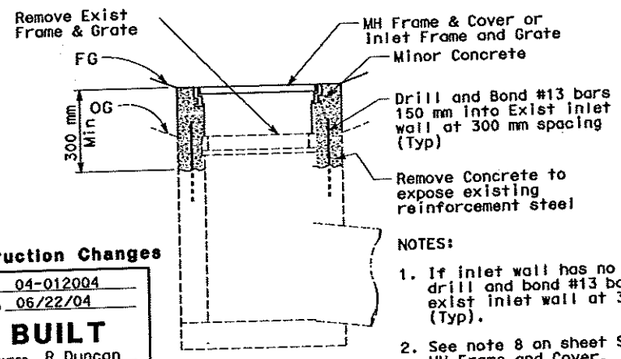
PLAN

MODIFY INLET W/ MH FRAME AND COVER

ADJUST INLET



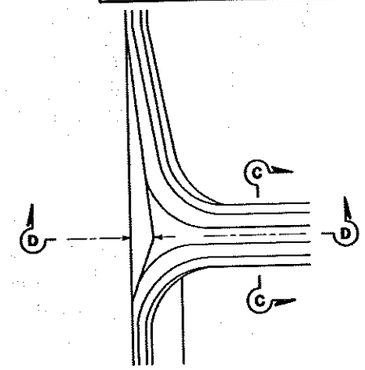
SECTION B-B



SECTION E-E

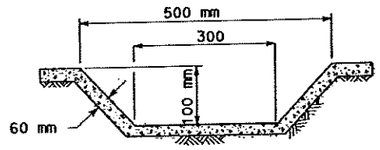
NOTES:

1. If inlet wall has no reinforcing, drill and bond #13 bars 150 mm into exist inlet wall at 300 mm spacing (Typ).
2. See note 8 on sheet SS-3 for MH Frame and Cover.



PLAN

TYPE C DIKE



CONCRETE GUTTER

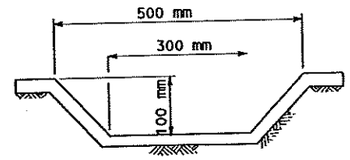
3 a

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

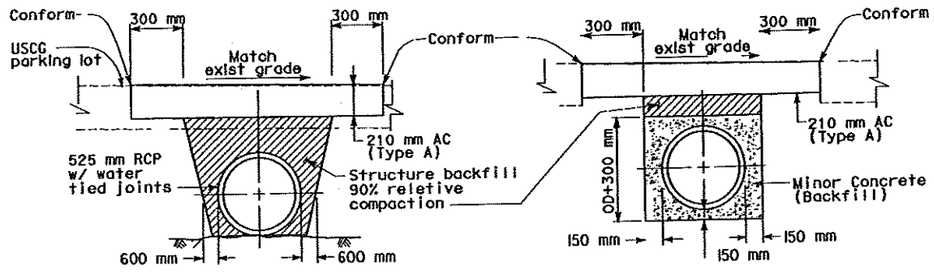
CONCRETE GUTTER AND G2 DRAIN INLET

NO SCALE



SECTION C-C

See Note 1



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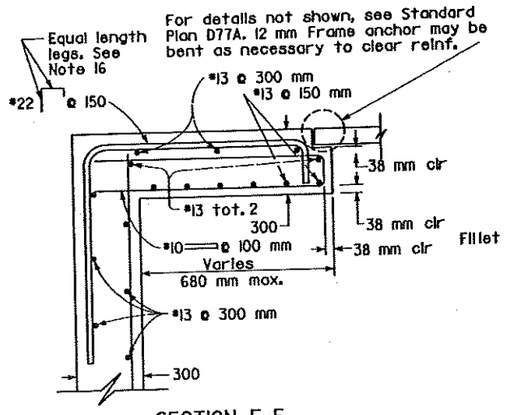
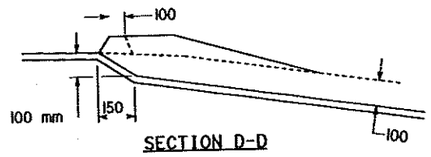
TRENCH PAVING DETAIL FOR RCP



SECTION F-F



SECTION D-D

Note: For dimensions not shown, see Std Plan D87D.

ASPHALT CONCRETE OVERSIDE DRAINS

NO SCALE

DRAINAGE DETAILS

SCALE AS SHOWN

D-4

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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USERNAME => ahucng

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Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: KR — DATE 3/03 — REVISED BY
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DISTRICT	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	27	79

Caltrans Metric

Kamal Roubani 3/28/03
REGISTERED CIVIL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 Second St., Suite 700N
San Francisco, CA 94107-1317

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DRAINAGE QUANTITIES

DRAINAGE SYSTEM NUMBER	DRAINAGE UNIT	REMOVE INLET (ea)	ADJUST INLET (ea)	MODIFY INLET W/ MH FRAME & COVER (ea)	ABANDON CULVERT (ea)	300 mm RCP (m)	375 mm RCP (m)	450 mm RCP (m)	525 mm RCP (m)	JOINT TYPE	375 mm CONCRETE FES (ea)	525 mm CONCRETE FES (ea)	MINOR CONCRETE (MISC CONSTRUCTION) (m3)	MINOR CONCRETE (MINOR STRUCTURE) (m3)	MINOR CONCRETE (BACKFILL) (m3)	MISC IRON & STEEL (kg)	FRAME & GRATE (N) (TYPE 600-12X) (ea)	MH FRAME & COVER (N) (ea)	MAXIMUM COVER (N) (m)	HIGHT OF INLET "H" (N) (m)	RSP (FACING, METHOD B) (m3)	RSP FABRIC (TYPE A) (m2)	DESCRIPTION	STATION	DRAINAGE PLAN SHEET NO.	DRAINAGE SYSTEM NO.	DRAINAGE UNIT
1	a													~~0.69~~		~~108~~	~~1~~			~~0.90~~			~~G1 INLET~~	3.34 RT. M2 10+15.25	D-1	1	a
	b					~~7.0~~				STD									0.8				~~300 mm RCP~~		D-1		b
	c							32.3						1.63		108	1		0.90	~~1.22~~			G1 ~~G2~~ INLET	3.99 LT. M2 10+18.19	D-1		c
	d									STD									0.7				450 mm RCP		D-1		d
	e							25.7						1.54		108	1			1.14			G2 INLET	3.57 RT. M2 10+49.65	D-1		e
	f									STD									0.7				450 mm RCP		D-1		f
	g							34.2						1.52		108	1			1.12			G2 INLET	3.59 RT. M2 10+75.76	D-1		g
	h									STD									0.8				450 mm RCP		D-1		h
	i								20.0	WATER TIGHT				2.30		108	1			1.90			G2 INLET	4.13 RT M2 11+10.10	D-1		i
	j																		1.7				525 mm RCP		D-1		j
	k								29.2	WATER TIGHT				2.55		108	1			2.16			G2 INLET	3.60 RT. M2 11+30.32	D-1		k
	l																		1.6				525 mm RCP		D-1		L
	m								39.0	STD				1.98		108	1			1.58			G2 INLET	23.55 RT. M2 11+50.10	D-1		m
	n														12.0				1.0				525 mm RCP		D-1		n
	o											1											CONCRETE FES	54.56 RT. M2 11+78.04	D-1		o
	P																				~~2.2~~	~~4.8~~	~~ROCK SLOPE PROTECTION~~	~~54.56 RT. M2 11+78.04~~	D-1		P
2	a		1																				EXIST INLET	3.60 LT. M2 10+67.72	D-1	2	a
3	a												2.20										CONC GUTTER	7.50 LT M2 11+40.92 TO INLET 3b	D-1	3	a
	b												0.4	1.31		108	1			0.78			G2 INLET W/ Apron	7.45 LT M2 11+14.87	D-1		b
	c							12.1		STD									1.4				450 mm RCP		D-1		c
4	a			1														1					EXIST INLET	1.50 LT M2 11+30.58	D-1	4	a
5	a				1																		EXIST PIPE		D-1	5	a
	b	1																					EXIST INLET	12.0 LT M2 11+81.0	D-1		b
	c				1																		EXIST PIPE		D-1		c
	d	1																					EXIST PIPE INLET	4.35 LT M2 11+79.37	D-1		d
	e				1																		EXIST PIPE		D-1		e
	f				1																		EXIST PIPE		D-1		f
	g				1																		EXIST PIPE		D-1		g
	h				1																		EXIST INLET	22.0 LT M2 11+76.0	D-1		h
	i	1	*																	Removed 10/22/03			EXIST INLET	4.45 RT M2 12+13.1	D-1		i
6	a													0.72		108	1			0.98			G1 INLET	4.50 RT M2 12+95.73	D-1	6	a
	b					27.2				STD									0.7						D-1		b
	c													0.72		108	1			0.98			G1 INLET	~~5.60~~ RT M2 12+67.73	D-1		c
	d					14.5				STD									0.8						D-1		d
	e													1.47		108	1			1.06			G2 INLET	~~7.20~~ LT M2 12+47.79	D-1		e
	f						16.0			STD									0.7						D-1		f
	g													1.51		108	1			1.10			G2 INLET	6.60 LT M2 12+~~30.73~~ 38	D-1		g
	h						16.5			STD															D-1		h
	i										1												CONCRETE FES	10.70 RT M2 12+26.87	D-1		i
	j																				1.8	4.0	ROCK SLOPE PROTECTION	150 ~~10.70~~ RT M2 12+26.87	D-1		j
	K																				22	48	Rock Slope Protection	110 RT M2 12+50	D-1		K
7	a	1																			Not Found		EXIST INLET	1.50 RT M2 12+72.44	D-1	7	a
	b				1																Not Found		100 mm		D-1		b
8	a				1																Not Found		200 mm CMP		D-1	8	a
Total		3	2	1	8	48.9	32.2	104.3	88.2		1	1	2.6	18.0	12.0	1296	12	1			4.0	8.8					

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Resident Engineer Responsible for *Construction Changes*

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE DATE 7/28/04
CHECKED BY R L DATE 10/2004

DRAINAGE QUANTITIES

D-5

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: KR
CHECKED BY: GVL
DATE REVISED: 3/03
REVISED BY: 3/03

LAST REVISION 00-00-00; DATE PLOTTED => 11-MAR-2005; TIME PLOTTED => 11:04

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DGN FILE => 40120qi05.dgn
USERNAME => ahucng

CU 04251 EA 012001

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	28	79

Kamal Rouhani 3/28/03
REGISTERED CIVIL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 Second St., Suite 700N
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Caltrans Metric

NOTES:

1. ALL EXISTING SANITARY SEWERS ARE CLAY PIPE, UNLESS OTHERWISE NOTED.
2. FOR ADDITIONAL NOTES SEE U-1 SHEET.
3. SEE U-1 SHEET FOR UTILITY POTHOLING INFORMATION.
4. SEE NOTE 8 ON SANITARY SEWER DETAIL SHEET FOR MH FRAME AND COVER.

ABBREVIATIONS

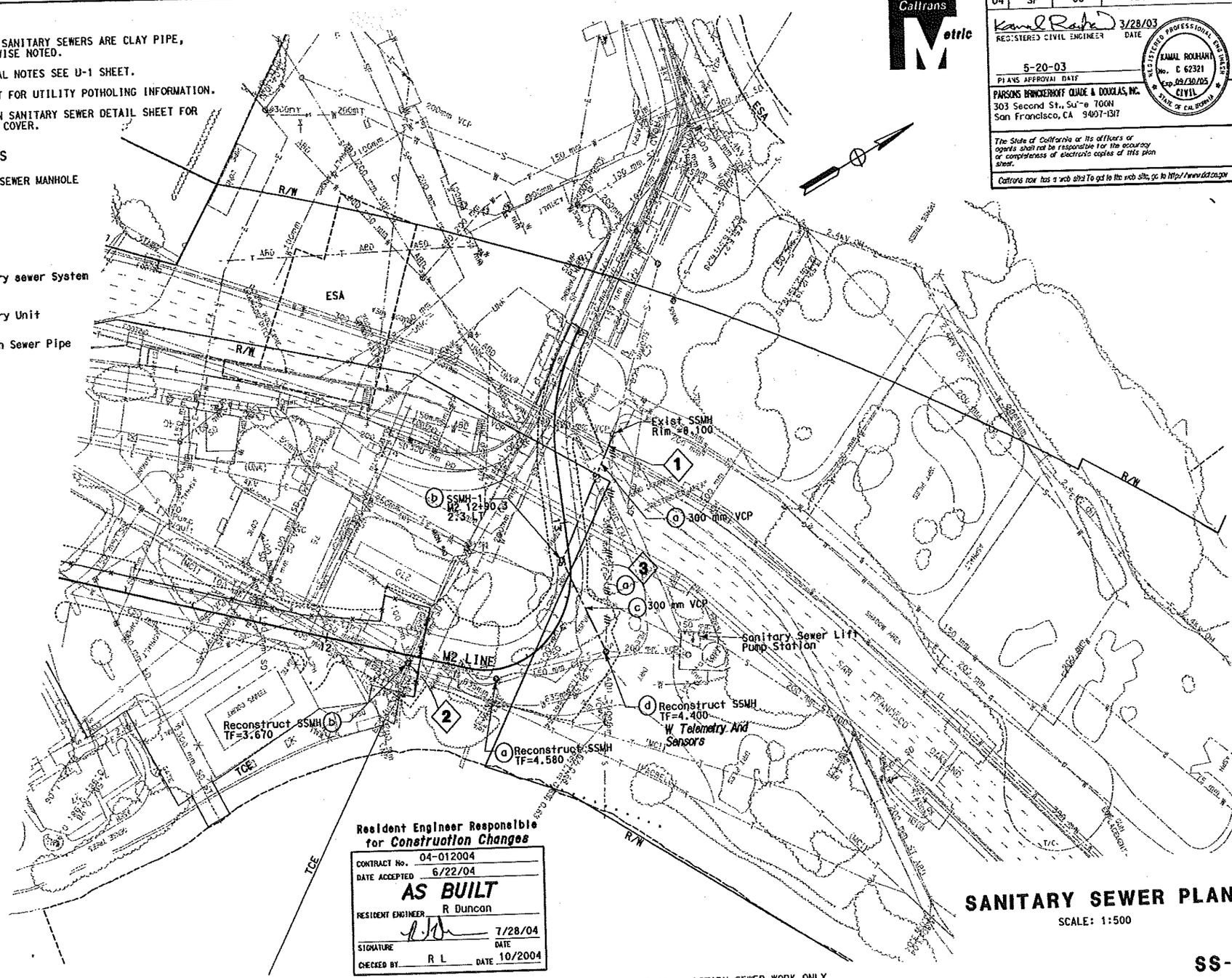
SSMH SANITARY SEWER MANHOLE

LEGEND

Sanitary sewer System

Sanitary Unit

Abandon Sewer Pipe



Resident Engineer Responsible for Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE 7/28/04 DATE
CHECKED BY R L DATE 10/2004

SANITARY SEWER PLAN
SCALE: 1:500

SS-1

THIS PLAN ACCURATE FOR SANITARY SEWER WORK ONLY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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DESIGN OVERSIGHT
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7/20/200

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DIST	COUNTY	ROUTE	KILOMETER POST SHOWN TOTAL PROJECT	TOTAL SHEETS
04	SF	80	12.9 29	79

Caltrans Metric

Kamal Rohani 3/28/03
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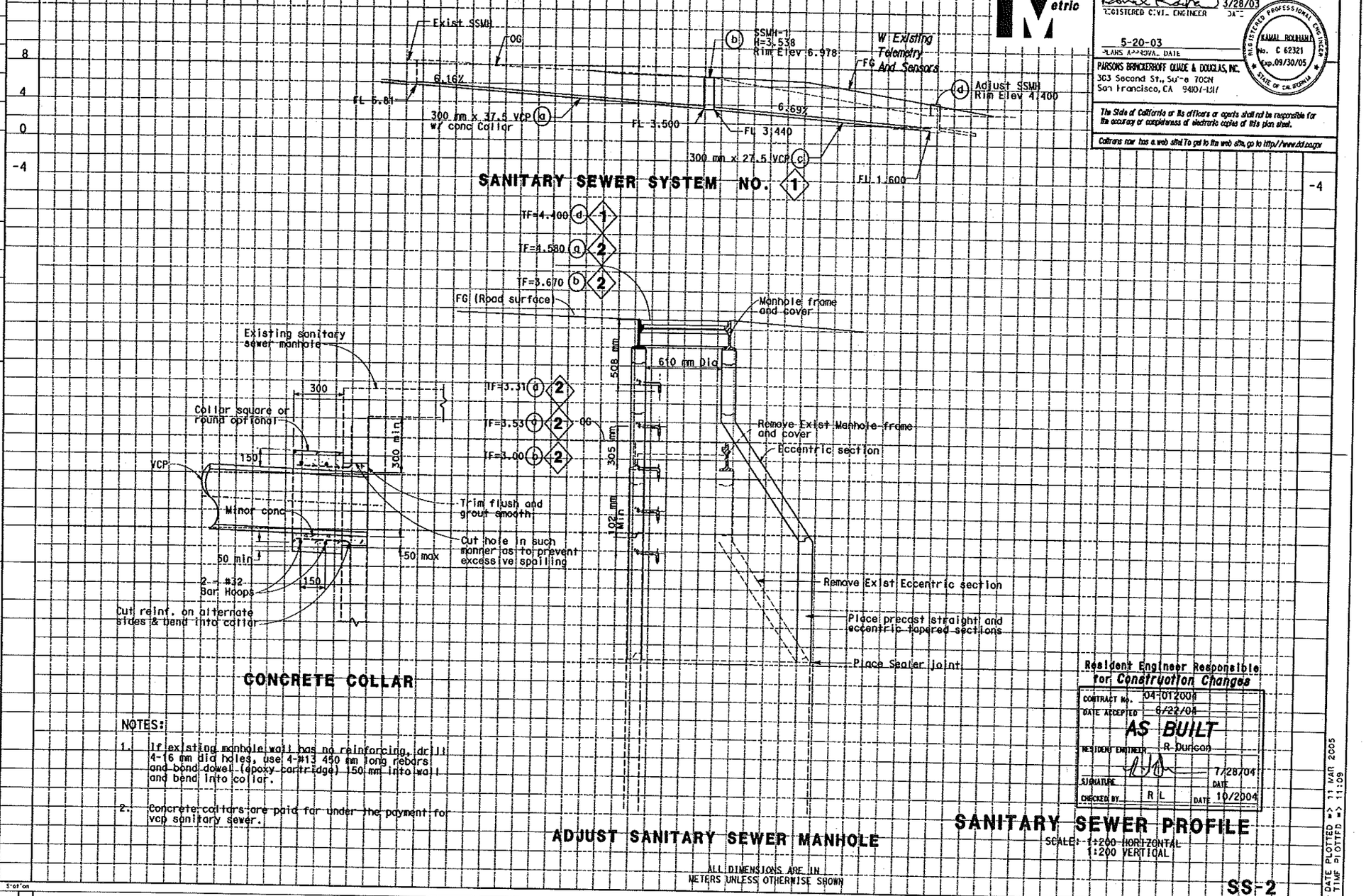

NOTES:

1. If existing manhole wall has no reinforcing, drill 4-16 mm dia holes, use 4-#13 450 mm long rebars and bond dowel (epoxy cartridge) 150 mm into wall and bend into collar.
2. Concrete collars are paid for under the payment for vcp sanitary sewer.

Resident Engineer Responsible for Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R. Duncan
SIGNATURE 7/28/04 DATE
CHECKED BY R L DATE 10/2004

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CU 04251 EA 012001

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	12.9	30	79

Caltrans Metric

Kamal Rouhani 3/28/03
REGISTERED CIVIL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

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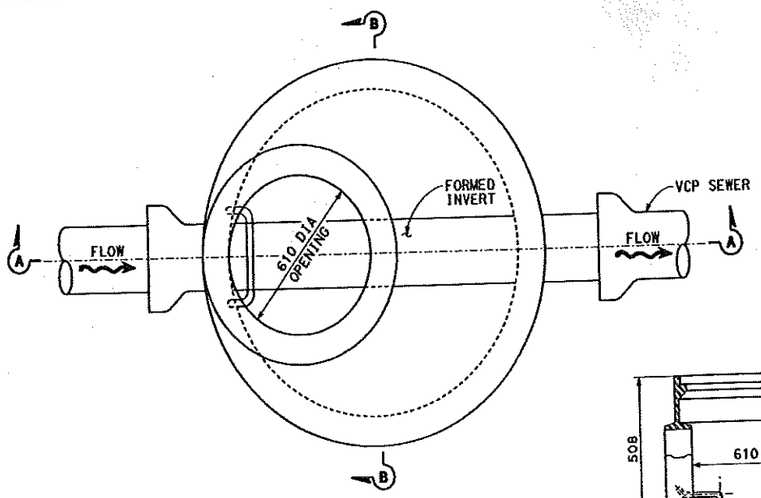
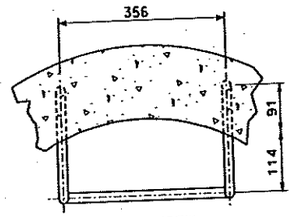
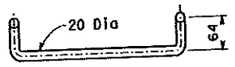


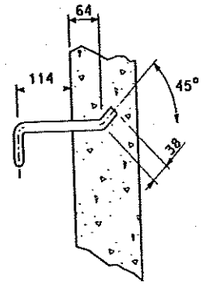
PLAN



TOP VIEW

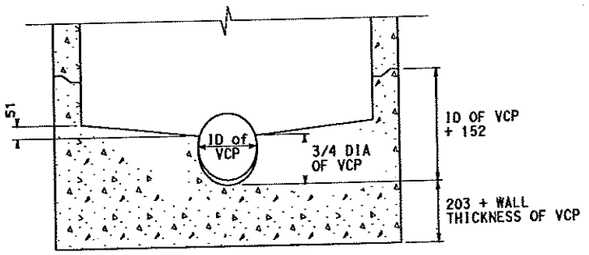


FRONT VIEW

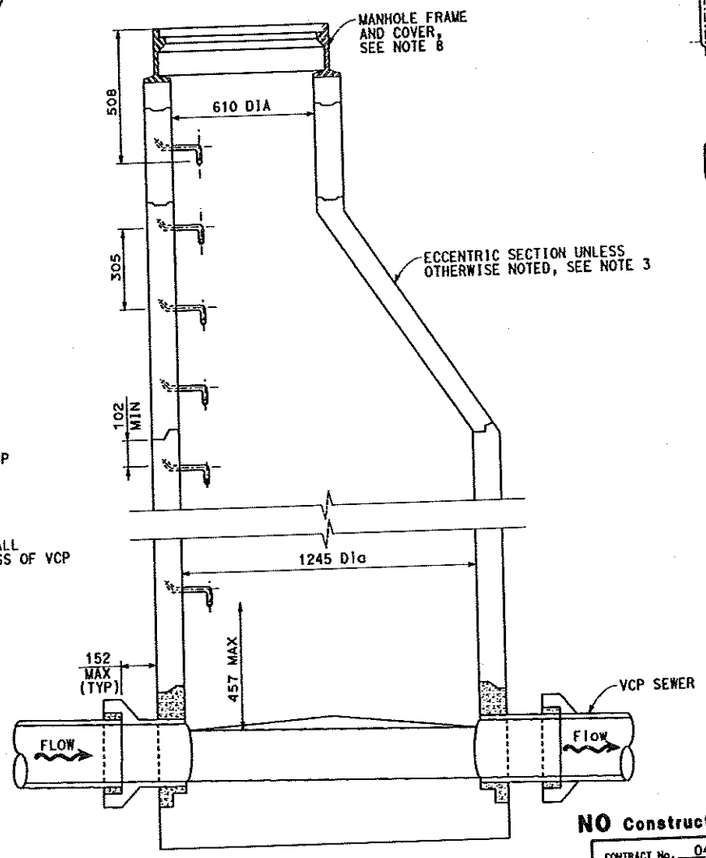


SIDE VIEW

STAINLESS STEEL STEP DETAIL



SECTION B-B



SECTION A-A

PRECAST CONCRETE MANHOLE

NOTES:

1. MANHOLE FRAME AND ALL JOINTS SHALL BE SET IN MORTAR.
2. ALL PRECAST COMPONENTS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C 478M.
3. VERTICAL WALL OF ECCENTRIC CONE SECTION SHALL BE ON UPSTREAM SIDE OF MANHOLE, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
4. CONCRETE FOUNDATION FOR MANHOLE SHALL BE 21 MPA CAST-IN-PLACE CONCRETE.
5. CONTRACTOR SHALL MINIMIZE THE NUMBER OF SECTION RINGS BY UTILIZING LARGEST SECTIONS AVAILABLE.
6. ALL STEPS SHALL BE CLASS 316 STAINLESS STEEL OR POLYPROPHYLENE CONFORMING TO TYPE II, GRADE 16906 AS PRESCRIBED BY ASTM D2146 WITH 50 MM GRADE 420 STEEL REINFORCEMENT CONFORMING TO ASTM A 615M.
7. SEE SS-1 SHEET FOR LOCATIONS OF SSMH.
8. MANHOLE FRAME AND COVER SHALL BE 610 MM FULL TRAFFIC TYPE NON-ROCKING MANHOLE FRAME & COVER MANUFACTURED BY PHOENIX IRON WORKS OR APPROVED EQUAL.

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

SANITARY SEWER DETAILS
NO SCALE

CITY AND COUNTY OF SAN FRANCISCO

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

SS-3

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CU 04251 EA 012001

7/20/200

SANITARY SEWER QUANTITIES

SANITARY SEWER PLAN SHEET NO.	SYSTEM NO. ◇	UNIT NO. ○	300mm VCP SANITARY SEWER PIPE	ABANDON SEWER PIPE	CONCRETE COLLAR (N)	SEWER MANHOLE	SANITARY SEWER MANHOLE FRAME & COVER (N)	RECONSTRUCT SANITARY SEWER MANHOLE	HEIGHT OF MANHOLE (N)	DESCRIPTION	STATION/OFFSET (FOR MANHOLES ONLY)	SYSTEM NO. ◇	UNIT NO. ○
			M	EA	EA	EA	EA	EA	EA				
SS-1	1	a	37.5		1					300 mm VCP with Conc collar		1	
	1	b				1	1		3.54	CONSTRUCT SSMH-1	M2 12+90.3 2.3 LT	1	a
	1	c	27.5							300 mm VCP		1	b
	1	d						1	2.86	RECONSTRUCT SSMH, BUILD WALLS (H=1.09)	M2 12+73.2 15.7 RT	1	c
	2	a						1	4.22	RECONSTRUCT SSMH, BUILD WALLS (H=1.05)	M2 12+49.8 2.4 RT	1	d
	2	b						1	3.33	RECONSTRUCT SSMH, BUILD WALLS (H=0.67)	M2 12+24.4 2.1 RT	2	a
	3	a		1						ABANDON SEWER		2	b
												3	a
TOTAL			65.0	1	1	1	1	3					

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Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	31	79

Kamal Rouhani 3/28/03
REGISTERED CIVIL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

SANITARY SEWER QUANTITIES

SS-4

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	32	79

Kamal Roukhani 3/28/03
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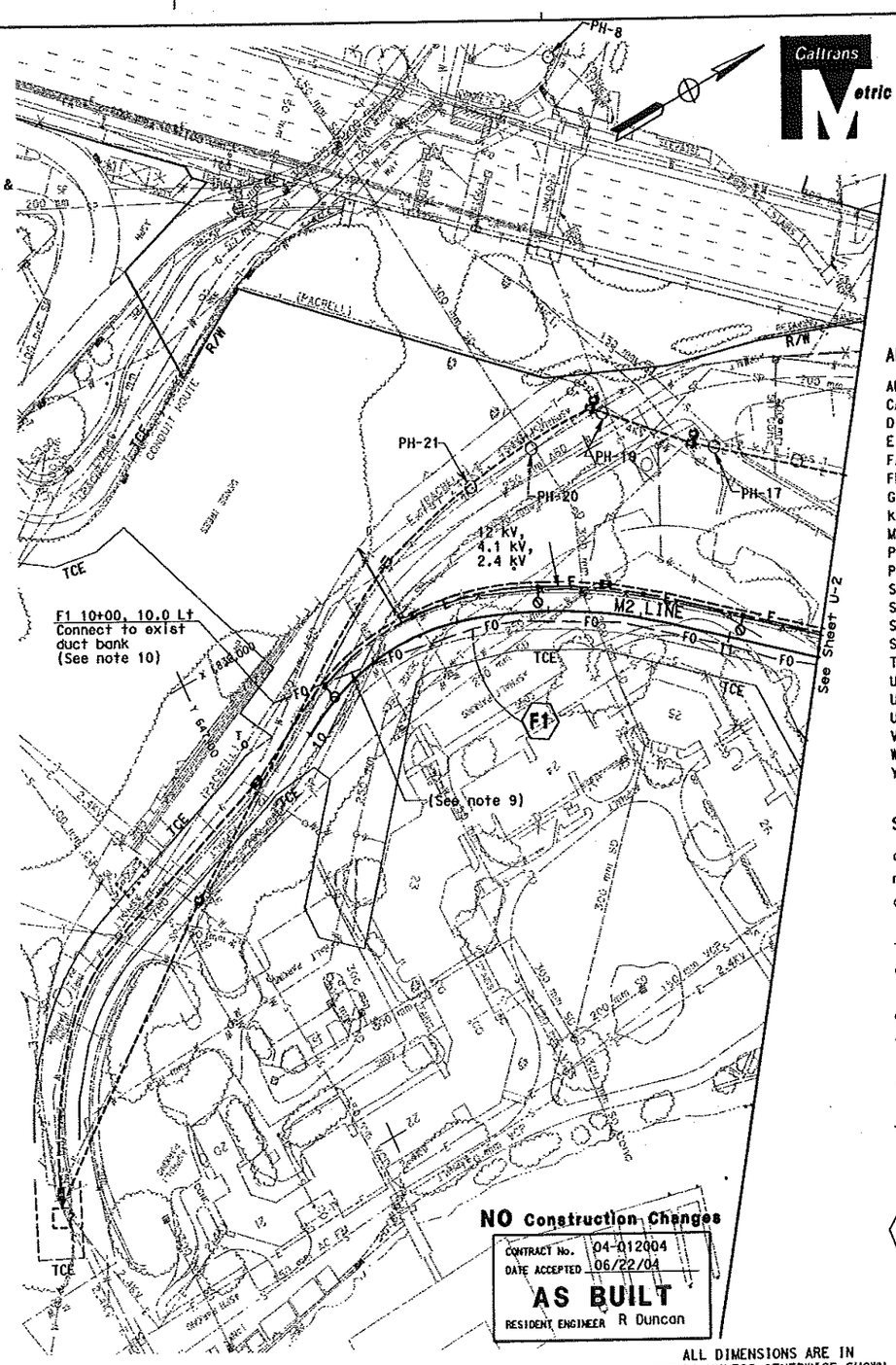
NOTES:

1. Locations of utility facilities on these plans are approximate and shall be verified by the Contractor prior to construction.
2. All saltwater pipes are abandoned in place.
3. Contractor to provide temporary utility connections to all new & existing facilities during staging operation as necessary.
4. Contractor to protect / monitor existing utilities that are to remain. Utilities are old and can break from ground vibration during construction.
5. For sanitary sewer relocations see SS-sheets.
6. Elevation is based on 1929 national geodetic vertical datum (ngvd29).
7. For drainage see d- sheets.
8. For electrical utility relocations see E sheets.
9. Contractor to install 2-103 mm concrete incased conduits. Installation of fiber optic cables by pacbell(sbc). See E-sheets for conc incasement dimensions.
10. Connections by SBC.

LEGEND:

SYMBOL	UTILITY	OWNERSHIP
SD	Storm Drainage	US Navy
SP	Saltwater Pipe	US Navy
S	SSanitary Sewer	US Navy
W	Water	US Navy
FO	Fiber Optic Line	Pacbell(SBC)
E	Electrical	US Navy

PH#	N	E	GROUND Elev	Depth Top Bottom	Description
1	647420.083	1836055.575	9.342	0.203, 0.559	Elect Duct
2	647400.405	1836067.454	9.008	0.229, 0.584	Elect Duct
3	647385.889	1836078.450	8.723	0.686, 1.143	Elect Duct
4	647366.048	1836089.639	8.214	0.330	Telephone Duct
			8.214	0.914	Elect Duct
5	647228.376	1835850.118	52.390	0.635	Gas Line
6	647218.427	1835883.635	49.704	0.610	Gas Line
7	647207.362	1835910.928	47.188	0.635	Gas Line
8	647227.409	1835927.749	44.482	0.635	Gas Line
9	647246.035	1835903.128	41.656	0.584	Gas Line
10	647259.847	1835873.518	39.247	0.533	Gas Line
11	647346.523	1836101.699	7.348	0.432	Telephone Duct
			7.348	0.737	Elect Duct
12	647335.685	1836108.716	6.959	0.254, 0.991	Elect Duct
13	647337.315	1836107.508	6.929	0.406, 0.889	Elect Duct
14	647322.430	1836090.791	7.272	0.356, 0.813	Elect Duct
15	647285.691	1836057.200	2.934	0.051, 0.406	Elect Duct
16	647262.886	1836042.078	2.712	0.178, 0.610	Elect Duct
17	647239.488	1836023.237	5.324	0.508	Elect Duct
18	647224.602	1836012.282	6.944	0.102	½inch Pipe
			6.944	0.229	2 inch pipe
			6.944	0.305, 0.762	Elect Duct
19	647205.754	1835994.915	6.933	0.305 to 0.559	Conc. duct
			6.933	0.533, 0.787	Elect Duct
20	647188.837	1835994.002	6.718	0.254	2-inch pipe
			6.718	0.127, 0.483	Elect Duct
21	647173.680	1835994.489	6.473	0.203	Unknown Duct



ABBREVIATIONS:

ABD	Abandoned
CA	Compressed Air
DIP	Ductile Iron Pipe
E	Electric
FA	Fire Alarm
FM	Force Main
G	Gas
kV	Kilo Volt
MCI	Mci Telecommunications
PACBELL	Pacific Bell
PH	Pothole
SFWD	San Francisco Water Department
SP	Saltwater Pipe
SS	Sanitary Sewer
ST	Steel
TCE	Temporary Construction Easement
U	Utility
UNK	Unknown
USCG	United States Coast Guard
V	Volts
W	Water
YBI	Yerba Buena Island

SYMBOLS:

oC	Cable Vault
nE	Electric Handhole
oE	Electric Manhole
▪	Electric Pull Box
	Fire Hydrant
oG	Gas Valve
!	Light Pole
oSW	Saltwater Valve
oS	Sewer Manhole
▪	Storm Drain Inlet
oT	Telephone Manhole
oT	Telephone Vault
	Utility Pole
oU	Utility Vault
⋈	Water Valve
oW	Water Vault
(X)	Utility System

UTILITY PLAN

SCALE: 1:500

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THIS PLAN ACCURATE FOR UTILITIES ONLY.

U-1

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
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Kamal Rouhani 3/28/03
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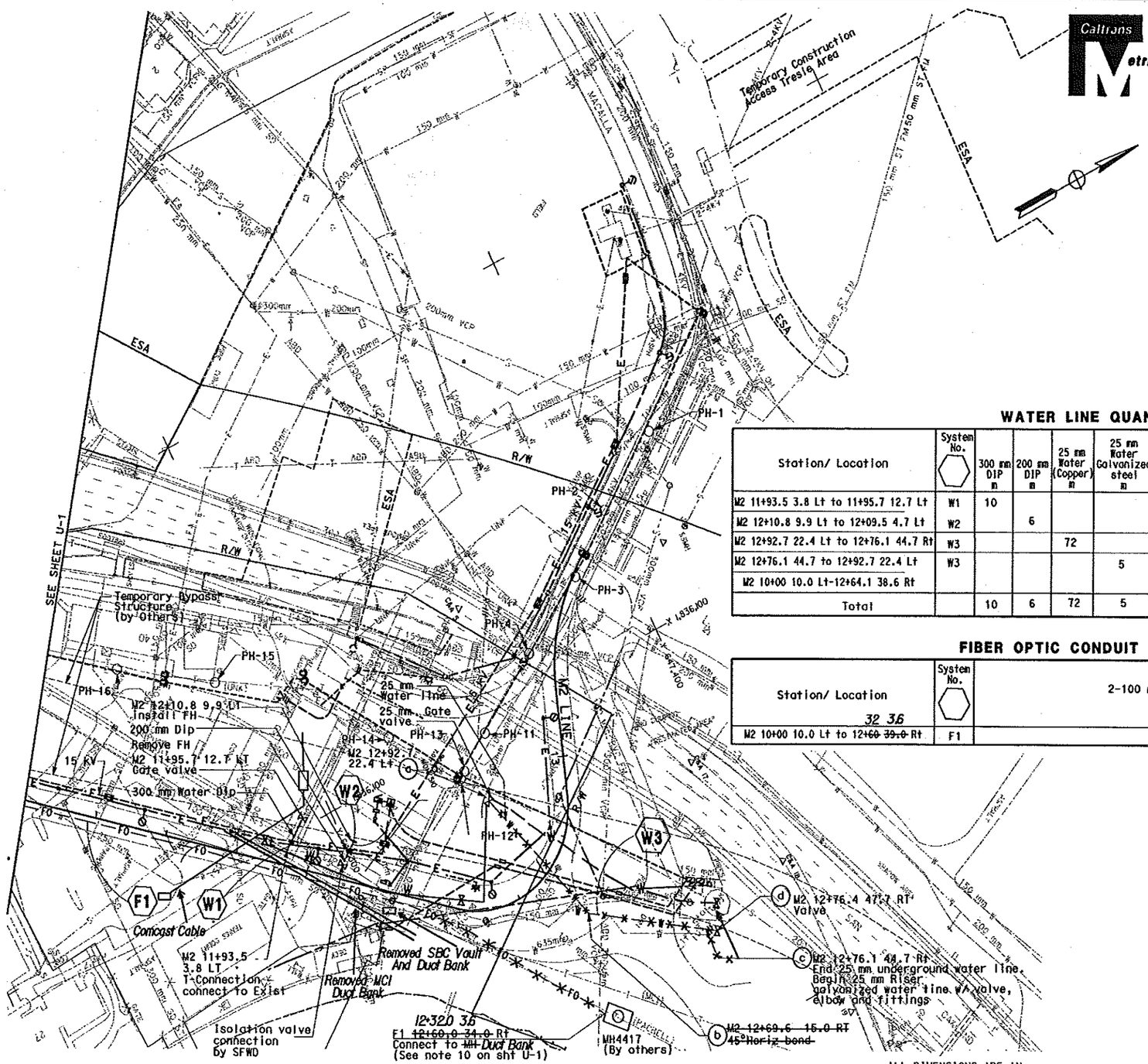

WATER LINE QUANTITIES

Station/ Location	System No.	300 mm DIP m	200 mm DIP m	25 mm Water (Copper) m	25 mm Water Galvanized steel m		200 mm Isolation Valve EA	25 mm Valve EA	Remove FH EA	Install FH EA	2-100mm PVC SCH 40 Conduits Incased in Conc m
M2 11+93.5 3.8 Lt to 11+95.7 12.7 Lt	W1	10									
M2 12+10.8 9.9 Lt to 12+09.5 4.7 Lt	W2		6				1		1	1	
M2 12+92.7 22.4 Lt to 12+76.1 44.7 Rt	W3			72							
M2 12+76.1 44.7 to 12+92.7 22.4 Lt	W3				5			2			
M2 10+00 10.0 Lt-12+64.1 38.6 Rt											295
Total		10	6	72	5		1	2	1	1	295

FIBER OPTIC CONDUIT QUANTITIES

Station/ Location 32 36	System No.	2-100 mm Concrete Encased (m)
M2 10+00 10.0 Lt to 12+~~60 39.0~~ Rt	F1	290

Resident Engineer Responsible for *Construction Changes*

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE 7/28/04 DATE
CHECKED BY R L DATE 10/2004

UTILITY PLAN

SCALE: 1:500

THIS PLAN ACCURATE FOR UTILITIES ONLY.

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

U-2

CALCULATED/ DESIGNED BY	KR	DATE 3/03	REVISED BY
CHECKED BY	CVL	3/03	DATE REVISED

DESIGN OVERSIGHT
Bob Zandipour

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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DGN FILE => 40120qk02.csb
USERNAME => ahuang

CU 04251 EA 012001

LAST REVISION 00-00-00 DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 11:11

DIST	COUNTY	ROUTE	K-LOCATOR POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	33A	

REGISTERED CIVIL ENGINEER 8/14/03 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

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Caltrans Metric

NOTES:

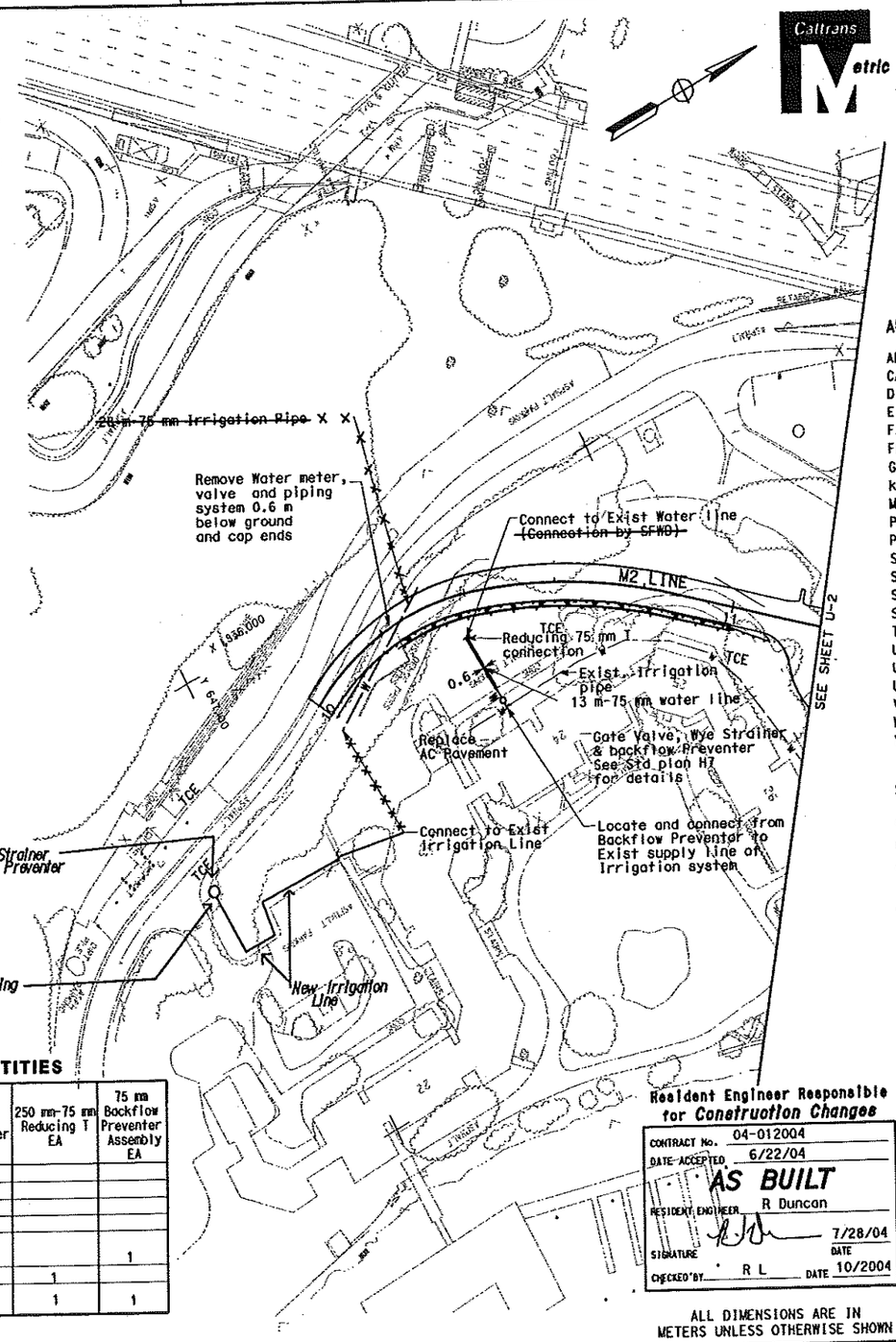
1. Locations of utility facilities on these plans are approximate and shall be verified by the contractor prior to construction.
2. All Existing irrigation pipes whithin limit of Road Excavation shall be removed and ends capped.

LEGEND:

SYMBOL	UTILITY	OWNERSHIP
—— SD ——	Storm Drainage	US Navy
—— SP ——	Saltwater Pipe	US Navy
—— S	SSanitary Sewer	US Navy
—— W ——	Water	US Navy

MARK	DATE	DESCRIPTIONS REVISIONS	REV	CK
1	8/15/03	New Sheet	KR	GVL

CONTRACT CHANGE ORDER NO. 6
SHEET ___ OF ___



ROADWAY QUANTITIES

Station/ Location	Replace AC Pavement m3
M2 10+38.6 8.7 Rt to 10+44.8 21.8 Rt	2

IRRIGATION SYSTEM QUANTITIES

Station/ Location	Remove Exist Irrigation system LS	75 mm supply line m	75 mm Gate Valve EA	75 mm Wye Strainer EA	250 mm-75 mm Reducing T EA	75 mm Backflow Preventer Assembly EA
M2 10+20.8, 0.4 Rt	1					
M2 10+00 6.8 Rt to 10+31.3 4.4 Lt		28				
M2 10+38.6 8.7 Rt to 10+44.8 21.8 Rt		13				
M2 10+45.0 22.5 Rt			1			
M2 10+45.0 22.5 Rt				1		
M2 10+45.0 22.5 Rt						1
M2 10+38.6 8.7 Rt					1	
TOTAL	1	41	1	1	1	1

ABBREVIATIONS:

ABD	Abandoned
CA	Compressed Air
DIP	Ductile Iron Pipe
E	Electric
FA	Fire Alarm
FM	Force Main
G	Gas
kV	Kilo Volt
MCI	Mci Telecommunications
PACBELL	Pacific Bell
PH	Pothole
SFWD	San Francisco Water Department
SP	Saltwater Pipe
SS	Sanitary Sewer
ST	Steel
TCE	Temporary Construction Easement
U	Utility
UNK	Unknown
USCG	United States Coast Guard
V	Volts
W	Water
YBI	Yerba Buena Island

SYMBOLS:

oC	Cable Vault
	Electric Handhole
oE	Electric Manhole
	Electric Pull Box
	Fire Hydrant
oG	Gas Valve
	Light Pole
SW	Saltwater Valve
oS	Sewer Manhole
	Storm Drain Inlet
oT	Telephone Manhole
oT	Telephone Vault
	Utility Pole
cU	Utility Vault
	Water Valve
oW	Water Vault

Resident Engineer Responsible for Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE 7/28/04 DATE
CHECKED BY R L DATE 10/2004

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IRRIGATION PLAN

SCALE: 1:500

U-3

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DESIGN OVERSIGHT: Bob Zandipour

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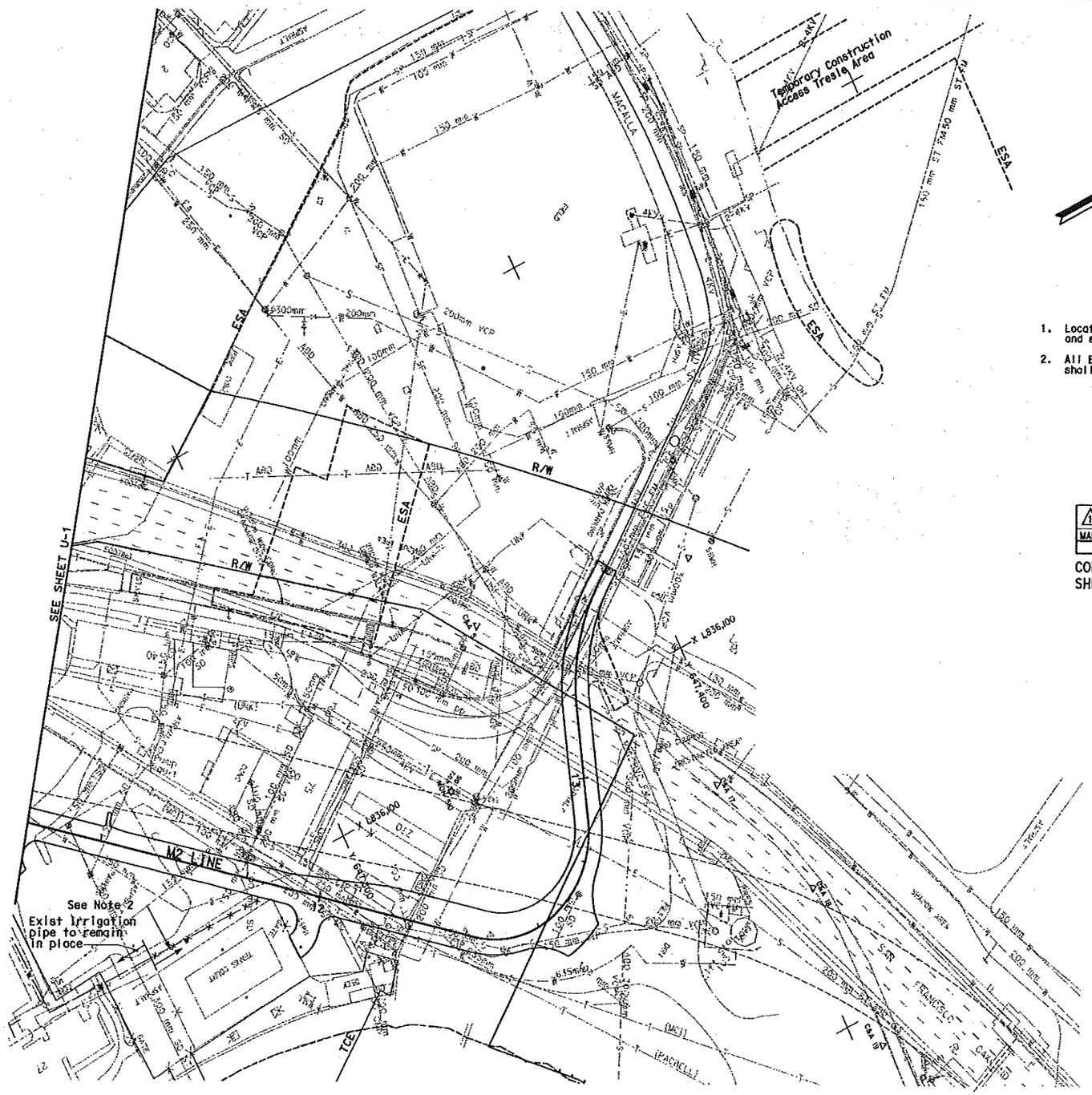

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	33B	

Kamal Rouhani 8/14/03
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

PLANS APPROVAL DATE

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1. Locations of utility facilities on these plans are approximate and shall be verified by the contractor prior to construction.
2. All Existing irrigation pipes within limit of Road Excavation shall be removed and ends capped.

MARK	DATE	DESCRIPTIONS	KR GVL REV CK
1	7/15/03	New Sheet	

REVISIONS

CONTRACT CHANGE ORDER NO._____
SHEET_____OF

NO Construction Changes
CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

IRRIGATION PLAN

SCALE: 1:500

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

U-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	34	79

REGISTERED CIVIL ENGINEER 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

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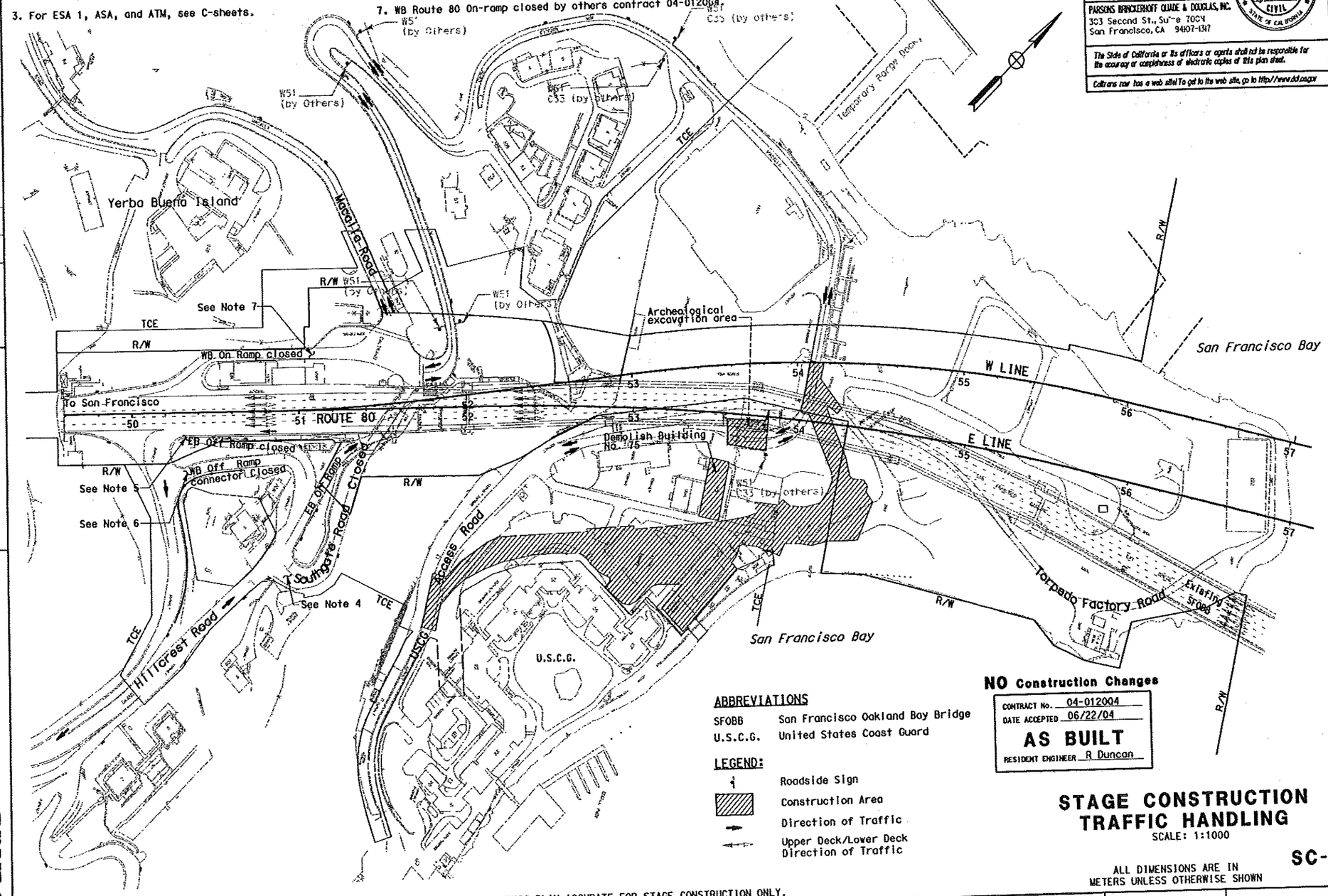
Caltrans Metric

NOTES:

1. Location for Construction Area Signs are approximate. Exact sign location will be determined by the Engineer.
2. Existing Utility Facilities have not been plotted on this plan.
3. For ESA 1, ASA, and ATM, see C-sheets.
4. Southgate Road closed, by others contract 04-0120R4.
5. EB Route 80 off-ramp (right) closed by others contract 04-0120G4.
6. WB Route 80 off-ramp connector to Hillcrest Road closed by others contract 04-0120G4.
7. WB Route 80 On-ramp closed by others contract 04-0120G4.



NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ABBREVIATIONS

SFOBB	San Francisco Oakland Bay Bridge
U.S.C.G.	United States Coast Guard

LEGEND:

- Roadside Sign
- Construction Area
- Direction of Traffic
- Upper Deck/Lower Deck Direction of Traffic

STAGE CONSTRUCTION TRAFFIC HANDLING

SCALE: 1:1000

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SC-1

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION ONLY.

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LEGEND:

Construction Area

Direction of Traffic

NOTE:
1. Begin Archeological Excavation after completion of Road work and opening of traffic to M2 line . Restore Exist pavement with 210 mm of AC (type A).
2. For temporary fence details, see sheet C-8.

CONSTRUCTION AREA SIGNS QUANTITIES

CODE	SIGN MESSAGE	PANEL SIZE (mm)	No. OF POST AND SIZE	EA
C18	ROAD CONSTRUCTION AHEAD	1200 x 1200	1-140 mm x 140 mm	1
C13	END CONSTRUCTION	900 x 600	1-140 mm x 140 mm	1

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	35	79

REGISTERED CIVIL ENGINEER 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

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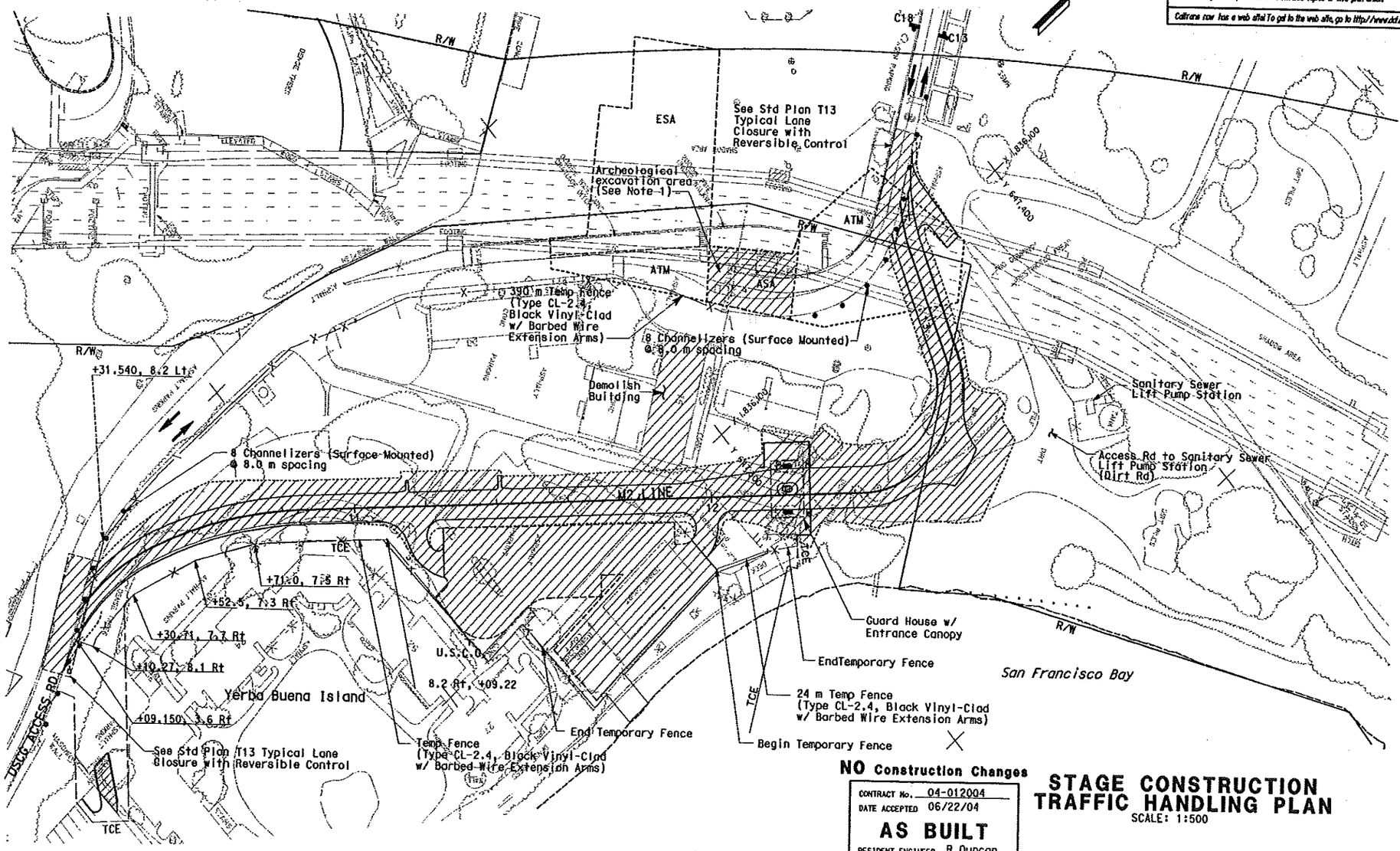

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

STAGE CONSTRUCTION TRAFFIC HANDLING PLAN

SCALE: 1:500

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USERNAME => ohuang

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SC-2

REVISED BY	DATE REVISED
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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	36	79

REGISTERED CIVIL ENGINEER 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

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NO Construction Changes

CONTRACT No. 04-012004
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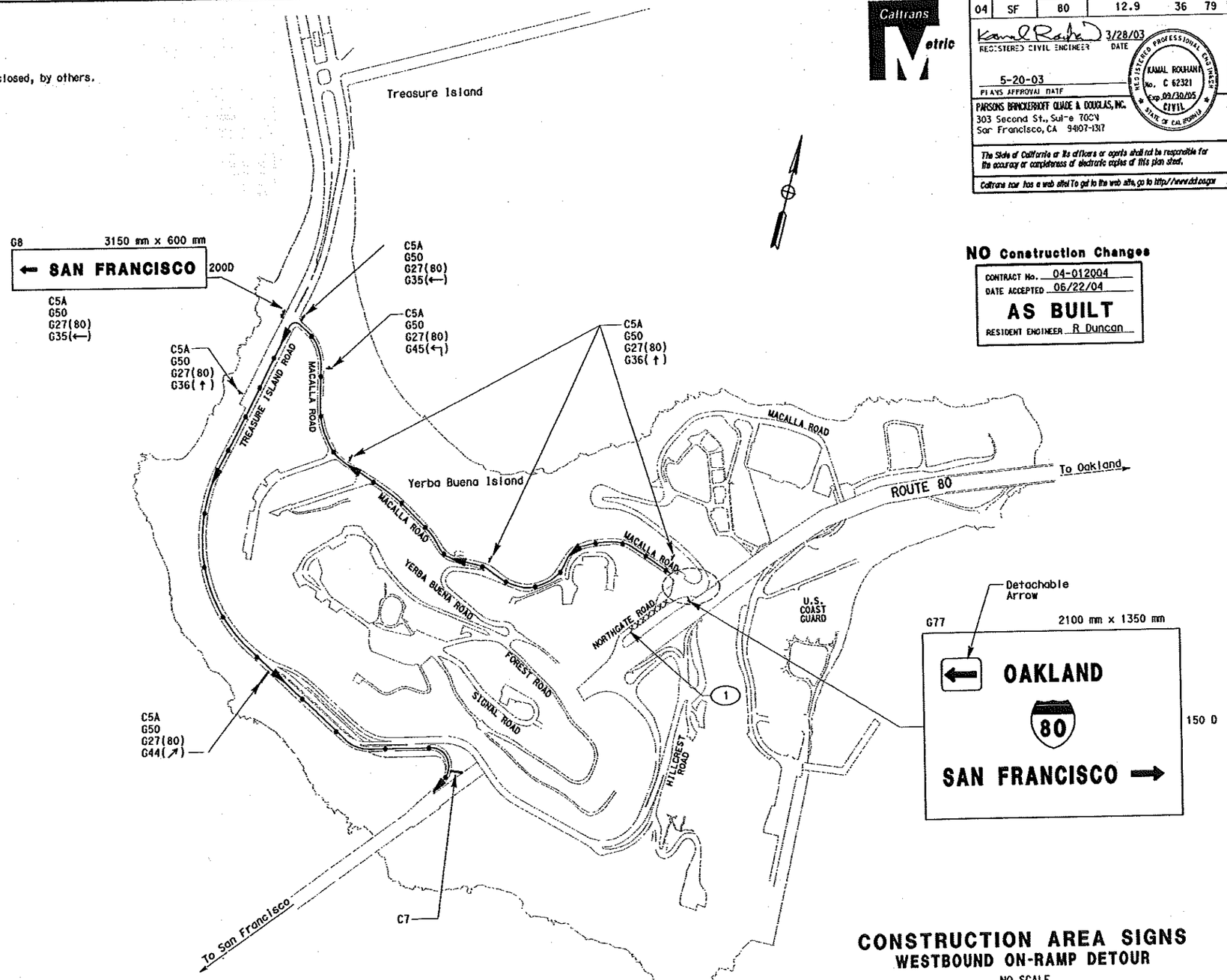
DETOUR NOTES:

(1) West bound On-Ramp closed, by others.



CONSTRUCTION AREA SIGNS
WESTBOUND ON-RAMP DETOUR
NO SCALE

For General Notes and/or Legend See Sheet CS-1

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THIS PLAN ACCURATE FOR CONSTRUCTION AREA SIGNS ONLY.

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CS-1

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	37	79

Kamal Rouhani 3/28/03
REGISTERED CIVIL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

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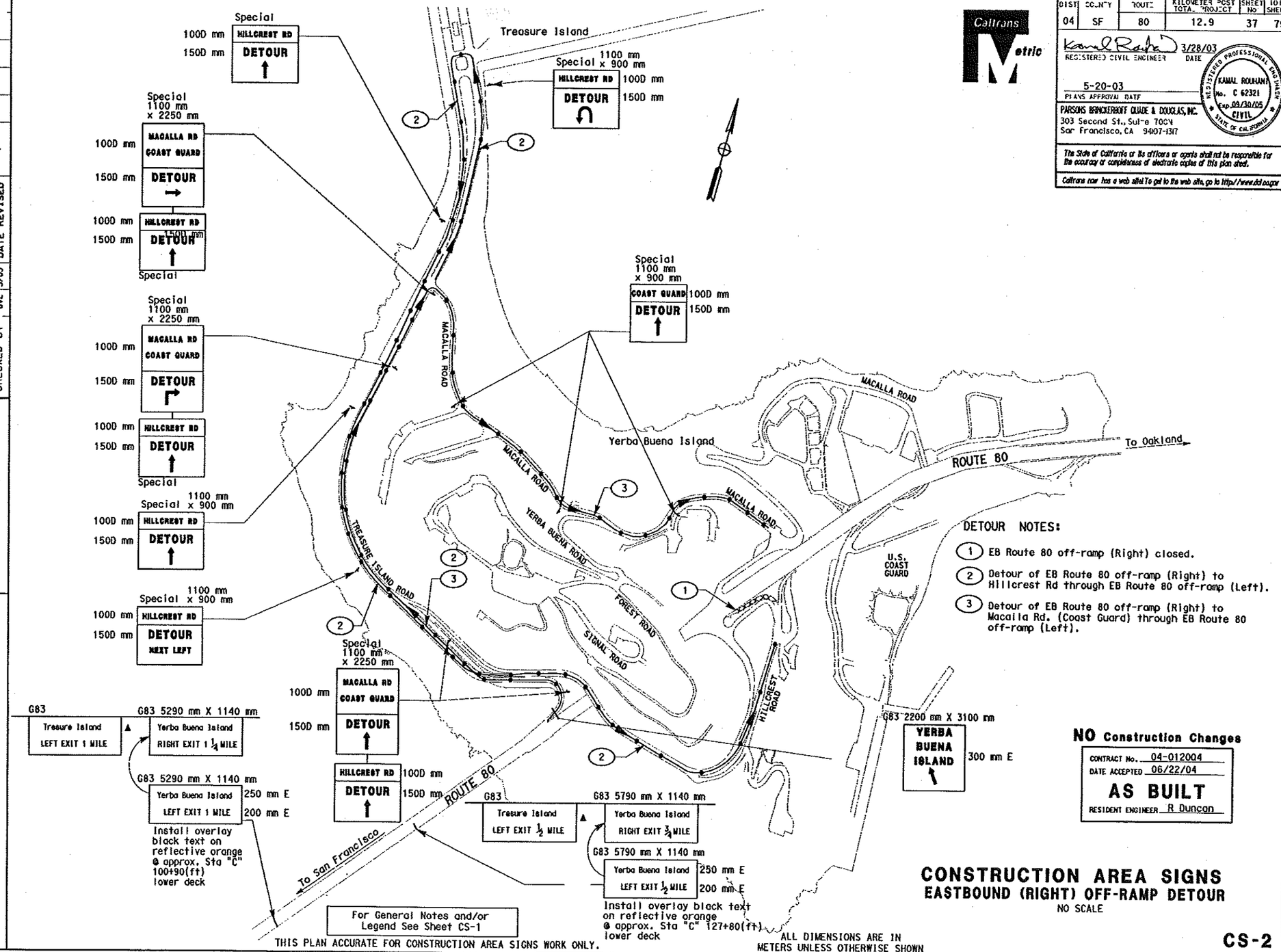

DETOUR NOTES:

1. EB Route 80 off-ramp (Right) closed.
2. Detour of EB Route 80 off-ramp (Right) to Hillcrest Rd through EB Route 80 off-ramp (Left).
3. Detour of EB Route 80 off-ramp (Right) to Macalla Rd. (Coast Guard) through EB Route 80 off-ramp (Left).

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
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CONSTRUCTION AREA SIGNS
EASTBOUND (RIGHT) OFF-RAMP DETOUR
NO SCALE

For General Notes and/or Legend See Sheet CS-1

THIS PLAN ACCURATE FOR CONSTRUCTION AREA SIGNS WORK ONLY.

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CS-2

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	38	79

Kamal Roukhani 3/28/03
REGISTERED CIVIL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

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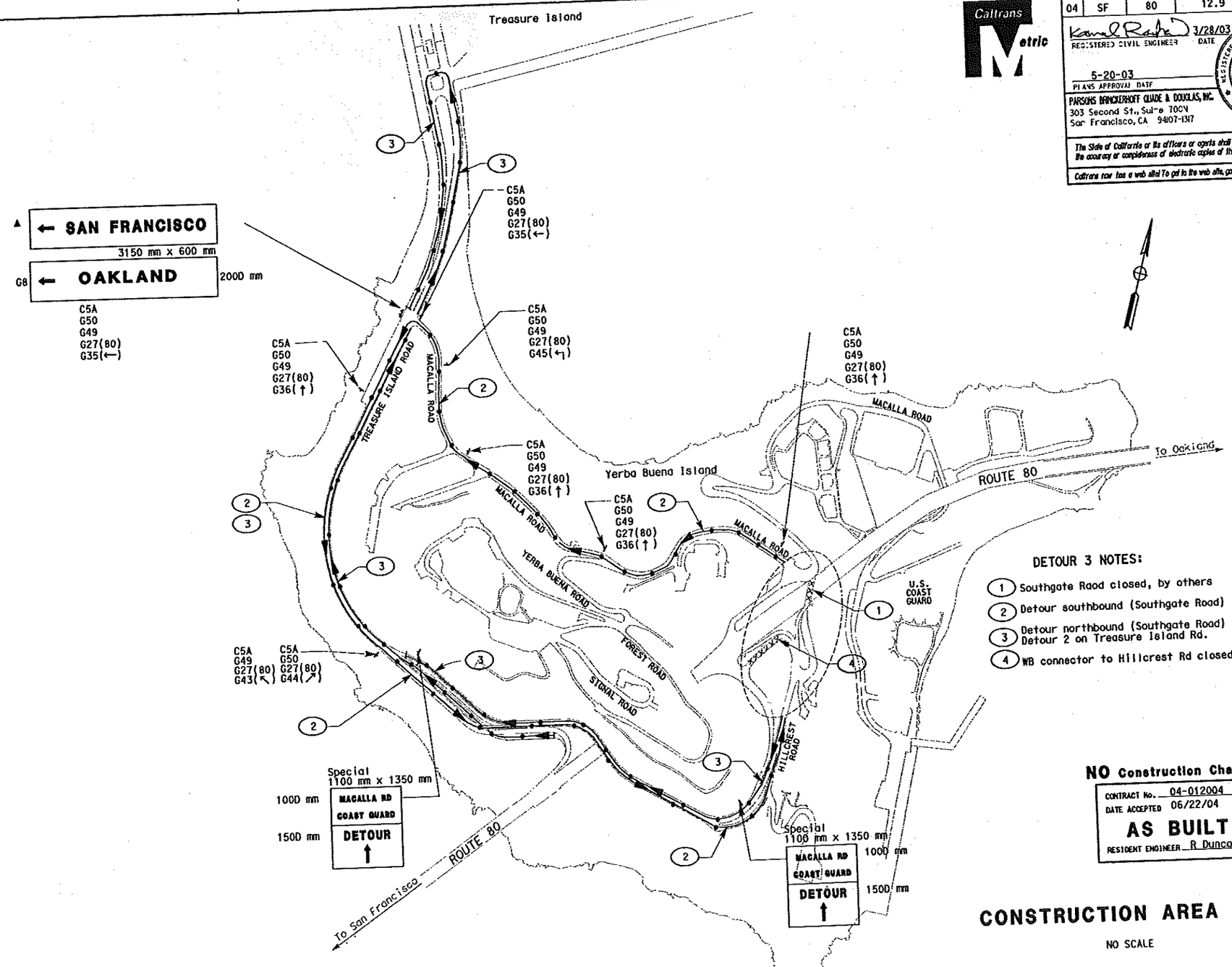

DETOUR 3 NOTES:

1. Southgate Road closed, by others
2. Detour southbound (Southgate Road)
3. Detour northbound (Southgate Road) joins Detour 2 on Treasure Island Rd.
4. WB connector to Hillcrest Rd closed, by others

NO Construction Changes
CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

CONSTRUCTION AREA SIGNS

NO SCALE

CS-3

For General Notes and/or Legend See Sheet CS-1

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This plan accurate for Construction Area Signs only.

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7/20/20

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CURVE DATA

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②	1.500	124° 26' 59" RT	2.848	3.258	647,216.800	1,836,077.037
③	10.000	90° 49' 40" LT	10.146	15.852	647,223.246	1,836,087.551
④	10.000	42° 43' 36" RT	3.912	7.457	647,230.712	1,836,107.177
⑤	1.500	111° 32' 18" LT	2.205	2.920	647,222.038	1,836,069.149

LEGEND:

▬ DELINEATOR

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	39	79

REGISTERED CIVIL ENGINEER 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

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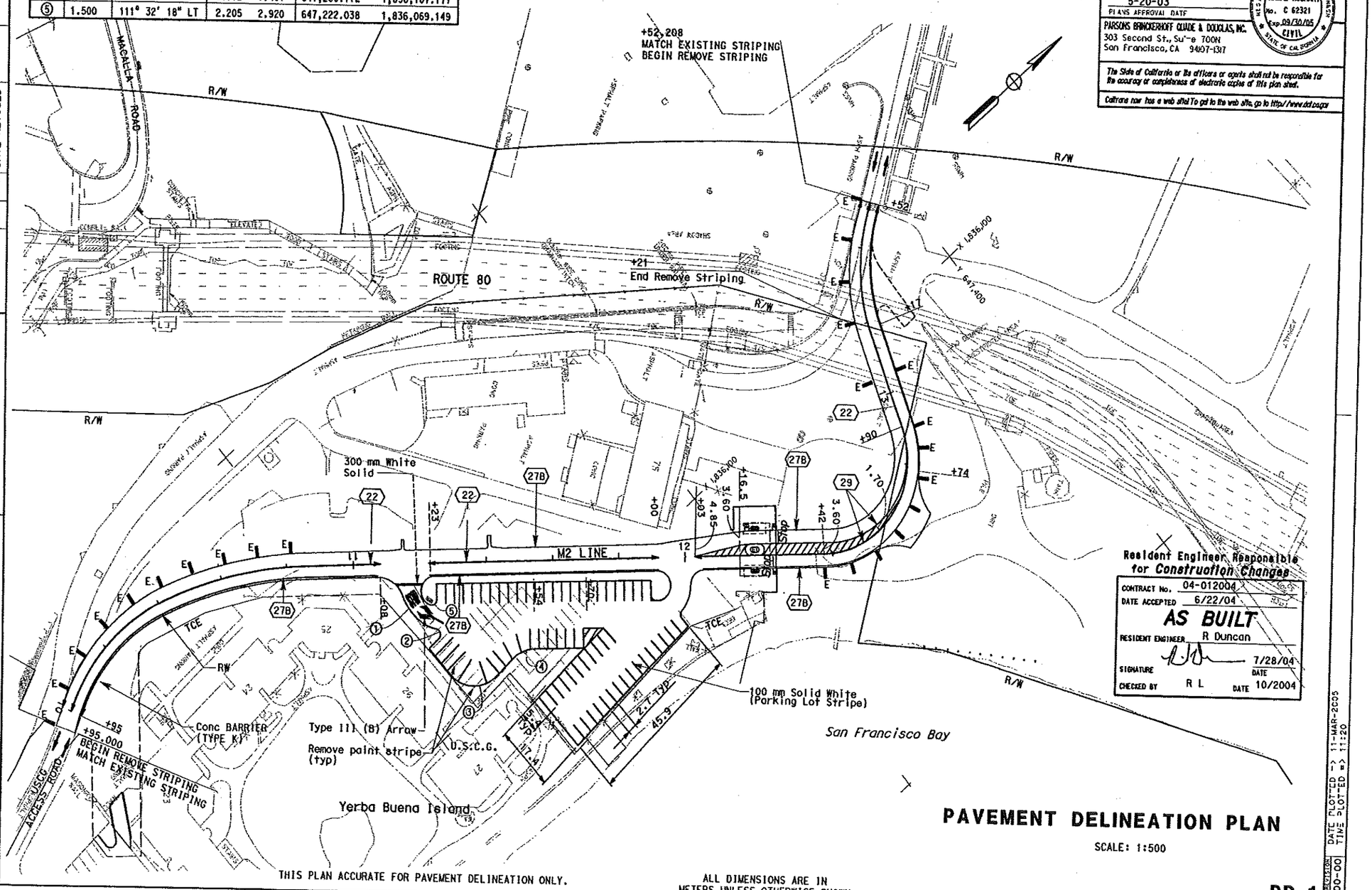

PAVEMENT DELINEATION PLAN

SCALE: 1:500

THIS PLAN ACCURATE FOR PAVEMENT DELINEATION ONLY.

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PD-1

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	40	79

Caltrans Metric

Kawal Rouhani 3/28/03
REGISTERED CIVIL ENGINEER DATE

05-20-03
PLANS APPROVAL DATE

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PAVEMENT DELINEATION QUANTITIES

SHEET No.	Station Limits	Detail No. or Pavement Marking	Pavement Markers Retroreflective Type D EA	Paint Traffic Stripe (2-Coat) 100 mm Yellow Solid m	Paint Traffic Stripe (2-Coat) 100 mm White Solid m	Paint Pavement Marking (2-Coat) m2	Remove Paint stripe m
PD-1	M2 9+95 to 11+08	22	47	226			
	M2 11+23 to 11+92	22	29	138			
	M2 12+90 to 13+52	22	26	124			
	M2 9+95 to 13+52 LT	27B			357		
	M2 9+95 to 11+08 RT	27B			113		
	M2 11+23 to 11+92 RT	27B			69		
	M2 12+03 to 13+52 RT	27B			149		
	M2 12+03 to 12+90 RT	29	37	348			
	M2 11+16 RT	"STOP"				2.04	
	M2 11+12 to 11+20	300 mm white solid				2.40	
	USCG Parking lot				700		
	M2 11+12 to 11+20	TYPE III (B) ARROW				6.78	
	M2 11+20 to 12+00						192
	TOTAL		139	836	1388	11.22	192

DELINEATOR

SHEET No.	Station Limits	Delineator Class 1 Type E EA
PD-1	M2 9+95 to 10+82	10
	M2 11+42 to 11+86	8
	M2 12+95 to 13+52	6
	TOTAL	24

CHANNELIZERS (SURFACE MOUNTED)

SHEET No.	Station Limits	Channelizers (Surface mounted) EA
SC-2	M2 9+85 Rt -10+39.0 11.7 Lt	8
	M2 13+12.2 22.0 Lt-13+55 Rt	8
	TOTAL	16

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

PAVEMENT DELINEATION QUANTITIES

PD-2

DATE	REVISED BY	DATE	REVISED
3/03	GVL		

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	41	79

REGISTERED CIVIL ENGINEER 3/28/03 DATE

05-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 Second St., Suite 700N
San Francisco, CA 94107-1317

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EARTHWORK

LOCATIONS	ROADWAY EXCAVATION (m3)	OBLITERATE SURFACING (m2)	(N) EMBANKMENT (m3)	IMPORTED BORROW (m3)
M2 Line 10+000 to 13+47.208	198	2435	1260	1062
M2 9+79.0 to 9+85.0 23.0 RT(Location A)	6			
M2 11+59.3 to 11+85.0 Rt(Location D)	26			
M2 11+34.0 -11+41.0 23.0 Rt(Location C)	4			
M2 11+27.0 7.0 Rt (Location B)	1			
M2 11+33 6.0 RT to 11+72 48.0 Rt	27			
M2 12+12 11.0 Rt	1			
M2 13+20.2 45.0 Lt (TOP 0.45 m) Archeological Excavation)	53.0			
HAZARDOUS & CLASS II SOIL BACKFILL				638.4
BUILDING No.75 BACKFILL				150
TOTAL	316	2435	1260	1850

(N): NOT A SEPERATE PAY ITEM, FOR INFORMATION ONLY

ROADWAY QUANTITIES

LOCATIONS	ASPHALT CONCRETE (TYPE A)	CLASS 3 AGGREGATE BASE	PLACE AC DIKE (TYPE A)	PLACE AC DIKE (TYPE C)
	tonne	m3	m	m
M2 Line 10+00.000 to 10+22.000	6			
M2 Line 10+000 to 13+47.208	1030	890		
M2 Line 13+47.208 to 13+52.208				
M2 11+30.3 6.0 RT to 11+72.0 48.0 Rt (Drainage Trench Paving	62			
M2 9+79.0 to 9+85.0 23.0 Rt and Lt(Location A)	1.5		18	
M2 10+00.000 to 11+11.000 Rt (location A)	1.3			110
M2 10+80.000 to 11+14.485 Lt	0.7			35
M2 11+14.985, 11+40.920 Lt Overside Drain	0.3			14
M2 11+41.420 to 12+20.893 Lt	1.7			81
M2 11+31.000 to 11+91.534 Rt	1.3			61
M2 12+05.534 to 12+20.893 Rt	0.3			16
M2 12+21.893 to 12+29.000 Lt	0.2			8
M2 12+21.893 to 12+39.500 Rt	0.4			18
M2 11+66.468 to 12+000.924 18.0 Rt	3.6		47	
M2 11+24.768 5.7 Rt to 11+90.082 6.1 Rt	5.5		66	
Misc Area	300			
TOTAL	1115	890	131	343

CHAIN LINK FENCE, GATE

LOCATIONS	REMOVE FENCE & GATE	CHAIN LINK FENCE (TYPE CL-2.4 BLACK VINYL CLAD) WITH EXTENSION ARMS	SLIDING GATE (TYPE CL-2.4, BLACK VINYL CLAD WITH BARBED WIRE EXTENSION ARMS)	2.4 m TEMPORARY GATE (TYPE CL-2.4) W/ BARBED WIRE EXTENSION ARM	TEMPORARY FENCE (TYPE CL-2.4) W/ BARBED WIRE EXTENSION ARM
	m	m	ea	ea	m
M2 11+51.5 36.2 Rt to 12+01.5 18.7 Rt	70				
M2 11+80.0 11.0 Lt-11+85.0 29.0 Lt(Bldg #75)	53				
M2 12+03.2 36.0 Lt-12+16.3 5.8 Rt	74				
M2 10+26.75 21.20 Lt to 12+27.52 6.63 Lt		234			
M2 12+27.52 3.6 Rt to 12+23.31 10.32 Rt		16			
M2 12+27.52 3.6 Rt to 12+27.52			2		
M2 12+05.3 45.1 Lt-11+51.8 36.2 Rt					390
M2 13+32.2 42.1 Lt to 13+17.7 5.8 Lt (Archeological Excavation)					43
M2 13+18.63 4.66 Lt to 13+39.61 0.76 Rt				2	
TOTAL	197	250	2	2	433

REMOVE CONCRETE

LOCATIONS	m3
M2 9+79.0 to 9+85.0 23.0 Rt (Masonry Wall in Location A)	5
M2 9+85.0 25.0 Rt Conc Curb & sidewalk (Location A)	5
M2 11+27.0 7.0 Rt (Location B)	1
M2 11+34.0-11+41.0 23.0 Rt (Location C)	1
M2 10+20.0-10+62.2 10.7 Lt	3
M2 10+17.0 9.0 Lt-10+24.3 8.6 Lt	1
M2 11+31.7 8.5 Lt-11+59.3	8.5
TOTAL	24.5

~~REMOVE ASPHALT CONCRETE DIKE~~

~~LOCATIONS~~	~~m~~
~~M2 10+00.0 2.9 Lt-10+09.6 4.2 Lt~~	~~11~~
~~TOTAL~~	~~11~~

MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)

LOCATIONS	CURB (A1-150)	GUTTER
	m3	
M2 12+18.273 to 12+24.013 Lt	1.0	
M2 12+19.890 to 12+22.400 Rt and Lt	0.8	
Conc Gutter & Inlet Apron (from Drainage quantity)		2.6
TOTAL	4.4	

PLACE ASPHALT CONCRETE (MISC AREA)

LOCATIONS	m2
M2 9+79.0 to 9+85.0 23.0 Rt (Location A)	44
M2 11+27.0 7.0 Rt (Location B)	4
M2 11+34.0-11+41.0 23.0 Rt (Location C)	26
M2 11+59.3-13+00.9 (Location D)	260
AC pads for Gate operators and weapon clearing barrel	6
M2 12+00.0 -12+22 50 Lt (Archeological Excavation)	260
TOTAL	600

COLD PLANE AC PAVEMENT (45 mm)

LOCATIONS	m2
M2 10+00.000 to 10+22.000	50
M2 13+47.208 to 13+52.208	28
M2 ~~12~~+59.3 to ~~13~~+00.9 Rt	740
// /2 TOTAL	818

METAL BEAM GUARD RAILING

LOCATIONS	MBGR	TERMINAL SYSTEM (TYPE SRT)	RETURN SECTION	TERMINAL ANCHOR ASSEMBLY (TYPE SFT)
	m	ea	ea	ea
M2 10.00.000 - 10+11.50 Rt		1		
M2 10+11.50 - 11+14.30 Rt	103			
M2 11+14.30 - 11+14.80 Rt			1	1
TOTAL	103	1	1	1

ROADWAY EXCAVATION (TYPE H AND CLASS II)

LOCATIONS	HAZARDOUS OG TO 1.0 BELOW OG m3	CLASS II BELOW ELEVATION 1.5 m3
M2 LINE 12+20.0-12+30.0	0.5	
M2 LINE 12+30.0-12+40.0	21.4	
M2 LINE 12+40.0-12+50.0	52.7	
M2 LINE 12+50.0-12+60.0	50.7	
M2 LINE 12+60.0-12+70.0	55.9	
M2 LINE 12+70.0-12+80.0	77.7	
M2 LINE 12+80.0-12+90.0	72.7	
M2 LINE 12+90.0-13+00.0	48.6	
M2 LINE 12+90.0-13+00.0	27.0	
M2 LINE 13+00.0-13+10.0	20.9	
M2 LINE 13+10.0-13+20.0	26.5	
M2 LINE 13+20.0-13+30.0	33.1	
M2 LINE 13+30.0-13+40.0	10.0	
M2 LINE 13+40.0-13+47.00	2.0	
DRAINAGE SYSTEM No.1i		0.5
DRAINAGE SYSTEM No.1j		11.0
DRAINAGE SYSTEM No.1k		0.8
DRAINAGE SYSTEM No.1l		27.0
DRAINAGE SYSTEM No.1m		1.1
DRAINAGE SYSTEM No.1n		30.0
SANITARY SEWER SYSTEM 1a	64	
SANITARY SEWER SYSTEM 1b	2	
SANITARY SEWER SYSTEM 1c	2	
TOTAL	568	70.4

Resident Engineer Responsible for *Construction Changes*

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE DATE 7/28/04
CHECKED BY R L DATE 10/2004

SUMMARY OF QUANTITITES

Q-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT Bob Zandipour

CALCULATED/DESIGNED BY KR CHECKED BY CVL DATE 3/03 REVISED BY DATE REVISED

LAST REVISION 00-00-00 DATE PLOTTED => 11-MAR-2005 TIME PLOTTED => 11:22

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DGN FILE => 40120qo01.csb
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CU 04251 EA 012001

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	42	79

Kamal Rouhani 3/28/03
REGISTERED CIVIL ENGINEER DATE

05-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 Second St., Suite 700N
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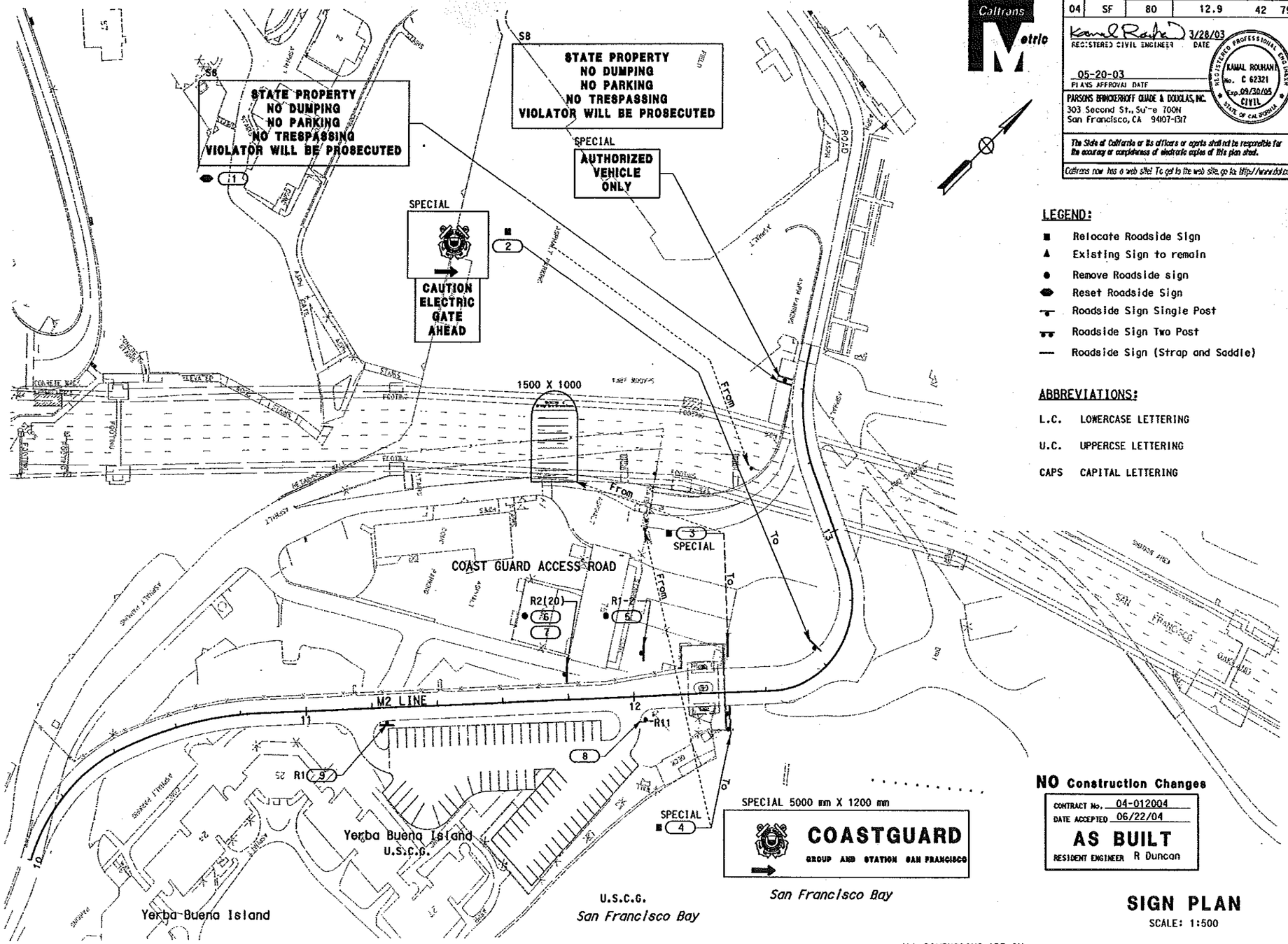

LEGEND:

- ■ Relocate Roadside Sign
- ▲ Existing Sign to remain
- ● Remove Roadside sign
- Reset Roadside Sign
- Roadside Sign Single Post
- Roadside Sign Two Post
- Roadside Sign (Strap and Saddle)

ABBREVIATIONS:

L.C. LOWERCASE LETTERING

U.C. UPPERCSE LETTERING

CAPS CAPITAL LETTERING

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

SIGN PLAN

SCALE: 1:500

S-1

THIS PLAN ACCURATE FOR SIGN WORK ONLY.

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DESIGN OVERSIGHT
Bob Zandipour

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DATE 3/03 REVISED BY
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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	43	79

Kamal Rouhani 3/28/03
REGISTERED CIVIL ENGINEER DATE

05-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

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ROADSIDE SIGN QUANTITIES

SHEET No.	SIGN No.	SIGN CODE	PANEL SIZE Horiz		PANEL SIZE Vert	POST LENGTH	POST SIZE 89 x 89 mm	POST SIZE 89 x 140 mm	ROADSIDE SIGN ONE POST EA	RELOCATE EA	RESET EA	REMOVE EA	REMARKS
S-1	1	S8	914	x	559	3.9		X			1		
		S8	914	x	559								
		Special	914		305								"Authorized Vehicles Only"
	2	Special	1219.2	x	914	3.8		X		1			Mount Coast Guard sign on new post
		Special	610		457								
	3	Special	1000	x	1500					1			Mounted on fence
	4	Special	5000		1200					1			Metal frame with 2 metal posts
	5	R1-2										1	in concrete base
	6	R2 (20)										1	
	7	R2 (20)	600	x	750	*	X		1				
	8	R11	900		900	*	X		1				DO NOT ENTER
	9	R1	762	x	762	4.0	X		1				
	Total								3	3	1	2	

* See Std Plan RS1 and RS2 for post length and Embedment Length

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

SIGN QUANTITIES

S-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT
Bob Zandipour

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CU 04251

EA 012001

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	44	79

REGISTERED ENGINEER 3/28/03 DATE

05-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Jose Shirs Deyong — No. S 2246 — Exp. 12/31/05 — STRUCTURAL — STATE OF CALIFORNIA

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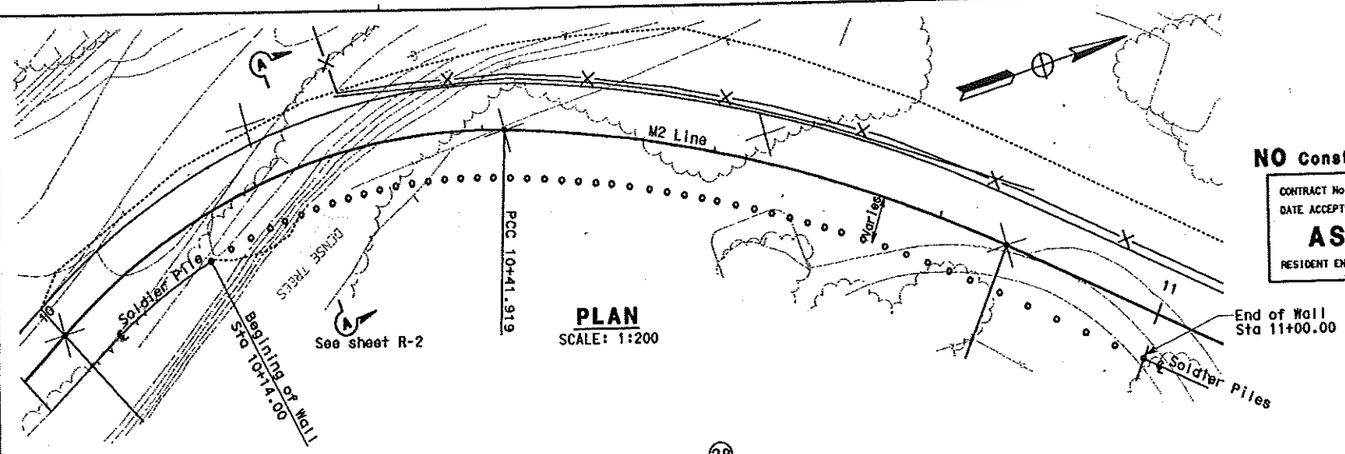
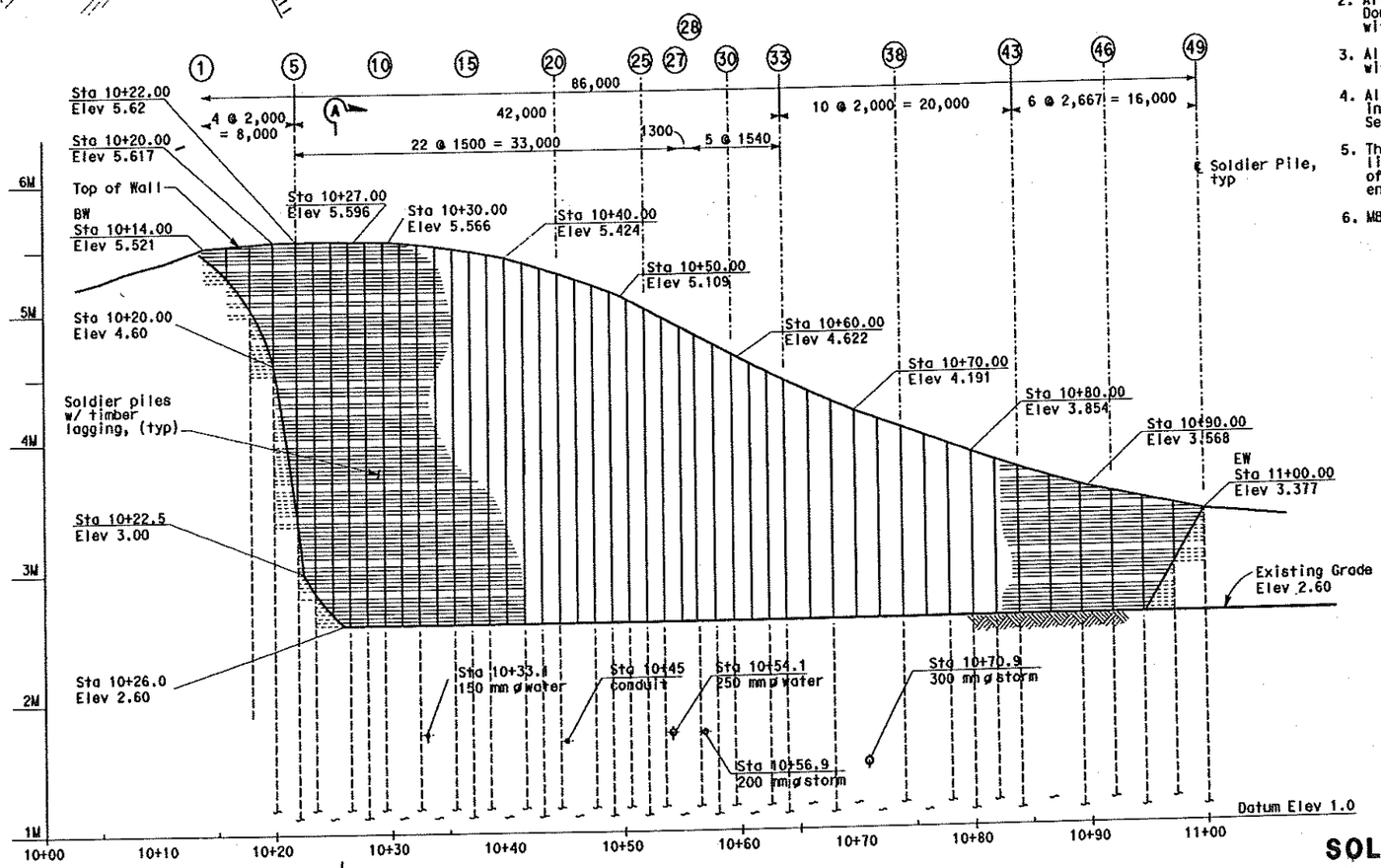


PLAN
SCALE: 1:200

NOTES:

1. All structural steel shall be AASHTO M270M, Grade 36.
2. All timber lagging shall be structuctural lumber Douglas Fir-Larch, commercial grade No.1 with bending stress Fb of 1200 psi.
3. All concrete shall be normal weight concrete with compressive strength at 28 day of 20.69 MPa.
4. All timber lagging shall have preservative treatment in accordance with Caltrans Standard Specifications, Section 58.
5. The contractor shall verify all underground utility lines for their locations and size prior to drilling of holes. Report discrepancy and interference to the engineer for solutions.
6. MBGR is not shown for clarity.



See sheet R-2

DEVELOPED ELEVATION
SCALE: 1:200 HORIZ.
1:20 VERT.

QUANTITIES

ITEM	UNIT	QUANTITY
	W360x32.9 (m)	73.534
Soldier Pile	W360x51 (m)	58.637
	W360x72 (m)	149.481
Timber Lagging	m^3	16.642
Class 3 Concrete (Encasing Soldier Pile)	m^3	55.50
610 mm Drilled hole	m	191
Structure Excavation	m^3	1.11
Structure Backfill	m^3	30

(N) NOT A SEPERATE PAY ITEM, FOR INFORMATION ONLY

SOLDIER PILE RETAINING WALL
SCALE AS NOTED

R-1

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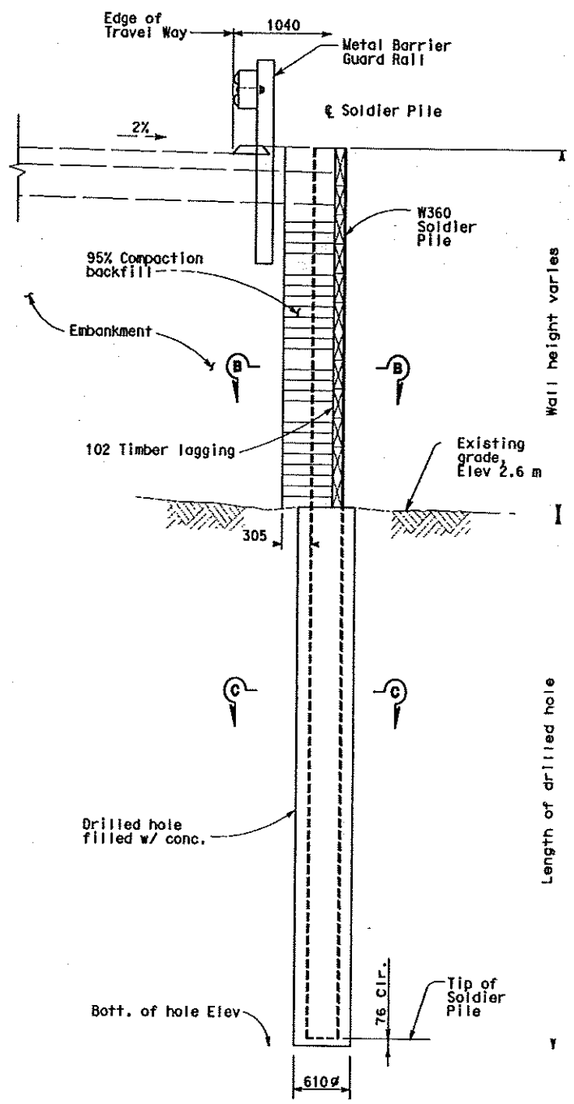
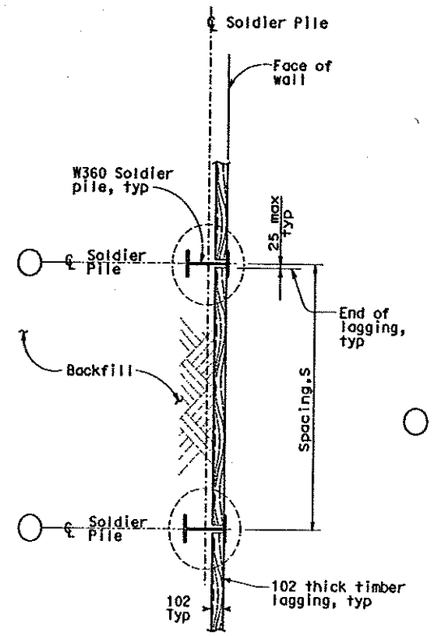


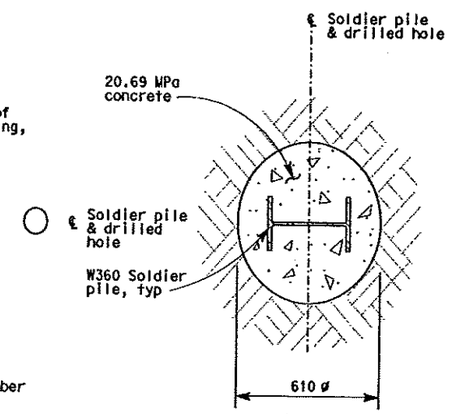
SECTION A-A

SCALE: 1:25



SECTION B-B

SCALE: 1:20



SECTION C-C

SCALE: 1:10

SOLDIER PILE SCHEDULE

SOLDIER PILE	1	2	3	4	5 to 24	25 to 33	34 to 43	44 to 49	REMARK
Max. Wall Height, (m)	0.3	0.65	1.1	2.2	3	2.5	1.8	1	
Pile Spacing,S (m)	2	2	2	2	1.5	Varies See Elevation	2	2.67	
Bott of drilled hole Elev (m)	4	3	1.9	-0.56	-2.28	-1.21	-0.6	0	
Pile Section	W360x32.9	W360x32.9	W360x32.9	W360x51	W360x72	W360x51	W360x32.9	W360x32.9	

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	45	79

REGISTERED STRUCTURAL ENGINEER 3/28/03 DATE

05-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Hoe Sing Chyong No. S 2246 Exp. 12/31/05 STRUCTURAL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
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NOTES:

1. For general notes, see R-1.

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

SOLDIER PILE RETAINING WALL

SCALE AS NOTED

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R-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	47	79

REGISTERED ELECTRICAL ENGINEER — DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL — STATE OF CALIFORNIA

SILVERMAN & LIGHT
2011 PARK AVENUE - SUITE 00
EMERYVILLE, CA 94608-3632

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CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

DRAWING INDEX

E-1 LIGHTING AND ELECTRICAL SYSTEMS
ELECTRICAL DRAWING INDEX, SYMBOLS, ABBREVIATIONS AND GENERAL NOTES

E-2 LIGHTING AND ELECTRICAL SYSTEM
PROJECT NOTES

E-3 LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATION)

E-4 LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATION)

E-5 LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATOIN)

E-6 LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATION)

E-7 LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATION)

E-8 SITE SECURITY AND CANOPY LIGHTING
(YBI-USCG ROAD RELOCATION)

E-9 ELECTRICAL DETAILS
ONE LINE DIAGRAM

E-10 ELECTRICAL DETAILS
120/280 V SERVICE WIRING DIAGRAM AND UTILITY YARD

E-11 ELECTRICAL DETAILS
CITY OF SAN FRANCISCO TYPICAL DETAIL
STREET LIGHT

E-12 ELECTRICAL DETAILS
ELECTRICAL PULL BOX LOCATION AND CANOPY LIGHTING FIXTURE

E-13 ELECTRICAL DETAILS
TRANSFORMER AND SERVICE PEDESTAL PADS

E-14 ELECTRICAL DETAILS
UTILITY COMPANY TYPICAL DETAIL
PRIMARY UNDERGROUND ENCLOSURE

E-15 ELECTRICAL DETAILS
200 A SUBSURFACE SECTIONALIZING SWITCHES

E-16 ELECTRICAL DETAILS
UTILITY COMPANY TYPICAL DETAIL
UNDERGROUND DUCT LINES CONCRETE ENCASED

E-17 ELECTRICAL DETAILS
UTILITY COMPANY TYPICAL DETAIL
UNDERGROUND DUCT LINES CONCRETE ENCASED

E-18 ELECTRICAL DETAILS
CABLE RISERS IN EXISTING 12 kV VACUUM SWITCH AND IN EXISTING ELECTRICAL VAULT 106

E-19 ELECTRICAL DETAILS
CABLE RISERS IN EXISTING 2.4 kV VACUUM SWITCH & EXISTING 4.6 kV METER CABINET AT UTILITY YARD

E-20 ELECTRICAL DETAILS
UTILITY COMPANY TYPICAL DETAIL
GROUNDING CONNECTIONS

SYMBOLS

(SEE CATRANS STANDARD PLANS ES-1A AND ES-1B, FOR ADDITIONAL STANDARD SYMBOLS)

- EXISTING FLOOD LIGHT
- EXISTING LUMINAIRE ON WOOD POLE TO REMAIN UNLESS OTHERWISE SPECIFIED OR INDICATED.
- CITY STANDARD ELECTROLIER
- MEDIUM VOLTAGE PULL BOX
- CCTV CAMERA
- GATE OPERATOR PUSH BOTTON CONTROL
- ALARM PANEL (LIFT STATION)

SYMBOLS CONTINUATION)

- WALL MOUNTED TELEPHONE OUTLET
- UNDERGROUND CONDUIT TO REMAIN IN PLACE UNLESS OTHERWISE SPECIFIED OR INDICATED.
- CONCEALED CONDUIT RUN IN CONCRETE SLAB

ABBREVIATIONS

(SEE CALTANS STANDARD PLANS ES-1A AND ES-1B FOR ADDITIONAL ABBREVIATIONS)

ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
CCTV	CLOSED CIRCUIT TELEVISION
EPB	ELECTRICAL PULL BOX
CU	COPPER
G, GND, GND	GROUND
HHW&P	HETCH HETCHY WATER & POWER
KV	KILOVOLT
KVA	KILOVOLT AMPERE
MH	MANHOLE
OH	OVERHEAD
SFOBB	SAN FRANCISCO OAKLAND BAY BRIDGE
UG	UNDERGROUND
CG	COAST GUARD

SEQUENCE OF ELECTRICAL INSTALLATION

A. SEQUENCE A:

1. INSTALL TEMPORARY DISCONNECT FOR EXISTING GUARD SHACK AT EXISTING 208 VOLT DISTRIBUTION EQUIPMENT NEAR BUILDING 75.
2. PROVIDE NEW FEEDER TO EXISTING GUARD SHACK PRIOR TO THE DEMOLITION OF BUILDING 75.
3. INSTALL STREET LIGHTING SYSTEM ALONG THE TEMPORARY COAST GUARD ROAD.

B. SEQUENCE B:

1. INSTALL NEW UNDERGROUND MEDIUM VOLTAGE FEEDER BETWEEN THE EXISTING HHW&P SUBSTATION AND THE WALK-IN VAULT 106. SCHEDULE WORK WITHIN THE SUBSTATION AND WALK-IN VAULT WITH HHW&P. PROVIDE BACKUP GENERATOR AS NECESSARY FOR COAST GUARD OPERATIONS DURING POWER OUTAGES NECESSITATED BY WORK IN THE SUBSTATION OR WALK-IN VAULT. INSTALLATION SHALL BE COMPLETE WITH CABLES COILED AND READY FOR EXTENSION TO FINAL TERMINATION POINTS IN BOTH VAULT 106 AND THE SUBSTATION BY HHW&P. FINAL TERMINATION TO BE DONE BY HHW&P.
2. INSTALL NEW 75 kVA, 12 kV-120/208 VOLT THREE PHASE PAD MOUNT TRANSFORMER AND 120/208 VOLT THREE PHASE SERVICE PEDESTAL FED FROM NEW 200 AMP SUBSURFACE SELECTOR SWITCH MOUNTED IN EPB-14. INSTALL NEW FEEDERS TO THE PUMPING STATION
3. TEST ALL ASPECTS OF MEDIUM VOLTAGE FEEDER INSTALLATION AND COMPLETE STATE INSPECTIONS. TEST AND INSPECT THE TRANSFORMER INSTALLATION AND THE SERVICE PEDESTAL INSTALLATION. COORDINATE WITH HHW&P ALL ASPECTS OF CUTOVER BETWEEN OLD MEDIUM VOLTAGE SYSTEN AND NEW MEDIUM VOLTAGE SYSTEM.
4. SCHEDULE THE CUTOVER TIME BETWEEN THE OLD AND NEW SYSTEM AND PROVIDE BACKUP EMERGENCY GENERATOR AS NECESSARY FOR COAST GUARD OPERATIONS DURING POWER OUTAGE WHILE CUTOVER OCCURS.
5. HHW&P WILL DISCONNECT THE MEDIUM VOLTAGE FEEDER FROM THE EXISTING VACUUM SWITCHES AT THE UTILITY YARD AND VAULT 106 AND WILL RECONNECT THE NEW SYSTEM AT BOTH VAULT 106 AND THE SUBSTATION. COORDINATE CUTOVER BETWEEN OLD AND NEW MEDIUM VOLTAGE LINES WITH BOTH HETCH HETCHY WATER & POWER AND THE COAST GUARD. PROVIDE BACKUP EMERGENCY GENERATOR AS NECESSARY TO PROVIDE POWER TO THE COAST GUARD FACILITY WHILE THE CUTOVER OCCURS.
6. WHEN CUTOVER IS OCCURING, SIMULTANEOUSLY ENERGIZE NEW FEEDER TO PUMPING STATION AND DISCONNECT EXISTING SERVICE TO PUMPING STATION. KEEP DOWNTIME TO A MINIMUM AND COORDINATE ALL POWER OUTAGES WITH THE COAST GUARD.
7. MAINTAIN SERVICE TO EXISTING GUARD SHACK ON OLD COAST GUARD ROAD AND TO EXISTING STREET LIGHTING UNTIL TEMPORARY COAST GUARD IS OPENED AND OPERATIONAL.
8. REMOVE EXISTING PAD MOUNT TRANSFORMER AND SERVICE EQUIPMENT NEAR BUILDING 75 WHEN CUTOVER TO NEW SERVICE IS COMPLETE.

C. SEQUENCE C:

1. ENERGIZE POWER TO TEMPORARY STREET LIGHTING ALONG TEMPORARY COAST GUARD ROAD AND TO THE TEMPORARY GUARD SHACK ON THE TEMPORARY COAST GUARD ROAD.

GENERAL NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION. STANDARD SPECIFICATION DATED JULY 1999, ERRATUM NO.99-1 AND STANDARD PLANS DATED JULY 1999 AND THE SPECIAL PROVISIONS.
2. ALL EXISTING EQUIPMENT SHALL REMAIN IN PLACE UNLESS OTHERWISE NOTED.
3. LOCATIONS OF STANDARD CONDUITS, PULL BOXES AND OTHER EQUIPMENT SHOWN ON THE PLANS ARE APPROXIMATE AND MAY BE CHANGED TO SUIT FIELD CONDITIONS OR AS DIRECTED BY THE ENGINEER.
4. THE CONTRACTOR SHALL CALL UNDERGROUND SERVICE ALERT (USA) AT (800) 642-2444, 48 HOURS PRIOR TO ALL EXCAVATION.
5. IN INSTALLATION OF OTHER UTILITIES, SEE SANITARY SEWER, STORM DRAIN AND UTILITY DRAWINGS.
6. ANY AND ALL PLANNED ELECTRICAL OUTAGES WILL HAVE A MINIMUM FOURTEEN (14) DAYS LEADTIME.
7. ALL E SHEETS ARE ACCURATE FOR ELECTRICAL WORK ONLY.
8. HETCH HETCHY W&P REQUIRES MINIMUM LEAD TIME OF THREE (3) WORKING DAYS FOR CONNECTING OR ENERGIZING OF ELECTRICAL SERVICE AFTER ANY AND ALL CONDITIONS HAVE BEEN MADE.
9. HETCH HETCHY WATER AND POWER WILL NOT CONNECT OR ENERGIZE A SERVICE WITHOUT AN INSPECTION TAG OR CERTIFIED COMPLIANCE LETTER FROM A STATE CERTIFIED SENIOR ENGINEER.
10. FOR OTHER UTILITIES ON YBI SEE UTILITY, SANITARY SEWER AND DRAINAGE DRAWINGS.
11. ALL EXISTING MANHOLES AND PULL BOXES SHALL NOT TO BE REUSED AS PART OF THE ELECTRICAL SYSTEM. REMOVED MANHOLES AND PULL BOXES SHALL BE REMOVED AND BECOME THE PROPERTY OF THE CONTRACTOR.
12. PULL BOXES INSTALLED ON THE SHOULDER OF ROADWAY SHALL HAVE A TRAFFIC COVER.
13. SHEET E-1 THROUGH E-20 ARE ACCURATE FOR ELECTRICAL WORK ONLY.

LIGHTING AND ELECTRICAL SYSTEMS
ELECTRICAL DRAWING INDEX, SYMBOLS, ABBREVIATIONS AND GENERAL NOTES

E-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

DESIGN OVERSIGHT: Bob Zandipour

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DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 11:25

USER FEATURES 00-00-00

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USERNAME => ohuang

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7/20/2005

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PROJECT NOTES

1. INSTALL ONE 41C-4#2/0, 1#6 GROUND (SEWER LIFT PUMP PS-103).
2. TWO EXISTING OVERHEAD COMMUNICATION CABLES TO REMAIN.
3. EXISTING OVERHEAD LINE TO REMAIN.
4. RISE CONDUIT TO EXISTING LIFT PUMP PS-103 CONTROLLER AND CONNECT TO NEW CIRCUIT. VERIFY EXACT LOCATION IN FIELD.
5. EXISTING 2.4 kV, 4.16 kV, AND 12.4 kV SYSTEM.
6. INSTALL 1-103C WITH 3#2/0 (FOR 4.16 kV SYSTEM) 15 kV SHIELDED CABLES TYPE MV-105, 1-103C WITH 3#1 (FOR 2.4 kV SYSTEM) 15 kV SHIELDED. CABLES TYPE MV-105 AND ONE 103C WITH 3#1/0 (FOR 12 kV SYSTEM) 15 kV SHIELDED CABLES TYPE MV-105 IN 76 mm CONCRETE ENCASEMENT. PROVIDE CODE SIZE GROUND CONDUCTOR IN EACH SYSTEM. SEE DETAIL ON E-16 AND E-17.
7. INSTALL ONE 103C, 3#1/0 TYPE MV-105 SHIELDED 15 kV CABLES AND ONE #2 GROUND CONDUCTOR.
8. INSTALL NEW 75 kVA PAD MOUNT THREE PHASE OIL FILLED TRANSFORMER, WITH RADIAL FEED PRIMARY SWITCH AND INTERNAL FUSING. 12 kV DELTA CONNECTED PRIMARY AND 120/208 VOLT WYE CONNECTED SECONDARY. SEE DETAILS ON E-13 FOR MORE INFORMATION.
9. EXISTING WOOD POLE.
10. EXISTING 3-2 kVA TRANSFORMER BANK AND EXISTING DISTRIBUTION BOARD TO BE REMOVED AFTER NEW 75 kVA PADMOUNT TRANSFORMER IS INSTALLED AND ENERGIZED.
11. INSTALL STEEL STREET LIGHT STANDARD POLE (11 GAUGE 203 mm x 102 mm x 8.7 m) WITH 1.8 m ELLIPTICAL UPSWEPT HOT-DIP GALVANIZED STEEL BRACKET ARM ASSEMBLIES WITH 150 W HPS COBRA STYLE LUMINAIRE, 120 V HIGH POWER FACTOR MAGNETIC REGULATOR BALLAST, REFLECTOR AND GLASS REFRACTOR. SEE DETAILS ON E-11 FOR MORE INFORMATION.
12. DISCONNECT FROM EXISTING CIRCUIT AND REMOVE EXISTING LUMINAIRE AFTER NEW STREET ELECTROLIERS ARE ENERGIZED.
13. CONNECT TEMPORARY POWER FOR TEMPORARY ELECTROLIERS TO NEW 120/208 V SERVICE ENCLOSURE.
14. RISE CONDUIT TO EXISTING ALARM PANEL AND CONNECT NEW CIRCUITS.
15. REMOVE AND TURN OVER EXISTING CABLES TO HETCH HETCHY WATER & POWER. ABANDON CONDUIT IN PLACE, AFTER NEW REPLACEMENT POWER CABLES ARE INSTALLED AND PUT INTO OPERATION.
16. INSTALL 3 POLE, 3-WAY, 200 A, 15 kV OIL-INSULATED SUB-SURFACE VACUUM SWITCH, IN NEW UNDERGROUND EQUIPMENT ENCLOSURE. SEE DETAILS ON E-15. PROVIDE ADEQUATE SPARE CABLE LENGTH FOR TERMINATION. COORDINATE W/ THE ENGINEER (CALTRANS) PRIOR TO THIS INSTALLATION. HHW&P SHALL MAKE FINAL MV CABLE TERMINATIONS.
17. TO ELECTRICAL SUBSTATION. SEE ONE LINE DIAGRAM ON E-9 AND E-10 FOR MORE INFORMATION. COORDINATE WITH THE ENGINEER (CALTRANS) FOR LOCATION OF CONDUIT TERMINATIONS.
18. EXISTING 120/280 V, 1-PHASE 3W ELECTRICAL PANELBOARD IN EXISTING GUARD HOUSE TO REMAIN IN PLACE UNTIL THE NEW TEMPORARY GUARD HOUSE IS FUNCTIONAL.
19. INTERCEPT EXISTING CONDUIT WHICH FEED EXISTING GUARD SHACK ELECTRICAL PANEL AND EXTEND TO TEMPORARY METER BREAKER UNIT AT THE BEGINING OF STAGE 1 (FIRST ORDER OF WORK). PROVIDE NEW CONDUCTORS BETWEEN EXISTING PANEL AND TEMPOPARY METER BREAKER UNIT. SEE ONE LINE DIAGRAM ON E-9 FOR MORE INFORMATION.
20. AT THE BEGINNING OF STAGE 1 (FIRST ORDER OF WORK). INSTALL TEMPORARY METER BREAKER UNIT IN NEMA-3R ENCLOSURE ON TEMPORARY SUPPORT. COORDINATE WITH THE HETCH HETCHY WATER & POWER FOR METER TYPE. SEE ONE LINE DIAGRAM ON E-9 FOR MORE INFORMATION AND CALTRANS STANDARD PLAN ES-2A.
21. INSTALL 200 A, 4 WIRE 120/208 V, 3-PHASE TYPE III-CF DOUBLE METERING SERVICE EQUIPMENT ENCLOSURE. SEE E-10 FOR WIRING DIAGRAM.
22. NEW GUARD HOUSE 120/208 V, 3-PHASE, 4 W ELECTRICAL PANEL-GS PROVIDED BY OTHERS, COORDINATE WITH GUARD HOUSE VENDOR FOR EXACT LOCATION.
23. INSTALL 41C-2 COMMUNICATION CABLES EACH WITH 12#18 AWG.
24. INSTALL 2#6 AWG THHN IN EXISTING 41C CONDUIT AND CONNECT TO EXISTING 20A-1P CIRCUIT BREAKER IN EXISTING SERVICE ENCLOSURE.
25. EXISTING FLASHING BEACON.
26. INSTALL 41C, 2#4 (120 V STREET LIGHTING), 1#8 GROUND.
27. PULL CABLES TO PULL BOX AND COIL ENOUGH SPARE CABLE LENGTH TO EXTEND TO EXISTING VAULT 106 FOR HHW&P TERMINATION. COORDINATE WITH HHW&P FOR OVERALL CABLE LENGTH REQUIRED.
28. PULL CABLES TO PULL BOX AND COIL ENOUGH SPARE CABLE LENGTH TO EXTEND TO EXISTING VACUUM SWITCHES FOR HHW&P TERMINATION. COORDINATE WITH HHW&P FOR OVERALL CABLE LENGTH REQUIRED.
29. INSTALL ELECTRICAL PULL BOX 1.4 m X 2.6 m WITH FULL TRAFFIC COVER. SEE TYPICAL SECTION DETAILS ON E-14 FOR MORE INFORMATION.
30. INSTALL CONDUIT INTO PULL BOX, EXTEND AND TERMINATE AT THE TEMPORARY
31. CONNECT POWER FOR GUARD HOUSE ELECTRICAL PANEL-GS TO NEW 120/208 V SERVICE ENCLOSURE.
32. MULTIFUNCTIONAL FACE/BADGE READER WITH TWO SMALL SOLID STATE CAMERAS; ONE TO VIEW THE FACE OF THE INDIVIDUAL SEEKING ACCESS, AND THE OTHER TO VIEW THEIR PHOTO IDENTIFICATION BADGE. INSTALL READER IN WEATHERPROOF HOOD AND MOUNT ON HEAVY DUTY STEEL COLUMN.
33. THE CONTRACTOR TO FIELD VEIFY EXISTING CONDUIT ROUTING.
34. 120/208 V 3-POLE, 4 WIRE GUARD HOUSE ELECTRICAL PANEL (PROVIDED BY GUARD HOUSE FABRICATOR).
35. CORE DRILL EXISTING CONCRETE VAULT OR PIT SEAL AROUND CONDUIT. SEE DETAILS ON E-18 AND E-19.
36. RISE CONDUIT TO EXISTING LIFT PUMP CONTROLLER. CONNECT TO NEW CIRCUIT.
37. INSTALL 53C, 4#3/0 AND 1#6 GOUND (120/208 V, 3-PHASE, 4-WIRE) TO TYPE III SERVICE ENCLOSURE.
38. RELOCATED FLASHING BEACON LIGHT. INSTALL 2#12 & 1#12 GROUND IN 21C. COORDINATE WITH ENGINEER FOR EXACT LOCATION.
39. INSTALL No. 5 PULL BOX ADJACENT TO SERVICE CABINET.
40. NOT USED
41. INSTALL 41C - 3#4 AWG AND 1#8 GROUND (GUARD HOUSE ELECTRICAL PANEL-GS).
42. INSTALL SURFACE CEILING MOUNTED METAL HALIDE LUMINAIRE 40 mm DIA. x 280 mm HIGH WITH 200 WATT CLEAR METAL HALIDE, ED-17 MEDIUM BASE LAMP. DIECAST ALLUMINUM BALLAST HOUSING WITHLIGHT GRAY SUPER TGIC POWDER COAT PAINT OVER CHROMATE CONVERSION HOUSING, ONE PIECE CLEAR OPTICAL HOUSING WITH LIGHT GRAY CENTER BAND. DOWNLIGHT OPTICAL REFLECTOR CONCEALED BEHIND PAINTED BAND. 120 VOLTS, UL LISTED. SEE DETAIL E-12.
43. INSTALL 21C, 3#12 AWG & 1#12 GROUND (120 V EXIT AND ENTRY POWER) AND, 27C (EXIT AND ENTRY GATE OPERATOR CONTROLS AS REQUIRED).
44. CONNECT TO NEW GATE OPERATOR, SPECIFIED, INSTALLED AND WIRED BY OTHERS. COORDINATE WITH ENGINEER FOR EXACT LOCATION.
45. COORDINATE WITH GUARD HOUSE VENDOR FOR EXACT CONDUIT STUB-UP LOCATIONS AND STUB-UP CONDUITS 152 mm ABOVE FLOOR.
46. INSTALL, 27C (AUDIO & VIDEO SIGNAL AS REQUIRED).
47. INSTALL SINGLE HEAD 305 mm RED LIGHT EMITTING DIODE (LED) WARNING FLASHER SIGNAL ASSEMBLY, 120 V AND INSTALL ALL NECESSARY HARDWARE REQUIRED ABOVE GROUND LEVEL.
48. INSTALL SINGLE HEAD 305 mm YELLOW LIGHT EMITTING DIODE (LED) WARNING FLASHER SIGNAL ASSEMBLY, 120 V AND INSTALL ALL NECESSARY HARDWARE REQUIRED ABOVE GROUND LEVEL.
49. GATE OPERATOR PUSH BUTTON STATION, (SPECIFIED BY OTHERS) INSTALLED AND CONNECTED BY THE GATE CONTRACTOR. COORDIANTE WITH USCG FOR EXACT LOCATION.
50. SPECIFIED, INSTALLED AND WIRED BY OTHERS. SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATION.
51. INSTALL PHOTO-ELECTRIC UNIT TO CONTROL CANOPY LIGHTING, 120 V FACING NORTH.
52. INTERCOM/TELEPHONE IN WEATHERPROOF HOOD MOUNTED ON HEAVY DUTY STEEL COLUMN TO MATCH EXISTING.
53. 21C, 2#12 & 1#12 GROUND TO PANEL-GS.
54. WEATHERPROOF SURVEILLANCE DOME WITH INTEGRATED COLOR AND MONOCHROME CAMERA, 18X AUTO-FOCUS ZOOM LENS, HIGH RESOLUTION, LOW LIGHT CAMERA. CAMERA SHALL BE EQUIPPED WITH VARI-FOCAL, AUTO IRISH LENSES TO ALLOW FOR DAY/NIGHT VIEWING, FULL RANGE OF PAN, TILT, ZOOM MOVEMENTS AND BACKLIGHT COMPENSATION. COORDINATE WITH THE ENGINEER FOR EXACT LOCATION.
55. EXISTING WOOD POLES TO REMAIN IN PLACE.
56. EXISTING BUILDING 75 ELECTRICAL PANEL BOARD.
57. REMOVE AND SCRAP EXISTING FLOOD LIGHT ON STEEL PIPE, INCLUDING RELATED CONDUIT AND WIRE BACK TO EXISTING GUARD HOUSE ELECTRICAL PANEL AFTER THE NEW TEMPORARY GUARD HOUSE IS ENERGIZED AND OPERATIONAL.
58. REMOVE AND SCRAP EXISTING OVERHEAD POWER LINE, WOOD POLE AFTER NEW STREET ELECTROLIER IS ENERGIZED.
59. EXISTING WARNING LIGHT FIXTURE TO REMAIN IN PLACE UNTIL THE END OF CONTRACT. FIXTURE BECOME THE PROPERTY OF THE CONTRACTOR.
60. EXISTING MULTI FUNCTIONAL FACE/BADGE READER, KEY PAD AND INTERCOM TO EMAIN IN PLACE UNTIL THE COMPLETION OF THE PROJECT. TURN-OVER THE EQUIPMENT TO THE U.S. COAST GUARD.
61. EXISTING SECURITY CAMERA, MICROWAVE ANTENNA AND FLOOD LIGHT ON WOOD POLE TO REMAIN IN PLACE UNTIL COMPLETION OF THE PROJECT. TURNOVER CAMERA AND MICROWAVE ANTENNA TO U.S. COAST GUARD. WOOD POLE AND FLOOD LIGHT BECOME PROPERTY OF THE CONTRACTOR.
62. EXISTING GATE OPERATOR TO REMAIN IN PLACE UNTIL THE COMPLETION OF THE PROJECT. TURN-OVER EQUIPMENT TO THE U.S. COAST GUARD.

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04	SF	80	12.9	48	79

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CAROL LIGHT No. 10145 Exp.09/30/03 ELECTRICAL STATE OF CALIFORNIA

SILVERMAN & LIGHT
2010 PARK AVENUE - SUITE 00
EMERYVILLE, CA 94608-3632

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NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

LIGHTING AND ELECTRICAL SYSTEM
PROJECT NOTES
NO SCALE

E-2

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Carol Light
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5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
CAROL LIGHT
No. 10145
Exp. 09/30/03
ELECTRICAL
STATE OF CALIFORNIA

SILVERMAN & LIGHT
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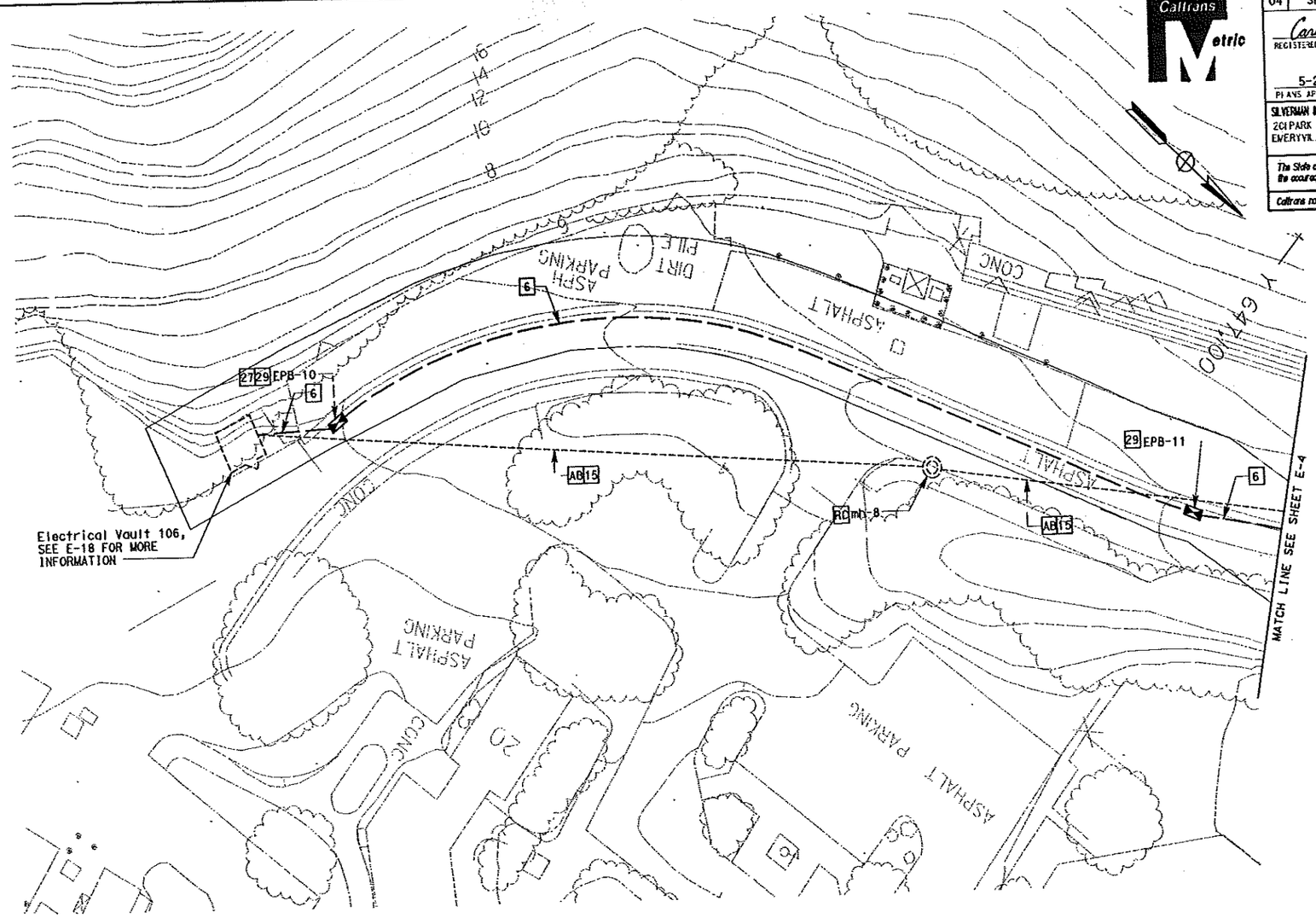

SHEET NOTES:

1. FOR NOTES, ABBREVIATION AND LEGEND, SEE E-1.
2. FOR PROJECT NOTES, SEE E-2.

THIS SHEET IS SUPERSEDED BY SHEET No. 49A

LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATION)

SCALE 1:200

E-3

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Carol Light
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5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
CAROL LIGHT
No. 10145
Exp. 09/30/03
ELECTRICAL
STATE OF CALIFORNIA

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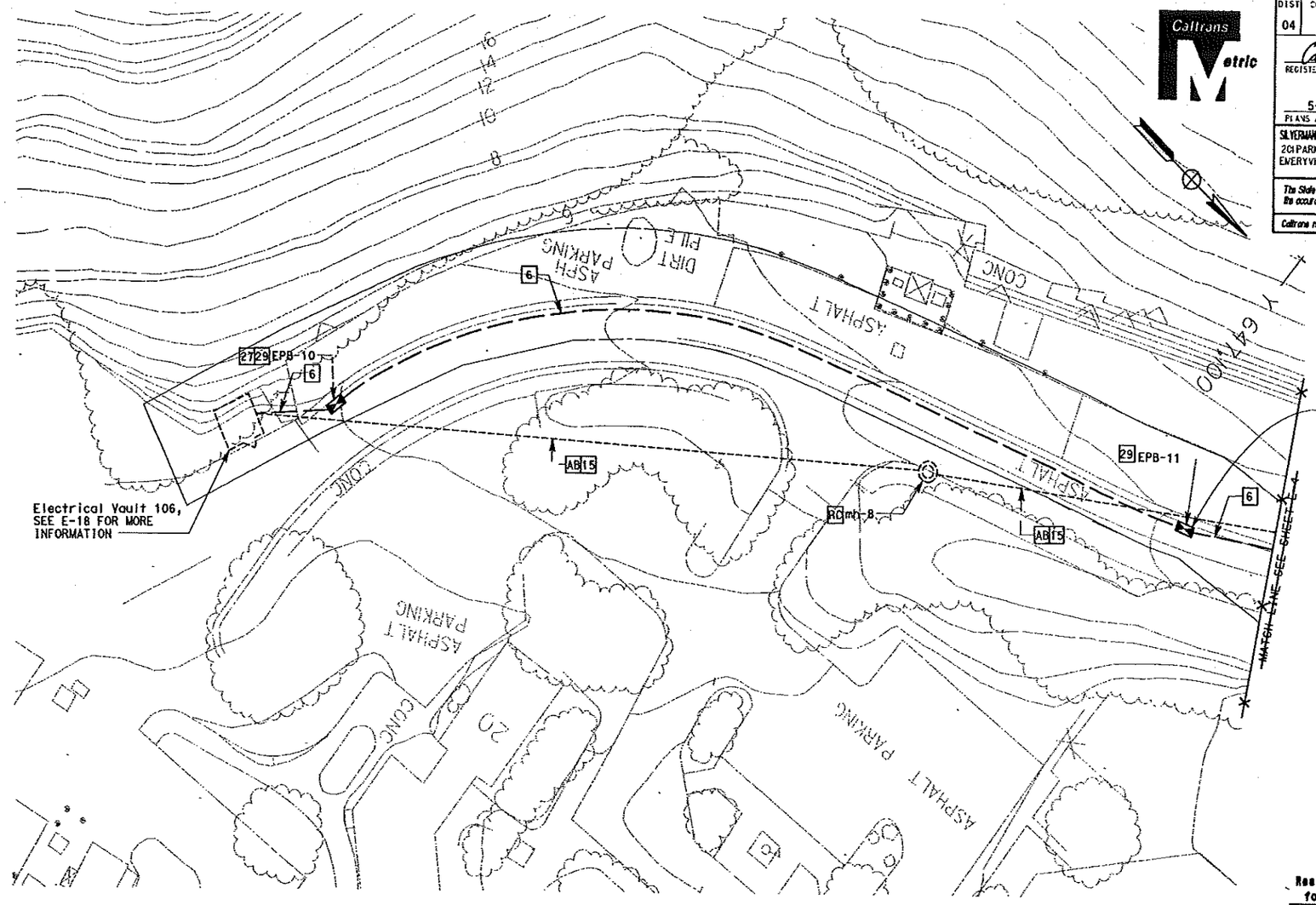

SHEET NOTES:

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2. FOR PROJECT NOTES, SEE E-2.

NUMBER OF CONDUITS CHANGES FROM 6 TO 3 STARTING FROM EPB 11 TO 15

Resident Engineer Responsible for Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE DATE 7/28/04
CHECKED BY R L DATE 10/2004

LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATION)

SCALE 1:200

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E-3A

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Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
CAROL LIGHT
No. 10145
Exp. 09/30/03
ELECTRICAL
STATE OF CALIFORNIA

SILVERMAN & LIGHT
2011 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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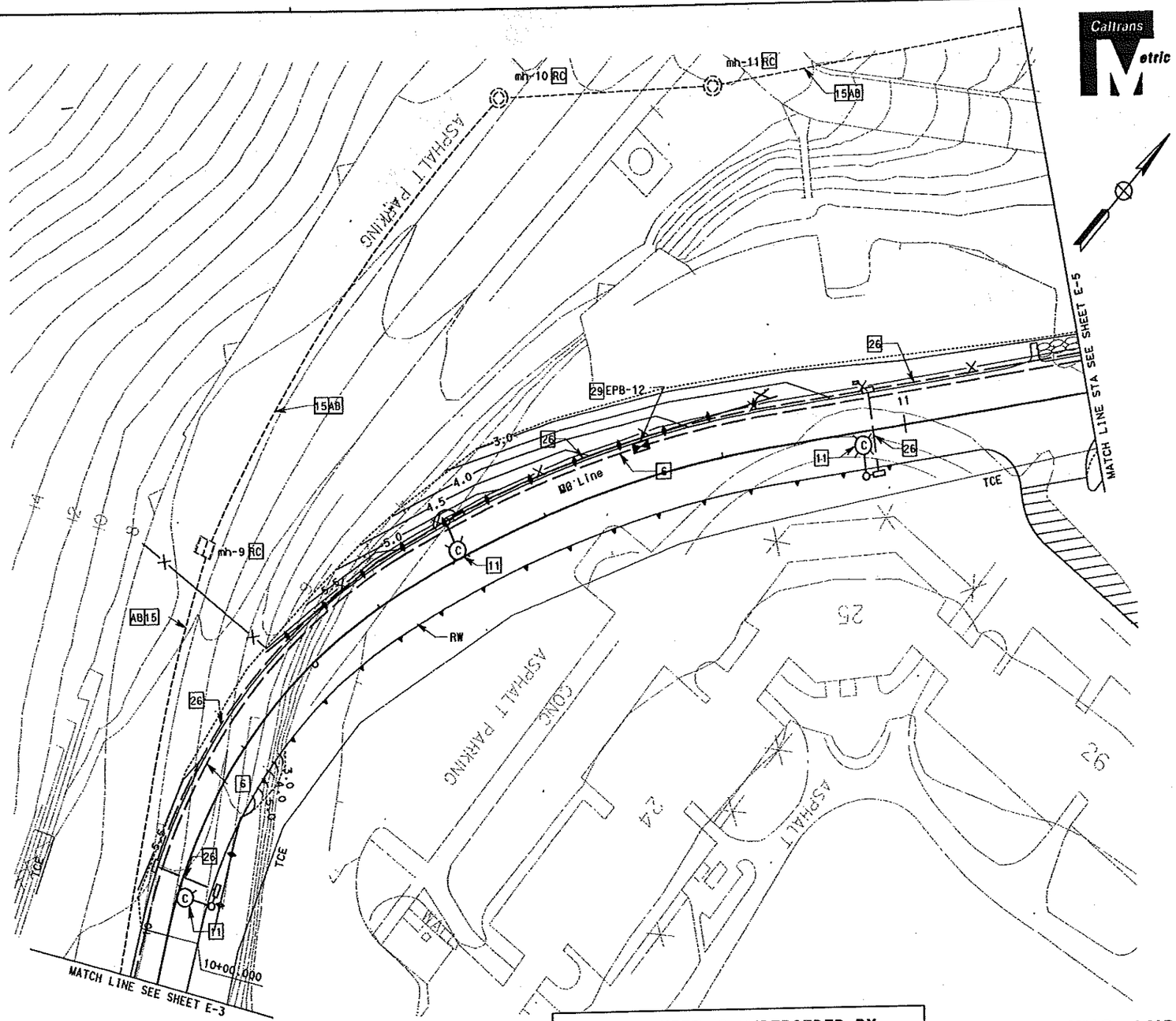

SHEET NOTES:

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2. FOR PROJECT NOTES, SEE E-2.

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SHEET No. 50A

LIGHTING AND ELECTRICAL SYSTEMS
(YBI-USCG ROAD RELOCATION)

SCALE 1:200

E-4

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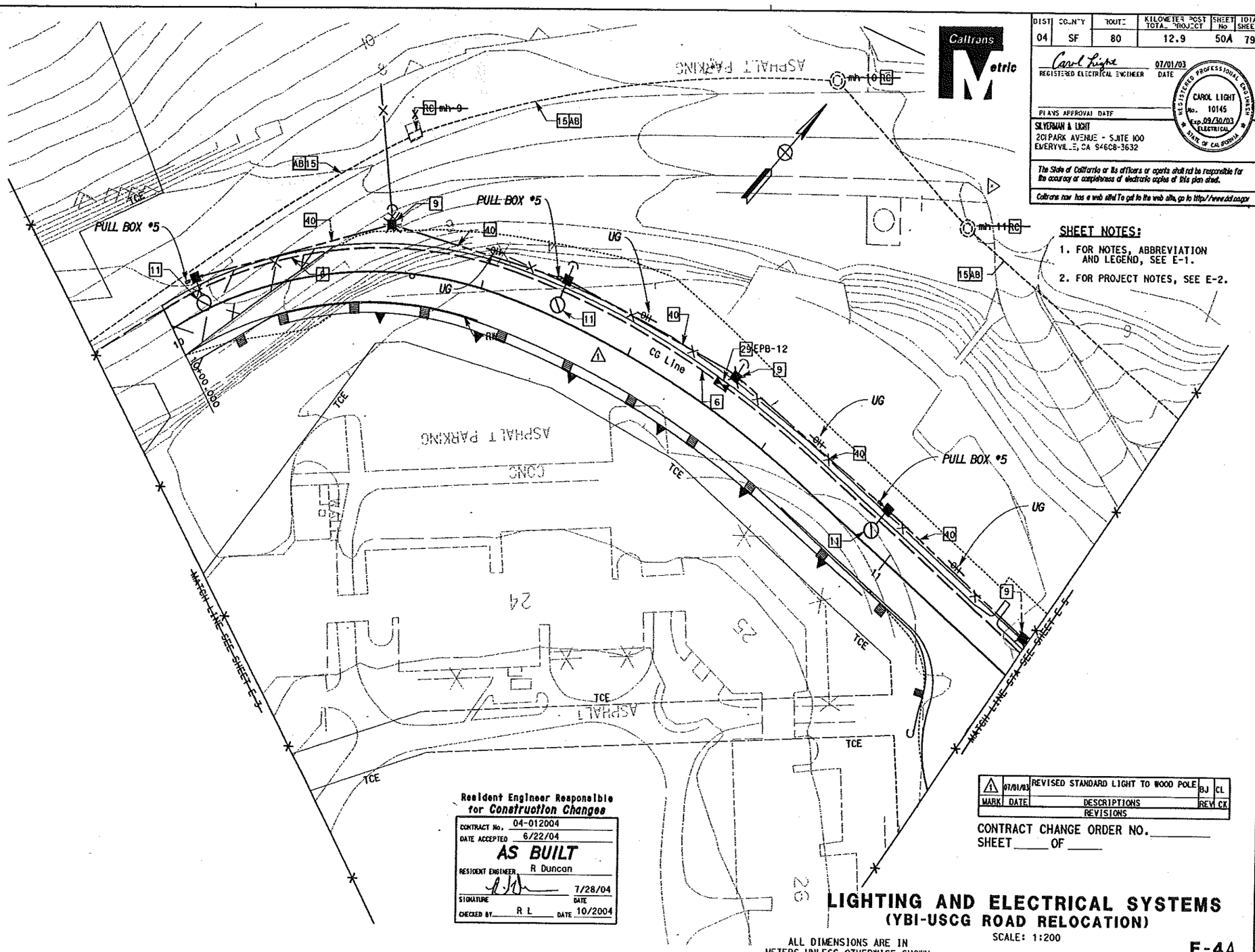

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	50A	79

Carol Light 07/01/03
REGISTERED ELECTRICAL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL STATE OF CALIFORNIA

SILVERMAN & LIGHT
201 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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2. FOR PROJECT NOTES, SEE E-2.

Resident Engineer Responsible for Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE 7/28/04 DATE
CHECKED BY R L DATE 10/2004

MARK	DATE	DESCRIPTIONS	REV	CK
1	07/01/03	REVISED STANDARD LIGHT TO WOOD POLE	BJ	CL

REVISIONS

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SHEET____ OF____

LIGHTING AND ELECTRICAL SYSTEMS
(YBI-USCG ROAD RELOCATION)

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	51	79

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
CAROL LIGHT
No. 10145
EXP. 09/30/03
ELECTRICAL
STATE OF CALIFORNIA

SILVERMAN & LIGHT
2010 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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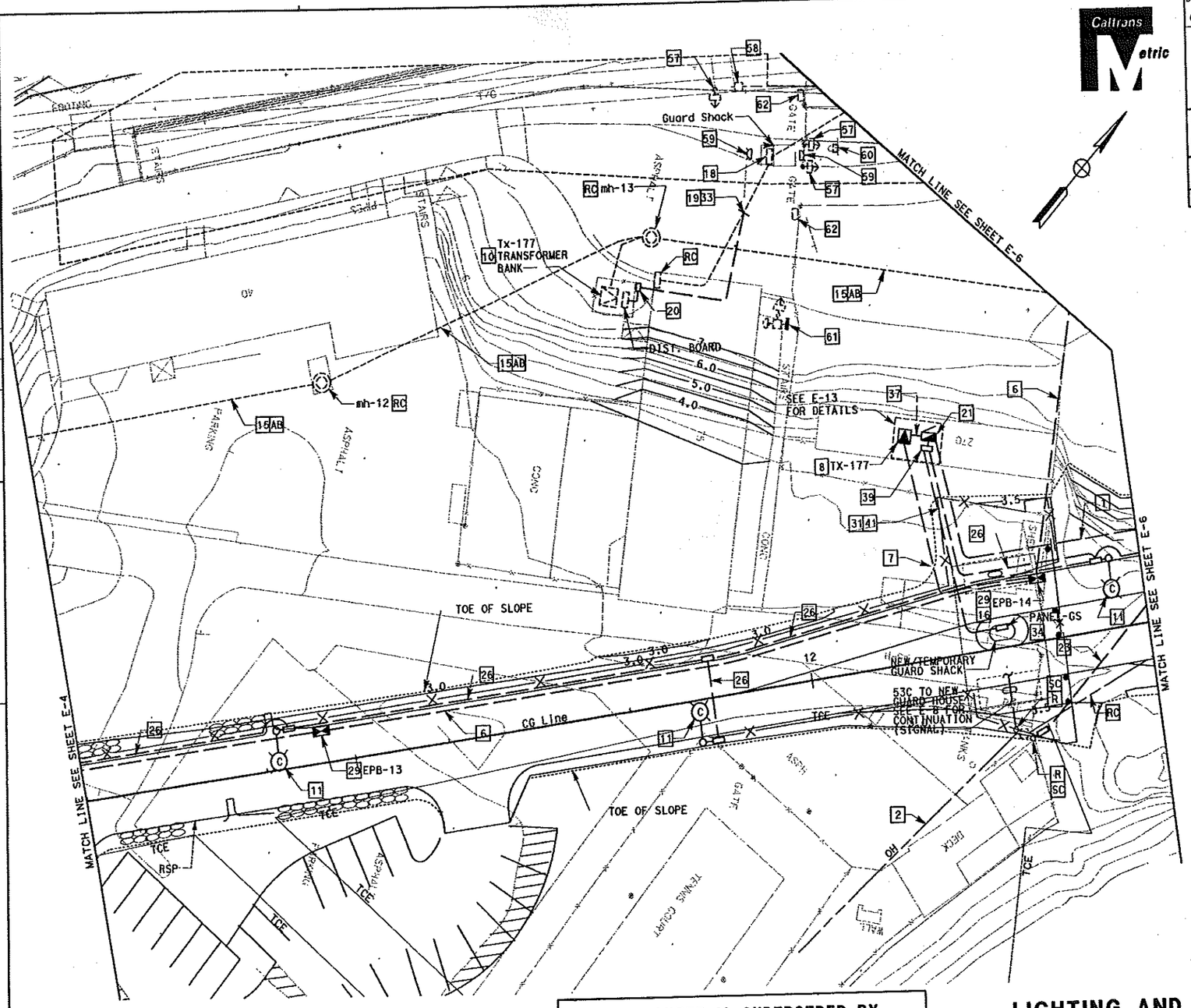


SHEET NOTES:

1. FOR NOTES, ABBREVIATION AND LEGEND, SEE E-1.
2. FOR PROJECT NOTES, SEE E-2.

THIS SHEET IS SUPERSEDED BY
SHEET No. 51A

LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATION)

SCALE 1:200

E-5

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

DGN FILE => 40120q_05.csb
USERNAME => ahlong

CU 04251

EA 012001

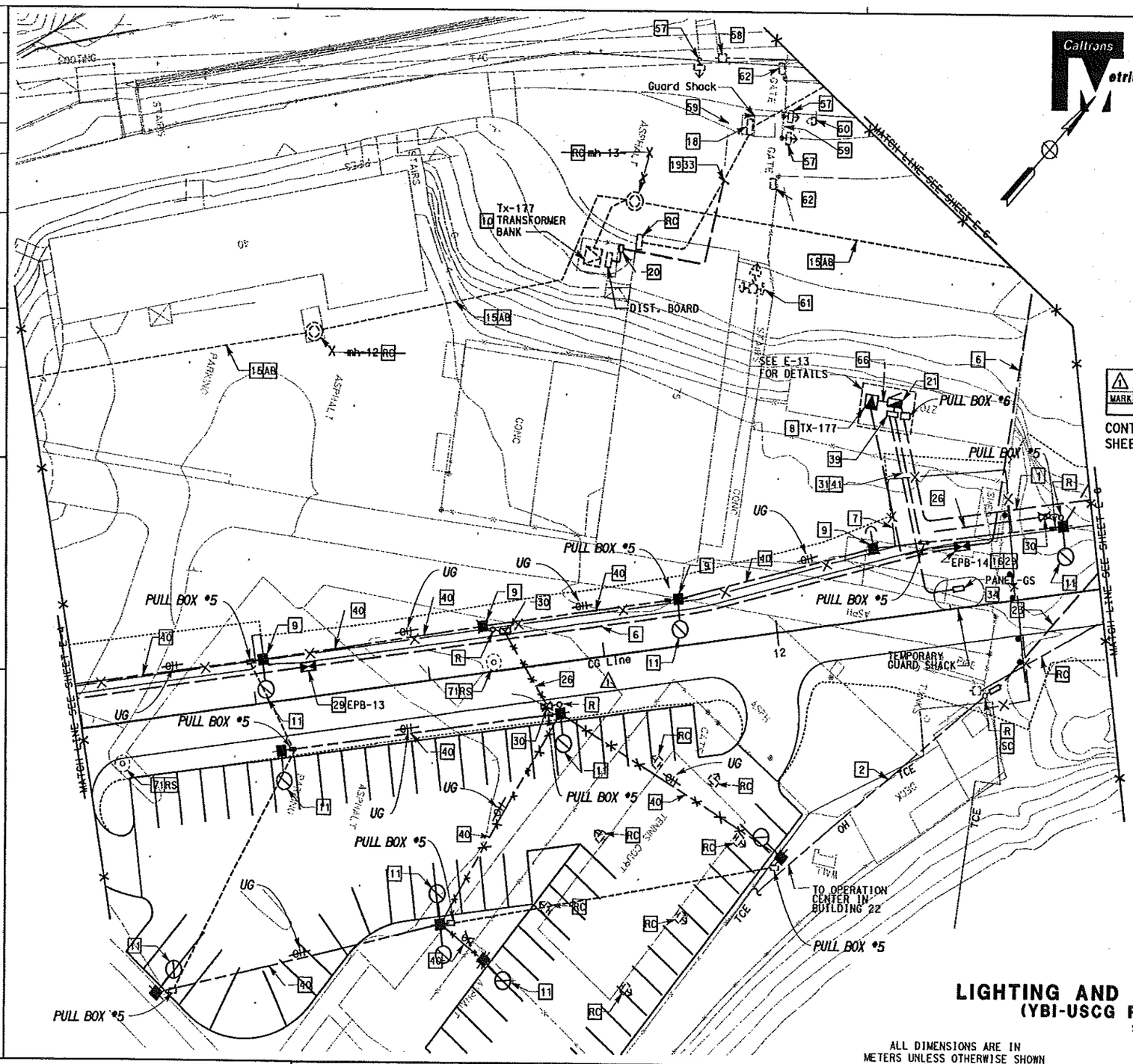
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: BJ
CHECKED BY: CL

DATE REVISED BY
DATE REVISED

LAST REVISION 00-00-00
DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 12:23



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	51A	79

Carol Light 07/01/03
REGISTERED ELECTRICAL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL STATE OF CALIFORNIA

SILVERMAN & LIGHT
2011 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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SHEET NOTES:

1. FOR NOTES, ABBREVIATION AND LEGEND, SEE E-1.
2. FOR PROJECT NOTES, SEE E-2.

MARK	DATE	DESCRIPTIONS	REV	CK
1	07/01/03	ADDED PARKING LIGHTS, REVISED STANDARD LIGHTS TO WOOD POLE	BJ	CL

REVISIONS

CONTRACT CHANGE ORDER NO. 15
SHEET ____ OF ____

Resident Engineer Responsible for *Construction Changes*

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE 7/28/04 DATE
CHECKED BY R L DATE 10/2004

LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATION)

SCALE: 1:200

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

E-5A

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: BJ
CHECKED BY: CL

REVISED BY	DATE REVISED
BJ	7/1/03

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USERNAME => ahuang

CU 04251 EA 012001

DATE PLOTTED => 11-MAR-2005
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7/20/2005

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	52	79

Caltrans Metric

Carol Light
REGISTERED ELECTRICAL ENGINEER — DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL — STATE OF CALIFORNIA

SILVERMAN & LIGHT
201 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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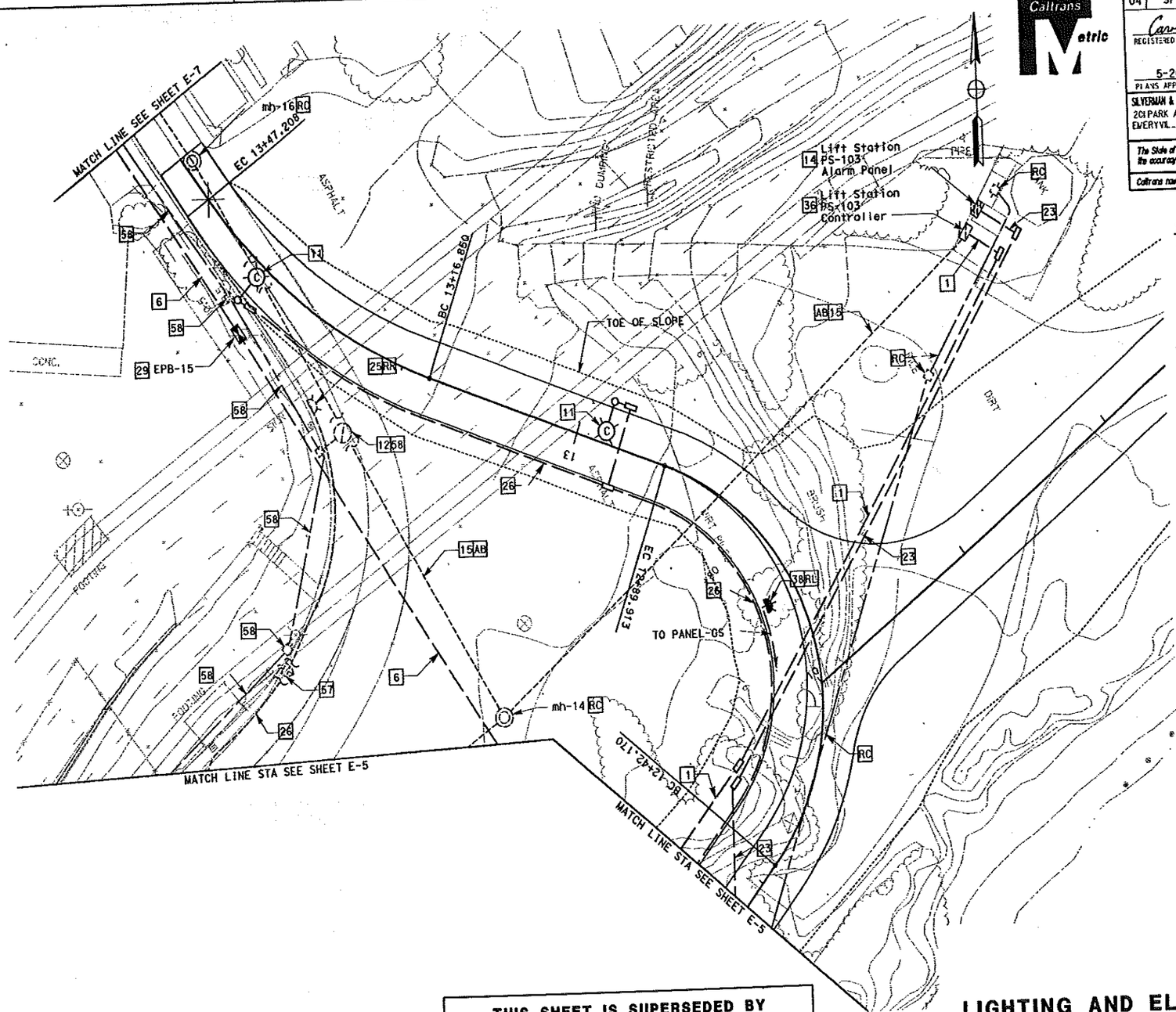

SHEET NOTES:

1. FOR NOTES, ABBREVIATION AND LEGEND, SEE E-1.
2. FOR PROJECT NOTES, SEE E-2.

THIS SHEET IS SUPERSEDED BY
SHEET No. 52A

LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATION)

SCALE 1:200

E-6

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USERNAME => oh_ang

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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TIME PLOTTED => 12:25

7/20/200

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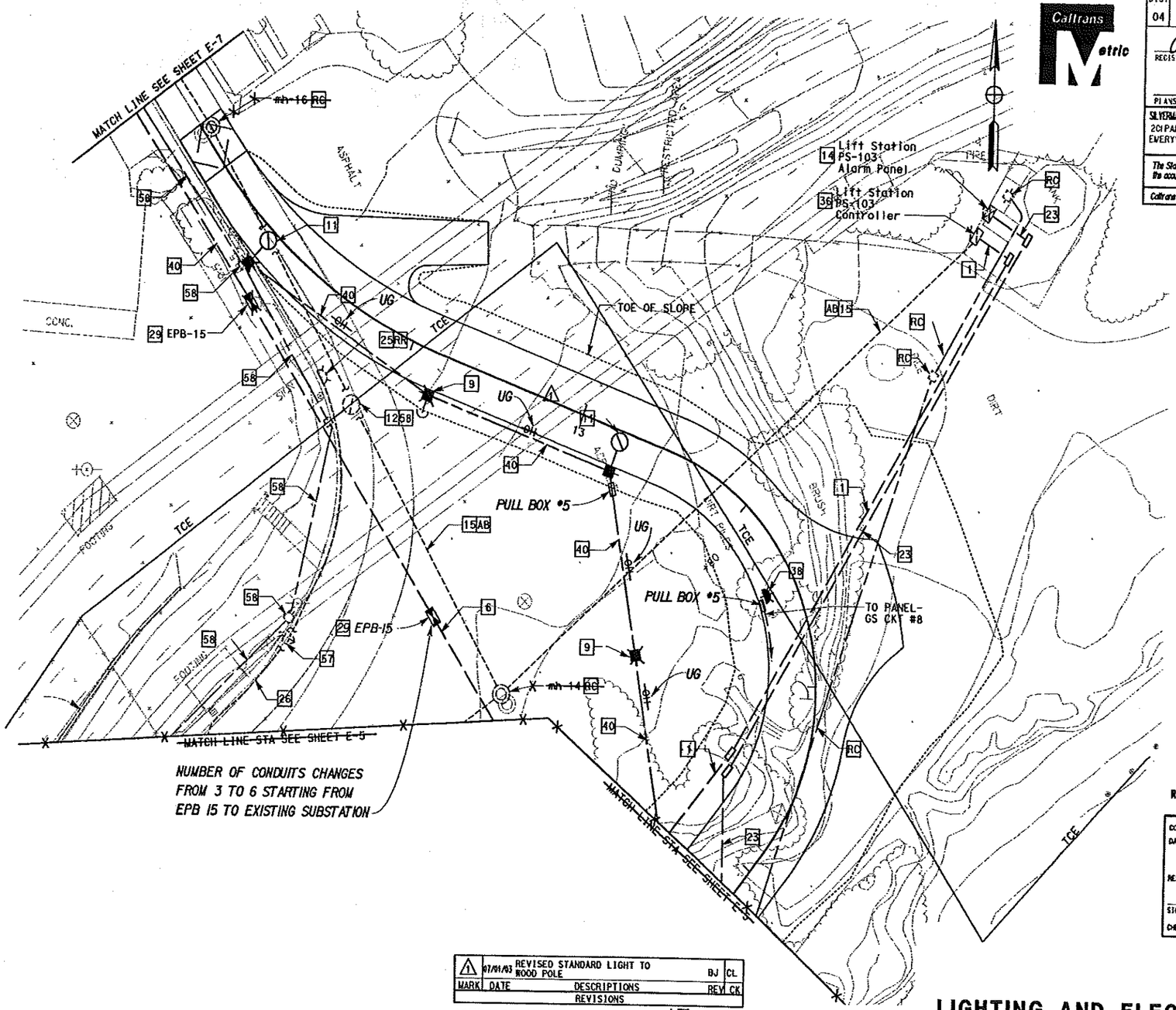

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	52A	79

Carol Light
REGISTERED ELECTRICAL ENGINEER — 07/01/03 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — CAROL LIGHT No. 10145 Exp.09/30/03 ELECTRICAL — STATE OF CALIFORNIA

SILVERMAN & LIGHT
2011 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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SHEET NOTES:

1. FOR NOTES, ABBREVIATION AND LEGEND, SEE E-1.
2. FOR PROJECT NOTES, SEE E-2.

Resident Engineer Responsible for Construction Changes
CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE — DATE 7/28/04
CHECKED BY R L — DATE 10/2004

MARK	DATE	DESCRIPTIONS	REV	CK
1	07/01/03	REVISED STANDARD LIGHT TO WOOD POLE	BJ	CL

REVISIONS

CONTRACT CHANGE ORDER NO. 15
SHEET ____ OF ____

LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATION)

SCALE: 1:200

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

E-6A

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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DATE REVISED BY: BJ
DATE REVISED: 7/1/03

LAST REVISION 00-00-00
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TIME PLOTTED => 12:25

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DIST	COUNTY	ROUTE	KILOMETER POST (TOTAL PROJECT)	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	53	79

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL STATE OF CALIFORNIA

SILVERMAN & LIGHT
1250 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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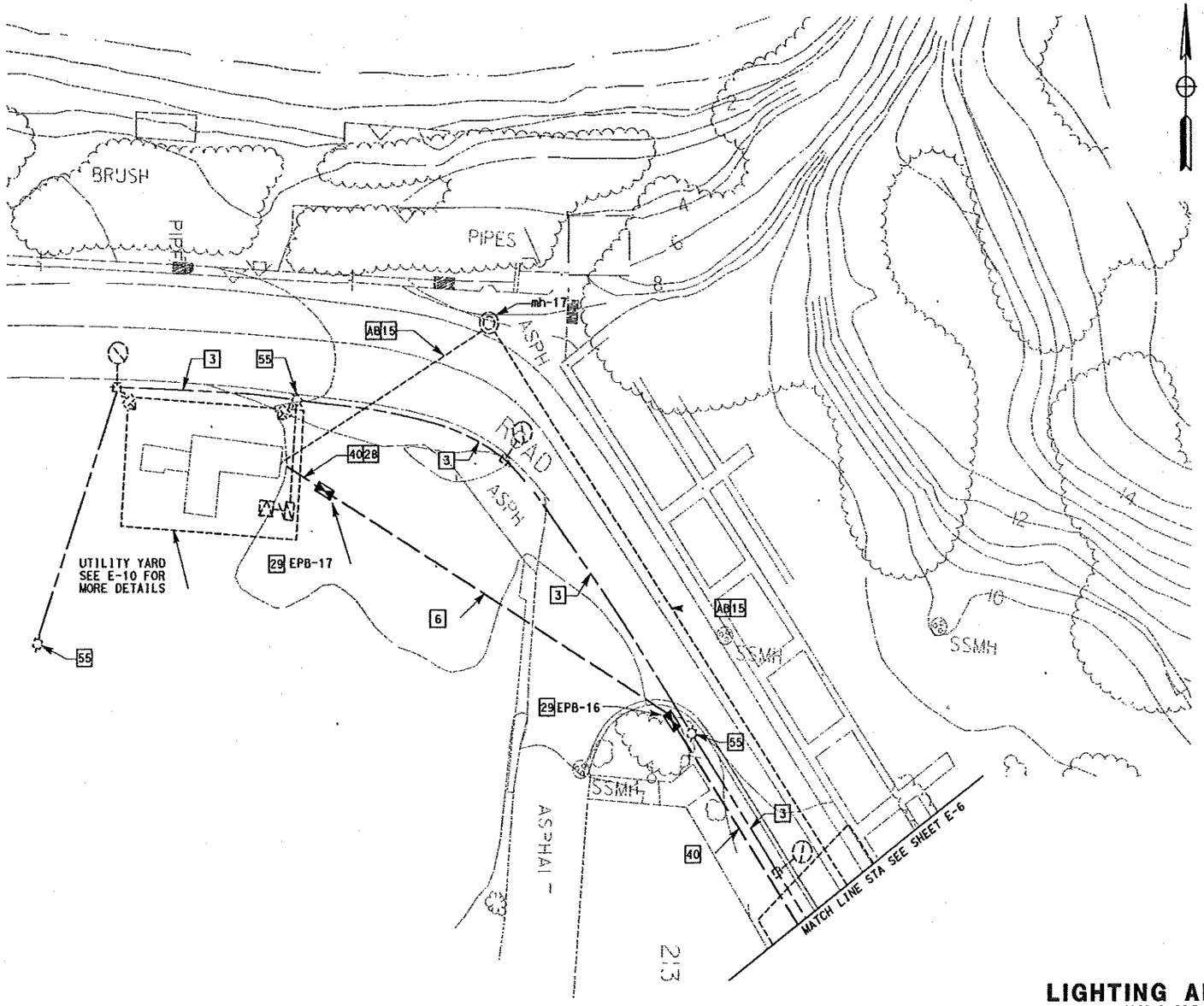

SHEET NOTES:

1. FOR NOTES, ABBREVIATION AND LEGEND, SEE E-1.
2. FOR PROJECT NOTES, SEE E-2.

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

LIGHTING AND ELECTRICAL SYSTEM
(YBI-USCG ROAD RELOCATION)

SCALE 1:200

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

E-7

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: BJ
CHECKED BY: CL

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USERNAME => chucng

CU 04251

EA 012001

DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 12:26

LAST REVISION 00-00-00

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	54	79

Caltrans Metric

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
CAROL LIGHT
No. 10145
Exp. 09/30/03
ELECTRICAL
STATE OF CALIFORNIA

SILVERMAN & LIGHT
2011 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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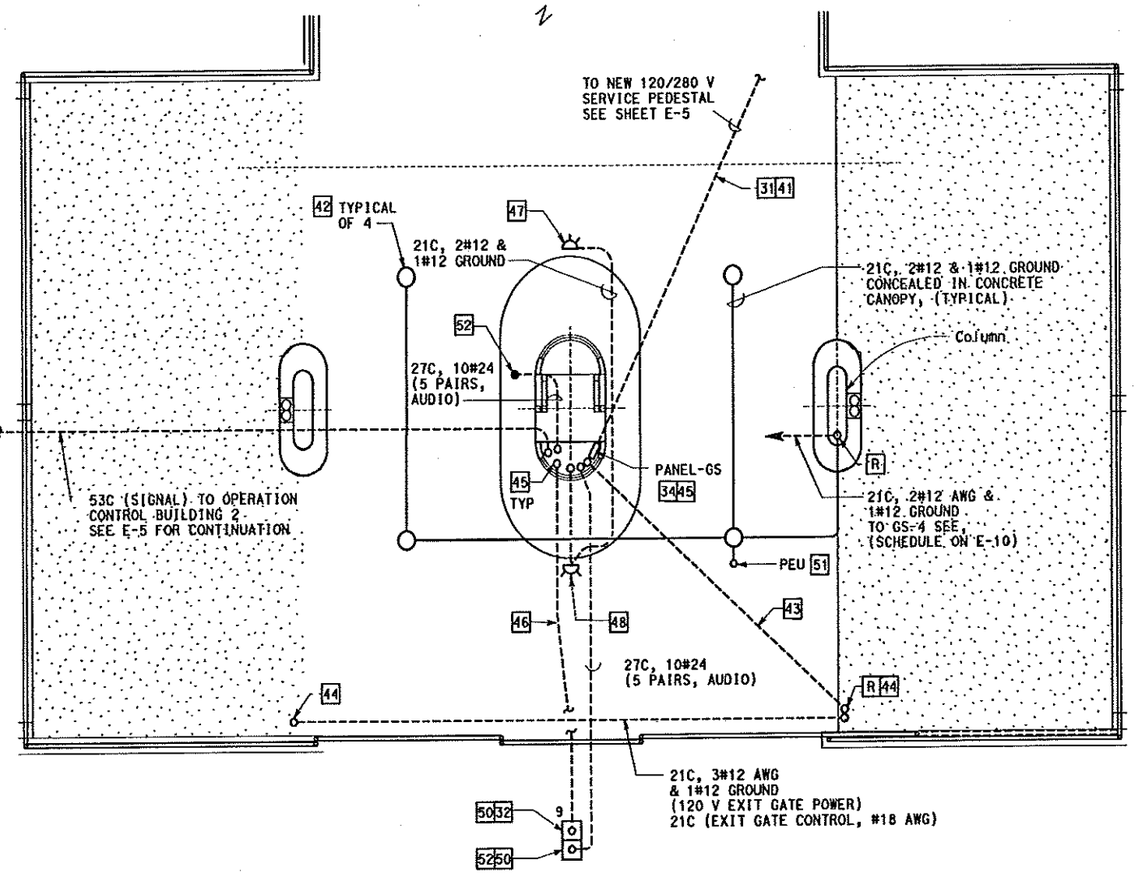
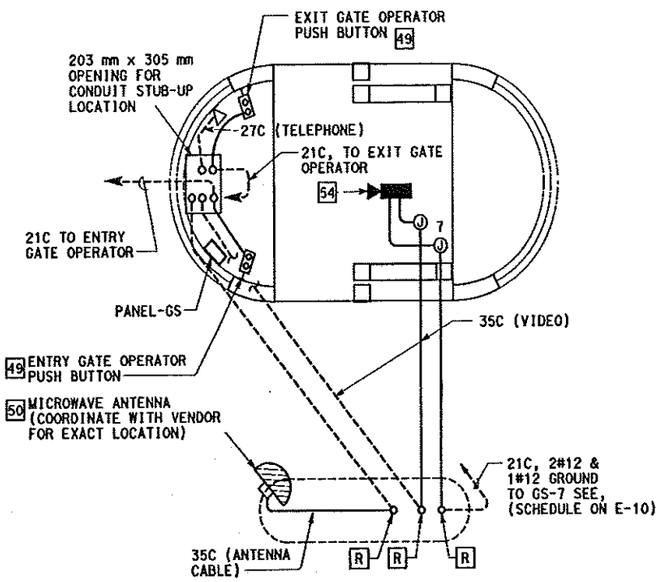


PLAN - ENTRY AND GUARD HOUSE
SCALE 1:50



GUARD HOUSE
NO SCALE

THIS SHEET IS SUPERSEDED BY
SHEET No. 54 A

SITE SECURITY AND CANOPY LIGHTING
(YBI-USCG ROAD RELOCATION)
SCALE 1:50

E-8

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

	DATE	REVISED BY	DATE	REVISED
CALCULATED/DESIGNED BY	BJ			
CHECKED BY	CL			

LAST REVISION 00-00-00
DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 12:27

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USERNAME => ohlong
CU 04251
EA 012001

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	54A	

Carol Light — REGISTERED ELECTRICAL ENGINEER — 07/01/03 DATE

REGISTERED PROFESSIONAL ENGINEER — CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

SILVERMAN & LIGHT
2001 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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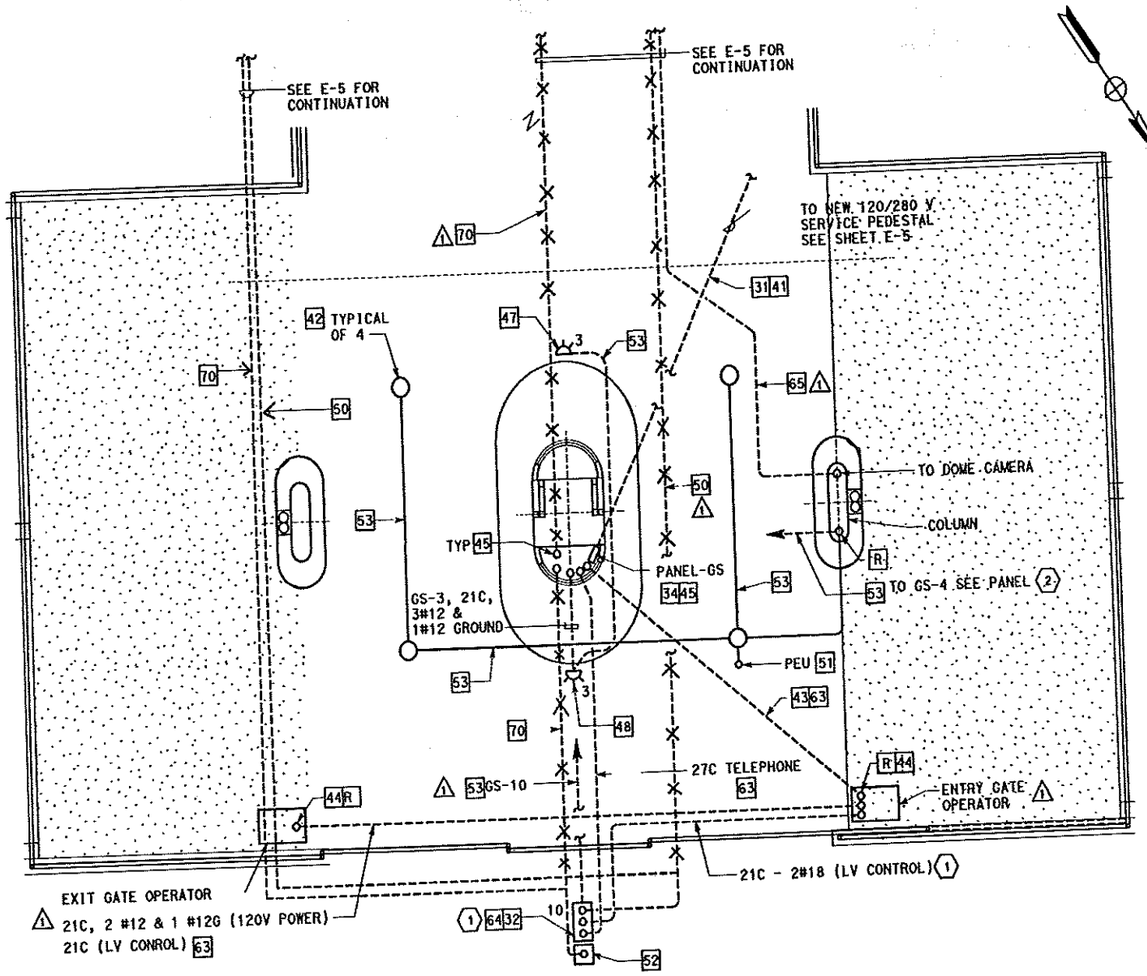
Caltrans Metric

MARK	DATE	DESCRIPTIONS REVISIONS	BJ	CL
1	07/01/03	REVISED SECURITY SYSTEM		

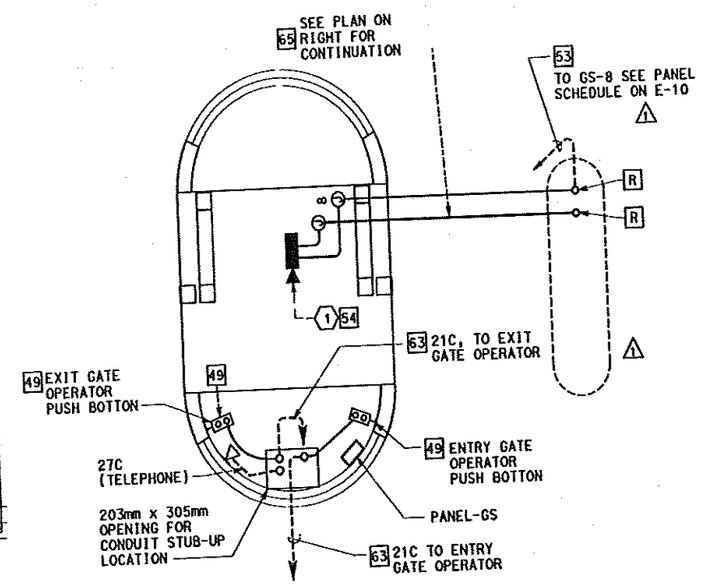
CONTRACT CHANGE ORDER NO._____
SHEET ____ OF ____



PLAN - ENTRY AND GUARD HOUSE
SCALE: 1:50

1 SHEET NOTES:

1. SEE SECURITY SYSTEM WIRING DIAGRAM ON E-21 FOR MORE INFORMATION.
2. SEE PANEL GS-SCHEDULE ON E-10.



GUARD HOUSE
NO SCALE

Resident Engineer Responsible for *Construction Changes*

CONTRACT No. 04-012004
DATE ACCEPTED 6/22/04
AS BUILT
RESIDENT ENGINEER R Duncan
SIGNATURE — DATE 7/28/04
CHECKED BY R L DATE 10/2004

SITE SECURITY/CANOPY LIGHTING
(YBI-USCG ROAD RELOCATION)
SCALE: 1:50

E-8A

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY	BJ	DATE	REVISED BY	BJ
CHECKED BY	CL		DATE REVISED	7/1/03

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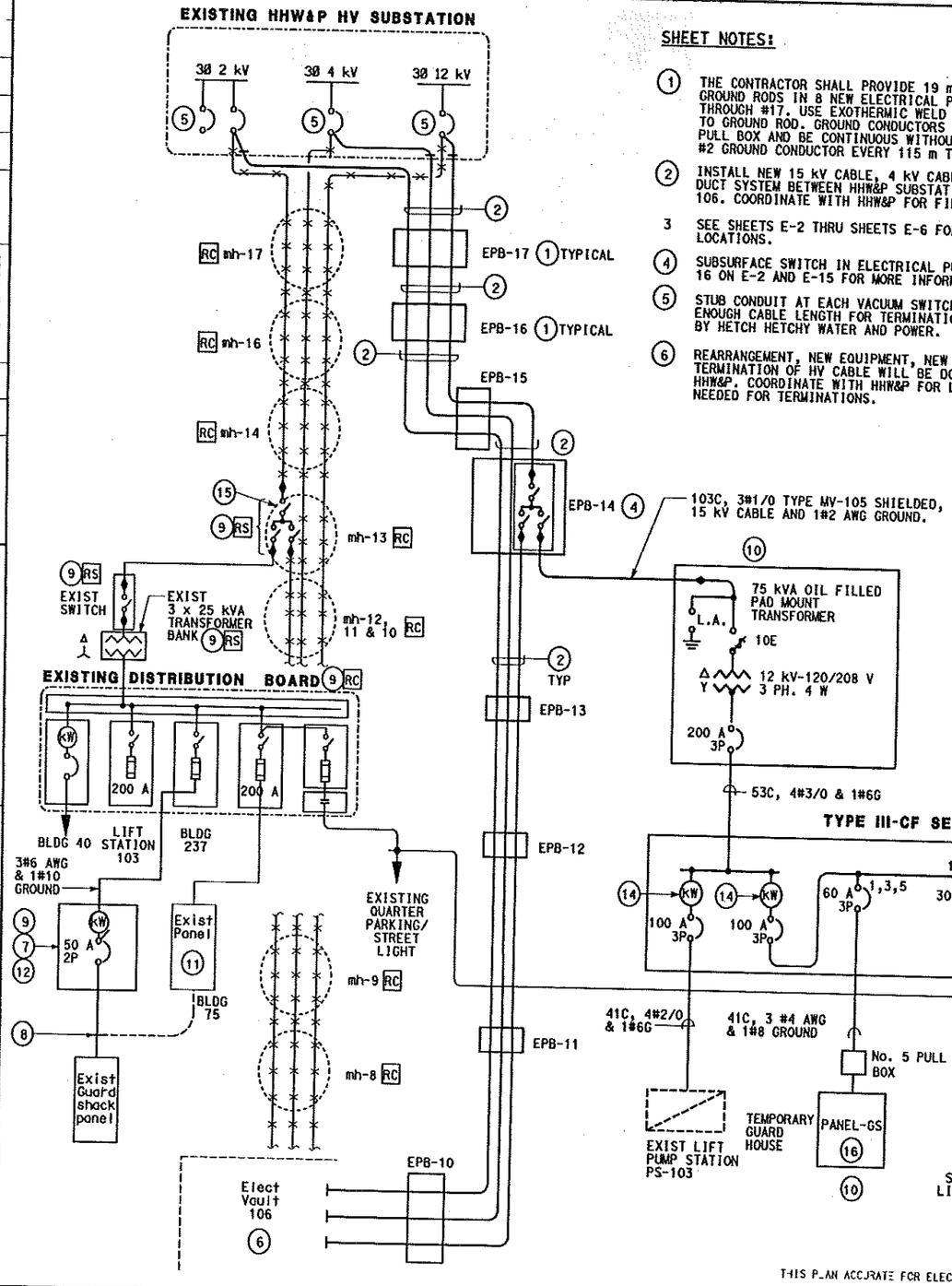

SHEET NOTES:

1. THE CONTRACTOR SHALL PROVIDE 19 mm DIA x 3 m COPPER CLAD GROUND RODS IN 8 NEW ELECTRICAL PULL BOXES & SPLICE BOXES #10 THROUGH #17. USE EXOTHERMIC WELD TO BOND #2 GND CONDUCTORS TO GROUND ROD. GROUND CONDUCTORS SHALL BE LOOPED IN EACH PULL BOX AND BE CONTINUOUS WITHOUT BREAK. PROVIDE HV SHIELD TO THE #2 GROUND CONDUCTOR EVERY 115 m TO 130 m (OR NEAREST MANHOLE).
2. INSTALL NEW 15 kV CABLE, 4 kV CABLES IN NEW DUCT SYSTEM BETWEEN HHW&P SUBSTATION AND ELEC. VAULT 106. COORDINATE WITH HHW&P FOR FINAL HV CABLE TERMINATIONS.
3. SEE SHEETS E-2 THRU SHEETS E-6 FOR HIGH VOLTAGE PULL BOXES LOCATIONS.
4. SUBSURFACE SWITCH IN ELECTRICAL PULL BOX. SEE PROJECT NOTE 16 ON E-2 AND E-15 FOR MORE INFORMATION.
5. STUB CONDUIT AT EACH VACUUM SWITCHGEAR AND PROVIDE ENOUGH CABLE LENGTH FOR TERMINATION. FINAL CONNECTION BY HETCH HETCHY WATER AND POWER.
6. REARRANGEMENT, NEW EQUIPMENT, NEW DEVICES AND TERMINATION OF HV CABLE WILL BE DONE & PROVIDED BY HHW&P. COORDINATE WITH HHW&P FOR LENGTH OF CABLE NEEDED FOR TERMINATIONS.
7. INSTALL TEMPORARY SERVICE METER BREAKER UNIT IN NEMA-3R ENCLOSURE ON TEMPORARY SUPPORT.
8. INTERCEPT EXISTING CONDUIT AND EXTEND TO TEMPORARY SERVICE DISCONNECT. PROVIDE NEW CONDUCTORS BETWEEN EXISTING MAIN GATE PANEL AND TEMPORARY SERVICE DISCONNECT.
9. DISCONNECT AND REMOVE EXISTING EQUIPMENT AND DEVICES AFTER NEW 75 kVA TRANSFORMER AND NEW SERVICE EQUIPMENT PEDESTAL IS INSTALLED AND ENERGIZED.
10. COORDINATE WITH ENGINEER (CALTRANS) FOR EXACT LOCATION.
11. REMOVE AND SCRAP EXISTING PANEL, INCLUDING RELATED WIRES BACK TO EXISTING 200 A DISCONNECT DURING DEMOLITION OF BUILDING 75.
12. MOUNT METER BREAKER UNIT, +1.2 ABOVE GRADE. SEE CALTRANS STANDARD PLAN ES-2A.
13. FOR PROJECT NOTES, SEE SHEET E-2.
14. COORDINATE METER TYPE WITH HETCH HETCHY WATER AND POWER.
15. DISCONNECT EXISTING SWITCH AND TURN-OVER TO HHW&P.
16. PROVIDED BY GUARD HOUSE FABRICATOR
17. INTERCEPT EXISTING CONDUIT THAT FEEDS QUARTER PARKING LIGHTS AND EXTEND TO NEW TYPE III SERVICE PEDESTAL, PROVIDE NEW CONDUCTORS, THE CONTRACTOR SHALL VERIFY IN FIELD EXISTING CONDUIT ROUTING AND CONDUCTOR SIZE.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	55	79

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE
5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL STATE OF CALIFORNIA

SILVERMAN & LIGHT
2GI PARK AVENUE - SUITE 00
EMERYVILLE, CA 94608-3632

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NO Construction Changes
CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ELECTRICAL DETAILS
ONE LINE DIAGRAM
NO SCALE

E-9

THIS PLAN ACCURATE FOR ELECTRICAL WORK ONLY

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USERNAME => ahuang

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN OVERSIGHT Bob Zandipour
CALCULATED/DESIGNED BY BJ CHECKED BY CL
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DATE PLOTTED => 11-MAR-2005
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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	56	79

Caltrans Metric

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL STATE OF CALIFORNIA

SILVERMAN & LIGHT
2011 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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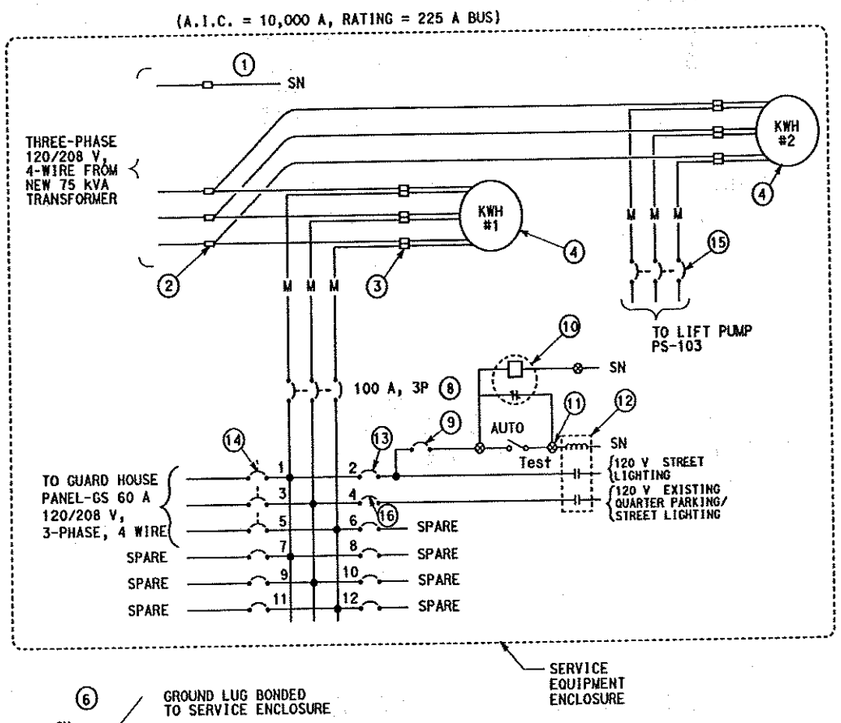
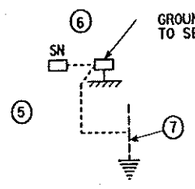
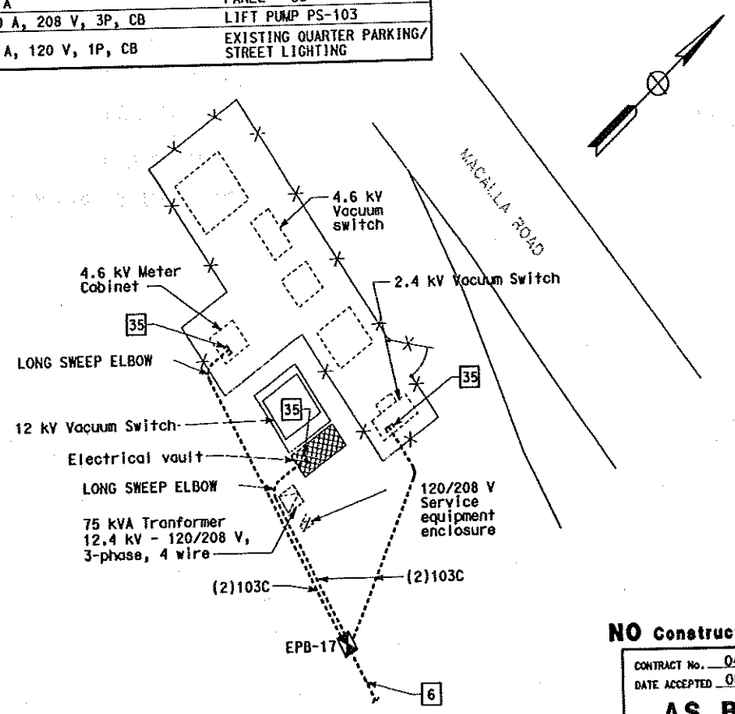




120/208 V SERVICE WIRING DIAGRAM
NO SCALE

TYPE III-CF DOUBLE METERING SERVICE (120/208 V) EQUIPMENT LEGEND		
1	NEUTRAL LUG	
2	LANDING LUG	
3	TEST BYPASS FACILITIES	
4	METER SOCKET AND SUPPORT	
5	SOLID NEUTRAL TERMINAL STRIP	
6	GROUND LUG	
7	GROUND ROD	
8	100 A, 208 V, 3P, CB	MAIN CIRCUIT BREAKER
9	15 A, 120 V, 1P, CB	LIGHTING CONTROL
10	PHOTOELECTRIC UNIT	
11	TERMINAL BLOCK	
12	60 A, 2PNO CONTACTOR	LIGHTING
13	30 A, 120 V, 1P, CB	120 V STREET LIGHTING
14	60 A	PANEL - GS
15	100 A, 208 V, 3P, CB	LIFT PUMP PS-103
16	30 A, 120 V, 1P, CB	EXISTING QUARTER PARKING/ STREET LIGHTING



UTILITY YARD
SCALE 1:100

120/208 V GUARD HOUSE ELECTRICAL PANEL (PROVIDED BY OTHERS) FURNISH WITH 3P, 60 A MAIN CB AND FOLLOWING CIRCUIT BREAKERS:					
NO.	AMPERES	VOLTS	POLES	LOAD	REMARK
1	20	120	1	ENTRY GATE OPERATOR	A
2	20	120	1	EXIT GATE OPERATOR	A
3	20	120	1	GUARD HOUSE FLASHING LIGHTS	A
4	20	120	1	CANOPY LIGHTS	VIA PEU, A
5	20	120	1	GUARD HOUSE RECEPTACLES & LIGHT	B
6/7	20	208	2	GUARD HOUSE HVAC	B
8	20	120	1	SURVEILLANCE DOME CAMERA	A
9	20	120	1	FLASHING BEACON LIGHT	A
10	20	120	1	FACE/BADGE CAMERA	A
11	20	120	1	SPARE	
12	20	120	-	SPARE	
13	20	120	-	SPARE	

REMARKS:
A. EQUIPMENT PROVIDED AND CONNECTED UNDER THIS CONTRACT.
B. EQUIPMENT PROVIDED AND CONNECTED BY GUARD HOUSE FABRICATOR.

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ELECTRICAL DETAILS
120/208 V SERVICE WIRING DIAGRAM AND UTILITY YARD
SCALE AS SHOWN

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

E-10

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour
CALCULATED/DESIGNED BY: BJ
CHECKED BY: CL
DATE REVISED
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DATE

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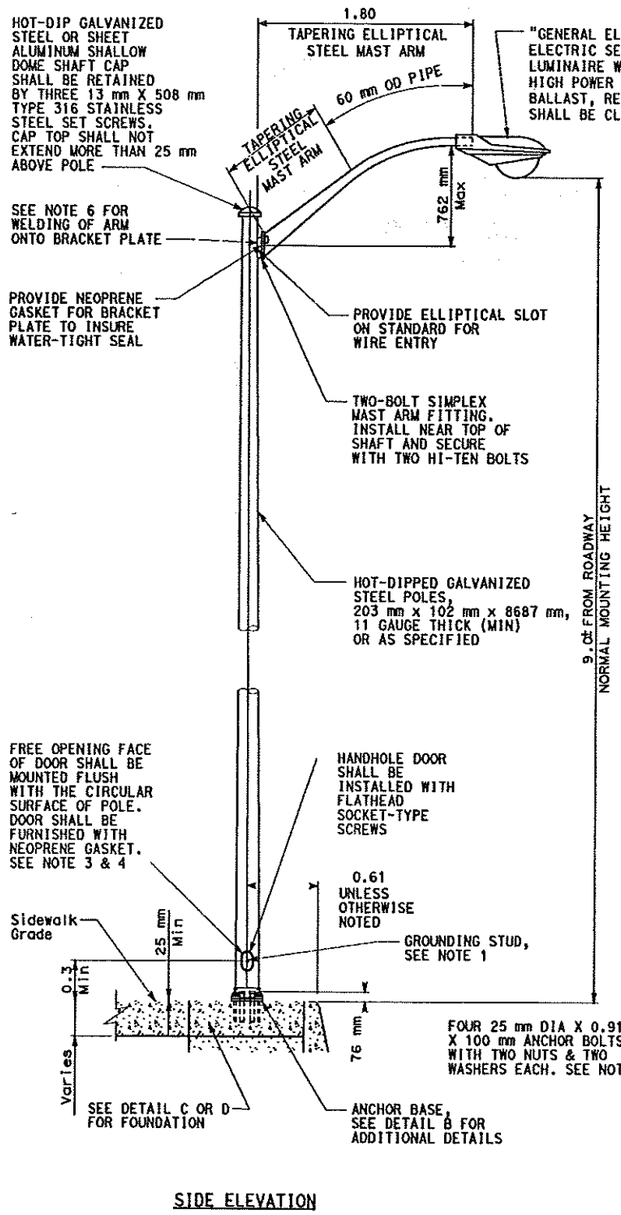
CU 04251
EA 012001

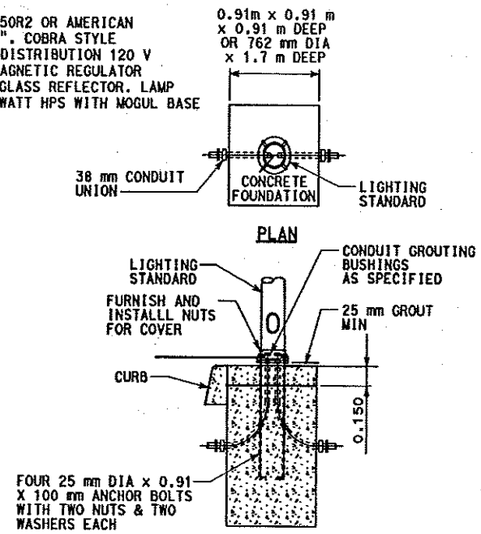
DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 12:29



SIDE ELEVATION

DETAIL A

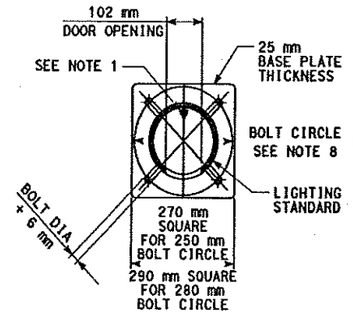
STREET LIGHT ON STEEL SHAFT WITH ELLIPTICAL BRACKET ARM



ELEVATION

DETAIL C

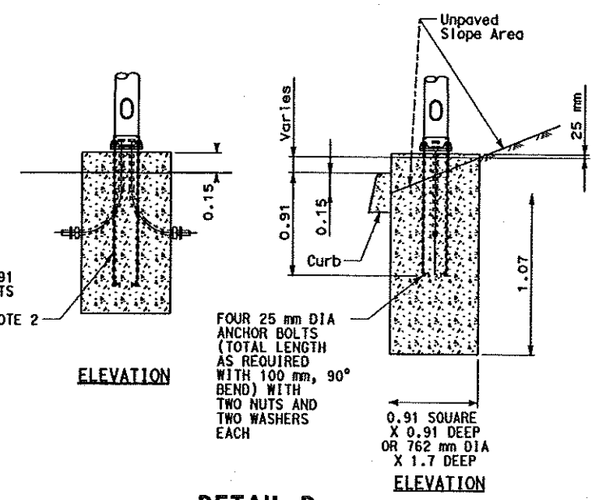
FOUNDATION FOR STREET LIGHT



PLAN

DETAIL B

STANDARD ANCHOR BASE



ELEVATION

DETAIL D

FOUNDATION FOR STREET LIGHT IN UNPAVED AREA

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

SHEET NOTES:

1. GROUND STUD (WELDED TO INTERIOR SURFACE OF SHAFT OPPOSITE DOOR OPENING). STUD SHALL BE 6 mm X 508 mm (CONTINUOSLY THREADED) X 19 mm AND SHALL BE FURNISHED WITH A TYPE 316 STAINLESS STEEL NUT AND A STAINLESS STEEL SHAKEPROOF WASHER.
2. EACH ANCHOR BOLT-THREADED TOP 200 mm.
3. THE STANDARD, HANDHOLE COVER, MAST ARM, AND ANCHOR BOLTS WITH NUTS & WASHERS, SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION.
4. THE HANDHOLE COVER OR DOOR SHALL HAVE THE SAME RADIUS OF CURVATURE AS THE SHAFT AND WHEN INSTALLED, SHALL FORM A SYMMETRICAL APPEARANCE WITH THE SHAFT.
5. THE TAPERING ELLIPTICAL SECTION SHALL NOT BE MORE THAN TWO-THIRDS THE LENGTH OF THE MAST ARM AND SHALL TAPER TO THE EXTERNAL DIAMETER OF 50 mm PIPE.
6. ALL EXPOSED WELDS SHALL BE GROUND SMOOTH AND SHALL CONFORM TO CONTOURS OF ADJACENT SURFACES. ALL WELDS SHALL HAVE A FINISHED DEPTH OF 10 mm.
7. DOOR OR HANDHOLE COVER SHALL BE SECURELY RETAINED IN PLACE WITH TWO 6 mm X 500 mm STAINLESS STEEL SCREWS.
8. FOR SHAFTS OF 7.6 m OR LESS IN LENGTH, THE BOLT CIRCLE SHALL BE 250 mm, UNLESS OTHERWISE NOTED. FOR SHAFTS MORE THAN 7.6 m IN LENGTH, THE BOLT CIRCLE DIAMETER SHALL BE 280 mm.
9. THE THREADS OF ALL FASTENERS SHALL BE COATED WITH AN APPROVED INDUSTRIAL TYPE OF WATER-PROOF GREASE LUBRICANT CONTAINING A HIGH CONTENT OF GRAPHITE.
10. THE DOOR OR HANDLEHOLE COVER GASKET SHALL BE MOUNTED TO THE COVER WITH AN APPROVED TYPE OF AUTOMOTIVE ENGINE GASKET CEMENT. THE NON-CEMENTED SURFACE OF THE GASKET SHALL BE COATED WITH A SILICONE IMPREGNATED RUBBER LUBRICANT.

ELECTRICAL DETAILS
CITY OF SAN FRANCISCO TYPICAL DETAIL
STREET LIGHT
SCALE 1:20

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

E-11

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	57	79

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE
05-20-03
PLANS APPROVAL DATE
CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

SILVERMAN & LIGHT
2011 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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DATE
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TIME PLOTTED => 12:30

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DGN FILE => 40120q_11.csb
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CU 04251
EA 012001

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	58	79

Caltrans Metric

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

05-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
CAROL LIGHT
No. 10145
Exp. 09/30/03
ELECTRICAL
STATE OF CALIFORNIA

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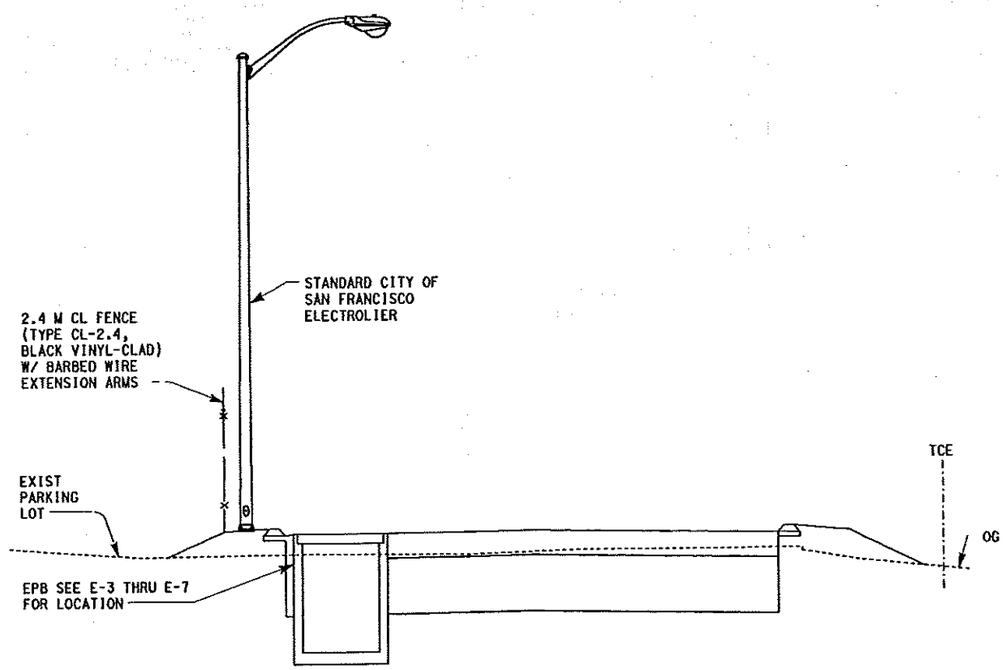
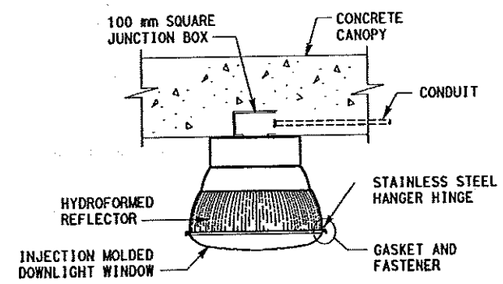


ELECTRICAL PULL BOX TYPICAL LOCATION



CANOPY LIGHTING FIXTURE

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ELECTRICAL DETAILS

ELECTRICAL PULL BOX LOCATION AND CANOPY LIGHTING FIXTURE

NO SCALE

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

E-12

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04	SF	80	12.9	59	79

Caltrans Metric

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL STATE OF CALIFORNIA

SILVERMAN & LIGHT
2010 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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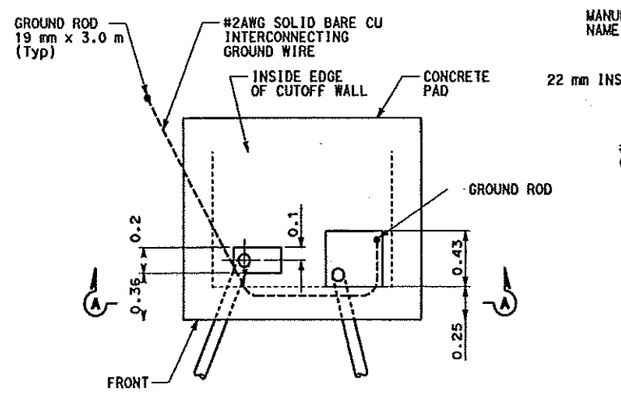
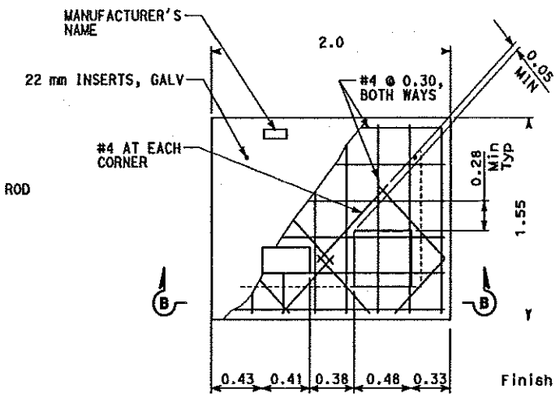
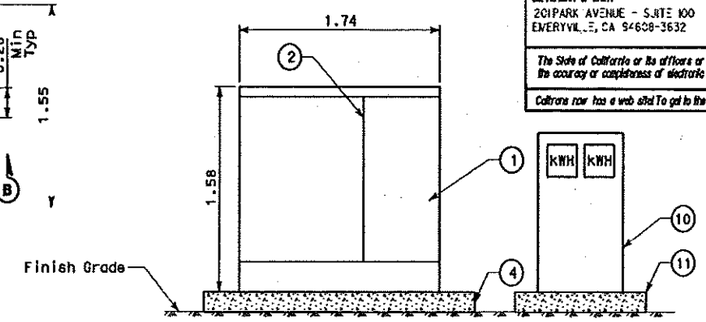


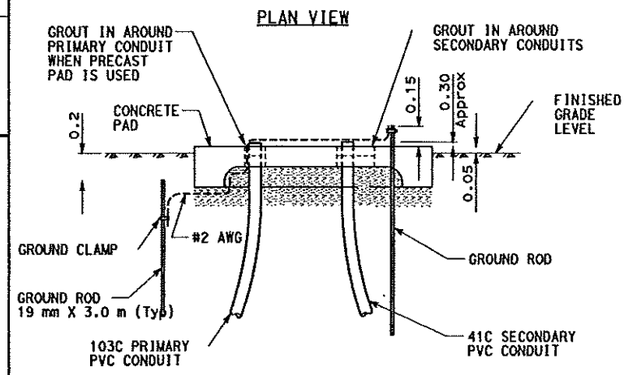
PLAN VIEW



PLAN IN SECTION

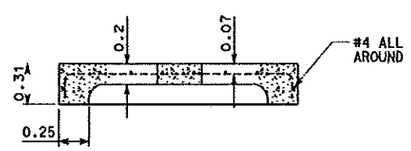


ELEVATION



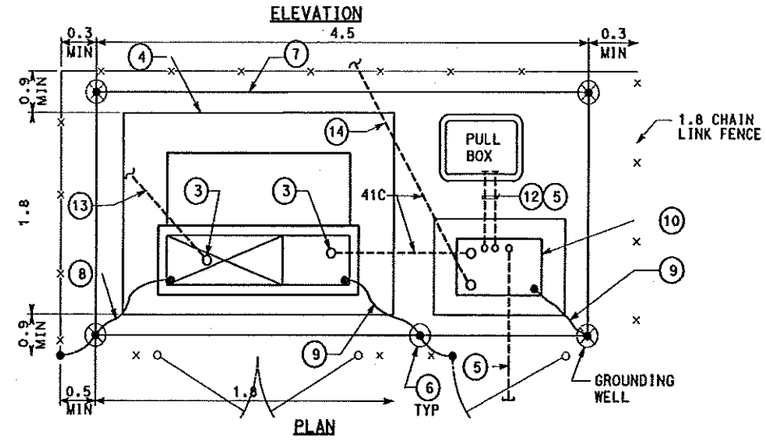
SECTION A-A

LOCATION FOR PRIMARY AND SECONDARY CONDUITS



CONCRETE PAD DETAILS

SECTION B-B



PLAN

PAD MOUNTED TRANSFORMER TX-177

FOR GROUNDING DETAIL SEE E-20

SHEET NOTES:

(A) CONDUIT SHALL BE CUT OFF APPROXIMETELY 25.4 mm ABOVE CONCRETE PAD SURFACE.

(B) APPROVED SUPPLIERS FOR PRECAST PADS ARE: ASSOCIATED CONCRETE PRODUCTS, ATLAS CONCRETE, BROOKS, JENSEN PRECAST, QUICKSET AND UTILITY VAULT.

(C) ALL EXPOSED EDGES SHALL HAVE 19 mm CHAMFER OR RADIUS.

(D) SURFACES SHALL HAVE A LIGHT BROOM OR WOOD FLOAT FINISH.

(E) CONDUIT WINDOWS SHALL BE GROUTED WITH NON-SHRINK GROUT (ASPHALT OR BLACKTOP IS NOT APPROVED FOR GROUTING).

(12) 41C TO PANEL-GS IN GUARD HOUSE. 41C TO STREET LIGHTING.
(13) 103C- 3#1/0 TYPE MV-105 SHIELDED 15kV CABLES & 1#2 GROUND
(14) 41C - 4#2/0 & 1#6 GROUND TO EXISTING SEWER LIFT PUMP PS-103 DISCONNECT.

(1) SECONDARY SECTION.
(2) STEEL HIGH/LOW VOLTAGE COMPARTMEENT BARRIER.
(3) SEAL OPENING AROUND PRIMARY AND SECONDARY CONDUITS IN GROUT.
(4) PRECAST (POURED IN PLACE) TRANSPORMER PAD. SEE DETAILS ON THIS SHEET.
(5) PROVIDE THREE 41C STUB-UP CONDUITS. TERMINATE 1.5 m BEYOND SERVICE ENCLOSURE PAD.
(6) 19 mm DIA x 3.0 m COPPER CLAD GROUND ROD.
(7) #1/0 BARE COPPER WIRE BURIAL DEPTH 610 mm MINIMUM.
(8) GROUND WIRE CABLE SHIELD.
(9) SECONDARY EQUIPMENT GROUND.
(10) TYPE 111-CF SERVICE EQUIPMENT ENCLOSURE. SEE E-10 FOR WIRING DIAGRAM.
(11) POURED IN PLACE SERVICE PEDESTAL PAD.

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

PG&E DETAIL
CONCRETE PAD FOR THREE-PHASE 12 kV PAD-MOUNTED TRANSFORMER TX-177

ELECTRICAL DETAILS
TRANSFORMER AND SERVICE PEDESTAL PADS

NO SCALE

A DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

E-13

DATE	REVISED BY	DATE REVISED
BJ	CL	

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DESIGN OVERSIGHT
Bob Zandipour

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USERNAME => ohuang

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EA 012001

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04	SF	80	12.9	60	79

Caltrans Metric

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
CAROL LIGHT
No. 10145
Exp. 09/30/03
ELECTRICAL
STATE OF CALIFORNIA

SILVERMAN & LIGHT
201 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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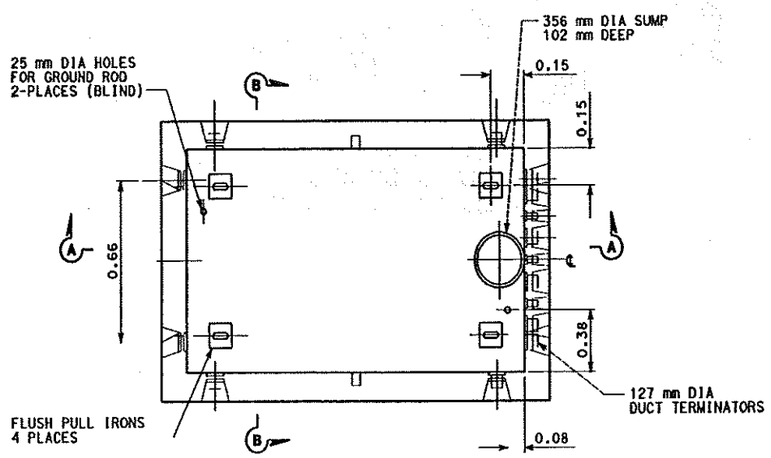
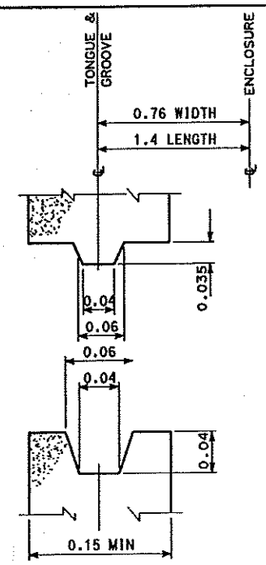
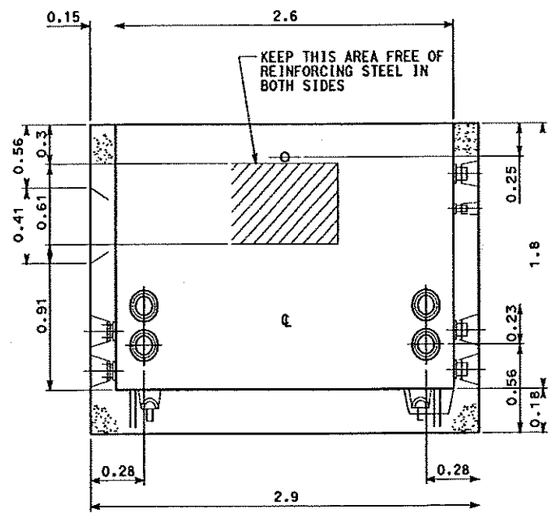


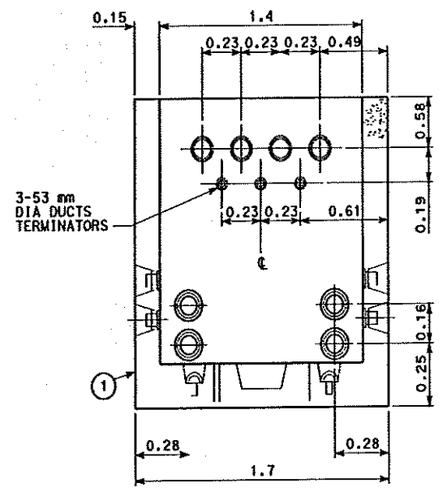
PLAN



DETAIL "A"
TONGUE & GROOVE

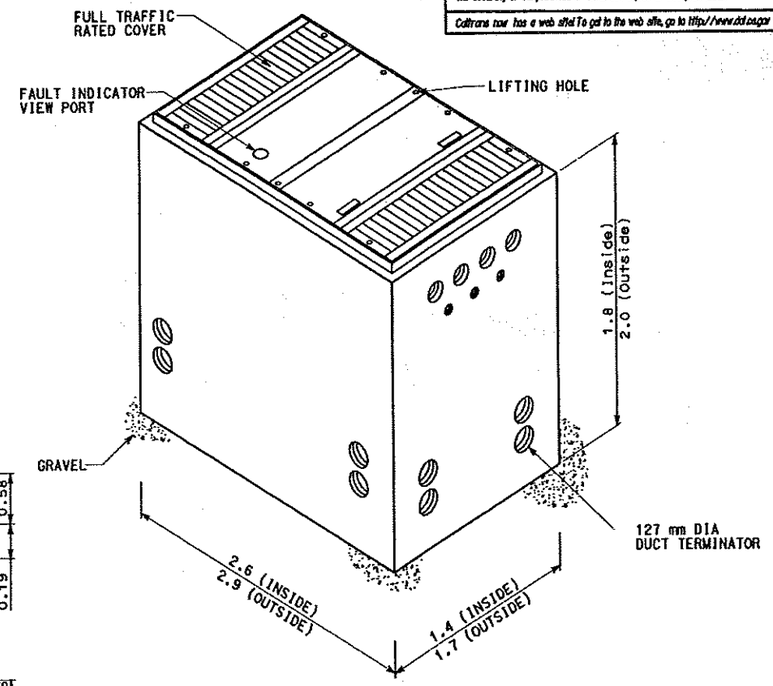


SECTION A-A



SECTION B-B

1.4 m x 2.6 m ENCLOSURE AND EXTENSIONS



TYPICAL EQUIPMENT ENCLOSURE

COMPLETE ENCLOSURE ASSEMBLY

TYPE OF ENCLOSURE	TYPE OF TRAFFIC LOADING	EXCAVATION SIZE (m)
EQUIPMENT	FULL TRAFFIC	2.0 W x 3.2 L x 2.3 D
PRIMARY PULL BOX	FULL TRAFFIC	

1.4 m x 2.6 m COMPLETE ENCLOSURE ASSEMBLIES

PARTS FOR ENCLOSURE REPLACEMENT

ITEM	DESCRIPTION	WEIGHT APPROX. (KG)
1	BODY, 1.8 m DEPTH	7643
2	EXTENSION, 0.30 m DEPTH	998
3	EXTENSION, 0.46 m DEPTH	1497

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

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ELECTRICAL DETAILS
UTILITY COMPANY TYPICAL DETAIL
PRIMARY UNDERGROUND ENCLOSURE
NO SCALE

E-14

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	12.9	61	79

Caltrans Metric

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
CAROL LIGHT
No. 10145
Exp. 09/30/03
ELECTRICAL
STATE OF CALIFORNIA

SILVERMAN & LIGHT
2011 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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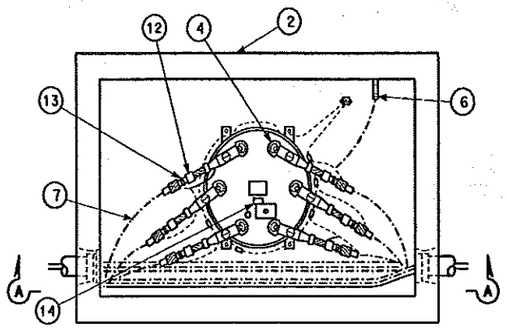
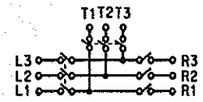
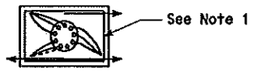


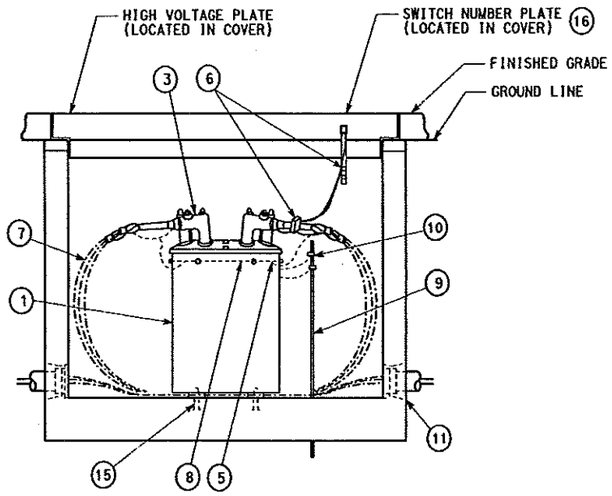
PLAN



3-POLE, 3-WAY SWITCH

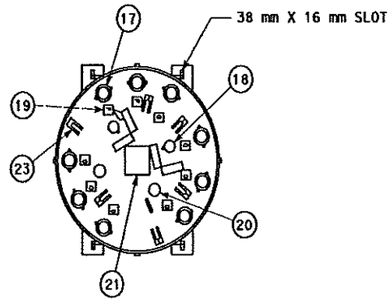


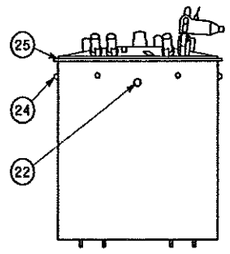
THREE-POLE, THREE-WAY SWITCH



SECTION A-A

THREE-POLE SWITCH





3-POLE, 3-WAY SWITCH

SHEET NOTES:

1. SWITCH PLACEMENT SHOULD HAVE ONE SET OF THREE BUSHING FACING THE SHORT WALL.

LIST OF MATERIAL

ITEM	DESCRIPTION
1	SWITCH, SUBSURFACE TYPE
2	ENCLOSURE, PRECAST CONCERTE (COMPLETE ASSEMBLY) 2.0 m X 3.2 m X 2.3 m
3	200 A PRIMARY TERMINATION: DEAD-BREAK ELBOW RECEPTACLES
4	200 A BUSHING INSERT DEAD-BREAK (303920)
5	CONNECTOR, TAP, COMPRESSION TYPE, AS REQUIRED
6	FAULT INDICATOR
7	PRIMARY CABLE FOR UNDERGROUND DISTRIBUTION
8	WIRE, GROUND, SOLID, BARE COPPER, SOFT DRAWN, #2 AWG
9	GROUND ROD, 19 mm X 3 m
10	CLAMP, GROUND ROD, 19 mm
11	DUCT TERMINATOR
12	PHASE DESTINATION TAG
13	CABLE SECTIONALIZING TAG
14	SWITCH NUMBER TAG
15	FASTENER, WEDGE, ANCHOR BOLT 13 mm - 330 mm x 95 mm
16	SWITCH NUMBER PLATE
17	HIGH VOLTAGE BUSHING
18	SWITCH HANDLE
19	LIFTING LOOPS
20	OIL LEVEL INDICATOR
21	SWITCH NAMEPLATE
22	OIL SAMPLING VALVE
23	PROVISION FOR MOUNTING SEPERABLE ESNA GROUNDING PLUG OR INSULATED DEAD-END PLUG
24	TANK GROUND TERMINAL
25	COVER, WELDED

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

INSTALLATION OF 200 A SUBSURFACE SECTIONALIZING SWITCH EPB-14

ELECTRICAL DETAILS
200 A SUBSURFACE SECTIONALIZING SWITCHES
NO SCALE

A DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

E-15

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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04	SF	80	12.9	62	79

Carol Light
REGISTERED ELECTRICAL ENGINEER — DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL — STATE OF CALIFORNIA

SILVERMAN & LIGHT
2010 PARK AVENUE - SUITE 100
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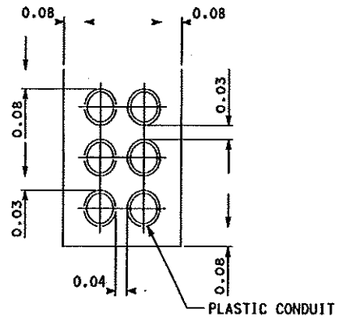
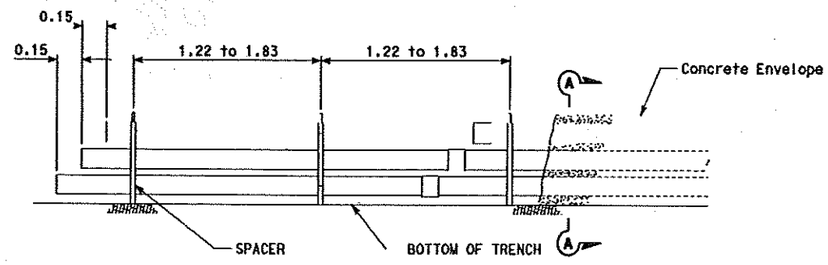


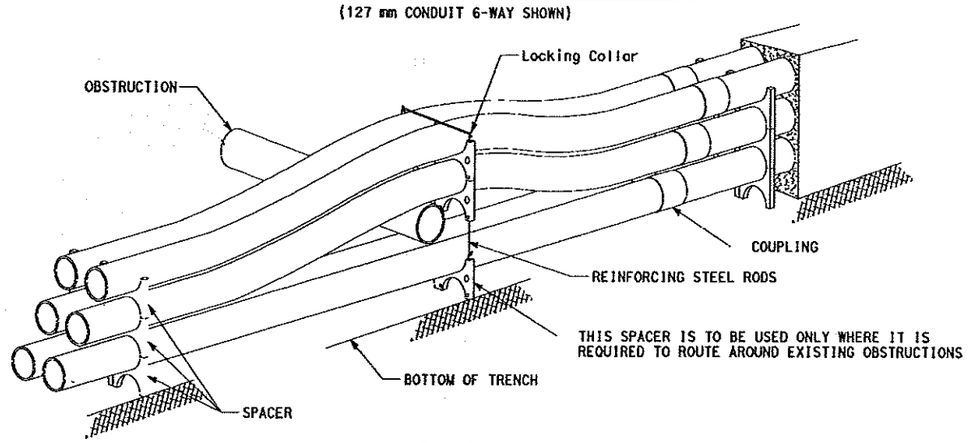
SECTION A-A



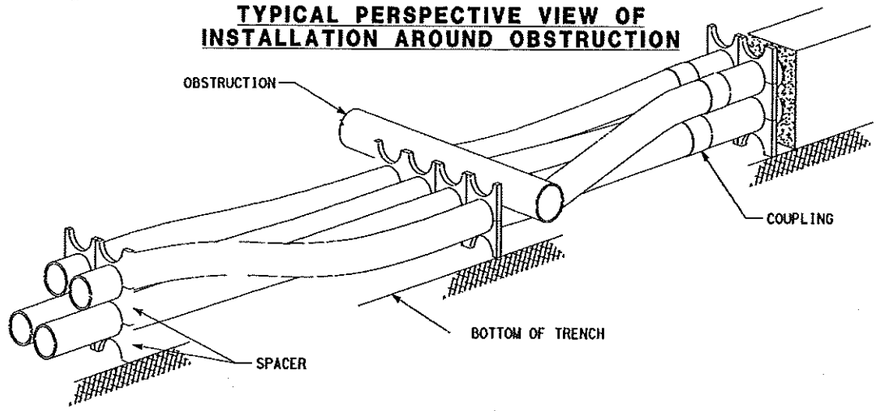
FRONT VIEW

TYPICAL STRAIGHT RUN INSTALLATION

(127 mm CONDUIT 6-WAY SHOWN)



TYPICAL PERSPECTIVE VIEW OF INSTALLATION AROUND OBSTRUCTION



TYPICAL PERSPECTIVE VIEW OF INSTALLATION UNDER OBSTRUCTION

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
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RESIDENT ENGINEER R Duncan

ELECTRICAL DETAILS
UTILITY COMPANY TYPICAL DETAIL
UNDERGROUND DUCT LINES CONCRETE ENCASED

NO SCALE

A DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

E-16

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: BJ
CHECKED BY: CL

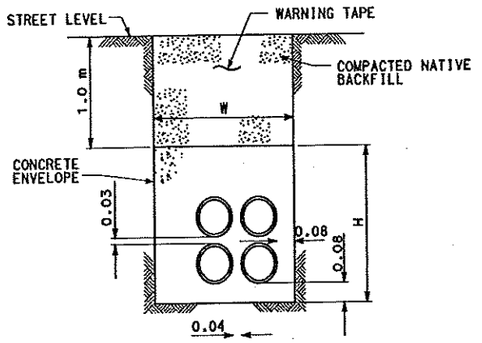
DATE	REVISED BY	DATE REVISED

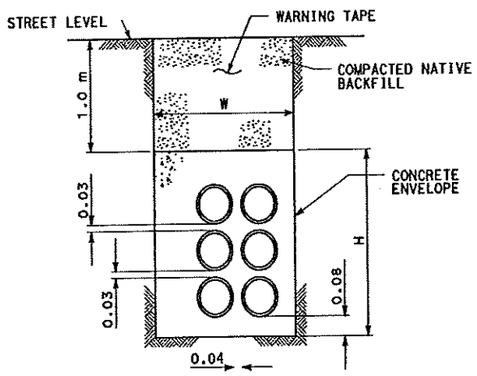
LAST REVISION 00-00-00
DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 12:33

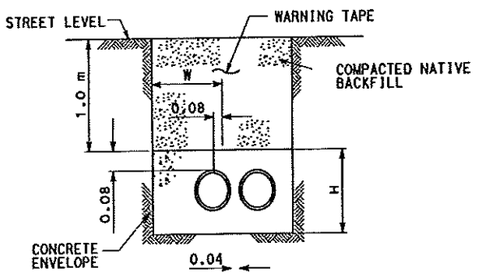
FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS — 0 20 40 60 80

DGN FILE => 40120q_16.dgn
USER NAME => ahuang

CU 04251 | EA 012001







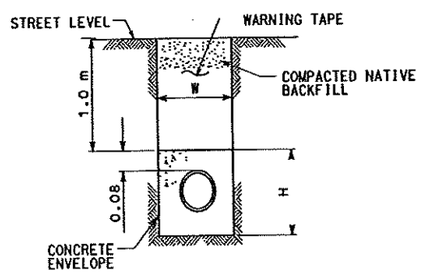


TABLE 1. DISTRIBUTION DUCT LINES

CONDUIT (mm)		ENVEVOPE DIM. (mm)	
	SIZE	W	H
4-WAY	103	419	419
6-WAY	103	419	572
2-WAY	78	368	241
	103	419	269

TABLE 2. SINGLE DUCT

CONDUIT (mm)		ENVELOPE DIM. (mm)	
	SIZE	W	H
SINGLE	53	216	216

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	63	79

Caltrans Metric

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL STATE OF CALIFORNIA

SILVERMAN & LIGHT
2010 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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SHEET NOTES:

1. QUANTITIES ARE APPRPXIMATE AND INCLUDE 10% ADDED FOR VARIATIONS ENCOUNTERED IN CONSTRUCTION.
2. WHERE WIDTH OF TRENCH IS GREATER THAN THE REQUIRED WIDTH OF THE ENVELOPE, THE HORIZONTAL SPACING BETWEEN CONDUITS MAY BE INCREASED AS LONG AS THE 80 mm SPACING BETWEEN CONDUIT AND OUTSIDE EDGE OF ENVELOPE IS MAINTAINED.
3. FOR DUCT LINES 4-WAY AND LARGER IN FILL AREAS OR AREAS OF KNOWN DIFFERENT GROUND SETTLEMENT, INSTALL #4 REINFORCING BARS IN ALL FOUR CORNERS OF THE CONDUIT ENVELOPE. OVERLAP BARS 380 mm AND INSTALL A MINUMUM OF 76 mm FROM TOP OR BOTTOM AND 25 mm FROM THE SIDE OF THE ENVELOPE.
4. CONCETE ENCASEMENT OF DUCT LINES OF LESS THAN 4-WAY SHOULD BE USED ONLY WHERE SEVERE EXPOSURE TO "DIG-INS" EXIST.
5. SLOPE SUFFICIENTLY TO PROVIDE ADEQUATE DRAINAGE. ON LEVEL GROUND SLOPE DUCT LINE FRON CENTER TO EACH PULL BOX.
6. LOCAL ORDINANCES MAY REQUIRE A MINIMUM DEPTH GREATER THAN 0.76 m DEPTH MAY BE REDUCED TO 0.46 m IN SIDEWALK AREA IF LOCAL ORDINACES PERMIT.

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ELECTRICAL DETAILS
UTILITY COMPANY TYPICAL DETAIL
UNDERGROUND DUCT LINES CONCRETE ENCASED
NO SCALE

E-17

A DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

DGN FILE => 40120q_17.csb
USERNAME => dh_ang

CU 04251

EA 012001

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: BJ
CHECKED BY: CL

DATE	REVISED BY	DATE REVISED

LAST REVISION 00-00-00

DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 12:34

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	64	79

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL STATE OF CALIFORNIA

SILVERMAN & LIGHT
2011 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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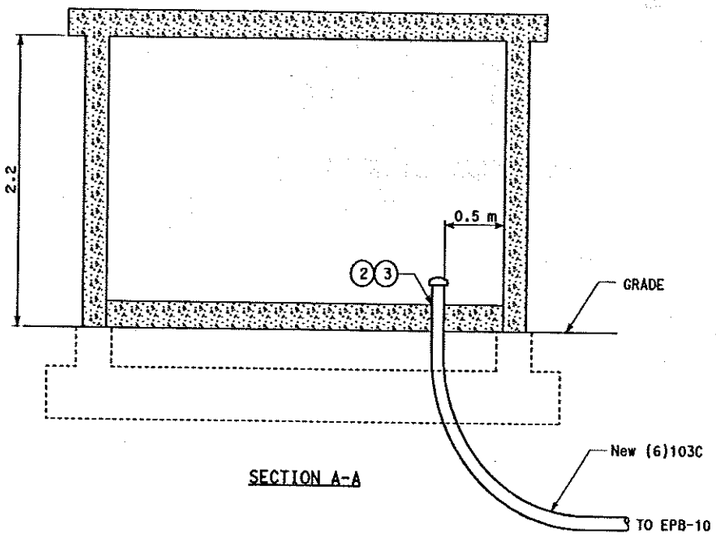
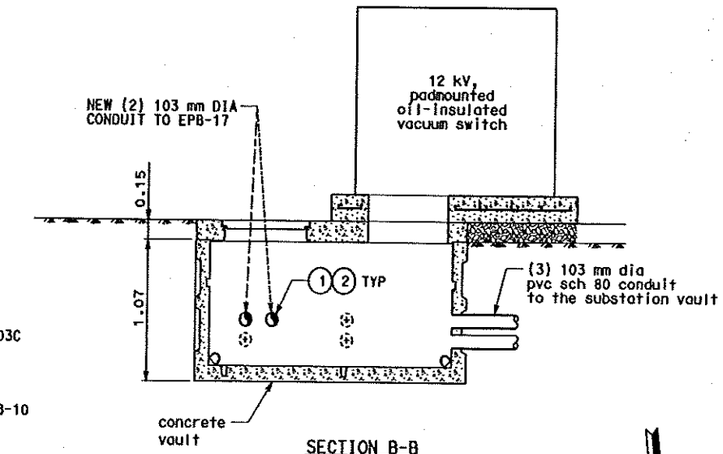


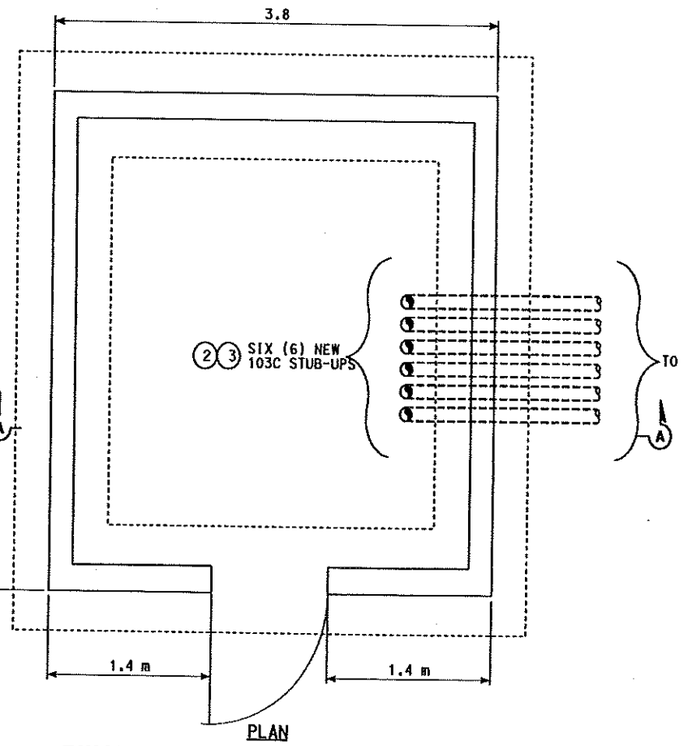
SECTION A-A



SECTION B-B

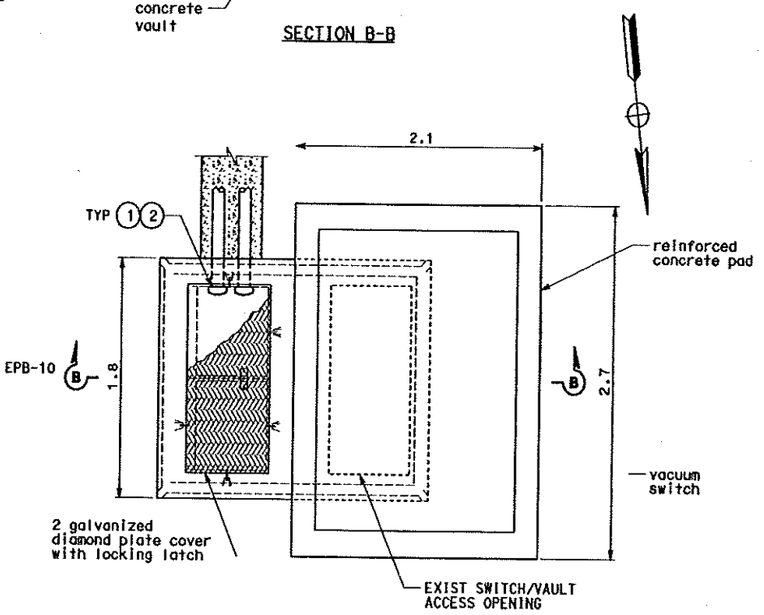
SHEET NOTES:

1. CORE DRILL EXISTING CONCRETE VAULT WALL.
2. SEAL AROUND CONDUIT.
3. CORE DRILL EXISTING CONCRETE FLOOR SLAB.



PLAN

EXISTING ELECTRICAL VAULT 106
(SEE E-3 FOR LOCATION)



PLAN

EXISTING SUBSTATION 12 kV VACUUM SWITCH
(SEE E-10 FOR LOCATION AT UTILITY YARD)

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ELECTRICAL DETAILS
CABLE RISERS IN EXISTING 12 kV VACUUM SWITCH AND IN EXISTING ELECTRICAL VAULT 106
NO SCALE

E-18

A DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

DGN FILE => 40120q_18.dgn
USERNAME => ahsong

CU 04251 EA 012001

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: BJ
CHECKED BY: CL
DATE REVISED BY
DATE REVISED

LAST REVISION 00-00-00
DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 12:34

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	65	79

Caltrans Metric

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CAROL LIGHT No. 10145 Exp. 09/30/03 ELECTRICAL STATE OF CALIFORNIA

SILVERMAN & LIGHT
2011 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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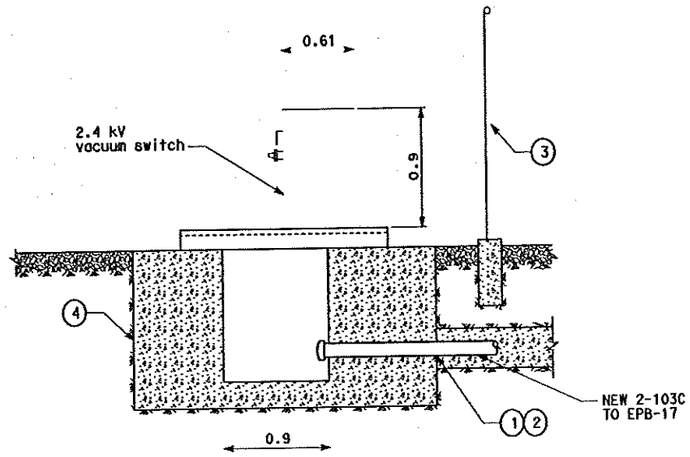
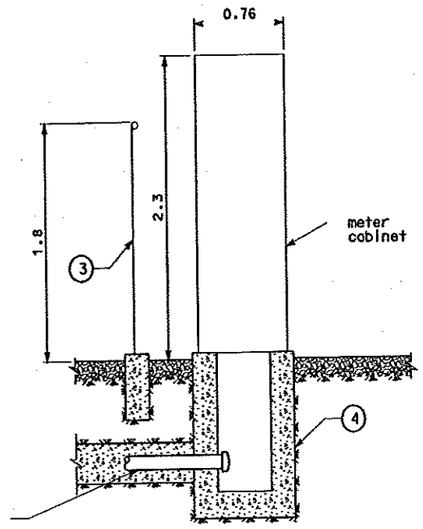
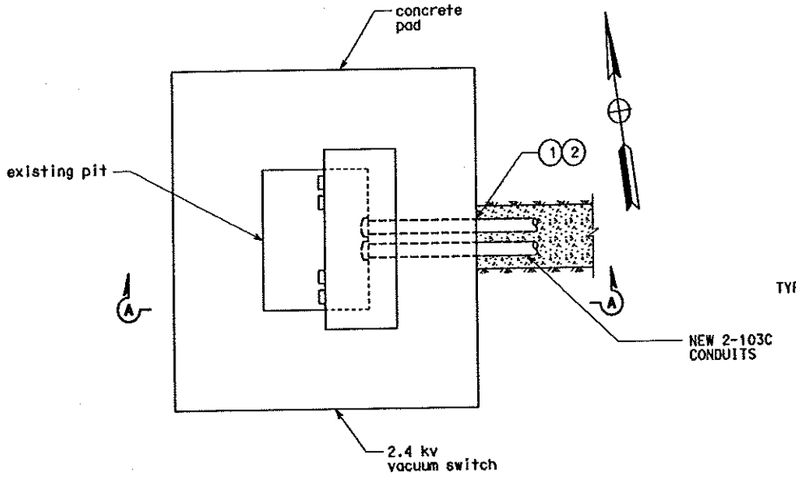


SECTION A-A

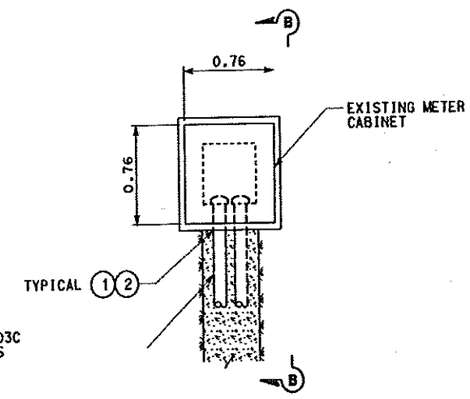


SECTION B-B



PLAN

EXISTING 2.4 kV VACUUM SWITCH
(SEE E-10 FOR UTILITY YARD LAYOUT)



PLAN

EXISTING 4.6 kV METER CABINET
(SEE E-10 FOR UTILITY YARD LAYOUT)

SHEET NOTES:

1. CORE DRILL EXISTING CONCRETE PIT WALL. VERIFY WALL THICKNESS IN FIELD.
2. SEAL AROUND CONDUIT.
3. REMOVE EXISTING FENCE TO ALLOW TRENCHING FOR NEW CONDUITS.
4. VERIFY PIT WALL DIMENSIONS IN THE FIELD.

NO Construction Changes

CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ELECTRICAL DETAILS
CABLE RISERS IN EXISTING 2.4 kV VACUUM SWITCH & EXISTING 4.6 kV METER CABINET AT UTILITY YARD
NO SCALE

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

E-19

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: BJ
CHECKED BY: CL
DATE REVISED BY
DATE REVISED

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS (0 20 40 60 80)

DGN FILE => 40120q19.csb
USERNAME => oh.ang

CU 04251 | EA 012001

LAST REVISION 00-00-00
DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 12:35

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	66	79

Caltrans Metric

Carol Light
REGISTERED ELECTRICAL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
CAROL LIGHT
No. 10145
Exp. 09/30/03
ELECTRICAL
STATE OF CALIFORNIA

SILVERMAN & LIGHT
2011 PARK AVENUE - SUITE 100
EMERYVILLE, CA 94608-3632

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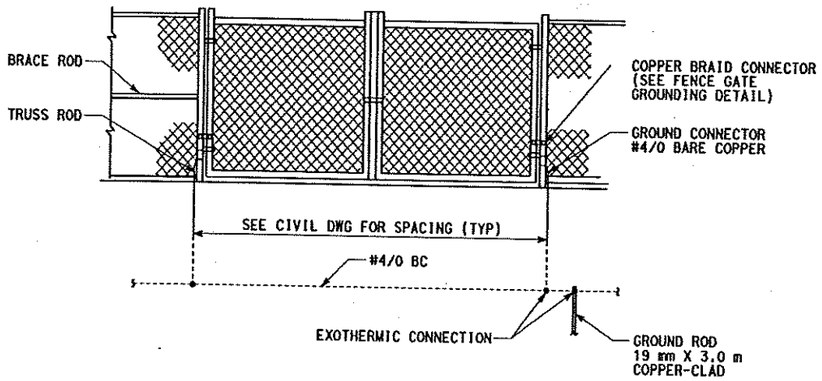
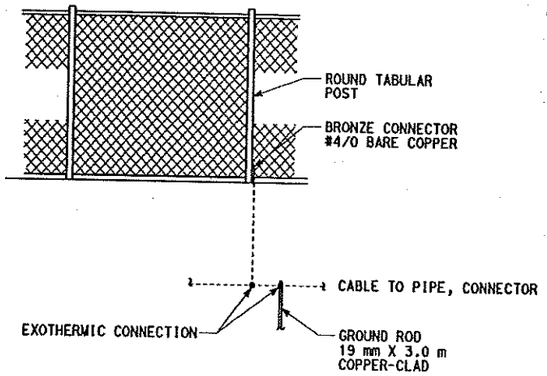
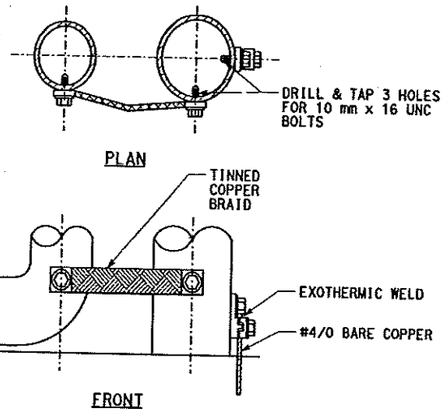


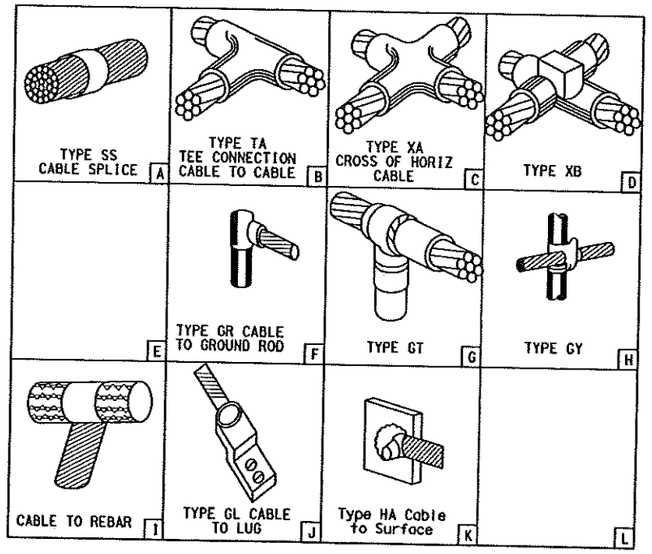
GATE GROUNDING DETAIL
(TRANSFORMER TX-177)



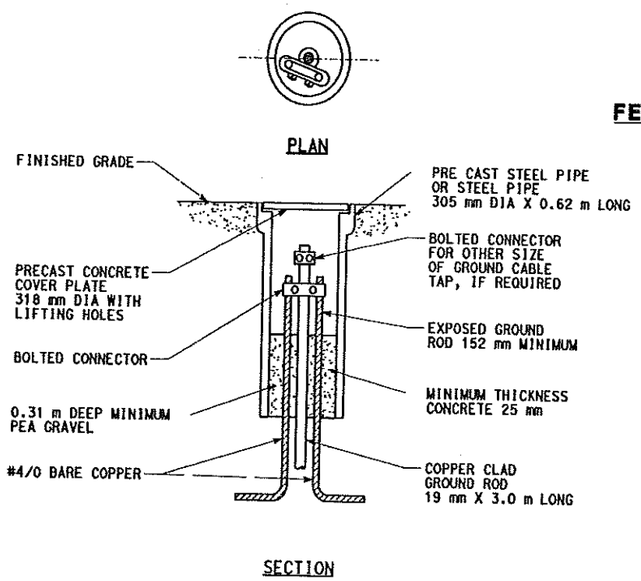
FENCE GROUNDING DETAIL
(TRANSFORMER TX-177)



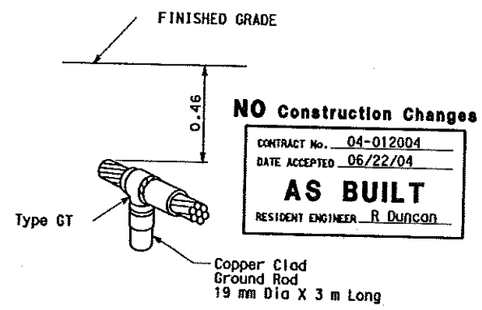
FENCE GATE GROUNDING DETAIL



EXOTHERMIC CONNECTIONS (FIG. A THRU K)



GROUNDING WELL



BURIED-GROUND ROD

NO Construction Changes
CONTRACT No. 04-012004
DATE ACCEPTED 06/22/04
AS BUILT
RESIDENT ENGINEER R Duncan

ELECTRICAL DETAILS
UTILITY COMPANY TYPICAL DETAIL
GROUNDING CONNECTIONS
NO SCALE

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

DGN FILE => 40120q_20.cdb
USERNAME => ahlang

CU 04251 EA 012001

E-20

DATE PLOTTED => 11-MAR-2005
TIME PLOTTED => 12:35

LAST REVISION 00-00-00

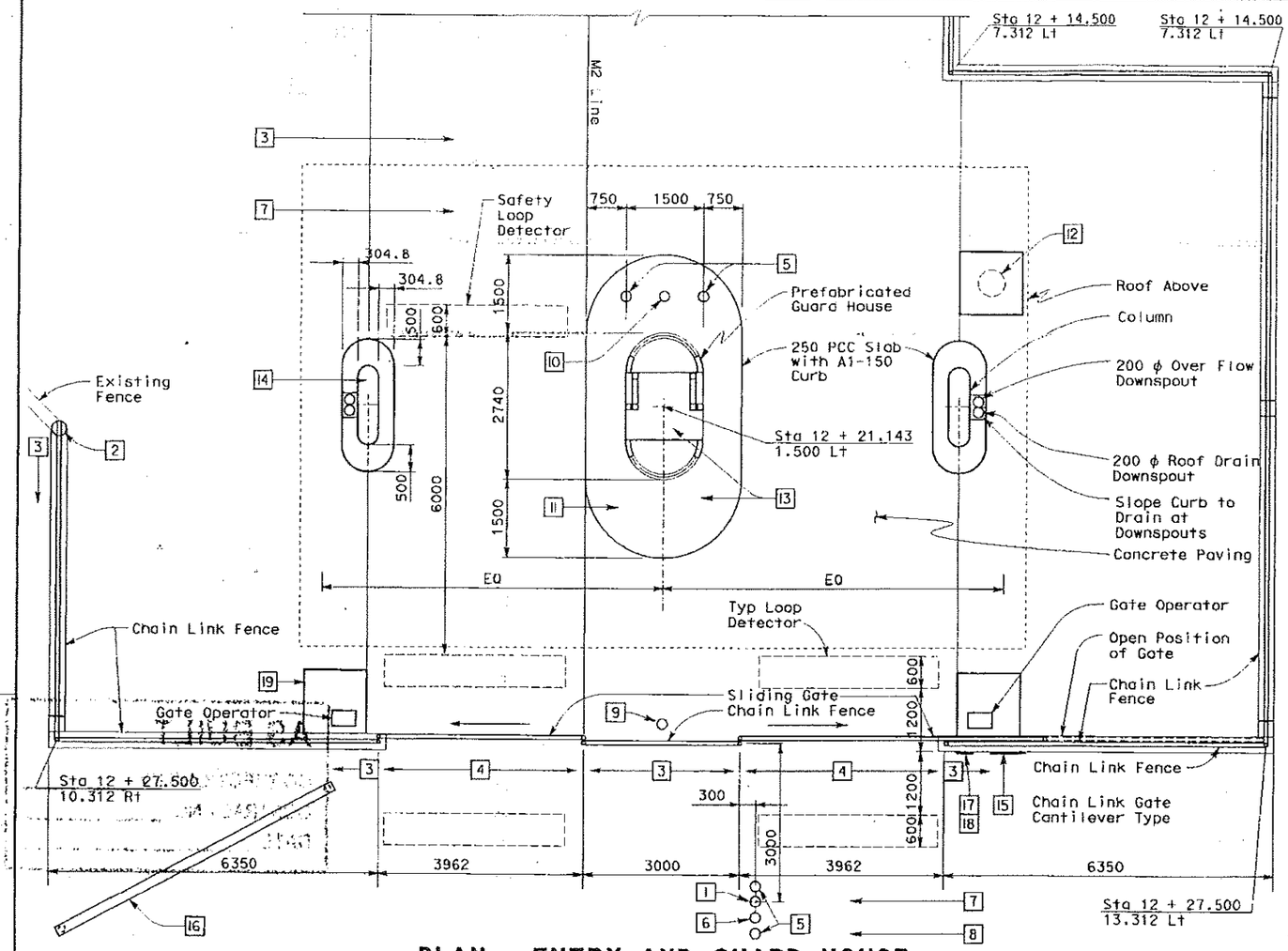
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT
Bob Zandipour

CALCULATED/DESIGNED BY BJ
CHECKED BY CL
DATE REVISED BY
DATE REVISED

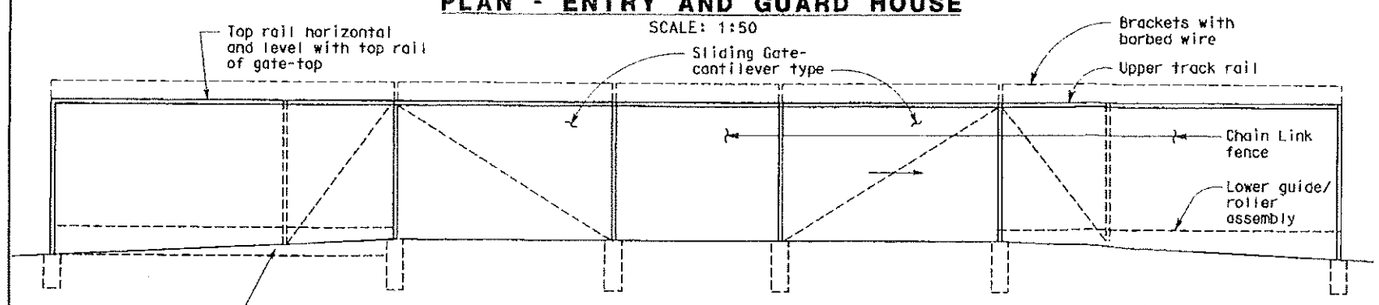
file://G:\Built-Design\04-0120Q4\As%20built%20Tiff\40120qu20.tif

7/20/2005



PLAN - ENTRY AND GUARD HOUSE

SCALE: 1:50



ELEVATION - SLIDING GATES - YBI

SCALE: 1:50

NOTES:

1. 2800 high pedestal with card reader, intercom and CCTV.
2. New corner post and connection to existing fence.
3. Brackets for barbed wire shall project toward exterior at chain link fence.
4. Brackets at sliding gates for barbed wire shall slope toward Coast Guard property.
5. Typ Bollard, 1000 h x 100 dia.
6. Telephone in Cabinet on Typ bollard.
7. Pavement sign - "STOP" - Std plan A240.
8. 4-striped on pavement 300 x 1900 @ 1200 O.C.
9. Relocate Exist red light-mount on Typ bollard.
10. Relocate Exist yellow light-mount on Typ bollard.
11. Yellow paint at curb-vertical-full height; top of curb-continuous stripe 150 wide.
12. Relocate Exist weapon clearing barrel.
13. Heavy broom texture at concrete.
14. Conduits for lights and camera embedded in column and canopy.
15. Relocate Exist "Wellcome" sign on fence.
16. Relocate Exist "Coast Guard" sign.
17. Relocate Exist "Auto Gate" sign on fence.
18. Relocate Exist "Search" sign on fence.
19. 1200 x 1200 AC pad for equipment.

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	71	79

Robert Brooks Howell 03/28/03
REGISTERED ARCHITECT DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED ARCHITECT ROBERT BROOKS HOWELL No. C 8657 Exp. 8/30/03 Architecture STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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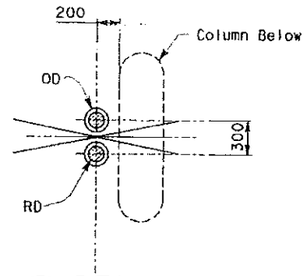
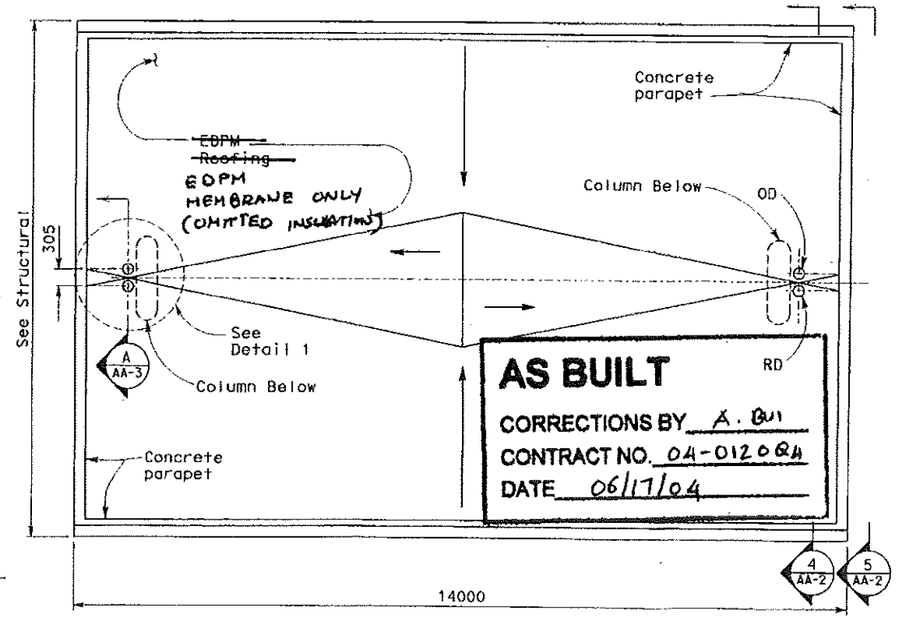


1 **DETAIL**
SCALE: 1:25



AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120G4
DATE 06/17/04

ROOF PLAN

SCALE: 1:50

SCALE: 1:50

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY R. Howell	CHECKED G. Lusherovich	
LAYOUT	BY R. Hernandez	CHECKED R. Howell	
QUANTITIES	BY P. McNamee	CHECKED R. Porrino	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
ARCHITECTURAL DESIGN

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

ENTRANCE CANOPY
PLAN & ELEVATION

AA-1

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04251
EA 0120H1

DGN FILE => aa01.dgn
USERNAME => tmorlok

DISREGARD POINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:43

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	72	79

Robert Brooks Howell 03/28/03
REGISTERED ARCHITECT DATE

5-20-03
PLANS APPROVAL DATE

LICENSED ARCHITECT ROBERT BROOKS HOWELL No. C 8657 Exp. 8/30/03 Architectural STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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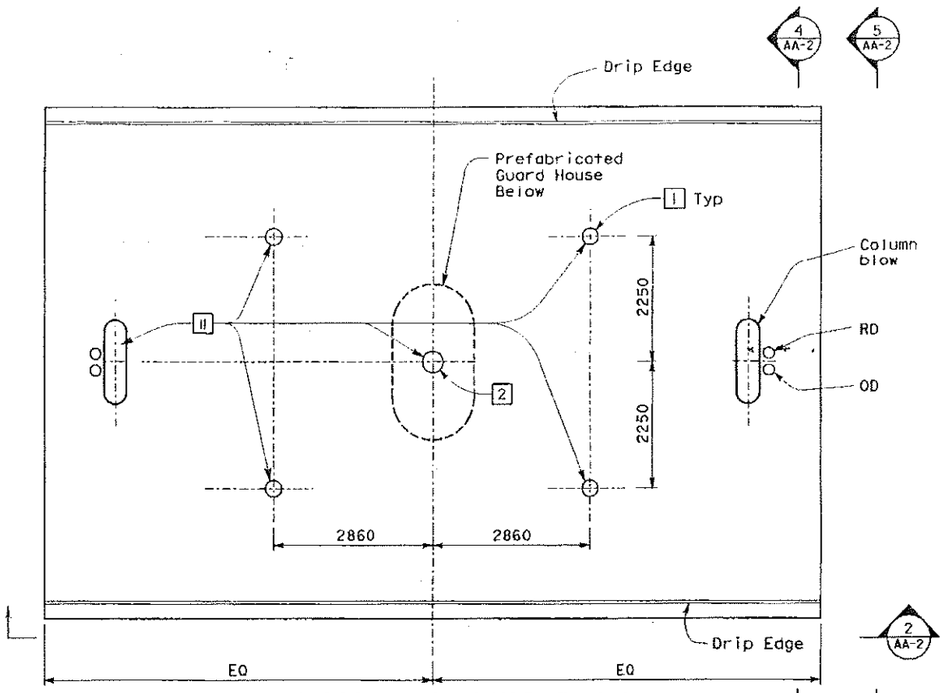
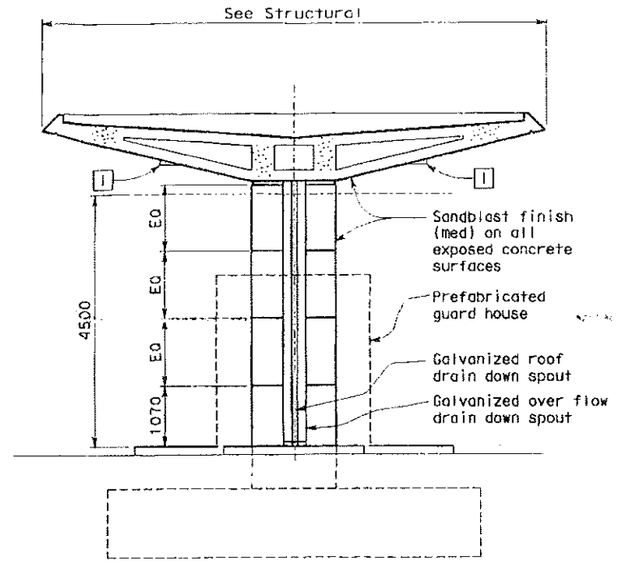
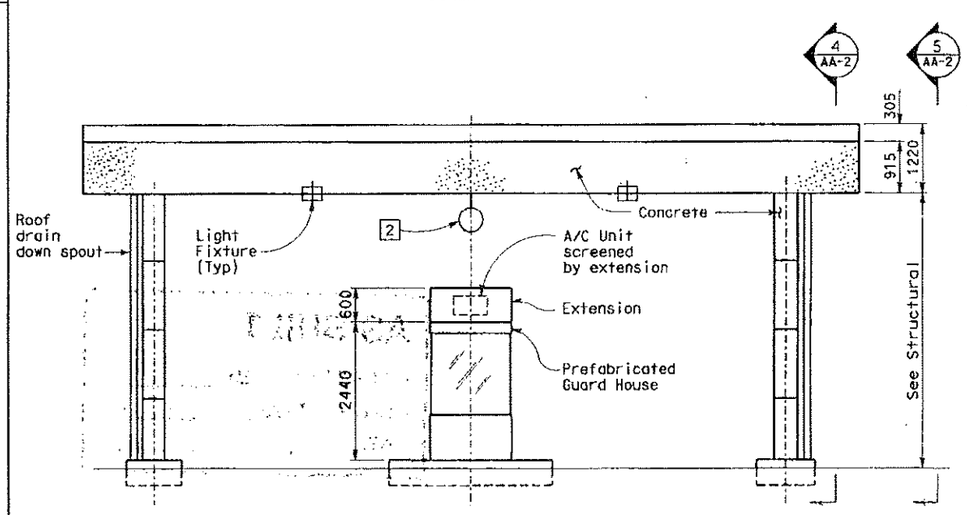
Caltrans Metric



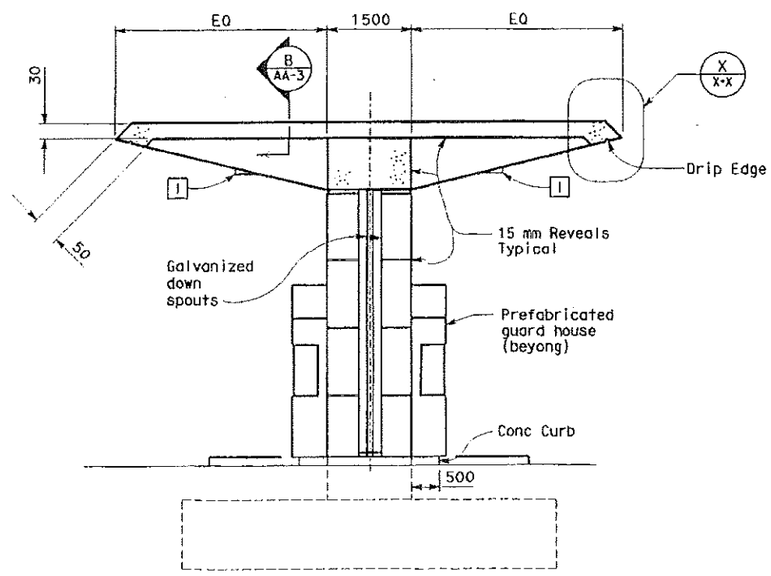
REFLECTED CEILING PLAN
SCALE: 1:50



4 SECTION
SCALE: 1:50



2 ELEVATION - ENTRANCE CANOPY - YBI
SCALE: 1:50

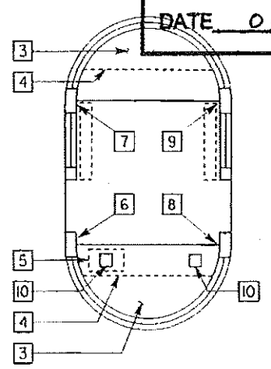


5 SECTION
SCALE: 1:50

NOTES:

1. 280 diameter concrete base for mounting light fixtures parallel horizontally.
2. Relocated CCTV camera and enclosure.
3. Plastic laminate counter-900h.
4. Vertical painted 37 thick plywood panel for mounting j-boxes and UPS. mount under counter.
5. Relocate 4 drawer pistol safe.
6. Relocate clock on wall
7. Coat-hook on wall.
8. Phone on wall
9. Light switch on wall.
10. Install gate operating controls in 2 panels in counter.
11. Conduits for lights and camera embedded in column and canopy.

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120R4
DATE 06/17/04



6 PLAN - GUARD HOUSE
SCALE: 1:25

SCALE: 1:50
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY R. Howell	CHECKED G. Lusherovich	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF STRUCTURES ARCHITECTURAL DESIGN	BRIDGE NO. 34-0006	ENTRANCE CANOPY
LAYOUT	BY R. Hernandez	CHECKED R. Howell			KILOMETER POST 12.7/13.0	REF CANOPY PLAN, ELEVATION & SECTION — AA-2
QUANTITIES	BY P. McNamee	CHECKED R. Perrino				

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04251
EA 0120H1

DGN FILE => aa02.dgn
USERNAME => tmorick

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:42

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	73	79

Robert Brooks Howell 03/28/03
REGISTERED ARCHITECT DATE

5-20-03
PLANS APPROVAL DATE

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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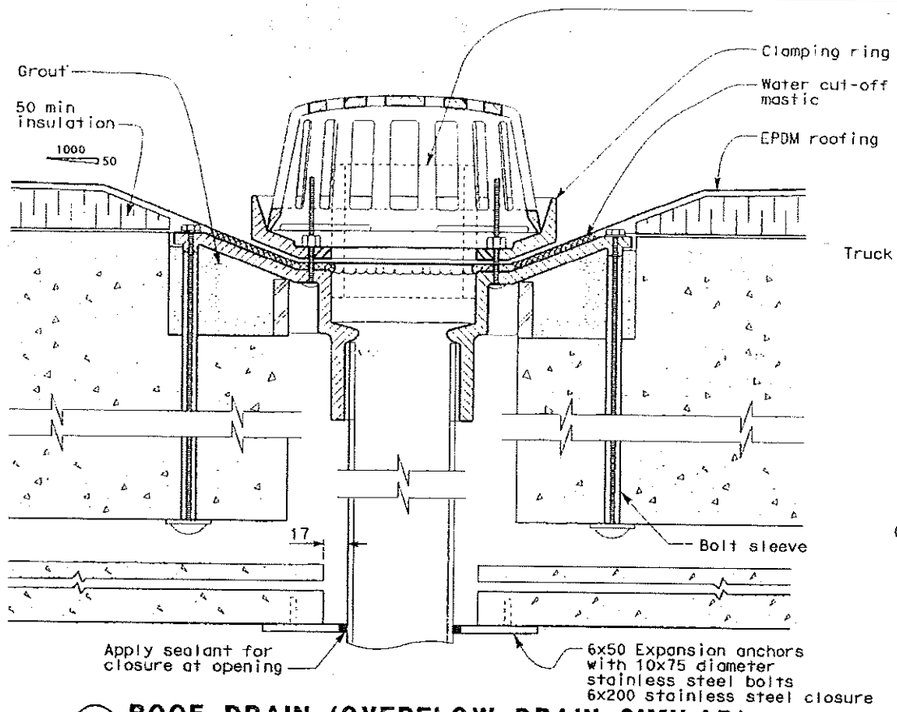
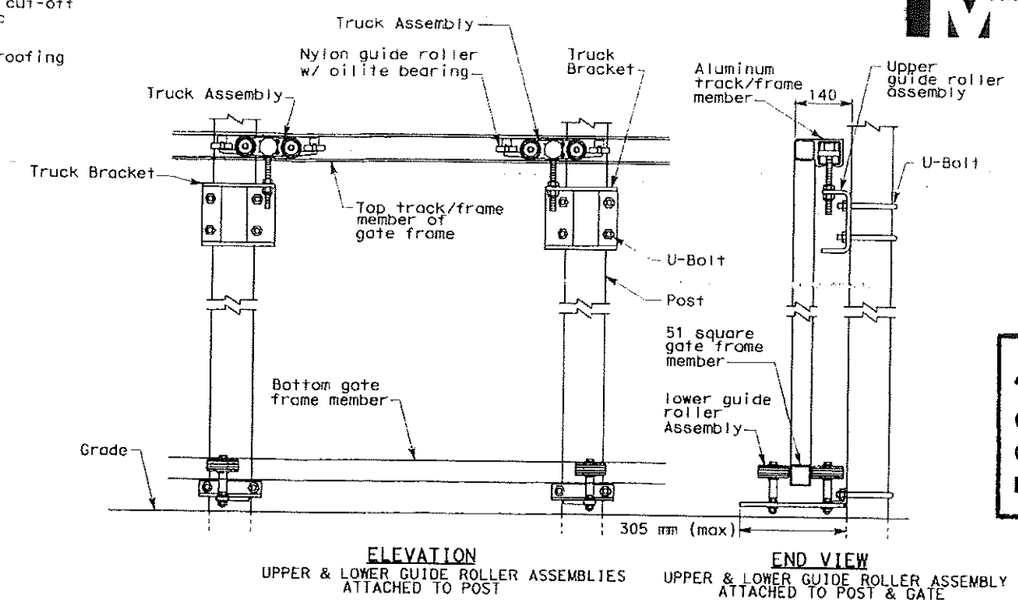
AS BUILT
CORRECTIONS BY A. DUI
CONTRACT NO. 04-0120 U4
DATE 06/17/04



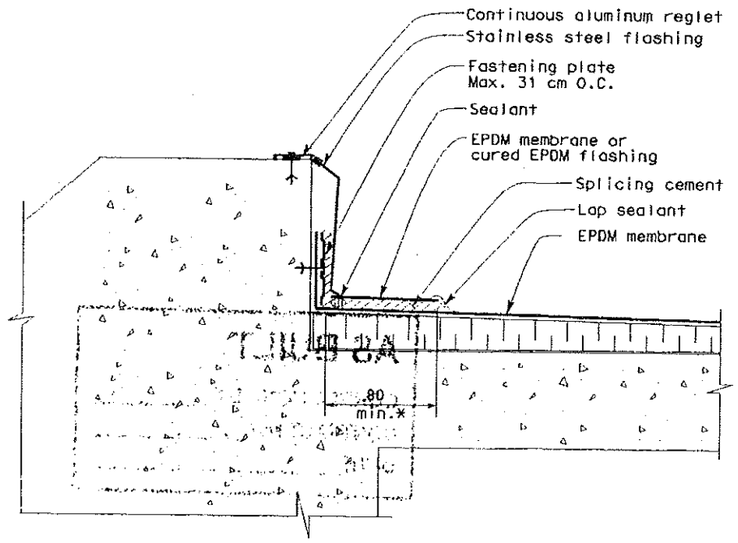
(A) ROOF DRAIN (OVERFLOW DRAIN SIMILAR)
NO SCALE



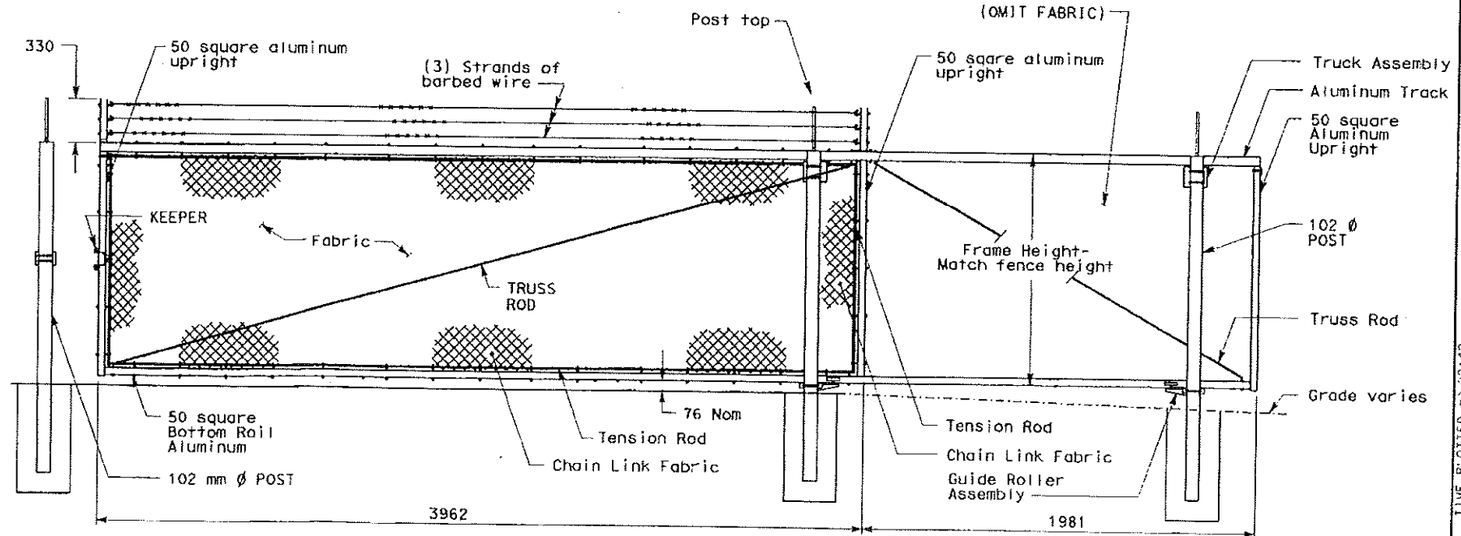
ELEVATION
UPPER & LOWER GUIDE ROLLER ASSEMBLIES ATTACHED TO POST

END VIEW
UPPER & LOWER GUIDE ROLLER ASSEMBLY ATTACHED TO POST & GATE

CANTILEVERED SLIDING GATES DETAIL
NO SCALE



(B) PARAPET FLASHING
NO SCALE



GATE ELEVATION
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY R. Howell	CHECKED G. Lusherovich	
LAYOUT	BY R. Hernandez	CHECKED R. Howell	
QUANTITIES	BY P. McNamee	CHECKED R. Porrino	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
ARCHITECTURAL DESIGN

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

ENTRANCE CANOPY
DETAILS

AA-3

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04251
EA 0120H1

DGN FILE => aa03.dgn
USERNAME => trnoriok

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:42

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	74	79

REGISTERED STRUCTURAL ENGINEER 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Wei Shing Owyang No. S 2246 Exp. 12/31/05 STRUCTURAL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
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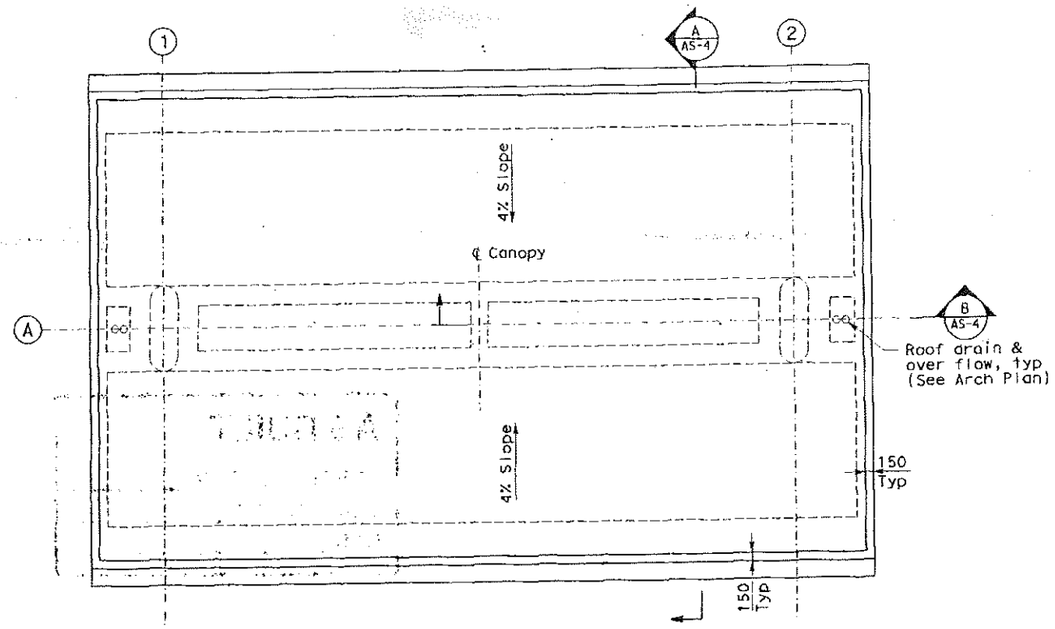
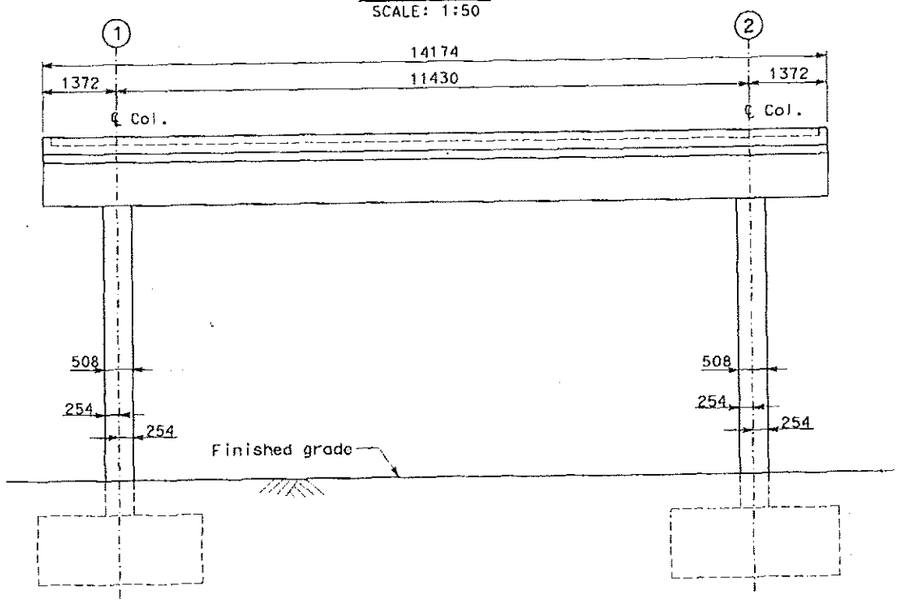
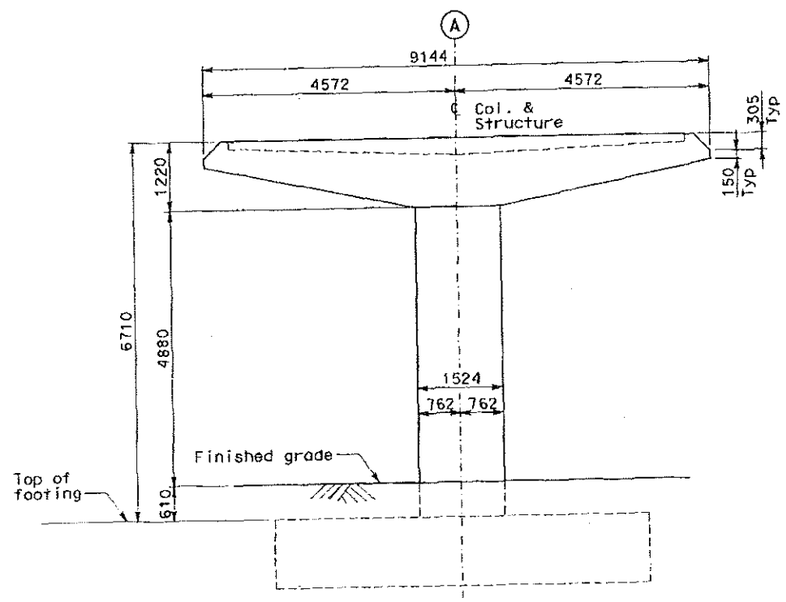


PLAN
SCALE: 1:50



FRONT ELEVATION
SCALE: 1:50



SIDE ELEVATION
SCALE: 1:50

GENERAL NOTES:

1. The ultimate cylinder strength of concrete (fc') at 28 days shall be 27.58 MPa.
2. Reinforcement shall conform to ASTM A615M, Grade 420 deformed steel bars (fy=420 MPa).
3. Design loads:

   Dead load - Structural weight plus 311.2 Pa roofing and 215.5 Pa lost form.
   Live load - 958 Pa
   Seismic forces - Based on UBC seismic zone 4 with Z=0.4, I=1.0, Ca=.44Na, Na=1.0, Cv=0.64Nv, Nv=1.12
4. Building Types - Ordinary moment-resisting frame (OMRF) in the longitudinal direction and Cantilevered column building system in the transverse direction.
5. Seismic response reduction factors:

   R = 3.5 for force in the longitudinal direction and
   R = 2.2 for force in the transverse direction.
6. Design Codes:

   UBC - Uniform Building Code, 1997 Edition.
   ACI - Building Code Requirements for Structural Concrete (ACI 318-99).
7. Allowable soil bearing pressure - 167.57 kN/m^2 with one-third increase for loads combined with seismic force.
8. Friction coefficient between footing and soil for lateral force resistance-0.4.
9. See architectural plan for orientation and location.

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120G4
DATE 06/17/04

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY W.S. Owyang	CHECKED L. Johnson	
LAYOUT	BY R. Hernandez	CHECKED W.S. Owyang	
QUANTITIES	BY W.S. Owyang	CHECKED L. Johnson	

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

CU 04251
EA 0120H1

DGN FILE => as01.dgn
USERNAME => trrichf

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

ENTRANCE CANOPY
PLAN AND ELEVATIONS

AS-1

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:29

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	12.9	75	79

REGISTERED STRUCTURAL ENGINEER 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Wee Shing Owyang No. S 2246 Exp. 12/31/05 STRUCTURAL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
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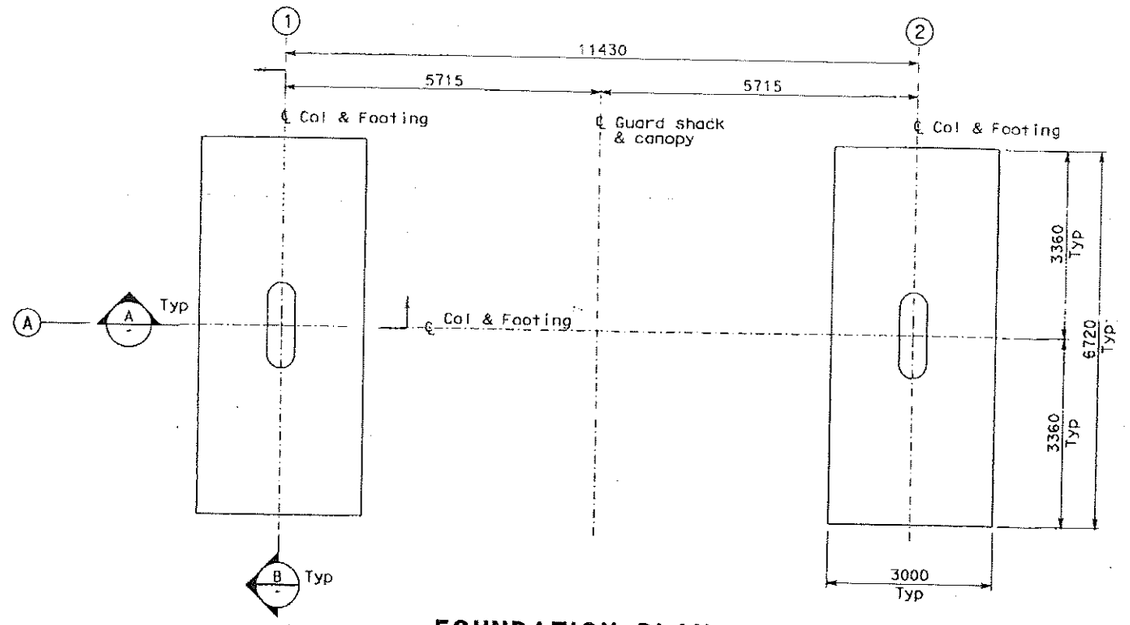
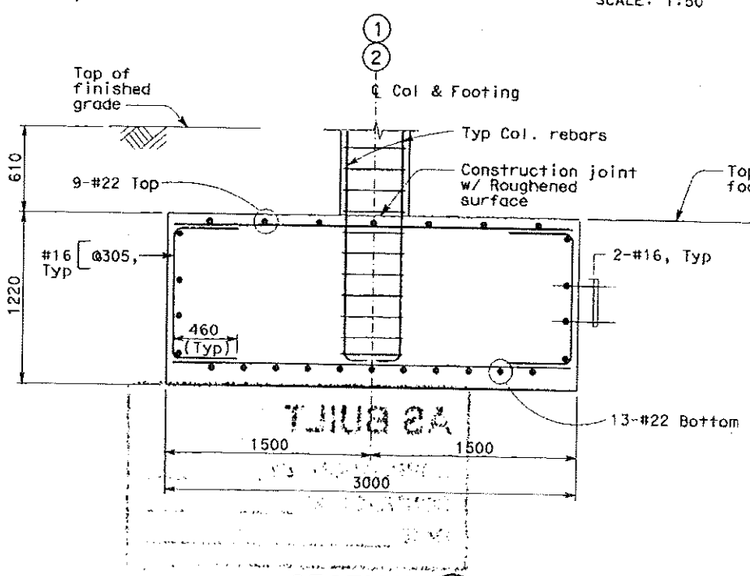


FOUNDATION PLAN
SCALE: 1:50

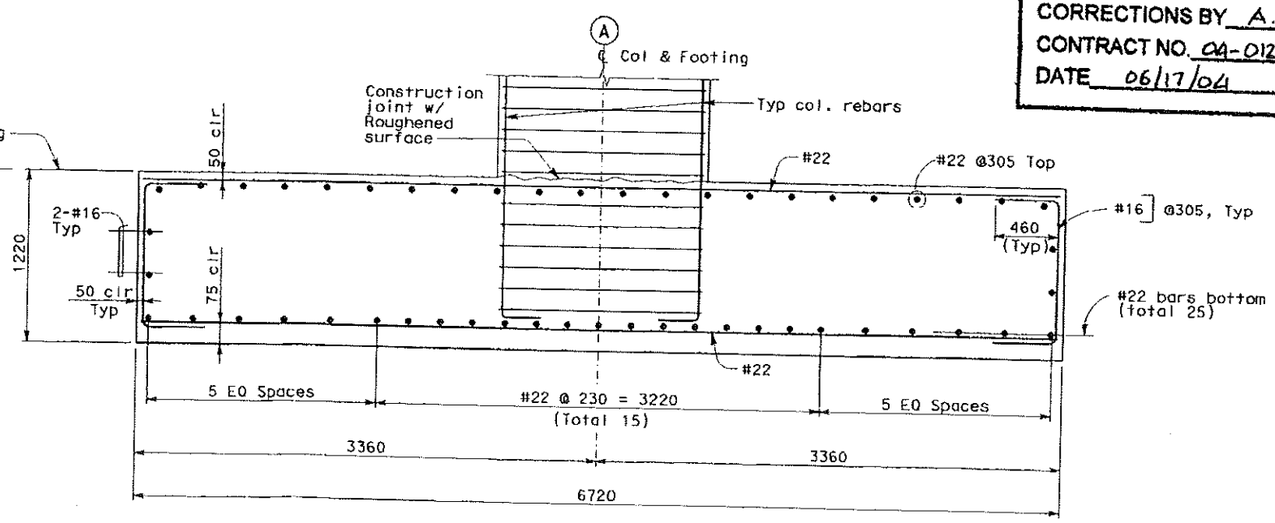
NOTES:

1. For general notes, see sheet AS-1.
2. See architectural plan for orientation and location.

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120U4
DATE 06/17/04



SECTION A
SCALE: 1:20



SECTION B
SCALE: 1:20

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

	BY	CHECKED
DESIGN	W.S. Owyang	L. Johnson
LAYOUT	R. Hernandez	W.S. Owyang
QUANTITIES	W.S. Owyang	L. Johnson

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

CU 04251
EA 0120H1

DGN FILE => as02.dgn
USERNAME => trrichf

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

ENTRANCE CANOPY
FOUNDATION PLAN AND SECTIONS

AS-2

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:29

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	76	79

REGISTERED STRUCTURAL ENGINEER — 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Wee Shing Owyang — No. C 2246 — Exp. 12/31/05 — STRUCTURAL — STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
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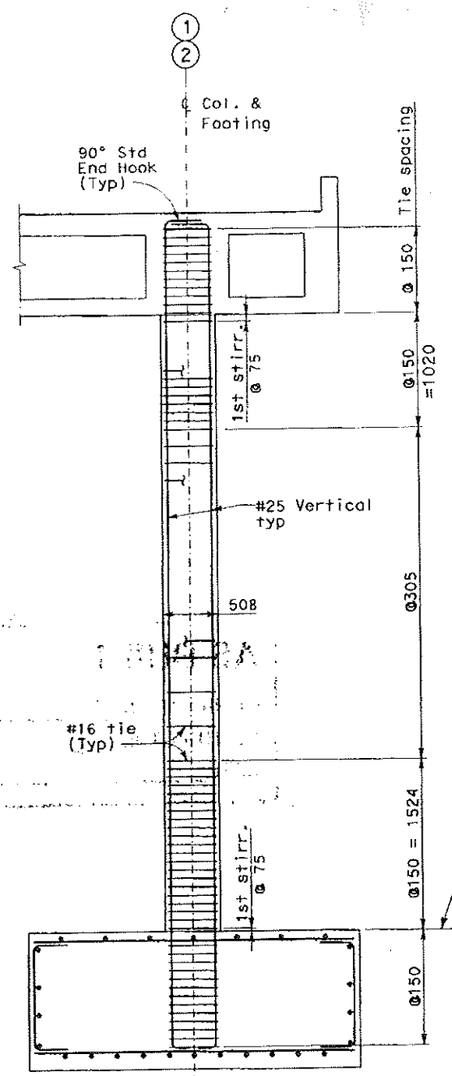
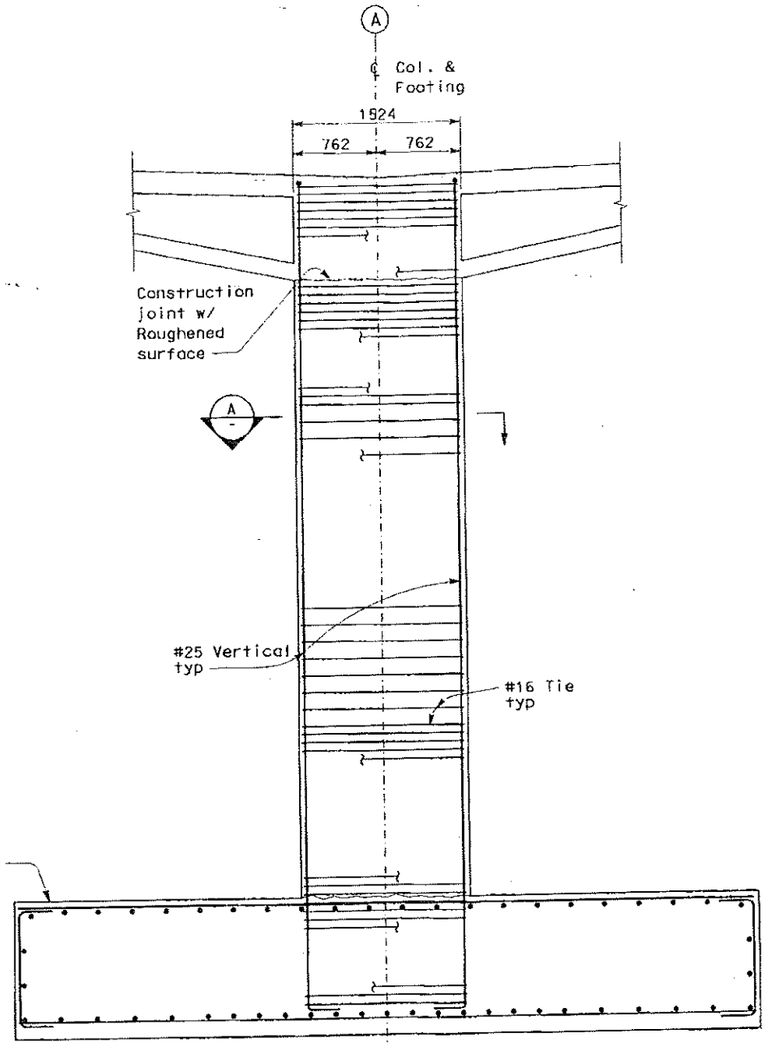


END ELEVATION

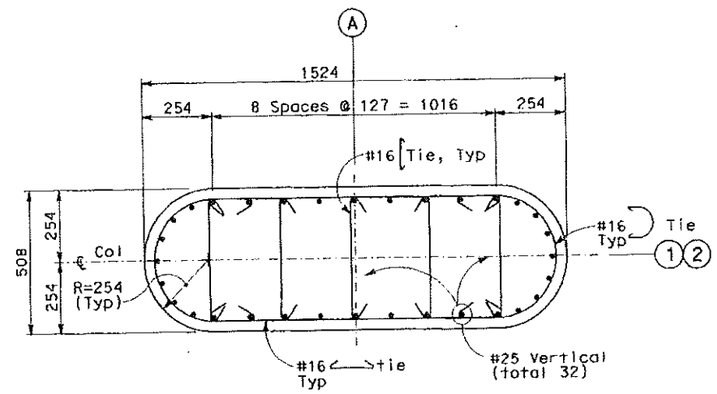


SIDE ELEVATION

COLUMN ELEVATION
SCALE: 1:25

NOTES:

1. For general notes, see sheet AS-1.



SECTION A
SCALE: 1:10

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120G4
DATE 06/17/04

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DESIGN	BY W.S. Owyang	CHECKED L. Johnson	
LAYOUT	BY R. Hernandez	CHECKED W.S. Owyang	
QUANTITIES	BY W.S. Owyang	CHECKED L. Johnson	

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

CU 04251
EA 0120H1

DGN FILE => as03.dgn
USERNAME => trrichf

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

ENTRANCE CANOPY
COLUMN ELEVATION AND SECTION

AS-3

SHEET OF

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:29

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	77	79

REGISTERED STRUCTURAL ENGINEER 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

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303 SECOND STREET, SUITE 700 N
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REGISTERED PROFESSIONAL ENGINEER — Wen Shing Owyang — No. S 2246 — Exp. 12/31/05 — STRUCTURAL — STATE OF CALIFORNIA

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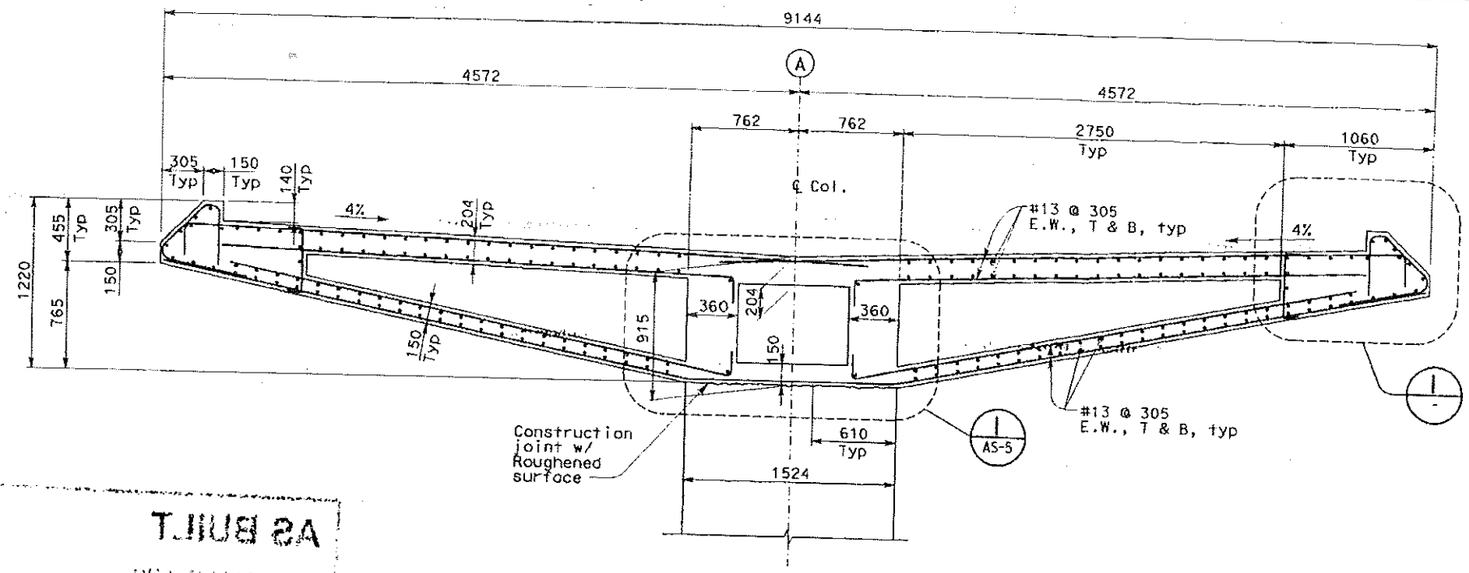
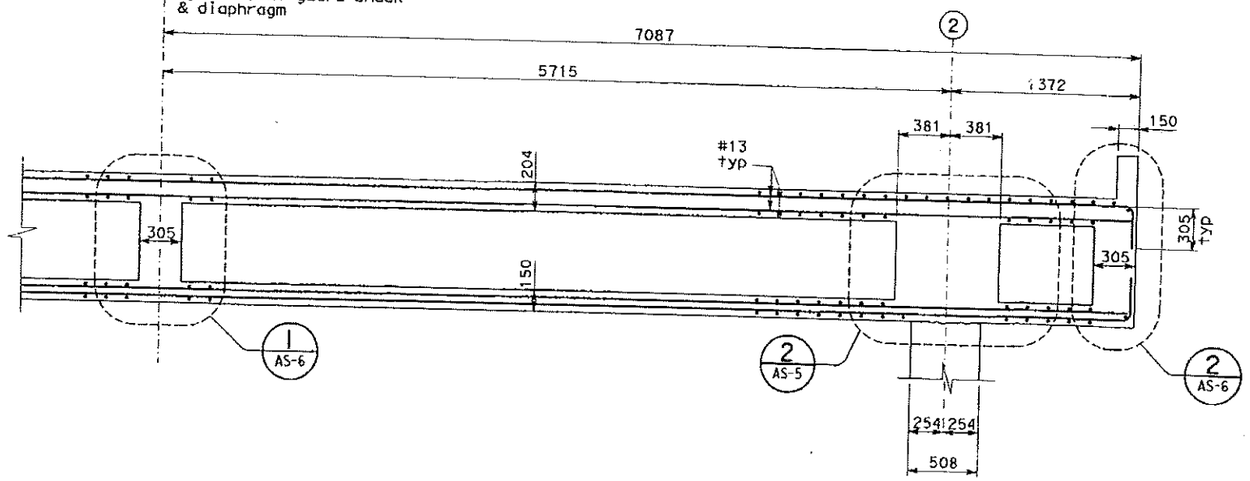


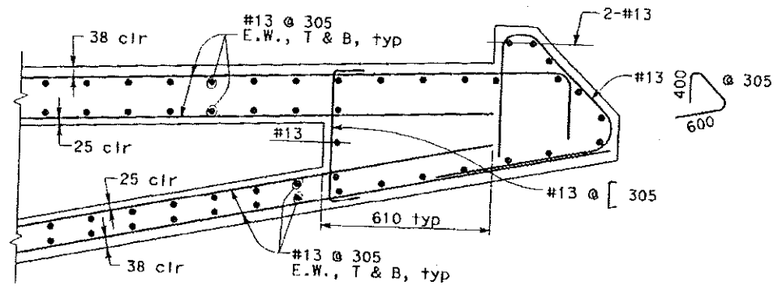
SECTION A AS-1
SCALE: 1:20

AS BUILT

℄ Symm. about guard shack & diaphragm



SECTION B AS-1
SCALE: 1:20



DETAIL 1
SCALE: 1:10

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-012004
DATE 06/17/04

NOTES:

1. For general notes, see sheet AS-1.

DESIGN	BY W.S. Owyang	CHECKED L. Johnson	
LAYOUT	BY R. Hernandez	CHECKED W.S. Owyang	
QUANTITIES	BY W.S. Owyang	CHECKED L. Johnson	

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

CU 04251
EA 0120H1

DGN FILE => as04.dgn
USERNAME => trrichf

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

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REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

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ENTRANCE CANOPY
SECTION AND DETAIL

AS-4

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:29

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	78	79

REGISTERED STRUCTURAL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
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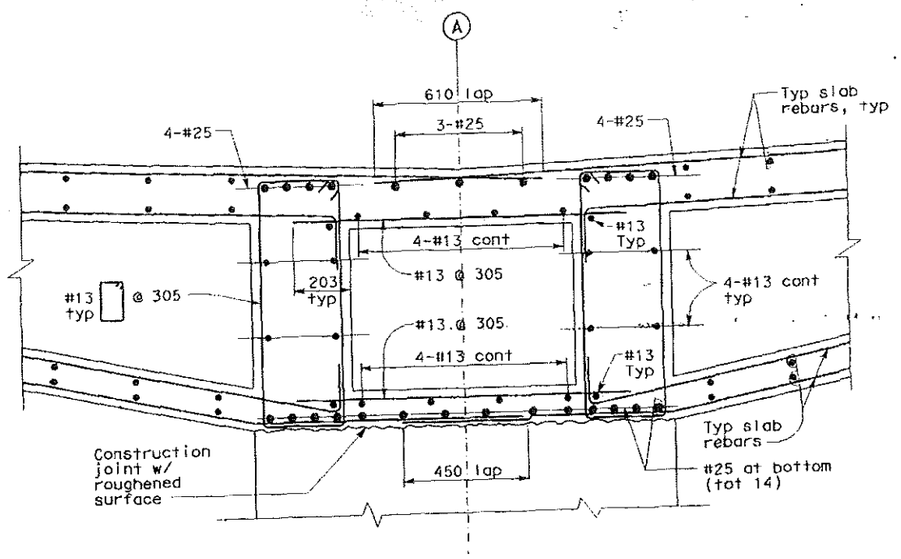
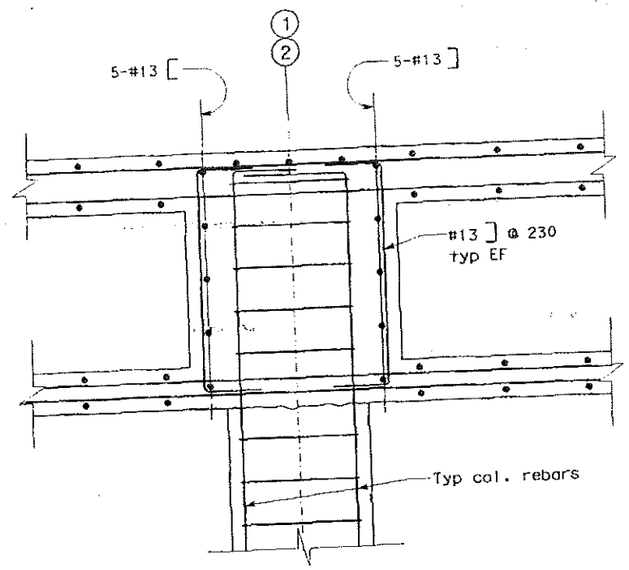


DETAIL 1 (AS-4)
SCALE: 1:10

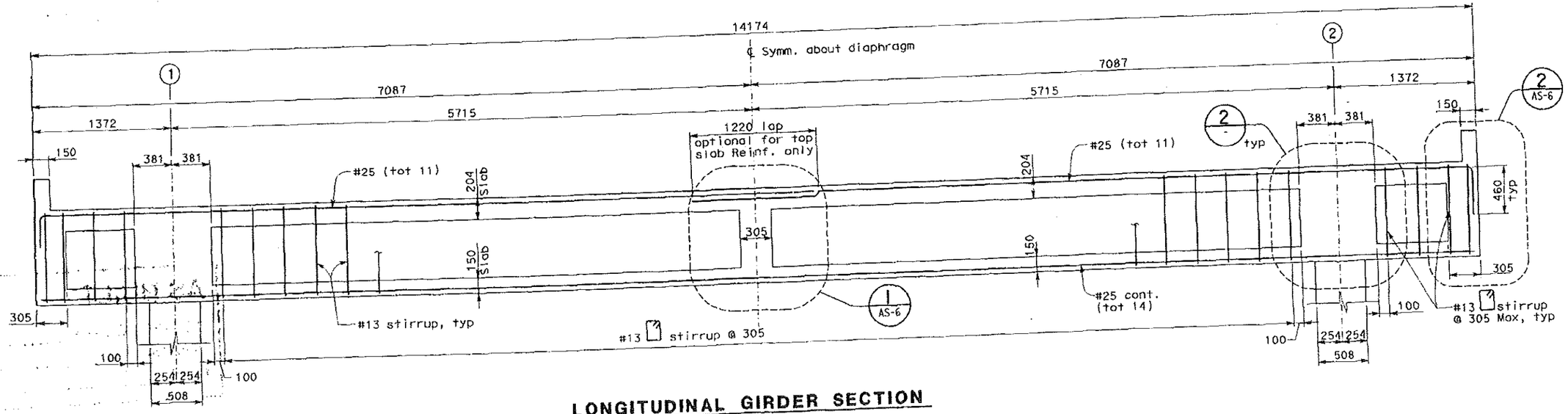


DETAIL 2 (AS-4)
SCALE: 1:10

NOTES:

1. For general notes, see sheet AS-1.

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120G4
DATE 06/17/04



LONGITUDINAL GIRDER SECTION
SCALE: 1:20

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY M.S. Owyong	CHECKED L. Johnson	
LAYOUT	BY R. Hernandez	CHECKED M.S. Owyong	
QUANTITIES	BY M.S. Owyong	CHECKED L. Johnson	

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

CU 04251
EA 01204H1

DGN FILE => as05.dgn
USERNAME => trrichf

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

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REVISION DATES (PRELIMINARY STAGE ONLY)

ENTRANCE CANOPY
LONGITUDINAL GIRDER SECTION

AS-5

SHEET OF

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:30

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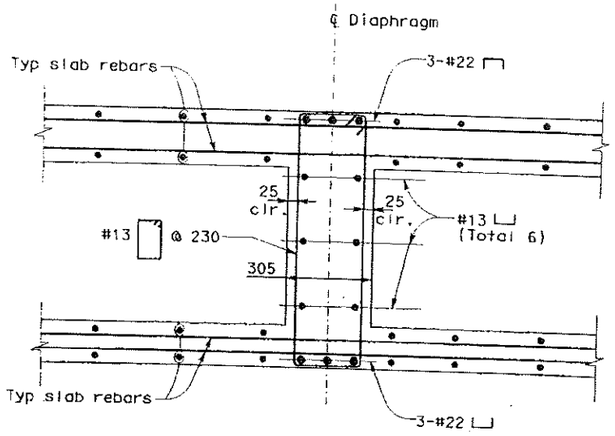
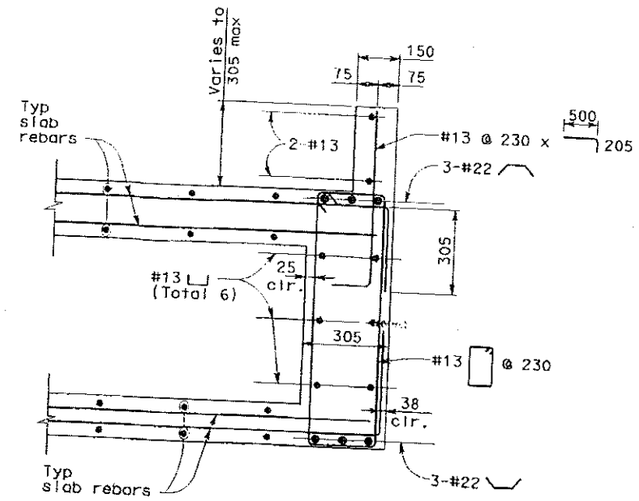


DETAIL 1 / AS-4 — AS-5
SCALE: 1:10



DETAIL 2 / AS-4 — AS-5
SCALE: 1:10

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	79	79

REGISTERED STRUCTURAL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Wee Shing Owyang — No. S 2241 — Exp. 12/31/05 — STRUCTURAL — STATE OF CALIFORNIA

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NOTES:

1. For general notes, see sheet AS-1.

AS BUILT
CORRECTIONS BY A. Boi
CONTRACT NO. 04-0120G4
DATE 06/17/04

	BY	CHECKED
DESIGN	W.S. Owyang	L. Johnson
LAYOUT	L. Wang	W.S. Owyang
QUANTITIES	W.S. Owyang	L. Johnson

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

CU 04251
EA 0120H1

DGN FILE => 0806.dgn
USERNAME => trrichf

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ENTRANCE CANOPY
DETAILS

AS-6

SHEET OF

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△NOTES ON PAYMENT ITEMS

Excavation:

Roadway Cuts: Slopes of 1½ to 1 in rock and 1½ to 1 in sand or other loose material are to be maintained. Payment will be made for the volume determined by these slopes as shown on the plans at the unit price bid for Item No.1.

Pier Wall and Column Footings: Volume of excavation will be determined by vertical planes through the outside lines of footings except where it is necessary to maintain or extend the roadway cut slopes. Payment will be made at the price bid for Item No.1.

Anchorage Tunnels: The cost of all excavation necessary for the construction of the anchorage tunnels in excess of the amount necessary for roadway cuts, pier, column and wall footings to be included in the lump sum bid for Item No.2.

Main Tunnel: The cost of all excavation between faces of portals in the tunnel to be included in the lump sum bid for Item No.9.

Concrete in Anchorage Tunnels:

The cost of concrete placed in the anchorage tunnels in the three stages shown on Drawing No.9 to be included in the lump sum bid for Item No.2.

Reinforcing Steel:

All reinforcing steel except hooks etc. to be paid for at the unit bid for Item No.17.

PAYMENT ITEMS

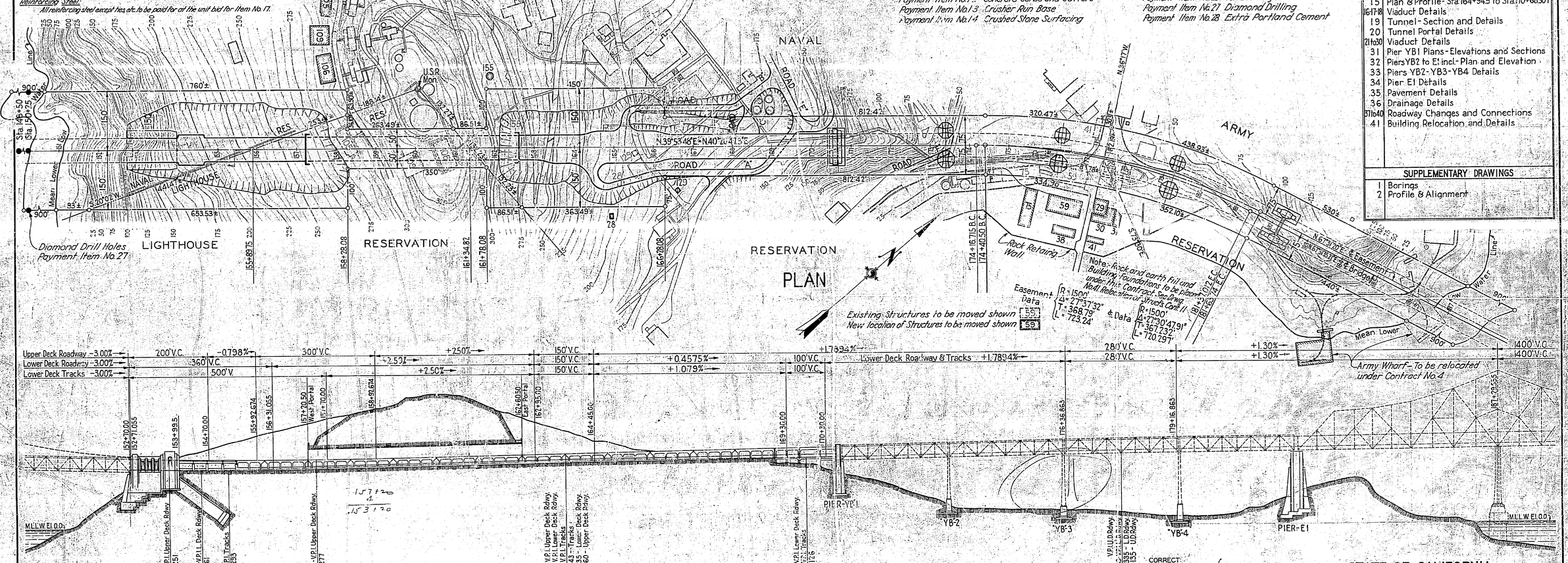
Payment Item No. 1 Excavation, Unclassified
Payment Item No. 2 Anchorage Tunnels
Payment Item No. 3 Anchorage Steelwork
Payment Item No. 4 Concrete Anchorage Foundations
Payment Item No. 5 Concrete Anchorage above Foundations
Payment Item No. 6 Concrete Viaduct and Wall Footings
Payment Item No. 7 Concrete Viaduct and Wall above Footings
Payment Item No. 8 Concrete Railings
Payment Item No. 9 Tunnel Construction
Payment Item No. 10 Concrete Foundations, Piers YB2 to YB4 and E1
Payment Item No. 11 Conc. above Foundations, Piers YB2 to YB4 and E1
Payment Item No. 12 Concrete Curbs and Gutters
Payment Item No. 13 Crusher Run Base
Payment Item No. 14 Crushed Stone Surfacing
Payment Item No. 15 Fuel Oil
Payment Item No. 16 Cut-back Asphalt
Payment Item No. 17 Reinforcing Steel
Payment Item No. 18 Miscellaneous Metalwork
Payment Item No. 19 Electrical Conduits and Fittings
Payment Item No. 20 Concrete Pavement, Lower Deck
Payment Item No. 21 Cast Iron Drain Pipe and Fittings
Payment Item No. 22 Castings
Payment Item No. 23 Drain Tile 4" to 12"
Payment Item No. 24 Portland Cement Roof Grouting
Payment Item No. 25 Pipe Piles in place
Payment Item No. 26 Jet Drilling
Payment Item No. 27 Diamond Drilling
Payment Item No. 28 Extra Portland Cement

LIST OF CONTRACT DRAWINGS

DWG. No.	TITLE
1	General Plan and Elevation
2	Masonry Plan
3	Plan & Elevations of Cable Anchorage
4&5	Cross Sections of Cable Anchorage
6	Cable Anchorage Beam Details
7&8	Details of Concrete Bents in Cable Anchorage
9	Cable Anchorage Wall Details
10	Anchorage Tunnels
11	Anchor Girders & Erection Chains
12	Eye Bar Chains
13	Plan & Profile - Sta. 152+46.0 to Sta. 159+36.5
14	Plan & Profile - Sta. 159+36.5 to Sta. 164+94.5
15	Plan & Profile - Sta. 164+94.5 to Sta. 170+68.307
16&17&18	Viaduct Details
19	Tunnel - Section and Details
20	Tunnel Portal Details
21 to 30	Viaduct Details
31	Pier YB1 Plans - Elevations and Sections
32	Piers YB2 to E1 incl. - Plan and Elevation
33	Piers YB2 - YB3 - YB4 Details
34	Pier E1 Details
35	Pavement Details
36	Drainage Details
37 to 40	Roadway Changes and Connections
41	Building Relocation and Details

SUPPLEMENTARY DRAWINGS

1	Borings
2	Profile & Alignment



GENERAL NOTES

All concrete in Cable Anchorage above footings, all Viaduct structure including footings, Walls, Tunnel lining and Portals, pavement slab and all of Pier YB1 to be Class "A" Conc. In Upper Deck handrail to be Class A-A.

Concrete in Cable Anchorage Footings, Anchorage Tunnels, Piers YB2, YB3, YB4 and E1 to be Class "B".

All corners not otherwise shown to be chamfered ¾".

All slabs to be finished to line and grade set by Engineer.

Construction joints in slabs and beams to have vertical headers with keys and to be located at points satisfactory to Engineer.

Copper water stops, downspouts and asphaltic joint filler to be included in price bid for Payment Item No.7.

All reinforcing bars where spliced shall lap 40 diameters.

Top beam bars to splice near center of span. Bottom beam bars to splice at supports. Slab bar splices to be staggered.

Main bars less than 40 ft. long not to be spliced.

Approved for the Navy under joint permit dated August 20, 1932

Secretary of the Navy

Date	Revision	By	Chkd.
2-15-33	△ Notes on Payment Items Added	R.L.M.	J.W.G.

BOARD OF CONSULTING ENGINEERS

CORRECT: Wm. B. Woodruff, Engineer of Design

APPROVED: Chas. E. Richards, Bridge Engineer; Chief Engineer; Director of Public Works; Chairman

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

SAN FRANCISCO-OAKLAND BAY BRIDGE

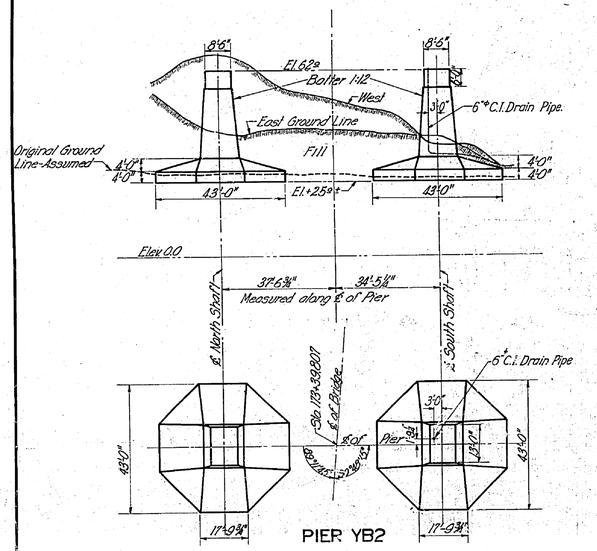
YERBA BUENA CROSSING
GENERAL PLAN & ELEVATION

SCALE IN FEET 100 50 0 100 200 300

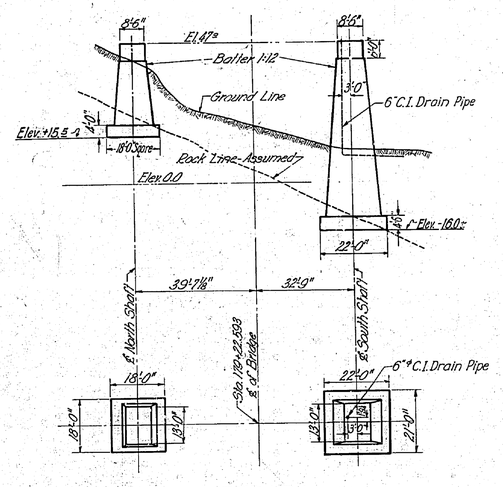
CONTRACT NO.5 DRAWING NO. 1

JANUARY 1, 1933

(OBSOLETE)

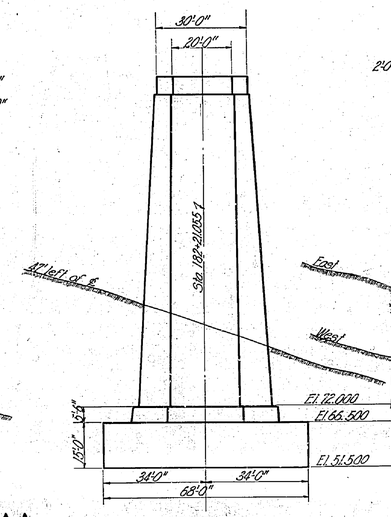


PIER YB2

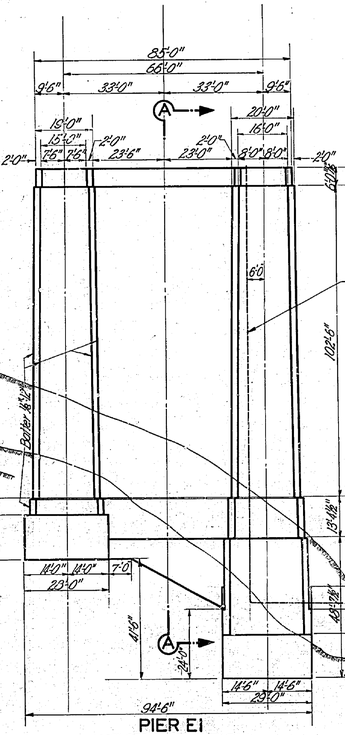


PIER YB4

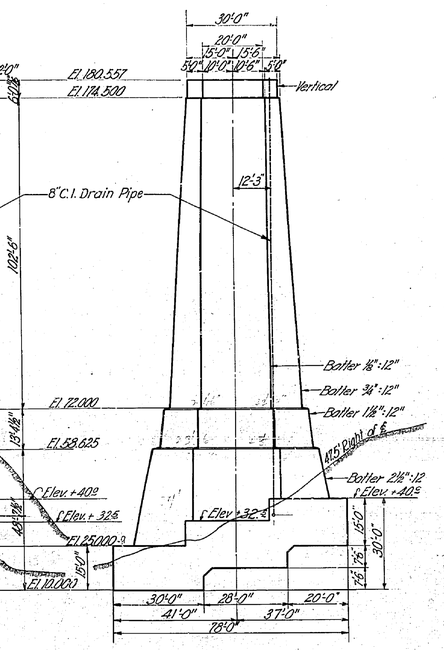
SECTION A-A



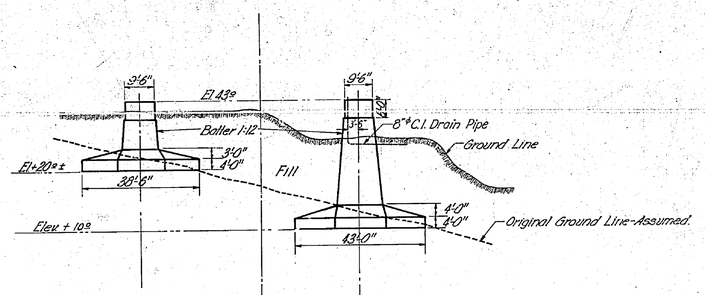
PIER E1
NORTH ELEVATION

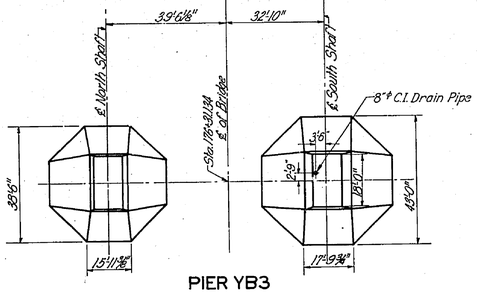


PIER E1
WEST ELEVATION



PIER E1
SOUTH ELEVATION





PIER YB3

Note:- Exact Footing elevations are to be determined in the field by the Engineer.
See Dwg. No. 1 for details of alignment.
Cast Iron drain pipes to extend approximately 10'-0 outside of concrete. Vitrified clay pipe to be installed to carry drainage from C.I. pipe to existing sewer lines or to the Bay.

Date	Revision	By	Ck'd
7-10-33	As Constructed	J.L.S.	
4-10-34	Footing YB4 corrected	J.S.K.	A.J.M.
3-7-34	C.I. Drains added	J.S.K.	
2-2-34	Elev. E-1 footing corrected	J.S.K.	

CORRECT
Engineer of Design

APPROVED
Bridge Engineer
Chief Engineer
Director of Public Works

BOARD OF CONSULTING ENGINEERS
Engineer
Engineer
Engineer

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

SAN FRANCISCO-OAKLAND BAY BRIDGE

YERBA BUENA CROSSING

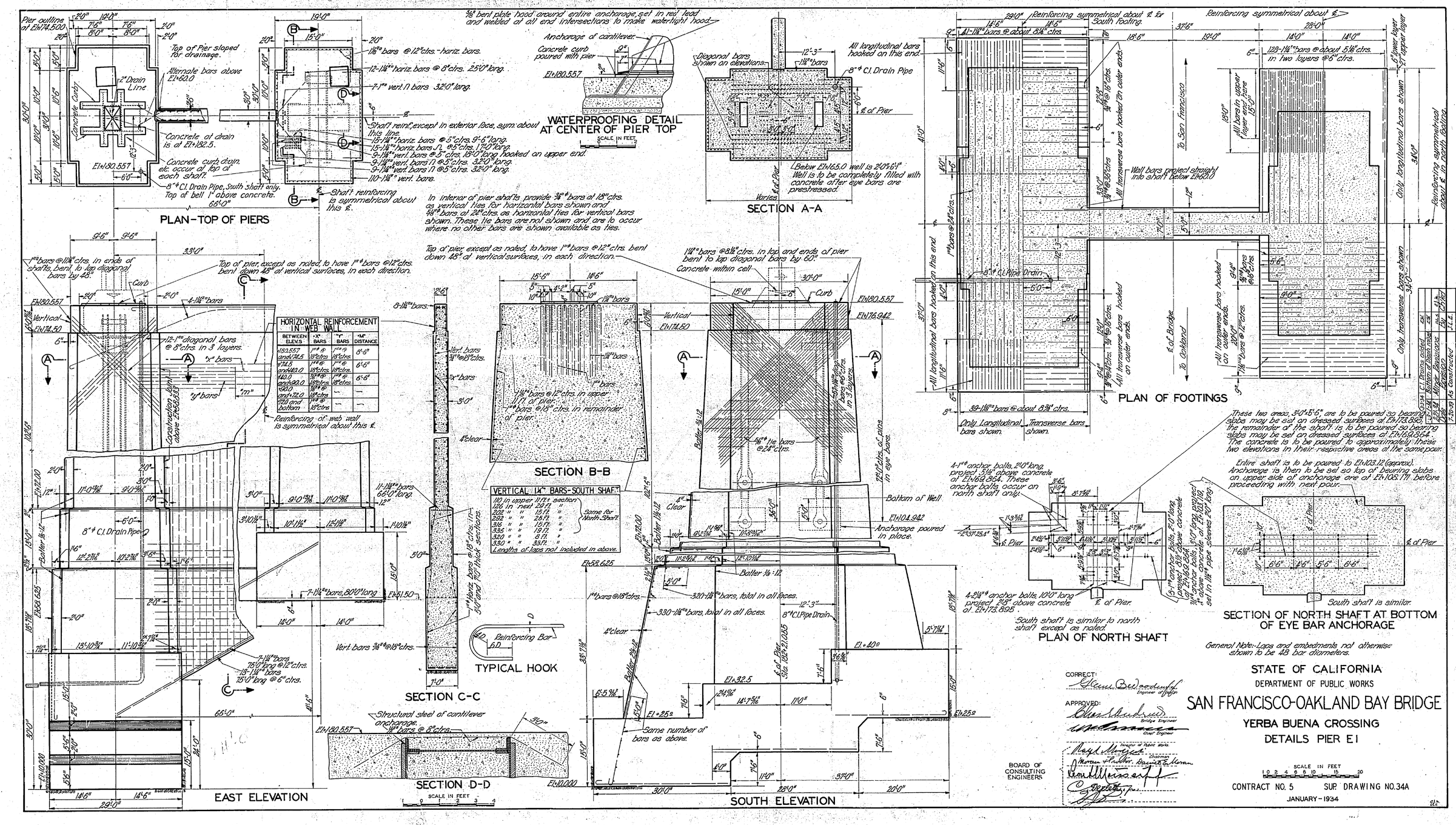
PIERS YB2 YB3 YB4 AND E1
PLANS AND ELEVATIONS

SCALE IN FEET
10 0 10 20 30 40

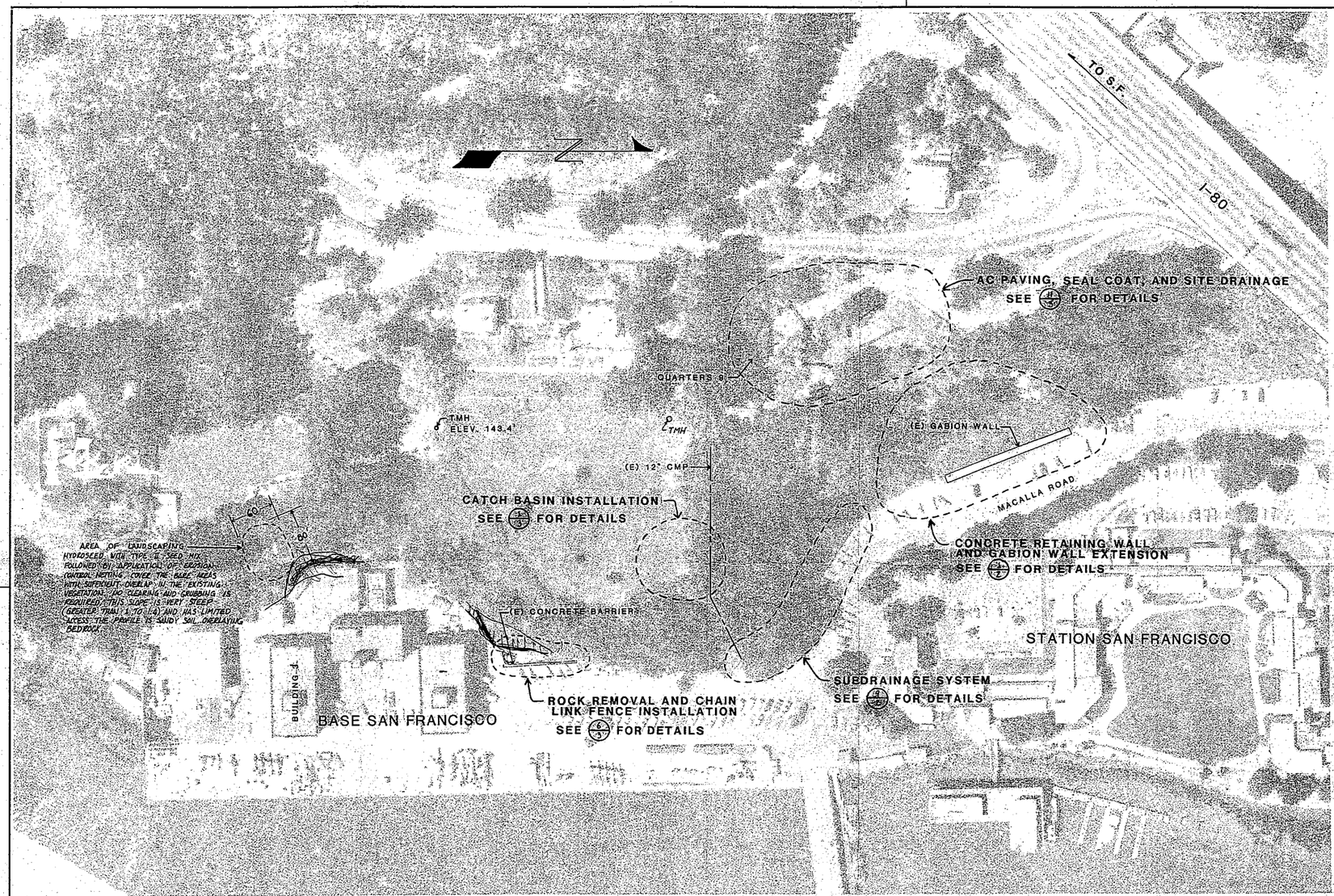
CONTRACT NO. 5 SUP. DRAWING NO. 32A

JANUARY - 1934

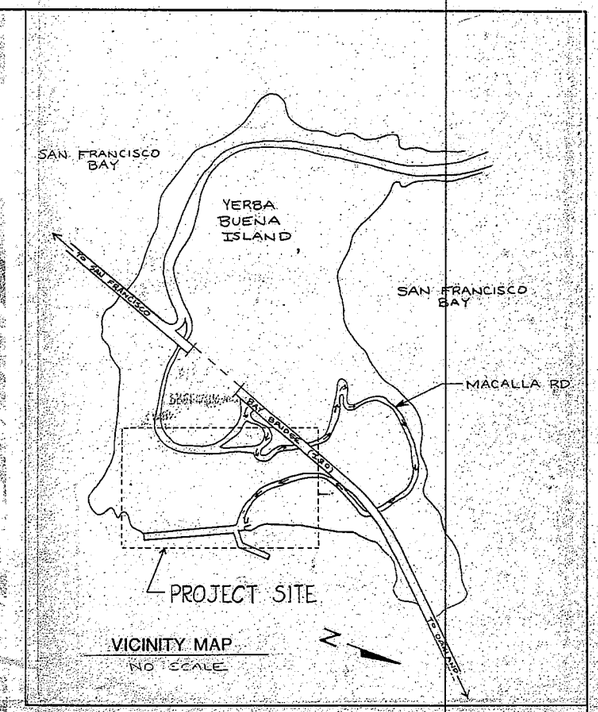
A.J.M.


PLAN-TOP OF PIERS
SECTION A-A
WATERPROOFING DETAIL AT CENTER OF PIER TOP
SCALE IN FEET
PLAN OF FOOTINGS
SECTION B-B
SECTION C-C
TYPICAL HOOK
Reinforcing Bar
SECTION D-D
EAST ELEVATION
SOUTH ELEVATION
PLAN OF NORTH SHAFT
SECTION OF NORTH SHAFT AT BOTTOM OF EYE BAR ANCHORAGE
South shaft is similar.
HORIZONTAL REINFORCEMENT IN WEB WALL
VERTICAL 1¼" BARS-SOUTH SHAFT
Same for North Shaft
Lengths of laps not included in above.
Reinforcing of web wall is symmetrical about this ℄.
Shaft reinforcing is symmetrical about this ℄.
Top of Pier sloped for drainage.
Alternate bars above El+60.0
2" Drain Line
Concrete curb drain etc. occur at lap at each shaft.
Concrete of drain is at El+182.5.
8" ϕ Cl. Drain Pipe, South shaft only. Top of bell 1" above concrete.
Top of pier, except as noted, to have 1" ϕ bars @ 12" ctrs. bent down 45° at vertical surfaces, in each direction.
1¼" ϕ bars @ 11¼" ctrs. in ends of shafts, bent to lap diagonal bars by 48".
12-1" ϕ diagonal bars @ 8" ctrs. in 3 layers.
Construction joint above El+65.833
Structural steel of cantilever anchorage.
1¼" ϕ bars @ 8" ctrs.
Anchorage of cantilever.
Concrete curb poured with pier
⅜" ϕ bent plate hood around entire anchorage, set in red lead and welded at all end intersections to make waterlight hood.
Diagonal bars shown on elevations.
All longitudinal bars hooked on this end.
8" ϕ Cl. Drain Pipe
Below El+165.0 well is 2'-0"×6'-1". Well is to be completely filled with concrete after eye bars are prestressed.
Varies
Reinforcing symmetrical about ℄ for South Footing.
Reinforcing symmetrical about ℄.
41-1¼" ϕ bars @ about 8¼" ctrs.
128-1¼" ϕ bars @ about 5⅛" ctrs. in two layers @ 6" ctrs.
6" lower layer 7" upper layer
To San Francisco
To Oakland
Well bars project straight into shaft below El+160.0
Only longitudinal bars shown
Only transverse bars shown
Reinforcing symmetrical about ℄ in north shaft.
8" ϕ Cl. Pipe Drain
39-1⅛" ϕ bars @ about 8¾" ctrs.
Only Longitudinal bars shown.
Transverse bars shown.
These two areas, 3'-0"×5'-6", are to be poured so bearing slabs may be set on dressed surfaces at El+173.895. The remainder of the shaft is to be poured so bearing slabs may be set on dressed surfaces at El+103.564. The concrete is to be poured to approximately these two elevations in their respective areas at the same pour.
Entire shaft is to be poured to El+103.12 (approx). Anchorage is then to be set so top of bearing slabs on upper side of anchorage are at El+105.171 before proceeding with next pour.
4-1¼" ϕ anchor bolts, 2'-0" long, project 5⅛" above concrete at El+169.864. These anchor bolts occur on north shaft only.
4-2¼" ϕ anchor bolts, 10'-0" long project 2'-8" above concrete at El+173.895.
South shaft is similar to north shaft except as noted.
Bottom of Well.
Anchorage poured in place.
Same number of bars as above.
General Note:-Laps and embedments not otherwise shown to be 48 bar diameters.
CORRECT:
APPROVED:
BOARD OF CONSULTING ENGINEERS
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
SAN FRANCISCO-OAKLAND BAY BRIDGE
YERBA BUENA CROSSING
DETAILS PIER E1
CONTRACT NO. 5
SUP. DRAWING NO. 34A
JANUARY-1934

bases end pier
on picnic areas



SITE PLAN
NOT TO SCALE



VICINITY MAP
NO SCALE

GENERAL NOTES

1. IN ADDITION TO THE AREAS OF LANDSCAPING INDICATED, THE CONTRACTOR IS RESPONSIBLE FOR LANDSCAPING AREAS PREVIOUSLY CONTAINING VEGETATION WHICH ARE EXCAVATED OR DAMAGED. LANDSCAPE THESE AREAS WITH THE LAWN SEED MIX IF THE SLOPE IS LESS THAN 1 TO 2 OR THE PREVIOUS VEGETATION WAS LAWN GRASS, OTHERWISE USE TYPE I SEED MIX.

2. SITE UTILITIES ARE INDICATED ON THE DETAILS CONTAINED WITHIN THESE PLANS.

PRELIMINARY
JUL 6 1987

ABBREVIATIONS

AC	ASPHALTIC CONCRETE	GA.	GAGE
ADD'L	ADDITIONAL	GALV.	GALVANIZED
AGG.	AGGREGATE		
ALT	ALTERNATE	IN.	INCHES
APPROX.	APPROXIMATE	INV.	INVERT
AVG.	AVERAGE		
		MAT'L	MATERIAL
C	CONDUIT	MH	MANHOLE
CB	CATCH BASIN	(N)	NEW
CI	CAST IRON		
CMP	CORRUGATED METAL PIPE	OC	ON CENTERS
CONC.	CONCRETE	PERF.	PERFORATED
CONN.	CONNECTION	PVC	POLYVINYL CHLORIDE
CTRS	CENTERS	PVMT.	PAVEMENT
(E)	EXISTING	RET.	RETAINING
ELEC.	ELECTRICAL		
ELEV.	ELEVATION	SMH	SEWER MANHOLE
EMH	ELECTRICAL MANHOLE	SS	STAINLESS STEEL
EPB	ELECTRICAL PULL BOX	STD.	STANDARD
EXT.	EXTENSION		
EXP.	EXPANSION	TMH	TELEPHONE MANHOLE
		TV	TELEVISION CABLE
FT.	FEET	TYP.	TYPICAL
		VCP	VITRIFIED CLAY PIPE

REV.	DATE	APPR.	DESCRIPTION	BY

DESIGNED: J. EARLY
DRAWN: J. EARLY
TRACED:
CHECKED:
REVIEWED BY:
SECT. CHIEF
REVIEWED BY:
TECH. ASST.
REVIEWED BY:
BRANCH CHIEF

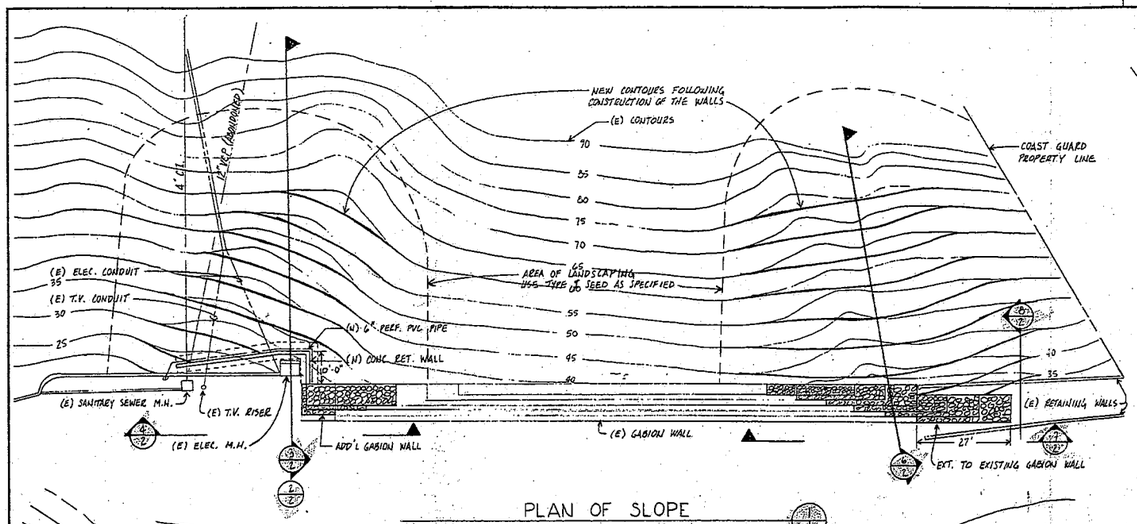
U.S. COAST GUARD — 12TH DISTRICT, ALAMEDA, CA.
CIVIL ENGINEERING
BASE SAN FRANCISCO — YERBA BUENA ISL., CA.

SLOPE STABILITY & SITE DRAINAGE
SITE PLAN

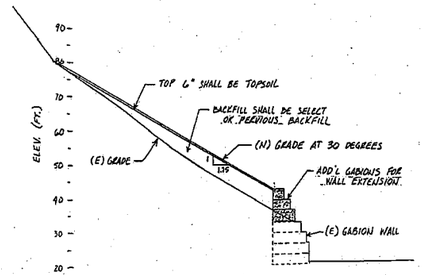
APPROVED: — DATE
CHIEF OF DIVISION

DRAWING NUMBER
6052 - 1
SCALE: AS SHOWN SHEET 1 OF 3

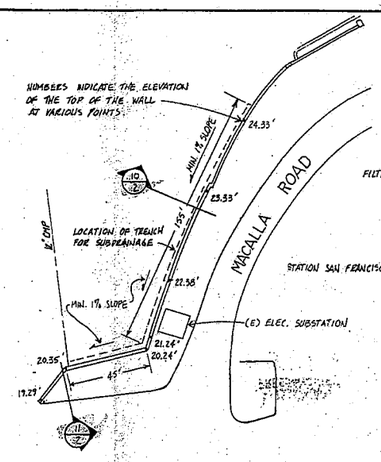
Dept. of Transp., USCG, CG-440 (Rev. 5-87)



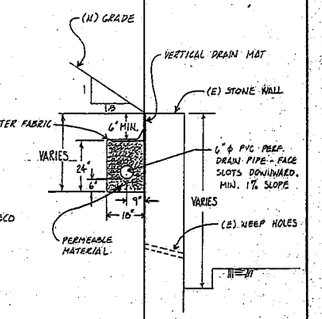
PLAN OF SLOPE
SCALE: 1" = 20'



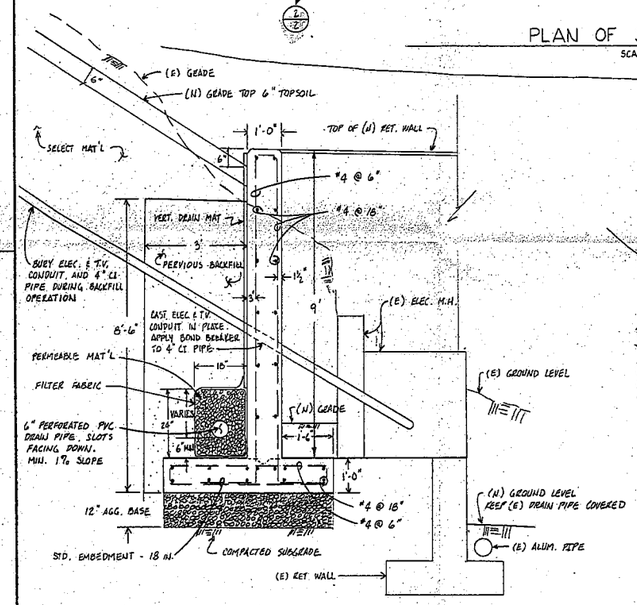
GABION CROSS SECTION
SCALE: 1" = 20'



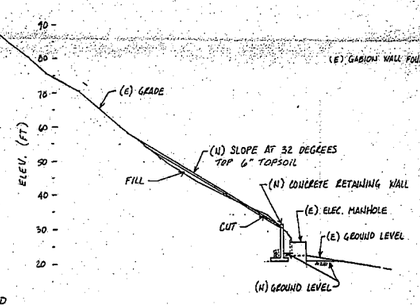
SUBDRAINAGE PLAN
SCALE: 1" = 40'



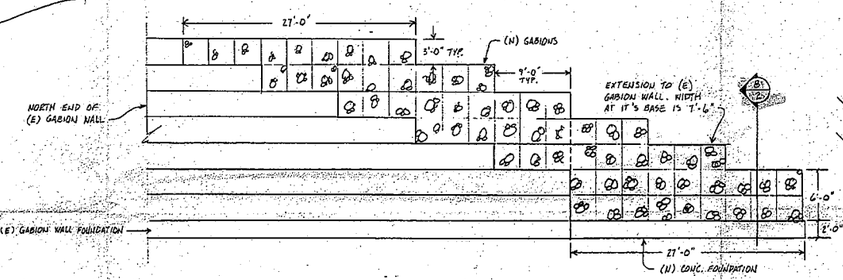
TYP. TRENCH DETAIL
SCALE: 3/8" = 1'-0"



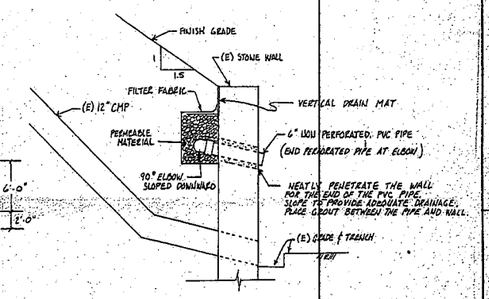
RET. WALL DETAIL
SCALE: 1/2" = 1'-0"



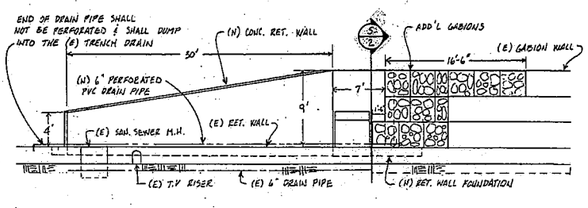
RET. WALL CROSS SECTION
SCALE: 1" = 20'



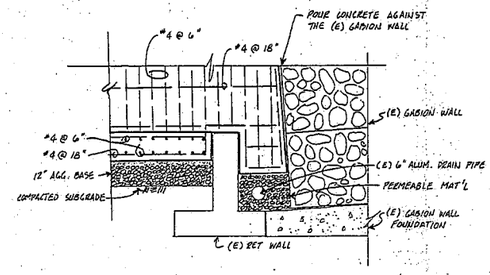
GABION FRONT ELEVATION
SCALE: 1/8" = 1'-0"



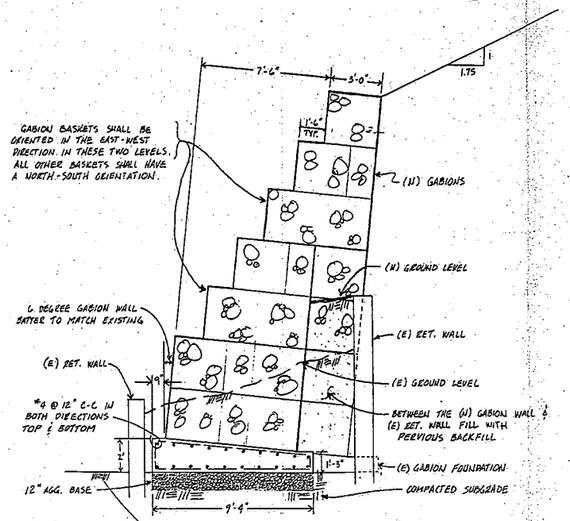
END OF PIPE DETAIL
SCALE: 3/16" = 1'-0"



RET. WALL ELEVATION
SCALE: 1/8" = 1'-0"



JOINT DETAIL
SCALE: 3/8" = 1'-0"



GABION SIDE ELEVATION
SCALE: 1/4" = 1'-0"

PRELIMINARY
JUL 6 1987

REV.	DATE	APPR.	DESCRIPTION	BY

DESIGNED: J. EARLY
DRAWN: J. EARLY
TRACED:
CHECKED:
REVIEWED BY:
SECT. CHIEF
REVIEWED BY:
TECH. ASST.
REVIEWED BY:
BRANCH CHIEF

U.S. COAST GUARD — 12TH DISTRICT, ALAMEDA, CA.

CIVIL ENGINEERING

BASE SAN FRANCISCO — YERBA BUENA ISL., CA.

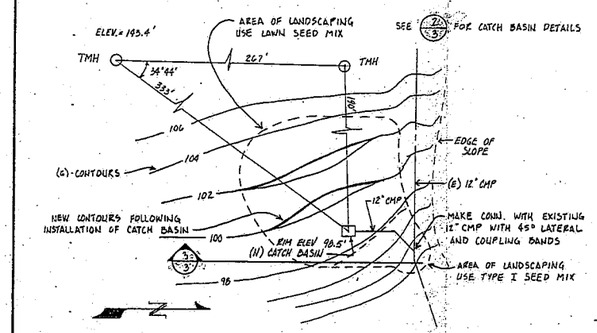
SLOPE STABILITY & SITE DRAINAGE

RETAINING WALL, GABION WALL, AND SUBDRAINAGE PLANS AND DETAILS

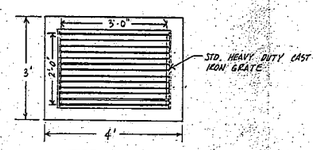
APPROVED: — DATE
CHIEF OF DIVISION

DRAWING NUMBER: 6052 - 2
SCALE: AS SHOWN — SHEET 2 OF 3

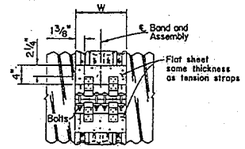
Dept. of Trans., USCG, CG-4060 (Rev. 3-67)



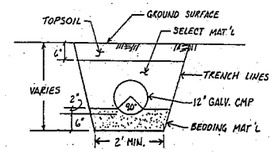
CATCH BASIN PLAN
SCALE: 1" = 20' (4/3)



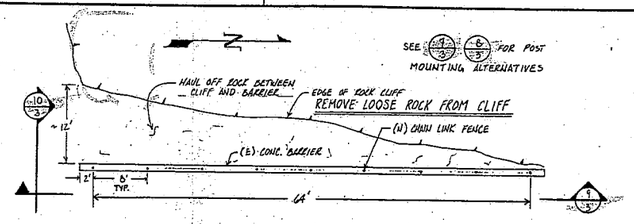
TOP VIEW



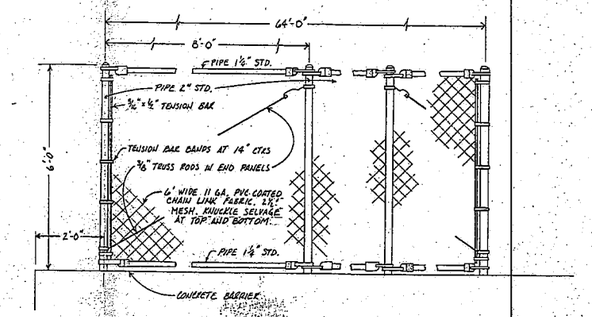
COUPLING BAND DETAIL
NO SCALE (4/3)



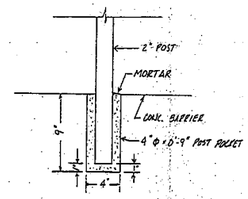
TRENCH DETAIL
SCALE: 1/2" = 1'-0" (5/3)



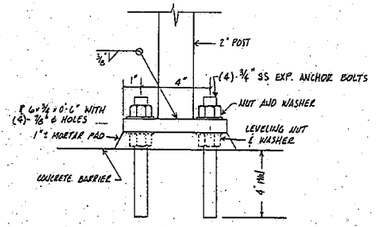
ROCK REMOVAL & FENCE PLAN
SCALE: 1" = 10' (6/3)



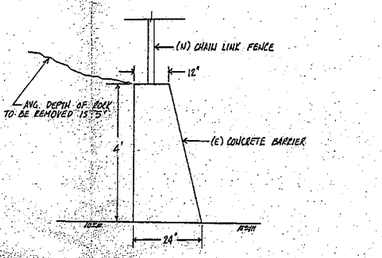
FENCE DETAIL
SCALE: 1/2" = 1'-0" (9/3)



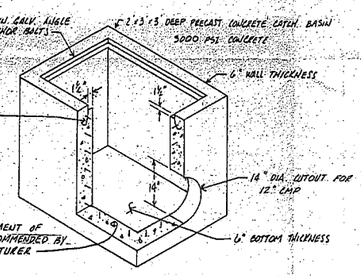
ALT. MOUNTING DETAIL
SCALE: 1 1/2" = 1'-0" (9/3)



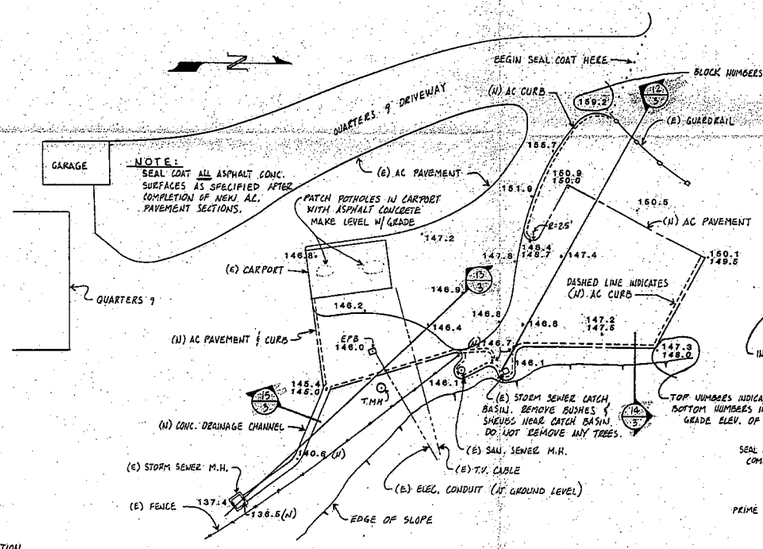
ALT. MOUNTING DETAIL
SCALE: 5" = 1'-0" (9/3)



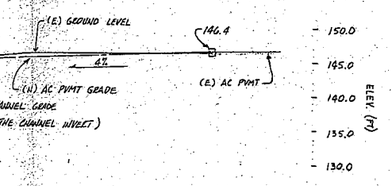
SIDE ELEVATION
SCALE: 1/2" = 1'-0" (10/3)



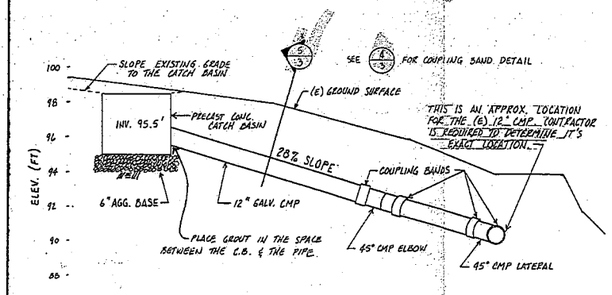
CATCH BASIN DETAIL
SCALE: 1/2" = 1'-0" (2/3)



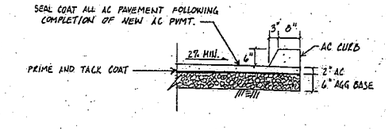
PAVING AND DRAINAGE PLAN
SCALE: 1" = 20' (11/3)



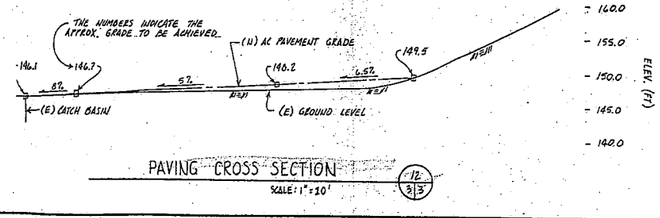
PAVING & CHANNEL CROSS SECTION
SCALE: 1" = 10' (15/3)



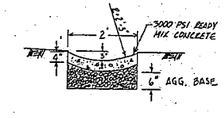
C.B. CROSS SECTION
SCALE: 1" = 4'-0" (5/3)



TYP. PAVEMENT & CURB DETAIL
SCALE: 1/2" = 1'-0" (14/3)



PAVING CROSS SECTION
SCALE: 1" = 10' (12/3)



CHANNEL DETAIL
SCALE: 1/2" = 1'-0" (15/3)

PRELIMINARY
JUL 6 1987

REV.	DATE	APPR.	DESCRIPTION	BY

DESIGNED: J. EARLY
DRAWN: J. EARLY
TRACED:
CHECKED:
REVIEWED BY:
SECT. CHIEF
REVIEWED BY:
TECH. ASST.
REVIEWED BY:
BRANCH CHIEF

U.S. COAST GUARD — 12TH DISTRICT, ALAMEDA, CA.

CIVIL ENGINEERING

BASE SAN FRANCISCO — YERBA BUENA ISL., CA.

SLOPE STABILITY & SITE DRAINAGE

CATCH BASIN, FENCE, AND PAVING PLANS AND DETAILS

APPROVED: — DATE
CHIEF OF DIVISION

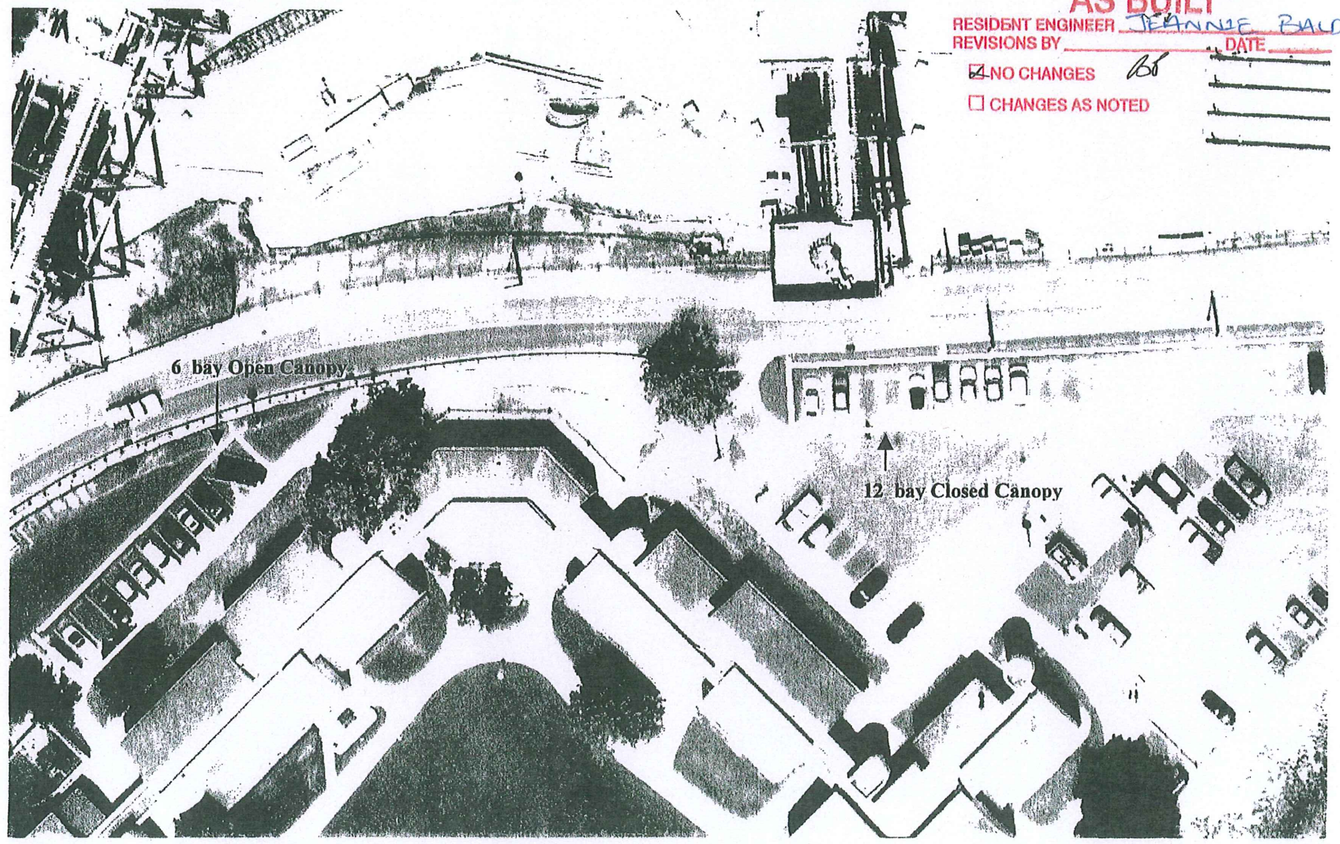
DRAWING NUMBER: 6052 - 3

SCALE: AS SHOWN — SHEET 3 OF 3

GPO 1975-625-419

Dept. of Transp., USCG, CG-4060 (Rev. 5-67)

CONTRACT NO. 04-0120R4
DATE ACCEPTED 10/20/2010
AS BUILT
RESIDENT ENGINEER JEANNIE BALDERRAMOS
REVISIONS BY _____ DATE _____
☒ NO CHANGES
☐ CHANGES AS NOTED



CONTRACT NO. 04 – 0120R4
CONTRACT CHANGE ORDER NO. 111
SHEET 2 OF 3

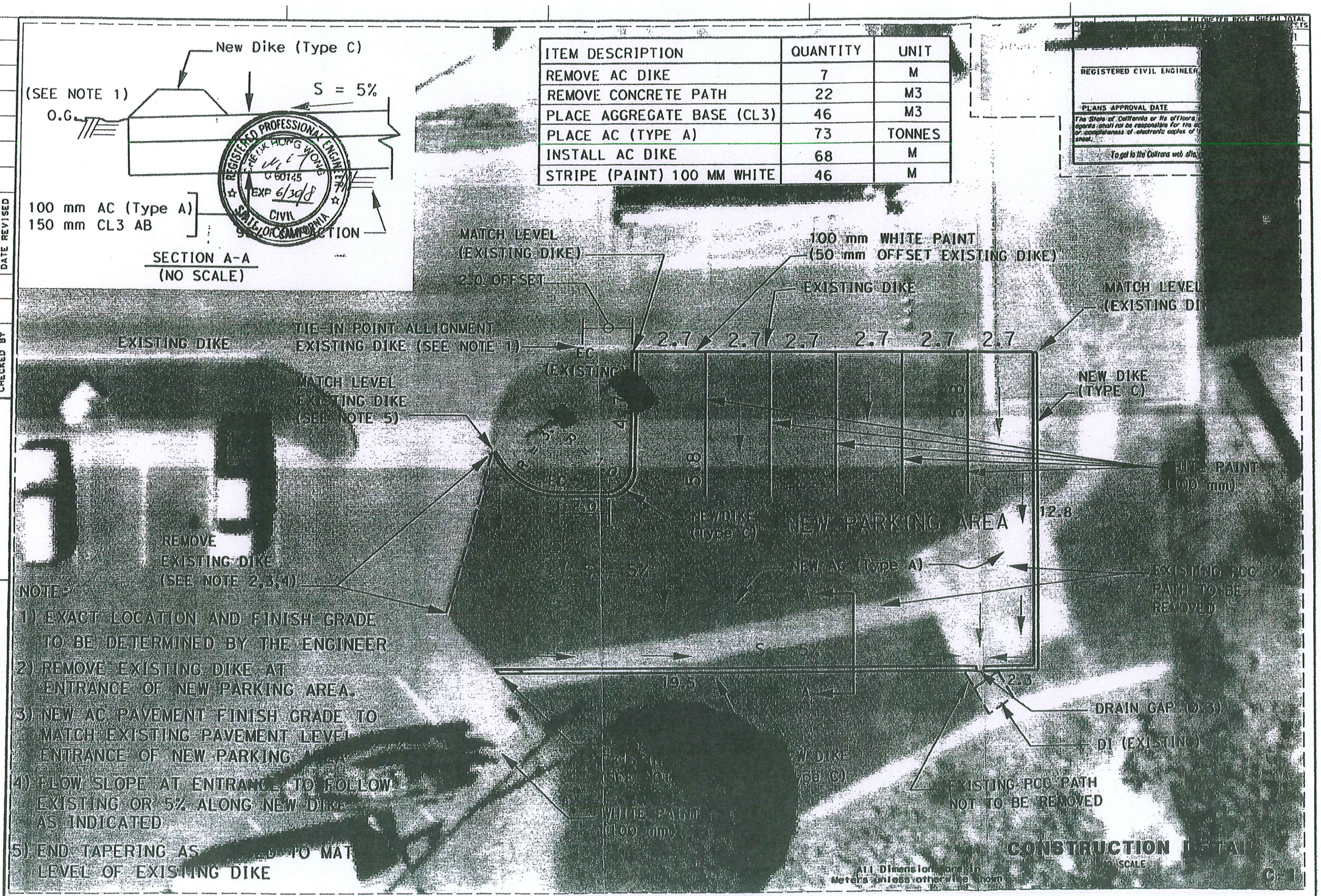
CONTRACT NO. 04-0120
DATE ACCEPTED 10/20/10
AS BUILT
RESIDENT ENGINEER JEANNIE RAYO-DERRAMOS
REVISIONS BY Bl DATE
☒ NO CHANGES
REVISIONS AS NOTED
DATE REVISED

CONTRACT NO. 04-0120K4

CONTRACT CHANGE ORDER NO. III

SHEET 3 OF 3

STATE OF CALIFORNIA · DEPARTMENT OF TRANSPORTATION
Caltrans
PROJECT ENGINEER
TOLL BRIDGE
CALCULATED/DESIGNED BY
CHECKED BY
DATE
REVISED BY



NOTES:

1) EXACT LOCATION AND FINISH GRADE TO BE DETERMINED BY THE ENGINEER
2) REMOVE EXISTING DIKE AT ENTRANCE OF NEW PARKING AREA.
3) NEW AC PAVEMENT FINISH GRADE TO MATCH EXISTING PAVEMENT LEVEL ENTRANCE OF NEW PARKING
4) FLOW SLOPE AT ENTRANCE TO FOLLOW EXISTING OR 5% ALONG NEW DIKE AS INDICATED
5) END TAPERING AS [illegible] TO MAT LEVEL OF EXISTING DIKE

ITEM DESCRIPTION	QUANTITY	UNIT
REMOVE AC DIKE	7	M
REMOVE CONCRETE PATH	22	M3
PLACE AGGREGATE BASE (CL3)	46	M3
PLACE AC (TYPE A)	73	TONNES
INSTALL AC DIKE	68	M
STRIPE (PAINT) 100 MM WHITE	46	M

KILOMETER POST | SHEET | TOTAL SHEETS

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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To get to the Caltrans web site,

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	72	79

Caltrans Metric

Robert Brooks Howell 03/28/03
REGISTERED ARCHITECT DATE

5-20-03
PLANS APPROVAL DATE

LICENSED ARCHITECT ROBERT BROOKS HOWELL No. C 8857 Exp. 11/30/03 Architecture STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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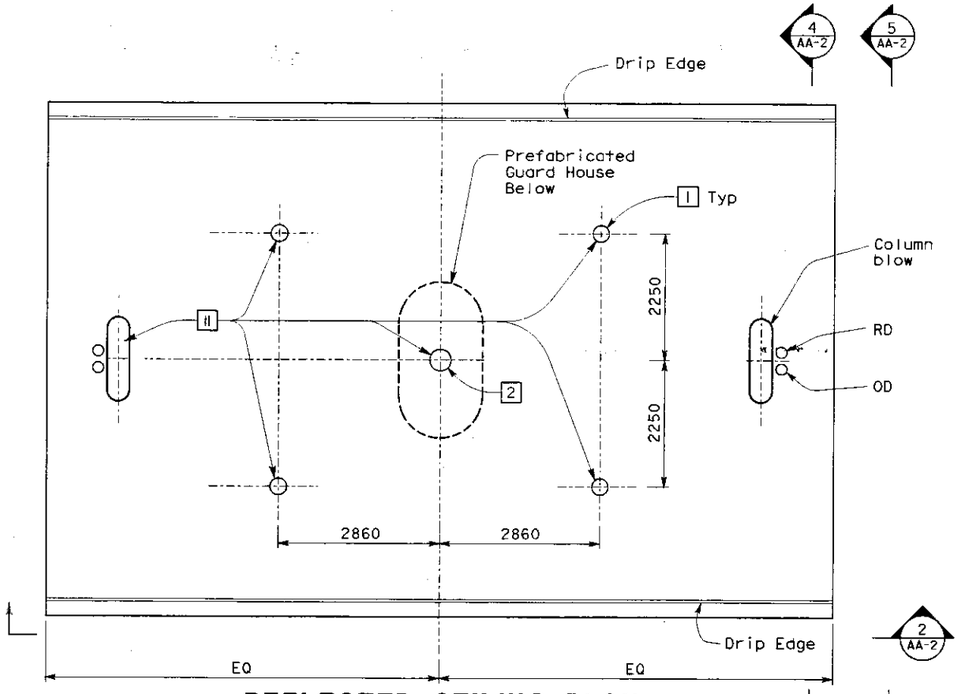
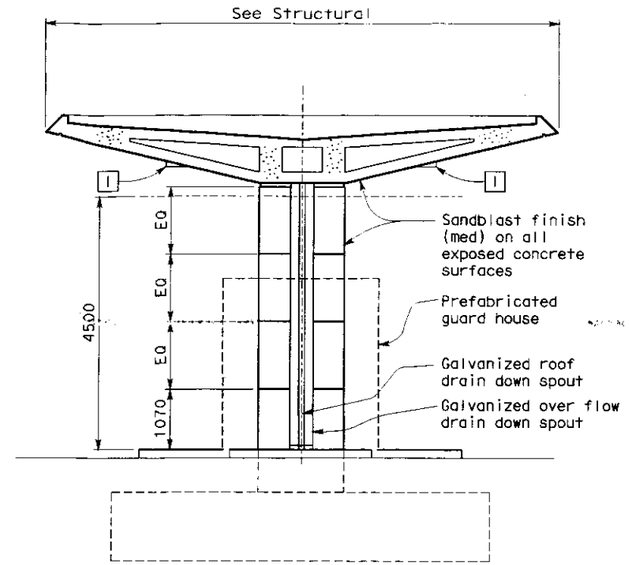
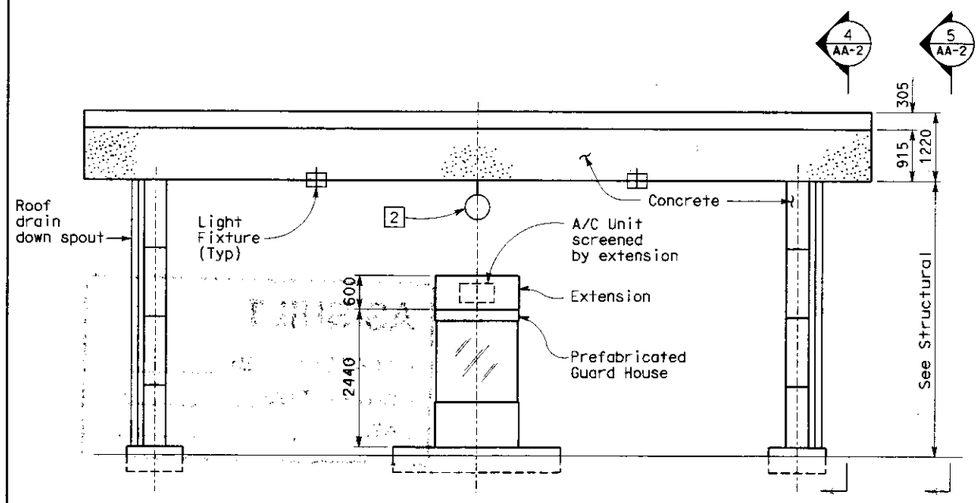


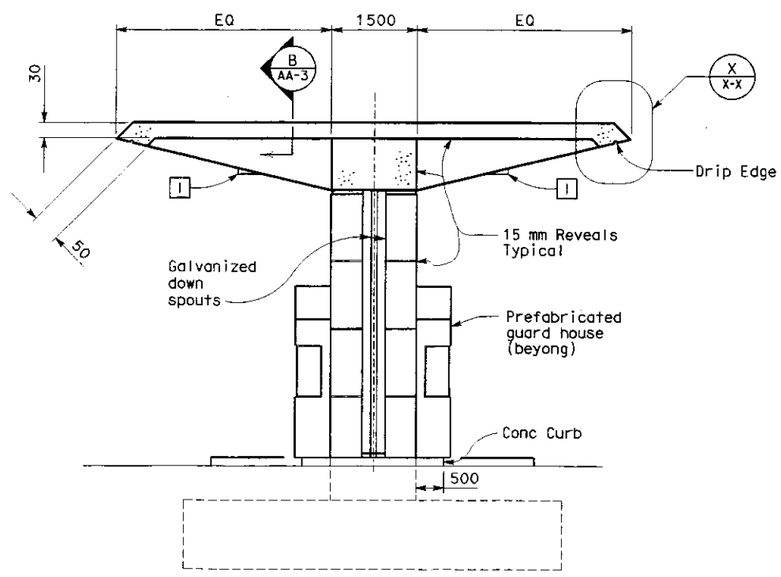
REFLECTED CEILING PLAN
SCALE: 1:50



4 SECTION
SCALE: 1:50



2 ELEVATION - ENTRANCE CANOPY - YBI
SCALE: 1:50

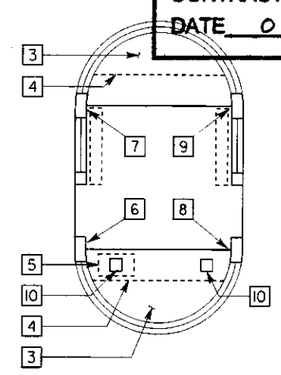


5 SECTION
SCALE: 1:50

NOTES:

1. 280 diameter concrete base for mounting light fixtures parallel horizontally.
2. Relocated CCTV camera and enclosure.
3. Plastic laminate counter-900h.
4. Vertical painted 37 thick plywood panel for mounting j-boxes and UPS. mount under counter.
5. Relocate 4 drawer pistol safe.
6. Relocate clock on wall
7. Coat-hook on wall.
8. Phone on wall
9. Light switch on wall.
10. Install gate operating controls in 2 panels in counter.
11. Conduits for lights and camera embedded in column and canopy.

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120R4
DATE 06/17/04



6 PLAN - GUARD HOUSE
SCALE: 1:25

SCALE: 1:50
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY R. Howell	CHECKED G. Lusherovich	
LAYOUT	BY R. Hernandez	CHECKED R. Howell	
QUANTITIES	BY P. McNamee	CHECKED R. Parrino	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
ARCHITECTURAL DESIGN

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

ENTRANCE CANOPY
REF CANOPY PLAN, ELEVATION & SECTION

AA-2

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04251
EA 0120H1

DGN FILE => aa02.dgn
USERNAME => trmarick

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:42

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	73	79

Caltrans Metric

Robert Brooks Howell 03/28/03
REGISTERED ARCHITECT DATE

5-20-03
PLANS APPROVAL DATE

LICENSED ARCHITECT ROBERT BROOKS HOWELL No. C 8157 Exp. 11/30/03 Architecture STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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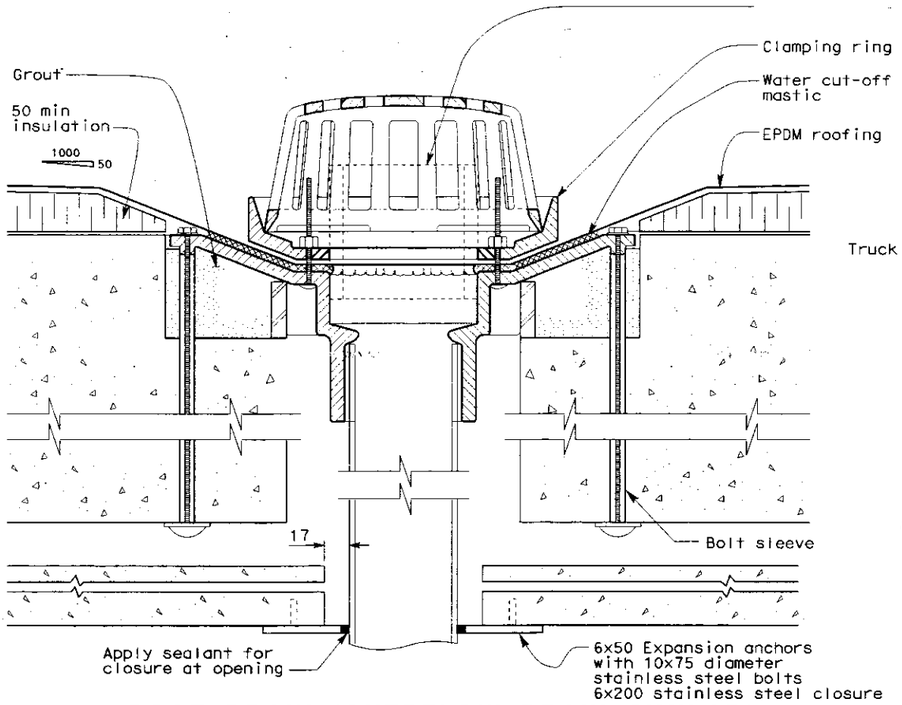
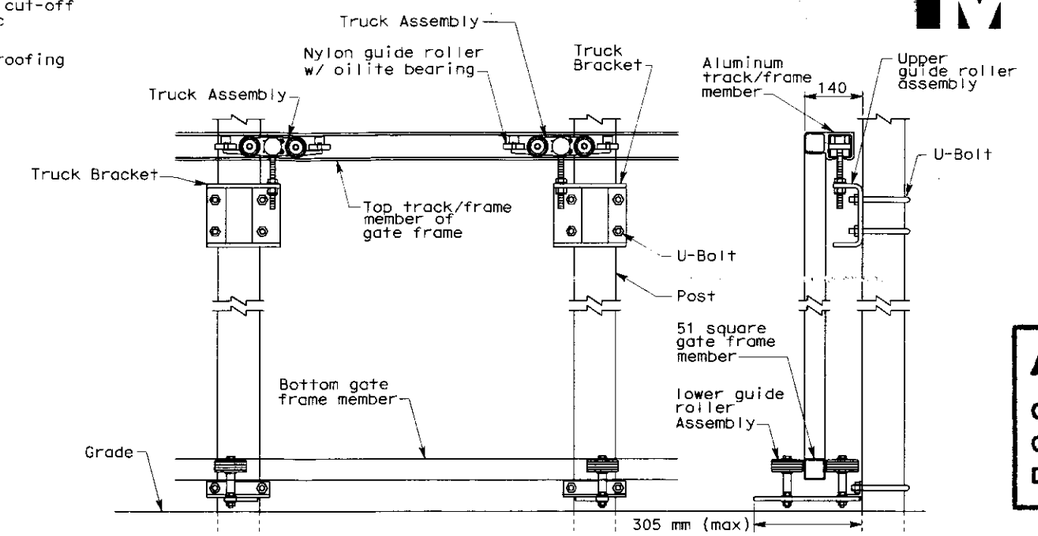
AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120&4
DATE 06/17/04



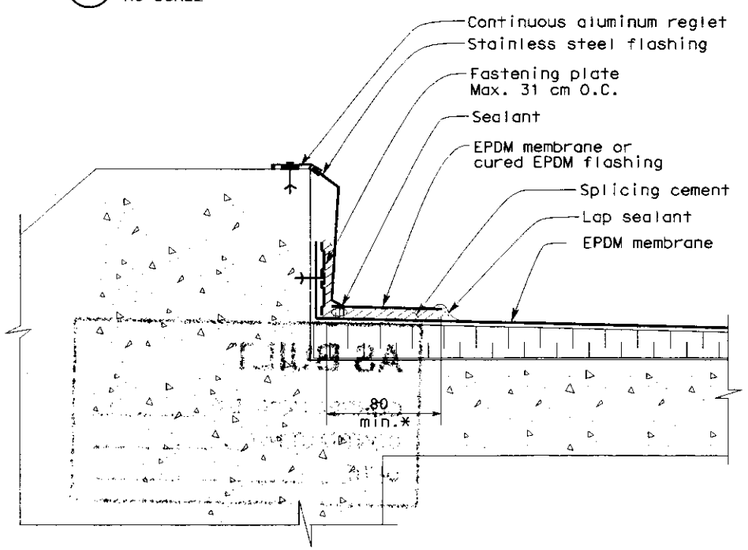
(A) ROOF DRAIN (OVERFLOW DRAIN SIMILAR)
NO SCALE



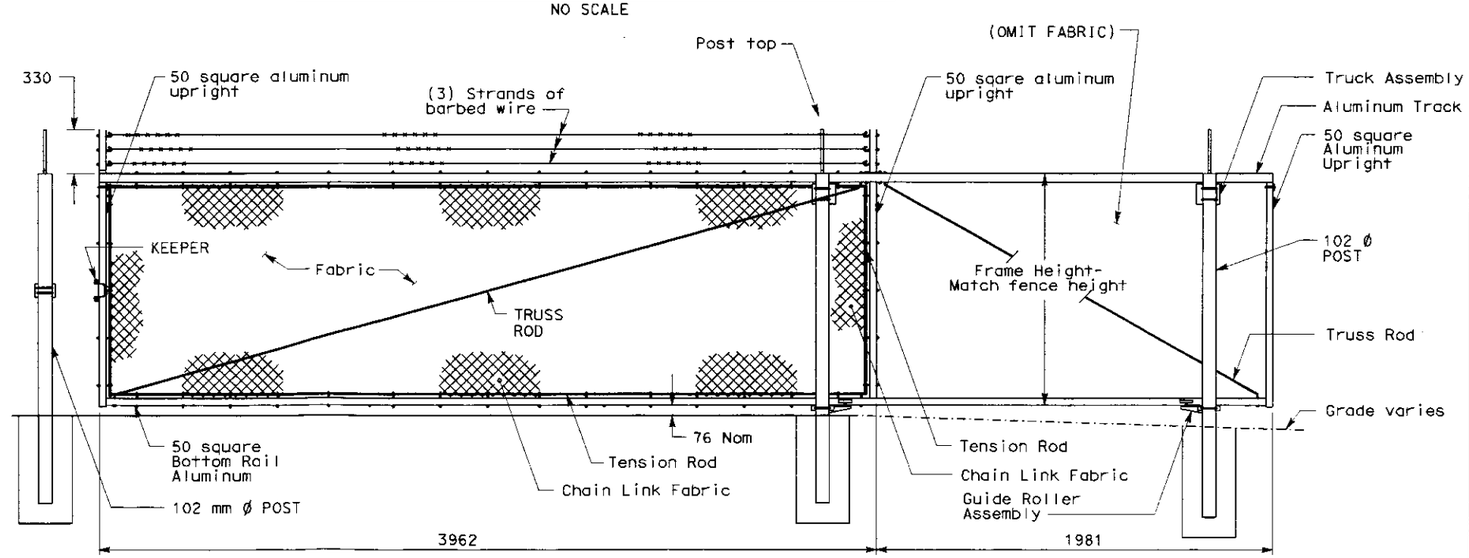
ELEVATION
UPPER & LOWER GUIDE ROLLER ASSEMBLIES ATTACHED TO POST

END VIEW
UPPER & LOWER GUIDE ROLLER ASSEMBLY ATTACHED TO POST & GATE

CANTILEVERED SLIDING GATES DETAIL
NO SCALE



(B) PARAPET FLASHING
NO SCALE



GATE ELEVATION
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

	BY	CHECKED
DESIGN	R. Howell	G. Lusherovich
LAYOUT	R. Hernandez	R. Howell
QUANTITIES	P. McNamee	R. Parrino

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
ARCHITECTURAL DESIGN

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

ENTRANCE CANOPY
DETAILS

AA-3

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04251
EA 0120H1

DGN FILE => aa03.dgn
USERNAME => trmariok

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	75	79

REGISTERED STRUCTURAL ENGINEER 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Wee Shing Owyang No. S 2246 Exp. 12/31/05 STRUCTURAL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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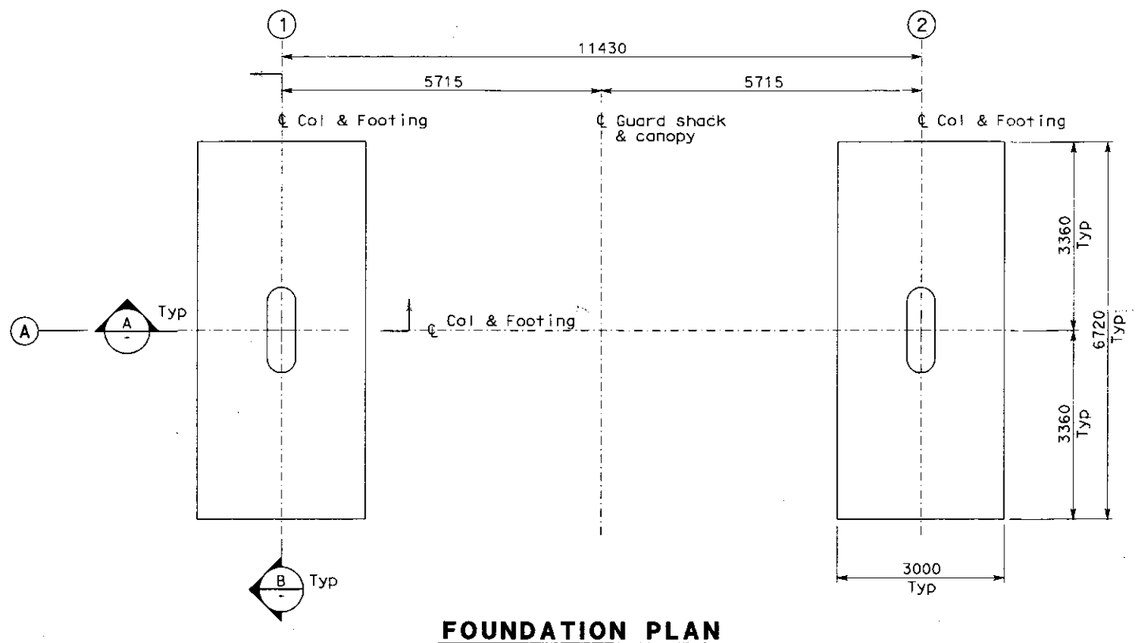
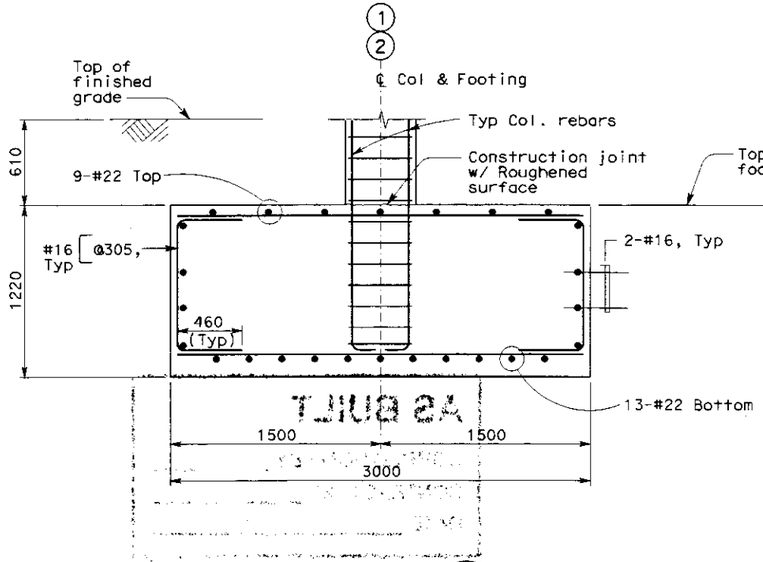


FOUNDATION PLAN
SCALE: 1:50

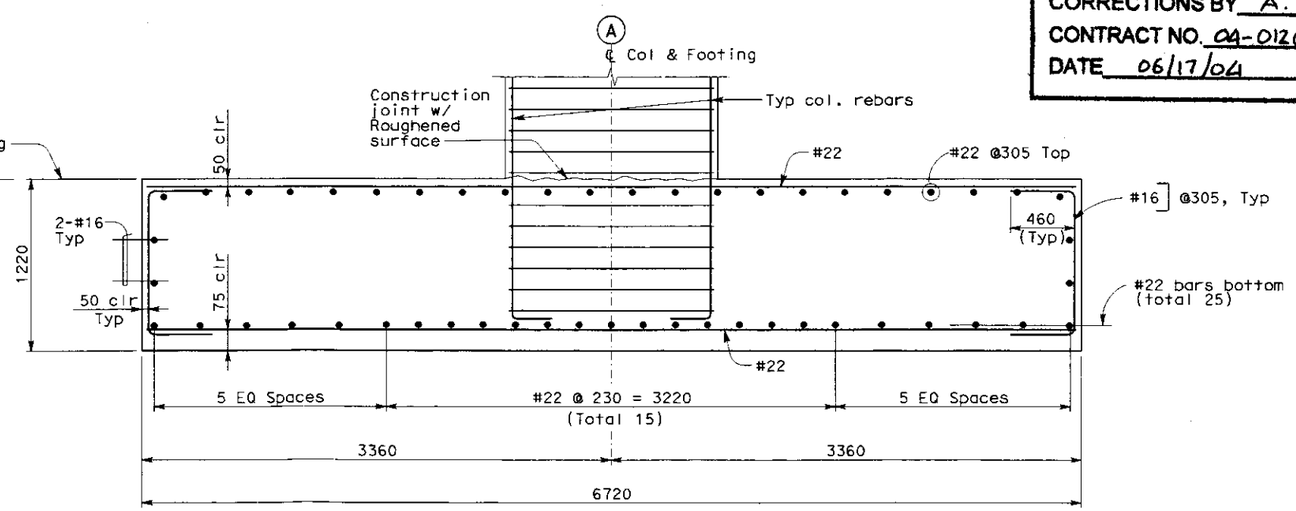
NOTES:

1. For general notes, see sheet AS-1.
2. See architectural plan for orientation and location.

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120U4
DATE 06/17/04



SECTION A
SCALE: 1:20



SECTION B
SCALE: 1:20

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY M.S. Owyang	CHECKED L. Johnson	
LAYOUT	BY R. Hernandez	CHECKED M.S. Owyang	
QUANTITIES	BY M.S. Owyang	CHECKED L. Johnson	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

ENTRANCE CANOPY
FOUNDATION PLAN AND SECTIONS

AS-2

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04251
EA 0120H1

DGN FILE => as02.dgn
USERNAME => trrichf

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	77	79

REGISTERED STRUCTURAL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mee Shing Owyong — No. S 2246 — Exp. 12/31/05 — STRUCTURAL — STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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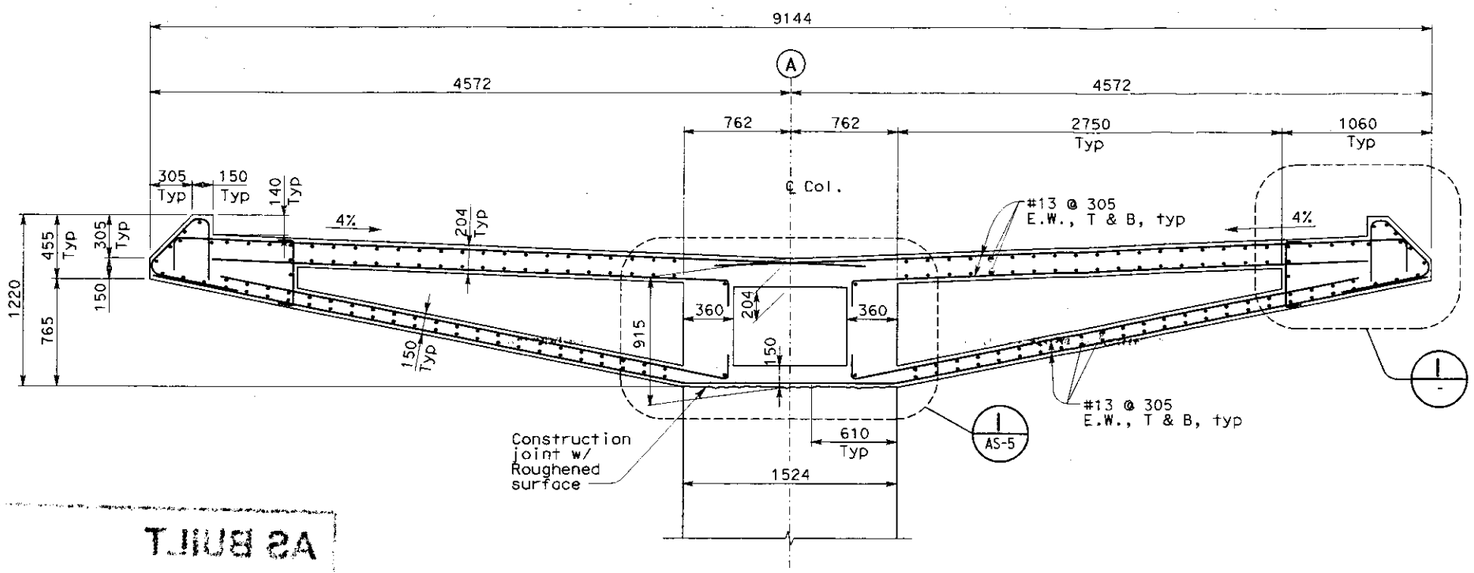
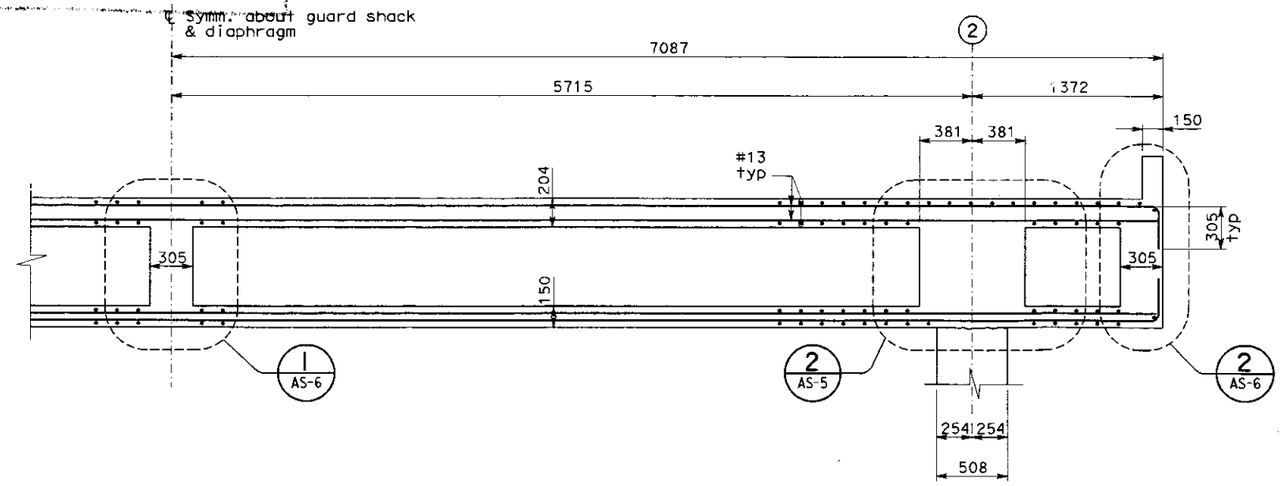
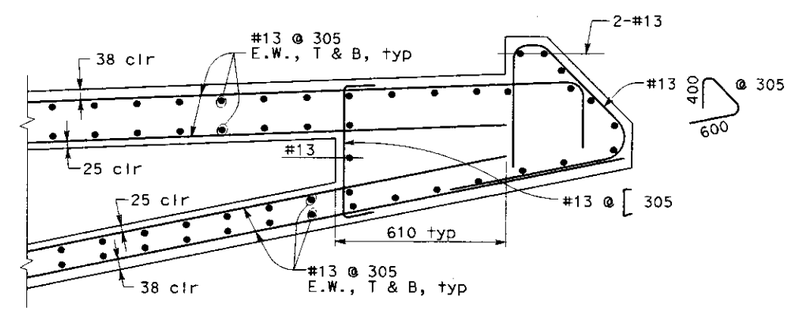


SECTION A / AS-1
SCALE: 1:20

AS BUILT



SECTION B / AS-1
SCALE: 1:20



DETAIL 1 / -
SCALE: 1:10

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120G4
DATE 06/17/04

NOTES:

1. For general notes, see sheet AS-1.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

	BY	CHECKED
DESIGN	M.S. Owyang	L. Johnson
LAYOUT	R. Hernandez	M.S. Owyang
QUANTITIES	M.S. Owyang	L. Johnson

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

ENTRANCE CANOPY
SECTION AND DETAIL

AS-4

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04251
EA 0120H1

DGN FILE => as04.dgn
USERNAME => trrichf

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04	SF	80	12.9	79	79

REGISTERED STRUCTURAL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mee Shing Owyang — No. S 2246 — Exp. 12/31/05 — STRUCTURAL — STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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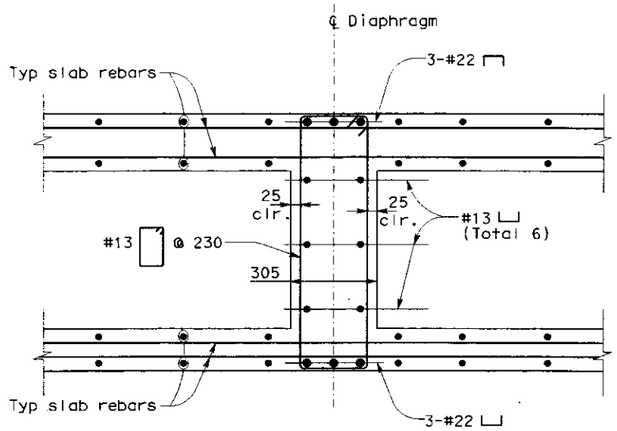
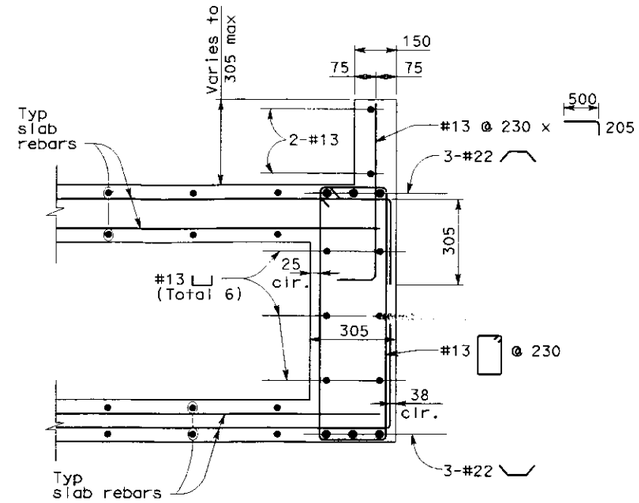


DETAIL 1 / AS-4 — SCALE: 1:10 — AS-5



DETAIL 2 / AS-4 — SCALE: 1:10 — AS-5

NOTES:

1. For general notes, see sheet AS-1.

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120U4
DATE 06/17/04

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY M.S. Owyang	CHECKED L. Johnson	
LAYOUT	BY L. Wang	CHECKED M.S. Owyang	
QUANTITIES	BY M.S. Owyang	CHECKED L. Johnson	

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

CU 04251
EA 0120H1

DGN FILE => as06.dgn
USERNAME => trrichf

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

ENTRANCE CANOPY
DETAILS

AS-6

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET — OF

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:30

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SF	80	12.9	2	79

Kamal Rouhani 3/28/03
REGISTERED CIVIL ENGINEER DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL ROUHANI No. C 62321 Exp. 09/30/05 CIVIL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 Second St., Suite 700N
San Francisco, CA 94107-1317

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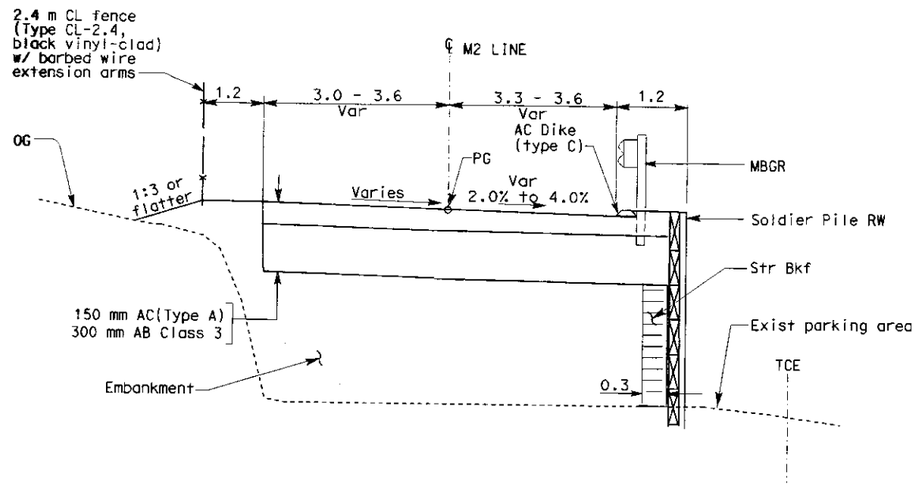
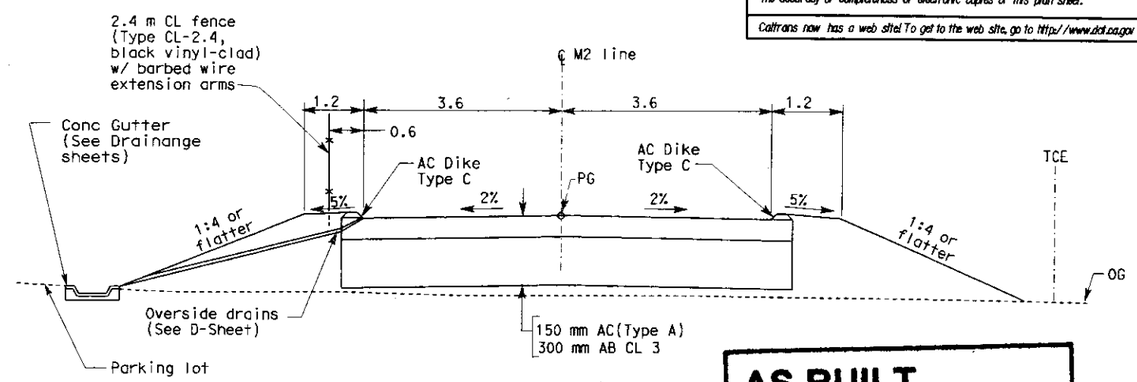
Caltrans Metric

NOTES:

1. Dimensions of the stuctural section are subject to tolerances specified in standard specifications.
2. Superelevation as shown or as directed by the Engineer.
3. For location of AC Dike (Type C) see construction detail sheets.

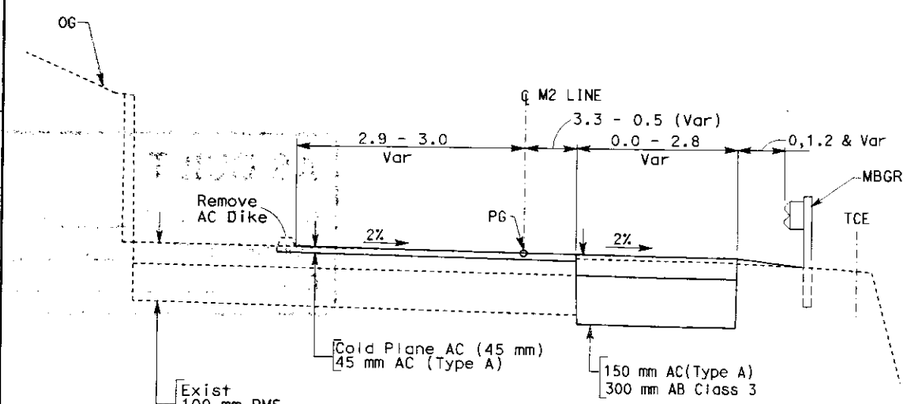


M2 LINE
STA 10+14.000 TO 11+00.000

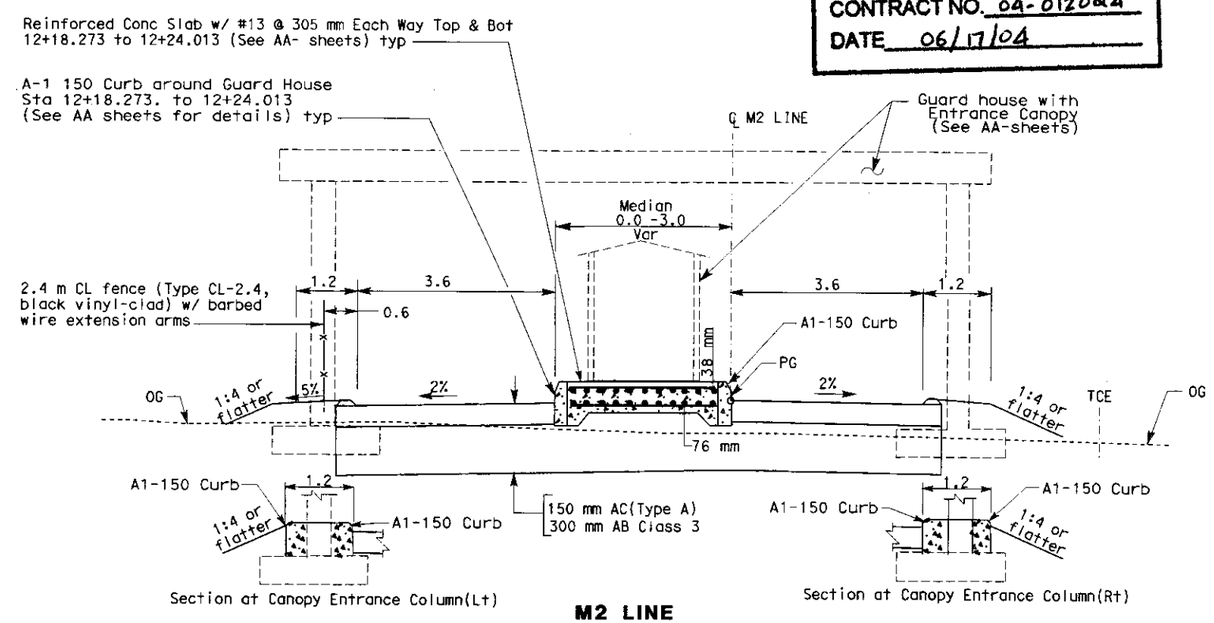


M2 LINE
STA 11+89.765 TO 12+42.170

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120G4
DATE 06/17/04



M2 LINE
STA 10+00.000 TO 10+14.000



M2 LINE
STA 11+00.000 TO 11+89.765

TYPICAL CROSS SECTIONS
NO SCALE

X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: Bob Zandipour

CALCULATED/DESIGNED BY: KR — DATE 3/03 — REVISED BY
CHECKED BY: GVL — 3/03 — DATE REVISED

LAST REVISION 00-00-00 — DATE PLOTTED => 20-MAY-2003 — TIME PLOTTED => 08:20

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

DGN FILE => 40120gb01.dgn
USERNAME => trmnguye

CU 04251 EA 012001

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.9	76	79

Caltrans Metric

REGISTERED STRUCTURAL ENGINEER 3/28/03 DATE

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Mee Shing Owyang No. S 2246 Exp. 12/31/05 STRUCTURAL STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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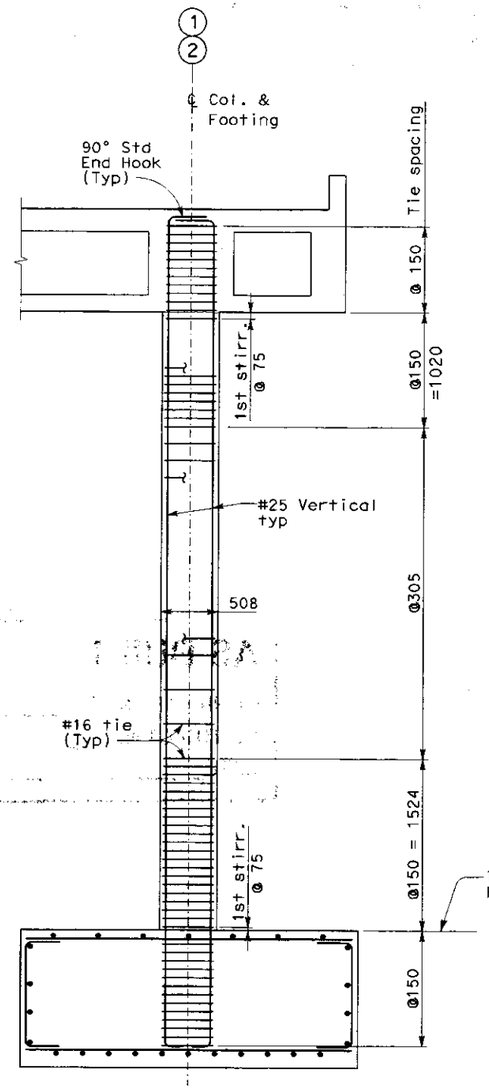
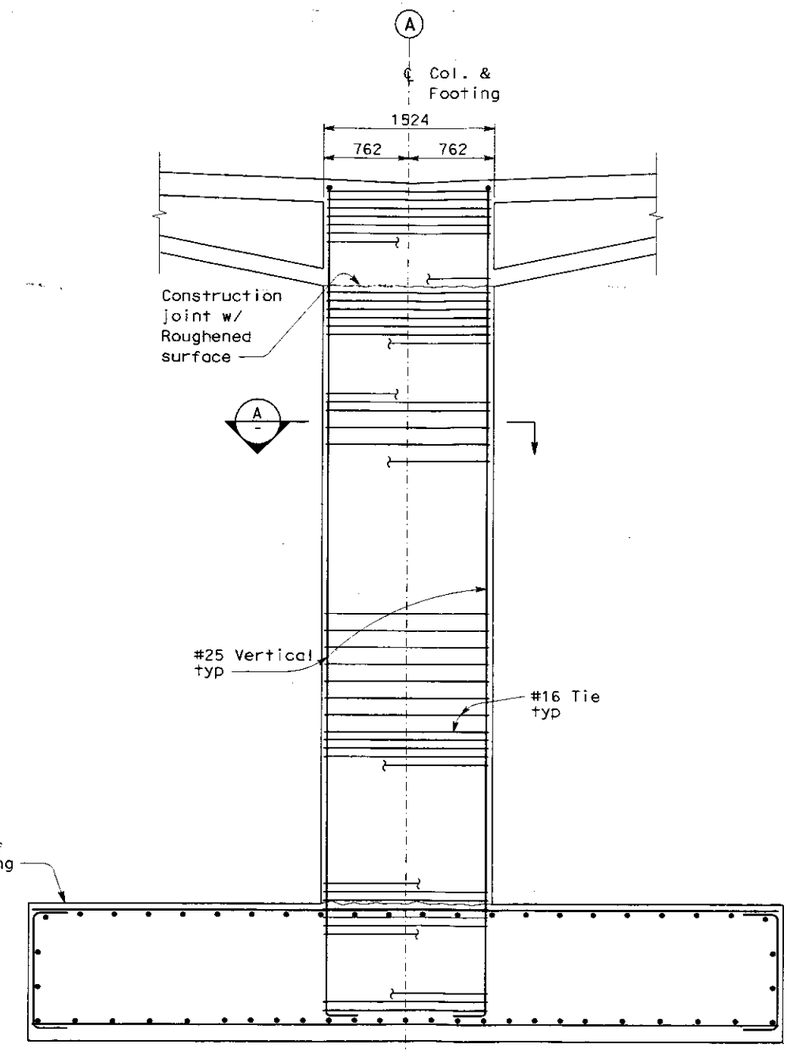


END ELEVATION

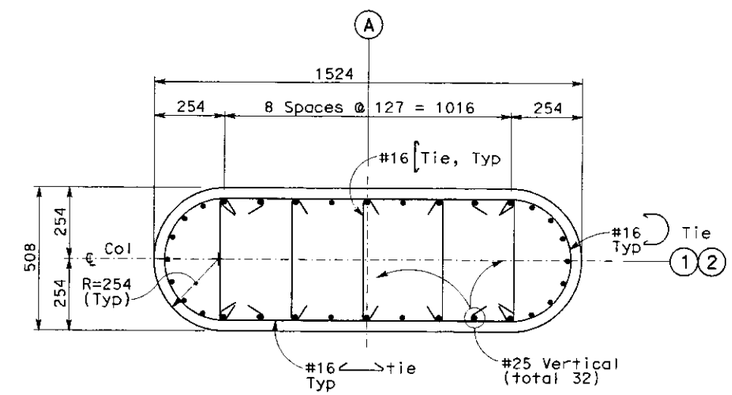


SIDE ELEVATION

COLUMN ELEVATION
SCALE: 1:25

NOTES:

1. For general notes, see sheet AS-1.



SECTION A
SCALE: 1:10

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120G4
DATE 06/17/04

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY M.S. Owyang	CHECKED L. Johnson	
LAYOUT	BY R. Hernandez	CHECKED M.S. Owyang	
QUANTITIES	BY M.S. Owyang	CHECKED L. Johnson	

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

CU 04251
EA 0120H1

DGN FILE => as03.dgn
USERNAME => trrichf

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

ENTRANCE CANOPY
COLUMN ELEVATION AND SECTION

AS-3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:29

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	12.9	78	79

REGISTERED STRUCTURAL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mee Shing Owyang — No. S 2246 — Exp. 12/31/05 — STRUCTURAL — STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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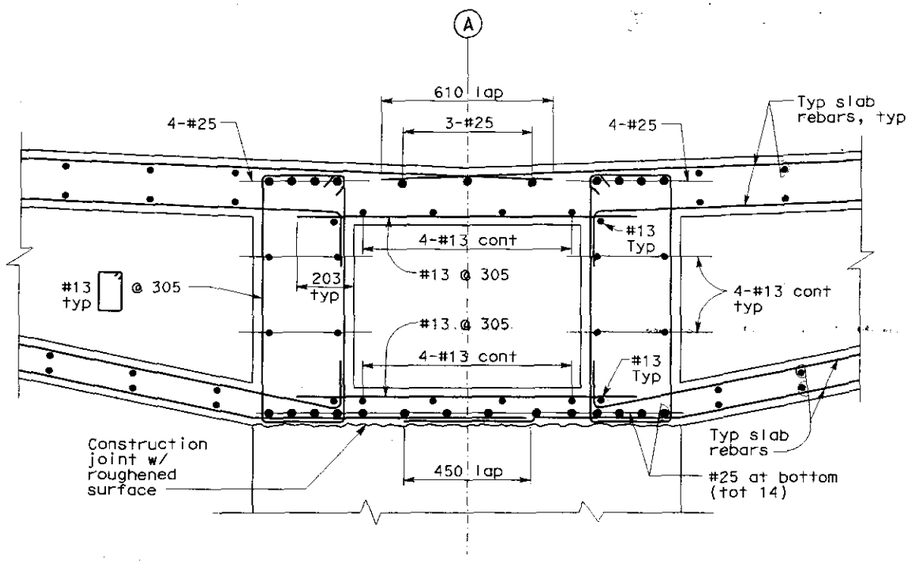
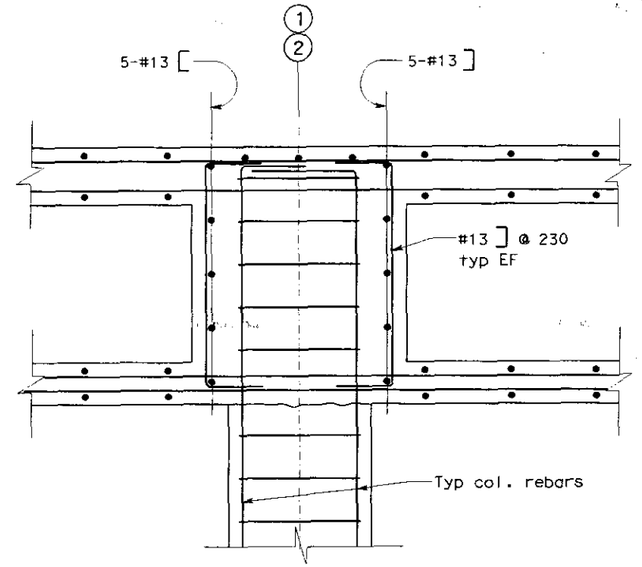


DETAIL 1 (AS-4)
SCALE: 1:10

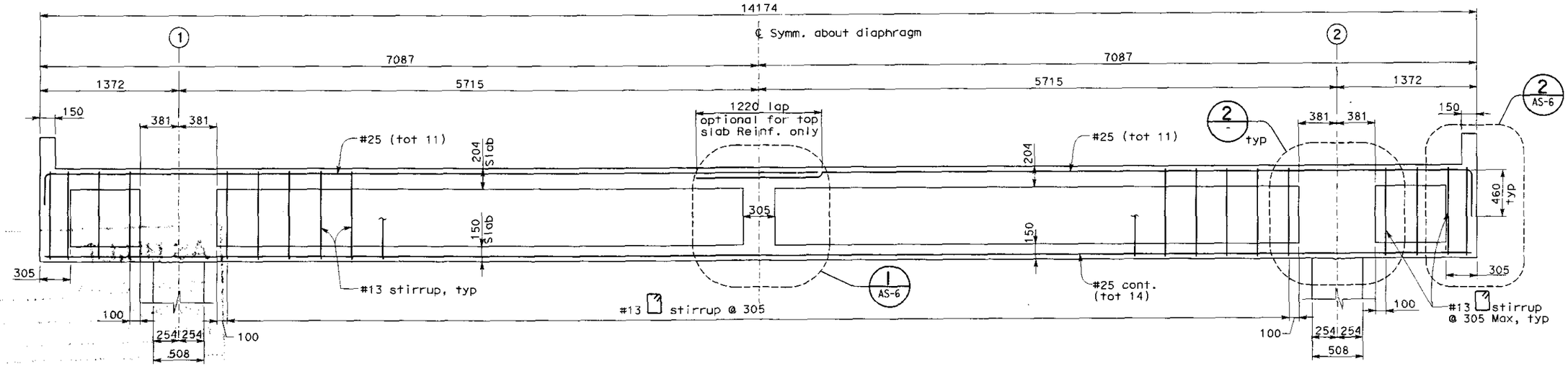


DETAIL 2 (AS-4)
SCALE: 1:10

NOTES:

1. For general notes, see sheet AS-1.

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120&4
DATE 06/17/04



LONGITUDINAL GIRDER SECTION
SCALE: 1:20

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY M.S. Owyang	CHECKED L. Johnson	
LAYOUT	BY R. Hernandez	CHECKED M.S. Owyang	
QUANTITIES	BY M.S. Owyang	CHECKED L. Johnson	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

ENTRANCE CANOPY
LONGITUDINAL GIRDER SECTION

AS-5

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04251
EA 0120H1

DGN FILE => as05.dgn
USERNAME => trrichf

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:30

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	71	79

Caltrans Metric

Robert Brooks Howell 03/28/03
REGISTERED ARCHITECT DATE

5-20-03
PLANS APPROVAL DATE

LICENSED ARCHITECT ROBERT BROOKS HOWELL No. C 8657 Exp. 11/30/03 Architectural STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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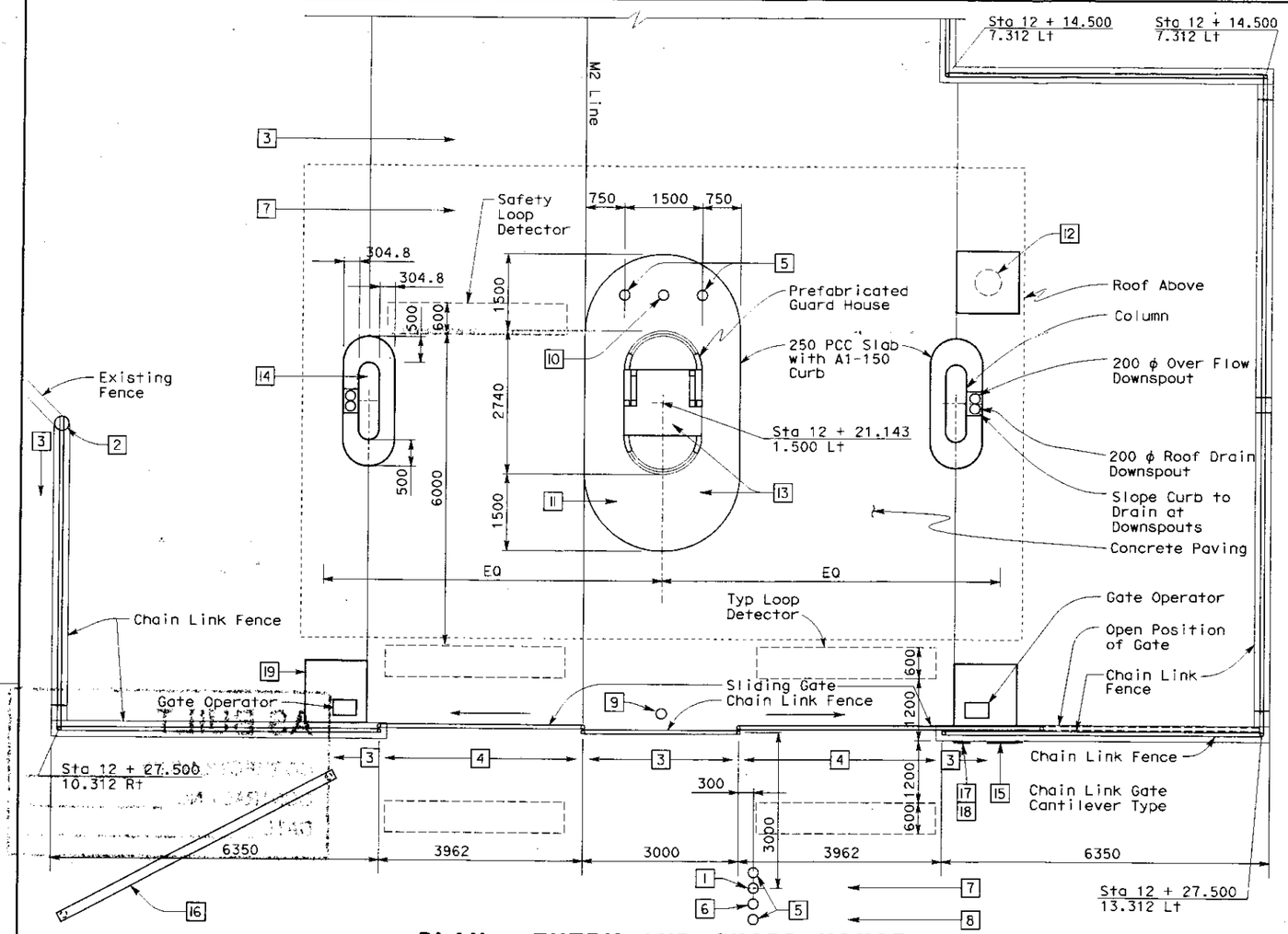
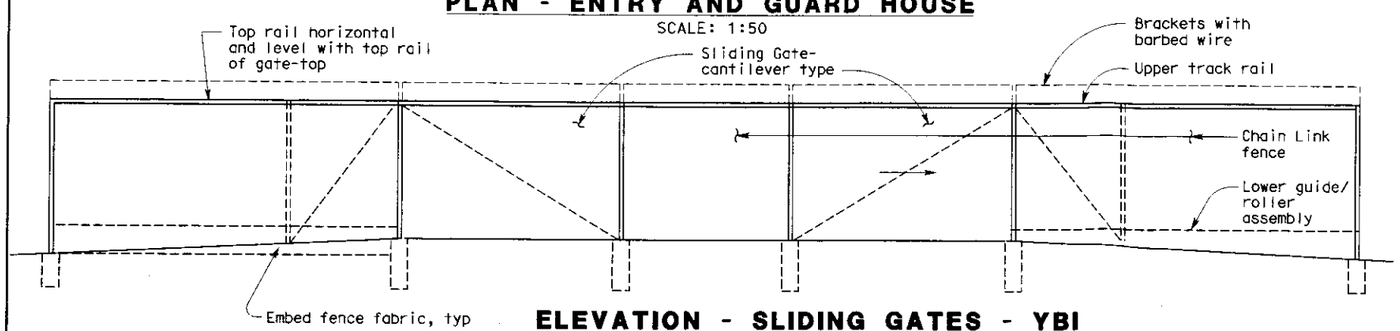
NOTES:

1. 2800 high pedestal with card reader, intercom and CCTV.
2. New corner post and connection to existing fence.
3. Brackets for barbed wire shall project toward exterior at chain link fence.
4. Brackets at sliding gates for barbed wire shall slope toward Coast Guard property.
5. Typ Bollard, 1000 h x 100 dia.
6. Telephone in Cabinet on Typ bollard.
7. Pavement sign - "STOP" - Std plan A240.
8. 4-striped on pavement 300 x 1900 @ 1200 O.C.
9. Relocate Exist red light-mount on Typ bollard.
10. Relocate Exist yellow light-mount on Typ bollard.
11. Yellow paint at curb-vertical-full height; top of curb-continuous stripe 150 wide.
12. Relocate Exist weapon clearing barrel.
13. Heavy broom texture at concrete.
14. Conduits for lights and camera embedded in column and canopy.
15. Relocate Exist "Wellcome" sign on fence.
16. Relocate Exist "Coast Guard" sign.
17. Relocate Exist "Auto Gate" sign on fence.
18. Relocate Exist "Search" sign on fence.
19. 1200 x 1200 AC pad for equipment.



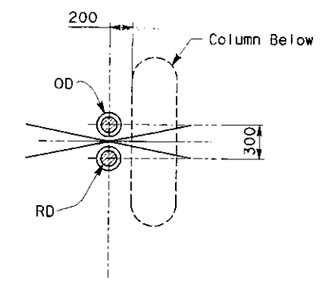
PLAN - ENTRY AND GUARD HOUSE

SCALE: 1:50



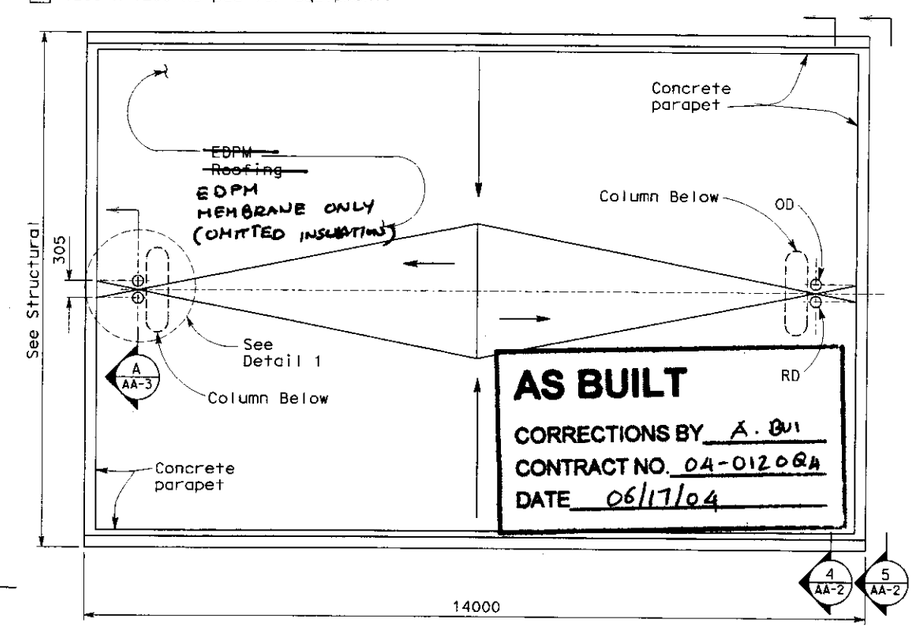
ELEVATION - SLIDING GATES - YBI

SCALE: 1:50



1 DETAIL

SCALE: 1:25



AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120RA
DATE 06/17/04

ROOF PLAN

SCALE: 1:50

SCALE: 1:50

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

	BY		CHECKED
DESIGN	R. Howell		G. Lusherovich
LAYOUT	R. Hernandez		R. Howell
QUANTITIES	P. McNamee		R. Parrino

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
ARCHITECTURAL DESIGN

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

ENTRANCE CANOPY
PLAN & ELEVATION

AA-1

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04251
EA 0120H1

DGN FILE => aa01.dgn
USERNAME => trmariak

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:43

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF	80	12.9	74	79

REGISTERED STRUCTURAL ENGINEER — DATE 3/28/03

5-20-03
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mee Shing Owyang — No. S 2246 — Exp. 12/31/05 — STRUCTURAL — STATE OF CALIFORNIA

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
303 SECOND STREET, SUITE 700 N
SAN FRANCISCO, CA 94107

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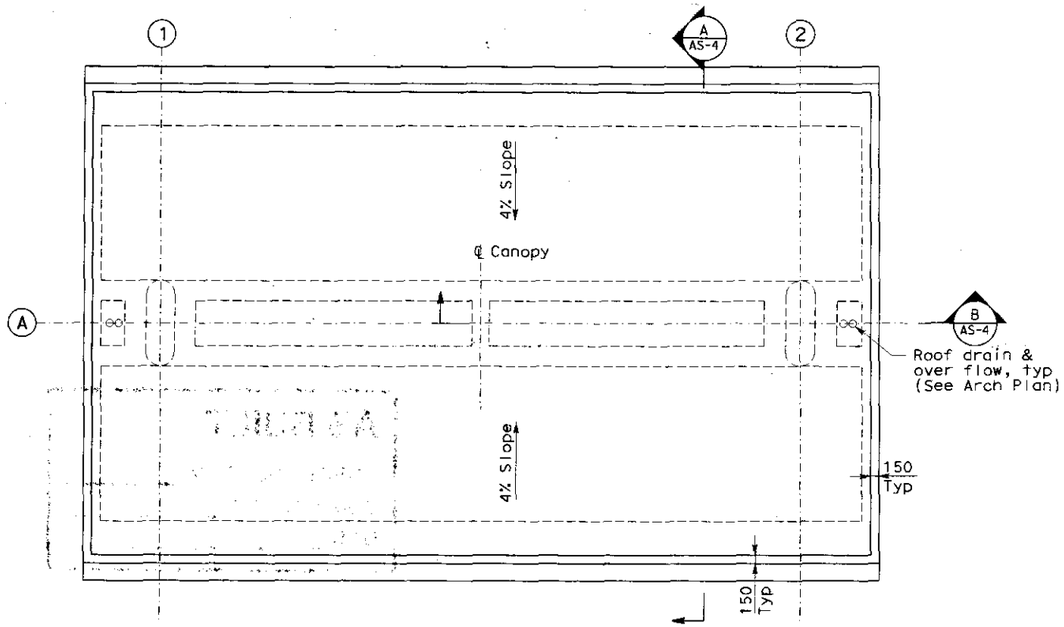
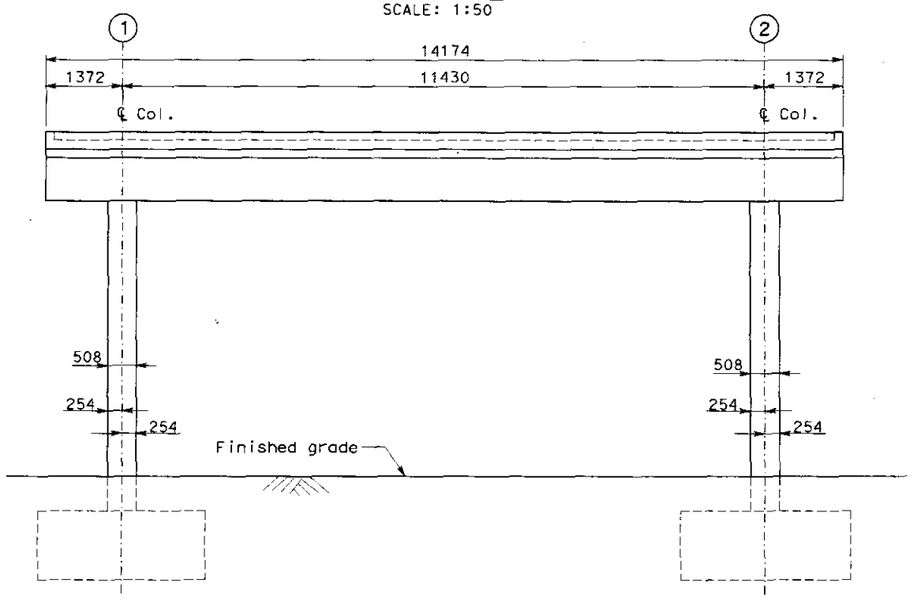
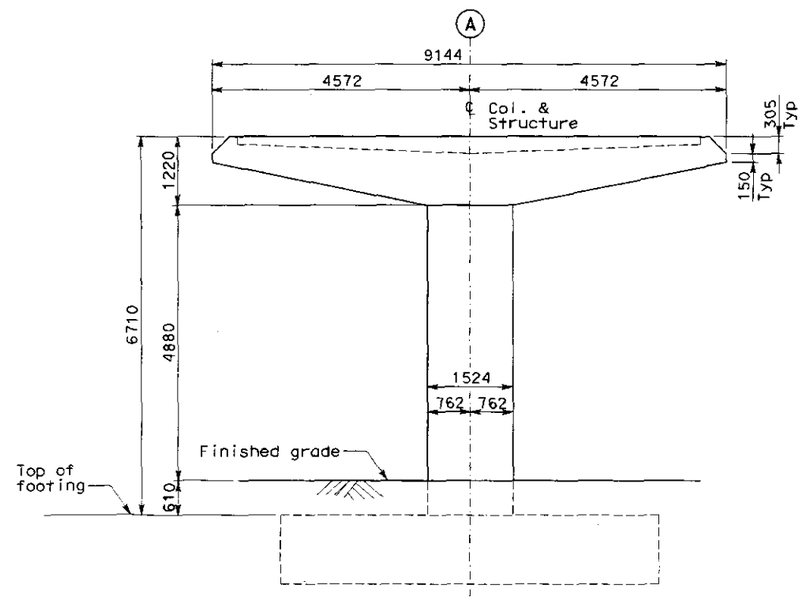


PLAN
SCALE: 1:50



FRONT ELEVATION
SCALE: 1:50



SIDE ELEVATION
SCALE: 1:50

GENERAL NOTES:

1. The ultimate cylinder strength of concrete (fc') at 28 days shall be 27.58 MPa.
2. Reinforcement shall conform to ASTM A615M, Grade 420 deformed steel bars (fy=420 MPa).
3. Design loads:

   Dead load - Structural weight plus 311.2 Pa roofing and 215.5 Pa lost form.
   Live load - 958 Pa
   Seismic forces - Based on UBC seismic zone 4 with Z=0.4, I=1.0, Ca=.44Na, Na=1.0, Cv=0.64Nv, Nv=1.12
4. Building Types - Ordinary moment-resisting frame (OMRF) in the longitudinal direction and Cantilevered column building system in the transverse direction.
5. Seismic response reduction factors:

   R = 3.5 for force in the longitudinal direction and
   R = 2.2 for force in the transverse direction.
6. Design Codes:

   UBC - Uniform Building Code, 1997 Edition.
   ACI - Building Code Requirements for Structural Concrete (ACI 318-99).
7. Allowable soil bearing pressure - 167.57 kN/m^2 with one-third increase for loads combined with seismic force.
8. Friction coefficient between footing and soil for lateral force resistance-0.4.
9. See architectural plan for orientation and location.

AS BUILT
CORRECTIONS BY A. BUI
CONTRACT NO. 04-0120G4
DATE 06/17/04

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

	BY	CHECKED
DESIGN	M.S. Owyang	L. Johnson
LAYOUT	R. Hernandez	M.S. Owyang
QUANTITIES	M.S. Owyang	L. Johnson

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURAL DESIGN

BRIDGE NO. 34-0006
KILOMETER POST 12.7/13.0

ENTRANCE CANOPY
PLAN AND ELEVATIONS

AS-1

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04251
EA 0120H1

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USERNAME => trrichf

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DATE PLOTTED => 20-MAY-2003 TIME PLOTTED => 08:29

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Interim Seismic Retrofit-East Bay Cantilever Truss (Contract No. 04-043004)

The as-built drawings, which are contained in these CDs, are scanned from drawings of the existing structure for the convenience of the contractor and as a means to convey to the contractor the available information regarding the existing structure. It is to be understood that no claim is being made as to the accuracy or completeness of the said information and that the State of California or its officers or agents shall not be responsible for the manner in which the contractor interprets and uses this information or for the accuracy, currency or completeness of these scanned as-built drawings. The contractor shall be responsible to obtain, at the contractor's expense, any additional information that the contractor deems necessary for completely and accurately assessing the existing conditions of the structure. The contractor shall not be entitled to any compensation for any claim arising from inaccuracy or insufficiency of these as-built drawings or in anyway related to these drawings.

105.General Plan No. 1
106.General Plan No. 2
107.Index to Plans
108.Floor Beam Details No. 1
109.Floor Beam Details No. 2
110.Floor Beam Details No. 3
111.Floor Beam Details No. 4
112.Floor Beam Details No. 5
113.Piers E2, E3 Details No. 1
114.Piers E2, E3 Details No2
115.Pier E4 Details No. 1
116.Pier E4 Details No. 2
117.Pier E4 Details No. 3
118.Pier E4 Details No. 4
119.Pier E4 Details No. 5
120.Pier E4 Bumper Details No. 1
121.Pier E4 Bumper Details No. 2
122.Pier E4 Bumper Details No. 3

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	105	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

PROFESSIONAL ENGINEER J. MACINTYRE No. C 47564 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

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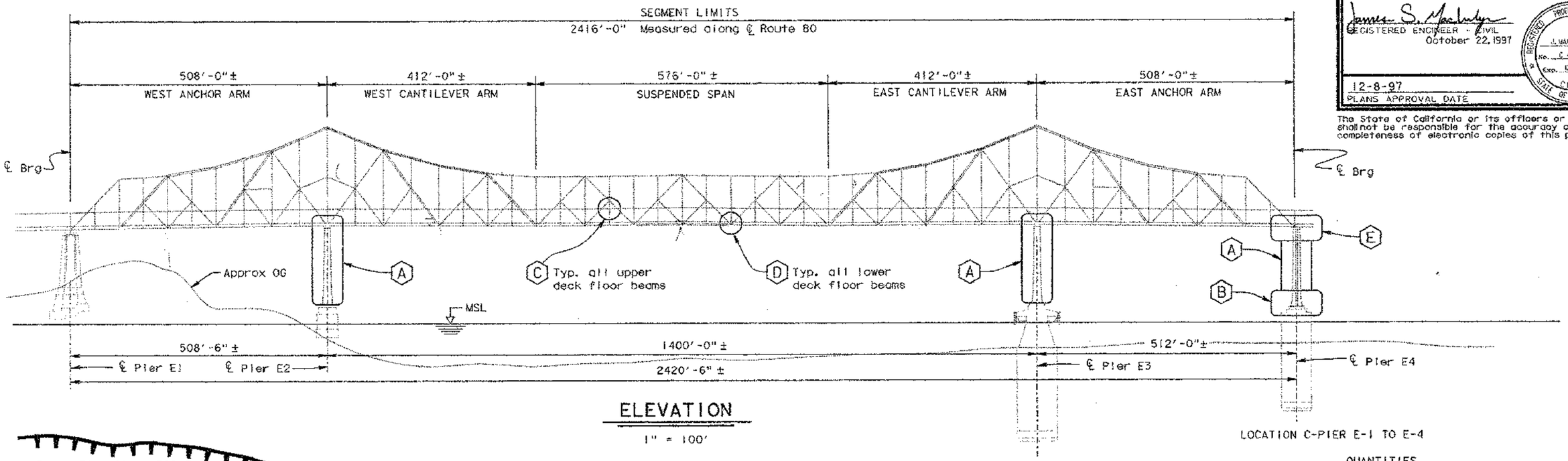


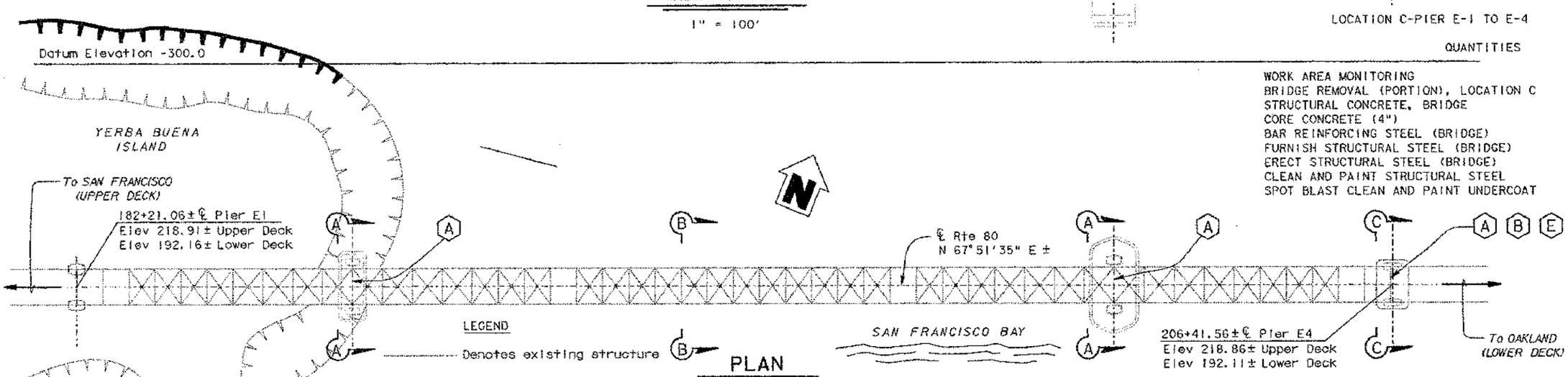
ELEVATION

1" = 100'

LOCATION C-PIER E-1 TO E-4

QUANTITIES

WORK AREA MONITORING	LUMP	SUM
BRIDGE REMOVAL (PORTION), LOCATION C	LUMP	SUM
STRUCTURAL CONCRETE, BRIDGE	8	CY
CORE CONCRETE (4")	352	LF
BAR REINFORCING STEEL (BRIDGE)	1,750	LB
FURNISH STRUCTURAL STEEL (BRIDGE)	63,800	LB
ERECT STRUCTURAL STEEL (BRIDGE)	63,800	LB
CLEAN AND PAINT STRUCTURAL STEEL	LUMP	SUM
SPOT BLAST CLEAN AND PAINT UNDERCOAT	1,690	SQFT



PLAN

1" = 100'

LEGEND

Denotes existing structure

A Tower Connection Retrofit

B Base of Tower Anchor Bolt Retrofit

C Upper deck floor beam connection retrofit

D Lower deck floor beam connection retrofit

E Tower Bumper

Denotes new construction

NOTES:

1. For Sections A-A, B-B and C-C see "GENERAL PLAN NO. 2" sheet.
2. For General Notes see "INDEX TO PLANS" sheet.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
GENERAL PLAN NO. 1

DESIGN	BY J. MACINTYRE 4-97	CHECKED J. SUNDSTROM 5-97			
DETAILS	BY D.A. SANDERSON 4-97	CHECKED J. SUNDSTROM 5-97	LAYOUT	BY J. MACINTYRE 4-97	CHECKED J. SUNDSTROM 5-97
QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED

DESIGN ENGINEER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 04300

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 1 OF 18

05 OSD 2234 (CADD 2/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

USERNAME => tmikesl

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:31

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	106	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

PROFESSIONAL ENGINEER — J. MACINTYRE — No. C 42504 — EXP. 12-31-99 — CIVIL — STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

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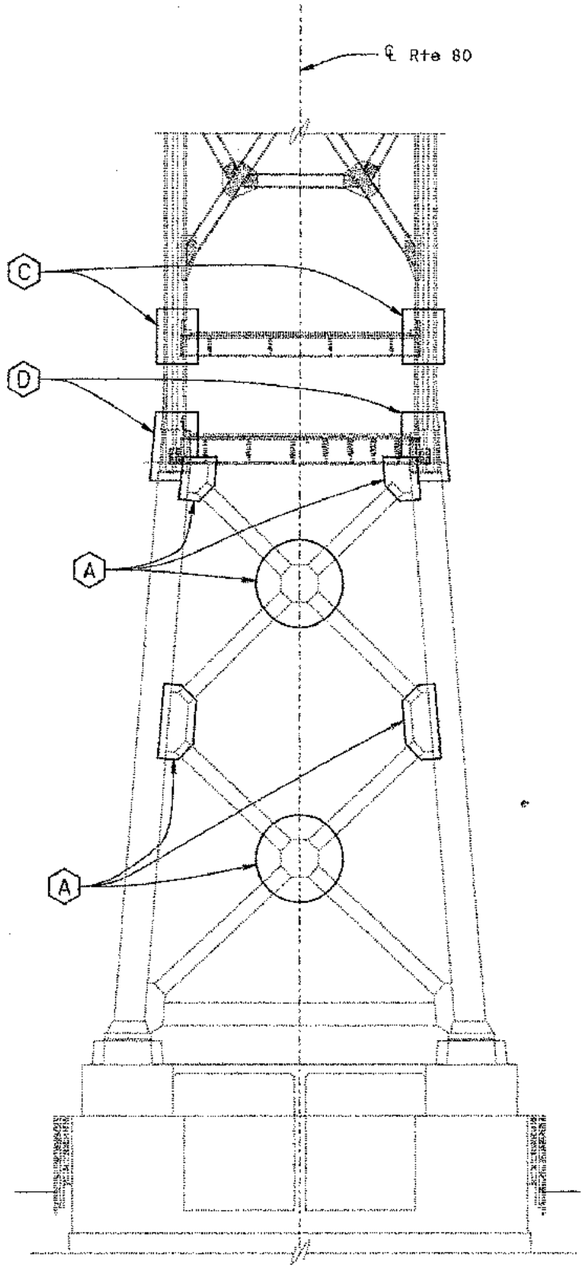
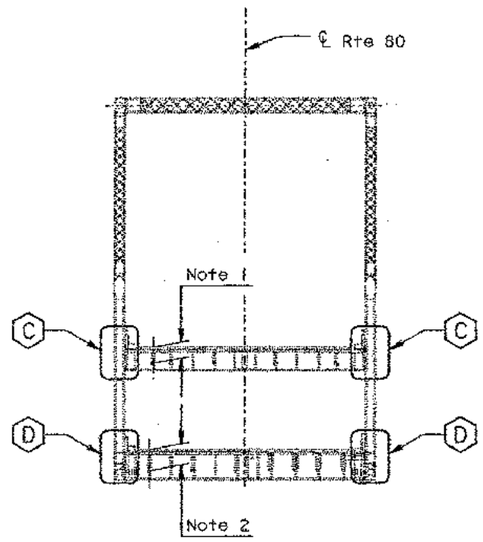


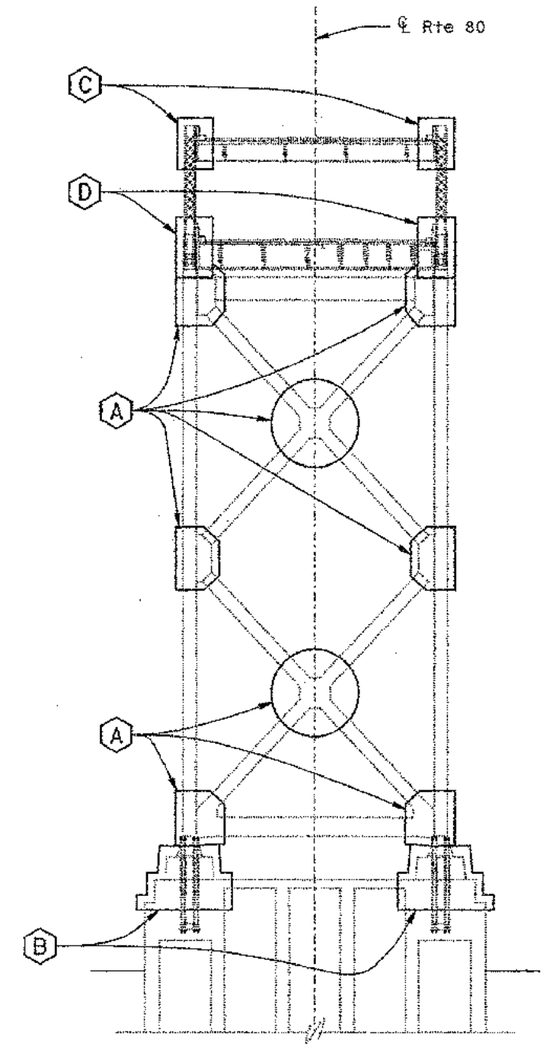
SECTION A-A

1" = 20'



SECTION B-B

1" = 20'



SECTION C-C

1" = 20'

LEGEND

Denotes existing structure

(A) Tower Connection Retrofit

(B) Base of Tower Anchor Bolt Retrofit

(C) Upper Deck Floor Beam Connection Retrofit

(D) Lower Deck Floor Beam Connection Retrofit

(E) Tower Bumper

Notes:

1. 4'-2 ½"± - Top of upper deck to bottom of north exterior stringer.
2. 5'-6"± - Top of lower deck to bottom of north exterior stringer.
3. For limits of floor beam retrofit type (C) and (D) see "General Plan No. 1" sheet.
4. For location of Section A-A, B-B and C-C see "General Plan No. 1" sheet.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGN ENGINEER

DESIGN	BY J. MACINTYRE 4-97	CHECKED J. SUNDSTROM 5-97		
DETAILS	BY D.A. SANDERSON 4-97	CHECKED J. SUNDSTROM 5-97	LAYOUT	BY J. MACINTYRE 4-97 CHECKED J. SUNDSTROM 5-97
QUANTITIES	BY P. WATZ 5-97	CHECKED J. SUMMERS/J. MACINTYRE 5-97	SPECIFICATIONS	BY PLANS AND SPECS COMPARED

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.5

CU 04
EA 043001

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 2 OF 18

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
GENERAL PLAN NO. 2

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:32

USERNAME => jrmikesl

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	107	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

PROFESSIONAL ENGINEER REGISTERED J. MACINTYRE No. C 47564 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

DESIGN:	1994 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND SAN FRANCISCO-OAKLAND BAY BRIDGE WEST SPAN SEISMIC RETROFIT DESIGN CRITERIA
REINFORCED CONCRETE: (NEW)	GRADE 60 ASTM A706 f_y = 60,000 psi f'_c = 4,000 psi
REINFORCED CONCRETE: (EXISTING)	f_y = 33,000 psi f'_c = 5,000 psi
STRUCTURAL STEEL (NEW)	ASTM A36 UNLESS OTHERWISE NOTED f_y = 36,000 psi
STRUCTURAL STEEL (EXISTING)	MEDIUM CARBON STEEL f_y = 37,000 psi f_u = 62,000 psi SILICON STEEL f_y = 45,000 psi f_u = 80,000 psi NICKEL STEEL f_y = 55,000 psi f_u = 90,000 psi
ANCHOR BOLTS	ASTM F1554 GRADE 36 UNLESS OTHERWISE NOTED
HIGH STRENGTH BOLTS	ASTM A325 UNLESS OTHERWISE NOTED
HIGH STRENGTH THREADED RODS	ASTM A354 GRADE BD UNLESS OTHERWISE NOTED
WELDS	E70XX UNLESS OTHERWISE NOTED

GENERAL NOTES

1. All new connection bolts shall be high strength bolts and shall conform to ASTM A325 bearing type unless otherwise noted in the plans. All high strength bolts in standard size holes shall be furnished with one waher beneath the turning element. All high strength bolts in oversized holes shall be furnished with two hardened washers (conforming to ASTM F436), with one washer beneath the bolt and with one washer beneath the nut. Heads of all bolts shall be on the outside face of the member as practical, unless otherwise noted. Bolt threads shall be excluded from the shear planes.
2. Maintenance platforms and ladders interfering with the new construction and not shown in Road Plans shall be temporarily removed or modified as required and reinstalled as approved by the Engineer.
3. Drain pipes to be removed as required for retrofit and reinstalled as approved by the Engineer.
4. For utilities and highway facilities, such as air, water and electrical utility relocation, see Road Plans.
5. For traffic controls, see Road Plans.
6. "Near Side" of a member or connection in the plans refers to the side shown. "Far Side" of a member or connection in the plans refers to the other side of the same member or connection from the side shown.
7. All retrofit construction shown in the plans is symmetrical about centerline of roadway, unless otherwise noted.
8. Anchor bolts to be ASTM F1554 Grade 36.

INDEX TO PLANS

SHEET NO.	TITLE
1.	GENERAL PLAN NO. 1
2.	GENERAL PLAN NO. 2
3.	INDEX TO PLANS
4.	FLOOR BEAM DETAILS NO. 1
5.	FLOOR BEAM DETAILS NO. 2
6.	FLOOR BEAM DETAILS NO. 3
7.	FLOOR BEAM DETAILS NO. 4
8.	FLOOR BEAM DETAILS NO. 5
9.	PIERS E2, E3 DETAILS NO. 1
10.	PIERS E2, E3 DETAILS NO. 2
11.	PIER E4 DETAILS NO. 1
12.	PIER E4 DETAILS NO. 2
13.	PIER E4 DETAILS NO. 3
14.	PIER E4 DETAILS NO. 4
15.	PIER E4 DETAILS NO. 5
16.	PIER E4 BUMPER DETAILS NO. 1
17.	PIER E4 BUMPER DETAILS NO. 2
18.	PIER E4 BUMPER DETAILS NO. 3

STANDARD PLANS DATED JULY 1992

A10A ABBREVIATIONS

STANDARD PLAN SHEET NO.
DETAIL NO.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
INDEX TO PLANS

	BY	CHECKED
DESIGN	J. MACINTYRE 4-97	J. SUNDSTROM 5-97
DETAILS	D.A. SANDERSON 4-97	J. SUNDSTROM 5-97
QUANTITIES	P. WATZ 5-97	J. SIEMERS/J. MACINTYRE 5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DS OSD 2139 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 3 OF 18

USERNAME => trmikest
caltp_09080534

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:33

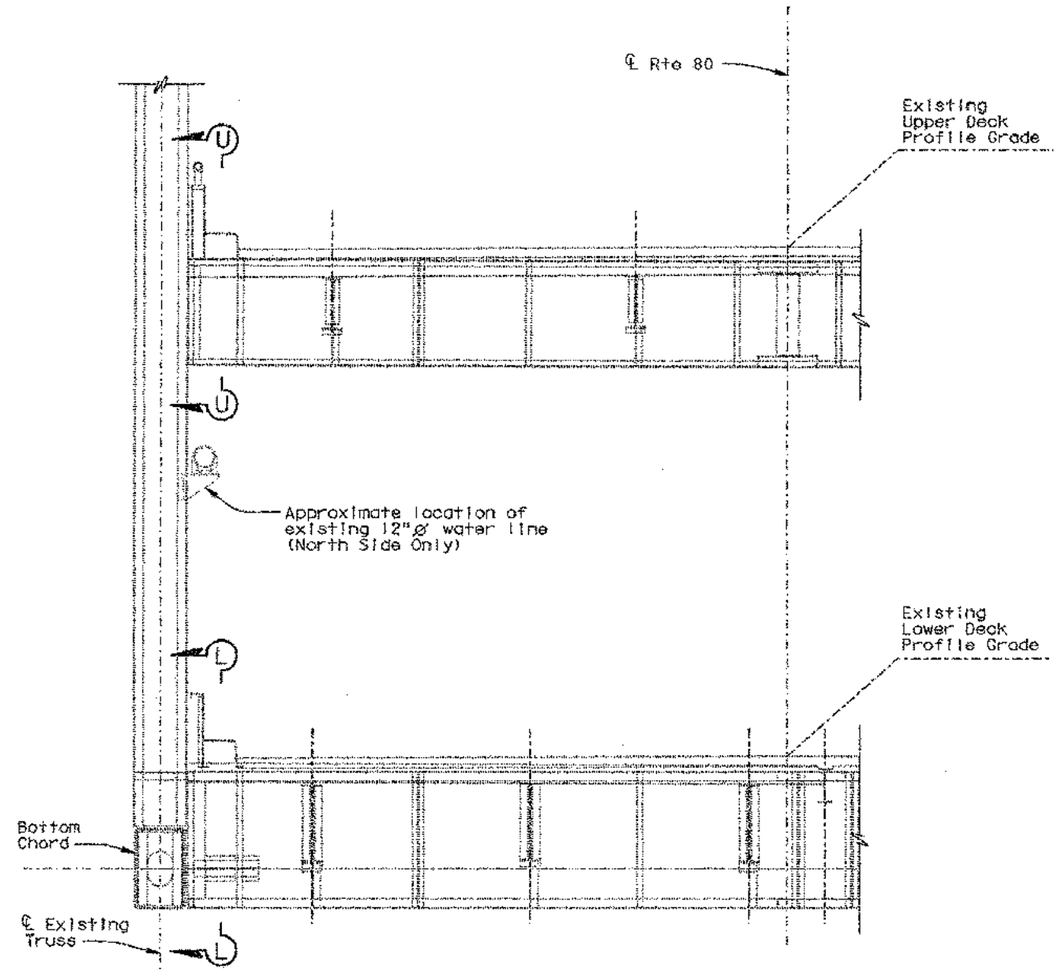
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	108	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

REGISTERED PROFESSIONAL ENGINEER J. MACINTYRE No. C 47564 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



TYPICAL PART ELEVATION

1/4" = 1'-0"

NOTE:

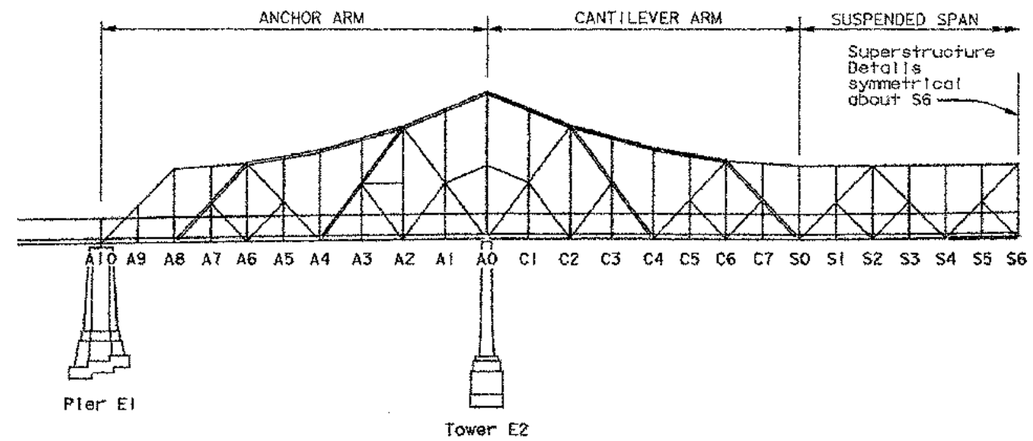
For Sections U-U see "Floor Beam Details No. 2" sheet.

For Sections L-L see "Floor Beam Details No. 3, 4 and 5 sheets.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

LEGEND

indicates existing structures.



FLOOR BEAM LOCATION DIAGRAM

1" = 100'

FLOOR BEAM ENDS

INSTALLATION NOTES:

1. Rivet replacement with HS bolts shall begin with the center-most pair of rivets and continue, by pairs, alternating above and below the starting pair.
2. All bolts shall be fully tensioned prior to removing any additional rivets.
3. Only one end of a floor beam shall be worked on at any one time.
4. Only non-adjacent floor beam ends shall be worked on simultaneously.
5. New bolts shall be the same size, or larger as required, as the rivets being replaced.
6. Rivets which cannot be removed without damaging the adjacent steel shall be cored out, leaving a hole 3/16" larger in diameter than the diameter of the removed rivet. The new HS bolt shall have a diameter which is 1/16" smaller than the cored hole.

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
FLOOR BEAM DETAILS NO. 1

	BY	CHECKED
DESIGN	U. SUNDSTROM 3-97	J. MACINTYRE 5-97
DETAILS	D.A. SANDERSON 3-97	J. MACINTYRE 5-97
QUANTITIES	P. WATZ 5-97	J. SIEMBERG/J. MACINTYRE 5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

DS-OSD 2338 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04
EA 043001

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES PRELIMINARY STAGE ONLY

SHEET 4 OF 18

USERNAME => trmings1

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:34

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	109	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

REGISTERED PROFESSIONAL ENGINEER J. MACINTYRE No. C 47564 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

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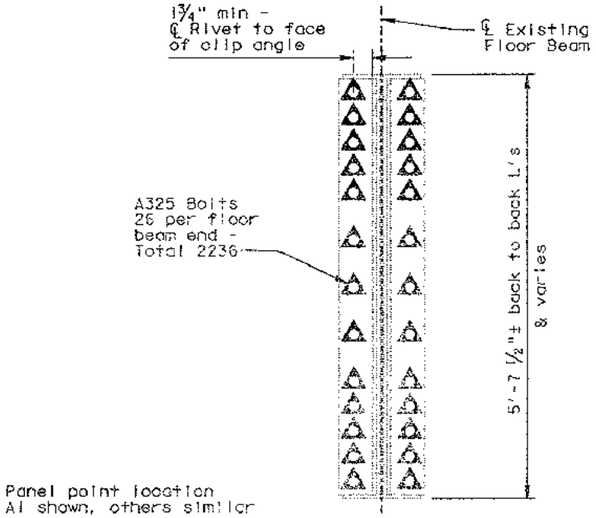
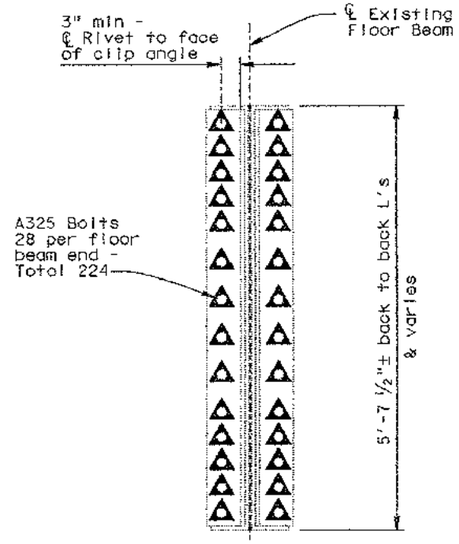


TYPICAL SECTION U-U

1" = 1'-0"

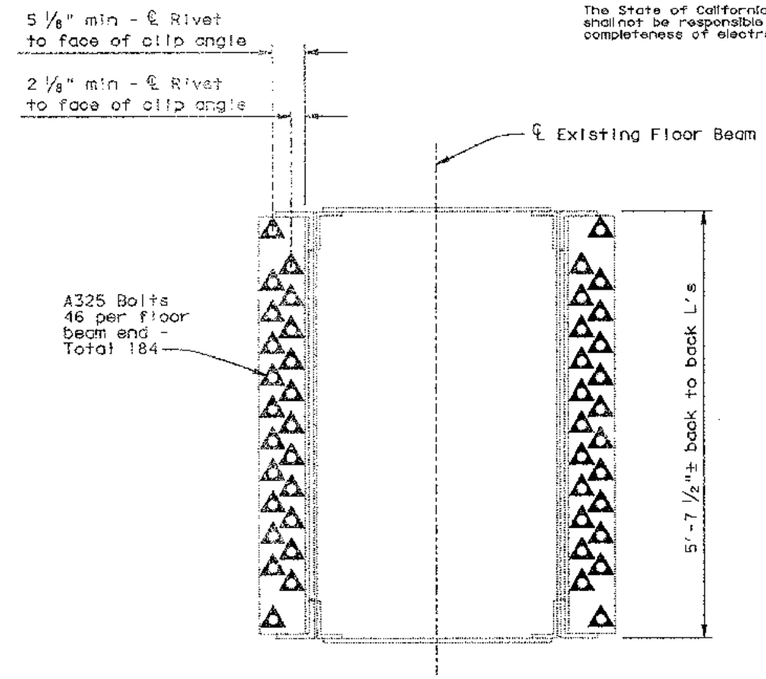


SECTION U-U

1"= 1'-0"

UPPER FLOOR BEAM LOCATIONS

A6, A8



SECTION U-U

1"= 1'-0"

UPPER FLOOR BEAM LOCATIONS

A0

LOCATION	NUMBER OF RIVETS	APPROXIMATE GRIP LENGTH (Inches)
A10	52	1 5/8
A9	52	1 1/8
A8	56	2 7/8
A7	52	1 1/4
A6	56	2 13/16
A5	52	1 1/8
A4	52	1 7/8
A3	52	1 3/4
A2	52	1 7/8
A1	52	1 1/4
A0	92	2 7/8
C1	52	1 3/16
C2	52	1 7/8
C3	52	1 3/16
C4	52	1 3/4
C5	52	1 1/8
C6	52	1 7/8
C7	52	1 3/8
S0	52	1 5/8
S1	52	1 1/8
S2	52	1 7/8
S3	52	1 1/8
S4	52	1 5/8
S5	52	1 1/8
S6	52	1 7/8

Notes:

1. For Floor Beam Location Diagram see "Floor Beam Details No. 1" sheet.
2. Existing steel railing, curb, walkway and pipe railing not shown.
3. "Typical Section U-U" is typical for all upper floor beam locations except as shown.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

LEGEND

- Indicates existing structures.
- ▲ Indicates existing rivets to be removed and replaced with new 1⅛" ϕ high strength bolts.
- ○ Indicates approx. location of existing rivets

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
FLOOR BEAM DETAILS NO. 2

	BY	CHECKED
DESIGN	J. SUNDSTROM 3-97	J. MACINTYRE 5-97
DETAILS	D.A. SANDERSON 3-97	J. MACINTYRE 5-97
QUANTITIES	P. WATZ 5-97	J. SIGNERS/J. MACINTYRE 5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 2-27-97 6-2-97 6-27-97 8-22-97 10-23-97

SHEET 5 OF 18

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DS OSD 2139 (CADD 9/95)

USERNAME => trmikasi
ctfb2_09080552

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:35

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	110	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

REGISTERED PROFESSIONAL ENGINEER J. MACINTYRE No. C 47564 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

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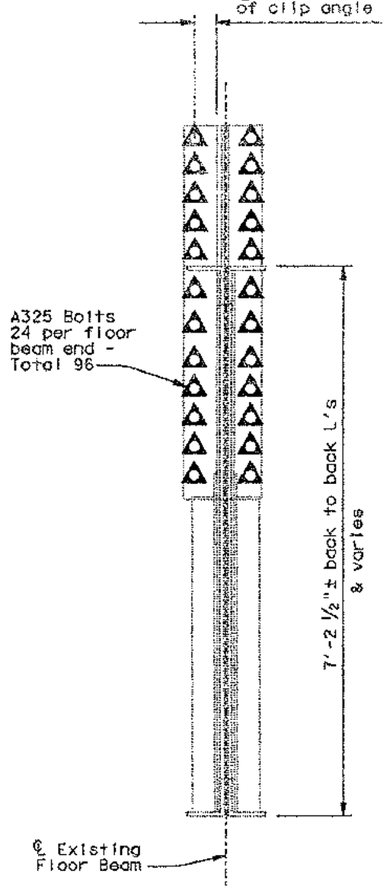
Notes:

1. For Floor Beam Location Diagram see "Floor Beam Details No. 1" sheet.
2. Existing steel railing, curb, walkway and pipe railing not shown.

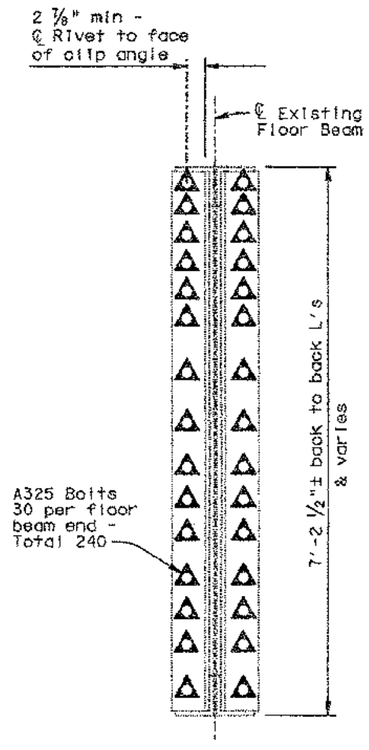


SECTION L-L

1"= 1'-0"

LOWER FLOOR BEAM LOCATION

A10

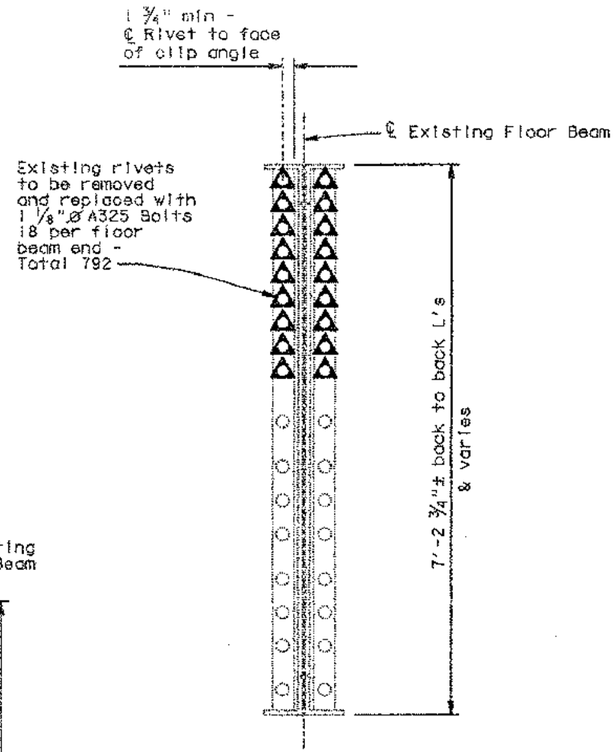


SECTION L-L

1"= 1'-0"

LOWER FLOOR BEAM LOCATIONS

A8, S4



SECTION L-L

1"= 1'-0"

LOWER FLOOR BEAM LOCATIONS

A1, A3, A5, A7, A9, C1, C3, C5, C7, S1, S3

LOCATION	NUMBER OF RIVETS	APPROXIMATE GRIP LENGTH (Inches)
A10	48	5 1/8
A9	36	1 3/4
A8	32	4 1/16
A8	28	4 7/16
A7	36	2 5/16
A5	36	2 3/8
A4	32	4 1/4
A3	36	2 1/2
A2	32	5 1/8
A1	36	3 3/4
A0	96	6 1/8
A0	128	8 1/8
C1	36	2 3/8
C2	32	3 3/8
C3	36	1 13/16
C4	32	4 5/8
C5	36	1 3/4
C6	32	2 13/16
C7	36	3 1/8
S0	48	3 15/16
S1	36	1 3/4
S2	32	2 1/2
S3	28	1 3/4
S4	28	3 5/16
S4	32	4 3/4
S5	48	1 7/8
S6	40	4 1/8

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

LEGEND

Indicates existing structures.

Indicates existing rivets to be removed and replaced with new 1 1/4" ø high strength bolts, unless otherwise noted.

Indicates approx. location of existing rivets

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
FLOOR BEAM DETAILS NO. 3

	BY	CHECKED
DESIGN	J. SUNDSTROM 3-97	J. MACINTYRE 5-97
DETAILS	D.A. SANDERSON 3-97	J. MACINTYRE 5-97
QUANTITIES	P. WATZ 5-97	J. SIMMERS/J. MACINTYRE 5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 12-8-97 | REVISION DATES PRELIMINARY STAGE ONLY 6-26-97 6-30-97 8-29-97 10-23-97

SHEET 6 OF 18

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

05 050 209 (CADD 9/95)

USERNAME => trmikest
offb3_09085238

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:57

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	111	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

PROFESSIONAL ENGINEER — J. MACINTYRE — No. C 47564 — Exp. 12-31-99 — CIVIL — STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

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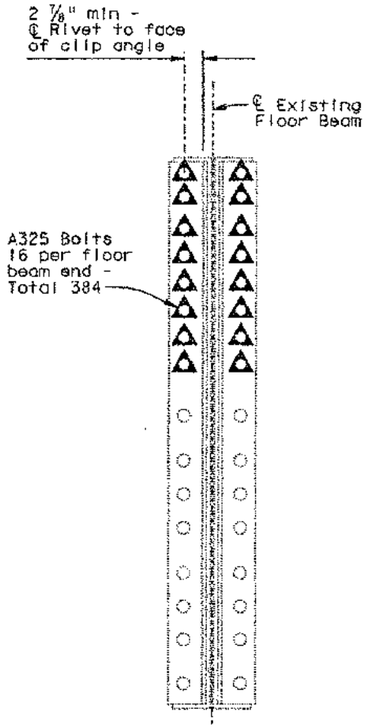
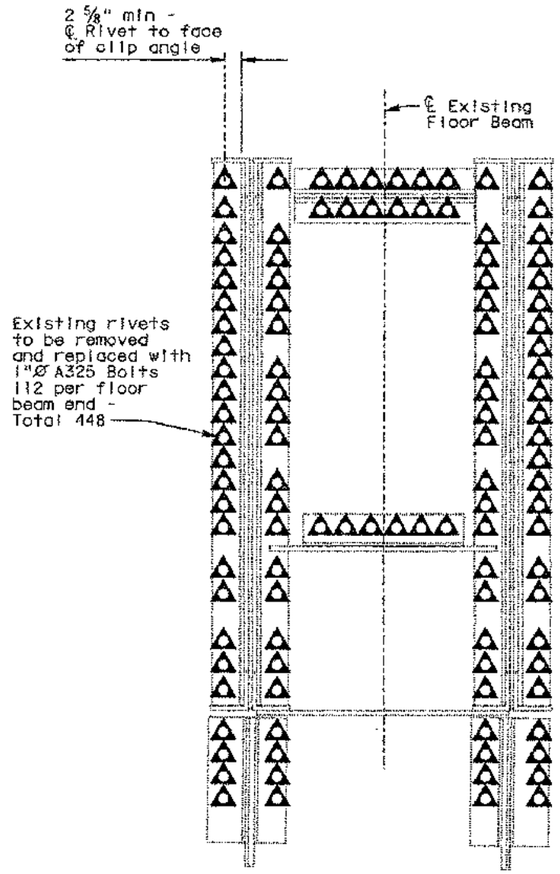


SECTION L-L

1"= 1'-0"

LOWER FLOOR BEAM LOCATIONS

A2, A4, C2, C4, C6, S2

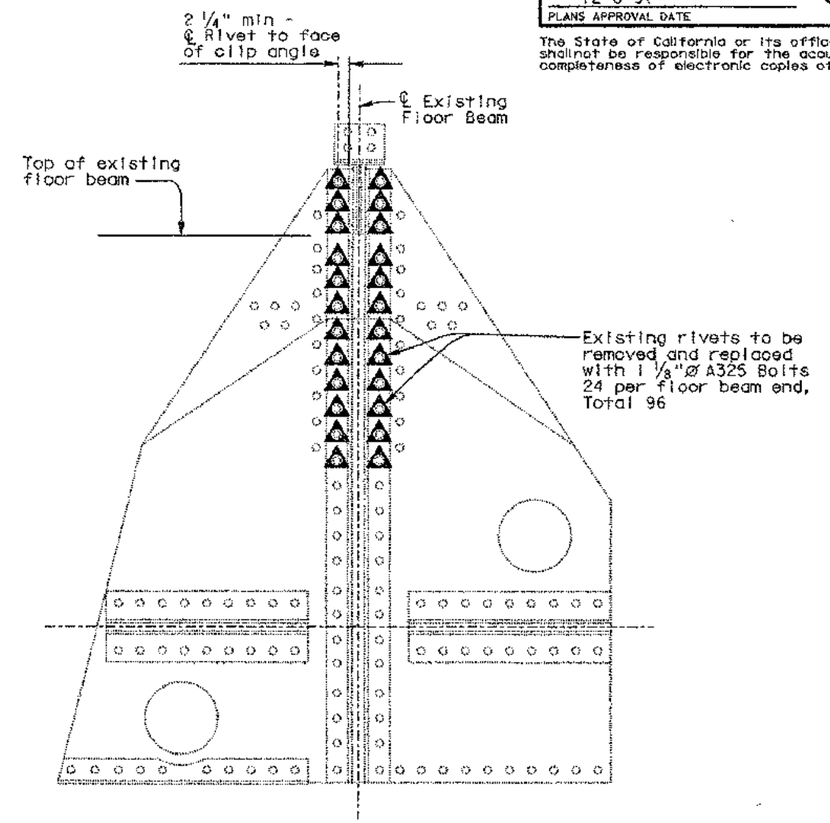


SECTION L-L

1"= 1'-0"

LOWER FLOOR BEAM LOCATIONS

A0



SECTION L-L

1"= 1'-0"

LOWER FLOOR BEAM LOCATIONS

S5

LEGEND

- Indicates existing structures.
- Indicates existing rivets to be removed and replaced with new 1 1/4" Ø high strength bolts, unless otherwise noted.
- Indicates approx. location of existing rivets

Notes:

1. For Floor Beam Location Diagram see "Floor Beam Details No. 1" sheet
2. Existing steel railing, curb, walkway and pipe railing not shown.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
FLOOR BEAM DETAILS NO. 4

	BY	CHECKED
DESIGN	J. SUNDSTROM 3-97	J. MACINTYRE 5-97
DETAILS	P.A. SANDERSON 3-97	J. MACINTYRE 5-97
QUANTITIES	P. WATZ 5-97	J. SIEMERS/J. MACINTYRE 5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DS 050 2639 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 7-22-97 8-8-97 10-2-97

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 7 OF 18

USERNAME => trphlis

DATE PLOTTED => 9-DEC-1997
TIME PLOTTED => 08:46

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	112	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

REGISTERED PROFESSIONAL ENGINEER — J. MACINTYRE — No. C 47564 — Exp. 12-31-99 — CIVIL — STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

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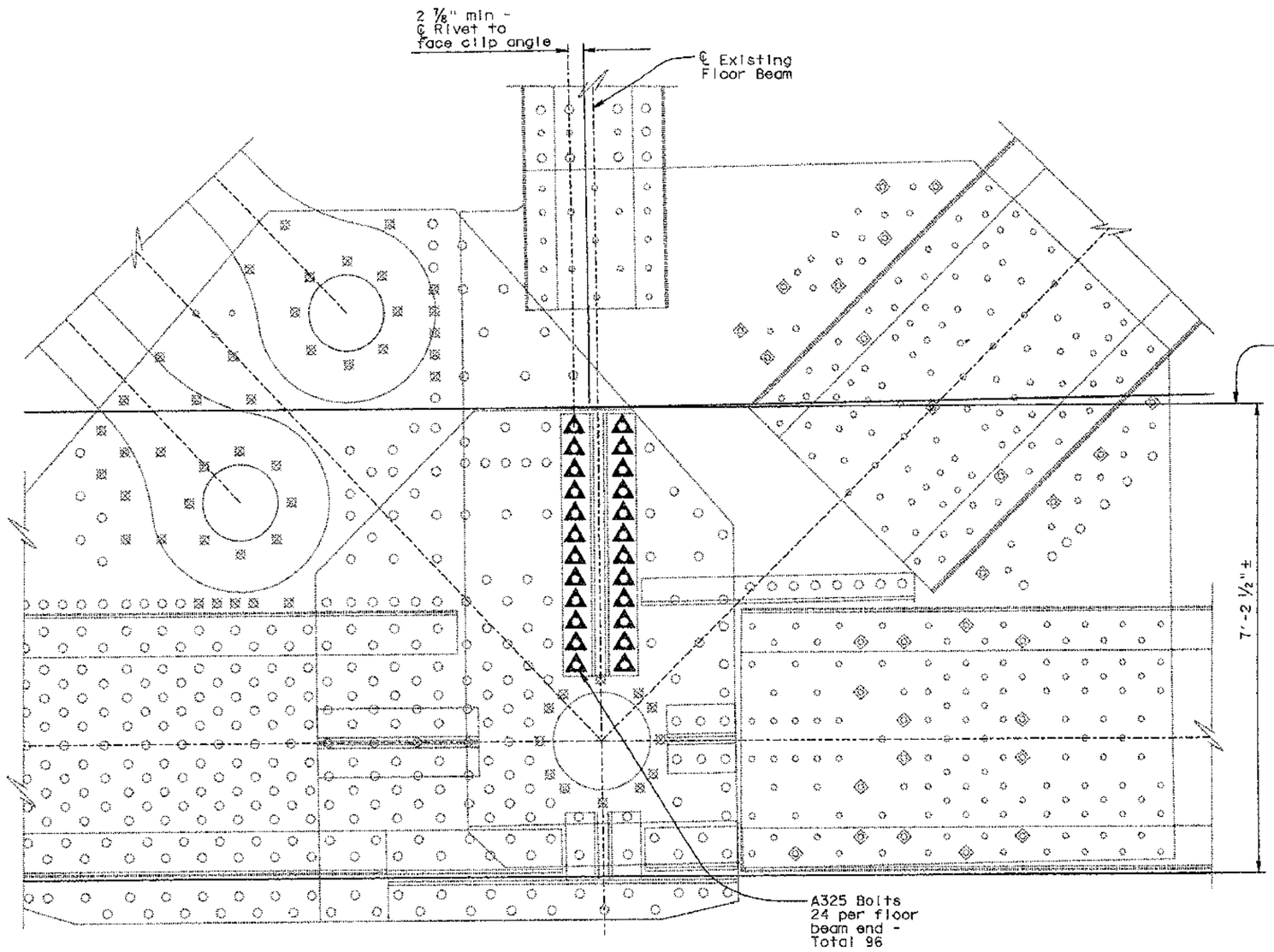
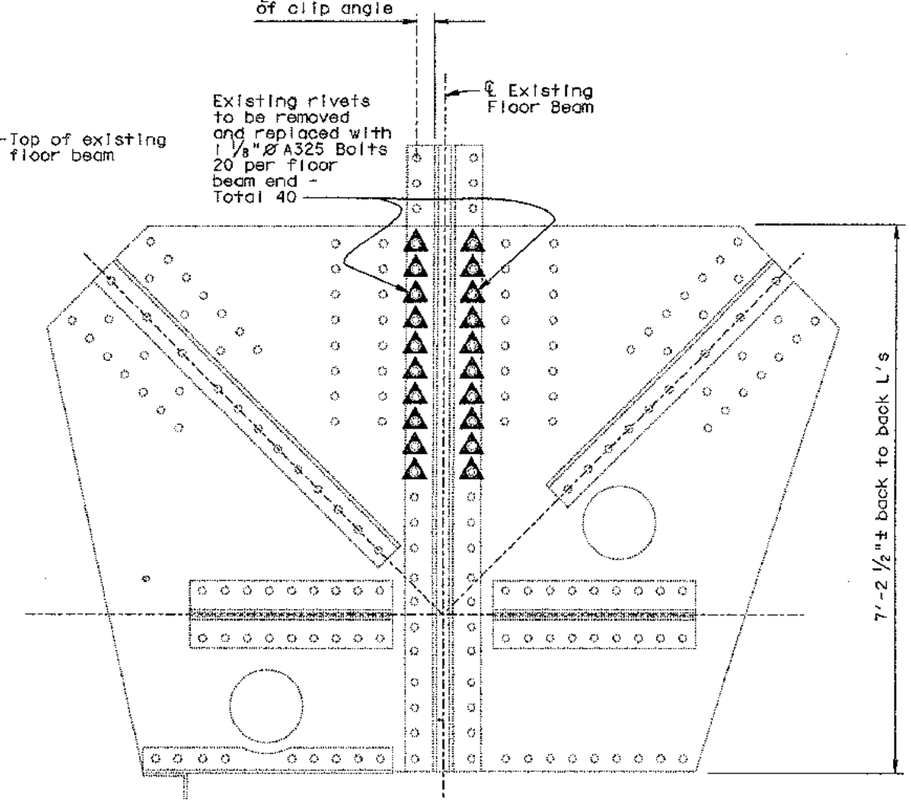


SECTION L-L

1" = 1'-0"

LOWER FLOOR BEAM LOCATIONS

S0



SECTION L-L

1" = 1'-0"

LOWER FLOOR BEAM LOCATION

S6

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

Notes:

1. For Floor Beam Location Diagram see "Floor Beam Details No. 1" sheet.
2. Existing steel railing, curb, walkway and pipe railing not shown.

LEGEND

- *Indicates existing structures.*
- ▲ *Indicates existing rivets to be removed and replaced with new 1 1/4" ø high strength bolts, unless otherwise noted.*
- ○ *Indicates approx. location of existing rivets*

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
FLOOR BEAM DETAILS NO. 5

DESIGN	BY J. GUNDSTROM 3-97	CHECKED J. MACINTYRE 5-97	
DETAILS	BY D.A. SANDERSON 3-97	CHECKED J. MACINTYRE 5-97	
QUANTITIES	BY P. WATZ 5-97	CHECKED J. GIBBERS/J. MACINTYRE 5-97	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 2-22-97 5-8-97 10-2-97

SHEET 8 OF 18

DS OSD 2139 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

USERNAME => trphlis
cf6b5 09084530

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:47

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	113	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

REGISTERED PROFESSIONAL ENGINEER J. MACINTYRE No. C 47564 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

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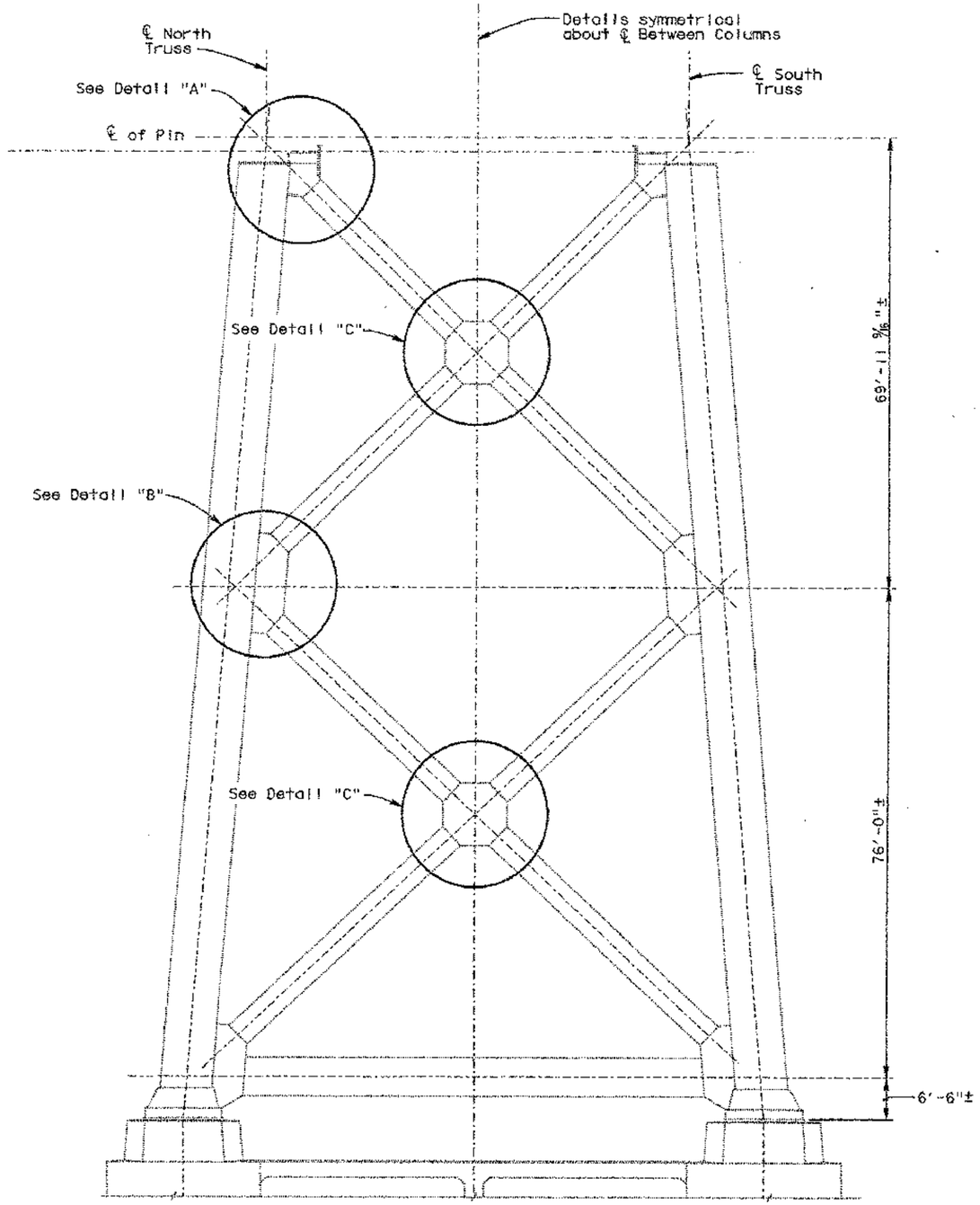
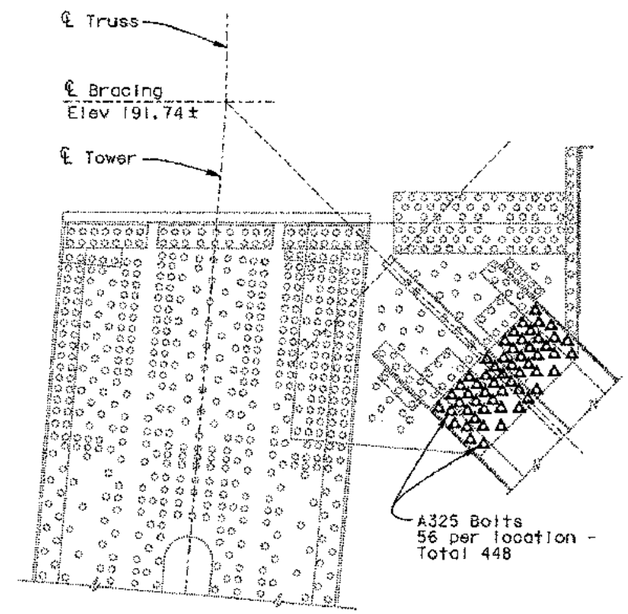


PART ELEVATION

3/32" = 1'-0"



DETAIL "A"

1/2" = 1'-0"

DETAIL "A"	
Number Per Location	Approximate Grip Length (Inches)
12	2 1/16
6	1 3/4
38	1 3/8

LEGEND

Indicates existing structures.

▲ *Indicates existing rivets to be removed and replaced with new 1" Ø high strength bolts.*

○ *Indicates approx. location of existing rivets*

Notes:

1. Pier E2 shown, Pier E3 similar.
2. For Detail "B" & Detail "C" see "Piers E2, E3 Details No. 2" sheet.

TOWERS E2, E3 & E4

INSTALLATION NOTES:

1. Rivet replacement with HS bolts shall begin with the center-most rivets in any given member-end and continue outward in a concentric pattern. No more than 25% of the total rivets to be replaced in a single face of any single member end may be worked on at one time.
2. Only one member-end per gusset shall be worked on at one time and must be completed before work commences on any additional member-ends within the same gusset.
3. Only one face of a gusset shall be worked on at any one time.
4. All HS bolts shall be fully tensioned prior to removing any additional rivets.
5. New HS bolts shall be the same size, or larger as required, as the rivets being replaced.
6. Rivets which cannot be removed without damaging the adjacent steel shall be cored out, leaving a hole 3/16" larger in diameter than the diameter of the removed rivet. The new HS bolt shall have a diameter which is 1/16" smaller than the cored hole.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
PIERS E2, E3 DETAILS NO. 1

	BY		CHECKED	
DESIGN	J. SUNDSTROM	3-97	J. MACINTYRE	5-97
DETAILS	D.A. SANDERSON	3-97	J. MACINTYRE	5-97
QUANTITIES	J. MACINTYRE	5-97	J. SUNDSTROM	5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DS OSD 2159 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 2-22-97 3-5-97 5-5-97 5-29-97 5-30-97 6-12-97 6-26-97 10-2-97 10-23-97

SHEET 9 OF 18

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:49

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	114	205

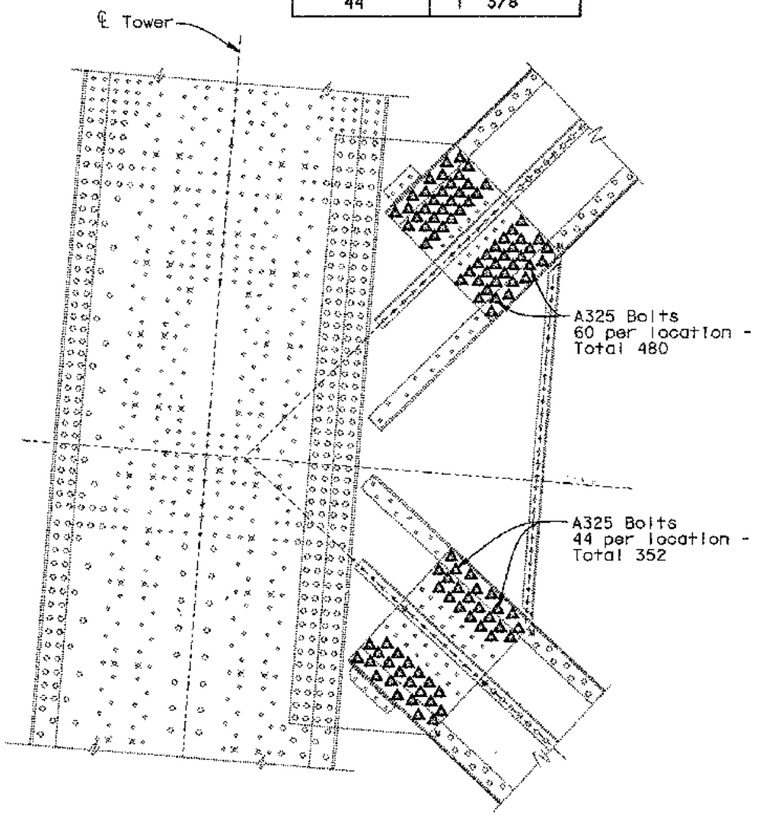
REGISTERED ENGINEER - CIVIL
October 22, 1997

REGISTERED PROFESSIONAL ENGINEER J. MACINTYRE No. C 47564 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

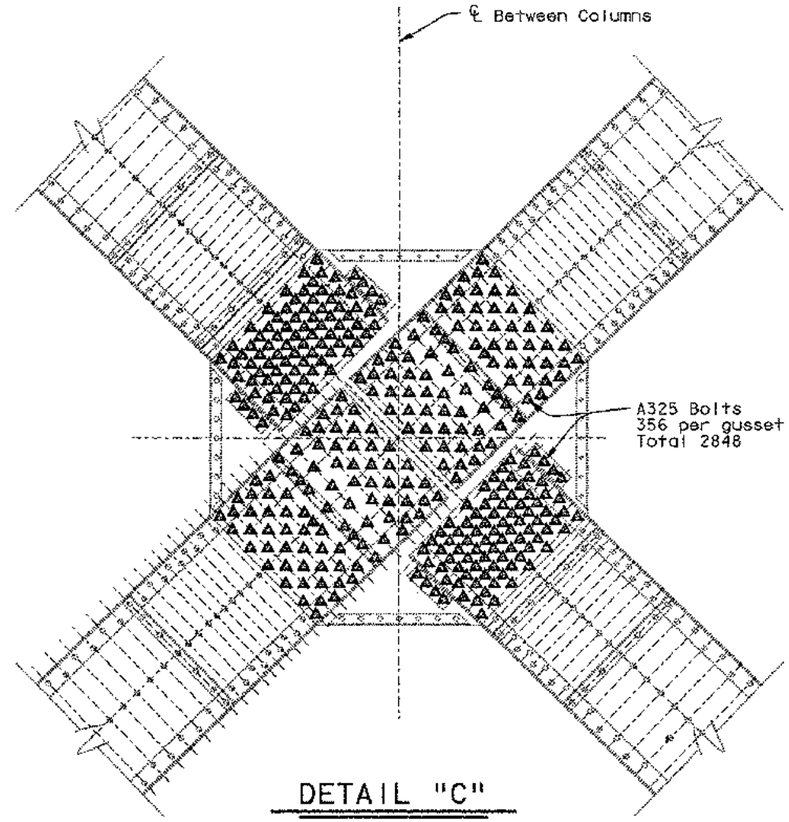
DETAIL "B" - UPPER	
Number Per Location	Approximate Grip Length (Inches)
16	1 13/16
44	1 3/8



DETAIL "B"

½" = 1'-0"

DETAIL "B" - LOWER	
Number Per Location	Approximate Grip Length (Inches)
16	2 1/16
28	1 3/8



DETAIL "C"

½" = 1'-0"

DETAIL "C"	
Number Per Location	Approximate Grip Length (Inches)
160	2 1/16
36	2 7/16
32	1 13/16
128	1 3/8

Note:

1. For location of Detail "B" & Detail "C" see "Piers E2, E3 Details No. 1" sheet.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

LEGEND

Indicates existing structures.

Indicates existing rivets to be removed and replaced with new 1" ø high strength bolts.

Indicates approx. location of existing rivets

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:50

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
PIERS E2,E3 DETAILS NO. 2

	BY		CHECKED	
DESIGN	J. SUNDSTROM	3-97	J. MACINTYRE	5-97
DETAILS	D.A. SANDERSON	3-97	J. MACINTYRE	5-97
QUANTITIES	J. MACINTYRE	5-97	J. SUNDSTROM	5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 10 OF 18

05 OSD 259 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

USERNAME => trphlis
copire2a32_09084546

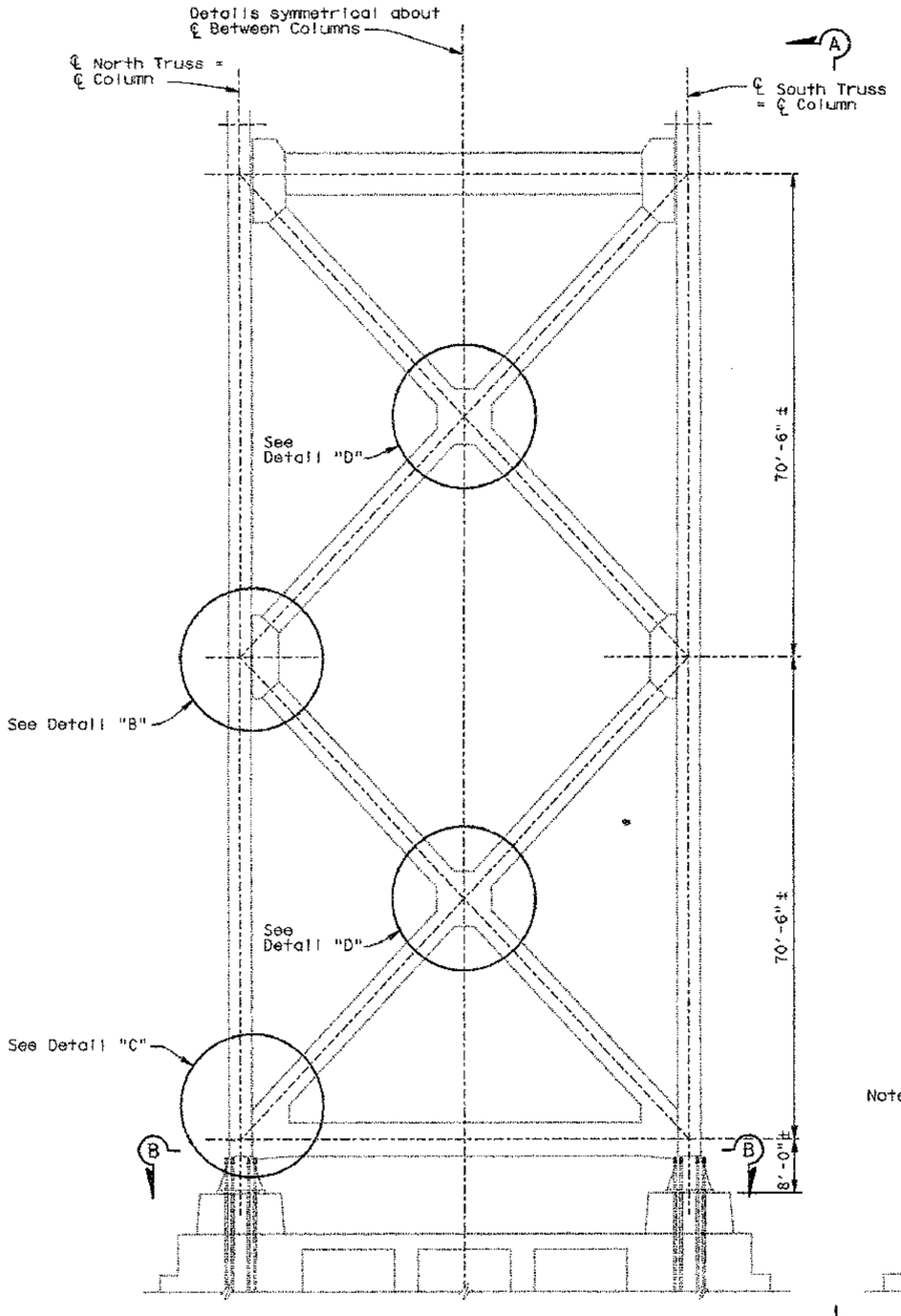
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	115	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

PROFESSIONAL ENGINEER J. MACINTYRE No. C 47564 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

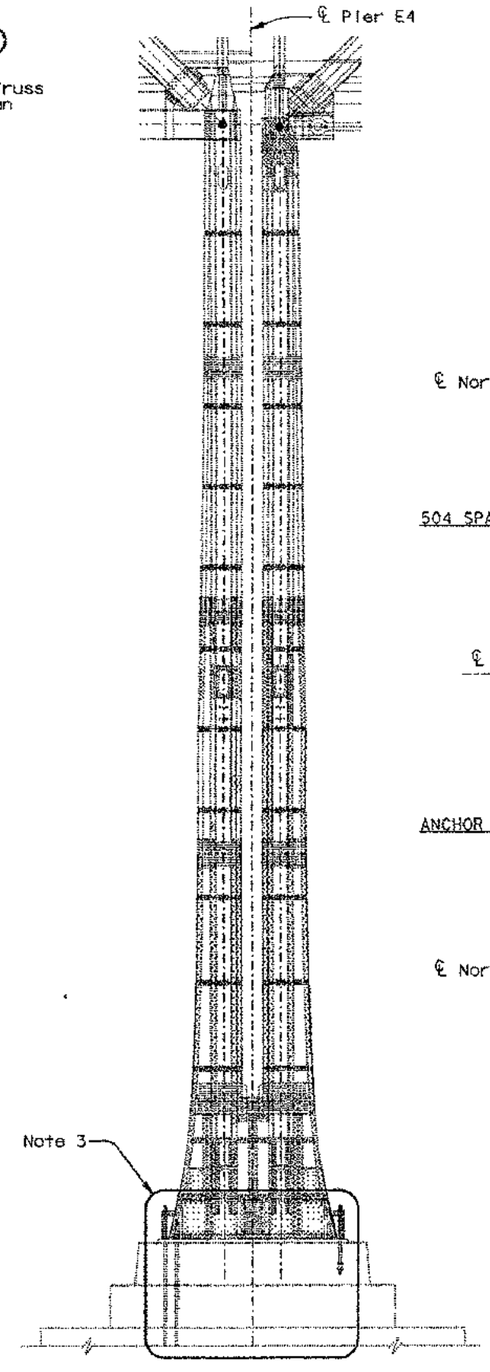
12-8-97
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



PART ELEVATION

3/32" = 1'-0"

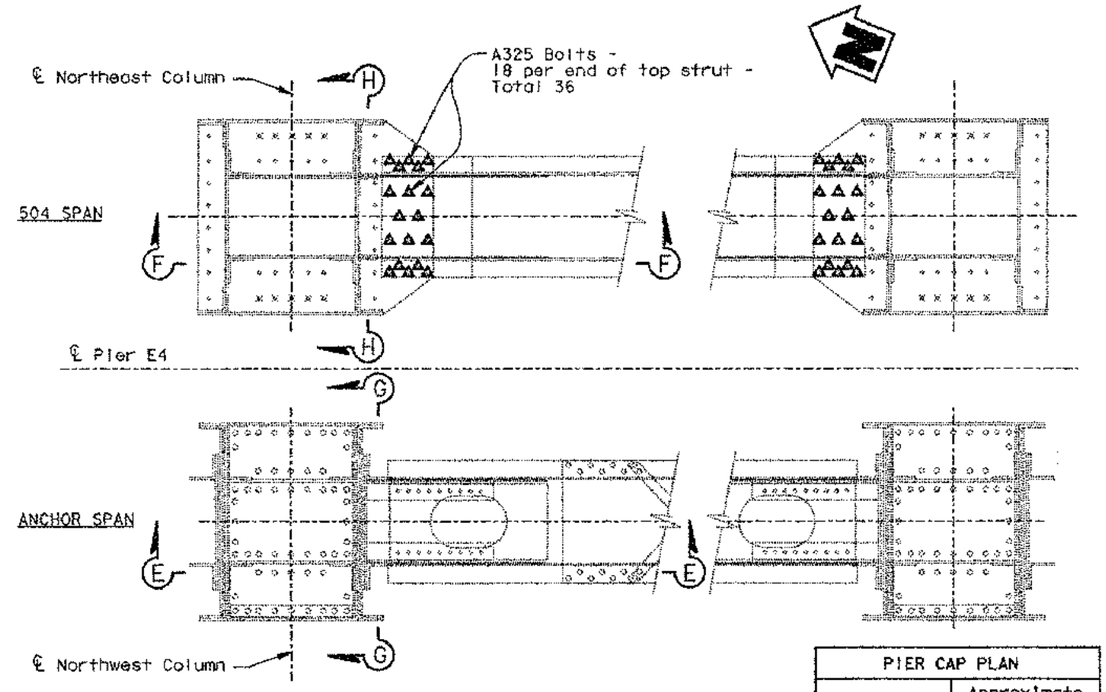


VIEW A-A

3/32" = 1'-0"

LEGEND

- ——— indicates existing structures.
- ▲ indicates existing rivets to be removed and replaced with new 1" Ø high strength bolts.
- ○ indicates approx. location of existing rivets



PIER CAP PLAN

1/2" = 1'-0"

PIER CAP PLAN	
Number Per Location	Approximate Grip Length (Inches)
20	3 13/16
16	3 5/16

Notes:

1. For Detail "B", Detail "C" and Detail "D" see "Pier E4 Details No. 2" sheet.
2. For Sections E-E, F-F, G-G and H-H see "Pier E4 Details No. 3" sheet.
3. For base of tower retrofit details see "Pier E4 Details No. 4 and No. 5" sheets.
4. For Pier E4 shop drawings reference see "Pier E4 Details No. 2" sheet.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
PIER E4 DETAILS NO. 1

	BY		CHECKED	
DESIGN	J. LYNCH	3-97	J. SUNDSTROM	5-97
DETAILS	D.A. SANDERSON	3-97	J. SUNDSTROM	5-97
QUANTITIES	J. LYNCH	5-97	J. SIEMERS	5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DS OSD 2039 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 5-2-97 6-24-97 10-2-97 10-29-97

SHEET 11 OF 18

USERNAME => trphlis

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:51

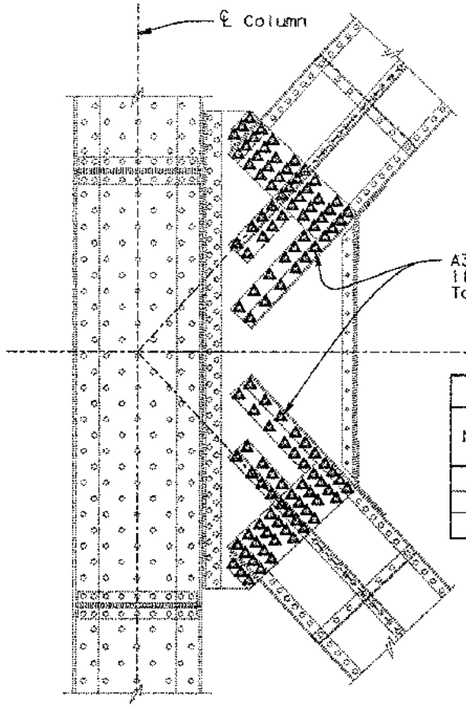
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	116	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

REGISTERED PROFESSIONAL ENGINEER
J. MACINTYRE
No. C 47564
Exp. 12-31-99
CIVIL
STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

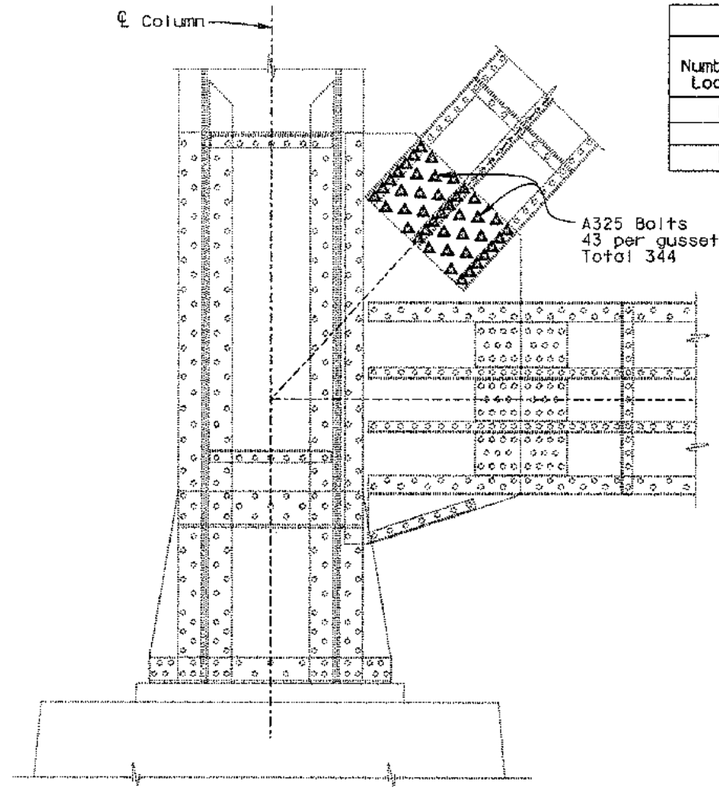
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



DETAIL "B"	
Number Per Location	Approximate Grip Length (inches)
272	1 1/2
128	1 7/16
512	1

DETAIL "B"

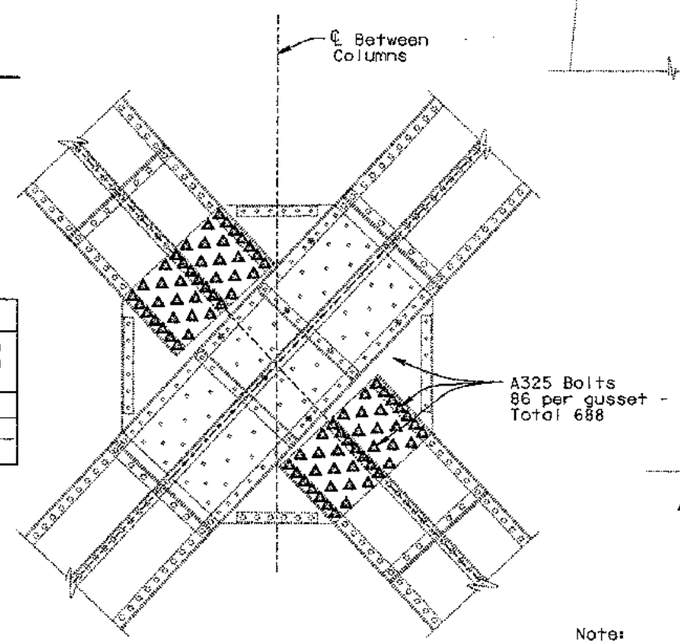
½" = 1'-0"



DETAIL "C"	
Number Per Location	Approximate Grip Length (inches)
112	1 1/2
56	1 7/16
176	1

DETAIL "C"

½" = 1'-0"



DETAIL "D"	
Number Per Location	Approximate Grip Length (inches)
224	1 1/2
112	1 7/16
352	1

DETAIL "D"

½" = 1'-0"

LEGEND

Indicates existing structures.

Indicates existing rivets to be removed and replaced with new ⅞" ø high strength bolts.

Indicates approx. location of existing rivets

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

Note:

1. For location of Detail "B", Detail "C" and Detail "D" see "Pier E4 Details No. 1" sheet.

	BY		CHECKED	
DESIGN	J. LYNCH	3-97	J. SUNDSTROM	5-97
DETAILS	D.A. SANDERSON	3-97	J. SUNDSTROM	5-97
QUANTITIES	J. LYNCH	5-97	J. SIEMERS	5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
PIER E4 DETAILS NO. 2

DS 050 2039 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04
EA 043001

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)
2-28-97 1-28-97 5-2-97 6-27-97 10-29-97 10-29-97

SHEET 12 OF 18

USERNAME => trontis

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:53

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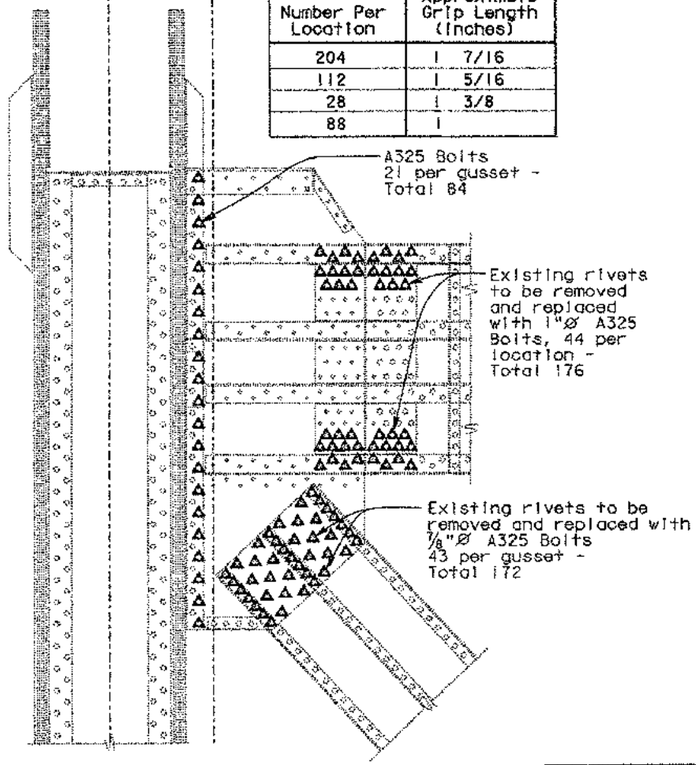
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Alo	80	7.8/8.9, 0.0/1.1	117	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

REGISTERED PROFESSIONAL ENGINEER J. MACINTYRE No. C 37584 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

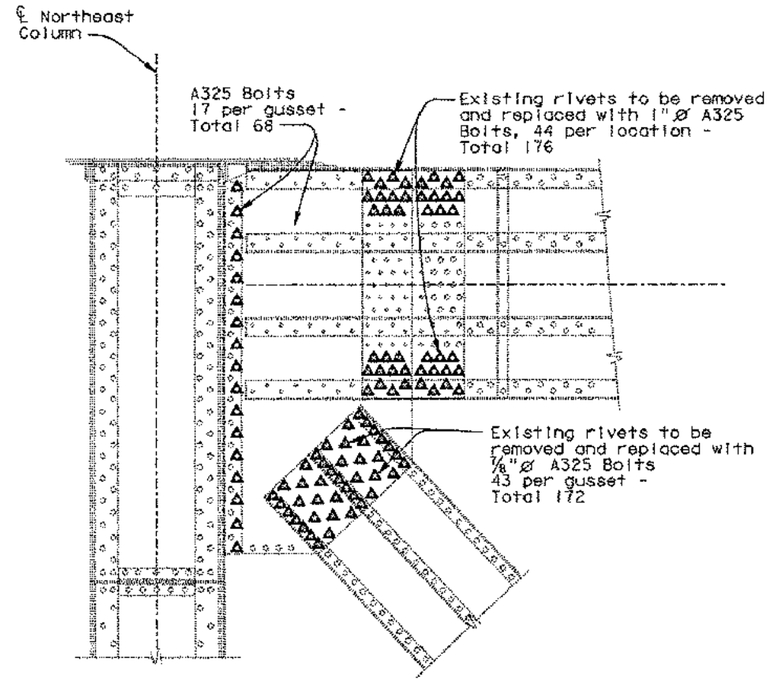
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



SECTION E-E	
Number Per Location	Approximate Grip Length (Inches)
204	1 7/16
112	1 5/16
28	1 3/8
88	1

SECTION E-E

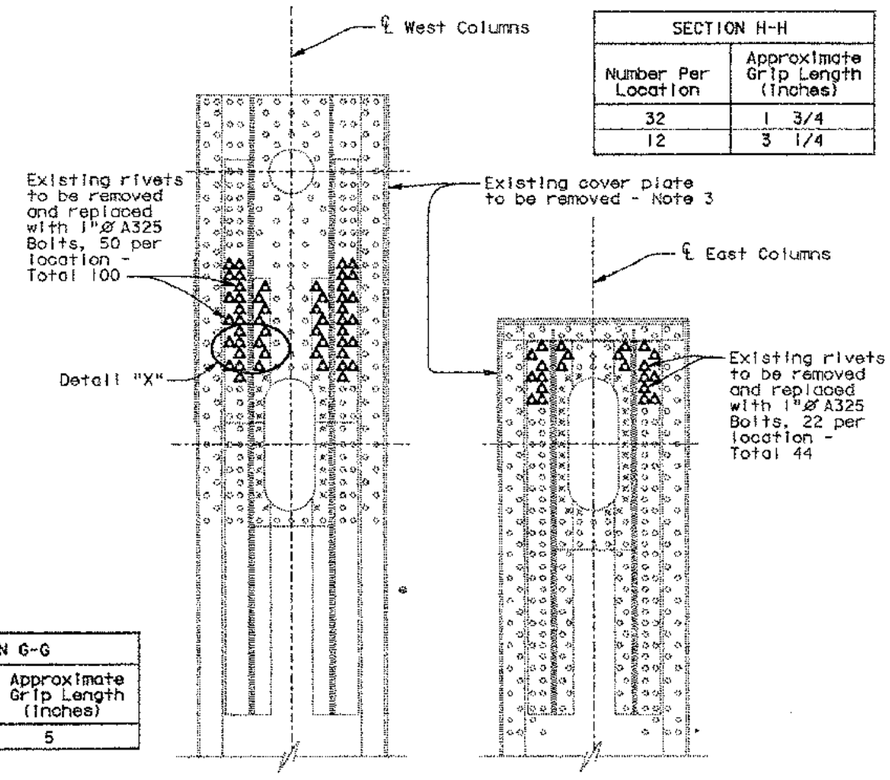
1/2" = 1'-0"



SECTION F-F	
Number Per Location	Approximate Grip Length (Inches)
188	1 7/16
112	1 5/16
28	1 3/8
88	1

SECTION F-F

1/2" = 1'-0"



SECTION H-H	
Number Per Location	Approximate Grip Length (Inches)
32	1 3/4
12	3 1/4

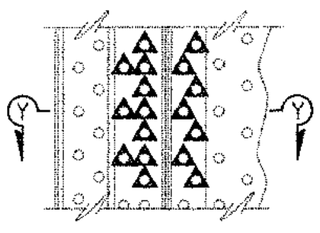
SECTION G-G	
Number Per Location	Approximate Grip Length (Inches)
100	5

SECTION G-G

1/2" = 1'-0"

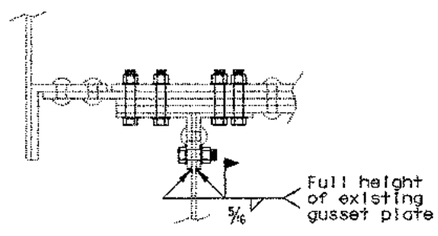
SECTION H-H

1/2" = 1'-0"



DETAIL "X"

1" = 1'-0"



SECTION Y-Y

1 1/2" = 1'-0"

Notes:

1. For location of Sections E-E, F-F, G-G and H-H see "Pier E4 Details No. 1" sheet.
2. Superstructure not shown
3. For limits of cover plate removal see "Pier E4 Tower Bumper Details No. 2 and No. 3" sheets.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

LEGEND

- ——— *Indicates existing structures.*
- △ *Indicates existing rivets to be removed and replaced with new 1 1/8" Ø high strength bolts, unless otherwise noted.*
- ○ *Indicates approx. location of existing rivets*

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
PIER E4 DETAILS NO. 3

	BY		CHECKED	
DESIGN	J. LYNCH	3-97	J. SUNDSTROM	5-97
DETAILS	D.A. SANDERSON	3-97	J. SUNDSTROM	5-97
QUANTITIES	J. LYNCH	5-97	J. SIEMERS	5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DS OSB 2139 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES →
REVISION DATES (PRELIMINARY STAGE ONLY) 2-22-97 5-30-97 6-12-97 6-26-97 10-29-97

SHEET 13 OF 18

USERNAME => trphlis
DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:54

CAPTREA3_09084713

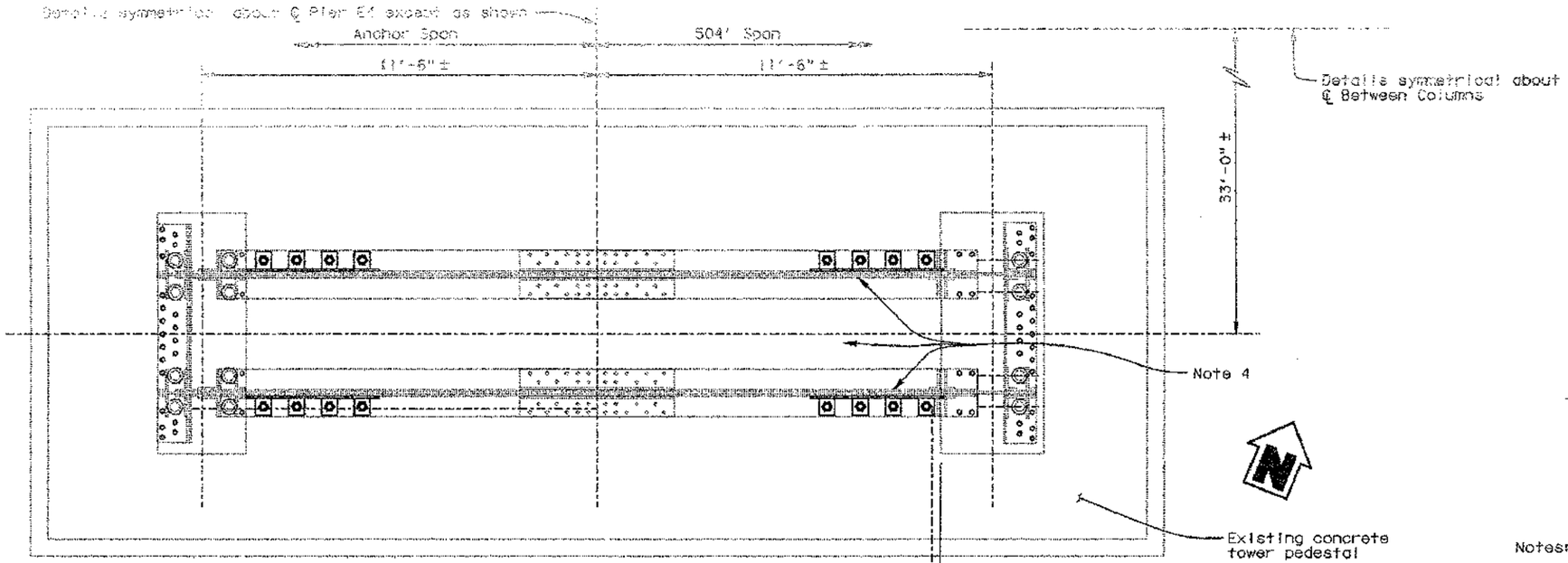
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	118	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

REGISTERED PROFESSIONAL ENGINEER J. MACINTYRE No. C 47564 Exp. 12-31-98 CIVIL STATE OF CALIFORNIA

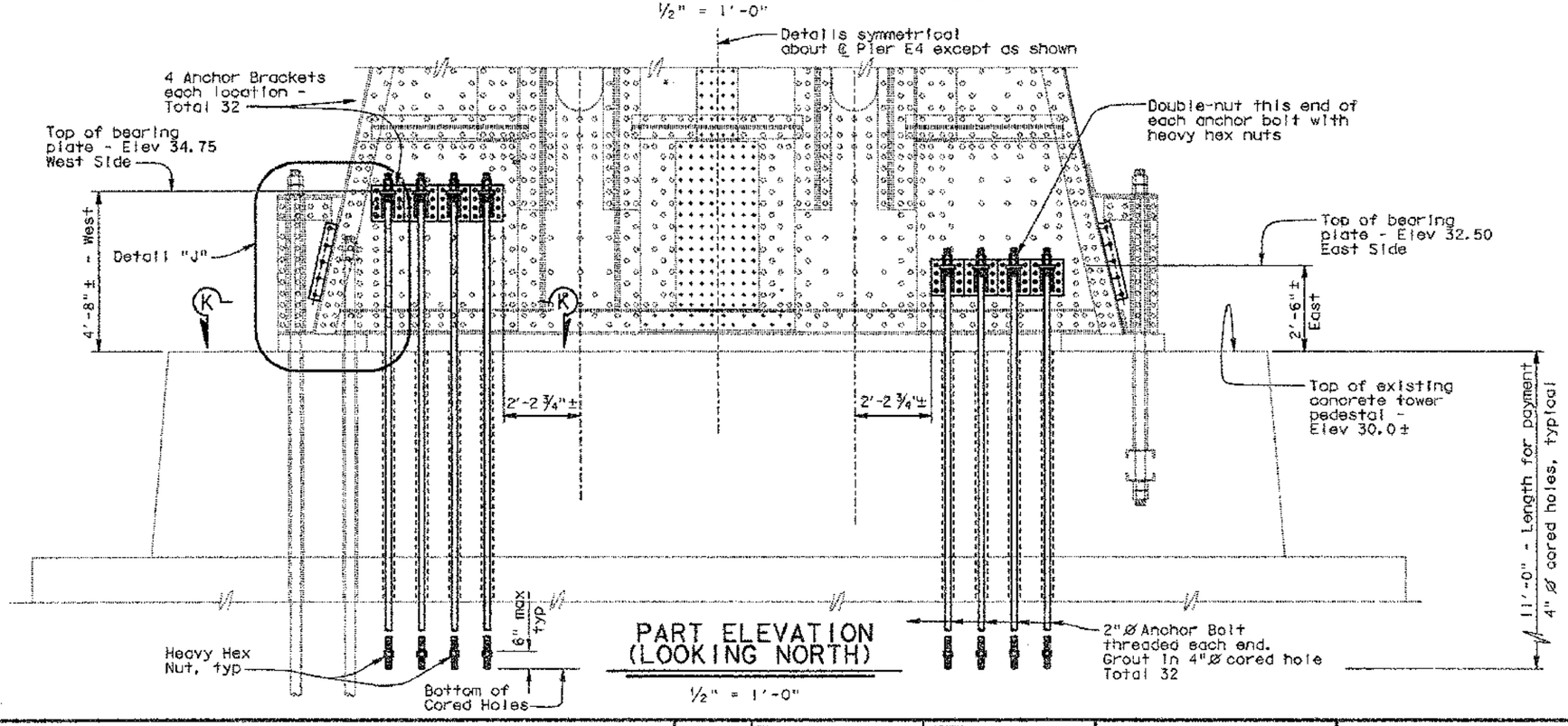
12-8-97
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



PART PLAN

½" = 1'-0"



PART ELEVATION (LOOKING NORTH)

½" = 1'-0"

LEGEND

- Indicates existing structures.
- ● Indicates new high strength bolts.
- ○ Indicates approx. location of existing rivets

Notes:

1. For Detail "J" and Section K-K see "Pier E4 Details No. 5" sheet
2. For details not shown see "Pier E4 Details No. 5" sheet
3. Existing rivet heads behind the new anchor brackets shall be ground flush with the surrounding plate.
4. Existing rivet heads inside the column shall be ground flush with the surrounding plate when interference occurs with new anchor bracket bolts.
5. Surfaces of cored holes shall be roughened to ¼" amplitude.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

	BY		CHECKED	
DESIGN	J. LYNCH	3-97	J. SUNDSTROM	5-97
DETAILS	D.A. SANDERSON	3-97	J. SUNDSTROM	5-97
QUANTITIES	J. LYNCH	5-97	J. SIEMERS	5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
PIER E4 DETAILS NO. 4

DS OSD 2139 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04
EA 043001

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 2-27-97 3-3-97 5-8-97 5-30-97 5-30-97 5-22-97 5-30-97 6-5-97 6-20-97 10-2-97

SHEET 14 OF 18

USERNAME => trphlis

DATE PLOTTED => 9-Sep-1997
TIME PLOTTED => 08:58

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DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	119	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

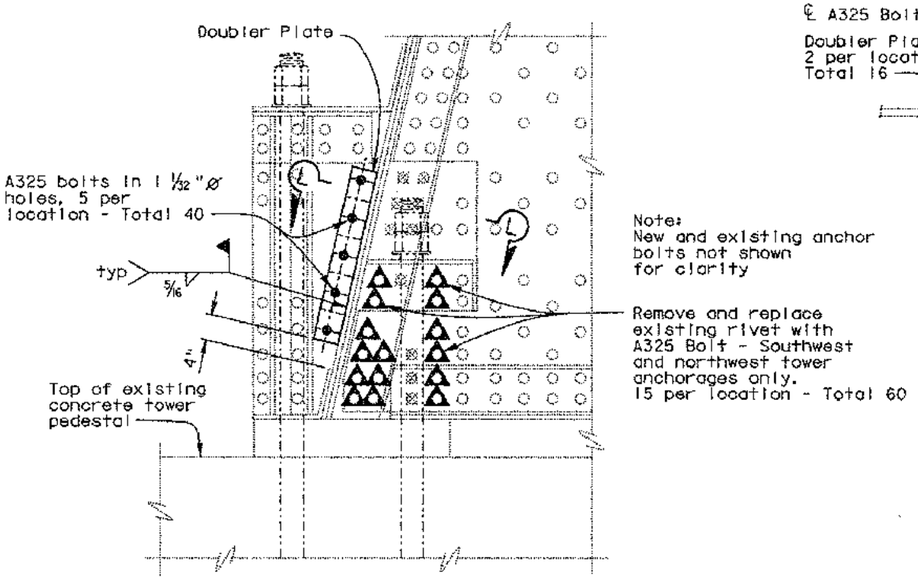
REGISTERED PROFESSIONAL ENGINEER — J. MACINTYRE — No. C 47564 — Exp. 12-31-99 — CIVIL — STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

Note:

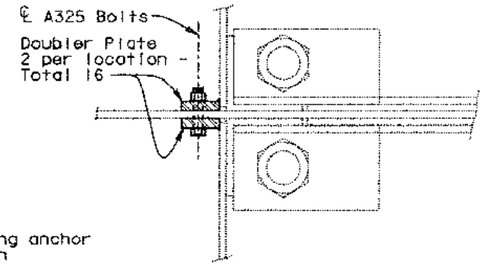
1. For location of Detail "J" and Section K-K see "Pier E4 Details No. 4" sheet.



DETAIL "J"

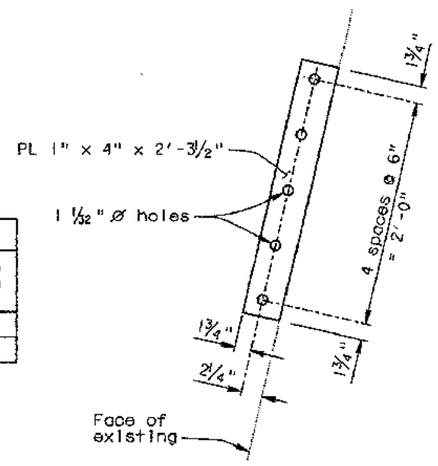
1" = 1'-0"

DETAIL "J"	
Number Per Location	Approximate Grip Length (inches)
40	2 3/4
60	3 3/4



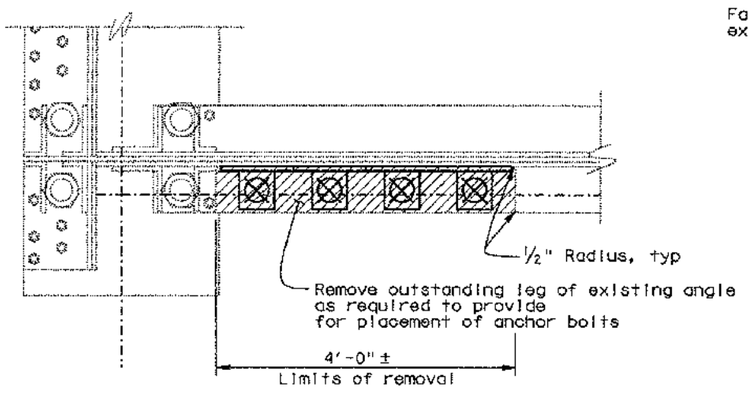
SECTION L-L

1 1/2" = 1'-0"



DOUBLER PLATE

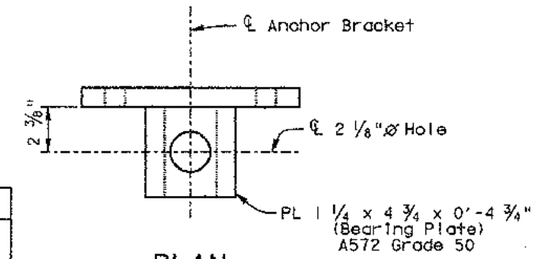
1 1/2" = 1'-0"



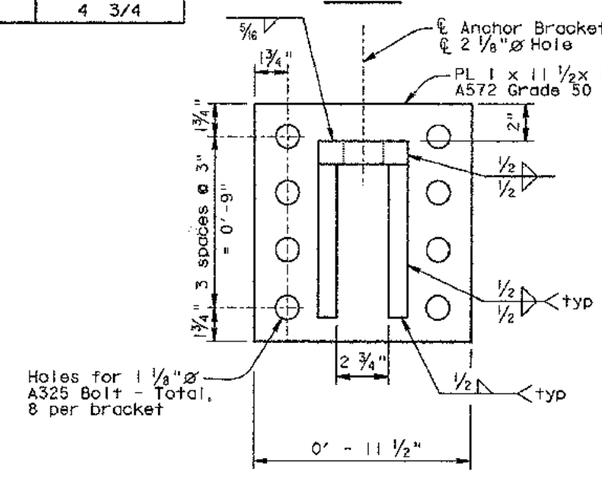
SECTION K-K

1" = 1'-0"

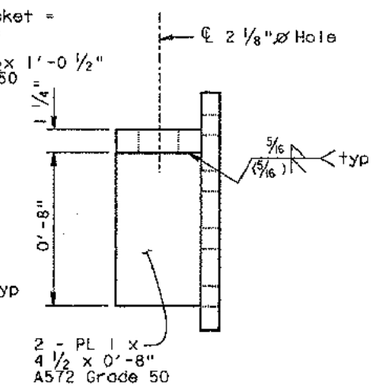
ANCHOR BRACKET DETAILS	
Number Per Location	Approximate Grip Length (inches)
256	4 3/4



PLAN



ELEVATION



RIGHT SIDE

ANCHOR BRACKET DETAILS

3" = 1'-0"

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

LEGEND

- Indicates existing structures.
- ● Indicates new 1"Ø high strength bolts.
- △ Indicates existing rivets to be removed and replaced with new 1"Ø high strength bolts.
- ○ Indicates approx. location of existing rivets
- ⊗ Indicates location of new Anchor Bolt

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
PIER E4 DETAILS NO. 5

	BY	CHECKED
DESIGN	J. LYNCH 3-97	J. SUNDSTROM 5-97
DETAILS	D.A. SANDERSON 3-97	J. SUNDSTROM 5-97
QUANTITIES	J. LYNCH 5-97	J. SIEMERS 5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DS 050 2139 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 2-27-97 6-28-97 8-21-97 10-29-97

SHEET 15 OF 18

USERNAME => trphlis
centra45 09084723

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:56

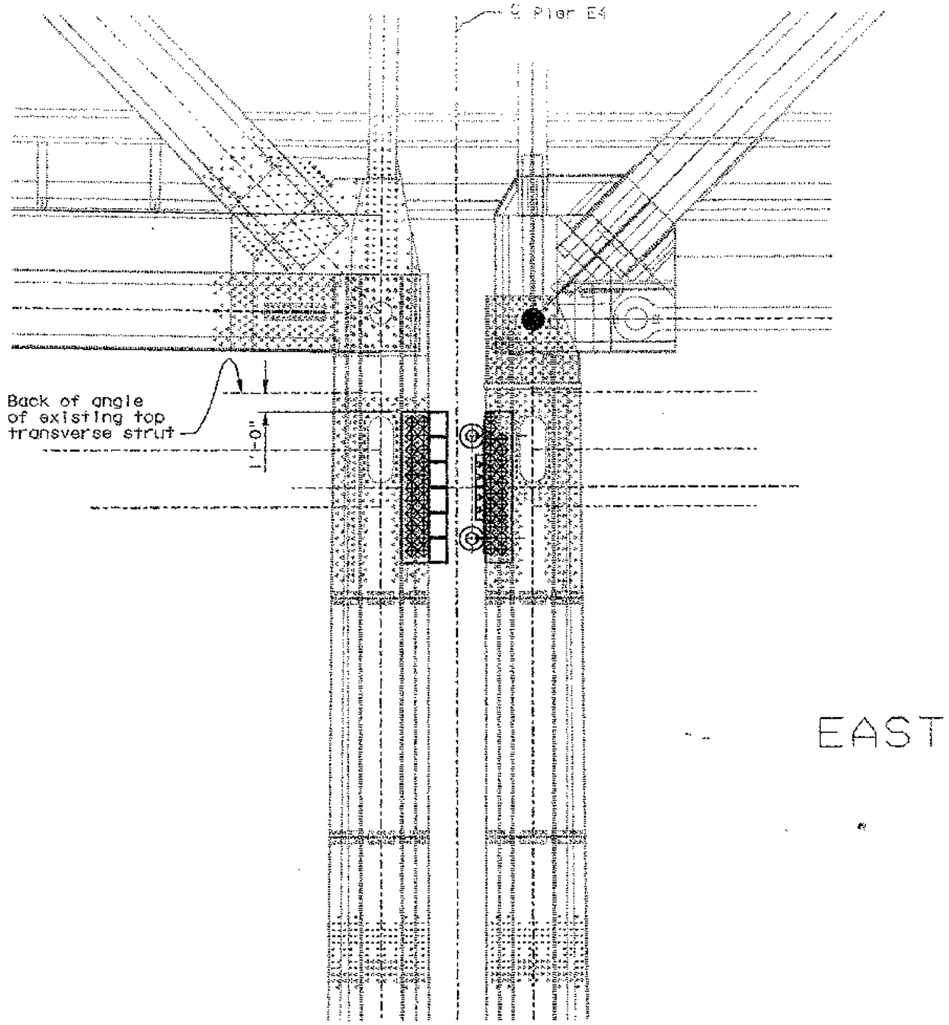
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	120	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

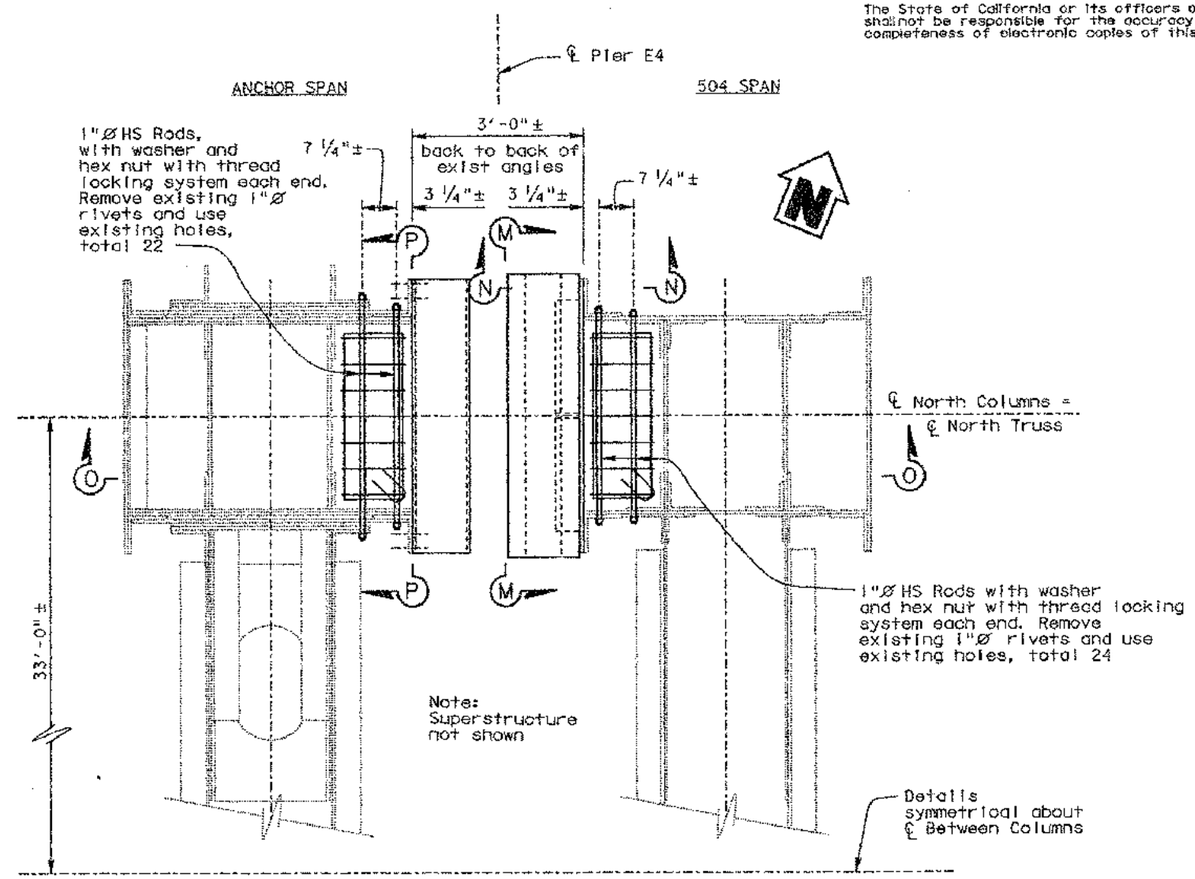
REGISTERED PROFESSIONAL ENGINEER J. MACINTYRE No. C 47564 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



PART ELEVATION
¼" = 1'-0"



PART PLAN
¾" = 1'-0"

TOP OF PIER BUMPER DETAILS

Notes:

1. For Sections M-M & N-N see "Pier E4 Tower Bumper Details No. 2" sheet.
2. For Sections O-O and P-P see "Pier E4 Tower Bumper Details No. 3" sheet.

LEGEND

Indicates existing structures.

Indicates approx. location of existing rivets

Indicates approx. location of existing rivet to be replaced with 1" ϕ HS Rod

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
PIER E4 BUMPER DETAILS NO. 1

	BY		CHECKED	
DESIGN	J. LYNCH	3-97	J. SUNDSTROM	5-97
DETAILS	D.A. SANDERSON	3-97	J. SUNDSTROM	5-97
QUANTITIES	J. LYNCH	5-97	J. SIEMERS	5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 3-28-97 3-14-97 3-24-97 3-28-97 5-20-97 5-28-97 5-27-97 5-30-97 5-27-97 6-28-97

SHEET 16 OF 18

OS OSD 2339 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

USERNAME => trrlcnf
ceplre4bl_09075800

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:06

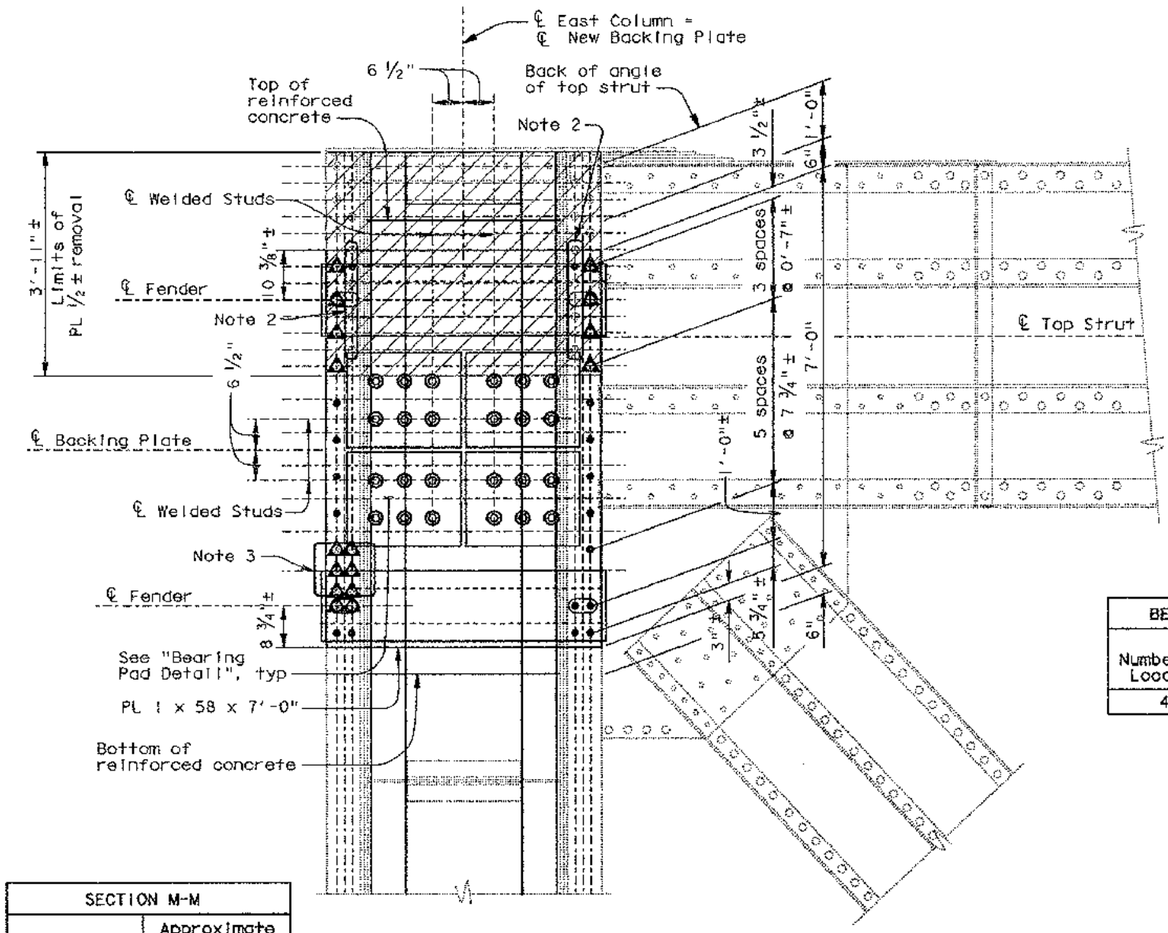
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	121	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

REGISTERED PROFESSIONAL ENGINEER J. MACINTYRE No. C 47564 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

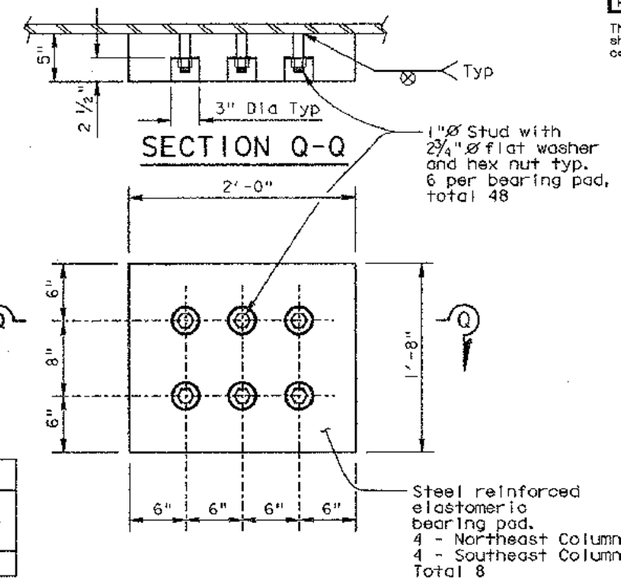


SECTION M-M

¾" = 1'-0"

Northeast column shown, southeast column similar by opposite hand

SECTION M-M	
Number Per Location	Approximate Grip Length (Inches)
42	1 3/4
12	2 1/4



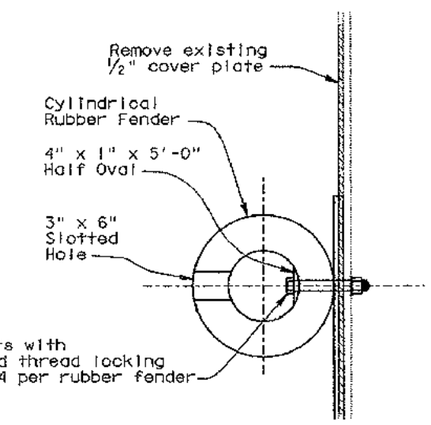
SECTION Q-Q

BEARING PAD DETAIL

1 ½" = 1'-0"

BEARING PAD DETAIL	
Number Per Location	Approximate Grip Length (Inches)
48	2 1/2

SECTION N-N	
Number Per Location	Approximate Grip Length (Inches)
16	6 1/2



SECTION N-N

1 ½" = 1'-0"

LEGEND

- *Indicates existing structures.*
- *Indicates existing rivets to be removed and replaced with new 1"Ø high strength bolts, unless otherwise noted.*
- *Indicates approx. location of existing rivets*
- *Indicates new 1"Ø high strength bolts.*
- *Indicates limits of removal of existing steel cover plate*

Notes:

1. For location of Sections M-M and N-N see "Pier E4 Tower Bumper Details No. 1" sheet.
2. Remaining existing rivets within the new backing plate location shall be removed.
3. Rivets supporting the maintenance platform shall be replaced with HS bolts through the new backing plate.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
PIER E4 BUMPER DETAILS NO. 2

	BY	CHECKED
DESIGN	J. LYNCH 3-97	J. SUNDSTROM 5-97
DETAILS	D.A. SANDERSON 3-97	J. SUNDSTROM 5-97
QUANTITIES	J. LYNCH 5-97	J. SIEMERS 5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

CU 04
EA 043001

DISREGARD PRINTS BEARING EARLIER REVISION DATES 2-27-97 10-2-97 10-29-97

SHEET 17 OF 18

DS OSD 2139 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

USERNAME => trrichf
caplrc4b2_09075903

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 08:07

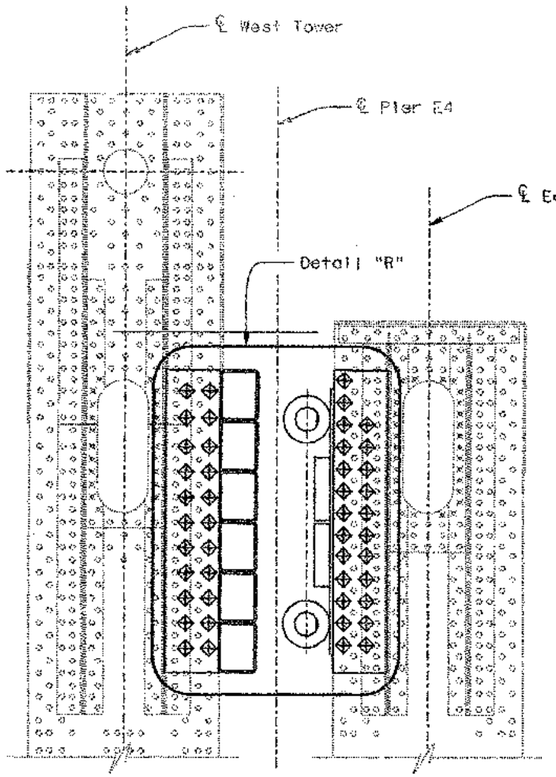
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	7.8/8.9, 0.0/1.1	122	205

REGISTERED ENGINEER - CIVIL
October 22, 1997

REGISTERED PROFESSIONAL ENGINEER J. MACINTYRE No. C 47564 Exp. 12-31-99 CIVIL STATE OF CALIFORNIA

12-8-97
PLANS APPROVAL DATE

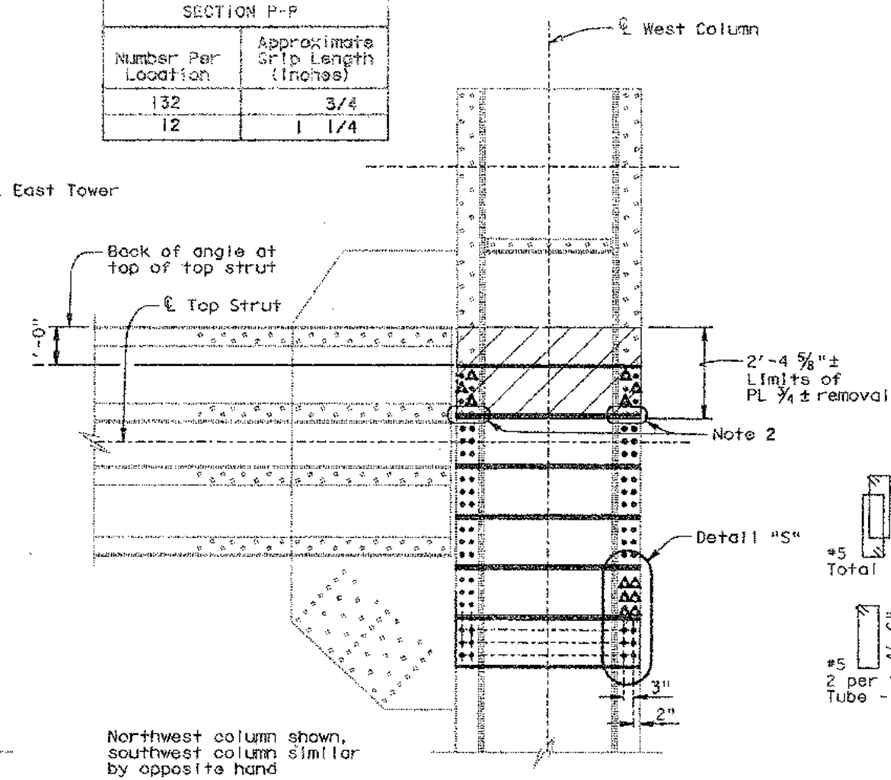
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



SECTION O-O

½" = 1'-0"

SECTION P-P	
Number Per Location	Approximate Grip Length (Inches)
132	3/4
12	1 1/4



SECTION P-P

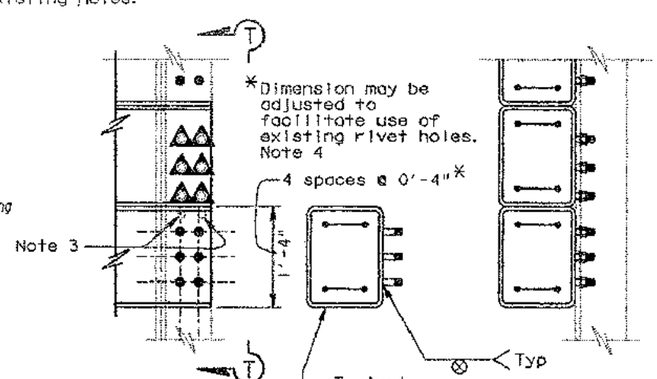
½" = 1'-0"

Notes:

1. For location of Sections O-O and P-P see "Pier E4 Tower Bumper Details No. 1" sheet.
2. Remaining existing rivets within the new structural tube assembly locations shall be removed.
3. Contractor shall provide full bearing between new concrete and new structural steel.
4. Rivets supporting the maintenance platform shall be replaced with 1"ø welded studs through existing holes.

LEGEND

- *Indicates existing structures.*
- *Indicates location of existing rivets to be removed. Existing rivet hole to be reused for placement of structural tube assembly.*
- *Indicates new 1" ø HS Rod*
- *Indicates approx. location of existing rivets*
- *Indicates location of new 1 1/16" ø cored hole for 1" ø stud, unless otherwise noted.*
- *Indicates limits of removal of existing steel cover plate*

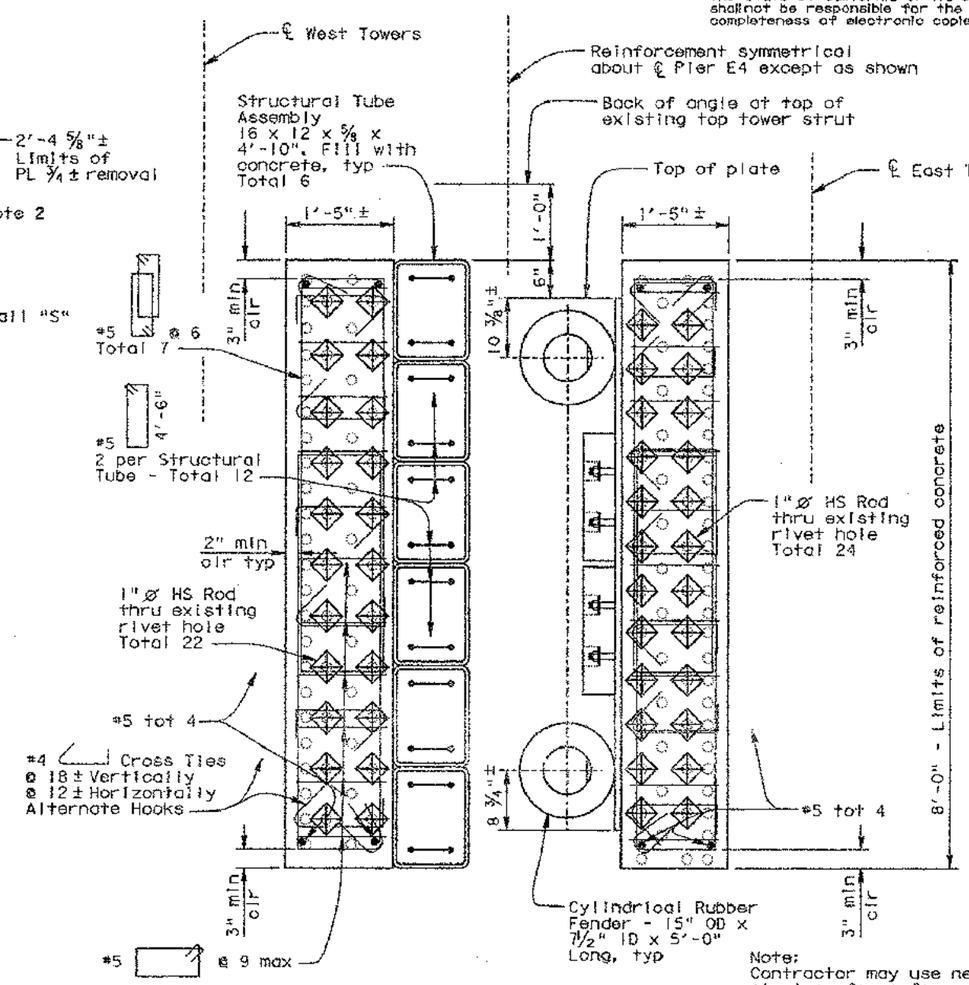


DETAIL "S"

1" = 1'-0"

VIEW T-T

1" = 1'-0"



DETAIL "R"

1" = 1'-0"

Note:
Contractor may use new steel as forms for concrete. Provide 2" cover over all reinforcement except as shown.

North Tower Bumper shown, South Tower Bumper similar.

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

	BY		CHECKED	
DESIGN	J. LYNCH	3-97	J. SUNDSTROM	5-97
DETAILS	D.A. SANDERSON	3-97	J. SUNDSTROM	5-97
QUANTITIES	J. LYNCH	5-97	J. SIEMERS	5-97

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN
TOLL BRIDGE SPECIAL ANALYSIS

BRIDGE NO. 33-0025
POST MILE 1.15

INTERIM SEISMIC RETROFIT PROJECT
EAST BAY CANTILEVER TRUSS
SAN FRANCISCO-OAKLAND BAY BRIDGE
PIER E4 BUMPER DETAILS NO. 3

DS OSD 239 (CADD 9/95)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04
EA 043001

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 5-28-97 1-30-97 5-28-97 5-28-97 5-28-97 5-28-97 5-28-97 5-28-97 5-28-97 10-23-97

SHEET 18 OF 18

USERNAME => trrlonf
contrg4b3_09084648

DATE PLOTTED => 9-Dec-1997
TIME PLOTTED => 09:33

Cantilever Structure - Lower Chord Damage Repair (Contract No. 04-035104)

The as-built drawings, which are contained in these CDs, are scanned from drawings of the existing structure for the convenience of the contractor and as a means to convey to the contractor the available information regarding the existing structure. It is to be understood that no claim is being made as to the accuracy or completeness of the said information and that the State of California or its officers or agents shall not be responsible for the manner in which the contractor interprets and uses this information or for the accuracy, currency or completeness of these scanned as-built drawings. The contractor shall be responsible to obtain, at the contractor's expense, any additional information that the contractor deems necessary for completely and accurately assessing the existing conditions of the structure. The contractor shall not be entitled to any compensation for any claim arising from inaccuracy or insufficiency of these as-built drawings or in anyway related to these drawings.

1. Project Plan and Elevation
2. South Truss Elevation
3. Jacking System
4. Jacking System Details
5. Jacking Brackets
6. Chord Repair Details – 1
7. Chord Repair Details – 2
8. Erection Plan-Jacking Struts
9. Erection Plan
10. Left End Jacking Bracket
11. Right End Jacking Bracket
12. Jacking Struts (Sheet 3)
13. Traveler Rails
14. Splice Plates & Angles
15. Jacking Struts (Sheet 6)
16. Reinforcing Plates

DIST	CO	ROUTE	POST MILE	SHT NO	TOTAL SHEETS
04	SF	80	8.5	1	7

Chief, Office of Office Engineer
Registered Civil Engineer No. 8183

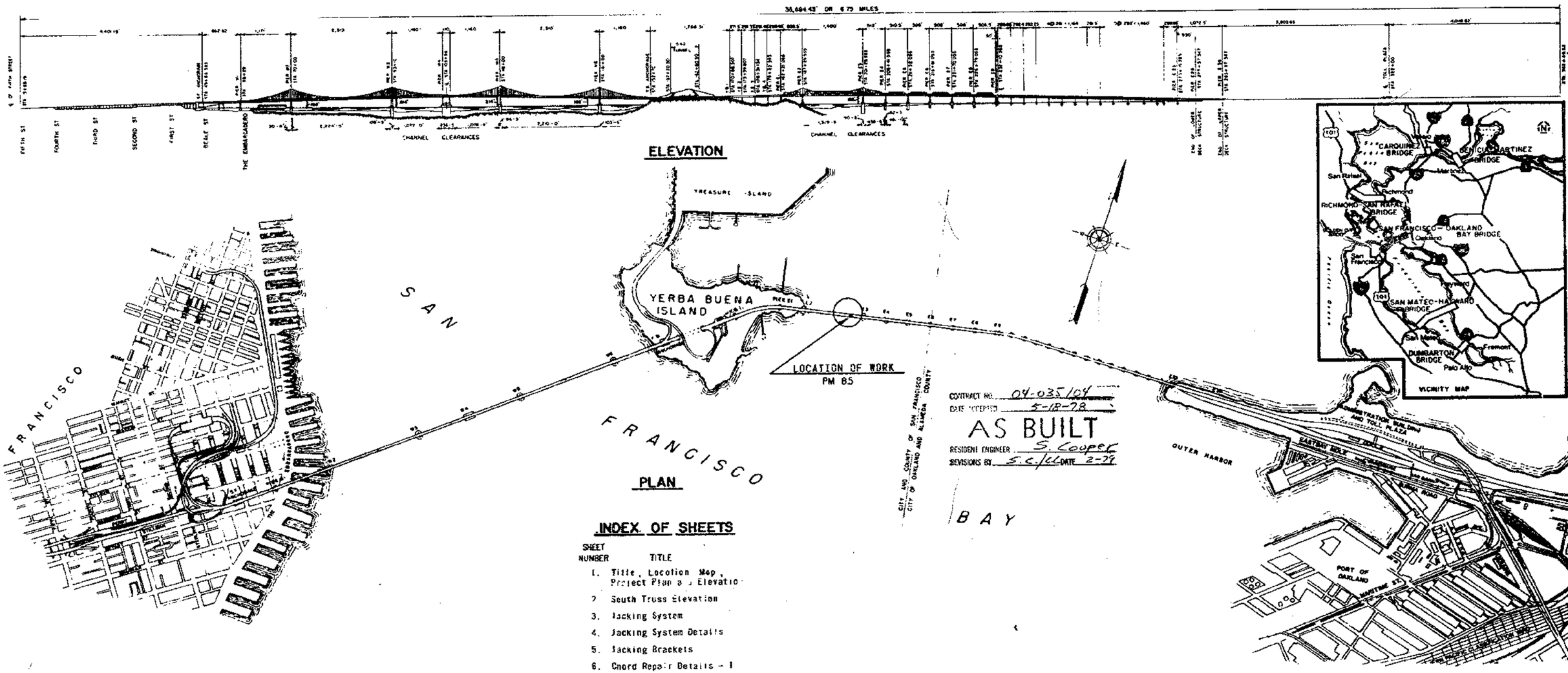
APPROVED October 11, 1977

STATE OF CALIFORNIA
BUSINESS AND TRANSPORTATION AGENCY

DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY

IN THE CITY AND COUNTY OF SAN FRANCISCO
ON THE SAN FRANCISCO - OAKLAND BAY BRIDGE
to be supplemented by Standard Plans dated March, 1977



INDEX OF SHEETS

SHEET NUMBER	TITLE
1.	Title, Location Map, Project Plan and Elevation
2.	South Truss Elevation
3.	Jacking System
4.	Jacking System Details
5.	Jacking Brackets
6.	Chord Repair Details - 1
7.	Chord Repair Details - 2

GENERAL NOTES

1. Dimensions shown for existing members are taken from construction drawings. The Contractor shall field verify and adjust all dimensions to fit existing conditions since variations are to be anticipated.
2. The design of the jacking system components shall be based on the current specifications of the American Institute of Steel Construction and the jack manufacturers.
3. The vertical clearances shown in ELEVATION are based on MHHW.

MARK	DATE	REVISION	BY	CHK.
1	2-7/79	As Built without Revision	CFC	

CONTRACT NO. 04-035104

STATE OF CALIFORNIA — BUSINESS AND TRANSPORTATION AGENCY — DEPARTMENT OF TRANSPORTATION

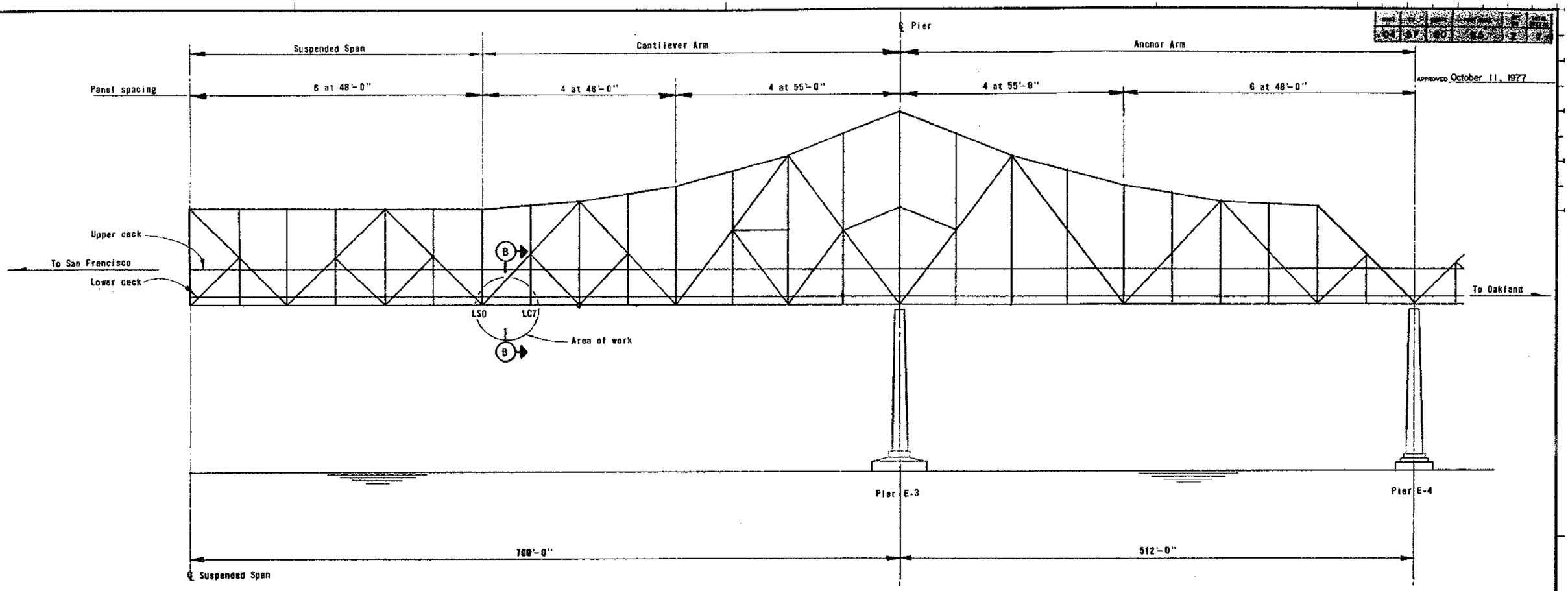
DESIGN BY
ENGINEERING BY
ESTIMATES BY
APPROVAL RECOMMENDED
CHIEF - ENGINEERING DESIGN

APPROVED Sept. 30, 1977
DIRECTOR

SAN FRANCISCO - OAKLAND BAY BRIDGE
CANTILEVER STRUCTURE
LOWER CHORD DAMAGE REPAIR

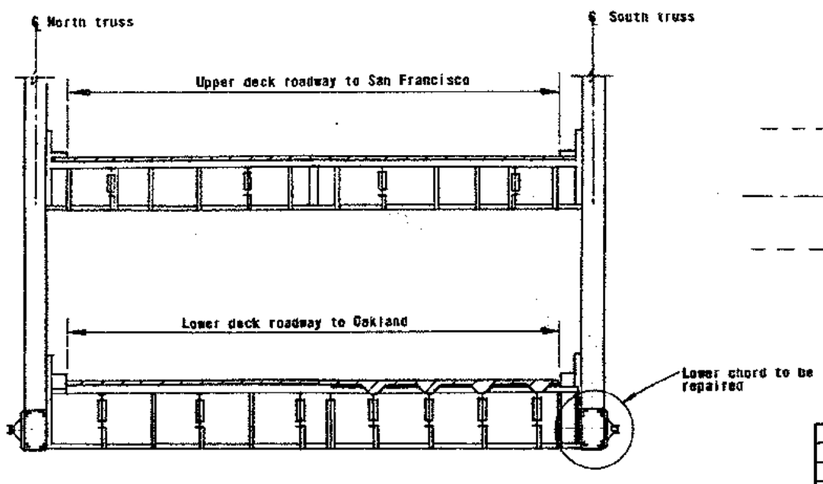
PROJECT PLAN AND ELEVATION

SCALE 1" = 1150' | SHEET NO. 1 | DRAWING NO. 04-035104-1R

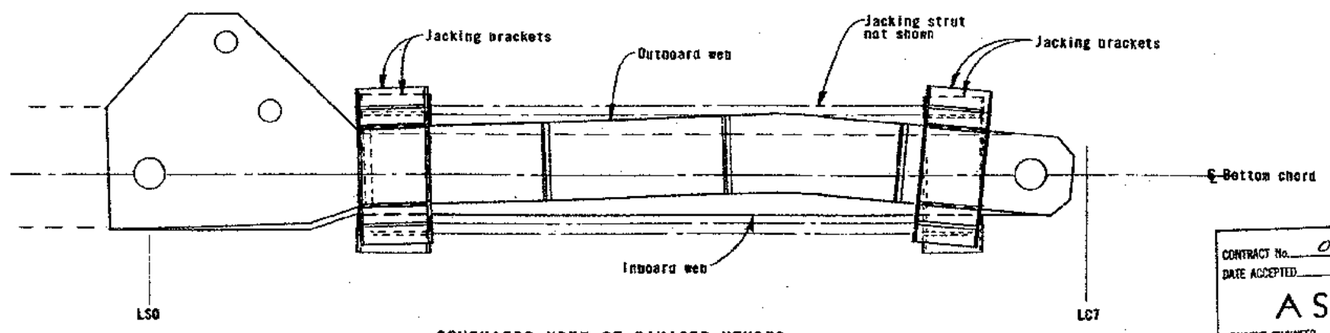


APPROVED October 11, 1977

ELEVATION - SOUTH TRUSS



SECTION B-B



SCHEMATIC VIEW OF DAMAGED MEMBER
PRIOR TO JACKING

No Scale

CONTRACT No. 04-035104
DATE ACCEPTED 5-18-78
AS BUILT
RESIDENT ENGINEER S. Cooper
REVISIONS BY S.C./C.C. DATE 2-79

MARK	DATE	REVISION	BY	CHK.
1	2-7-79	As Built without Revision	CFC	

STATE OF CALIFORNIA — BUSINESS AND TRANSPORTATION AGENCY — DEPARTMENT OF TRANSPORTATION — TOLL BRIDGES — DISTRICT 04

DESIGN BY R.E. Kim CHK. R.D. Zimmerman
DRAWN BY C.R. Ross CHK. S. Larsen
SPECIFICATION C.C. Cooper REVIEWED R. Olson
IN CHARGE OF DESIGN Ronald D. Zimmerman
REGISTERED ENGINEER, CIVIL

APPROVED Sept. 30, 1977
S. Larsen
REVIEW ENGINEER — REVIEWING ENGINEER DETAIL

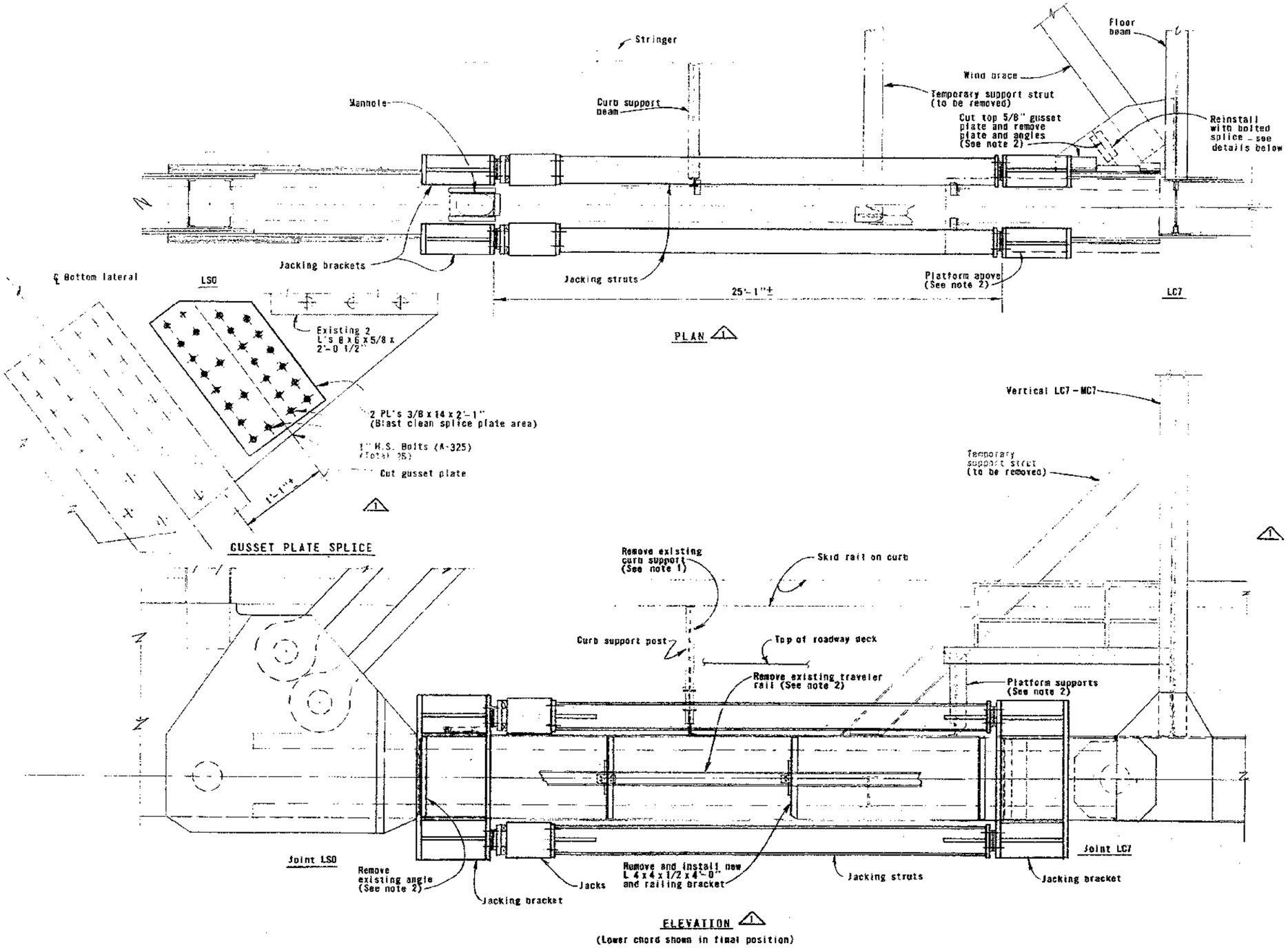
SAN FRANCISCO - OAKLAND BAY BRIDGE
CANTILEVER STRUCTURE
LOWER CHORD DAMAGE REPAIR

SOUTH TRUSS ELEVATION

SCALE 1" = 50' | SHEET NO. 2 | DRAWING NO. 04-035104-2R

DIST	CO	ROUTE	POST MILE	SHT NO.	TOTAL SHEETS
04	SF	80	8.5	3	7

APPROVED October 11, 1977



REPAIR SEQUENCE

1. Remove curb support post and beam and install temporary supporting system. Reinstall curb support after removing jacking system.
2. Remove existing traveler rail and rail support, existing platform and supports and a portion of the existing wind brace gusset plate and angles as needed to install jacking system. Reinstall all members after completion of repair.
3. The Contractor shall submit his proposed details of accomplishing notes 1 and 2 above to the Engineer for approval.
4. Install jacking system. The jacking system shall consist of four jacks with jacking brackets and four jacking struts. For details see sheet 4. The Contractor's methods for supporting the jacking components shall be submitted to the Engineer for approval.
5. Manifold jacks together with a valving system which allows jacks to be operated together or independently.
6. Jack 25^k into each jacking strut and shim jacks.
7. Remove temporary bottom plate by removing bolts beginning at ends and working toward center.
8. Remove temporary internal struts by cutting at centers and unbolting ends.
9. Unbolt and remove temporary external struts.
10. Jack 3200^k (total) into system (800^k per jacking strut).
11. Shim jacks and complete bolting of jacking frame struts
12. Straighten existing chord and individual plate and angle members as directed by the Engineer.
13. Remove existing damaged material and install new cover plate and angle sections.
14. Install web cover plates. 1
15. Install upper angle reinforcement.
16. Fabricate and install internal horizontal diaphragm.
17. Release load and remove jacking system.
18. Fill bolt holes in chord with high strength bolts.

NOTES

1. After the completion of step 5 in the REPAIR SEQUENCE above, the Contractor shall test the jacking system by applying a load to the system in increments as directed by the Engineer. Release load after completion of test.
2. The Contractor may submit alternative jacking arrangements to the Engineer for approval.

CONTRACT No. 04-035104
DATE ACCEPTED 5-18-78
AS BUILT
RESIDENT ENGINEER S. Cooper
REVISIONS BY S.C/CC DATE 2-79

MARK	DATE	REVISION	BY	CHK.
1	2-7-79	As Build with Revision	C.F.C	CCT

STATE OF CALIFORNIA — BUSINESS AND TRANSPORTATION AGENCY — DEPARTMENT OF TRANSPORTATION — TOLL BRIDGES — DISTRICT 04

DESIGN BY R.E. Kaiser CHK. C.D. Zimmerman
DRAWN BY C.F. CISLENA CHK. S. Larsen
SPECIFICATION F. Carling ESTIMATE C. Chen
IN CHARGE OF DESIGN: Ronald D. Zimmerman
REGISTERED ENGINEER 51868

Caltrans APPROVED Sept. 30, 1977
S. Larsen
DESIGN ENGINEER - REGISTERED ENGINEER C12732

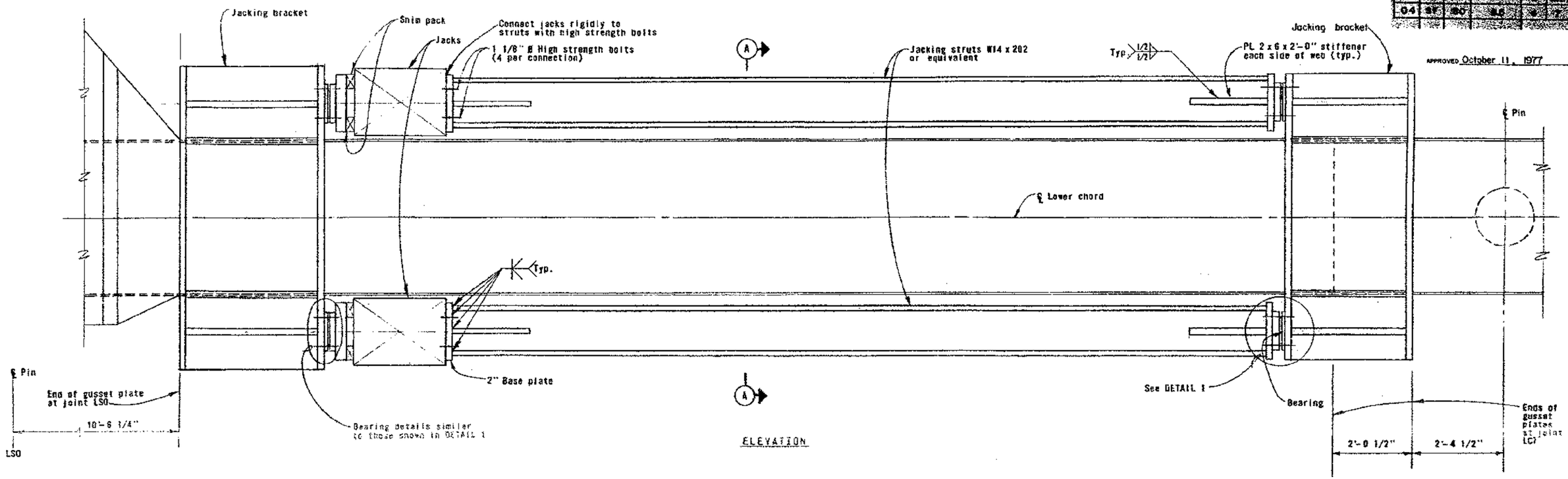
SAN FRANCISCO OAKLAND BAY BRIDGE
CANTILEVER STRUCTURE
LOWER CHORD DAMAGE REPAIR

JACKING SYSTEM

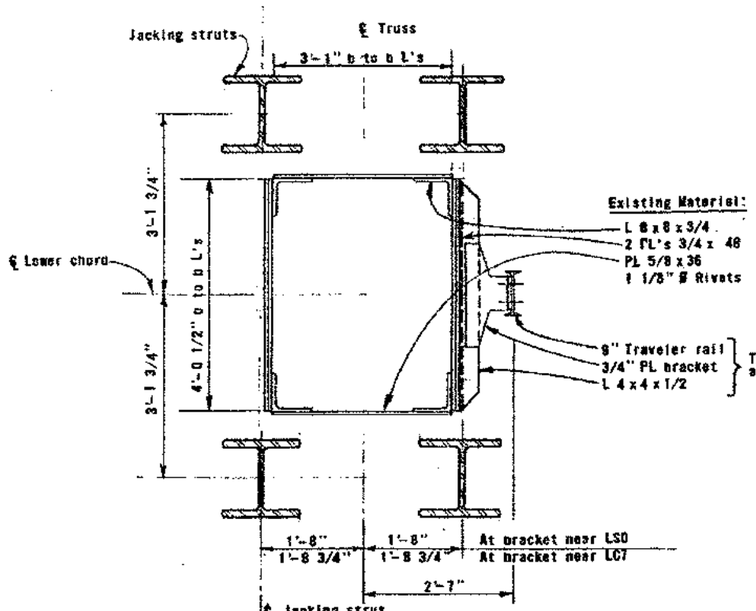
SCALE 3/8" = 1'-0" | SHEET NO. 3 | DRAWING NO. 04-035104-3R

STRUCT	NO.	SHEET	PART BASE	SET NO.	TOTAL SHEETS
04	SF	80	8.0	4	7

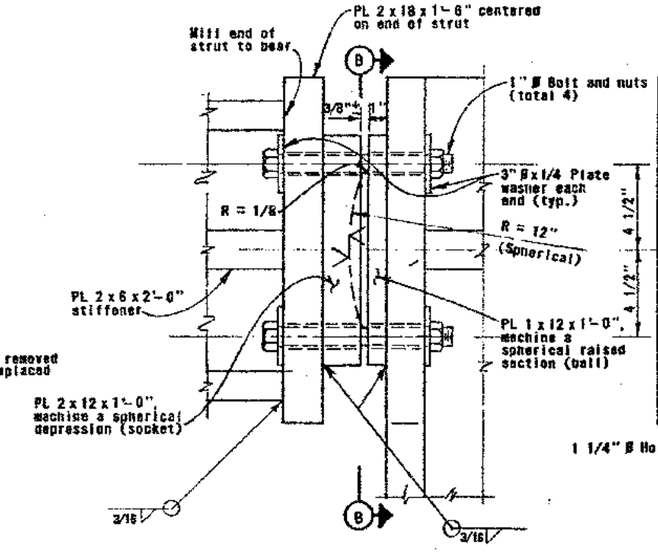
APPROVED October 11, 1977



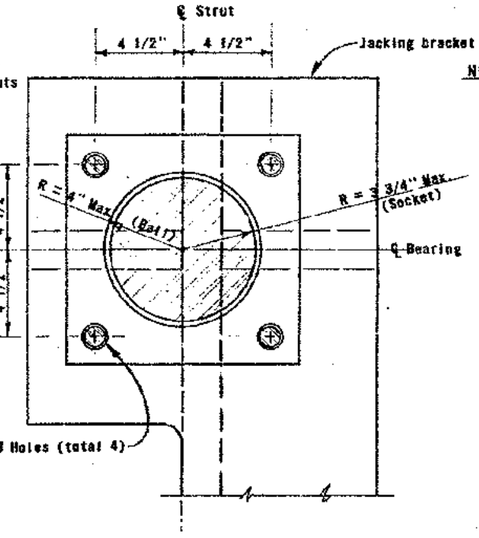
ELEVATION



SECTION A-A



DETAIL 1



SECTION B-B

BEARING DETAILS
3" = 1'-0"

NOTES

1. The jacks furnished had a capacity of 500 tons each.
2. The jack and shim details shown are for illustrative purposes only. The Contractor shall submit details of his jacks, bolting and shimming system for approval of the Engineer. The shimming arrangement shall be capable of transmitting 1000 kips in each jacking strut.
3. Lubricate contact surfaces of spherical bearing.
4. For jacking bracket details see sheet 5.
5. The 1" ø bolts at bearing shall be snug tight before jacking and tightened after jacking.
6. For further details on the jacking system refer to the approved shop drawings.

CONTRACT No. 04-035104
DATE ACCEPTED 5-18-78
AS BUILT
RESIDENT ENGINEER S. Cooper
REVISIONS BY S.C./C.C. DATE 2-79

MARK	DATE	REVISION	BY	CHK.
1	2-7-79	As Built with Revisions	CFC	CCC

STATE OF CALIFORNIA — BUSINESS AND TRANSPORTATION AGENCY — DEPARTMENT OF TRANSPORTATION — TOLL BRIDGES — DISTRICT 04

DESIGN BY P.E. Kaine CHK. R.D. Zimmerman
DRAWN BY C.E. Cicciolla CHK. S. Cooper
SPECIFICATION R.C. Alberg ESTIMATE R. Thomas
IN CHARGE OF DESIGN Ronald D. Zimmerman
REGISTERED ENGINEER STAMP

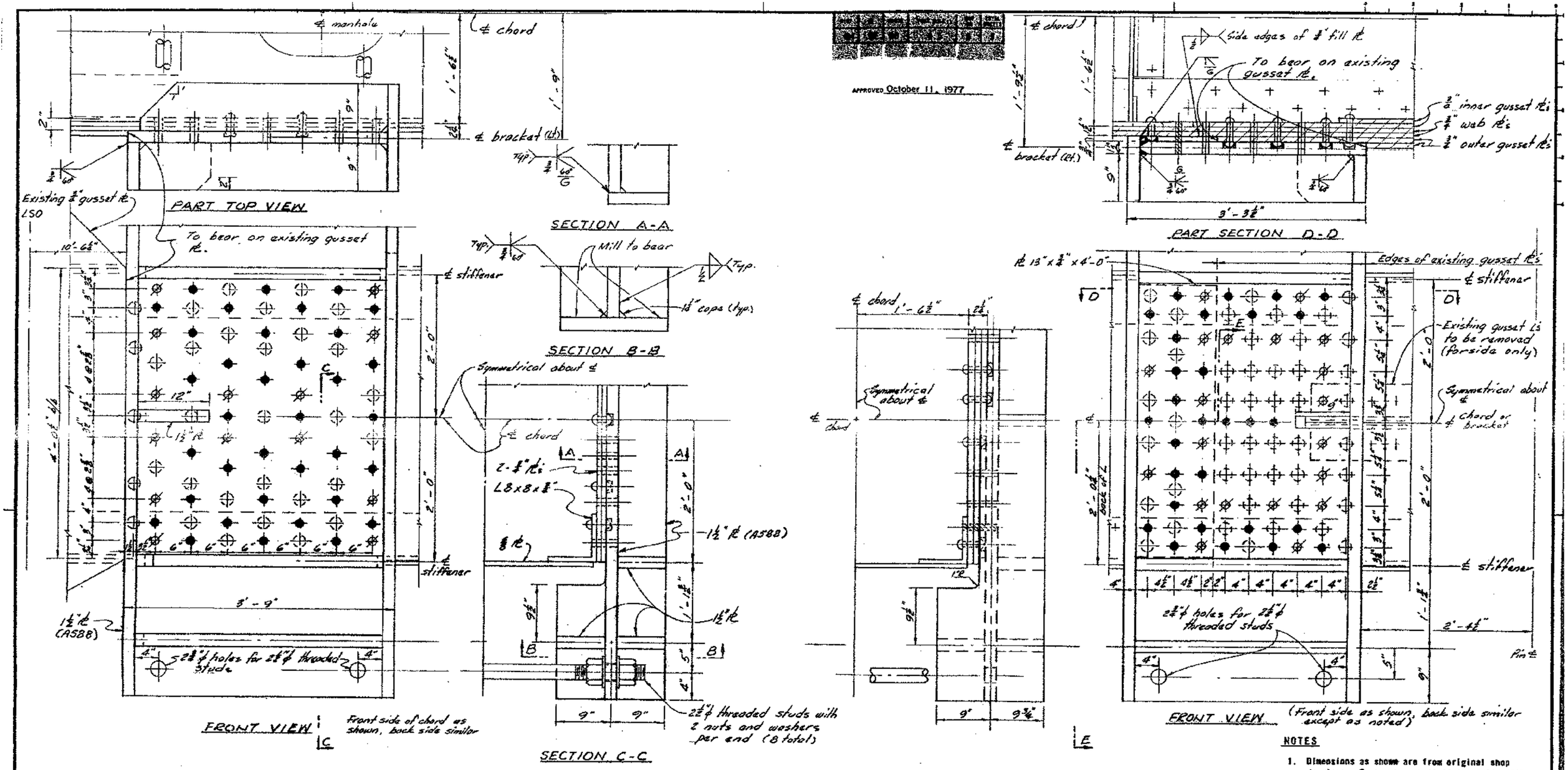
APPROVED Sept. 30, 1977
S. Larsen
BRIDGE ENGINEER — REGISTERED ENGINEER STAMP

SAN FRANCISCO - OAKLAND BAY BRIDGE
CANTILEVER STRUCTURE
LOWER CHORD DAMAGE REPAIR

JACKING SYSTEM DETAILS

SCALE Unless Noted 3/4" = 1'-0" | SHEET NO. 4 | DRAWING NO. 04-035104-4R

APPROVED October 11, 1977



NOTES

1. Dimensions as shown are from original shop drawings. Contractor shall field verify prior to fabrication.
2. Sand blast seating area on existing member, prior to installation of jacking brackets.
3. Removal of existing rivets and drilling new holes on existing member for installation of jacking bracket shall be done on one side of each end at a time.
4. New bolts and nuts shall be 1 1/8" diameter ASTM-A490 except as noted.
5. For strut bearing detail, see sheet 4.

LEGEND ⚠

- 2" ϕ hole with ¼" bevel around inside bottom edge.
- Drill new hole for H.S. bolt.
- Remove existing rivet for H.S. bolt.

CONTRACT No. 04-035104
DATE ACCEPTED 5-18-78
AS BUILT
RESIDENT ENGINEER S. Cooper
REVISIONS BY S.C. DATE 2-79

MARK	DATE	REVISION	BY	CHK.
1	2-79	As built with revision.	ctc	

STATE OF CALIFORNIA — BUSINESS AND TRANSPORTATION AGENCY — DEPARTMENT OF TRANSPORTATION — TOLL BRIDGES — DISTRICT 04

DESIGN BY T. Lee CHK. R. Hansman
DRAWN BY T. Lee CHK. R. Hansman
SPECIFICATION Otto Ang MANAGER R. Hansman
IN CHARGE OF DESIGN T. Lee
REGISTERED ENGINEER CIVIL

APPROVED Sept. 30, 1977
S. Larsen
BRIDGE ENGINEER - REGISTERED ENGINEER CIVIL

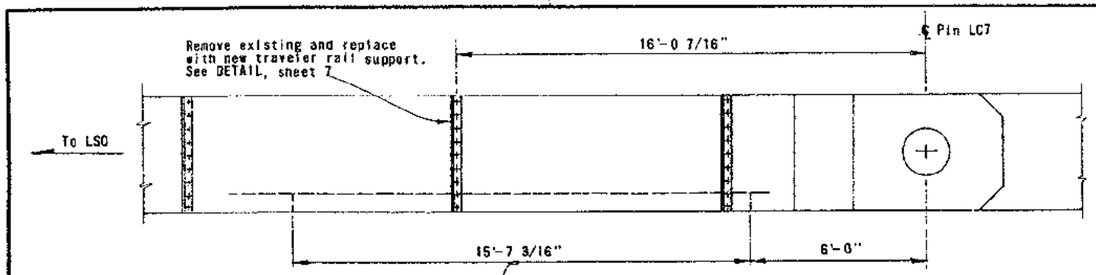
SAN FRANCISCO - OAKLAND BAY BRIDGE
CANTILEVER STRUCTURE
LOWER CHORD DAMAGE REPAIR

JACKING BRACKETS

SCALE 1 1/2" = 1'-0" | SHEET NO. 5 | DRAWING NO. 04-035104-5R

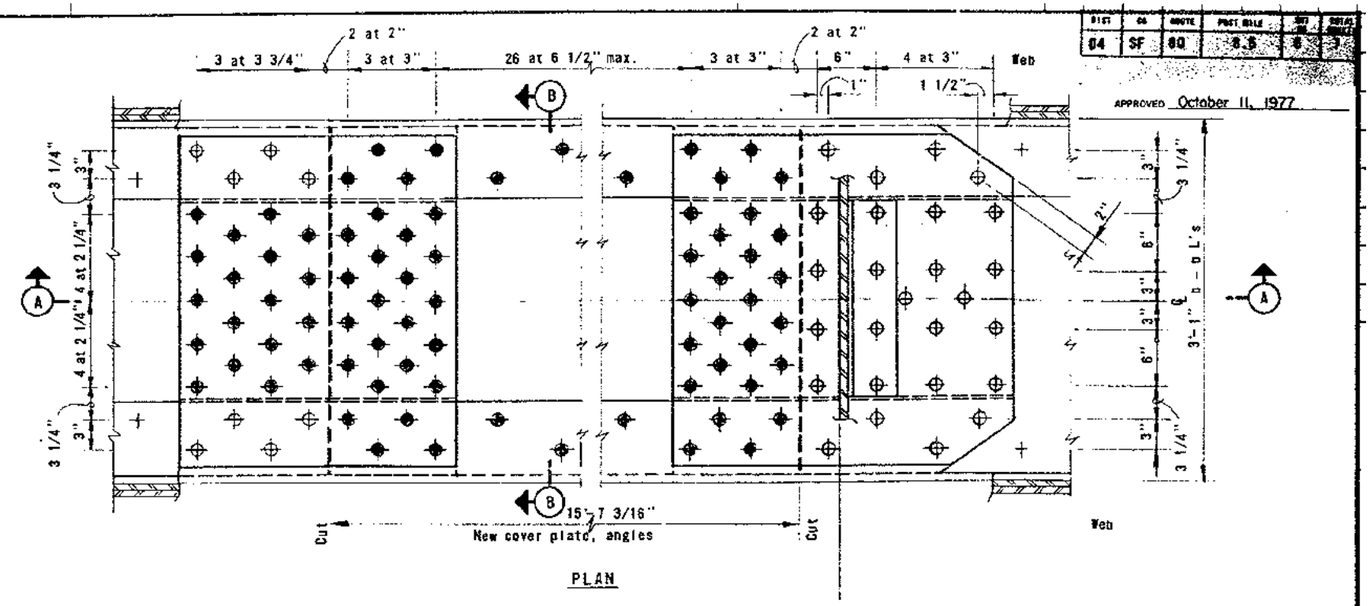
DIST	CO	ROUTE	POST MILE	SHEET	TOTAL SHEETS
04	SF	80	8.5	8	7

APPROVED October 11, 1977

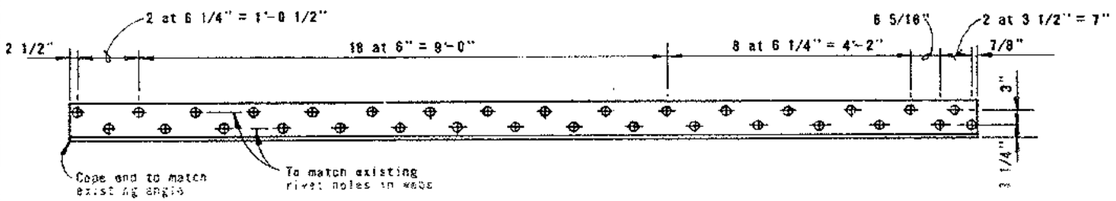


CONTRACT No. 04-035104
DATE ACCEPTED 5-18-78
AS BUILT
RESIDENT ENGINEER S. Cooper
REVISIONS BY S.C./C.F.C. DATE 2-79

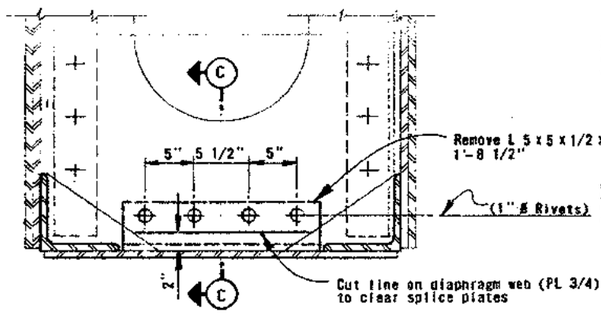
PART ELEVATION
(Temporary bracing and traveler rail not shown)
3/8" = 1'-0"



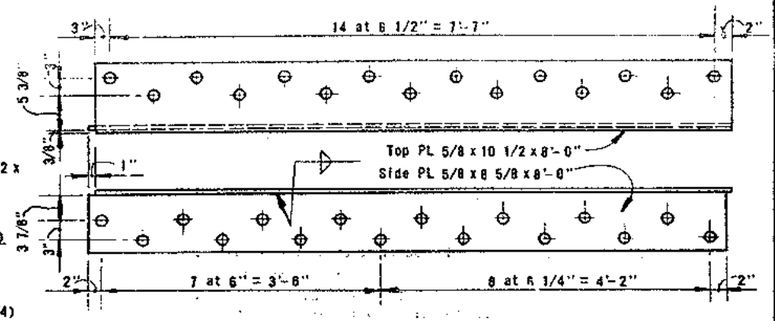
PLAN



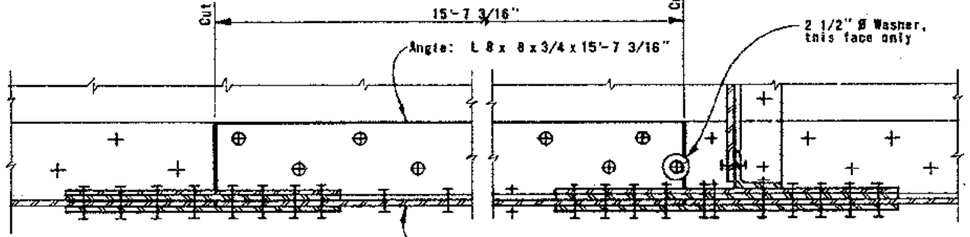
NEW ANGLE
L 8 x 8 x 3/4 x 15'-7 3/16"
(Inboard web angle shown.
Outboard web angle opposite hand.)



DIAPHRAGM MODIFICATION



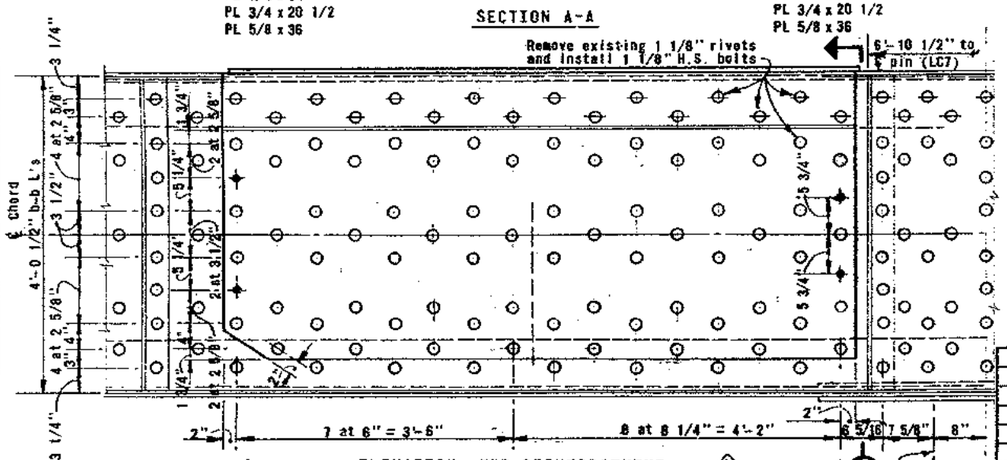
1 UPPER ANGLE REINFORCEMENT
1" = 1'-0" (CCO #3)



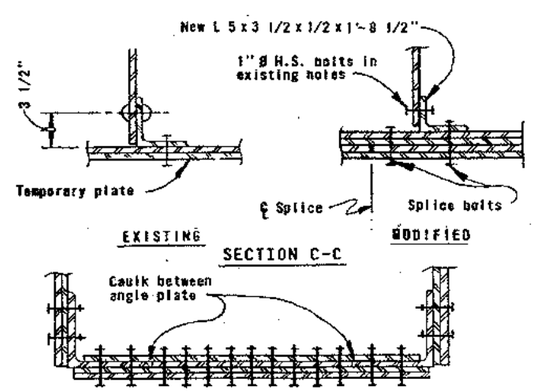
Splice plates: L = 2'-4 1/2"
PL 5/8 x 34
PL 3/4 x 20 1/2
PL 5/8 x 36

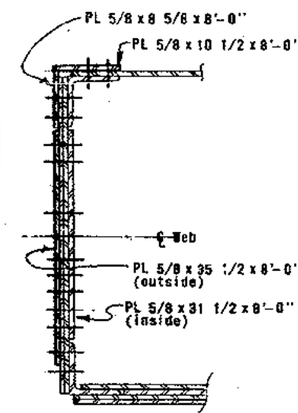
Splice plates: L = 2'-11"
PL 5/8 x 34
PL 3/4 x 20 1/2
PL 5/8 x 36

SECTION A-A



ELEVATION - WEB REINFORCEMENT
1" = 1'-0" (CCO #3)





SECTION D-D
1" = 1'-0"

NOTES

1. All new fasteners shall be 1 1/8" ø A490 H.S. bolts unless otherwise noted.
2. Key to fastener symbols:
   - ⊥ = existing rivets, to remain.
   - ⊕ = existing rivets or bolts, to be removed, and holes to be utilized for new connections.
   - ⊕ = new holes.
3. Existing rivet holes are 1 3/16" ø.
4. Existing 1 1/16" ø holes in bottom cover plate between angle legs are part of temporary bottom plate end connection. Ream to fit 1 1/8" ø bolts.
5. Maximum gap between new and existing material at splices shall be 1/8" at each end.
6. Existing portion of bottom cover plate and outstanding legs of angles to be removed may be flame cut. Legs of angles in contact with webs shall not be flame cut.
7. High strength bolts in diaphragm web-to-angle connection may be A325.

MARK	DATE	REVISION	BY	CHK.
1	2-7-79	As Built with Revisions	CFC	CFC

STATE OF CALIFORNIA — BUSINESS AND TRANSPORTATION AGENCY — DEPARTMENT OF TRANSPORTATION — TOLL BRIDGES — DISTRICT 04

DESIGN BY R. Zimmerman CHK. R.E. Kaiser
DRAWN BY C.F. Collona CHK. R.E. Kaiser
SPECIFICATION W. Colberg DRAWING
IN CHARGE OF DESIGN Ronald D. Zimmerman
REGISTERED ENGINEER CIVIL

APPROVED Sept. 30, 1977
S. Larsen
DESIGN ENGINEER — REGISTERED ENGINEER C12733

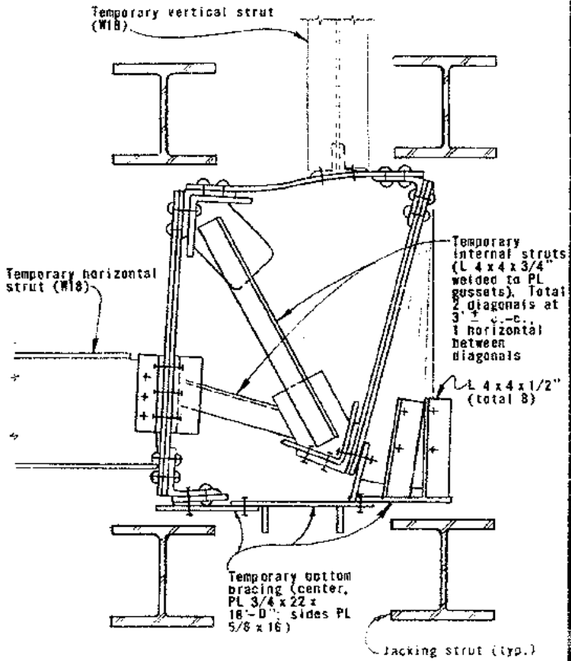
SAN FRANCISCO - OAKLAND BAY BRIDGE
CANTILEVER STRUCTURE
LOWER CHORD DAMAGE REPAIR

CHORD REPAIR DETAILS - 1

SCALE | SHEET NO. 8 | DRAWING NO. 04-035104-6R

DIST	CO.	ROUTE	POST MILE	SHEET NO.	TOTAL SHEETS
04	SF	80	0.5	7	7

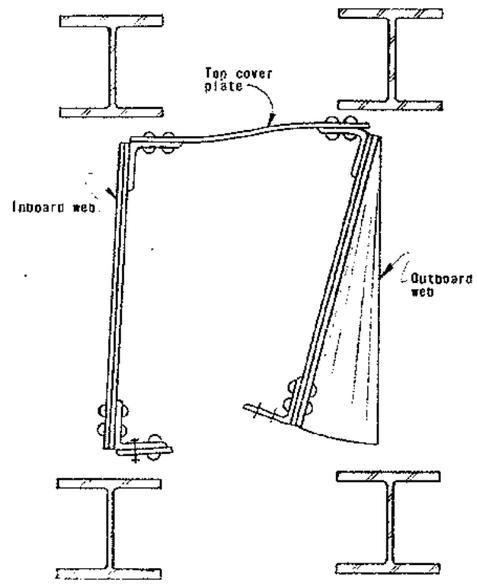
APPROVED October 11, 1977



NOTE: All temporary bracing connections are 1" Ø H.S. bolts.

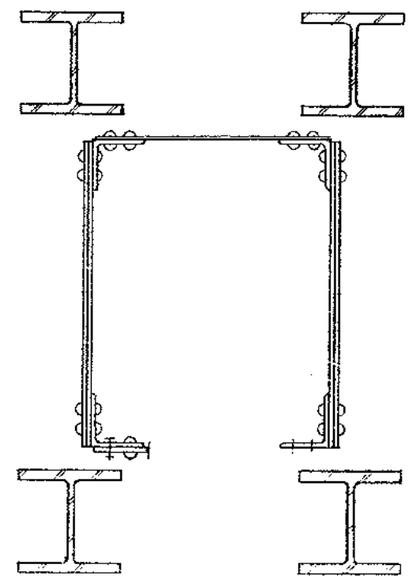
I (1)

Jacking system installed, temporary bracing still in place



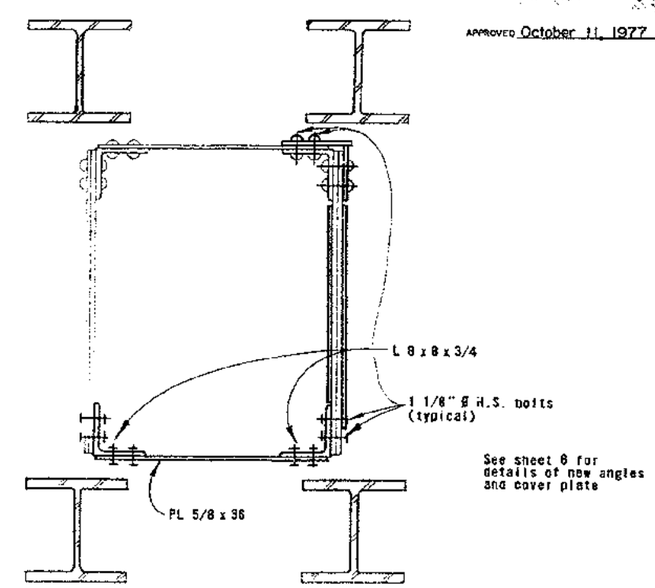
II (6)

Initial force in jacking system, temporary bracing removed



III (12)

Full force in jacking system, truss chord straightened



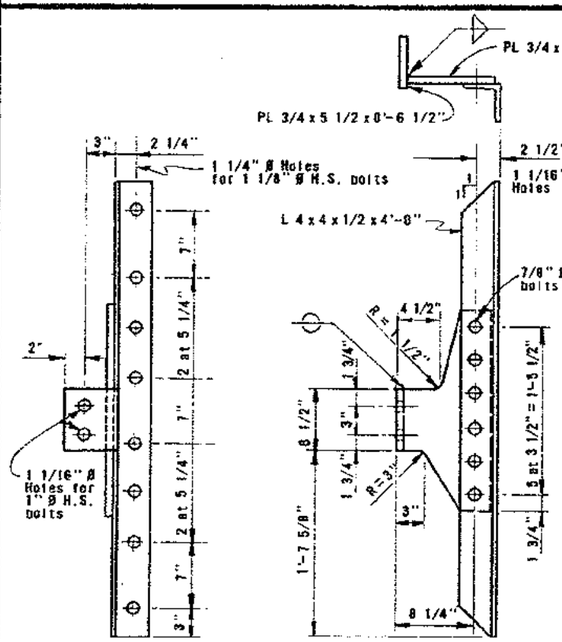
See sheet 8 for details of new angles and cover plate

IV (13)(14)(15) △1

New bottom angles, web and upper angle reinforcement cover plates and bottom cover plate in place.

REPAIR SEQUENCE - SECTION NEAR MIDPOINT OF DAMAGED AREA

See REPAIR PROCEDURES, sheet 3. Numbers in parentheses () indicate applicable notes.

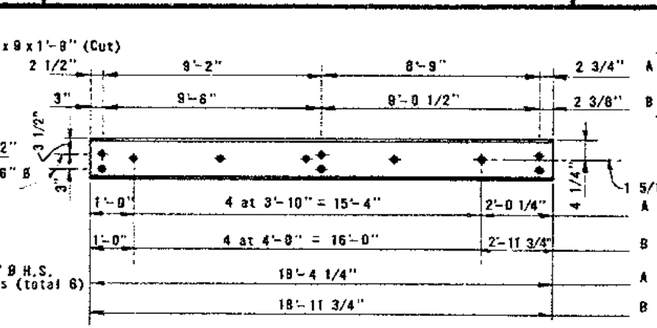


ELEVATION

SIDE VIEW

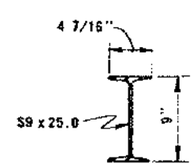
TRAVELER RAIL SUPPORT

1 1/2" = 1'-0"



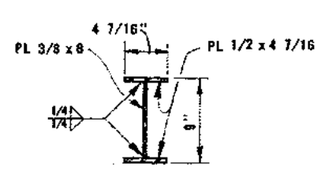
ELEVATION

No Scale



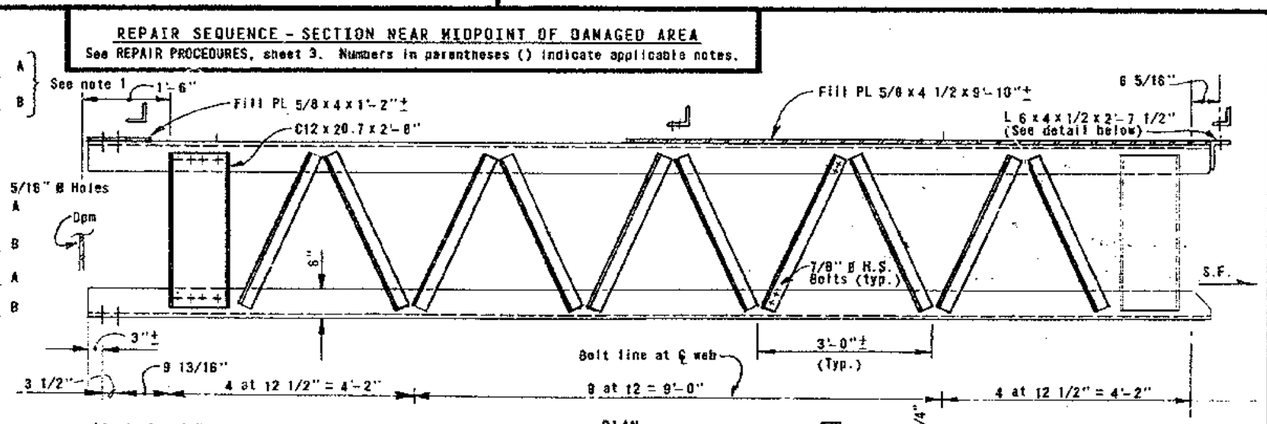
EXISTING SECTION

1 1/2" = 1'-0"

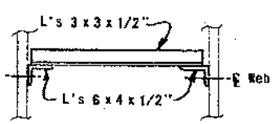


WELDED SECTION

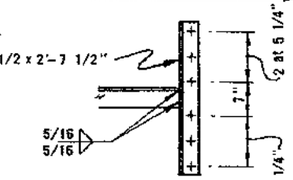
1 1/2" = 1'-0"



PLAN



SECTION



ANGLE DETAIL

△1 INTERNAL HORIZONTAL DIAPHRAGM

3/4" = 1'-0"

CONTRACT No. 04-035104
DATE ACCEPTED 5-18-78

AS BUILT

RESIDENT ENGINEER S. Cooper
REVISIONS BY SC/C.F.C. DATE 2-79

TRAVELER RAIL

NOTES

1. Traveler rail "A" shall replace the existing section at the new traveler rail support. Traveler rail "B" shall be installed in south panel LC6 - LC5 with 1" H.S. bolt at existing supports.

MARK	DATE	REVISION	BY	CHK.
△1	2-7-79	As Built with Revisions	CFC	[illegible]

STATE OF CALIFORNIA — BUSINESS AND TRANSPORTATION AGENCY — DEPARTMENT OF TRANSPORTATION — TOLL BRIDGES — DISTRICT 04

DESIGN BY R.E. Kaan CHK. R.Zimmerman
DRAWN BY C.F. CICCHA CHK. R.E. Kaan
SPECIFICATION [illegible] ESTIMATE [illegible]
IN CHARGE OF DESIGN Ronald D. Zimmerman
REGISTERED ENGINEER CIVIL

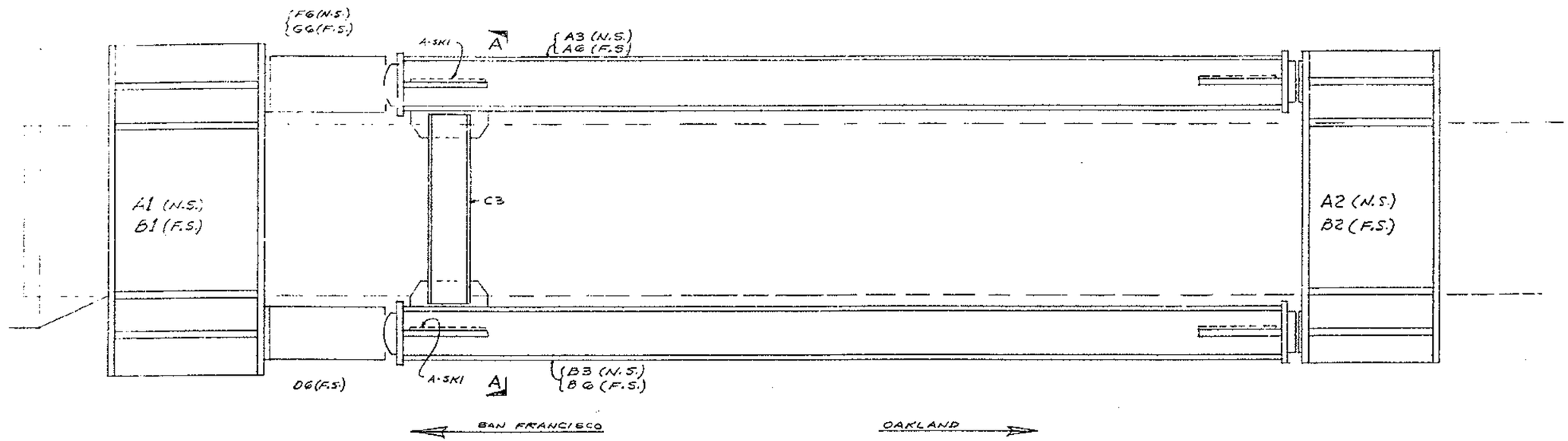
Caltrans APPROVED Sept. 30, 1977
S. Larsen
DESIGN ENGINEER - REGISTERED ENGINEER CIVIL

SAN FRANCISCO - OAKLAND BAY BRIDG
CANTILEVER STRUCTURE
LOWER CHORD DAMAGE REPAIR

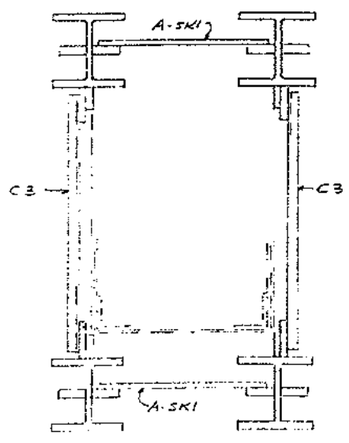
CHORD REPAIR DETAILS - 2

SCALE | SHEET NO. 7 | DRAWING NO. 04-035104-TR

S 04-035104-E



ELEVATION - (LOOKING NORTH)



SECTION A-A

INDEX OF DRAWINGS

E1	ERECT. PLAN - JACKING STRUTS	4	TRAVELER RAILS
E2	ERECT. PLAN	5	SPLICE PL'S AND ANGLES
1	LEFT END JACKING BRKT.	6	JACKING STRUTS
2	RIGHT END JACKING BRKT.	7	REINFORCING PLATES
3	JACKING STRUTS		

BRIDGE No. 04-S.F.-80-8.5
CONTRACT No. - 04-035104

	ERECT.	
	SHIPPER	
	SHOP	
	APPROVED	
	FOR APPROVAL	
SET	DWGS.	DATE

THE PALM IRON AND BRIDGE WORKS
STEEL WIRE ROPE FABRICATORS
1431 S STREET · P. O. BOX 15430 · SACRAMENTO, CALIF. 95813
PHONE 444-3880

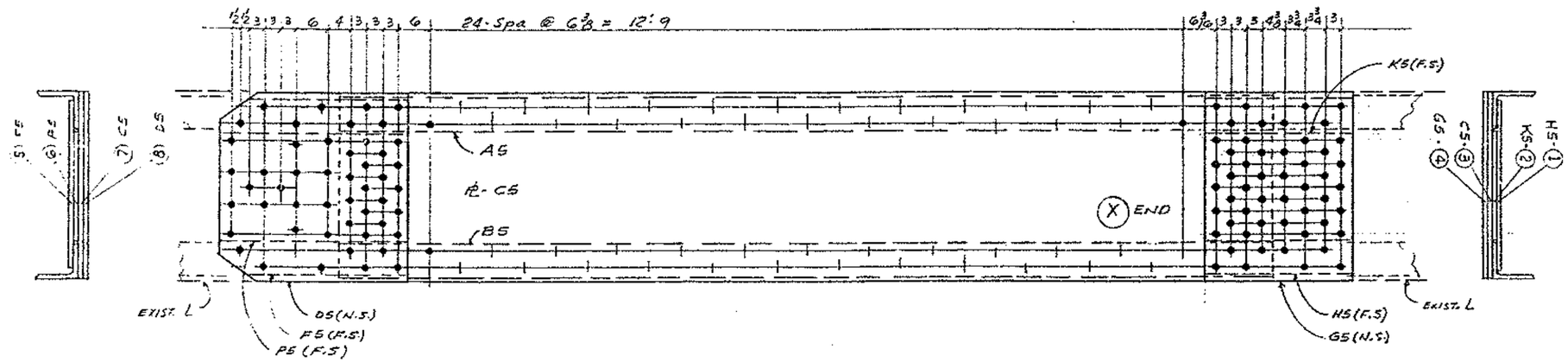
REVISIONS

DATE

SHOP PAINT

ERECTION PLAN - JACKING STRUTS			
JOB SAN FRANCISCO/OAKLAND BAY BRIDGE			
LOCATION OAKLAND			
CONTRACTOR CHRISTIE CONSTRUCTORS			
DR. BY N.H	DATE 1-18-78	JOB NO.	SHL NO.

S 04-035104-E



ERECT PLATES WITH STAMPED NUMBERS TURNED TO POSITION SHOWN

NEW COVER PLATE & SPLICE ℄

ERECT PLATES WITH STAMPED NUMBER TURNED TO POSITION SHOWN

BRIDGE No- 04-S.F-80-8.5

CONTRACT No- 04-035104

	ERECT.	
	SHIPPER	
	SHOP	
	APPROVED	
	FOR APPROVAL	
SET	DWGS.	DATE

THE PALM IRON AND BRIDGE WORKS

STEEL MINOR (ONLY) FABRICATORS

1431 E STREET • P. O. BOX 15498 • SACRAMENTO, CALIF 95813

PHONE 444-3600

PALM IRON

ERECTION PLAN

SAN FRANCISCO/OAKLAND BAY BRIDGE

LOCATION OAKLAND CALIF

CONTRACTOR CHRISTIE CONSTRUCTORS

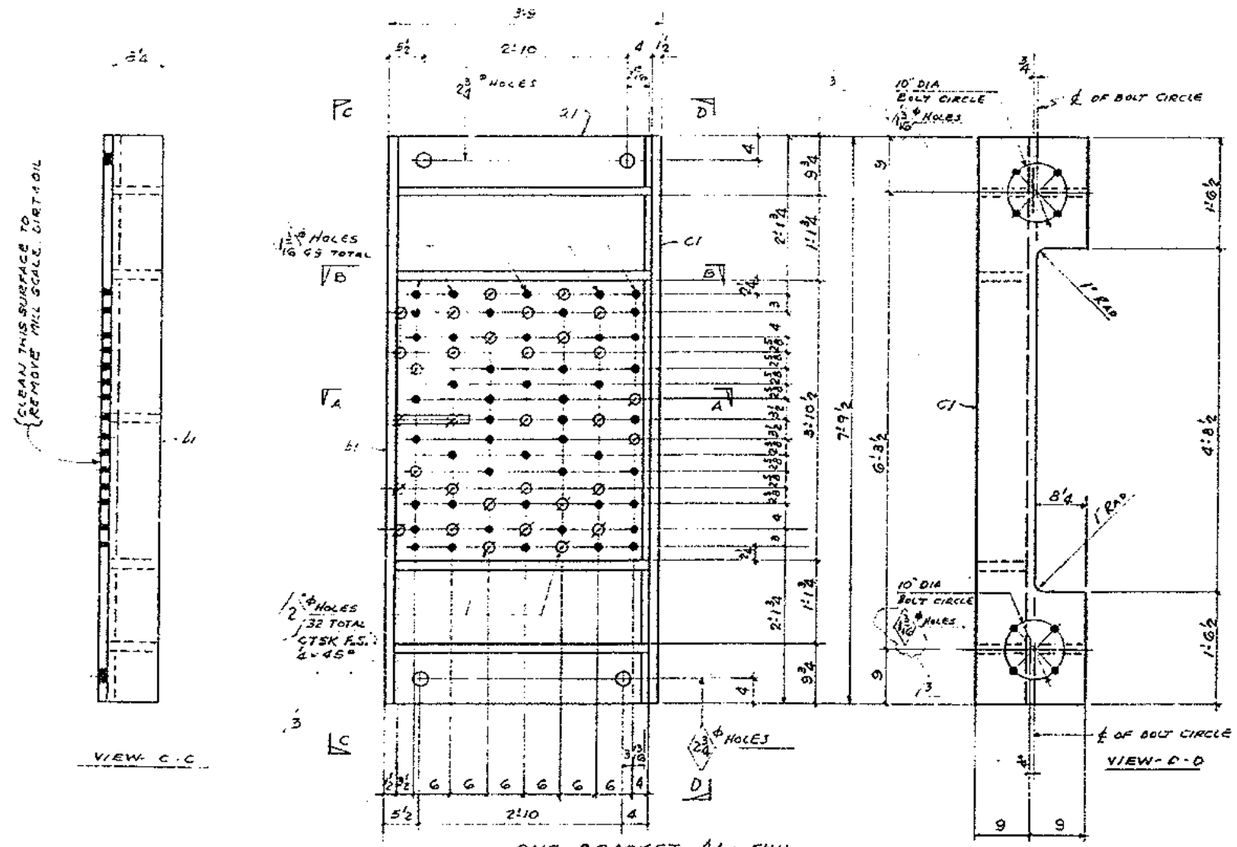
DR. BY HH | DATE 1-25-78 | JOB NO. | DWG. NO.

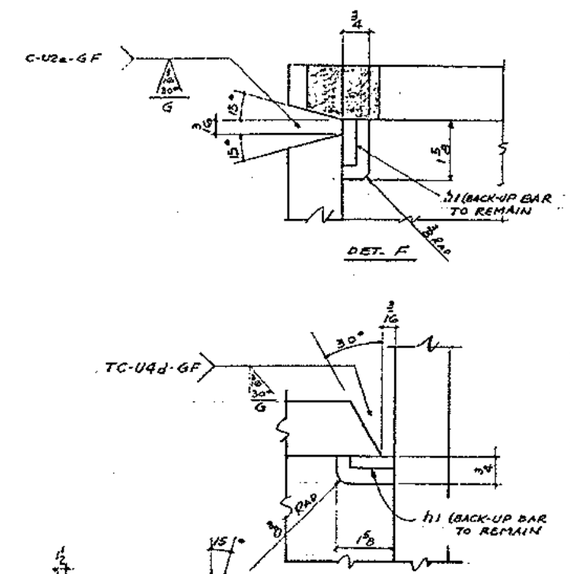
SHOP PAINT

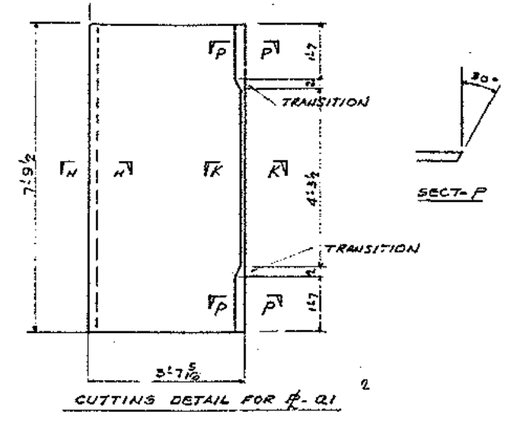
DATE 3/6

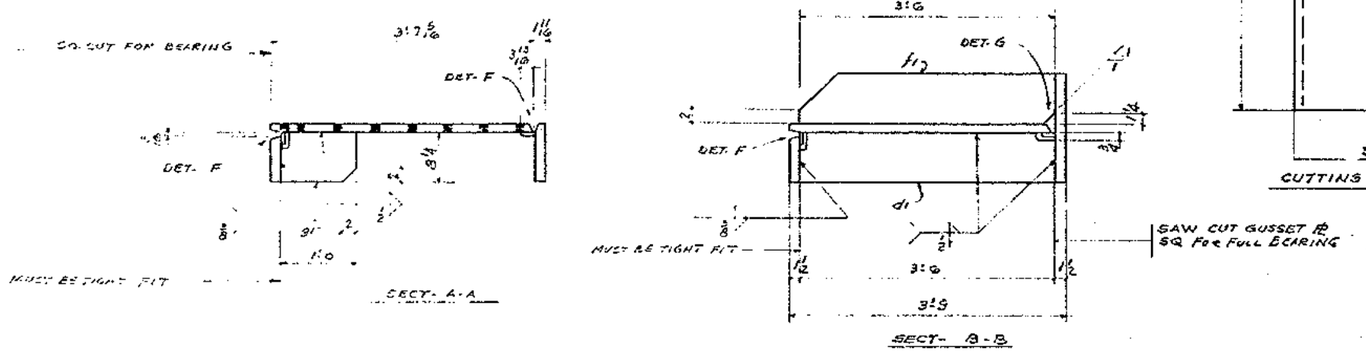
REVISIONS

ADDED END VIEWS AND DETAILS









BILL OF MATERIALS

PCS.	SECTION	LENGTH FT.	LENGTH IN.	MK	REMARKS	WTS
ONE	BRACKET				A1	
ONE	BRACKET				B1	
2	PL. 1/2 x 3 7/16	7	9 1/2	a1	ASTM A588	
2	PL. 1/2 x 8 1/16	7	9 1/2	b1	do	
2	PL. 1 1/2 x 18	7	9 1/2	c1	do	
8	PL. 1 1/2 x 8 1/4	3	6	d1	SAW CUT 2-ENDS do	
4	PL. 1 1/2 x 8 1/4	3	6	f1	SAW CUT 1-END do	
2	PL. 1 1/2 x 8 1/4	1	0	g1	do	
4	F.B. 1 1/4 x 3/8	7	11 1/2	h1	BACK UP BARS ASTM- A36	

INSPECTION REQ'D BY STATE OF CALIF
MILL TEST REPORTS REQ'D
CERTIFIED WELDERS REQ'D

SET	DWGS.	DATE
1	INSPECT	12/7
	ERECT.	
2	SHIPPER	12/7
4	SHOP	12/7
1	PRAD	12/7
	APPROVED	
7	FOR APPROVAL	11/29

BRIDGE No 04-SF-80-B.5
CONTRACT No 04-035104

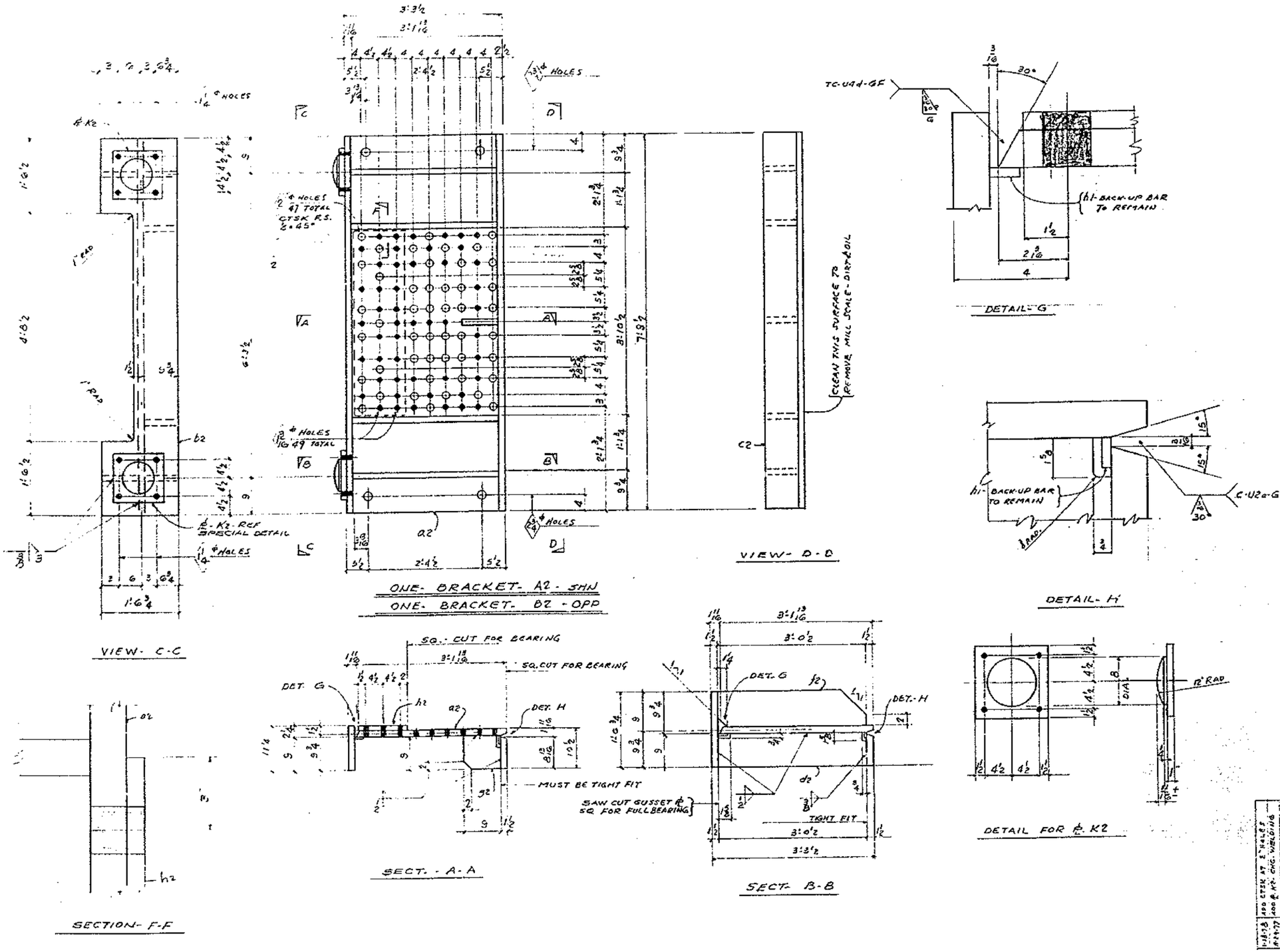
THE PALM IRON AND BRIDGE WORKS
STEEL erector FABRICATORS
1431 S STREET • P O Box 19438 • SACRAMENTO, CALIF. 95819
Phone 444-3563

NONE	LEFT END JACKING BRACKET
	JOB SAN FRANCISCO-OAKLAND BAY BRIDGE
	LOCATION OAKLAND, CALIF
SHOP PAINT	CONTRACTOR CHRISTIE CONSTRUCTORS
NOTED	DR. BY N.N. DATE 11-25-77 JOB NO. DR. NO.

REVISIONS
JOB DESIGN OF 1/2" HOLES CHG. HOLE SIZE
CHG. SAW CUT AND PL. A1
CHG. WELDING
DATE 10-6-77 10-19-77

BILL OF MATERIALS

PCS.	SECTION	LENGTH FT.	LENGTH IN.	MK	REMARKS	WTS
ONE	BRACKET				A2	
ONE	do				B2	
2	PL. 1 1/2 x 3'-1 13/16	7	9 1/2	a2	ASTM- A588	
2	PL. 1 1/2 x 18 3/4	7	9 1/2	b2	do	
2	PL. 1 1/2 x 8 1/16	7	9 1/2	c2	do	
8	PL. 1 1/2 x 9	3	0 1/2	d2	SAWCUT 2-ENDS do	
4	PL. 1 1/2 x 8 1/4	3	0 1/2	f2	SAW CUT 1-END do	
2	PL. 1 1/2 x 9	0	9	g2	do	
2	PL. 3/4 x 12 1/2	4	0	h2	do	
4	PL. 2" x 12	1	0	K2	ASTM- A36	
4	F.B. 1 1/4 x 3/8	7	11 1/2	h1	ASTM- A36	



INSPECTION REQ'D BY
STATE OF CALIF
MILL TEST REPORTS REQ'D
CERTIFIED WELDERS REQ'D

BRIDGE No 04-S.F-80-8.5
CONTRACT No 04-035104

SET	DWGS.	DATE
1	INSPECT	11/7
	ERECT.	
2	SHIPPER	11/7
4	SHOP	11/7
1	PROD	11/7
	APPROVED	
7	FOR APPROVAL	11/23

THE PALM IRON AND BRIDGE WORKS
STEEL AND MISC. IRON FABRICATORS
1431 S. STAGE • P.O. BOX 15436 • SACRAMENTO, CALIF. 95813
PHONE 444-3690

RIGHT END JACKING BRACKET

JOB SAN FRANCISCO - OAKLAND BAY BRIDGE

LOCATION OAKLAND, CALIF

CONTRACTOR CHRISTIE CONSTRUCTORS

NONE

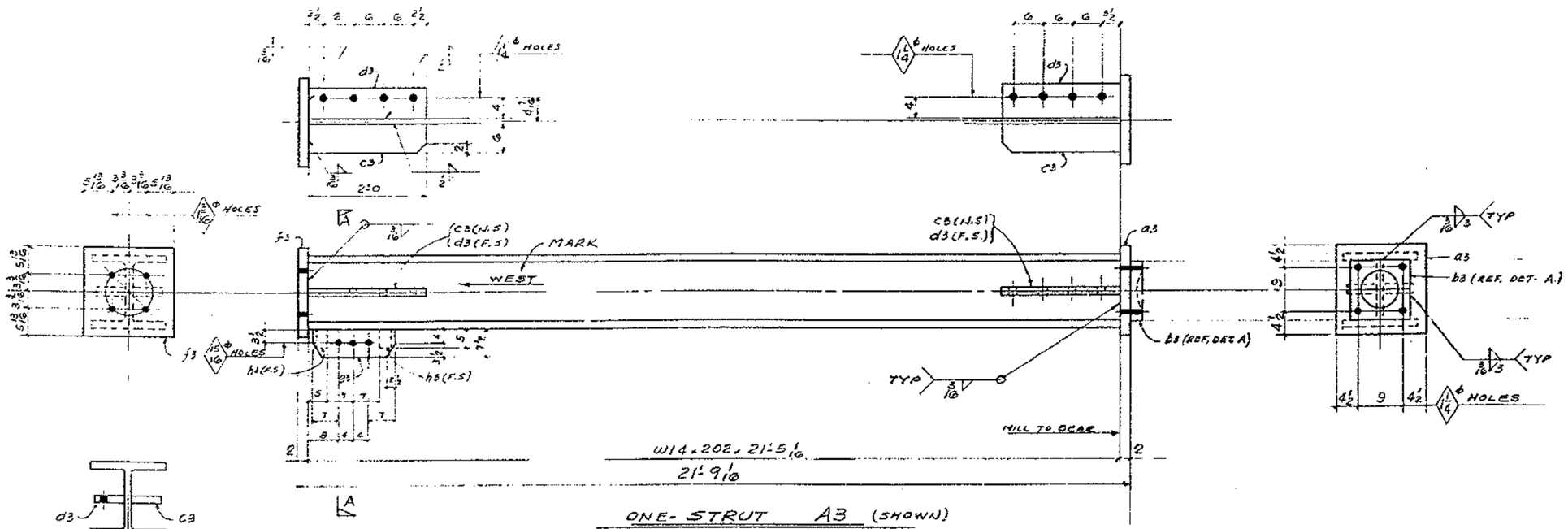
SHOP PAINT

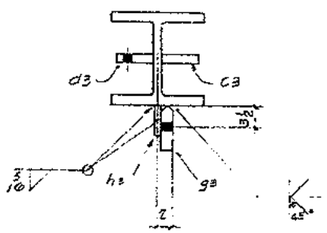
DR. BY H.H | DATE 11-23-77 | JOB NO. | DR. NO.

NOTED

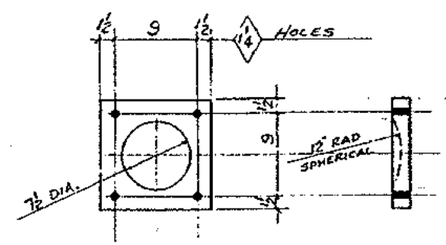
DATE: 11-23-78, 4-24-77, 4-24-77

REVISIONS: ADD OTHER AT 2" HOLES; ADD PL K2; CHG. WELDING



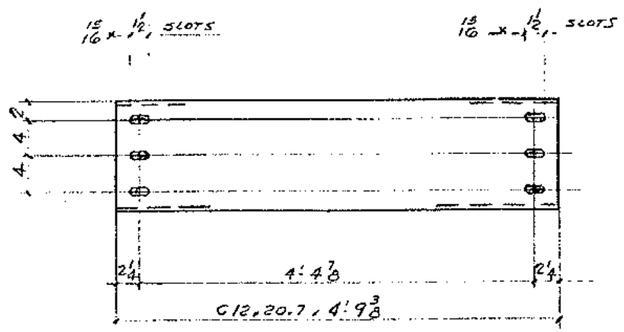


SECTION- A-A



DETAIL FOR #. b3

DETAIL- A



2- CHANNELS- C3

BILL OF MATERIALS

POS.	SECTION	LENGTH FT.	LENGTH IN.	MK	REMARKS	WTS
ONE	W14 x 202	21	5 1/16		A3	
ONE	W14 x 202	21	5 1/16		B3	
2	PL- 2 x 18	1	6	a3		
2	PL- 2 x 12	1	0	b3		
4	PL- 2 x 6	2	0	c3		
4	PL- 2 x 6	2	0	d3		
2	PL- 2 x 18	1	6	f3		
2	PL- 1 1/2 x 7 1/2	1	10	g3		
4	PL- 1 x 3	0	5	h3		
2	C12 x 20.7	4	9 3/8		C3	

INSPECTION REQ'D
BY STATE OF CALIF.
MILL TEST REPORTS REQ'D
CERTIFIED WELDERS REQ'D

1	INSPECT	12/28
	ENGT.	
2	SHIPPER	12/28
4	SHOP	12/29
1	PREP.	12/27
	APPROVED	
7	FOR APPROVAL	12/8
REV	DWGS.	DATE

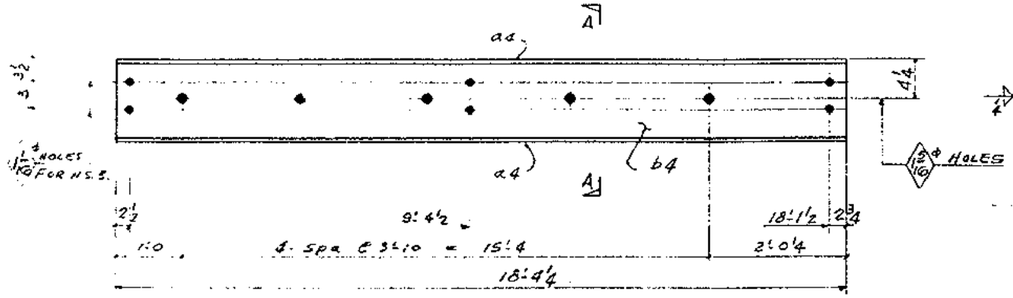
BRIDGE No - 04-S.F-80-B.S
CONTRACT No - 04 035104

THE PALM IRON AND BRIDGE WORKS
STEEL AND ORNAMENTAL FABRICATORS
1431 S STATE • P. O. BOX 15496 • SACRAMENTO, CALIF 95813
PHONE 442-3680

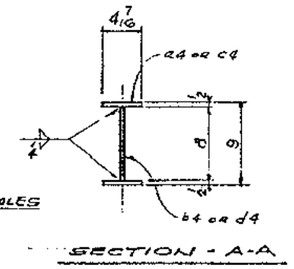
JACKING STRUTS
JOB SAN FRANCISCO/OAKLAND BAY BRIDGE
LOCATION OAKLAND, CALIF
CONTRACTOR CHRISTIE CONSTRUCTORS
DR. BY H.H. DATE 11-29-77 JOB NO. SHE NO.

NONE
SHOP PAINT

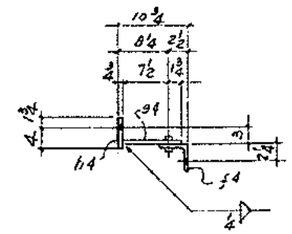
DATE	REVISIONS
11/8/78	GEN. REV.
12/8/77	ADD HOLES IN STIFF. PL.

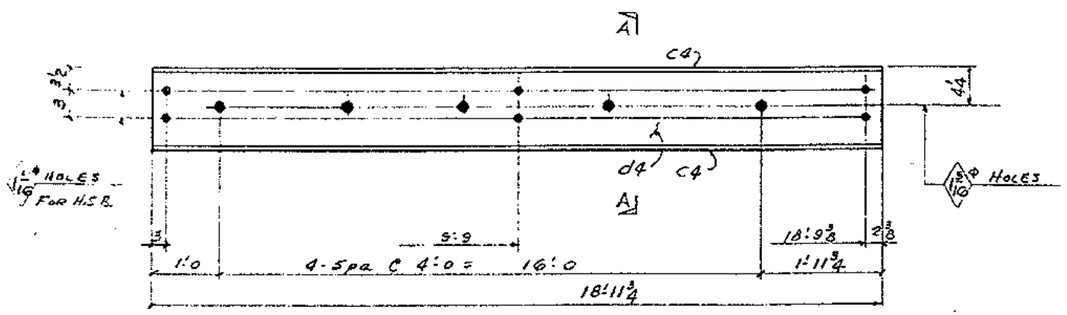


ONE- BEAM- A4

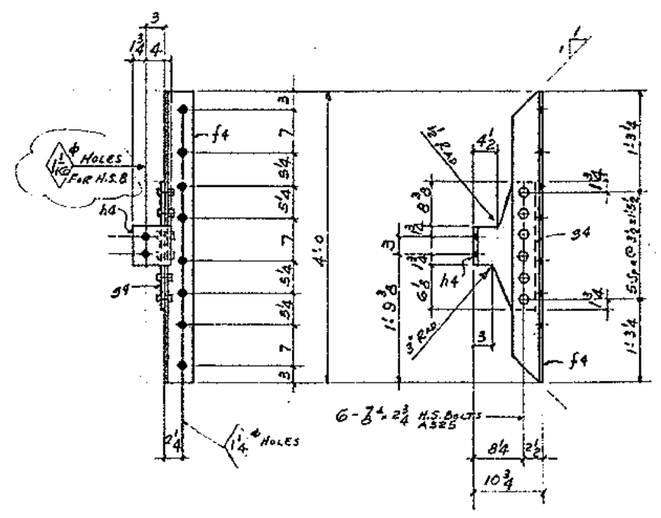


SECTION - A-A





ONE- BEAM- B4



3- BRACKETS- C4

BILL OF MATERIALS

PCS.	SECTION	LENGTH FT.	LENGTH IN.	MK	REMARKS	WTS
ONE	BEAM-				A4	
2	PL- ½ x 4 7/16	18	4¼	a4		
ONE	PL- ⅜ x 8	18	4¼	b4		
ONE	BEAM-				B4	
2	PL- ½ x 4 7/16	18	11¾	c4		
ONE	PL- ⅜ x 8	18	11¾	d4		
3	BRACKETS				C4	
3	L 4 x 4 x ½	4	0	f4		
3	PL- ¾ x 9¼	1	9	g4		
3	PL- ¾ x 5¾	0	6½	h4		
18	⅞ϕ H.S.B. (A325)		2¾			
18	⅞ϕ HARD, FLAT WASHERS					

CONTACT SURFACES AROUND HOLES TO BE MASKED TO AVOID PAINTING MASKING TO REMAIN TO PREVEN RUST

DEBURR AND OMIT PAINT 3" AROUND HOLES FOR H.S.B.

INSPECTION REQ'D BY STATE OF CALIF.
MILL TEST REPORTS REQ'D
CERTIFIED WELDERS REQ'D

SET	DWGS.	DATE
1	INSPECT	12/18
	ERECT.	
2	SHIPPER	12/28
4	SHOP	12/18
1	PROD.	12/18
	APPROVED	
7	FOR APPROVAL	12/1

BRIDGE No - 04-S.F-80-8.5
CONTRACT No - 04-035104

THE PALM IRON AND BRIDGE WORKS
STEEL STRUCTURAL FABRICATORS
1431 S STREET • P O BOX 15018 • SACRAMENTO CALIF 95813
PHONE 444-3680

SANDBLAST & PAINT PER SECT- 59-2 OF STD SPECS.

TRAVELER RAILS

JOB SAN FRANCISCO OAKLAND BAY BRIDGE

LOCATION OAKLAND, CALIF

SHOP PAINT

CONTRACTOR CHRISTIE CONSTRUCTORS INC

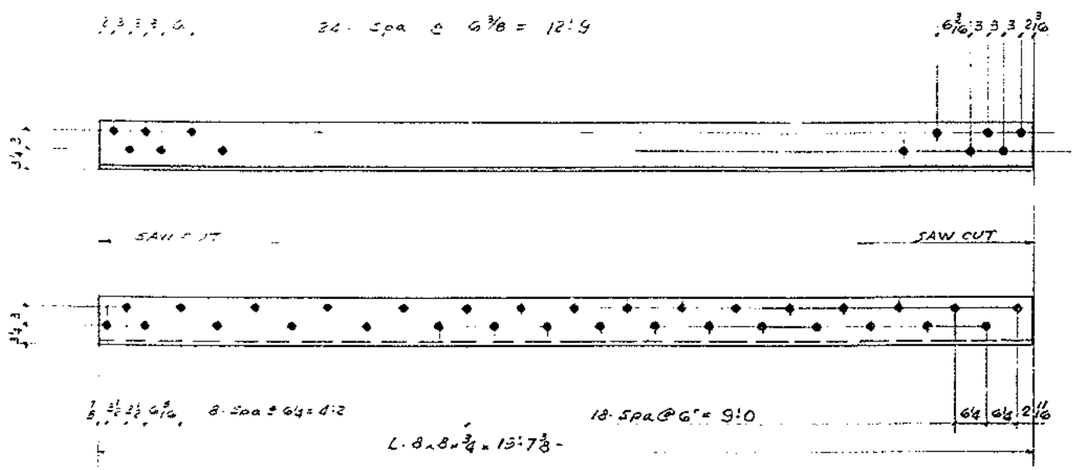
NOTED

DWG. BY H. K. DATE 11-28-77 JOB NO. DWG. NO.

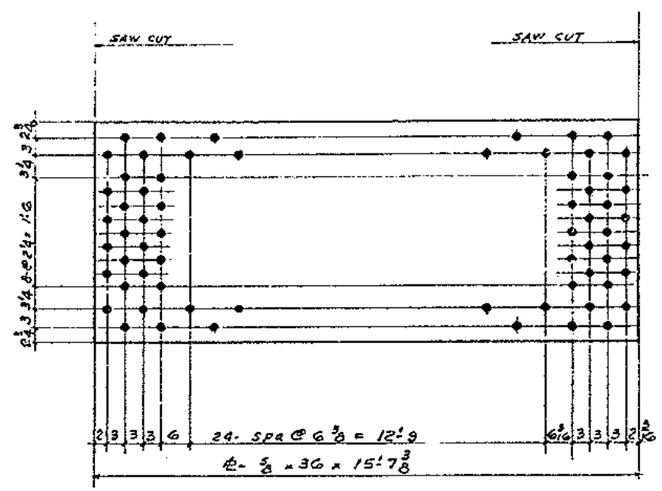
REVISIONS

DATE

Add No. Paint Around Holes



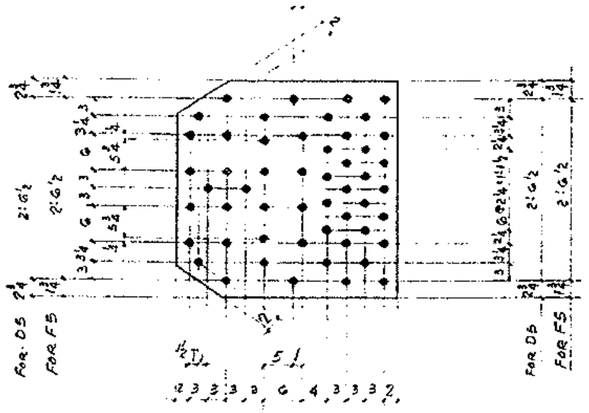
ONE - ANGLE - A5 (SHN)
ONE - ANGLE - B5 (OPP)



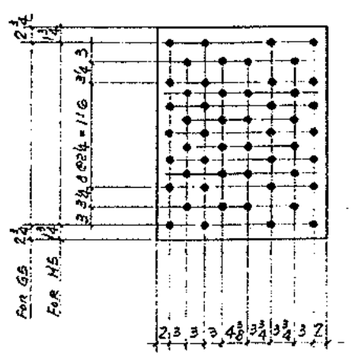
ONE - PLATE - C5

BILL OF MATERIALS

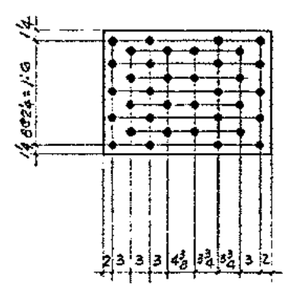
PCS.	SECTION	LENGTH FT.	LENGTH IN.	MK	REMARKS	WTS
ONE	L-8 x 8 x 3/4	15	7 3/8	A5	SAWCUT 2-ENDS A588-STL	
ONE	L-8 x 8 x 3/4	15	7 3/8	B5	SAW CUT-2 ENDS A588	
ONE	PL-5/8 x 36	15	7 3/8	C5	SAW CUT 2-ENDS A588	
ONE	PL-5/8 x 36	2	11	D5		
ONE	PL-5/8 x 34	2	11	F5		
ONE	PL-5/8 x 36	2	3 7/8	G5		
ONE	PL-5/8 x 34	2	3 7/8	H5		
ONE	PL-3/4 x 20 1/2	2	3 7/8	K5	A-588	
ONE	PL 3/4 x 20 1/2	2	11	P5	A-588	
ONE	L-5 x 3 1/2 x 1/2	1	8 1/2	T5	A-36-STL.	
2	PL-1/4 x		2 1/2 ϕ	W5	A36	



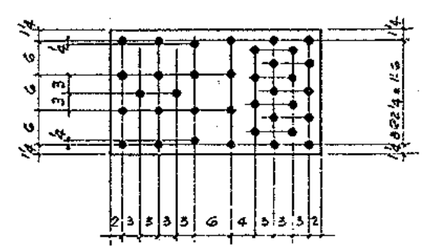
ONE - PLATE - D5
ONE - do F5



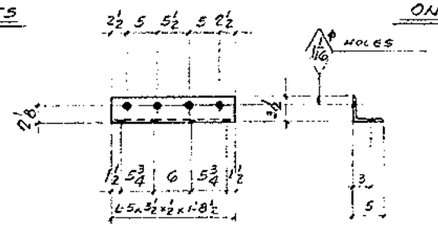
ONE - PLATE - G5
ONE - do H5



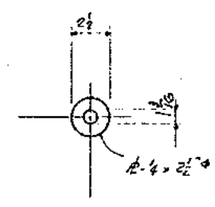
ONE - PLATE - K5



ONE - PLATE - P5



ONE - ANGLE - T5



2 - WASHERS - W5

OMIT PAINT 3" AROUND ALL HOLES

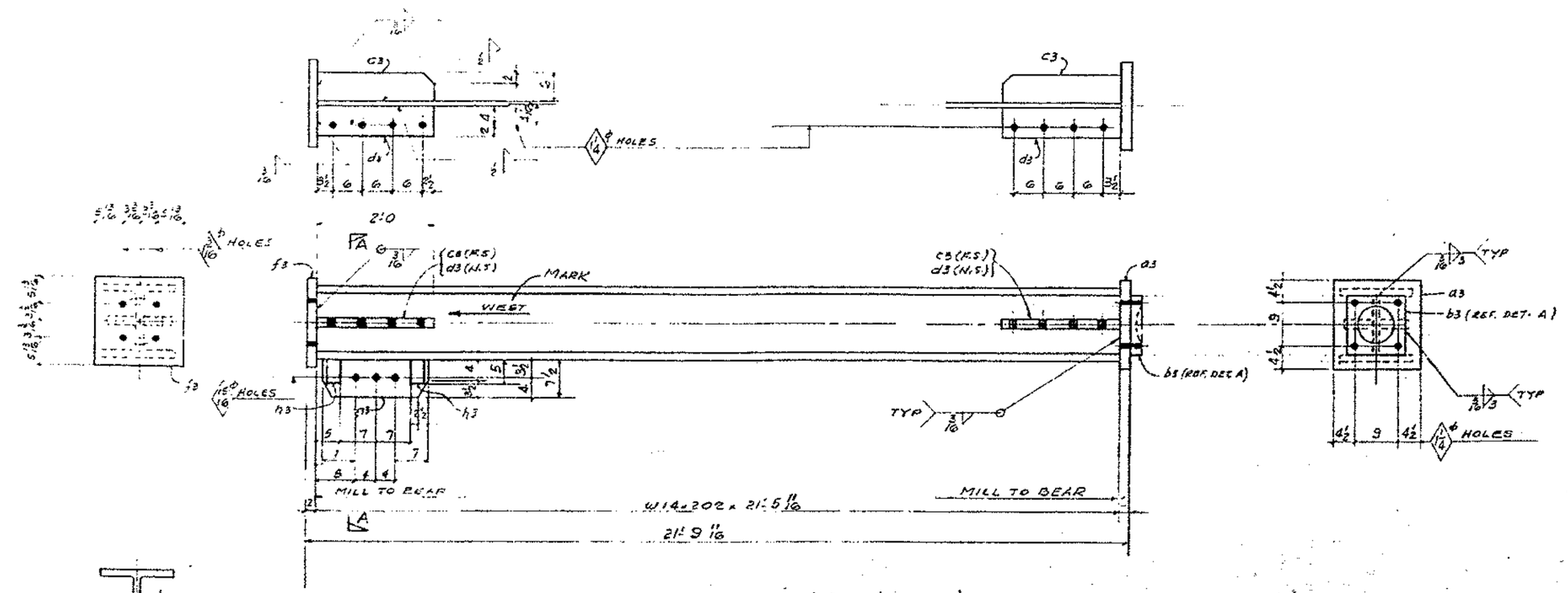
INSPECTION REQ'D
BY STATE OF CALIF
MILL TEST REPORTS REQ'D
CERTIFIED WELDERS REQ'D

SET	DWGS.	DATE
1	INSPECT	12/28
	ERECT.	
2	SHIPPER	12/28
4	SHOP	12/28
1	PROD.	12/28
	APPROVED	
7	FOR APPROVAL	12/1

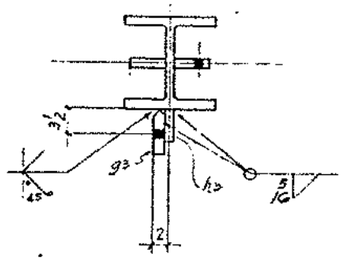
BRIDGE NO - 04-S.F-80-8.5
CONTRACT NO 04-035104

THE PALM IRON AND BRIDGE WORKS
STEEL AND CONCRETE FABRICATORS
1431 S STREET • P. O. BOX 19436 • SACRAMENTO, CALIF. 95819
PHONE 444-3080

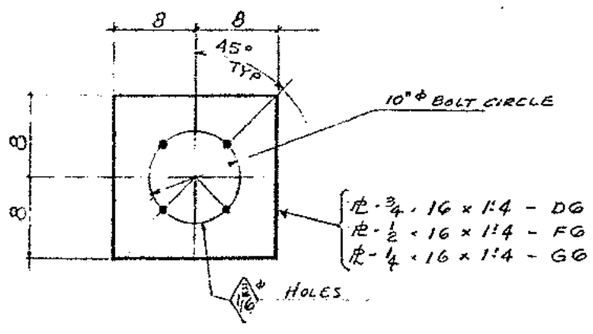
SANDBLAST & PAINT PER MRA-SQ-2 OF STD. SPECS.	SPLICE PLATES & ANGLES		
	JOB SAN FRANCISCO/OAKLAND BAY BRIDGE		
	LOCATION OAKLAND, CALIF		
SHOP PAINT	CONTRACTOR CHRISTIE CONSTRUCTORS INC		
1 3/16 ϕ	DWN. BY HH	DATE 12-1-77	JOB NO. / SHT. NO.



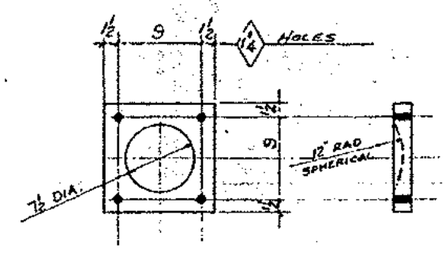
ONE - STRUT - A6 - (SHOWN)
ONE - STRUT - B6 - (OPP)



SECTION- A-A



ONE - PLATE - D6
ONE - do - F6
ONE - do - G6



DETAIL FOR PL. b3

DETAIL- A

BILL OF MATERIALS

POS.	SECTION	LENGTH FT.	LENGTH IN.	MK	REMARKS	WTS
ONE	W14x202	21	5 11/16		A6	
ONE	W14x202	21	5 11/16		B6	
2	PL-2 x 18	1	6	a3		
2	PL-2 x 12	1	0	b3		
4	PL-2 x 6	2	0	c3		
4	PL-2 x 6	2	0	d3		
2	PL-2 x 18	1	6	f3		
2	PL-1½ x 7½	1	10	g3		
6	PL 1 x 3	0	5	h3		
ONE	PL - ¾ x 16	1	4		D6	
ONE	PL - ½ x 16	1	4		F6	
ONE	PL - ¼ x 16	1	4		G6	

INSPECTION REQ'D
BY STATE OF CALIF.
MILL TEST REPORTS REQ'D
CERTIFIED WELDERS REQ'D

BRIDGE No - 04-S.F-80-8.5
CONTRACT No - 04-035104

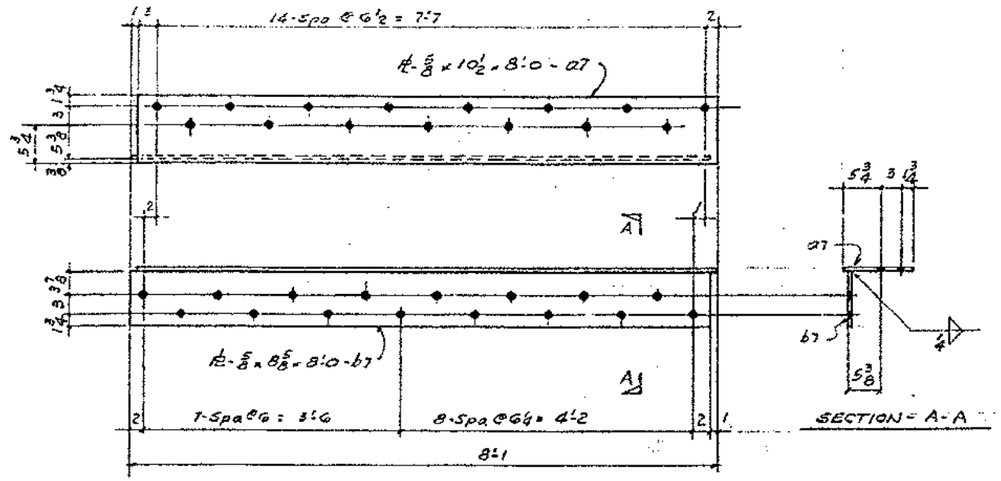
SET	DWGS.	DATE
1	INSPECT	12/2.8
	ERECT.	
2	SHIPPER	12/28
4	SHOP	12/28
1	PASS.	12/28
	APPROVED	
7	FOR APPROVAL	12/8

THE PALM IRON AND BRIDGE WORKS
STEEL AND/OR IRON FABRICATORS
1431 G STREET • P.O. BOX 19438 • SACRAMENTO, CALIF. 95819
PHONE 454-3580

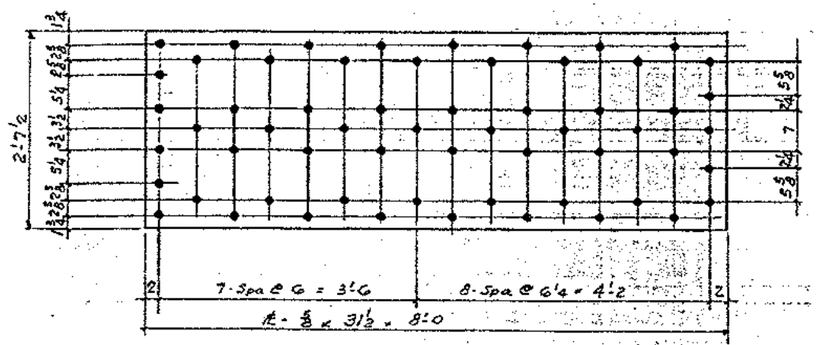
JACKING STRUTS
JOB SAN FRANCISCO/OAKLAND BAY BRIDGE
LOCATION OAKLAND, CALIF.
CONTRACTOR CHRISTIE CONSTRUCTORS

NONE
SHOP PAINT

BILL OF MATERIALS						
PCS.	SECTION	LENGTH FT.	LENGTH IN.	MK	REMARKS	WTS
ONE	ANGLE				A7	
ONE	PL-5/8 x 10 1/2	8	0		A588	
ONE	PL-5/8 x 8 5/8	8	0		A588	
ONE	PL-5/8 x 31 1/2	8	0		B7 A588	
ONE	PL-5/8 x 35 1/2	8	0		C7 A588	

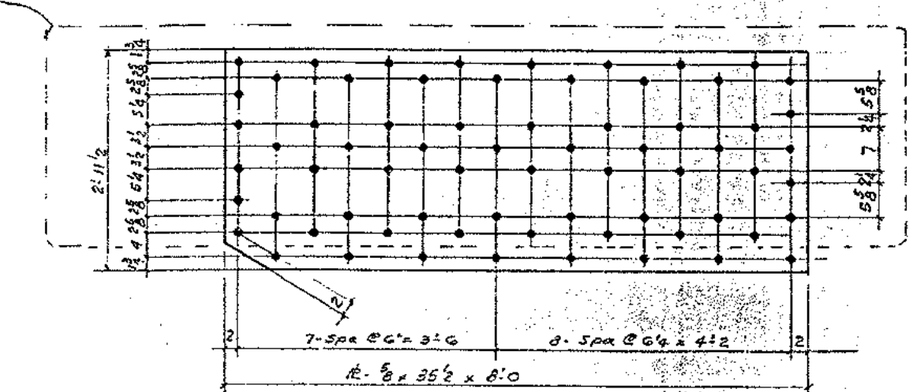


ONE - ANGLE - A7



ONE - PLATE - B7

MATCH DRILL OR REAM WITH PL-B7



ONE - PLATE - C7

1	INSPECT.	3/13
	ERECT.	
2	SHIPPER	3/13
4	SHOP	
1	PROD.	
	APPROVED	
8	FOR APPROVAL	3/14
REV	DWGS.	DATE

INSPECTION REQ'D BY
STATE OF CALIF.
MILL TEST REPORTS REQ'D
CERTIFIED WELDERS REQ'D

BRIDGE NO 04-SF-80-8.5

CONTRACT NO 04-035104

THE PALM IRON AND BRIDGE WORKS
STEEL AND ORNAMENTAL FABRICATORS
1431 S STREET • P. O. BOX 15438 • SACRAMENTO, CALIF. 95813
Phone 442-3680

RE-INFORCING PLATES

JOB SAN FRANCISCO-OAKLAND BAY BRIDGE

LOCATION OAKLAND

CONTRACTOR CHRISTIE CONSTRUCTORS

DR. BY H.L.H. DATE 3-14-78 JOB NO. DR. NO.

SHOP PAINT

NONE

REVISIONS

Add Mat'l Spec.

3-27 DATE

3

Reconstruction Steel Work - East Bay (Contract No. 04-4030)

The as-built drawings, which are contained in these CDs, are scanned from drawings of the existing structure for the convenience of the contractor and as a means to convey to the contractor the available information regarding the existing structure. It is to be understood that no claim is being made as to the accuracy or completeness of the said information and that the State of California or its officers or agents shall not be responsible for the manner in which the contractor interprets and uses this information or for the accuracy, currency or completeness of these scanned as-built drawings. The contractor shall be responsible to obtain, at the contractor's expense, any additional information that the contractor deems necessary for completely and accurately assessing the existing conditions of the structure. The contractor shall not be entitled to any compensation for any claim arising from inaccuracy or insufficiency of these as-built drawings or in anyway related to these drawings.

1. Project Plan and Elevation
2. Contract Work-Bid Items 1 to 4
3. Contract Work-Bid Items 5 to 15
4. Contractors' Work Area
5. Typical Sections
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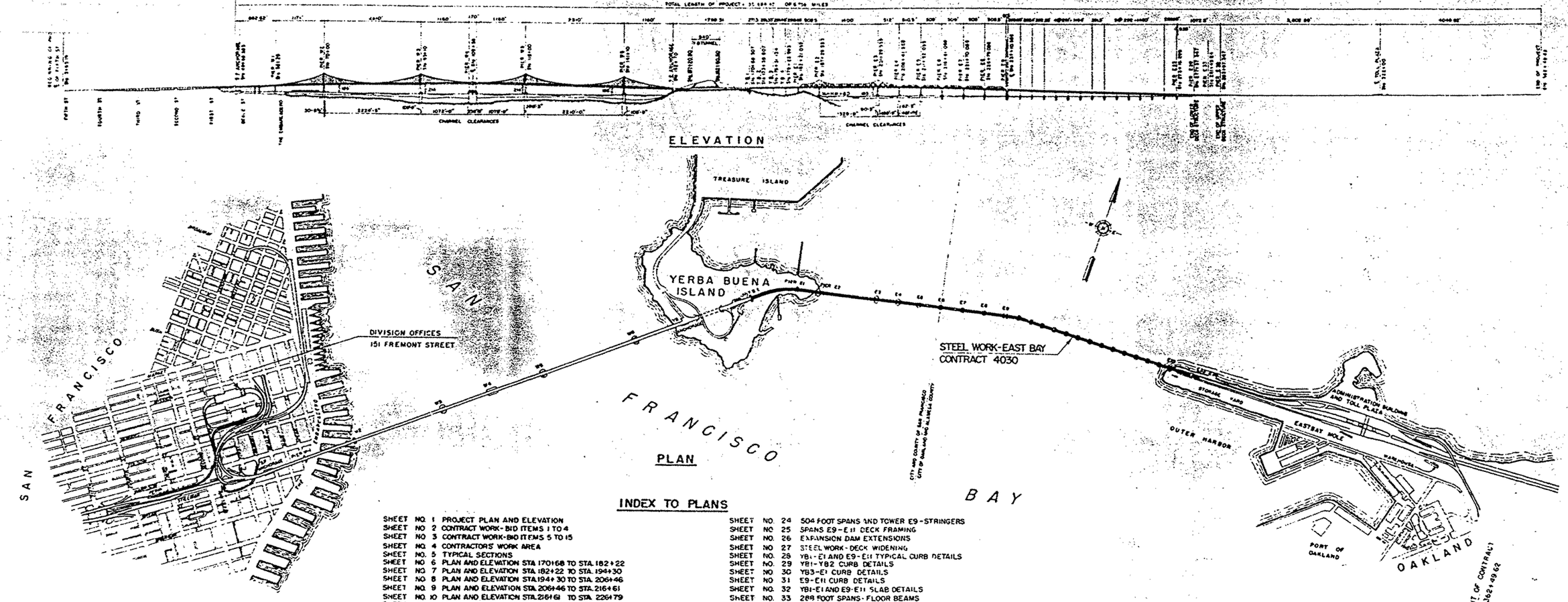
7. Plan and Elevation Sta. 182+22 to Sta. 194+30
8. Plan and Elevation Sta. 194+30 to Sta. 206+46
9. Plan and Elevation Sta. 206+46 to Sta. 216+61
10. Plan and Elevation Sta. 216+61 to Sta. 226+79
11. Plan and Elevation Sta. 226+79 to Sta. 238+18
12. Plan and Elevation Sta. 238+18 to Sta. 249+83
13. Plan and Elevation Sta. 249+83 to Sta. 261+49
14. Plan and Elevation Sta. 261+49 to Sta. 273+15
15. Plan and Elevation Sta. 273+15 to Sta. 281+50
16. Span YB1-YB2 Deck Framing
17. Span YB2-YB3 Deck Framing
18. Span YB3-YB4 Deck Framing and Details
19. Span YB4-E1 Deck Framing and Details
20. Cantilever Structure-Floor Beams
21. Cantilever Structure-Stringers
22. Cantilever Structure-Details
23. 504 Foot Spans-Floor Beams
24. 504 Foot Spans and Tower E9-Stringers
25. Spans E9-E11 Deck Framing
26. Expansion Dam Extensions
27. Steel Work-Deck Widening
28. YB1-E1 and E9-E11 Typical Curb Details
29. YB1-YB2 Curb Details
30. YB3-E1 Curb Details
31. E9-E11 Curb Details
32. YB1-E1 and E9-E11 Slab Details
33. 288 Foot Spans-Floor Beams
34. 288 Foot Spans Stringers and Joists
35. Girder Spans-Floor Beams
36. Type "A" Cover Plates

37. Type “B” Cover Plates
38. Shear Brackets
39. Stressing Devices
40. Electrical-Lighting Relocation
41. Traveler Scaffold Modifications
42. Traveler Rail Adjustment YB1-E1 and E9-E11
43. Traveler Rail Adjustment E1-E9 and E11-E25
44. Lane Signal System Removal
45. Drain Pipe Relocation

PROJECT ENGINEER - LICENSE 1478
DATE APPROVED, OCTOBER 8, 1963

DIRECTOR OF PUBLIC WORKS

APPROVAL RECOMMENDED BY
SUPERVISING BRIDGE ENGINEER
LICENSE 7187



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SHEET NO. 2 CONTRACT WORK-BID ITEMS 1 TO 4
SHEET NO. 3 CONTRACT WORK-BID ITEMS 5 TO 15
SHEET NO. 4 CONTRACTORS' WORK AREA
SHEET NO. 5 TYPICAL SECTIONS
SHEET NO. 6 PLAN AND ELEVATION STA 170+68 TO STA 182+22
SHEET NO. 7 PLAN AND ELEVATION STA 182+22 TO STA 194+30
SHEET NO. 8 PLAN AND ELEVATION STA 194+30 TO STA 206+46
SHEET NO. 9 PLAN AND ELEVATION STA 206+46 TO STA 216+61
SHEET NO. 10 PLAN AND ELEVATION STA 216+61 TO STA 226+79
SHEET NO. 11 PLAN AND ELEVATION STA 226+79 TO STA 238+18
SHEET NO. 12 PLAN AND ELEVATION STA 238+18 TO STA 249+83
SHEET NO. 13 PLAN AND ELEVATION STA 249+83 TO STA 261+49
SHEET NO. 14 PLAN AND ELEVATION STA 261+49 TO STA 273+15
SHEET NO. 15 PLAN AND ELEVATION STA 273+15 TO STA 281+50
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SHEET NO. 17 SPAN YB2-YB3 DECK FRAMING
SHEET NO. 18 SPAN YB3-YB4 DECK FRAMING AND DETAILS
SHEET NO. 19 SPAN YB4-E1 DECK FRAMING AND DETAILS
SHEET NO. 20 CANTILEVER STRUCTURE-FLOOR BEAMS
SHEET NO. 21 CANTILEVER STRUCTURE-STRINGERS
SHEET NO. 22 CANTILEVER STRUCTURE-DETAILS
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SHEET NO. 24 504 FOOT SPANS AND TOWER E9-STRINGERS
SHEET NO. 25 SPANS E9-E11 DECK FRAMING
SHEET NO. 26 EXPANSION DAM EXTENSIONS
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SHEET NO. 30 YB3-E1 CURB DETAILS
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SHEET NO. 32 YB1-E1 AND E9-E11 SLAB DETAILS
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SHEET NO. 34 286 FOOT SPANS-STRINGERS AND JOISTS
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SHEET NO. 42 TRAVELER RAIL ADJUSTMENT YB1-E1 AND E9-E11
SHEET NO. 43 TRAVELER RAIL ADJUSTMENT E1-E9 AND E11-E25
SHEET NO. 44 LANE SIGNAL SYSTEM REMOVAL
SHEET NO. 45 DRAIN PIPE RELOCATION

MARK	DATE	DESCRIPTION	BY	CH'K
1	6-1-65	As built without revisions	CB	EEF

REVISION

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

PROJECT PLAN AND ELEVATION

SCALE 1" = 1000' | BRIDGE 33-25 34-03 34-04 | SHEET NO. 1 | DRAWING C 4030-R

NO.	BID ITEM	QUAN.	UNIT	DESCRIPTION
1	removing concrete.	2442 ⚠1	cubic yards	Shall consist of all concrete removal, except th[illegible] the installation of shear brackets, as shown o[illegible] as specified. Reinforcing steel exposed by the removal of [illegible] carefully preserved during concrete remov[illegible] cut except as may be necessary to free [illegible] Exposed reinforcing steel shall be thoro[illegible] concrete and other foreign materials and ful[illegible] therefor shall be included in the unit price [illegible] Full compensation for making saw cuts for removal of [illegible] where required under this item and as shown on th[illegible] be included in the unit price paid for this item. The quantity of concrete removal shall be computed f[illegible] from plan dimensions except that, where such dimen[illegible] shown, field measurements taken before removal shall [illegible]
2	Class L concrete.	2655 ⚠1	cubic yards	Shall conform to the requirements of Section 25, Section [illegible] as modified hereinafter, Section 27 and Section 26, [illegible] consist of furnishing and placing all concrete as sh[illegible] the plans and as specified. The unit weight (loose weight) of the lightweight fine aggre-gate, when tested in a saturated, surface dry condition in accordance with Test Method No. Calif. 212, shall be not more than 70 pounds per cubic foot nor less than 55 pounds per cubic foot. The unit weight (loose weight) of the lightweight coarse aggre-gate, when tested in a saturated, surface dry condition in accordance with Test Method No. Calif. 212, shall be not more than 55 pounds per cubic foot nor less than 40 pounds per cubic foot. Lightweight coarse aggregate and lightweight fine aggregate shall conform to the following requirements as determined by Test Method No. Calif. 202 subject to adjustment of percentages for variations in specific gravity of each size of material.

Sieve Size	Percentage (by Weight) Passing Sieves: 5/8" x No. 4	Fine	Combined Aggregate
3/4"	100	---	100
5/8"	20-50	100	55-80
No. 4	0-10	90-100	40-60
No. 8	0-5	65-90	30-50
No. 16	---	45-70	20-35
No. 30	---	25-45	13-23
No. 50	---	10-25	5-15
No. 100	---	2-12	0-5
No. 200	0-2	0-4	0-2

NO.	BID ITEM	QUAN.	UNIT	DESCRIPTION
				Within the above limitations, the relative proportions of coarse and fine aggregates for lightweight concrete shall be adjusted as ordered by the Engineer to produce lightweight concrete of the weight and strength specified. Lightweight aggregate shall be stored in covered bins and main-tained in a saturated condition for at least 18 hours prior to being placed in a mixer. Each batch of ready-mixed concrete delivered at the job site shall be accompanied by a ticket showing volume of concrete, the weight of cement in pounds, the weight of mix water in pounds, and the total weight of all ingredients in pounds. The ticket shall also show the time of day at which the materials were batched and the reading of the revolution counter at the time the truck mixer was charging. Preformed expansion joint filler shall conform to the require-ments of AASHO Designation M153, Type I.
3	bar reinforcing steel.	170,972 ⚠1	pounds	Shall conform to the requirements of Section 28 for inter-mediate grade steel, except that plain bars for bar reinforcing steel trusses shall be structural grade steel with a maximum carbon content of 0.30 percent. Welding shall conform to the requirements of Section 67. Welds of bar reinforcing steel trusses shall be arc or resistance welds which shall resist without failure loads of 2,000 pounds in double shear.
4	structural carbon steel.	254,118 ⚠1	pounds	Shall conform to the requirements of Section 31 and 67 and shall consist of furnishing and installing all new structural and miscellaneous steel, except materials specifically provid[illegible] under Bid Items 5, 6, 7, 8, 9, 12, 14, and 15, complete in pl[illegible] as shown on the plans and as specified. Measurement shall b[illegible] by the pound, scale weight, including welds and galvanizin[illegible] All steel shapes, plates, and bars to be furnished [illegible] under this item shall conform to the requirements of [illegible] Designation: A7. Where existing concrete is to be removed and repla[illegible] dry-pack, as shown on the plans for the insta[illegible] brackets, such concrete removal, including [illegible] dry-pack work will not be measured for payment [illegible] sation therefor shall be included in the unit pri[illegible] this item. Expansion dam assemblies and expansion grating[illegible] dip galvanized after fabrication. Welded studs shall be full base threaded studs, [illegible] by Nelson Stud Welding Division, Gregory Indu[illegible] shall be furnished and installed as shown on th[illegible] specified, and shall be measured and paid for [illegible] item.

GENERAL NOTES - ALL WORK

[illegible] specifications refer to the [illegible] Sections as prepared [illegible]

[illegible] construction, and other in-[illegible] will be made available [illegible] to those interested.

[illegible] and elevations of existing struc-[illegible] from original construction [illegible] of typical conditions; [illegible] to be anticipated. Where [illegible], the Contractor shall verify [illegible] conditions and dimensions, [illegible] details of work to be sub-[illegible] Engineer.

[illegible] designated to be removed and relocated, [illegible] or stored shall be removed with all reason-[illegible] of all foreign material, ready [illegible] Materials to be stored shall be transported to and stored in the Division's Storage Yard on the East Bay Mole in locations to be designated and as directed by the Engineer. Any materials designated to be removed and re-used or stored which are unnecessarily damaged by the Contractor or by others while under his control, shall either be repaired to the Engineer's sat-isfaction or shall be replaced in kind at the Contractor's expense.

Materials designated to be stored shall be segregated according to size, type, shape or other category and shall be properly identified by tag, stencil mark, or other means approved by the Engineer. All bolts shall be stored with washers on and nuts run down.

5. The removal and disposal of materials not re-used or stored shall comply with the requirements of Section 10 and the following modifications.

Except as otherwise specifically provided, materials removed and not reinstalled shall become the property of the Contractor and shall be disposed of by him outside of the contract limits and full compensation therefor shall be included in the unit and lump sum prices paid for the various bid items requiring such work.

Removed concrete shall be broken into pieces not larger than three feet in greatest dimension, reinforcing steel projecting therefrom cut off flush, and the concrete shall be dumped and spread evenly in locations designated by the Engineer on the East Bay Mole.

NEW AND STATE-FURNISHED MATERIALS

6. Full compensation for furnishing and installing any new materials and doing all the work required to adapt new or State-furnished materials to locations shown on the plans shall be included in the prices paid for the various items of work. Wherever suitable State-furnished material is not available, the Contractor shall provide new materials as required in accordance with the speci-fications.

⚠1 CONCRETE AND GROUT See Contract Change Order No 8

7. All portland cement concrete shall be Class L, shall [illegible] requirements of Sections 26 and 27 and [illegible] compressive strength of 3,000 psi [illegible] weight of 105 pounds per cubic [illegible] of 28 days.

[illegible] dry-pack grout shall conform to the [illegible] requirements of Sections 26 and 27 and shall [illegible] by volume of Type II portland cement [illegible] sand with only enough water to [illegible] placement. All grout shall have a com-[illegible] of 3,000 psi at the end of 28 days and [illegible] and finish the adjacent concrete [illegible]

[illegible] grout and dry pack grout as shown [illegible] specified will not be measured, but [illegible] shall be included in the [illegible] various items of work and no addi-[illegible] will be made therefor.

[illegible] for bonding new concrete or grout to [illegible] between joints and deck, sur-[illegible] concrete shall be roughened by wet [illegible] to a minimum depth of 1/2-inch [illegible] flushed with a high pressure

CONCRETE AND GROUT (Cont'd)

air-water jet so that a clean surface of sound concrete is exposed. Preparation for bonding new dry-pack grout to the deck concrete shall consist of wire brushing and such other cleaning of the existing concrete surface as is required to provide a clean surface of sound concrete. The surfaces so exposed shall be kept continuously wet for not less than 24 hours before placing new concrete or grout and, at the time of placing, shall be clean and slightly damp. Holes drilled for grouting shall be treated in the same manner as provided for surfaces re-ceiving grout or new concrete except that cleaning shall be performed by high pressure air-water jet, and shall be free of all foreign and loose material at the time of grouting. Areas to receive epoxy resin adhesive shall be allowed to dry.

EPOXY ADHESIVE AND MORTAR

10. An epoxy-thiokol adhesive coating to bond new con-crete or grout to old concrete shall be applied to pre-pared surfaces of existing concrete as a brushed coating not less than 1/16-inch thick in areas where the finished surface is to be less than two inches above the surface of existing concrete, and shall be followed by placement of grout or concrete of 1-1/2 inch maximum slump at such times and in such a manner as to secure the most effec-tive bond between new concrete or grout and old concrete.

Mixing and application of all epoxy-thiokol adhesive coating shall be personally supervised by a qualified technical representative of the formulator. The pro-cedures and materials to be used and the qualifications of the technical representative shall be subject to the approval of the Engineer and no adhesive coating shall be placed until such approval has been granted.

Epoxy-thiokol adhesive coating shall be prepared as follows:

Description	Composition by Weight: Each	Combined Mix
Can A		
Shell Epon Resin 815, or equal	100%	60.7%
Can B		
Thiokol LP-3, or equal	80%	26.6%
DMP-30, or equal	20%	6.7%
	100%	100.0%

Into the combined mix of Cans A and B, add Murter White Silica, or equal, to produce the proper consistency for application as an adhesive coating. No epoxy-thiokol adhesive shall be applied when either the ambient or concrete temperature is lower than 60° F.

Epoxy-thiokol adhesive coating which sets up in the opinion of the formulator's representative or the Engi-neer before the concrete or grout is placed shall be removed by methods approved by the Engineer and fresh epoxy-thiokol adhesive coating shall be applied before the concrete or grout placed as shown on the plans and as specified: such work will not be measured but full compensation therefor shall be considered to be included in the unit price paid for removing concrete.

Should application of heat be required to complete the cure of the epoxy-thiokol adhesive coating, the heat shall be distributed evenly in such a manner that the temperature rise and fall of the concrete shall not ex-ceed 20° F. per hour. Full compensation for application of heat required to complete the cure of epoxy-thiokol adhesive shall be included in the unit price paid for concrete removal.

Full compensation for furnishing and applying the re-quired epoxy-thiokol adhesive coating shall be included in the price paid for concrete removal, and no additional allowance will be made therefor.

STEEL WORK

11. Where removing or removing and reinstalling existing structural steel is required to perform the work of this contract and such work is not specifically provided in the bid item descriptions, such removing or removing and reinstalling shall be performed by the Contractor as shown on the plans and as specified and will not be measured but full compensation therefor shall be con-sidered to be included in the unit or lump sum prices paid for the bid items for which such removing or remov-ing and reinstalling is required.

STEEL WORK (Cont'd)

12. Dimensions, weights and properties of rolled steel structural shapes shall match those set forth in the Steel Construction Manual of the American Institute of Steel Construction.

13. Welded steel members shall be fabricated to the dimensional tolerances set forth in the Standard Speci-fications for Welded Highway and Railway Bridges of the American Welding Society.

14. The Contractor shall provide a sufficient quantity of identified samples of A440, A441 and T-1 steel ordered under this contract to perform the tests required for qualification of welders, welding operators, and welding procedures. Such samples will not be measured but full compensation for furnishing and testing such samples shall be included in the unit prices paid for the struc-tural steel bid items and no additional compensation will be allowed therefor.

15. High strength bearing bolts with their nuts and hardened washers shall be furnished and installed in accordance with the requirements of Section 31 except that nuts shall be tightened by the calibrated wrench method. High strength bearing bolts shall be of the interference-body type as manufactured by Lamson and Sessions.

All high strength bearing bolts with their nuts and hardened washers will be measured and paid for under Bid Item 4.

16. Heads of bolts installed on longitudinal members shall face the center line of the lower deck, and on transverse members shall face the traffic flow of the completed bridge.

ELECTRICAL AND MECHANICAL WORK

17. Electrical and mechanical work shall conform to the requirements of Sections 60 and 62, and the following modifications.

Full compensation for galvanizing required for electrical and mechanical work shall be considered as included in the unit prices paid for the various items of work.

Cleaning and painting of electrical and mechanical work shall conform to the requirements of Sections 32, 33, 60, and 62, except that full compensation therefor shall be included in the lump sum price paid for cleaning and painting.

18. All ferrous fastenings and supports shall be hot-dip galvanized. The Contractor shall furnish and install all fastenings and supports required to provide pipe and conduit complete in place and in operable condition and full compensation therefor shall be included in the prices paid for the various items of work.

The interior of each conduit shall be clean before in-stallation of cable or wire, and full compensation for required cleaning shall be considered as included in the price paid per linear foot for the cable or wire to be installed.

19. The Contractor shall furnish and install an approved insulating material between dissimilar metals to prevent galvanic action.

20. Full compensation for all additional labor and materials not shown on the plans or called for herein and for furnishing and installing materials shown on the plans but not covered under specific bid items, but which are necessary to provide the electrical and mechanical work complete and in satisfactory operating condition shall be considered as included in the prices paid for the electrical and mechanical work or units thereof and no additional compensation will be allowed therefor. The use of State-furnished materials does not relieve the Contractor of his responsibility to provide the electrical and mechanical systems complete and in satis-factory operating condition.

21. All new materials and equipment in electrical and mechanical work furnished by the Contractor shall match existing materials in the project.

22. Existing electrical and mechanical systems and other utilities shall be maintained in operable condition equiv-alent in the opinion of the Engineer to that existing at the time construction is begun, and full compensation for such maintenance including the installation and removal of temporary facilities required to provide uninterrupted services shall be considered as included in the prices paid for the various contract items of work and no addi-tional payment will be allowed therefor.

USE OF STATE-OWNED TRAVELER SCAFFOLDS

23. Two State-owned traveler scaffolds, No's. BB4 and BB5 on the east bay spans and two State-owned traveler scaffolds, No's. BT1 and BT2, on the west bay spans are available for use by the Contractor at his option subject to the following requirements.

a. Not less than two State-owned traveler scaffolds shall be available at all times for use by bridge main-tenance forces on the east bay spans.

b. Prior to any use by the Contractor of State-owned scaffolds BB4 and BB5, the installation of air, electric, water, and control systems under Bid Item 9 shall be completed.

c. Whenever the Contractor in the progress of his work meets a scaffold used by the maintenance forces, he shall trade it for the last of his train, transfer materials and equipment from one to the other, and put both scaffolds into the condition suitable for the changed occupancy and use. The transfer shall be accomplished with the least possible interference with maintenance operations.

d. The State will furnish the Contractor extension beams, hangers, and accessories required in moving the scaffolds across expansion joints. This material shall be returned to the State in good condition immediately following each use.

e. The State-owned traveler scaffolds and the traveler rail system were designed to be used for main-tenance purposes. Their capacities for performing the work of this contract safely without adaptation are limited. Therefore, it shall be the Contractor's responsibility to determine the capacities of the State-owned traveler scaffolds No's. BB4, BB5, BT1, and BT2 and the existing and altered traveler rail system and to design and construct any additional alterations required thereon to insure their safety under any loads that may be imposed upon them, to construct any other structural, mechanical, electrical, or other alteration required in the performance of the contract work, and to repair and maintain the scaffolds in operable condition during the contract period. Upon completion of the work, the traveler scaffolds shall remain in place on the east bay spans at locations designated by the Engineer and the Contractor shall restore the traveler scaffolds and traveler rail system to a condition suitable for maintenance use as approved by the Engineer. Furnishing all materials and doing all work required to move and adapt the scaffolds and adapt the traveler rail system as required in this note and which are not provided under Bid Items 8 and 9 will not be measured but will be considered to be for the Contractor's convenience and full compensation therefor will be considered to be included in the unit and lump sum prices paid for the various items of work.

TRAVELER SCAFFOLD AND RAIL SYSTEM MODIFICATIONS

24. Detailed plans of modifications of State-owned traveler scaffolds and of the traveler rail system and construction details of all other scaffolds which will be used by the Contractor, together with proposed load-ings and procedures of use, shall be submitted to the Engineer for approval.

PROJECTS ENGINEER—LICENSE 1470

DATE APPROVED October 6, 1961

APPROVAL RECOMMENDED BY [signature] SUPERVISING BRIDGE ENGINEER, LICENSE 3378

DESIGN AND DETAILS REVIEWED BY [signature] 10-5-61

MARK	DATE	DESCRIPTION REVISION	BY	CH'K
⚠1	8/1/63	As built with revisions		EEF

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

CONTRACT WORK - BID ITEMS 1 TO 4

SCALE NONE | BRIDGE 33-25 34-03 34-04 | SHEET NO. 2 | DRAWING C-4030-2R

APPROVAL RECOMMENDED BY

PROJECTS ENGINEER—LICENSE

DATE APPROVED October 6 1961

NO.	BID ITEM	QUAN.	UNIT
5	high strength structural steel.	5,205,906 (△1)	pounds

DESCRIPTION (Item 5)

Shall conform to the applicable requirements of Section 31 and shall consist of furnishing and installing all steel designated on the plans to be A440 steel or A441 steel, complete in place as shown on the plans and as specified.

Steel designated on the plans as A441 steel shall be a high strength low alloy steel conforming to the requirements of ASTM Designation: A441.

Steel designated on the plans as A440 steel shall be a high strength structural steel conforming to the requirements of ASTM Designation: A440 as modified herein. For material 1/2-inch and under in thickness and all rolled sections with webs 1/2-inch and under in thickness, the maximum carbon content shall be 0.23 percent (ladle analysis) and the minimum yield strength shall be 45,000 psi; all other requirements of ASTM Designation: A440 shall apply. A440 steel plates over 1/2-inch in thickness shall conform to all requirements of ASTM Designation: A440.

Welding of high strength structural steel shall conform to the requirements of Section 67, Chapter I; Section 67, Chapter III articles (b), (h), (i); and the following modifications.

In lieu of the requirements of the indicated provisions of the Standard Specifications for Welded Highway and Railway Bridges of the American Welding Society the following shall apply.

Appendix D, paragraph D105(a).--Not less than one test weld shall be made for each procedure and position in each thickness of material to be welded in construction.

Appendix D, Table D-1.--

Actual Thickness to be Welded in Construction	Test Plate Thickness	Reduced-Section Tension (See Fig. D-6)	Free Bend (See Fig. D-7)	Root Bend (See Fig. D-8)	Face Bend (See Fig. D-8)	Side Bend (See Fig. D-9)
		Number and Type of Tests Required				
3/8-inch	3/8-inch	2	2	2	2	--
Over 3/8-inch	Actual Thickness	2	2	--	--	4

Appendix D, Fig. D-10.--Order of Removal of Test Specimens from Welded Test Plate (for Plate Over 3/8-inch Thick)

Appendix D, paragraph D109(a).--The tensile strength shall not be less than the following.

Thicknesses 3/4-inch and under
ultimate strength . . . 70,000 psi min.
Thicknesses over 3/4-inch to 1-1/2 inch inclusive
ultimate strength . . . 67,000 psi min.

In lieu of the number of sample joints (test welds) required for qualification of welding procedures set forth in Test Method No. Calif. 601-C, Part II, paragraph B.3.a., not less than one sample joint (test weld) shall be made for each procedure and position in each thickness of material to be welded in construction.

Physical property requirements for the mechanical properties of weld metal test set forth in Test Method No. Calif. 601-C, Part II, are as follows.

free bend specimens . . . 25% min. elongation
round tensile specimen . . . 70,000 psi min. tensile str.
. . . 25% min. elongation
. . . 50% min. reduction in area.
side bend specimens . . . pass

NO.	BID ITEM	QUAN.	UNIT
6	structural steel, T-1.	422,667 (△1)	pounds

DESCRIPTION (Item 6)

Shall conform to the applicable requirements of Section 31 and shall consist of furnishing and installing all steel designated on the plans to be T-1 steel including stressing and all other work required to provide the T-1 steel complete in place as shown on the plans and as specified.

T-1 steel shall be a heat-treated, constructional alloy steel of firebox quality as manufactured by the United States Steel Corporation, or equal, conforming to the following provisions.

T-1 steel shall conform in all respects to the requirements of Section 63, paragraph (b)(1). Testing of T-1 steel shall conform to the requirements of Section 63, paragraph (b)(4).

Welding of T-1 steel shall conform to the requirements of Section 67, Chapter I; Section 67, Chapter III, articles (c), (h), and (i); and the following modifications.

In the qualification of welders, welding operators, and welding procedures, the standard guided-bend test jig of the American Welding Society shall be modified to use a 1-1/4 inch radius mandrel instead of a 3/4-inch radius mandrel.

In lieu of the requirements of the indicated provisions of the Standard Specifications for Welded Highway and Railway Bridges of the American Welding Society the following shall apply.

Appendix D, paragraph D105.(a).--Not less than one test weld shall be made for each procedure and position in each thickness of material to be welded in construction.

Appendix D, Table D-1.--

Actual Thickness to be Welded in Construction	Test Plate Thickness	Reduced-Section Tension (See Fig. D-6)	Free Bend (See Fig. D-7)	Root Bend (See Fig. D-8)	Face Bend (See Fig. D-8)	Side Bend (See Fig. D-9)
		Number and Type of Tests Required				
3/8-inch	3/8-inch	2	2	2	2	--
Over 3/8-inch	Actual Thickness	2	2	--	--	4

Appendix D, Fig. D-10.--Order of Removal of Test Specimens from Welded Test Plate (for Plate Over 3/8-inch Thick)

Appendix D, paragraph D109(a).--Tensile strength shall not be less than 115,000 psi.

Appendix D, paragraph D109(b).--The elongation shall not be less than 18 percent.

In lieu of the number of sample joints (test welds) required for qualification of welding procedures set forth in Test Method No. Calif. 601-C, Part II, paragraph B.3.a., not less than one sample joint (test weld) shall be made for each procedure and position in each thickness of material to be welded in construction.

Physical property requirements for the mechanical properties of weld metal test set forth in Test Method No. Calif. 601-C, Part II, are as follows.

free bend specimens . . . 18% min. elongation
round tensile specimen . . . 115,000 psi min. tensile str.
. . . 18% min. elongation
. . . 50% min. reduction in area.
side bend specimens . . . pass

The State will furnish two stressing devices as shown on the plans for the Contractor's use during stressing operations. The stressing devices are available at the Division's office, 151 Fremont Street, San Francisco.

The Contractor will be required to furnish grip seats and rods and such other items as may be required for his operations. All Contractor-furnished items will be considered as being furnished for the Contractor's convenience, shall be approved by the Engineer and shall remain the property of the Contractor.

The State-furnished stressing devices shall be adapted as required during the course of the work, maintained in working condition at all times and stored on completion of the work.

The Contractor shall conduct tests, to be witnessed by the Engineer, to demonstrate that the jacks are capable of rated operation and that the State-furnished stressing devices are each capable of developing a tension of 400,000 pounds in actual use. Gages shall be re-calibrated and calibration curves shall be delivered to the Engineer before the devices are used.

The T-1 steel cover plates shall be stressed within a tolerance of plus five percent to minus zero percent of the initial prestress force specified on the plans.

T-1 steel cover plates that cannot be drawn tight to the existing flange by tightening the high strength bearing bolts (due to the presence of burrs, trapped drilling refuse or other obstruction) shall be separated from the flange and the interfaces cleaned of all obstructing material. After cleaning of the interfaces, the plates shall be retensioned and rebolted.

Red lead paste shall consist of red lead and linseed oil conforming to the requirements of Section 32 thoroughly ground together to form a paste of such consistency that it can be molded without crumbling but will not flow. Where application of red lead paste is indicated on the plans or required by the Engineer, voids shall be completely filled with red lead paste and such red lead paste will not be measured but full compensation for furnishing and placing all materials and doing all work required therefor shall be included in the unit price paid for T-1 steel under this bid item.

NO.	BID ITEM	QUAN.	UNIT	DESCRIPTION
7	steel curb alterations.	5,283.78 (△1)	linear feet	Shall conform to the requirements of Section 31 and shall consist of removing, altering, and reinstalling steel curb, including making all connections, plugging holes and furnishing and installing all plates, shapes, anchor bolts and other fastenings, and all other new materials required and doing all work required to provide the reinstalled steel curb complete in place as shown on the plans and as specified. Steel curb materials not reinstalled shall be removed and stored. New structural steel shall conform to the requirements of ASTM Designation: A7. New raised pattern floor plates, if required, shall be United States Steel Pattern M-1 or Central Knobby as required to match existing. Measurement shall be by the linear foot along the face of the curb after reinstallation.
8	Remodeling and adjusting traveler rails.		LUMP SUM	Shall conform to the requirements of Section 31 and shall consist of: removing, altering, and reinstalling traveler rail connections and hangers; furnishing and installing bent plates, shims, clamps, clip angles, rods, and all other new materials required; making all adjustments of the traveler rail system required to perform the work; and, upon completion of the work, providing the rails aligned and set to the specified grade with hanger rods adjusted to share the loads, all as shown on the plans and as specified.
9	altering traveler scaffolds.	2	each	Shall consist of altering the State-owned traveler scaffolds as required to furnish and install the air, electrical, water and control systems and all other new materials required to provide the scaffolds complete and in operating condition as shown on the plans and as specified. All miscellaneous materials, parts, and equipment shall match corresponding materials, parts, and equipment on the West Bay upper deck scaffolds.
10	Cleaning and painting.		LUMP SUM	

DESCRIPTION (Item 10)

Shall conform to the requirements of Sections 32 and 33 and shall consist of: all cleaning required to prepare surfaces for paint; to prepare surfaces for embedment in concrete or grout; and to prepare contact surfaces between existing members, T-1 steel cover plates, and of fill plates incidental to the T-1 steel cover plates; and all painting required in the work of this contract; all as shown on the plans and as specified.

STEEL CLEANING AND PAINTING SCHEDULE

Description of Surface	Cleaning and Painting Systems Required
existing, reinstalled, or ungalvanized new, metal surfaces to be embedded in concrete or grout	I-a
contact surfaces not designated to receive red lead paste between T-1 steel cover plates, existing members, and of fill plates incidental to the T-1 steel cover plates	I-a
existing painted steel surfaces designated to receive red lead paste	II-a
T-1 steel contact surfaces designated to receive red lead paste	I-b
new galvanized surfaces to be embedded in concrete	II-a
new galvanized surfaces not to be embedded in concrete	II-c
existing steel paint surfaces damaged by construction operations	I-c
existing painted or bare surfaces exposed by removal of materials	I-c
interior surfaces of luminaire poles to be reinstalled	I-c
exposed surfaces of all new and reinstalled steel not covered in the above descriptions	I-d

Cleaning systems designated in the steel cleaning and painting schedule are: I, sandblast cleaning; II, steam cleaning.

Painting systems designated in the steel cleaning and painting schedule are as follows.

a. No paint, except that steel to be embedded in concrete or grout and which will be exposed more than 48 hours between sandblast cleaning and placement of concrete or grout shall be protected by one coat of G-52. In no case shall such time of exposure exceed 14 days.

b. One coat G-52, and not less than two coats G-53.

c. One coat G-52, not less than two coats G-53, and one coat G-80.

d. Before erection; one coat G-52, one coat G-53, additional coats G-53 as required to provide a maximum elapsed time between coats of G-53 of six weeks and: after erection; one spot coat G-53, one full coat G-53, and one coat G-80.

Paints designated under painting systems, above, are as follows.

G-52 is pretreatment vinyl wash primer, State Specification 52-G-52.

G-53 is paint, primer, red lead, semi-quick drying, State Specification 58-G-53.

G-80 is aluminum paint finish coat, State Specification 54-G-80.

Pipe interiors and cast iron need not be sandblast cleaned or painted except that conduit shall conform to the requirements of Section 60.

Where sandblast cleaning of contact surfaces between existing members, T-1 steel cover plates, and of fill plates incidental to the cover plates is required, such sandblast cleaning shall be performed not more than 48 hours before fit-up.

Paint, if sprayed on, shall be brushed out around rivet and bolt heads and exposed edges to avoid bridging over crevices and re-entrant corners and to ensure even paint coats of the specified thickness.

Lower deck luminaires to be relocated and their ballasts shall not be painted except as required to touch up damaged paint.

NO.	BID ITEM	QUAN.	UNIT	DESCRIPTION
11	removing steel deck drains.	20,440 (△1)	pounds	Shall consist of removing six and eight inch diameter steel drain pipe, together with drain outlets, flanges, fittings, and all materials incidental thereto as shown on the plans and as specified. All metallic materials removed and not reinstalled under Bid Item 12 shall be stored. Measurement shall be by the pound, scale weight, of metallic materials removed except that computed weights may be used where expressly permitted by the Engineer.
12	installing steel deck drains.	10,193 (△1)	pounds	Shall consist of modifying and reinstalling State-furnished six and eight inch diameter steel drain pipe, drain outlets, flanges, fittings, and materials incidental thereto, together with furnishing and installing new asbestos gaskets and any new pipe, fittings, flanges, or other new materials required to provide the steel deck drains complete in place as shown on the plans and as specified. All pipe gaskets shall be new asbestos Johns Mansville No. 60, or equal. All other new materials shall conform to the requirements of Section 31. Measurement shall be by the pound, scale weight, of metallic materials installed, including new and State-furnished, as shown on the plans and as specified except that computed weights may be used where expressly permitted by the Engineer.
13	removing and storing electrical materials.	14,640 (△1)	pounds	Shall consist of removing and storing conduit, wires, cables, traffic signal heads, and junction boxes with their supports and fastenings, and all other electrical materials required to be removed and stored as shown on the plans and as specified. Measurement shall be by the pound scale weight.
14	removing, altering, and relocating upper deck pole-mounted luminaires.	24	each	Shall consist of: removing, altering, and reinstalling steel pipe handrailing; removing the existing pole-mounted luminaires together with their poles, lamps, and all other appurtenant materials; performing the required alterations; and reinstalling the luminaires, including furnishing and installing electrical and structural connections, new secondary wiring, and all other materials required to provide the reinstalled luminaires complete in place and in operating condition as shown on the plans and as specified. Removing, altering, and reinstalling steel pipe handrailing incidental to reinstalling the luminaires shall consist of removing existing handrailing, performing the required alterations and reinstalling the handrailing complete in place as shown on the plans and as specified including furnishing and installing all new materials required therefor with the following exception. The Contractor may, at his option, use State-furnished tees, flanges, and ball ornaments which are available on the East Bay Mole, subject to approval by the Engineer.
15	removing and remounting lower deck luminaires.	47	each	Shall consist of removing and temporarily relocating the lower deck sodium vapor luminaires as required to permit modifications of lower flanges of floor beams and subsequently remounting the luminaires on the modified floor beams, including furnishing and installing new secondary wiring, conduit, fastenings, fillers, and all other materials required to provide the remounted luminaires complete in place and in operating condition upon completion of the work as shown on the plans and as specified.

MARK	DATE	DESCRIPTION REVISION	BY	CHK
△1	11/63	As built with revisions	L.L.S.	E.E.F.

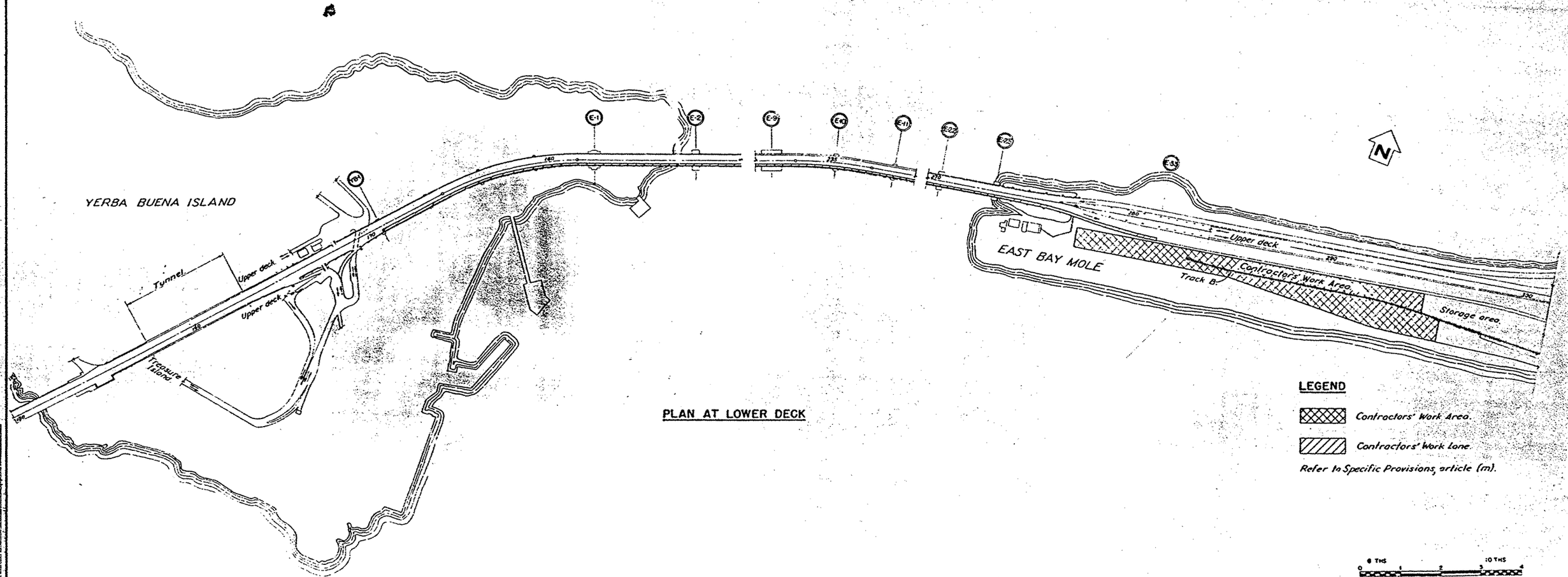
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

CONTRACT WORK-BID ITEMS 5 TO 15

SCALE NONE | BRIDGE 33-25, 34-03, 34-04 | SHEET NO 3 | DRAWING [illegible]

PROJECT ENGINEER - LICENSE 5479
DATE APPROVED October 18, 1961



PLAN AT LOWER DECK

LEGEND

Contractors' Work Area.

Contractors' Work Lane.

Refer to Specific Provisions, article (m).

0 THS 10 THS
0 1 2 3 4
SCALE IN INCHES

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

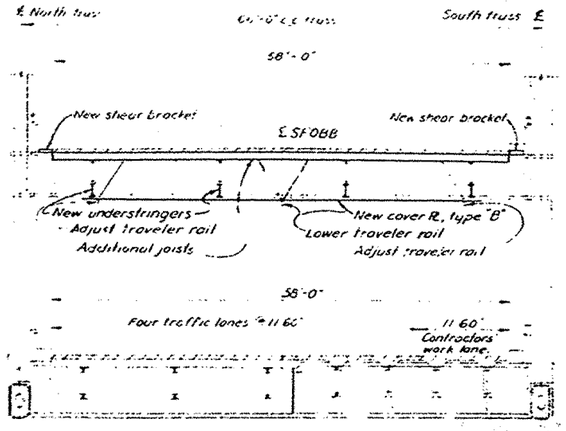
CONTRACTORS' WORK AREA

MARK	DATE	DESCRIPTION REVISION	BY	CHK
1	11.1.63	As built without revisions	OB	EEF

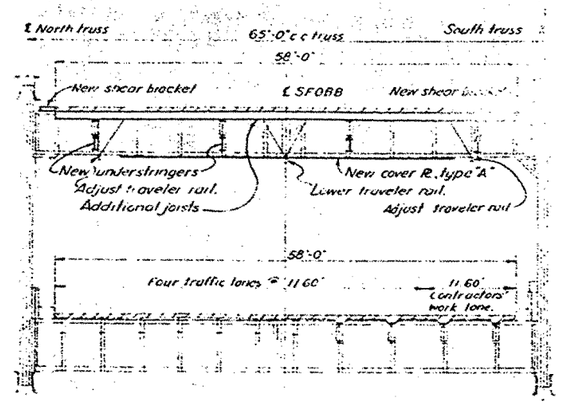
SCALE 1" = 200' | BRIDGE 33-25 34-05 34-04 | SHEET NO 4 | DRAWING C 4030-48

APPROVAL RECOMMENDED BY ... LICENSE 5147

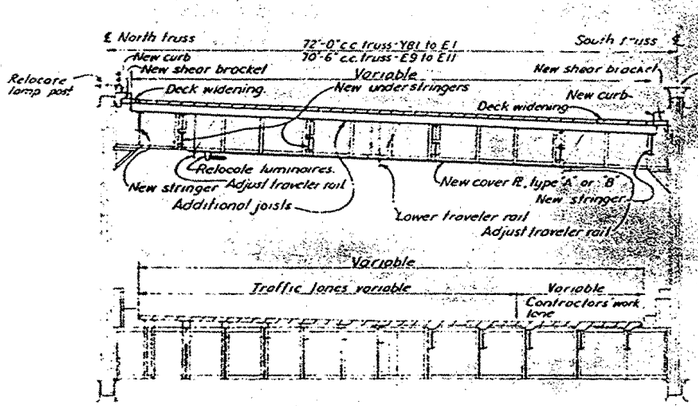
DESIGN			
CHECKED			
QUANTITIES			
TRACED			
TRACING CHECKED BY			



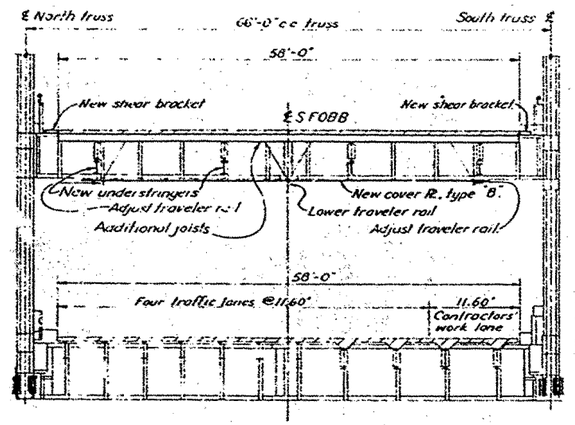
CANTILEVER STRUCTURE - PIER E1 TO E4



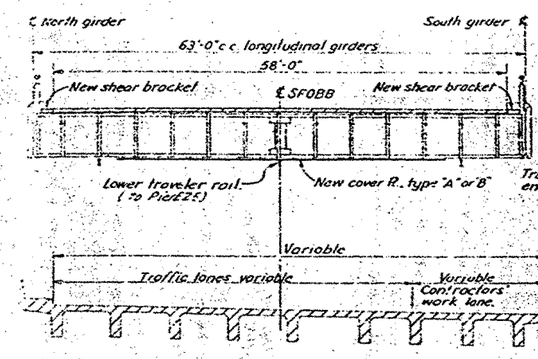
288 FT. SPANS - PIER E11 TO E23



288 FT. SPANS - PIER YB1 TO E 1 AND PIER E9 TO E11



504 FT. SPANS - PIER E4 TO E9



GIRDER SPANS — PIER E23 TO E33

DESIGN NOTES

(1) Standard Specifications for Highway Bridges of the American Association of State Highway Officials (AASHO) modified and specified as follows:

(2) Slab - 64

[illegible] weight concrete, reinforced, 120 lbs/cu.ft.

[illegible] concrete, light weight, f'c = 3000 p.s.i., fc = 1200 p.s.i., n=18

[illegible] steel, structural grade, fs = 18000 p.s.i.

[illegible] structural steel

A 440 modified, fs = 24000 p.s.i., fy = 45000 p.s.i., fu = 70000 p.s.i. min.

A 441, ¾" and less fs = 27000 p.s.i., fy = 50000 p.s.i., fu = 70000 p.s.i.; over ¾" fs = 24000 psi, fy = 46000 psi, fu = 70000 psi

F1 fs = 45000 p.s.i., fy = 100000 p.s.i., fu = 115000 p.s.i.

[illegible] bearing bolts. Specifications for Structural Joints using ASTM A325 Bolts, approved by the Research Council on [illegible] Bolted Structural Joints of the Engineering Foundation, March 1960

(3) [illegible] loading capacity of the stringers will be increased by bolting understringers to the bottom flange of the stringers.

(4) The loading capacity of the floor beams will be increased:

(a) by bolting prestressed high strength steel cover plates to the bottom flange:

(1) The addition of metal will reduce the tensile stresses of the existing material under live load.

(2) By prestressing the new cover plate an initial compressive force will be exerted on the bottom flange resulting in a reduction of the dead load tensile stresses. A greater portion of the working stresses of the existing material will thus be available for the live load

(3) By bolting shear brackets to both ends of the top (compression) flange, bearing laterally against the concrete deck, a partial composite action of steel and concrete will be obtained, thus, reducing the live load stresses in the top flange.

(5) The loading capacity of the joists will be increased by addition of new joists.

APPROVAL RECOMMENDED BY

DESIGN ENGINEER
DESIGN ENGINEER
CHECKED
DETAILS AND DETAILS REVIEWED BY

PROJECT ENGINEER
DATE APPROVED

11.63	As built without revisions	CB	EEF	
DATE	DESCRIPTION REVISION	BY	CH'K	

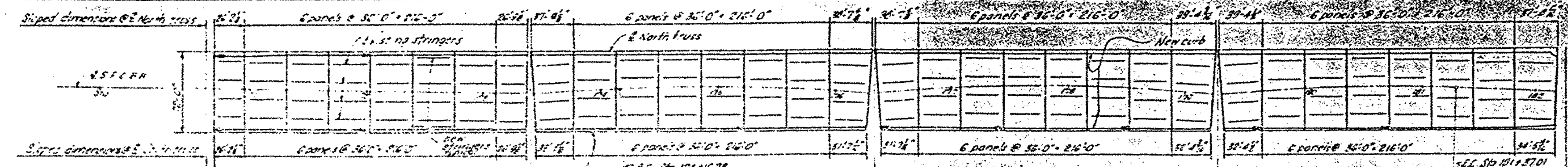
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

TYPICAL SECTIONS

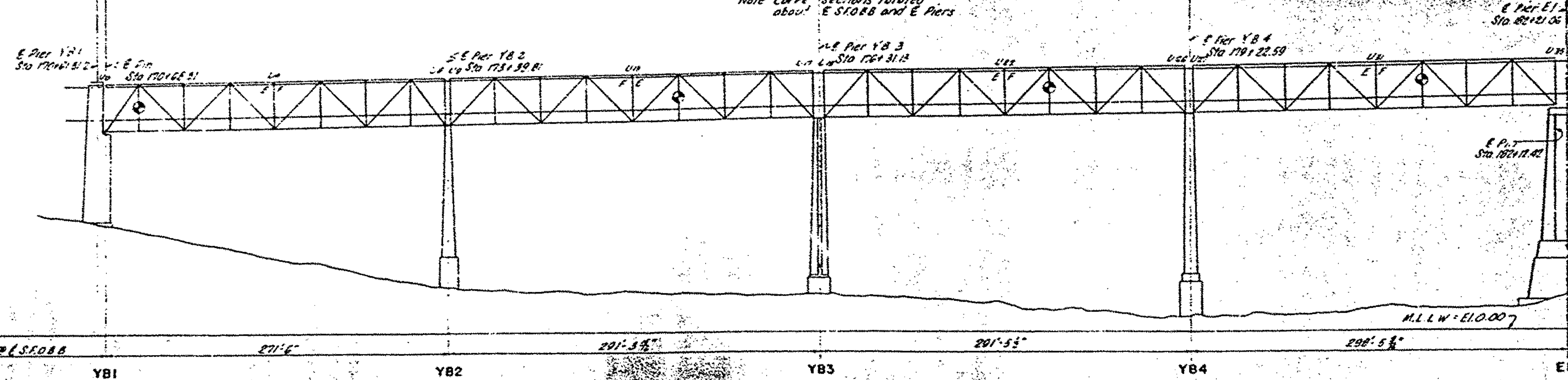
SCALE 1/8" = 1'-0" | BRIDGE 33-25, 34-03, 34-04 | SHEET No 5 | DRAWING C-4030-5R

8 THS 10 THS
0 1 2 3 4
SCALE IN INCHES

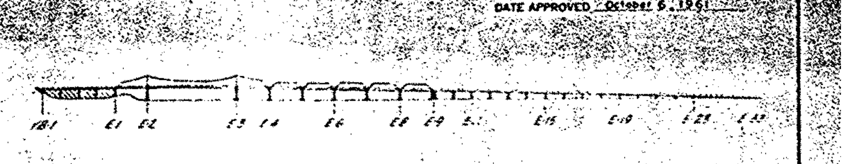


UPPER DECK PLAN

Note: Cross sections rotated about ℄ S.F.O.B.B. and ℄ Piers

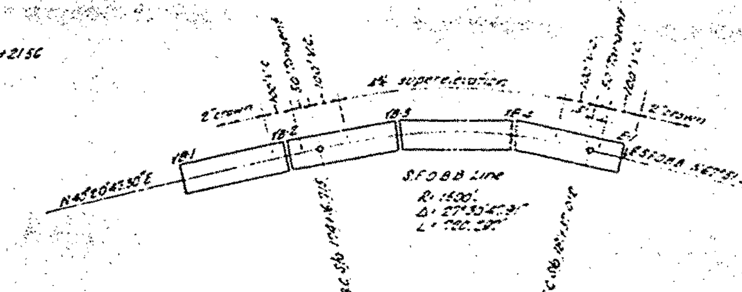


ELEVATION



LOCATION DIAGRAM

No Scale



SPAN LAYOUT

PIERS YB-1 THRU E-1

Scale: 1" = 200'

TABULATION OF QUANTITIES ⚠ *

No.	UPPER DECK PANEL POINT / BID ITEM	UNIT	U0	U1	U2	U3	U4	U5	U6	U7	U8 U9	U10	U11	U12	U13	U14	U15	U16	U17 U18	U19	U20	U21	U22	U23	U24	U25	U26 U27	U28	U29	U30	U31	U32	U33	U34	U35	TOTAL THIS SHEET	ACCUMULATED TOTAL	
1	Removing concrete	C.Y.	0.20	0.60	0.59	0.60	0.61	0.59	0.58	0.46	0.62	0.59	0.59	0.58	0.59	0.58	0.58	0.59	0.62	0.59	0.59	0.58	0.59	0.58	0.58	0.59	0.62	0.59	0.59	0.58	0.59	0.58	0.58	0.59	—	18.59	18.59	*
2	Class L concrete	C.Y.	4.07	6.37	6.04	6.06	6.07	6.04	6.05	4.88	6.60	6.02	6.03	6.07	6.09	6.07	6.00	6.46	6.66	6.00	6.04	6.07	6.08	6.05	5.99	6.71	6.72	6.01	6.04	6.07	6.05	6.05	6.04	6.39	—	191.52	191.52	*
3	Bar reinforcing steel	Lbs.	2,176	2,610	2,523	2,576	2,732	2,732	2,732	2,373	2,817	2,790	2,797	2,796	2,812	2,807	2,799	2,844	2,865	2,817	2,829	2,879	2,805	2,801	2,793	2,852	2,867	2,795	2,806	2,805	2,710	2,705	2,702	2,582	—	83,427	83,427	*
4	Structural carbon steel	Lbs.	7,400	10,035	9,868	10,979	9,868	10,036	10,036	11,060	12,887	9,865	9,698	10,654	9,953	9,402	9,699	13,187	13,017	10,036	10,379	10,879	9,868	10,040	10,209	13,443	13,102	9,868	9,868	10,654	10,377	10,208	10,208	10,377	—	336,021	336,021	*
5	High strength structural steel	Lbs.	15,470	20,426	20,815	20,815	20,815	20,815	20,815	16,800	20,815	20,815	20,815	20,815	20,815	20,815	20,815	19,986	20,065	20,815	20,815	20,815	20,815	20,815	20,815	20,085	20,085	20,815	20,815	20,815	20,815	20,815	20,815	21,585	—	653,272	653,272	*
6	Structural steel T-1	Lbs.	4,767	4,957	4,746	4,746	4,759	4,746	4,760	4,734	3,473	4,746	4,747	4,749	4,735	4,739	4,729	4,741	3,465	4,741	4,736	4,746	4,739	4,759	4,731	4,735	3,468	4,741	4,778	4,744	4,738	4,741	4,782	4,742	4,738	65,702	65,702	*
7	Steel curb alterations	L.F.	28.89	72.05	72.01	72.03	72.00	72.03	72.41	52.68	75.17	72.02	71.99	72.00	72.01	72.85	71.98	72.43	77.50	72.01	72.02	72.02	71.99	72.09	72.01	75.77	75.76	72.04	72.00	72.00	72.01	71.99	72.02	76.42	—	2,269.77	2,269.77	*
8	Adjusting traveler rails	L.S.																																				
9	Altering traveler scaffolds (new)	Ea.	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	—			
10	Cleaning and painting	L.S.																																				
11	Removing steel deck drains	Lbs.	2,435	0	0	2,814	0	0	755	0	0	820	0	0	651	0	0	20	653	0	897	0	0	775	0	0	775	0	0	857	0	0	0	0	—	11,652	11,652	*
12	Installing steel deck drains	Lbs.	789	0	0	789	0	0	315	0	0	668	0	0	659	0	0	432	652	0	660	0	0	658	0	0	658	0	0	659	0	0	0	0	—	7,329	7,329	*
13	Removing and storing electrical meters	Lbs.	707	0	0	0	0	0	0	0	0	0	0	0	707	0	0	0	0	0	0	0	707	0	0	0	0	0	0	0	707	0	0	0	—	2,828	2,828	*
14	Relocating upper deck luminaires	Ea.	0	2	0	0	0	2	0	0	0	2	0	0	2	2	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0	2	0	0	—	16	16	
15	Remounting lower deck luminaires	Ea.	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	—	8	8	

FLOOR STRENGTHENING REQUIREMENTS ⚠ *

Outside stringers	1 Existing stringer - North (silicon steel)	24 W74	27CB98	do	do	do	do	do	24CF74	27CB98	do	do	do	do	do	do	27CB100	do	27CB98	do	do	do	do	do	27CB100	do	27CB98	do	do	do	do	do	27CB100	
	1 Existing stringer - South (silicon steel)	24 W74	27CB98	do	do	do	do	do	24CF74	27CB98	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	
	1 New understringer - North (A440 steel)	16W58	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	
	Number of 7/8" connecting bolts	42*	50	50	50	50	50	50	42*	50	50	50	50	50	50	50	[illegible]	52	50	50	50	50	50	50	54*	[illegible]	50	50	50	50	50	50	52	
	1 New understringer - South (A440 steel)	16W58	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	
	Number of 7/8" connecting bolts	42*	50	50	50	50	50	50	42*	48	50	50	50	50	50	50	48*	48*	50	50	50	50	50	50	[illegible]	48	50	50	50	50	50	50	60	
	1 New stringer - North	—	30W116	do	do	do	do	do	do	do	do	do	do	do	do	do	30W124	do	30W108	do	do	do	do	do	30W124	do	30W108	do	do	do	do	do	do	
	1 New stringer - South	30W108	do	do	do	do	do	do	do	do	do	do	do	30W116	do	30W108	do	do	do	do	do	30W116	do	30W104	do	do	do	do	do	30W116	do	30W100	do	do
Inside stringers	2 Existing stringers (silicon steel)	24 W74	27CB98	do	do	do	do	do	24CF74	27CB98	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	
	2 New understringers (A440 steel)	16W58	21W68	do	do	do	do	do	16W58	21W68	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	
	Number of 7/8" connecting bolts	42	58	58	58	58	58	58	48	58	58	58	58	58	58	58	50.56*	58.56*	58	58	58	58	58	58	60.58*	60.58*	58	58	58	58	58	56	60.58*	
Joists	Sectional joists (A440 steel)	10W29	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	
	Number of joists	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	Linear feet of joists	321.65*	396	396	396	396	396	*396.5	*330.0	396.5*	396.5	396.5	396.5	396.5	346.5	396.5	396.5	377.5*	379.5	396.5	396.5	396.5	396.5	396.5	396.5	*79.5	380*	396.5	396.5	396.5	396.5	*065	396.5	396.5
	Number of splices	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*
	Extensions of existing joists (carbon steel)	—	—	—	[illegible]	—	—	—	—	—	—	—	—	[illegible]	—	—	—	—	—	—	—	[illegible]	—	—	—	—	—	—	—	[illegible]	—	—	—	
	Linear feet of joist extensions	—	—	—	2.74*	—	—	—	—	—	—	—	—	7.87*	—	—	—	—	—	—	—	7.67*	—	—	—	—	—	—	—	7.67*	—	—	—	
	Number of splices	—	—	—	2	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—	

Floor beams	U0	U1	U2	U3	U4	U5	U6	U7	U8 U9	U10	U11	U12	U13	U14	U15	U16	U17 U18	U19	U20	U21	U22	U23	U24	U25	U26 U27	U28	U29	U30	U31	U32	U33	U34	U35
Existing web (silicon steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Existing flange angles (silicon steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Existing cover plates (silicon steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Length	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	44'-2"	44'-0"	do	do	do	do	do	44'-2"	do	44'-0"	do	do
New cover plate (T-1 steel) Type	A	C	C	A	C	B	B	B	B	B	B	B	B	F	F	B	B	C	B	C	C	B	B	B	B	B	B	A	B	B	B	B	B
Size (30"×...)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Length	[illegible]	54'-11"*	52'-9"	54'-6"	54'-0⅜"	54'-9"	54'-6⅝"	54'-6"	[illegible]	54'-4"	54'-7½"	54'-10"	54'-5"	54'-6"	54'-2"	54'-7½"	[illegible]	54'-7"	54'-4"	53'-9"	54'-6"	54'-6"	54'-5½"	54'-6"	[illegible]	54'-7"	55'-8½"	54'-8"	54'-6"	54'-7"	54'-2⅝"	54'-7½"	54'-6½"
Initial prestress - kips	142	272	272	272	288	272	272	272	142	272	272	272	288	272	272	272	142	272	272	272	288	272	272	272	142	272	272	272	288	272	272	272	142
Number of end connecting bolts																																	
Fixed end	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
Stressing end	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
*Pairs of new strap brackets	2	2	2	2	2	2	2	2	4	2	2	2	2	2	2	2	4	2	2	2	2	2	2	2	4	2	2	2	2	2	2	2	2

LEGEND

⊗ Existing lane signal control lights.

→ Relocated deck drains (except existing at ℄ North)

⚠ * Indicates location where quantities, dimensions or denominations are changed due to revision.

NOTES

1. Exact location of work will be determined in the field.
2. For type "B" cover plate size see Sheet No. 57.
3. For Deck Framing Plans see Sheets No. 16, 17, 18, 19.

DATE APPROVED October 5, 1961

MARK	DATE	DESCRIPTION	BY	CHK
⚠	1-63	As built with revisions		EEF
		REVISION		

SCALE IN INCHES

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

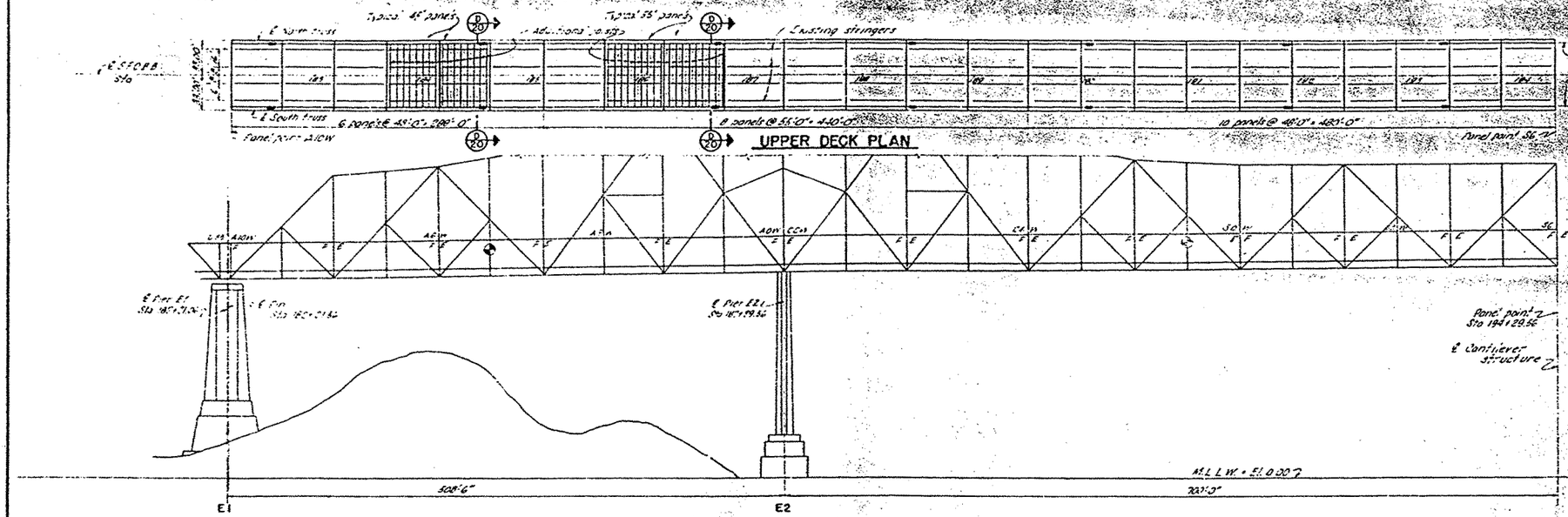
SAN FRANCISCO-OAKLAND BAY BRIDGE RECONSTRUCTION STEEL WORK - EAST BAY

PLAN AND ELEVATION STA. 170+68 TO STA. 182+22

UNLESS NOTED SCALE 1" = 50' | BRIDGE 33-25, 34-03, 34-04 | SHEET No 6 | DRAWING C 4030-69

APPROVAL RECOMMENDED BY ... SUPERVISING BRIDGE ENGINEER

DESIGN AND DETAILS REVIEWED BY / TRACED / QUANTITIES / DETAILS



LOCATION DIAGRAM

No Scale

LEGEND

- Existing lane signal control lights
- Existing deck drains
- △* Indicates location where quantities, dimensions or numbers are changed due to revision

NOTES

1. Exact location of work will be determined in the field
2. For sizes of type B cover plates see Sheet No. 37
3. For work on cantilever structure see Sheets No. 8 & 2

TABULATION OF QUANTITIES △*

UPPER DECK PANEL POINT		A10W	A8W	A6W	A5W	A6W	A5W	A4W	A3W	A2W	A1W	A0W	C0W	C1W	C2W	C3W	C4W	C5W	C6W	C7W	S5W	S1W	S5EW	S5EW	S4W	S5EW	SC	TOTAL THIS SHEET	ESTIMATED TOTAL	
NO.	BID ITEM	UNIT																												
1.	Removing concrete	CY	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	18.39	*
2.	Class L concrete	CY	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	191.52	*
3.	Bar reinforcing steel	LBS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	80,417	*
4.	Structural carbon steel	LBS	6,545	6,540	6,535	6,540	6,535	6,540	4,705	4,705	4,705	4,705	4,021	4,705	4,718	4,705	4,017	4,540	4,535	4,540	4,535	4,540	4,535	4,540	4,535	4,540	4,535	4,540	57,534	573,655	*
5.	High strength structural steel	LBS	27,330	27,330	27,330	27,330	27,330	27,330	30,250	30,250	30,250	30,250	30,250	30,250	30,250	30,250	30,250	27,330	27,330	27,330	27,330	27,330	27,330	27,330	27,330	27,330	27,330	27,330	614,756	1,228,040	*
6.	Structural steel castings	LBS	4,612	4,690	4,700	4,690	4,700	4,690	4,700	4,690	4,700	4,690	4,724	4,690	4,724	4,690	4,700	4,690	4,700	4,690	4,700	4,690	4,700	4,690	4,700	4,690	4,700	4,690	56,944	101,642	*
7.	Steel curb alterations	LS	0	0	C	0	C	0	0	0	0	C	0	0	0	0	0	0	0	0	0	C	0	0	0	0	0	C	C	2,269.71	*
8.	Adjusting traveller rails	LS																												
9.	Altering traveller scaffolds (note)	Ea	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)			
10.	Cleaning and painting	LS																												
11.	Remove steel deck panels	LBS	5,045	0	0	0	5,045	0	0	0	5,045	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,045	17,447	
12.	Install new steel deck panels	LBS	57	0	0	0	57	0	0	0	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	2,440	
13.	Removing existing electrical work	LBS	0	0	0	0	706	0	0	0	0	0	0	0	0	0	0	0	706	0	0	0	0	0	0	0	0	1,412	4,240	
14.	Relocating upper deck luminaires	Ea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	
15.	Removing lower deck luminaires	Ea	1	0	0	1	0	0	1	0	1	0	1	0	1	0	1	0	0	1	0	0	1	0	0	1	0	10	18	

FLOOR STRENGTHENING REQUIREMENTS △*

Floor Stringers	Existing stringers (silicon steel)	33CB125	do	do	do	do	do	36CB150	do	do	do	do	do	do	do	do	do	33CB125	do	do	do	do	do	do	do	do	do	do
	New understringers (A441 steel) thk	20×½	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Top flange	8×½	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Bottom flange	11×⅝	do	do	do	do	do	do	12×¾	do	do	do	do	do	do	do	do	11×⅝	do	do	do	do	do	do	do	do	do
	Number of ⅞ connecting bolts	66	66	66	66	66	66	72	72	72	72	72	72	72	72	72	72	66	66	66	66	66	66	66	66	66	66
Floor Beams	Existing stringers (silicon steel)	33CB125	do	do	do	do	do	36CB150	do	do	do	do	do	do	do	do	do	33CB125	do	do	do	do	do	do	do	do	do
	New understringers (A441 steel) thk	20×½	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Top flange	8×½	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Bottom flange	11×⅝	do	do	do	do	do	12×¾	do	do	do	do	do	do	do	do	do	11×⅝	do	do	do	do	do	do	do	do	do
	Number of ⅞ connecting bolts	72	72	72	72	72	72	76	76	76	76	76	76	76	76	76	76	72	72	72	72	72	72	72	72	72	72
	Pre camber	½	do	do	do	do	do	¾	do	do	do	do	do	do	do	do	½	do	do	do	do	do	do	do	do	do	do
Floor Joists	Additional joists (A440 steel)	10WF 39	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Number of joists	8	8	8	8	8	8	9	9	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	Center line of joists	402'	402'	402'	402'	402'	402'	522'	522'	522'	402'	402'	402'	522'	522'	522'	402'	402'	402'	402'	402'	402'	402'	402'	402'	402'	402'
	Number of splices	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*

SC See Sheet No 8

		A10W	A8W	A6W	A5W	A6W	A5W	A4W	A3W	A2W	A1W	A0W	C0W	C1W	C2W	C3W	C4W	C5W	C6W	C7W	S0W	S1W	S5EW	S5W	S4W	S5W
Floor Beams	Existing web (silicon steel)	27×½	do	do	do	do	do	do	do	do	do	do	27×½	27×½	do	do	do	27×½	do	do	do	do	do	do	do
	Existing flange angles (typ.)	6×6×½	do	do	do	do	do	6×6×½	do	do	do	do	6×6×½	6×6×½	do	do	do	6×6×½	do	do	do	do	do	do	do
	Existing cover plates (silicon steel)	14×½	do	do	do	do	do	do	14×½	do	do	do	14×½	do	do	do	14×½	do	do	do	do	do	do	do	do
	Camber	43½"	do	do	do	do	do	do	do	do	do	do	43½"	do	do	do	do	do	do	do	do	do	do	do	do
	New cover plate (silicon steel)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	Size	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
	Length	30-6½"	32-2½"	32-5½"	32-2½"	32-5½"	32-2½"	32-5½"	32-2½"	32-5½"	32-2½"	32-2½"	32-2½"	32-11½"	32-2½"	32-5½"	32-2½"	32-5½"	32-2½"	32-2½"	32-5½"	32-2½"	32-5½"	32-2½"	32-5½"	32-2½"
	Total weight (lbs)	111	204	205	204	205	204	205	204	206	202	202	289	296	289	289	289	284	289	284	289	284	289	284	289	284
	Number of rivets connecting bolts	14	24	26	24	26	24	26	26	30	26	26	24	30	24	22	24	22	24	22	24	22	24	22	24	24
	Rivet end	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	Rivetting end	24	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	* Pairs of new 7" ear brackets	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

MARK	DATE	DESCRIPTION	BY	CHK
1	11-1-63	As built with revisions	LLS	EEF

REVISION

SCALE IN INCHES (0 – 1 – 2 – 3 – 4 ; 8 THS – 10 THS)

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO - OAKLAND BAY BRIDGE RECONSTRUCTION
STEEL WORK - EAST BAY

PLAN AND ELEVATION STA. 182+22 TO STA. 194+30

UNLESS NOTED SCALE 1" = 50'	BRIDGE 33 - 25, 34 - 03, 34 - 04	SHEET No 7	DRAWING C-4030 78

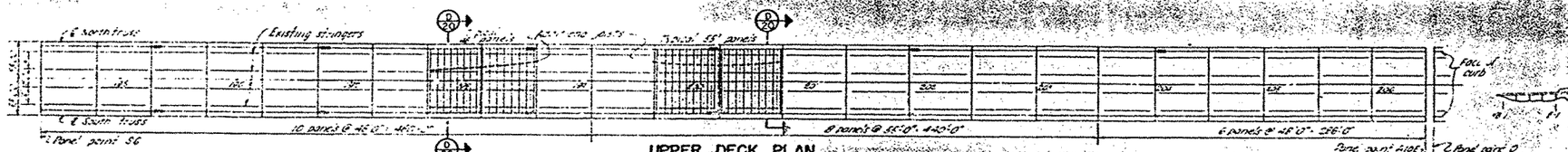
APPROVAL RECOMMENDED BY: W. A. Rice, Jr. — REVISION BRIDGE ENGINEER, LICENSE 11487

PROJECT ENGINEER — LICENSE 14176

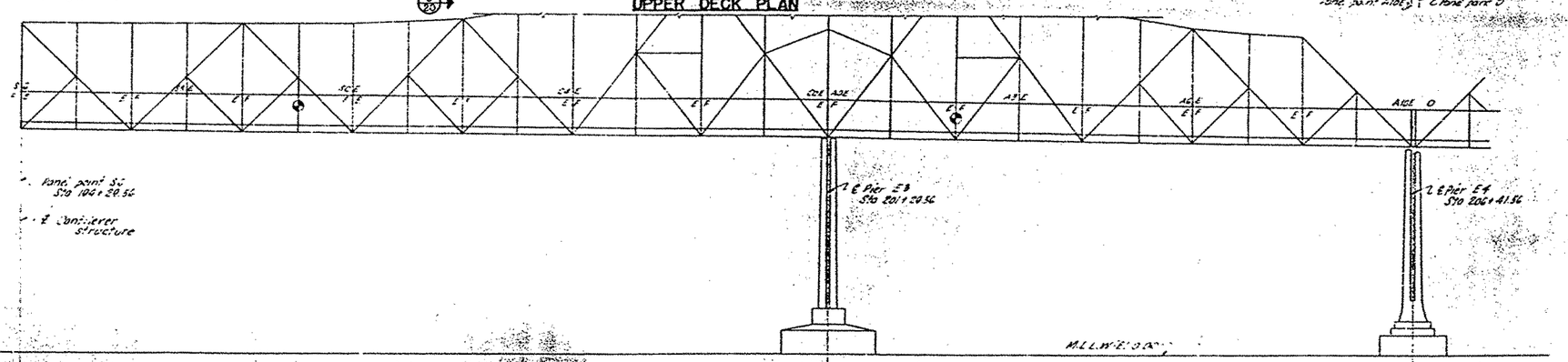
DATE APPROVED October 5, 1962

DESIGN — DESIGNED — CHECKED — DRAWN — CHECKED — REVISION BRIDGE ENGINEER REVIEWED BY — DATE APPROVED — REVISION BRIDGE ENGINEER

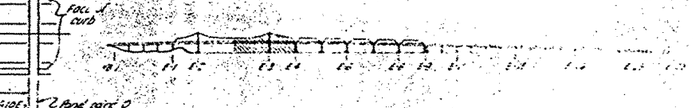
PROJECTS ENGINEER—LICENSE 1479
DATE APPROVED October 6, 1961



UPPER DECK PLAN



ELEVATION



LOCATION DIAGRAM

No Scale

LEGEND

- Existing lane signal control lights
- Existing deck drains
- ⚠ * Indicates location where quantities, dimensions or denominations are changed due to revision.

NOTES

1. Exact location of work will be determined in the field
2. For type "B" cover plate sizes see Sheet No 57
3. For work on cantilever structure see sheets No. 20, 21, 22

TABULATION OF QUANTITIES ⚠*

UPPER DECK PANEL POINT	SC	S5E	S4E	S3E	S2E	S1E	SOE	C7E	C6E	C5E	C4E	C3E	C2E	C1E	COE	A0E	A1E	A2E	A3E	A4E	A5E	A6E	A7E	A8E	A9E	A10E	TOTAL THIS SHEET	CONTRACT TOTAL	
NO. BID ITEM	UNIT																												
1 Removing concrete	CY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18.59	*
2 Class L concrete	CY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	191.52	*
3 Bar reinforcing steel	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,457	*
4 Structural carbon steel	Lbs	4,818	4,540	4,518	4,540	4,518	4,540	4,818	4,540	4,818	4,540	4,818	4,408	4,714	4,688	4,820	4,688	4,714	4,688	4,785	4,690	4,818	4,540	4,818	4,540	4,688	59,237	410,792	*
5 H.S. strength structural steel	Lbs	27,350	27,350	27,350	27,350	27,350	27,350	27,350	27,350	27,350	27,350	27,350	30,250	30,250	30,250	27,978	27,978	30,250	30,250	27,350	27,350	27,350	27,350	27,350	27,350	27,350	436,736	3,005,744	*
6 Fractural steel "B"	Lbs	4,700	4,690	4,700	4,690	4,700	4,690	4,700	4,690	4,700	4,690	4,700	4,690	4,725	4,690	0	4,690	4,725	4,690	4,700	4,690	4,700	4,690	4,700	4,690	4,690	46,729	145,361	*
7 Area curb alterations	L.S.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,269.77	*
8 Adjusting traveler only	L.S.																												
9 Altering traveler scaffolds (note)	Ea	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)			
10 Cleaning and painting	L.S.																												
11 Changing steel deck drains	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,697	*
12 Installing steel deck drains	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,440	*
13 Removal and disposal of deck drain materials	Lbs	0	0	0	0	0	706	0	0	0	0	0	0	0	0	0	0	706	0	0	0	0	0	0	0	0	1,412	5,652	*
14 Relocating upper deck lampposts	Ea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
15 Relocating lower deck lampposts	Ea	0	0	1	0	0	1	0	0	1	0	1	0	1	0	1	0	1	0	0	1	0	0	1	0	0	9	27	

FLOOR STRENGTHENING REQUIREMENTS ⚠*

	SC	S5E	S4E	S3E	S2E	S1E	SOE	C7E	C6E	C5E	C4E	C3E	C2E	C1E	COE	A0E	A1E	A2E	A3E	A4E	A5E	A6E	A7E	A8E	A9E	A10E
Existing stringers (silicon steel)	24 CB 85	do	do	do	do	do	do	do	do	do	36 CB 150	do	do	do	do	do	do	do	do	33 CB 115	do	do	do	do	do	do
New upper stringers (A441 steel) note	20 x ½	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Top flange	8 x ½	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Bottom flange	11½ x ½	do	do	do	do	do	do	do	do	do	12 x ¾	do	do	do	do	do	do	do	do	11½ x ½	do	do	do	do	do	do
Number of ¾ ø connecting bolts	72	66	66	66	66	66	66	66	66	66	72	72	72	72	72	72	72	72	72	72	66	66	66	66	66	74 *
Existing stringers (silicon steel)	24 CB 85	do	do	do	do	do	do	do	do	do	36 CB 150	do	do	do	do	do	do	do	do	33 CB 115	do	do	do	do	do	do
New upper stringers A441 steel) note	20 x ½	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Top flange	8 x ½	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Bottom flange	11½ x ½	do	do	do	do	do	do	do	do	do	12 x ¾	do	do	do	do	do	do	do	do	11½ x ½	do	do	do	do	do	do
Number of ¾ ø connecting bolts	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
Floorbeam	21	do	do	do	do	do	do	do	do	do	24	do	do	do	do	do	do	do	do	21	do	do	do	do	do	do
Stringer joists (A441 steel)	10 x ½	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	10 x ½	do	do	do	do	do	do
Number of joists	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Length feet of joists	46'-8"	40'-1"	40'-1"	40'-1"	46'-8"	46'-8"	46'-8"	40'-1"	40'-1"	40'-1"	46'-8"	50'-1"	50'-1"	50'-1"	50'-1"	46'-8"	46'-8"	50'-1"	50'-1"	50'-1"	40'-1"	40'-1"	46'-8"	46'-8"	46'-8"	46'-8"
Number of splices	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 *

	SC	S5E	S4E	S3E	S2E	S1E	SOE	C7E	C6E	C5E	C4E	C3E	C2E	C1E	COE	A0E	A1E	A2E	A3E	A4E	A5E	A6E	A7E	A8E	A9E	A10E
Existing web (silicon steel)	67 x ⅜	do	do	do	do	do	do	do	do	do	do	do	do	do	(2) 67 x ⅜		67 x ⅜	do	do	do	do	do	do	do	do	do
Existing cover plates (silicon steel)	6 x 4 x ½	do	do	do	do	do	do	do	do	do	6 x 4 x ½	do	do	do	(2) 6 x ½		6 x 4 x ½	do	do	do	do	do	do	do	do	do
Existing cover plates (silicon steel)	14 x ½	do	do	do	do	do	do	do	do	do	do	14 x ⅝	do	do			14 x ½	do	do	do	14 x ½	do	do	do	do	do
Length	48'-0"	do	do	do	do	do	do	do	do	do	do	do	do	do			43'-0"	do	do	do	do	do	do	do	do	do
Web plate "A" (note) type	B	B	B	B	B	B	B	B	B	B	B	B	B	B			B	B	B	B	B	B	B	B	B	B
Size (note)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)			(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Length	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"			52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"	52'-2½"
Total prestress - kips	282	284	285	284	295	284	319	284	284	284	319	284	294	289			319	284	319	319	292	284	295	284	284	282
Number of ¾ ø connecting bolts	22	24	26	24	24	24	26	24	26	24	26	24	30	26			24	30	24	24	24	26	24	26	26	26
Splice plate	30	30	30	30	30	30	30	30	30	30	30	30	30	30			30	30	30	30	30	30	30	30	30	30
Number of new floor brackets	2	2	2	2	2	2	2	2	2	2	2	2	2	2			2	2	2	2	2	2	2	2	2	2

MARK	DATE	DESCRIPTION	BY	CHK
1	8-1-63	As built with revisions	J.L.S.	E.E.F.

REVISION

SCALE IN INCHES (0, 1, 2, 3, 4 — 8 THS, 10 THS)

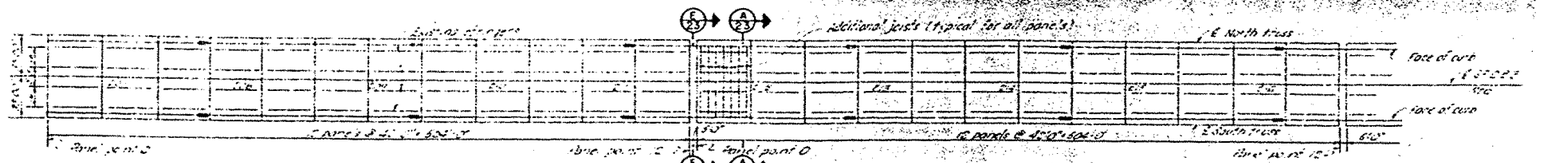
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO - OAKLAND BAY BRIDGE RECONSTRUCTION STEEL WORK - EAST BAY

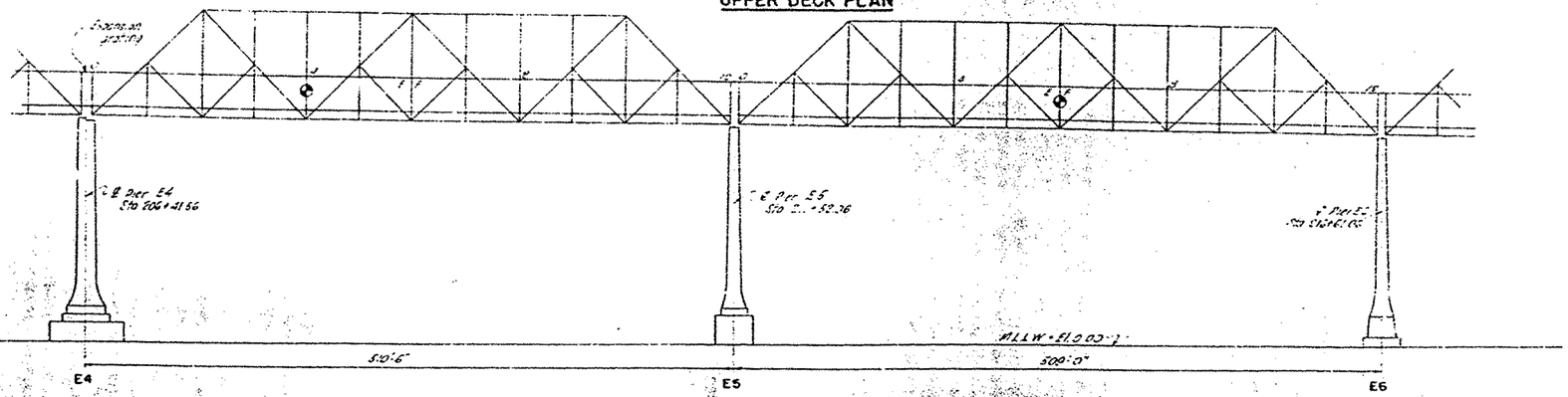
PLAN AND ELEVATION STA. 194+30 TO STA. 206+46

UNLESS NOTED SCALE 1" = 50'	BRIDGE 33 - 25 34 - 03 34 - 04	SHEET NO 8	DRAWING C 4030-89

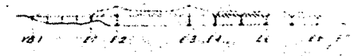
APPROVAL RECOMMENDED BY



UPPER DECK PLAN



ELEVATION



LOCATION DIAGRAM

LEGEND

- Existing lane signal control grid
- Existing deck drains
- ⚠ ★ Indicates location where quantities or denominations are changed

NOTES

1. Exact location of work will be determined in the field.
2. For type B or C curb boxes, see Sheet No. 57.
3. For work on fog signal, see Sheets No. 23, 24.

TABULATION OF QUANTITIES ⚠*

UPPER DECK PANEL POINT		0	1	2	3	4	5	6	7	8	9	10	11	12.10	2	3	4	5	6	7	8	9	10	11	12			
No.	BID ITEM	UNIT																										
1	Wearing concrete	C.F.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	18.99 ★
2	Class C concrete	C.Y.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	191.52 ★
3	Bar reinforcing steel	Lbs.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	82,427 ★
4	Structural carbon steel	Lbs.	4,975	4,954	4,954	4,443	4,954	4,954	4,699	4,443	4,954	4,954	4,954	8,012	5,231	4,954	4,954	4,443	4,954	4,954	4,699	4,443	4,954	4,954	4,954	8,012	48,654	461,646 ★
5	High strength structural steel	Lbs.	26,412	26,412	26,412	26,412	26,412	26,412	26,412	26,412	26,412	26,412	26,412	26,412	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	555,900	5,599,644 ★
6	Structural steel, T-1	Lbs.	4,608	4,728	4,732	4,728	4,732	4,728	4,723	4,728	4,732	4,728	4,732	4,728	5,224	4,728	4,732	4,728	4,732	4,728	4,723	4,728	4,732	4,728	4,732	4,728	44,490	106,832 ★
7	Step, curb abutment	L.F.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,269.77 ★
8	Adjusting traffic rails	L.F.																										
9	Altering trawler scaffolds (one)	Ea.	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	—	—	—
10	Cleaning and painting	L.S.																										
11	Removing steel deck drains	Lbs.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	13,697 ★
12	Installing steel deck drains	Lbs.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	2,440 ★
13	Removing and storing electrical outlets	Lbs.	0	0	0	706	0	0	0	0	0	0	0	0	0	0	0	0	706	0	0	0	0	0	0	—	1,412	7,044 ★
14	Relocating upper deck brackets	Ea.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	16
15	Remounting lower deck brackets	Ea.	0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	—	6	95

FLOOR STRENGTHENING REQUIREMENTS ⚠*

Floor beams	Existing stringer-North (silicon steel)	30 B 116	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Existing stringer-South (silicon steel)	30 B 116	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	New understringer-North (A440 steel)	21 W 73	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Number of ½" connecting bolts	42	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
	New understringer-South (A440 steel)	21 W 73	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Number of ½" connecting bolts	42	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Floor stringers	Existing stringers (silicon steel)	30 B 116	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	New understringers (A440 steel)	21 W 73	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Number of ½" connecting bolts	42	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Joists	Existing joists (A440 steel)	10 B 29	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Number of splices	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Linear feet of joists	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
	Number of splices	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Floor beams	Existing web plate (silicon steel)	0.4 x 36	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Existing cover plates (silicon steel)	0.4 x 16	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Length	40'-0"	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	New cover plate (A441 steel) Type	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	Size (note)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
	Length	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"	38'-6"
	Total steel est. kips	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
	Number of connecting bolts																								
	Leaving end	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
	Bearing end	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
	Pairs of new end brackets	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

MARK	DATE	DESCRIPTION	BY	CHK
⚠	4-1-69	As built with revisions	L.L.B.	E.S.F.

REVISION

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

PLAN AND ELEVATION STA 206+46 TO STA 210+61

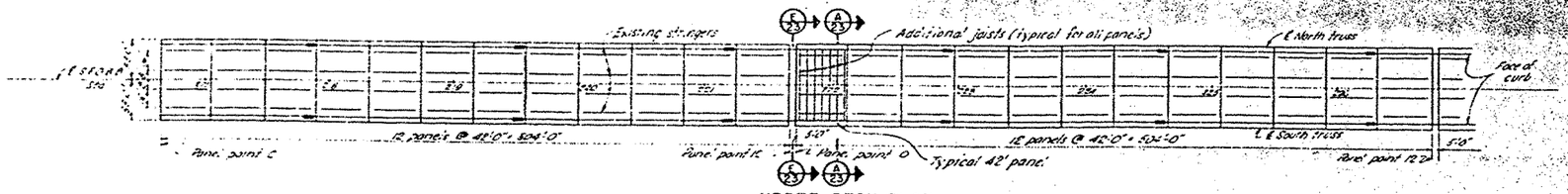
UNLESS NOTED
SCALE 1" = 50'

BRIDGE 34-0030-98

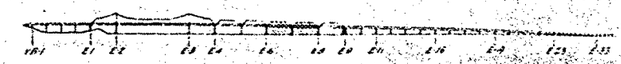
APPROVAL RECOMMENDED BY:

DESIGN ENGINEER
DETAILER
QUANTITIES
DESIGN AND DETAILS APPROVED BY

PROJECT ENGINEER — LICENSE 1479
DATE APPROVED October 6, 1961

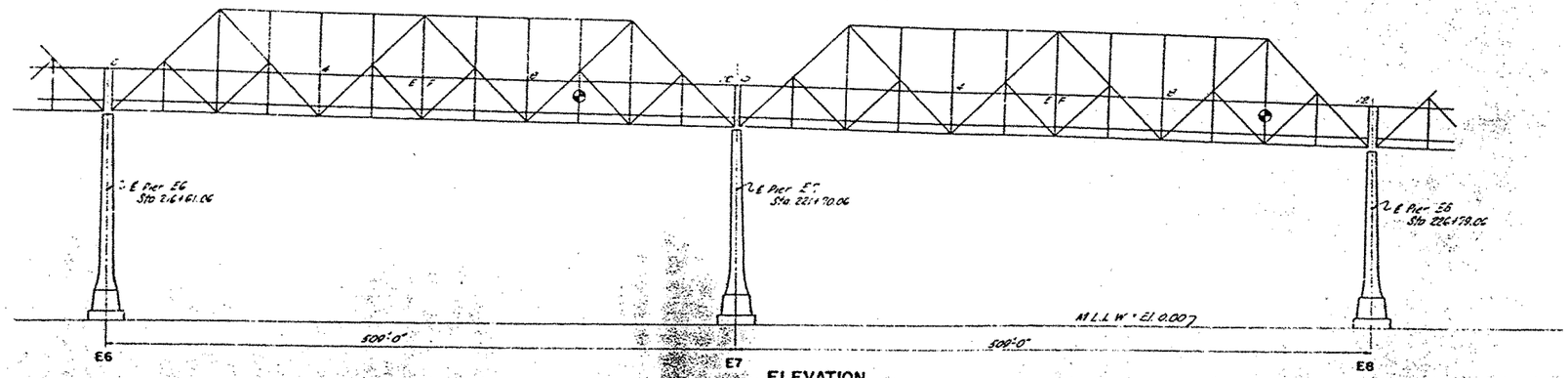


UPPER DECK PLAN



LOCATION DIAGRAM

No Scale



ELEVATION

LEGEND

- Existing lane signal control lights
- Existing deck drains.
- △* Indicates location where quantities, dimensions or denominations are changed due to revision.

NOTES

1. Exact location of work will be determined in the field.
2. See Sheet No. 87 for type "B" cover plate sizes.
3. For work on 504' spans, see sheets No. 23, 24.

TABULATION OF QUANTITIES △*

No.	BID ITEM	UNIT	0	1	2	3	4	5	6	7	8	9	10	11	12	0	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL THIS BUILT	ACCUMULATED TOTAL	
1	Removing concrete	C.Y.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18.59	*
2	Class "L" concrete	C.Y.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	181.52	*
3	Bar reinforcing steel	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57,487	*
4	Structural carbon steel	Lbs	3,231	1,954	1,954	1,443	1,954	1,954	1,499	1,443	1,954	1,954	1,954	3,912	3,231	1,954	1,954	1,443	1,954	1,954	1,499	1,443	1,954	1,954	1,954	3,912	—	50,812	307,439	*
5	High strength structural steel	Lbs	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	26,413	—	635,900	3,174,544	*
6	Structural steel "F"	Lbs	4,408	4,728	4,732	4,728	4,732	4,728	4,723	4,728	4,732	4,728	4,732	4,728	3,516	4,728	4,732	4,728	4,732	4,728	4,723	4,728	4,732	4,728	4,732	4,728	1,408	48,470	234,302	*
7	Steel curb elevations	Lf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	5,369.77	*
8	Adjusting transfer rails	L.S.																									—		—	
9	Altering traffic scaffolds (note)	Eq.	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	—		—	
10	Cleaning and painting	L.S.																												
11	Removing steel deck drains	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,697	*
12	Installing steel deck drains	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,440	*
13	Removing and storing electrical equipment	Lbs	0	0	0	0	0	0	0	0	704	0	0	0	0	0	0	0	0	0	0	0	0	0	0	704	0	0	1,412	6,496	*
14	Relocating suspended luminaires	Ea.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	
15	Removing bracket deck luminaires	Ea.	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	43	

FLOOR STRENGTHENING REQUIREMENTS

Floor beams	Existing stringer North (silicon steel)	SC B108	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Existing stringer South (silicon steel)	SC B108	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	New understringer North (A440 steel)	SIW 73	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Number of ¾ connecting bolts	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
	New understringer South (A440 steel)	SIW 73	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Number of ¾ connecting bolts	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Stringers	Existing stringers (silicon steel)	SC B108	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	New understringers (A440 steel)	SIW 73	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Number of ¾ connecting bolts	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
	Additional joists (A440 steel)	10WF29	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Number of joists	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Linear feet of joists	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'	1,470'
	Number of splices	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

△

		0	1	2	3	4	5	6	7	8	9	10	11	12	0	1	2	3	4	5	6	7	8	9	10	11	12
Floor Joists	Existing web (silicon steel)	SD 7½	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Existing flange angles (silicon steel)	L4x4x⅜	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Existing cover plates (silicon steel)	14 x ¼	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	Length	40'-0"	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
	New cover plate (A440 steel) Type	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	Size (note)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
	Length	50'-0⅝"	53'-11⅝"	54'-1⅝"	53'-11⅝"	54'-1⅝"	53'-11⅝"	54'-1⅝"	53'-11⅝"	54'-1⅝"	53'-11⅝"	54'-1⅝"	53'-11⅝"	50'-8⅝"	53'-11⅝"	54'-1⅝"	53'-11⅝"	54'-1⅝"	53'-11⅝"	54'-1⅝"	53'-11⅝"	54'-1⅝"	53'-11⅝"	54'-1⅝"	53'-11⅝"	54'-1⅝"	50'-8⅝"
	Total prestress kips	[illegible]	262	262	262	262	262	274	262	262	262	262	262	111	262	262	262	262	262	274	262	262	262	262	262	262	111
	Number of new connecting bolts																										
	Size	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾	¾
	Number	24	24	24	24	24	24	30	24	24	24	24	24	12	24	24	24	24	24	30	24	24	24	24	24	24	12
	Holes or new inner brackets	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	1

△

APPROVAL RECOMMENDED BY: [illegible]
DESIGNING BRIDGE ENGINEER

DESIGN
DETAILS
QUANTITIES
TRACED
CHECKED
DESIGN AND DETAIL REVIEWED BY

MARK	DATE	DESCRIPTION	BY	CH'K
△	11-69	As built with revisions	L.L.S.	E.E.F.

REVISION

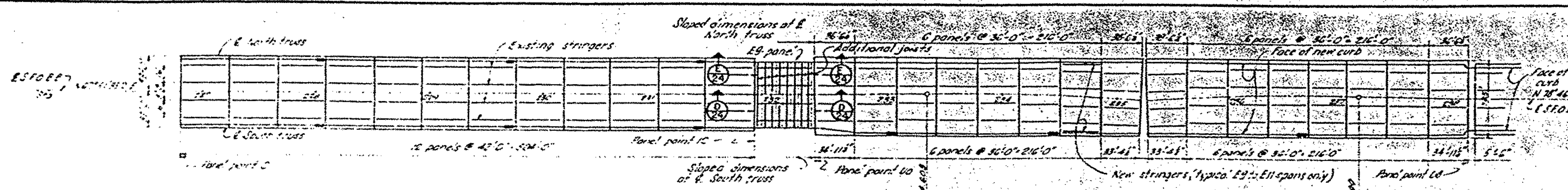
8 THS 0 1 2 3 10 THS 4
SCALE IN INCHES

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO - OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

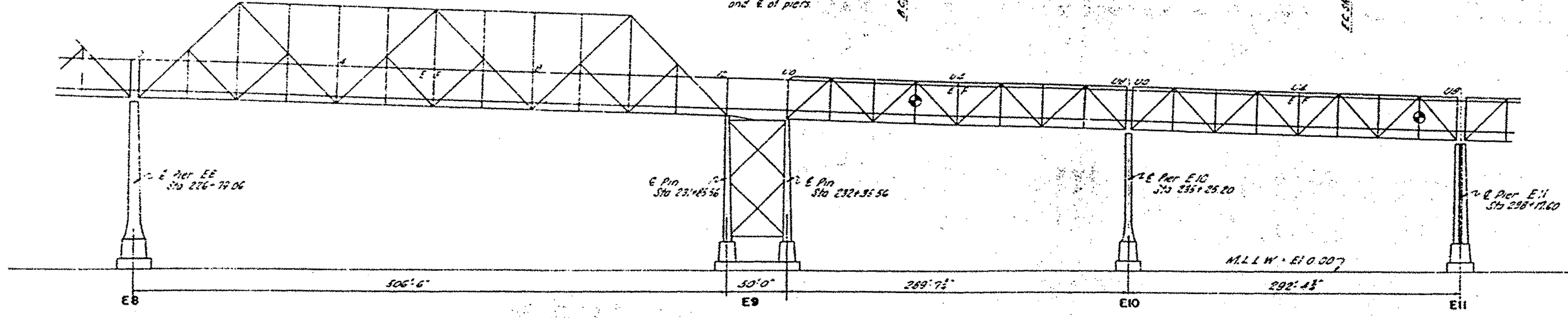
PLAN AND ELEVATION STA. 216+61 TO STA. 226+79

UNLESS NOTED SCALE 1" = 50'
33 - 25
34 - 03
BRIDGE 34 - 04
SHEET No. 10
DRAWING C 4030-10R

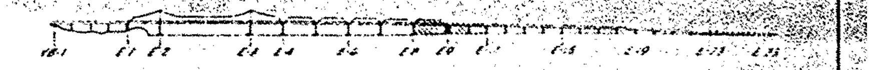


UPPER DECK PLAN

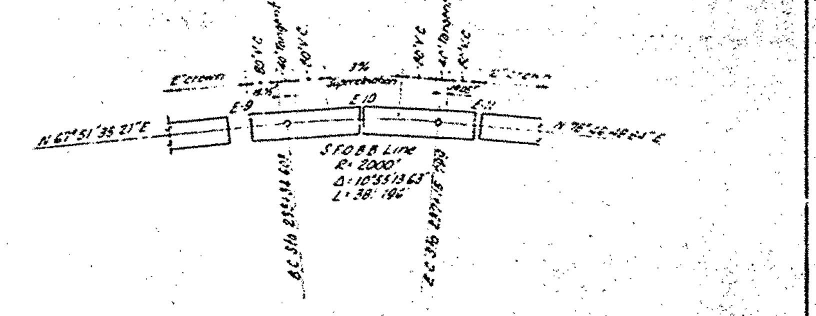
Note: Curve sections rotated about the intersection of ℄ of bridge and ℄ of piers.



ELEVATION



LOCATION DIAGRAM
No Scale



SPAN LAYOUT
PIERS E9 THRU E11
Scale 1" = 200'

TABULATION OF QUANTITIES ⚠2*

No.	Upper deck panel point / Bid item	Unit	0	1	2	3	4	5	6	7	8	9	10	11	12	U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7	U8	Total this sheet	Accumulated total
1	Removing concrete	CY	0	0	0	0	0	0	0	0	0	0	0	0	0	0.22	0.27	0.27	0.28	0.61	0.61	0.60	0.64	0.64	0.59	0.59	0.58	0.59	0.58	0.58	0.58	—	8.83	26.62 *
2	Class L concrete	CY	0	0	0	0	0	0	0	0	0	0	0	0	0	1.41	3.34	3.87	4.26	4.88	5.06	5.01	5.53	5.48	5.07	5.04	5.05	5.05	5.04	5.04	5.00	—	74.06	265.58 *
3	Bar reinforcing steel	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	4,178	4,466	4,538	4,595	2,254	2,306	2,301	2,344	2,347	2,312	2,317	2,321	2,308	2,308	2,308	2,290	—	33,495	120,982 *
4	Structural carbon steel	Lbs	3,231	4,954	4,954	4,443	4,954	4,954	4,499	4,443	4,954	4,954	4,954	4,414	4,103	5,614	5,529	5,785	4,220	10,125	10,125	9,871	13,701	15,341	9,871	10,211	10,124	10,124	9,871	9,871	10,041	—	176,649	483,107 *
5	High strength structural steel	Lbs	24,412	24,412	24,412	24,412	24,412	24,412	24,412	24,412	24,412	24,412	24,412	24,412	23,620	19,497	20,137	20,226	20,384	20,446	20,495	20,495	20,495	20,495	20,495	20,495	20,495	20,495	20,495	20,495	20,446	—	648,792	3,823,336 *
6	Structural steel, T-1	Lbs	4,408	4,728	4,732	4,728	4,732	4,728	4,723	4,728	4,752	4,728	4,732	4,728	4,723	18.02	4,484	4,445	4,479	4,445	4,482	4,472	4,480	4,528	4,479	4,471	4,483	4,476	4,479	4,474	1,484	1,150	47,505	270,807 *
7	Steel curb alterations	LF	0	0	0	0	0	0	0	0	0	0	0	0	0	30.18	36.02	35.99	35.95	77.06	72.03	72.02	76.02	75.87	71.98	72.01	71.98	72.09	72.01	72.01	75.79	—	1,014.01	3,283.78 *
8	Adjusting traveler rails	LS																																
9	Altering traveler scaffolds (note)	Ea	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	—	—	—
10	Cleaning and painting	LS																																
11	Removing steel deck drains	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	699	0	0	0	704	0	0	678	0	0	712	0	0	0	0	—	2,793	20,490 *
12	Installing steel deck drains	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	699	0	0	0	693	0	0	667	0	0	696	0	0	0	0	—	2,755	10,193 *
13	Removing and storing electrical materials	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	706	0	0	0	0	0	0	0	0	0	0	0	706	0	—	1,412	9,888 *
14	Relocating upper-deck luminaires	Ea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0	2	0	0	—	8	24
15	Remounting lower-deck luminaires	Ea	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	4	47

FLOOR STRENGTHENING REQUIREMENTS ⚠2*

Item	0	1	2	3	4	5	6	7	8	9	10	11	12	U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7
1 Existing stringer - North (silicon steel)	30 B108	do	do	do	do	do	do	do	do	do	do	do	32 B132	27 B98	do	do	do	do	do	do	27 B100	do	27 B98	do	do	do	do	do	do
1 Existing stringer - South (silicon steel)	30 B108	do	do	do	do	do	do	do	do	do	do	do	33 B132	27 B98	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
1 New understringer - North (A440 steel)	21WF73	do	do	do	do	do	do	do	do	do	do	do	See note 6	16WF58	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Number of 7/8" connecting bolts	62	62	62	62	62	62	62	62	62	62	62	62	66	50	50	50	50	50	50	50	52	52	50	50	50	50	50	50	50
1 New understringer - South (A440 steel)	21WF73	do	do	do	do	do	do	do	do	do	do	do	See note 6	16WF58	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Number of 7/8" connecting bolts	62	62	62	62	62	62	62	62	62	62	62	62	66	48*	50	50	50	50	50	50	50*	50*	50	50	50	50	50	50	50
1 New stringer - North														—	—	—	—	30WF108	do	do	30WF124	do	30WF108	do	do	do	do	do	do
1 New stringer - South														30WF108	do	30WF100	do	do	30WF108	do	do	do	do	30WF116	do	do	33WF130	do	do
2 Existing stringers (silicon steel)	30 B116	do	do	do	do	do	do	do	do	do	do	do	32 B132	27 B98	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
2 New understringers (A440 steel)	21WF73	do	do	do	do	do	do	do	do	do	do	do	See note 6	21WF68	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Number of 7/8" connecting bolts	66	66	66	66	66	66	66	66	66	66	66	66	74	56*	58	58	58	58	58	58	60,58*	60,58*	58	58	58	58	58	58	58
Additional joists (A440 steel)	10WF29	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Number of joists	7	7	7	7	7	7	7	7	7	7	7	7	8	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Linear feet of joists	406'	406'	406'	406'	406'	406'	406'	406'	406'	406'	406'	406'	464'	362.58'	375.5'	380.5'	383.17'	386.17'	387.5'	387.5'	387.5'	387.5'	387.5'	387.5'	387.5'	387.5'	387.5'	387.5'	387.5' *
Number of splices	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 *
Extensions of existing joists (carbon steel)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12 I 31.8	—	—	—	—	—	—	—	12 I 31.8	—	—	—	—
Linear feet of joist extensions	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.96'*	—	—	—	—	—	—	—	5.95'*	—	—	—	—
Number of splices	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—

Item	0	1	2	3	4	5	6	7	8	9	10	11	12	U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7	U8
Existing web (silicon steel)	C1x⅞	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Existing flange angles (silicon steel)	6x4x⅝	do	do	do	do	do	do	do	do	do	do	do	6x4x⅝	6x4x½	6x6x⅝	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Existing cover plates (silicon steel)	14x½	do	do	do	do	do	do	do	do	do	do	do	14x⅝	do	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Length	40-0	do	do	do	do	do	do	do	do	do	do	do	43'-0"	44'-11⅞"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
New cover plate (T1 steel) Type	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B	A
Size (note)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	12"x¾"	(2)	(2)	(2)	(2)	(2)	(2)	(2)	12"x¾"
Length	50'-8⅞"	53'-11⅝"	54'-1¼"	53'-11⅝"	54'-1¼"	53'-11⅝"	54'-1⅝"	53'-11⅝"	54'-1¼"	53'-11⅝"	54'-1¼"	53'-11⅝"	53'-1⅝"	55'-9"	45'-11"	45'-8"	45'-9"	45'-8"	45'-10"	45'-6½"	45'-6½"	[illegible]	45'-9"	45'-6"	45'-10"	45'-8"	45'-9"	45'-8"	45'-11"	42'-6"
Initial prestress kips	111	262	262	262	262	262	274	262	262	262	262	262	285	316	260	260	260	275	260	260	260	144	260	260	260	260	260	260	260	187
Number of end connecting bolts																														
Fixed end	24	24	24	24	24	24	24	24	24	24	24	24	24	30	26	26	26	26	26	26	26	20	26	26	26	26	26	26	26	26
Stressing end	28	28	28	28	28	28	30	28	28	28	28	28	30	32	30	30	28	30	28	30	30	34	30	30	28	30	28	30	30	28
Rows of new shear brackets	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	2	2	2	2	2	2	2	2

LEGEND

- ⊗ Existing lane signal control lights
- — Existing deck drains (on spans E8-E9) and relocated deck drains (on spans E9-E11)
- ⚠* Indicates location where quantities, dimensions or denominations are changed due to revision.

NOTES

1. Exact location of work will be determined in the field.
2. For type "B" cover plate sizes see Sheet No 27
3. For work on 504' span see Sheets No 23, 24
4. For Deck Framing Plan of spans E9-E11 see Sheet No 25
5. ⚠ For deck widening, curb alterations and slab details on E9-E11 Spans see Sheets No 27, 28, 31 and 32
6. ⚠ For size of understringers (A441 Steel) see Sheet No 24

SCALE IN INCHES

APPROVAL RECOMMENDED BY — SUPERVISING BRIDGE ENGINEER

DESIGN / DETAILS / QUANTITIES / TRACED / DESIGN AND DETAILS REVIEWED BY

SUPPLEMENTAL CONTRACT DRAWING

Mark	Date	Description	By	Chk
2		As built with revisions		EEF
1		Notes 5 and 6 added	EEF	AL

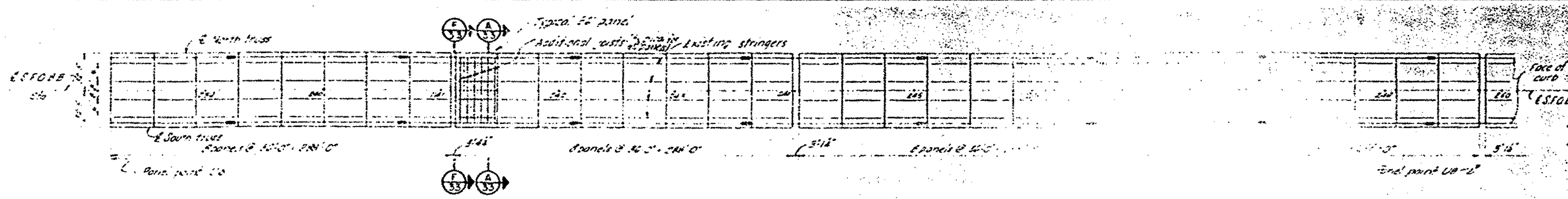
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO - OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

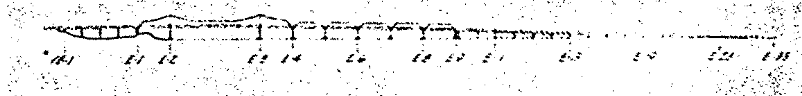
PLAN AND ELEVATION STA. 226+79 TO STA. 238+18

UNLESS NOTED SCALE 1" = 50' | BRIDGE 33-25, 34-03, 34-04 | SHEET No 11 | DRAWING C 4030 11R

PROJECTS ENGINEER — LICENSE 1279
DATE APPROVED October 6, 1961



UPPER DECK PLAN



LOCATION DIAGRAM

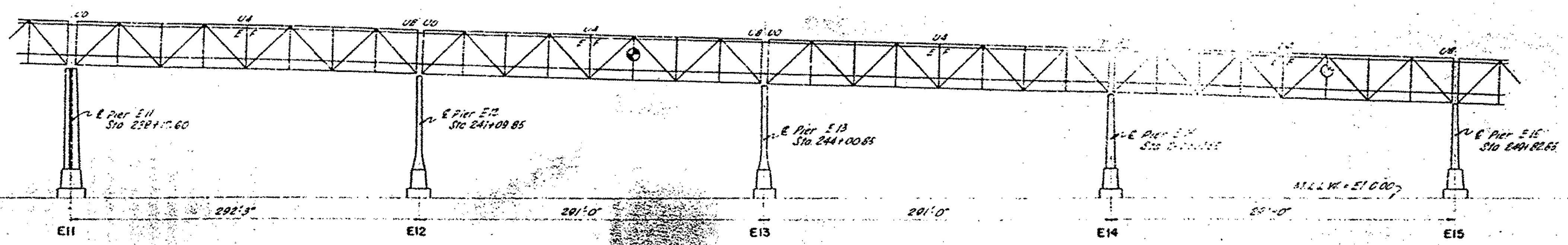
No Scale

LEGEND

Existing lane signal control lights

Existing deck drains

* Indicates location where quantities, dimensions or denominations are changed due to revision.



ELEVATION

NOTES

1. Exact location of work will be determined in the field.
2. For work on 288' spans, see Sheets No. 33, 34.

TABULATION OF QUANTITIES ⚠*

No.	UPPER DECK PANEL POINT / BID ITEM	UNIT	U0	U1	U2	U3	U4	U5	U6	U7	U8 U0	U1	U2	U3	U4	U5	U6	U7	U8 U0	U1	U2	U3	U4	U5	U6	U7	U8 U0	U1	U2	U3	U4	U5	U6	U7	U8	TOTAL THIS SHEET	ACCUMULATED TOTAL	
1	Removing concrete	CY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0	0	0	0	0	0	0	26.62	*
2	Class L concrete	CY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0	0	0	0	0	0	0	265.58	*
3	Bar reinforcing steel	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0	0	0	0	0	0	0	120,922	*
4	Structural carbon steel	Lbs	1,147	1,220	1,220	1,347	1,220	1,220	1,220	3,352	1,220	1,220	1,220	1,347	1,220	1,220	1,220	3,352	1,220	1,220	1,220	1,347	1,220	1,220	1,220	3,352	1,220	[illegible]	[illegible]	1,347	1,220	1,220	1,220	3,352		42,003	735,110	*
5	High strength structural steel	Lbs	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	[illegible]	[illegible]	19,506	19,506	19,506	19,506	19,506		624,192	4,447,598	*
6	Structural steel, T-1	Lbs	733	1,176	1,176	1,176	1,259	1,176	1,176	1,176	1,484	1,176	1,176	1,176	1,259	1,176	1,176	1,176	1,484	1,176	1,176	1,176	1,259	1,176	1,176	1,176	1,484	[illegible]	[illegible]	1,176	1,259	1,176	1,176	1,176	733	39,178	317,985	*
7	Steel curb alterations	LF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	[illegible]	0	0	0	0	0	0	0	3,28376	*
8	Adjusting traveler rails	LS																																				
9	Altering traveler scaffolds etc.	Ea	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	[illegible]	[illegible]	[illegible]	(1)	(1)	(1)	(1)	(1)			
10	Cleaning and painting	LS																																				
11	Removing steel deck drains	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	[illegible]	[illegible]	0	0	0	0		0	20,690	*
12	Installing steel deck drains	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	[illegible]	[illegible]	0	0	0	0		0	10,193	*
13	Removing and storing electrical materials	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	706	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	[illegible]	[illegible]	706	0	0	0	0	1,412	11,300	*
14	Relocating upper-deck luminaires	Ea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	[illegible]	[illegible]	0	0	0	0	0	0	21	
15	Remounting lower-deck luminaires	Ea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	[illegible]	[illegible]	0	0	0	0	0	0	47	

FLOOR STRENGTHENING REQUIREMENTS ⚠*

2 Existing stringers (silicon steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	[illegible]	[illegible]	[illegible]	[illegible]	do	do	do	do	
2 New understringers (A440 steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	[illegible]	[illegible]	[illegible]	[illegible]	do	do	do	do	
Number of ⅞" connecting bolts	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	[illegible]	[illegible]	[illegible]	[illegible]	50	50	50	50	
2 Existing stringers (silicon steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	do	do	do	do	
2 New understringers (A440 steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	do	do	do	do	
Number of ⅞" connecting bolts	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	58	58	58	58	
Additional joists (A440 steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	do	do	do	do	
Number of joists	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6	6	6	6	
Linear feet of joists	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	348'	348'	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	348'	348'	
Number of splices	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	0	*

Floor beams	U0	U1	U2	U3	U4	U5	U6	U7	U8 U0	U1	U2	U3	U4	U5	U6	U7	U8 U0	U1	U2	U3	U4	U5	U6	U7	U8 U0	U1	U2	U3	U4	U5	U6	U7	U8
Existing web (silicon steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	do	do	do	do
Existing flange angles (silicon steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	do	do	do	do
Existing cover plate	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	—	—	—
New cover plate (T-1 steel) Type	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	A	A	A	A
Size	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12 x ¾	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Length	36'-0"	[illegible]	[illegible]	45'-0"	45'-0"	[illegible]	[illegible]	[illegible]	[illegible]	45'-0"	45'-0"	45'-0"	45'-0"	[illegible]	45'-0"	45'-0"	[illegible]	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	45'-0"	45'-0"	45'-0"	36'-0"
Initial prestress-kips	77	207	207	207	207	207	207	207	[illegible]	207	207	207	207	207	207	207	[illegible]	207	207	207	207	207	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	207	207	207	77
Number of ⅞" connecting bolts																																	
Fixed end	4	[illegible]	26	[illegible]	28	26	[illegible]	26	14 16	[illegible]	26	26	28	[illegible]	[illegible]	26	14 26	26	[illegible]	26	28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	26	26	[illegible]	14
Bearing end	20	32	32	32	32	32	[illegible]	[illegible]	[illegible]	32	32	32	32	[illegible]	[illegible]	32	[illegible]	32	32	32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	32	32	20
*Pairs of new web stiffeners	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	2	2

MARK	DATE	DESCRIPTION	BY	CH'K
⚠1	11/63	As built with revisions	OB	EEF
REVISION				

8 THS — 10 THS
0 1 2 3 4
SCALE IN INCHES

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

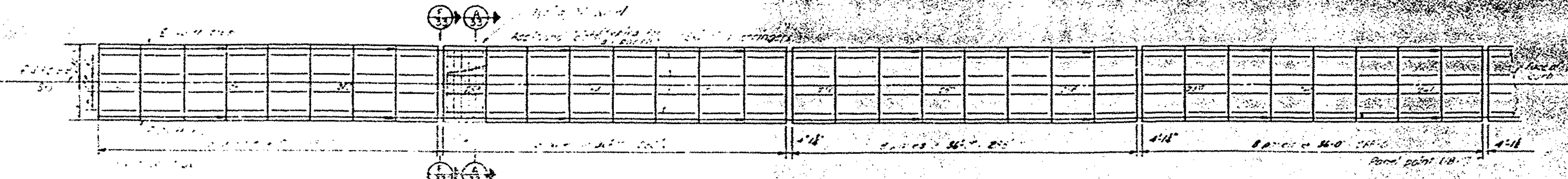
SAN FRANCISCO - OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

PLAN AND ELEVATION STA. 238+18 TO STA. 249+83

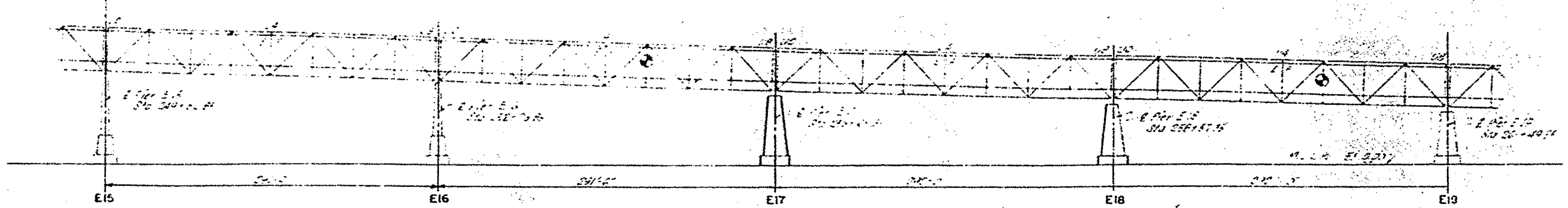
UNLESS NOTED SCALE 1" = 50' | BRIDGE 33-25, 34-01, 34-04 | SHEET NO. 12 | DRAWING C-4030-12R

APPROVAL RECOMMENDED BY
SUPERVISING BRIDGE ENGINEER LICENSE 1150

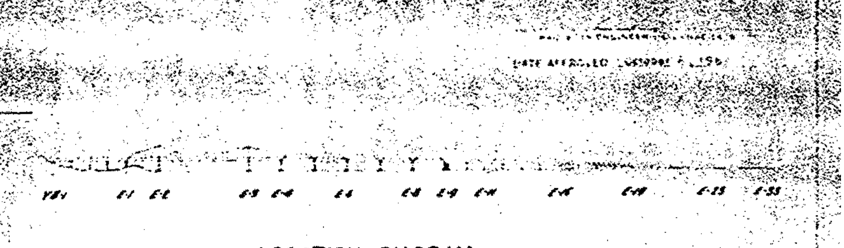
DESIGN AND DETAILS REVIEWED BY
TRACED
QUANTITIES
DETAILS
DESIGN



UPPER DECK PLAN



ELEVATION



LOCATION DIAGRAM

LEGEND

— Existing deck drains.

△ * Indicates location where quantities, dimensions or denominations are changed due to revision.

NOTES

TABULATION OF QUANTITIES △*

Upper deck panel point / No. Item	Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	Total	Grand total
1 Removing concrete	CY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		0	26.62 *
2 Class ? concrete	CY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		0	265.58 *
3 Bar reinforcing steel	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	120,922 *
4 Structural carbon steel	Lbs	4220	4220	4290	4347	4220	4220	4220	5352	4220	4220	4220	4347	4220	4220	4220	5352	5081	4220	4220	4347	4220	4220	4220	5357	3081	4220	4220	4347	4220	4220	4220	3852		51,798	786,408 *
5 High strength structural steel	Lbs	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506		624,192	6,071,720 *
6 Structural steel	Lbs	755	4176	4176	4176	4259	4176	4176	4176	4454	4176	4176	4176	4259	4176	4176	4176	4506	4176	4176	4176	4259	4176	4176	4176	4506	4176	4176	4176	4259	4176	4176	4176	755	98,266	357,251 *
7 Steel curb ...		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		[illegible]	3,283.76 *
8 Adjusting traveler rails	LS																																			
9 Altering traveler scaffold	LS	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)			
10 Cleaning and painting	LS																																			
11 Removing steel deck drains	Lbs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		0	20,690 *
12 Installing steel deck drains	Lbs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		0	10,193 *
13 Removing and storing electrical conduit	Lbs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	708	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	708	[illegible]	[illegible]	[illegible]		4416	12,716 *
14 Relocating upper deck luminaires	Ea	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		0	84
15 Removing overhead luminaires	Ea	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		0	47

FLOOR STRENGTHENING REQUIREMENTS △*

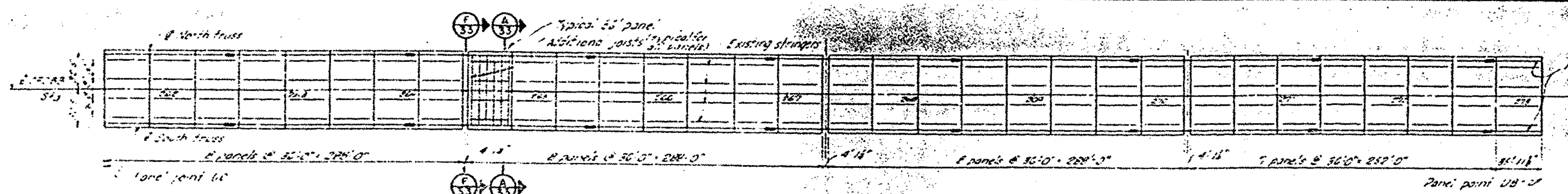
Existing stringers (silicon steel)	[illegible]
New wide-flange stringers	[illegible]
Number of ... bolts	[illegible]
Existing stringers (silicon steel)	[illegible]
New wide-flange stringers	[illegible]
Number of ... bolts	[illegible]
[illegible]	[illegible]

MARK	DATE	DESCRIPTION	BY	CHK
△1	4-1-63	As built with revisions	L.L.S.	E.E.F.
		REVISION		

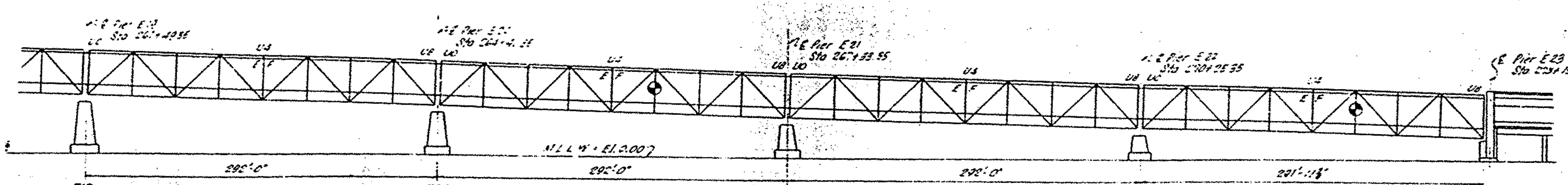
SAN FRANCISCO - OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

PLAN AND ELEVATION STA.249+83 TO STA.261+49

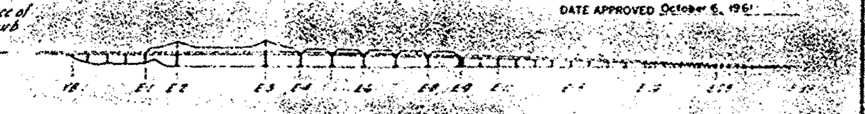
13



UPPER DECK PLAN



ELEVATION



LOCATION DIAGRAM

No Scale

LEGEND

- Existing lane signal control lights
- Existing deck drains
- △* Indicates location where quantities, dimensions or denominations are changed due to revision.

NOTES

1. Exact location of work will be determined in the field.
2. For work on 288' spans, see Sheets No. 33-34.

TABULATION OF QUANTITIES △*

No.	Upper deck panel point / Bid item	Unit	U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7	U8	Total this sheet	Accumulated total	
1	Removing concrete	C.Y.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	26.62	*
2	Class L concrete	C.Y.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	165.58	*
3	Bar reinforcing steel	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	180,922	*
4	Structural carbon steel	Lbs	3,081	4,220	4,220	4,347	4,220	4,220	4,220	3,352	3,081	4,220	4,220	4,347	4,220	4,220	4,220	3,352	3,081	4,220	4,220	4,347	4,220	4,220	4,220	3,352	3,081	4,220	4,220	4,347	4,220	4,220	4,220	1,504	—	83,672	840,580	*
5	High strength structural steel	Lbs	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,506	19,504	19,506	21,504	21,504	21,504	21,504	21,506	—	634,184	5,705,904	*
6	Structural steel, T-1	Lbs	753	4,176	4,176	4,176	4,259	4,174	4,176	4,176	4,504	4,176	4,176	4,176	4,259	4,174	4,176	4,176	4,504	4,176	4,176	4,176	4,259	4,176	4,176	4,176	4,504	4,176	4,176	4,176	4,259	4,176	4,176	4,176	753	99,878	846,520	*
7	Steel curb alterations	L.F.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	8,883.78	*
8	Adjusting traveler rails	L.S.																																				
9	Altering traveler scaffolds (each)	Ea	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	—	—	—	
10	Cleaning and painting	L.S.																																				
11	Removing steel deck drains	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	20,490	*
12	Installing steel deck drains	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	10,193	*
13	Removing and storing overhead sign brackets	Lbs	0	0	0	0	0	0	0	0	0	0	0	0	708	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	708	0	0	0	—	1,416	16,138	*
14	Relocating upper deck luminaires	Ea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	24	
15	Remounting lower-deck luminaires	Ea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	17	

FLOOR STRENGTHENING REQUIREMENTS △ *

Item	U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7	U8
2 Existing stringers (silicon steel)	21CB35	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
2 New understringers (A440 steel)	16WF58	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Number of ⅞" connecting bolts	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
2 Existing stringers (silicon steel)	27CB35	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
2 New understringers (A440 steel)	21WF68	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Number of ⅞" connecting bolts	56	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
Additional joists (A440 steel)	10WF29	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Number of joists	[illegible]	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Linear feet of joist	[illegible]	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'	348'
Number of splices	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Item	U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7	U8/U0	U1	U2	U3	U4	U5	U6	U7	U8
Existing web (silicon steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Existing flange angles (silicon steel)	[illegible]	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do	do
Existing cover plate	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
New cover plate (T-1 steel) Type	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A
Size	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Length	35'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	37'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	37'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	37'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	35'-0"
Initial prestress: kips	60	207	207	207	227	207	207	207	60	207	207	207	227	207	207	207	60	207	207	207	227	207	207	207	60	207	207	207	227	207	207	207	114
Number of end connecting bolts																																	
Fixed end	16	26	26	26	28	26	26	26	16	26	26	26	28	26	26	26	16	26	26	26	28	26	26	26	16	26	26	26	28	26	26	26	18
Stressing end	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34
* [illegible]	2	2	2	2	2	2	2	2	4	2	2	2	2	2	2	2	4	2	2	2	2	2	2	2	4	2	2	2	2	2	2	2	2

APPROVAL RECOMMENDED BY

DATE APPROVED October 6, 1961

MARK	DATE	DESCRIPTION	BY	CHK
△	8-1-62	As built with revisions	L.L.S.	EEF

REVISION

SCALE IN INCHES

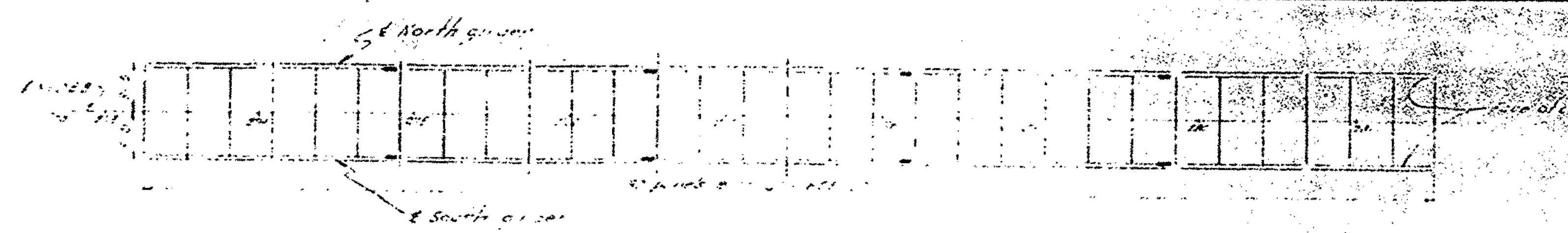
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO - OAKLAND BAY BRIDGE RECONSTRUCTION STEEL WORK - EAST BAY

PLAN AND ELEVATION STA. 261+49 TO STA. 273+15

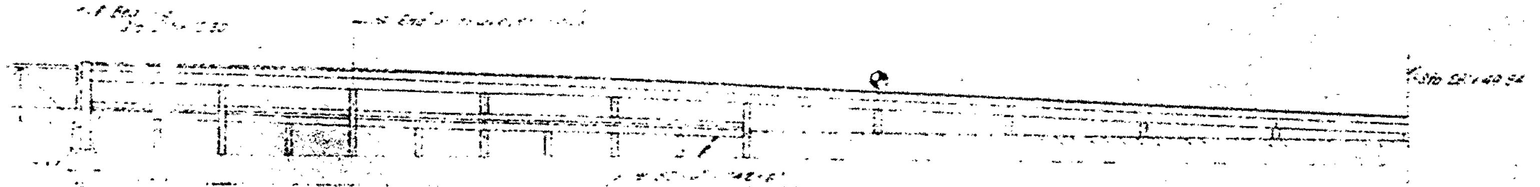
UNLESS NOTED SCALE 1" = 50' | BRIDGE 33-25, 34-03, 34-04 | SHEET NO. 14 | DRAWING C-4030-14

℄ North girder



℄ South girder

UPPER DECK PLAN



ELEVATION

LOCATION DIAGRAM

LEGEND

Existing lane signal control lights

Existing deck drains

* Indicates location where quantities, dimensions or denominations are changed due to revision.

NOTES

TABULATION OF QUANTITIES

Item	[illegible]	[illegible] Total
[illegible]		
[illegible]	0	26.62 *
[illegible]	0	265.58 *
[illegible]	0	120,922 *
[illegible]	10,538	851,118 *
[illegible]	0	5,705,904 *
[illegible]	24,338	422,867 *
[illegible]	0	3,283.78 *
[illegible]		L.S.
[illegible]	—	2
[illegible]		L.S.
[illegible]		20,490 *
[illegible]		10,193 *
[illegible]	708	14,840 *
[illegible]		24
[illegible]		4.7

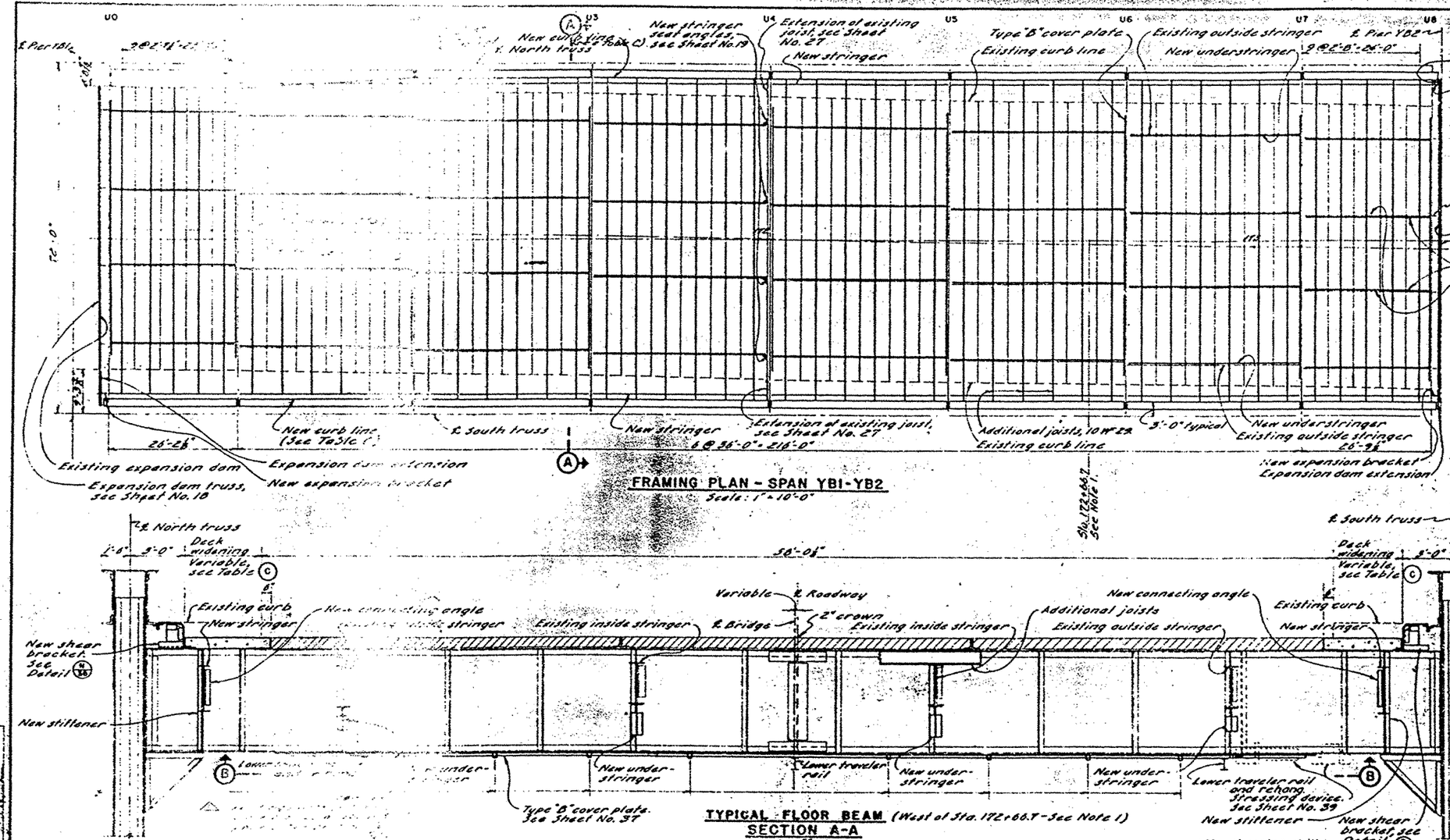
FLOOR STRENGTHENING REQUIREMENTS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

PLAN AND ELEVATION STA 27+15 TO STA 28+50

UNLESS NOTED SCALE 1" = 50'

SHEET NO. 15 DRAWING C-4030



FRAMING PLAN - SPAN YB1-YB2
Scale: 1" = 10'-0"

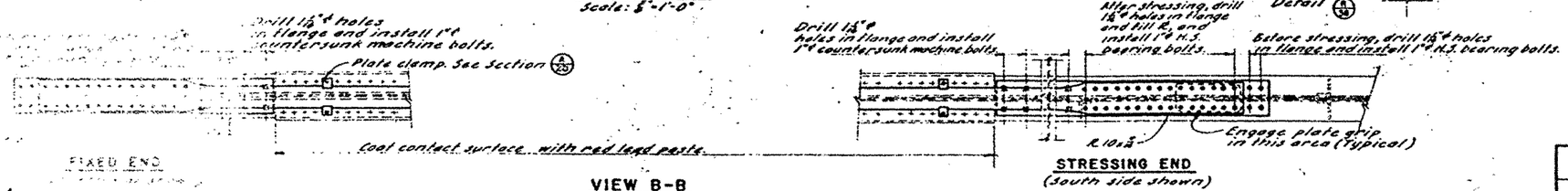
DISTANCE BETWEEN EXISTING AND NEW CURB LINES									
PANEL POINT	U0	U1	U2	U3	U4	U5	U6	U7	U8
NORTH	0-0	0-0	2-7 5/8	3-1 7/16	3-7 7/16	4-1 5/8	4-7 7/16	5-1 5/8	5-0 1/2
SOUTH	6-2 11/16	5-10 7/16	5-4 1/2	4-10 7/16	4-4 7/16	3-10 1/2	3-4 7/16	2-10 5/8	2-5 5/8

TABLE C - DECK WIDENING

NOTES

1. Deck sections East of Sta. 172+66.7 are transitional between those shown on this sheet and on Sheet No. 17.
2. For understringers, see Sheet No. 34. Shapes of understringers in end panels are to be the same as those in the 36' panels.
3. For new stringer connections, see Sheet No. 27
4. For joist details, see Sheet No. 34.
5. For curb alterations, see Sheets No. 28 and 29.
6. For expansion dam extensions, see Sheet No. 26. For new expansion brackets, see Sheet No. 27.
7. For erection procedure of floor beam cover plates, see Sheet No. 20.
8. For work on stringer seats, see Sheet No. 19.
9. For traveler rail adjustment, see Sheet No. 42.

TYPICAL FLOOR BEAM (West of Sta. 172+66.7 - See Note 1)
SECTION A-A
Scale: 3/8" = 1'-0"



VIEW B-B
Scale: 3/8" = 1'-0"

STRESSING END
(South side shown)

8 THS 10 THS
SCALE IN INCHES

MARK	DATE	DESCRIPTION	BY	CHK
1	11-1-63	As built with revisions	J.J.S.	EEF

REVISION

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

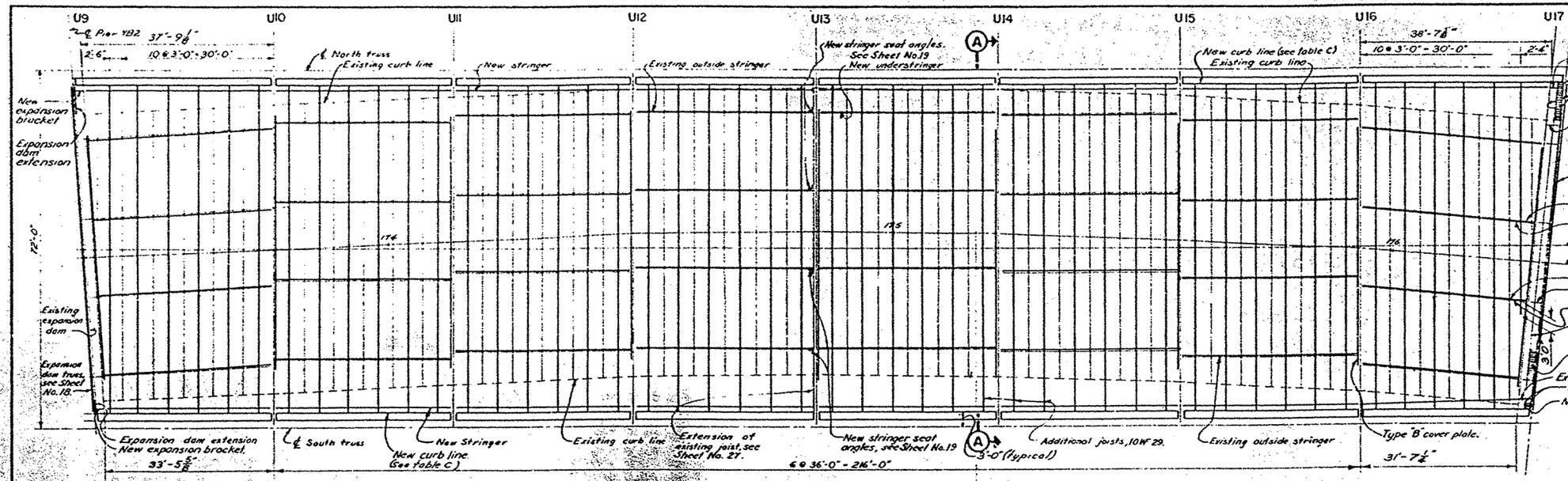
SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

SPAN YB1-YB2 DECK FRAMING

SCALE AS SHOWN | BRIDGE 33-25 34-03 34-04 | SHEET NO 16 | DRAWING C-4030-16R

PROJECTS ENGINEER — LICENSE 1478
DATE APPROVED October 6, 1961

APPROVAL RECOMMENDED BY ... SPECIFICATIONS ENGINEER — LICENSE 1478

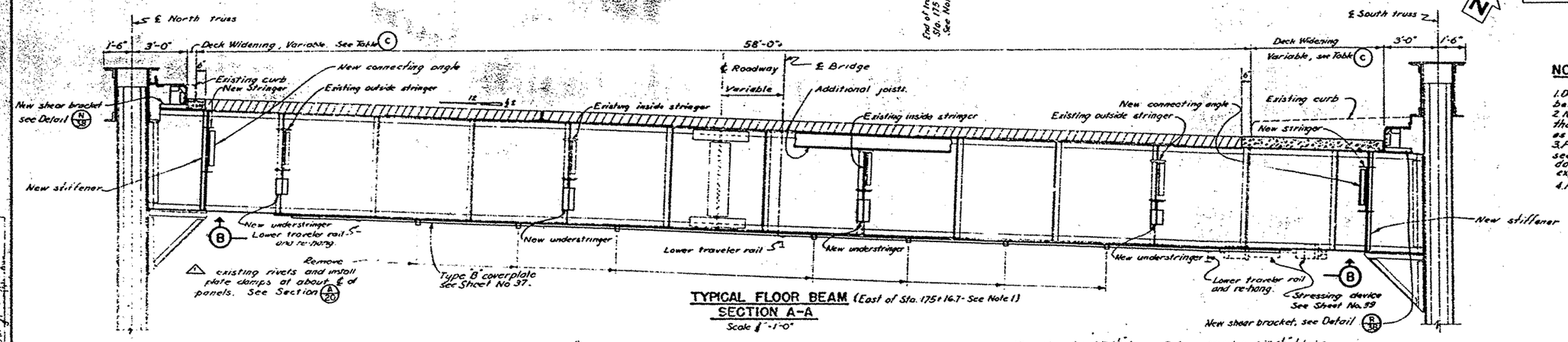


FRAMING PLAN - SPAN YB2 - YB3

Scale 1" = 10'-0"

DISTANCE BETWEEN EXISTING AND NEW CURB LINES									
PANEL POINT	U9	U10	U11	U12	U13	U14	U15	U16	U17
NORTH	5'-7 1/8	3'-10 1/8	2'-2 1/8	0'-11 1/8	0'-6	0'-10 3/8	2'-2	4'-3 1/8	7'-4 1/8
SOUTH	2'-6 1/8	4'-0 1/8	5'-8 1/8	7'-0 1/8	7'-6	7'-0 3/8	5'-9 1/8	3'-6 1/8	0'-10 3/8

TABLE C - DECK WIDENING



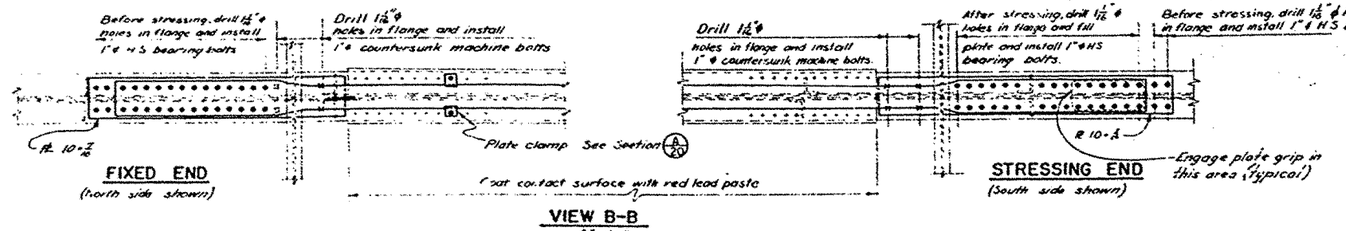
TYPICAL FLOOR BEAM (East of Sta. 175+16.7 - See Note 1)

SECTION A-A

Scale 1/4" = 1'-0"

NOTES

1. Deck sections West of Sta 175+16.7 are transitional between those shown on this sheet and on Sheet No 16.
2. Notes 2, 3, 4, 7, 8 and 9 on Sheet No 16 apply except that understringers in end panel of YB3 are shaped as shown on Sheet No 18.
3. For work on existing expansion brackets of Pier YB3 see Sheet No 15 (2). For new expansion grating and expansion dam extensions at Pier YB3 see Sheet No 26. For new expansion brackets, see Sheet No 27.
4. For curb alterations, see Sheet No 28.

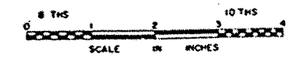


FIXED END (North side shown)

VIEW B-B

Scale 3/4" = 1'-0"

STRESSING END (South side shown)



MARK	DATE	DESCRIPTION REVISION	BY	CHK
1	11.1.65	As built with revisions	J.A.S.	E.E.F.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO-BAY TOLL CROSSINGS

SAN FRANCISCO - OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

SPAN YB2 - YB3 DECK FRAMING

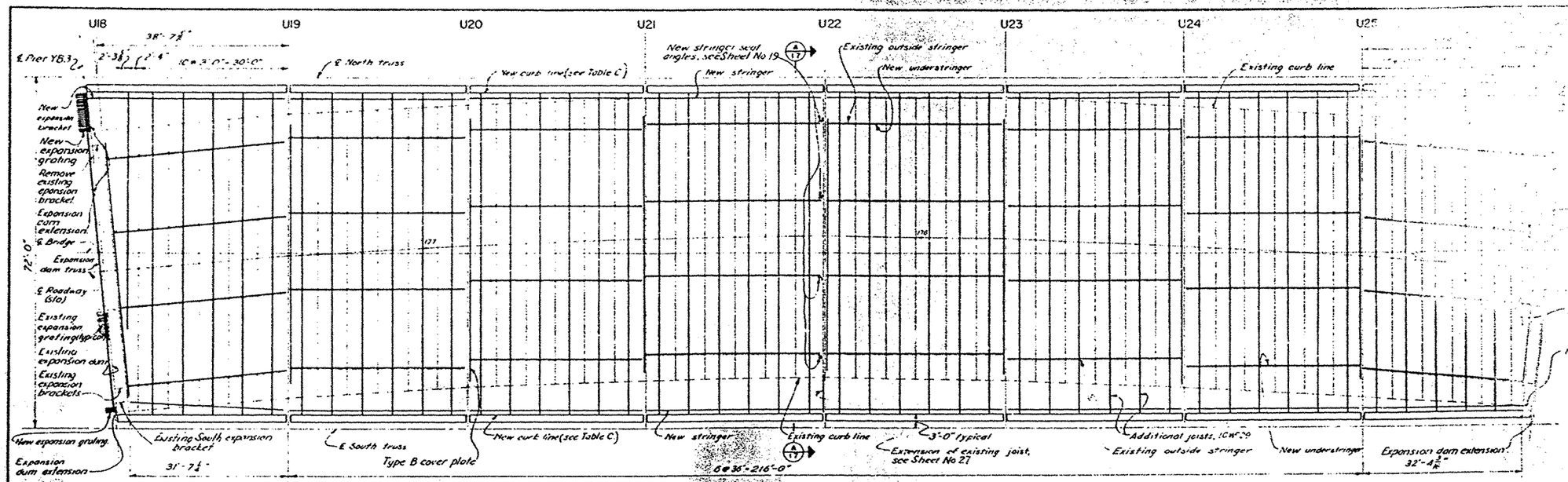
SCALE AS SHOWN | BRIDGE 33-25, 34-03, 34-04 | SHEET NO 17 | DRAWING C-4030-17R

PROJECTS ENGINEER - LICENSE TAPE
DATE APPROVED October 6, 1965

APPROVAL RECOMMENDED BY

PROJECTS ENGINEER—LICENSE 1479

DATE APPROVED October 5, 1961

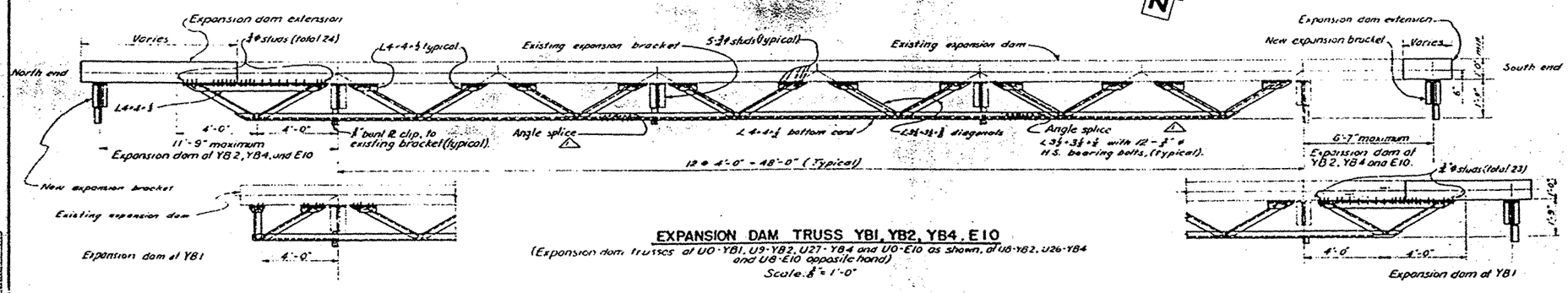


FRAMING PLAN-SPAN YB3-YB4

Scale: 1" = 10'-0"

DISTANCE BETWEEN EXISTING AND NEW CURB LINES									
PANEL POINT	U18	U19	U20	U21	U22	U23	U24	U25	U26
NORTH	7-6½	4-4½	2-2½	0-11½	0-6	0-10½	2-2	4-3½	7-6½
SOUTH	0-9½	3-5½	5-6½	7-0½	7-6	7-0½	5-9½	3-6 13/16	0-5½

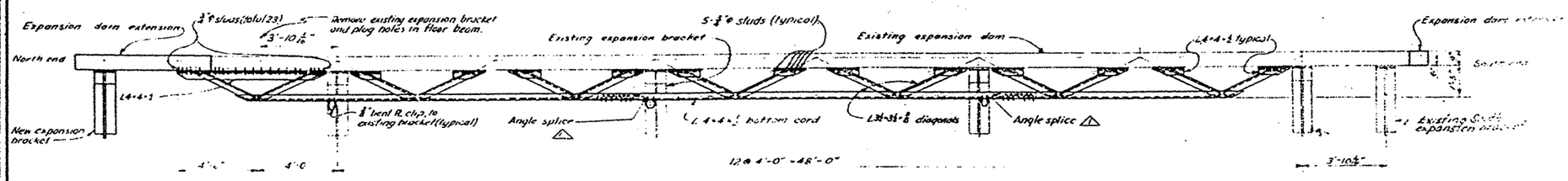
TABLE C-DECK WIDENING



EXPANSION DAM TRUSS YB1, YB2, YB4, E10

(Expansion dam trusses at U0-YB1, U9-YB2, U27-YB4 and U0-E10 as shown, at U18-YB2, U26-YB4 and U8-E10 opposite hand)

Scale: ⅜" = 1'-0"



EXPANSION DAM TRUSS YB3

(Expansion dam trusses: at U18 as shown, at U17 opposite hand)

Scale: ⅜" = 1'-0"

NOTES

1. For floor beams see section 4/17
2. Notes 2, 3, 4, 7, 8 and 9 on Sheet No. 16 apply, except that understringers in end panel at YB3 are shaped as shown on Sheet No. 19.
3. For work on existing expansion brackets of Pier YB3, see Sheet No. 17. For new expansion grating of Pier YB3 and expansion dam extensions, see Sheet No. 26. For new expansion brackets, see Sheet No. 27.
4. For typical expansion dam truss details, see Sheet No. 34.
5. For curb alterations see Sheets No. 28 and 30.
6. All connections to existing expansion dam to be ¾" ϕ full base threaded studs (Nelson HFB or equal).

8 THS 10 THS
0 1 2 3 4
SCALE IN INCHES

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO - OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

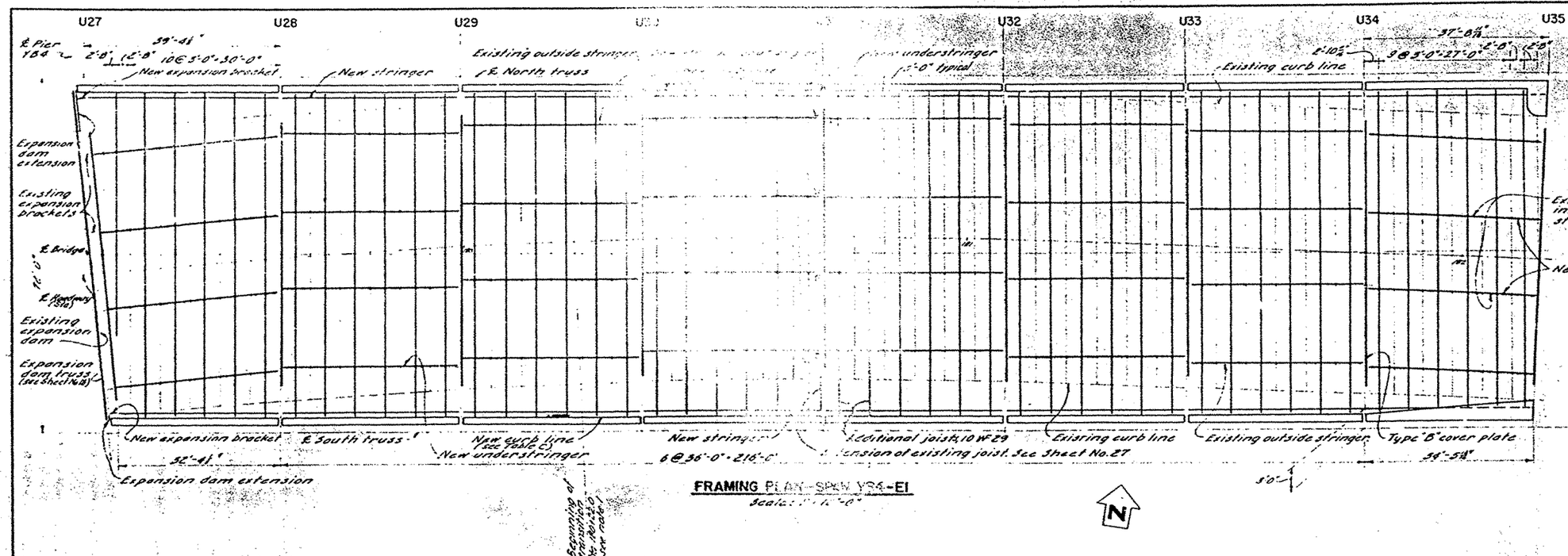
SPAN YB3-YB4 DECK FRAMING AND DETAILS

MARK	DATE	DESCRIPTION	BY
1	11.1.63	[illegible]	[illegible]

SCALE AS SHOWN | BRIDGE 33-26, 33-03, 34-03, 34-04 | SHEET NO 18 | DRAWING C-4050-18R

APPROVAL RECOMMENDED BY: [illegible] BRIDGE ENGINEER LICENSE [illegible]

REVISIONS	DATE	APPROVED
[illegible]	[illegible]	[illegible]



DISTANCE BETWEEN EXISTING AND NEW CURB LINES									
PANEL POINT	U27	U28	U29	U30	U31	U32	U33	U34	U35
NORTH	7-7 7/16"	4-4 3/16"	2-2 9/16"	0-11 11/16"	0-0	0-10 9/16"	2-2 1/16"	3-9 5/16"	5-0½
SOUTH	0-9 1/16"	3-6 1/16"	5-0 7/16"	7-0 3/16"	7-0	7-0 1/16"	5-9 9/16"	4-1 5/16"	6-0

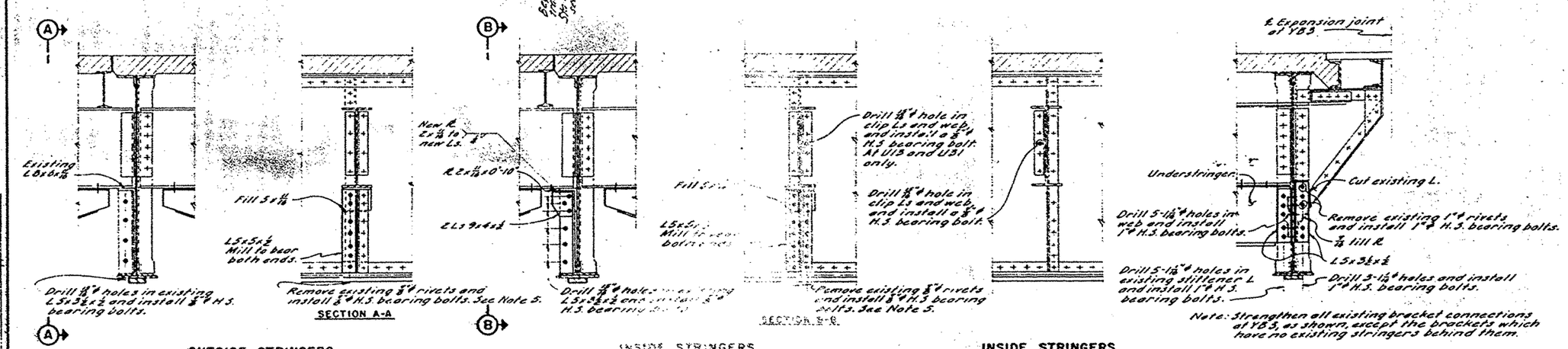
TABLE C - DECK WIDENING

NOTES

1. For deck sections West of Sta. 180+22.0 see Section "D". Deck sections East of Sta. 180+22.0 are modifications between those shown on Sheets No. 16 and 17.
2. Notes 2,3,4,7,8 and 9 on Sheet No. 16 apply.
3. For expansion dam extensions see Sheet No. 26. For new expansion brackets see Sheet No. 27.
4. For curb alterations, see Sheets No. 28 and 30.
5. Replace one rivet at a time.

FRAMING PLAN - SPAN YB4-E1

Scale: 1" = 1'-0"



OUTSIDE STRINGERS

INSIDE STRINGERS

STRINGER SEAT STRENGTHENING

(At floor beams U4, U15, U22 and U34)

INSIDE STRINGERS

CLIP ANGLE STRENGTHENING

(At floor beams U10, U11, U14, U15, U16, U28, U29, U30, U32, U33 and U34)

EXPANSION BRACKETS AT YB3

(Total 8)

6 THS 10 THS

0 1 2 3 4

SCALE IN INCHES

MARK	DATE	DESCRIPTION REVISION	BY	CHK
1	11/83	As built added revisions	L.L.S.	EEF

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

SPAN YB4-E1 DECK FRAMING AND DETAILS

UNLESS NOTED SCALE 3/4"=1'-0" | BRIDGE 33-25 34-03 34-04 | SHEET No 19 | DRAWING C-4030-19R

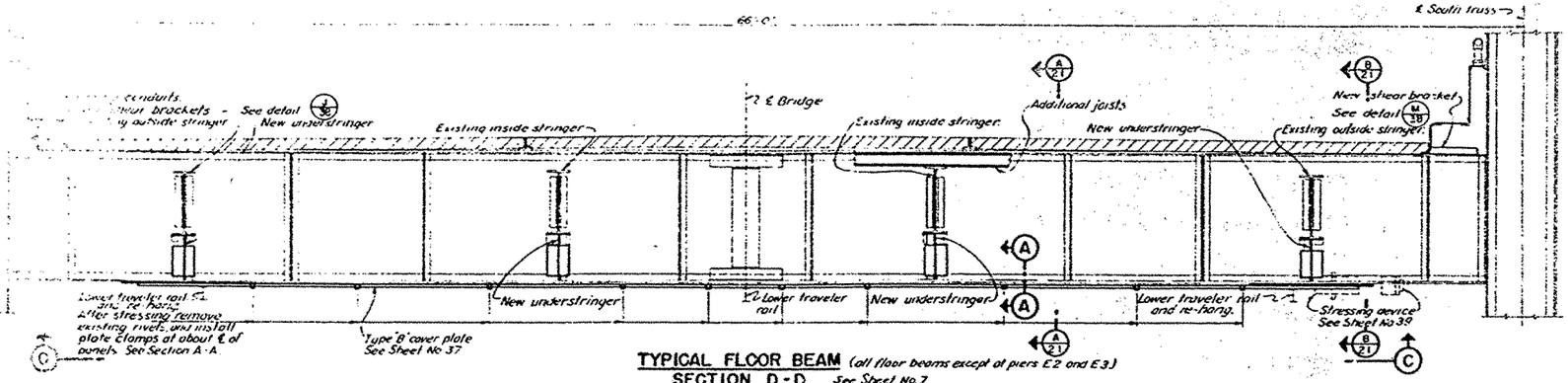
APPROVAL RECOMMENDED BY: SUPERVISING BRIDGE ENGINEER LICENSE 17471

PROJECT ENGINEER - LICENSE 1429

DATE APPROVED OCT. 5, 1981

PROJECTS ENGINEER LICENSE 4470

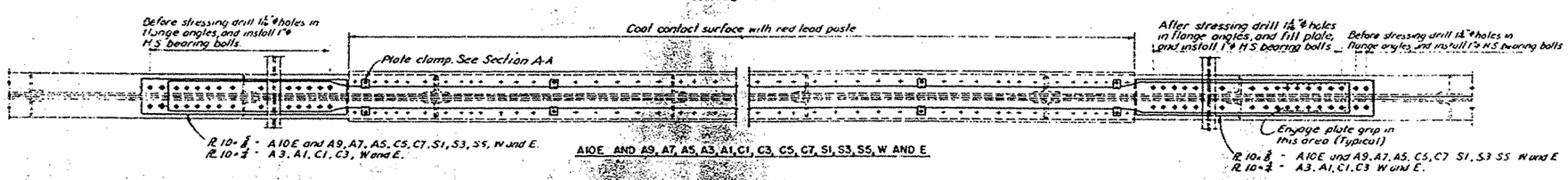
DATE APPROVED October 6, 1961

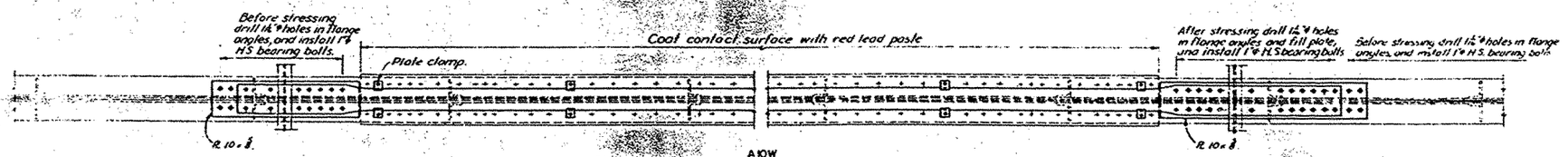


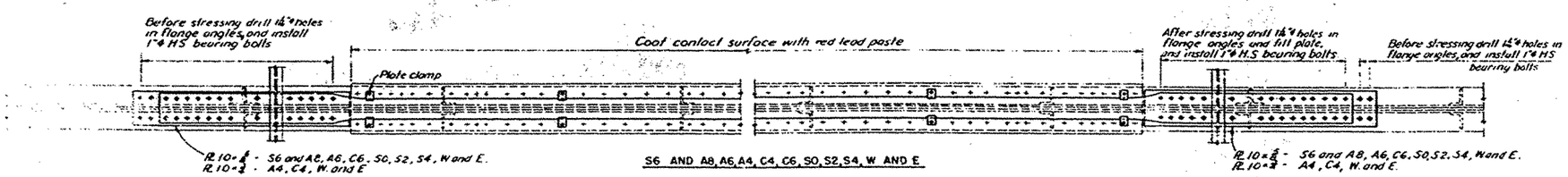
TYPICAL FLOOR BEAM (all floor beams except at piers E2 and E3)

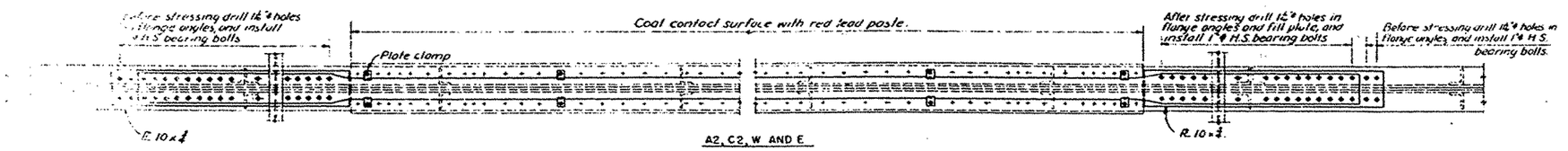
SECTION D-D See Sheet No. 7

Scale: 3/8" = 1'-0"









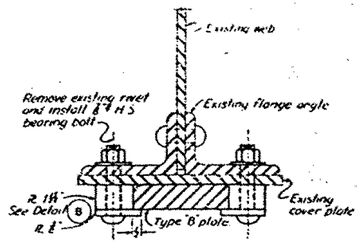
FIXED END
(North side shown)

VIEW C-C

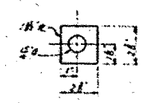
STRESSING END
(South side shown)

NOTES

1. For stringer seat strengthening see Sheet No. 22.
2. For understringers see Sheet No 21
3. For traveler rail adjustment see Sheet No 43
4. For panel point designation see Sheet Nos 7 and 8



SECTION A-A
Scale 3" = 1'-0"



DETAIL B
Scale 3" = 1'-0"

SUGGESTED ERECTION PROCEDURE FOR FLOOR BEAM COVER PLATES

1. Lower traveler rail to clear plate.
2. Drill flange holes at fixed end through template.
3. Clean contact areas of flange angles as specified.
4. Coat specified contact area of cover plate with red lead paste.
5. Erect cover plate, bolt fixed end to floor beam flange
6. Erect stressing device (see Sheet No. 39)
7. Stress cover plate by jacking in increments, allowing time for inspection after each increment. Lock jacks when the specified initial prestress is reached (see Sheets No 6-15)

   Note: Prestress tolerances : +5%, no understress.
8. While plate is held under full prestress drill holes in floor beam flange, using accessible holes of plate as template. Install H.S. bearing bolts.

   Note: If plates cannot be bolted tight due to presence of burrs or trapped drilling refuse, remove bolts, release jacks, separate plate from flange, clean contact surfaces, retension and rebolt.
9. Remove stressing device, drill flange holes thru removing plate holes and install remaining bolts.

0 6 THS 10 THS
SCALE IN INCHES

MARK	DATE	DESCRIPTION REVISION	BY	CHK
1	11.1.63	As built without revisions	CB	EEF

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

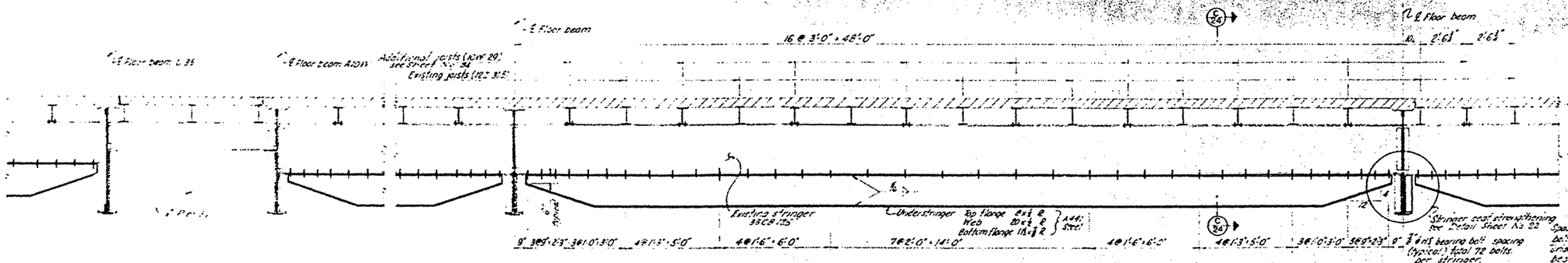
SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

CANTILEVER STRUCTURE-FLOOR BEAMS

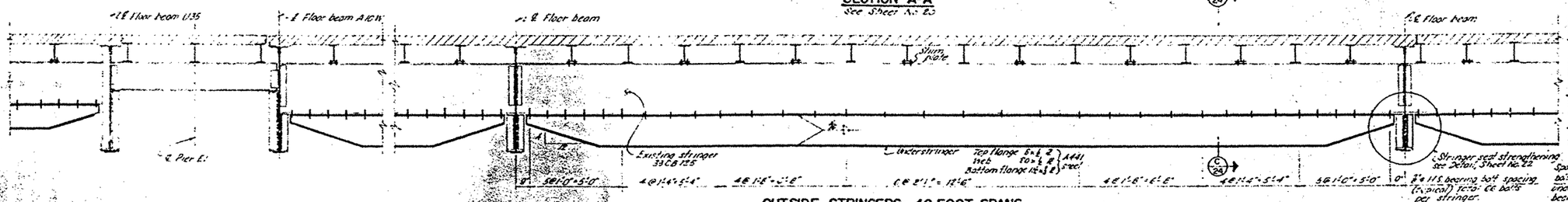
UNLESS NOTED SCALE 3/8" = 1'-0" | 33-25 34-03 34-04 | SHEET No. 20 | DRAWING 4030-20R

APPROVAL RECOMMENDED BY

PROJECT ENGINEER LICENSE 1470
DATE APPROVED October 6, 1961



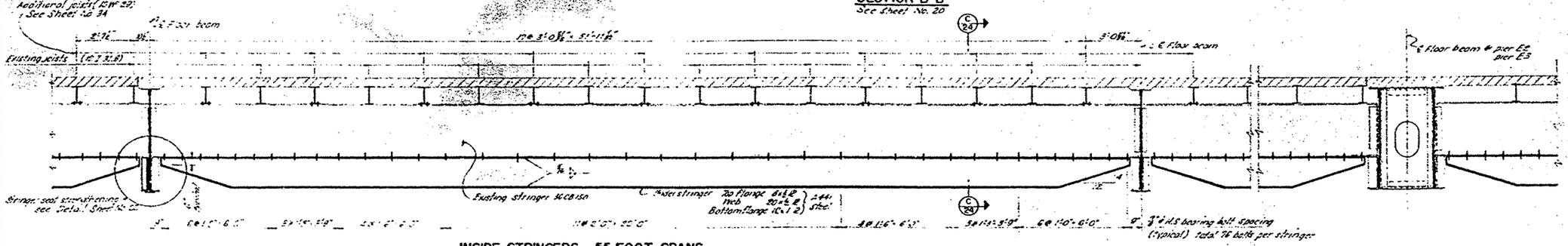
INSIDE STRINGERS - 48 FOOT SPANS
SECTION A-A
See Sheet No. 20



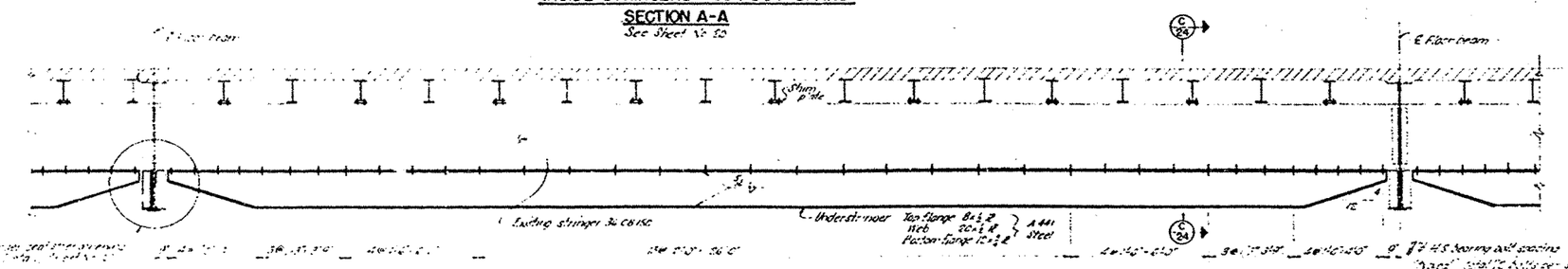
OUTSIDE STRINGERS - 48 FOOT SPANS
SECTION B-B
See Sheet No. 20

NOTES

1. For precamber of inside understringers see Sheets No. 7 and 8. For erection procedure of understringers see Sheet No. 34.
2. For joist details see Sheet No. 34.



INSIDE STRINGERS - 55 FOOT SPANS
SECTION A-A
See Sheet No. 20



OUTSIDE STRINGERS - 55 FOOT SPANS
SECTION B-B
See Sheet No. 20

8 THS 10 THS
0 1 2 3 4
SCALE IN INCHES

MARK	DATE	DESCRIPTION	BY	CHK
1	11 1 63	As built without revisions	CE	EEF

REVISION

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE RECONSTRUCTION STEEL WORK - EAST BAY

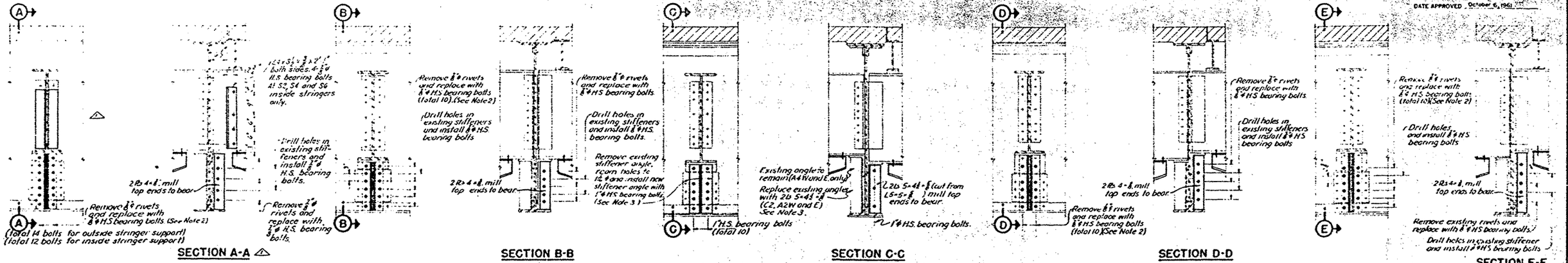
CANTILEVER STRUCTURE-STRINGERS

UNLESS NOTED SCALE 3/8" = 1'-0" | BRIDGE 33-25 34-03 34-03 | SHEET No 21 | DRAWING C-4030-21R

APPROVAL RECOMMENDED BY
Supervising Bridge Engineer
LICENSE 11257

PROJECT ENGINEER — LICENSE 1878

DATE APPROVED October 6, 1961



STRINGERS
(At floor beams △ C6, S0, S2, S4, W and E and S6)

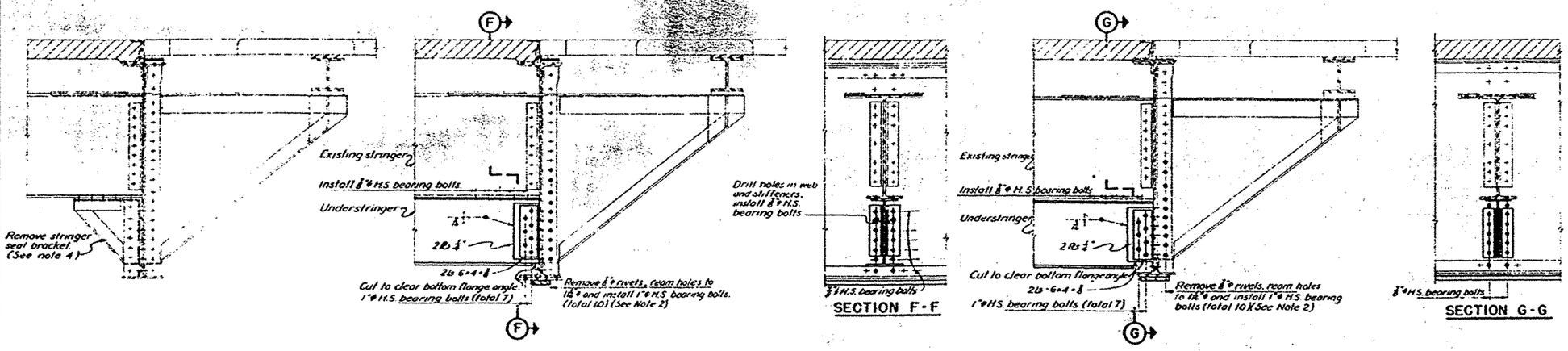
OUTSIDE STRINGERS
(At floor beams C2, A2, W and E)

INSIDE STRINGERS
(At floor beams C2, A2, A4 W and E)
OUTSIDE STRINGERS
(At floor beams A4 W and E)

OUTSIDE STRINGERS
(At floor beams C4 W and E)

INSIDE STRINGERS
(At floor beams C4, W and E)

STRINGER SEAT STRENGTHENING



EXISTING EXPANSION BRACKET

INSIDE EXPANSION BRACKETS

OUTSIDE EXPANSION BRACKETS

EXPANSION BRACKET STRENGTHENING AT PIER E4

NOTES

1. For designation and location of panel points (eg. A2 C2), see sheet No's 7 and 8.
2. Replace one rivet at a time.
3. Replace one stiffener angle at a time. Provide temporary support during erection.
4. Provide temporary bracing for the expansion bracket during and after removal of stringer seat bracket.

0 1 2 3 4 — 0 THS 10 THS
SCALE IN INCHES

APPROVAL RECOMMENDED BY

MARK	DATE	DESCRIPTION	BY	CH'K
1	11-1-63	As built with revisions	DB	EEF

REVISION

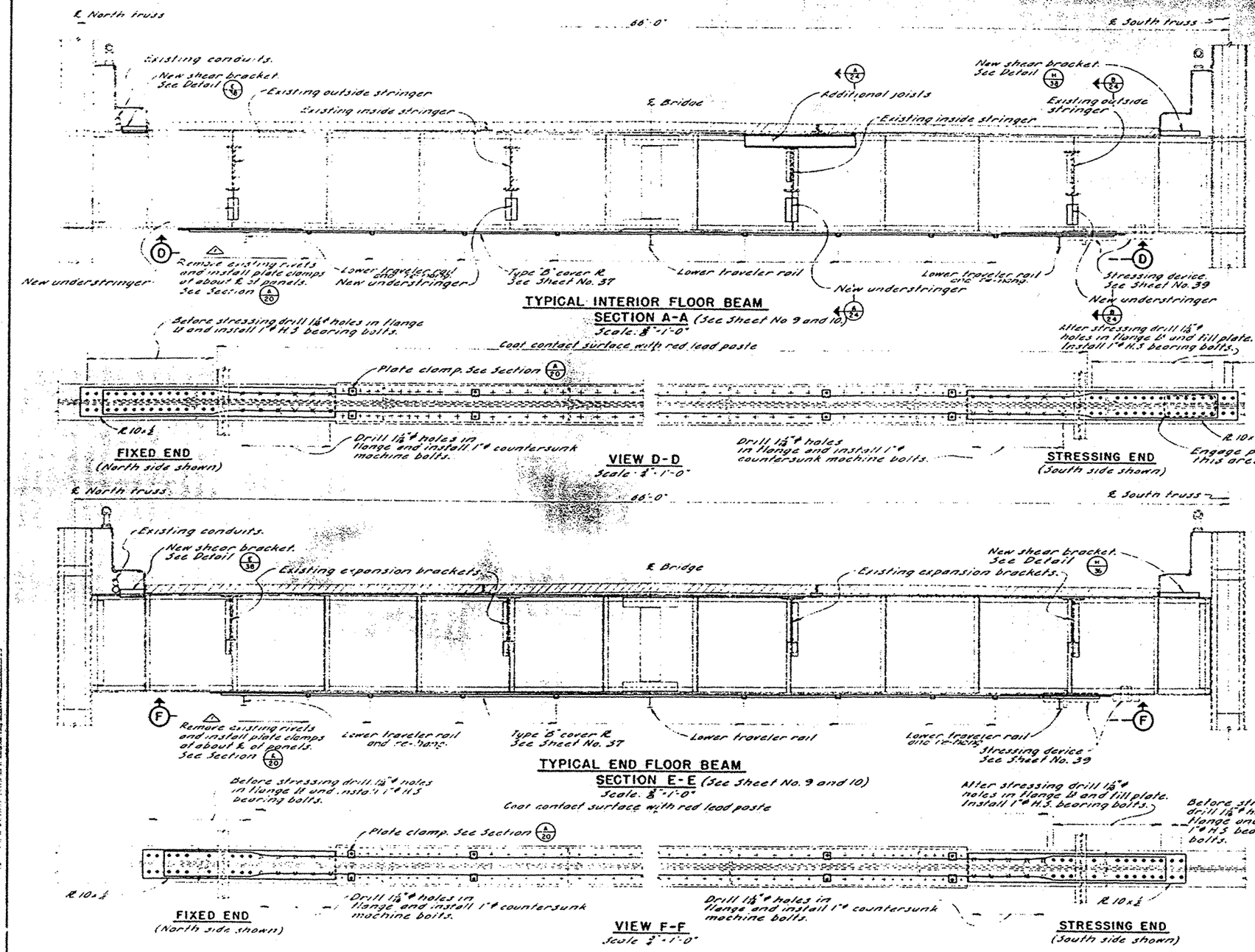
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

CANTILEVER STRUCTURE-DETAILS

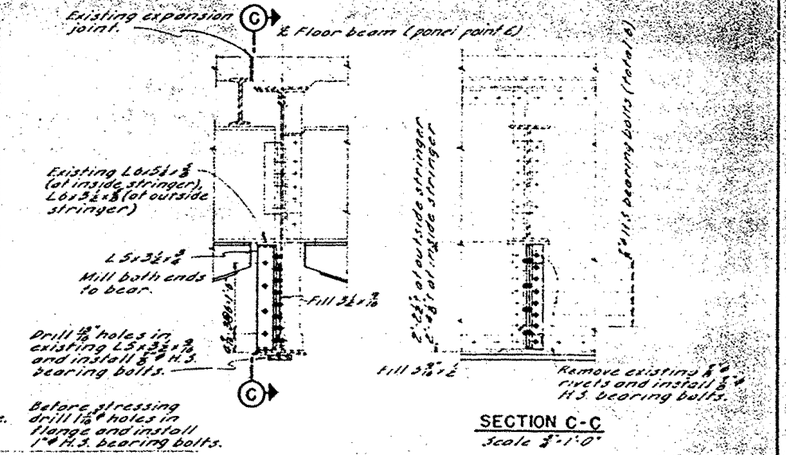
UNLESS NOTED SCALE ¾" = 1'-0" | BRIDGE 33-25, 34-03, 34-04 | SHEET No 22 | DRAWING: 4030-22R

PROJECT ENGINEER - LICENSE NO.
DATE APPROVED October 6, 1961



TYPICAL INTERIOR FLOOR BEAM
SECTION A-A (See Sheet No 9 and 10)
Scale: 3/8" = 1'-0"

VIEW D-D
Scale: 3/4" = 1'-0"



SECTION C-C
Scale 3/4" = 1'-0"

STRINGER SEAT STRENGTHENING
DETAIL B
(At interior expansion joints only, E4-E9)
Scale 3/4" = 1'-0"

TYPICAL END FLOOR BEAM
SECTION E-E (See Sheet No. 9 and 10)
Scale: 3/8" = 1'-0"
Coat contact surface with red lead paste

VIEW F-F
Scale 3/4" = 1'-0"

NOTES

1. For erection procedure of cover plates, see Sheet No 20.
2. For understringers, see Sheet No. 24.
3. For traveler rail adjustment, see Sheet No. 43.

0 THS 10 THS
0 1 2 3 4
SCALE IN INCHES

MARK	DATE	DESCRIPTION	BY	CH'K
1	11-1-63	As built with revisions	RB	EEF

REVISION

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK- EAST BAY

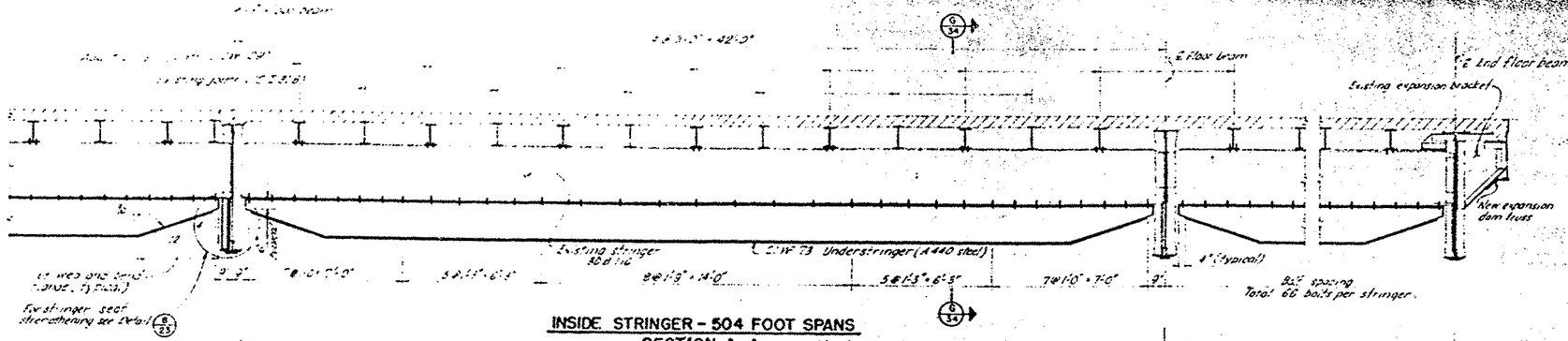
504 FOOT SPANS - FLOOR BEAMS

SCALE AS SHOWN | BRIDGE 33-25, 34-03, 34-04 | SHEET NO 23 | DRAWING C-4C,5C-23B

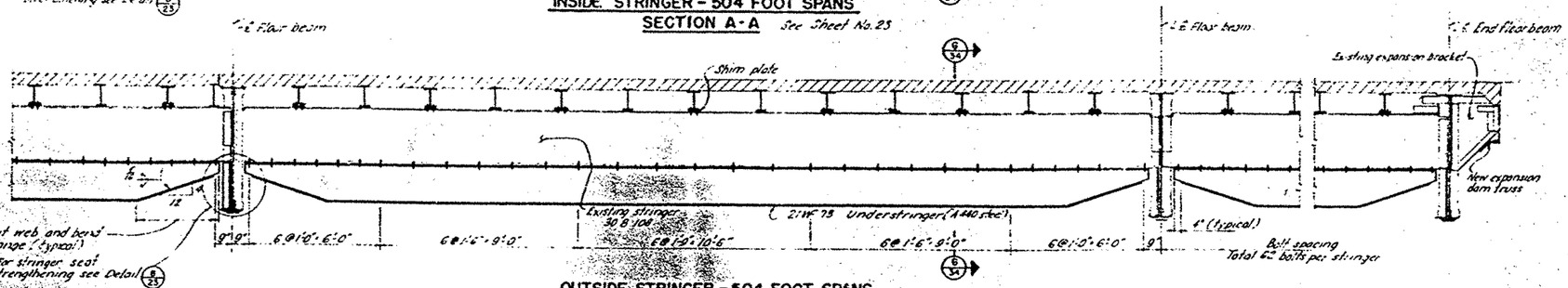
APPROVAL RECOMMENDED BY

PROJECT ENGINEER — LICENSE NO.

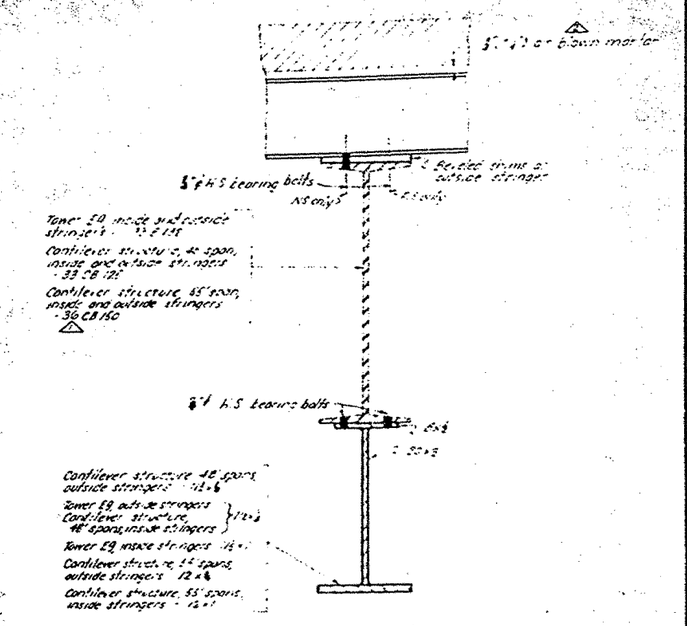
DATE APPROVED October 6, 1961



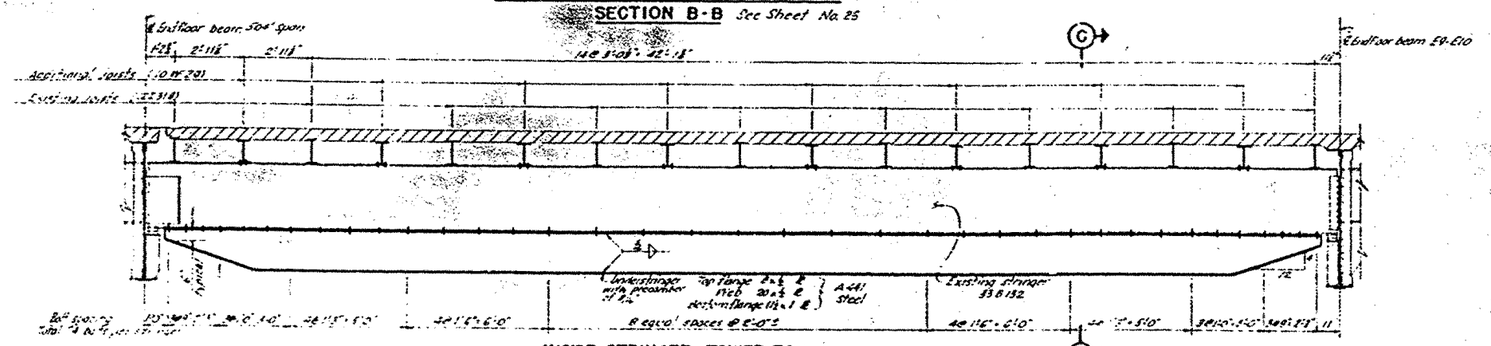
INSIDE STRINGER - 504 FOOT SPANS
SECTION A-A See Sheet No. 25



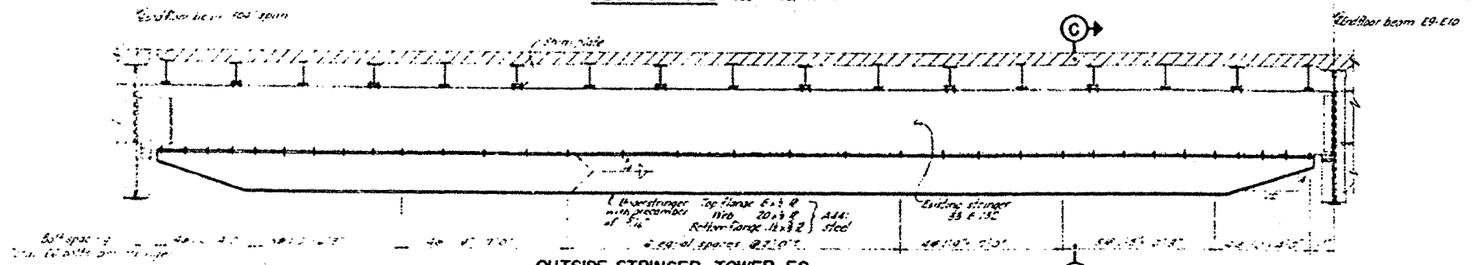
OUTSIDE STRINGER - 504 FOOT SPANS
SECTION B-B See Sheet No. 25



SECTION C-C
Scale 1" = 1'-0"



INSIDE STRINGER - TOWER E9
SECTION D-D See Sheet No. 11



OUTSIDE STRINGER - TOWER E9
SECTION E-E See Sheet No. 11

NOTES

1. For erection procedure of understringers see Sheet No. 34.
2. For additional welds see Sheet No. 34.
3. For expansion dam trusses at E5, E6, E7 and E8 see Sheet No. 34.

0 1 2 3 4 5 6 7 8 9 10 FTS
SCALE IN INCHES

SUPPLEMENTAL CONTRACT DRAWING

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO - OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

504 FOOT SPANS AND TOWER E9 - STRINGERS

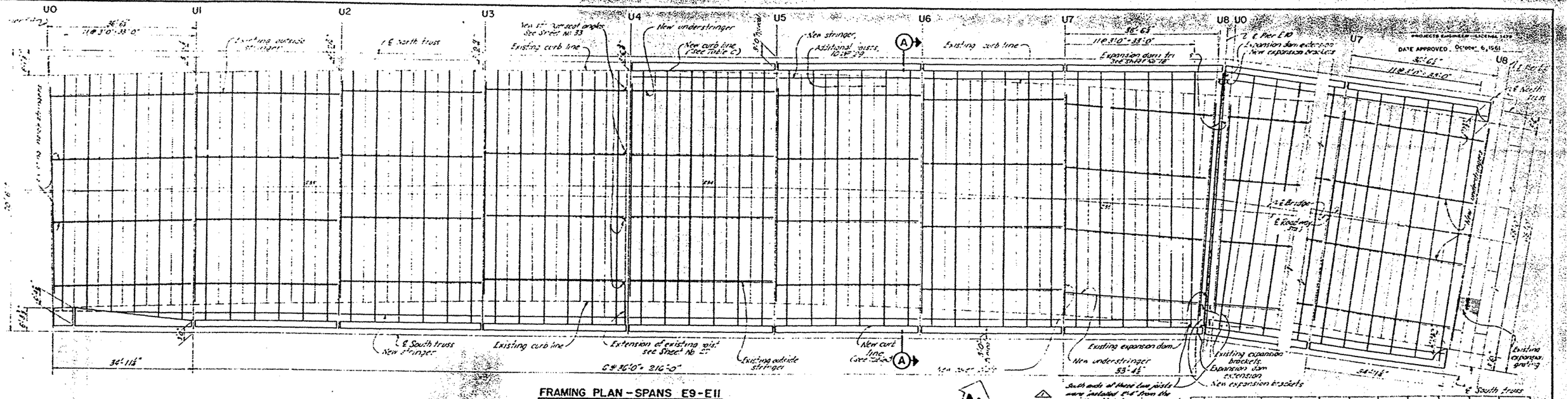
MARK	DATE	DESCRIPTION	BY	CHK
2	11 1 63	As built with revisions	GB	EEF
1	1 11 61	Existing stringer designation corrected	EEF	AL

REVISION

UNLESS NOTED SCALE 3/8" = 1'-0" | BRIDGE 33-25, 34-03, 34-04 | SHEET No. 24 | DRAWING C 403024B

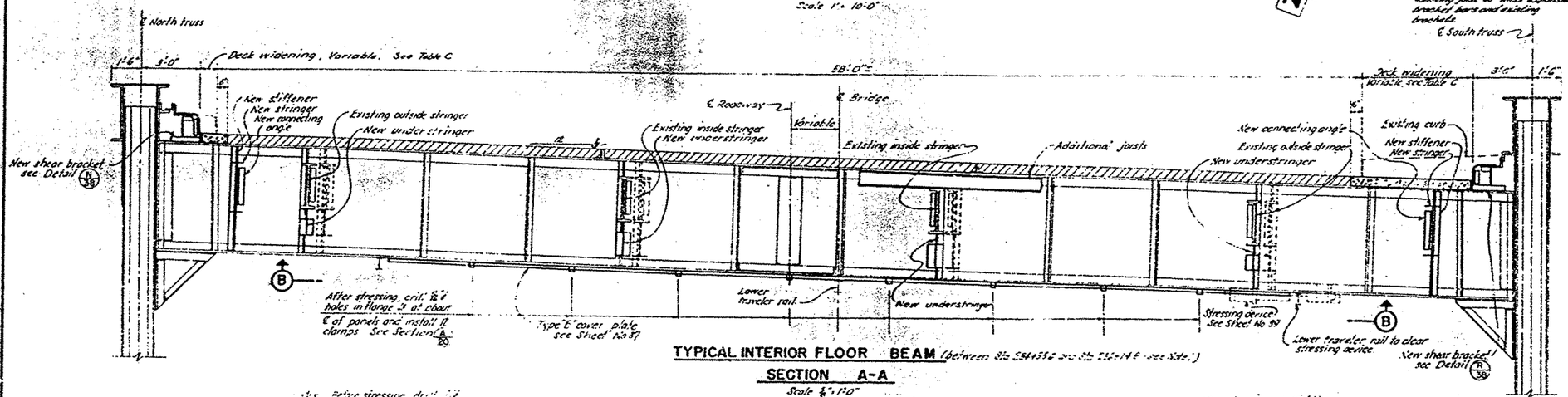
APPROVAL RECOMMENDED BY

DESIGN
DETAILS
QUANTITIES
CHECKED
LAYOUT
DETAILS AND QUANTITIES REVIEWED BY



FRAMING PLAN – SPANS E9-E11

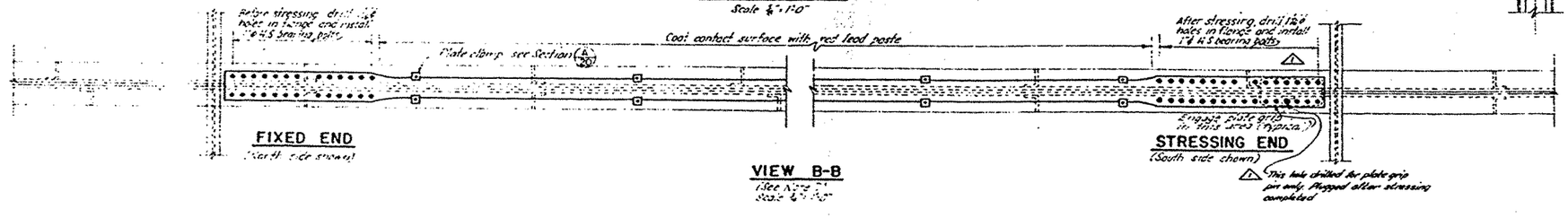
Scale 1" = 10'-0"



TYPICAL INTERIOR FLOOR BEAM (between Sta 284+35.6 and Sta 286+14.6 - see Note.)

SECTION A-A

Scale 1/4" = 1'-0"



FIXED END
(North side shown)

STRESSING END
(South side shown)

VIEW B-B

(See Note 1)
Scale 1/4" = 1'-0"

South ends of these two joists were installed 1'-6" from the existing joist to miss expansion bracket bars and existing brackets

SPAN E9-E10	PANEL POINT	U0	U1	U2	U3	U4	U5	U6	U7	U8
	NORTH	0-0	0-0	0-0	0-0	0-0	0-10 3/8	1-10	3-5 7/16	5-10 5/16
	SOUTH	0-0	4-0 3/8	4-10 7/16	5-7 11/16	5-11 5/8	5-7 1/2	4-7 1/2	2-11 9/16	0-5 11/16

SPAN E10-E11	PANEL POINT	U0	U1	U2	U3	U4	U5	U6	U7	U8
	NORTH	5-8 5/16	3-4 5/16	1-9 5/8	0-9 13/16	0-6 5/8	0-10 5/8	1-7 3/8	2-5 5/8	0-0
	SOUTH	0-11 7/16	3-0 13/16	4-5 3/8	5-7 3/16	5-11 5/8	5-7 1/2	4-10	4-0 3/8	0-0

TABLE C – DECK WIDENING
DISTANCE BETWEEN EXISTING AND NEW CURB LINES

NOTES

1. Interior deck sections West of Sta 284+35.6 and East of Sta 286+14.6 are transitional between those shown on this sheet and on Sheet No. 16.
2. For understringers see Sheet No. 34. Shapes of understringers in end panels to be equal to those in 36' panels.
3. For new stringers see Sheet No. 22.
4. For joint details see Sheet No. 54.
5. For curb alterations see Sheets No. 28 and 51.
6. For expansion dam extensions see Sheet No. 26. For new expansion brackets see Sheet No. 27.
7. For erection procedure of floor beam cover plates see Sheet No. 50. For floor beam U0 at E9 see view BB - Sheet No. 16, for floor beams U1 E, U1 at E10 see view 5-E on Sheet No. 35 and for floor beam U8 at E11 see view 6-E on Sheet No. 35.
8. For work on stringer seats see Sheet No. 37.
9. For traveler rail adjustment see Sheet No. 40.

SCALE IN INCHES: 0, 1, 2, 3, 4 — 8 THS, 10 THS

MARK	DATE	DESCRIPTION	BY	CH'K
1	11/68	As built with revisions	J.L.S.	E.E.F.

REVISION

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

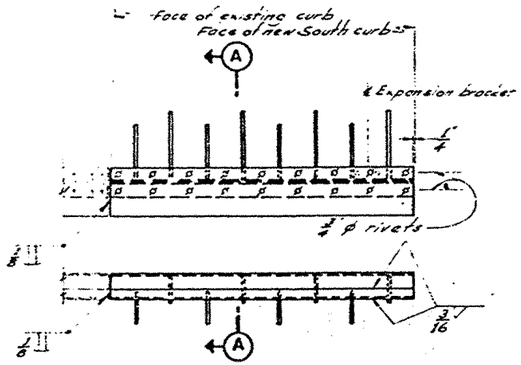
SAN FRANCISCO-OAKLAND BAY BRIDGE RECONSTRUCTION
STEEL WORK - EAST BAY

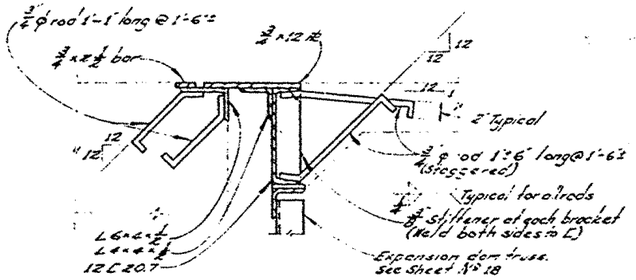
SPANS E9 - E11 DECK FRAMING

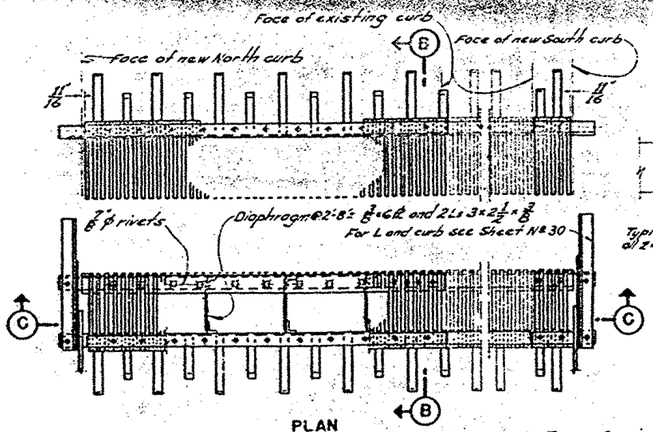
SCALE AS SHOWN | BRIDGE 33-25 34-05 34-04 | SHEET NO 25 | DRAWING C-4030-25R

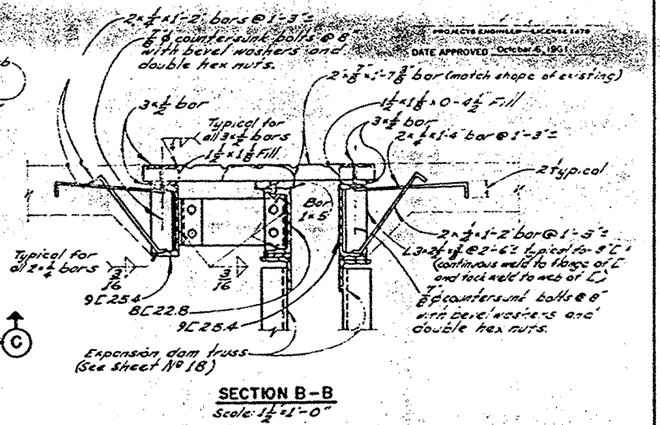
APPROVAL RECOMMENDED BY: H. H. Kirkley, Supervising Bridge Engineer, Lic. No. 5

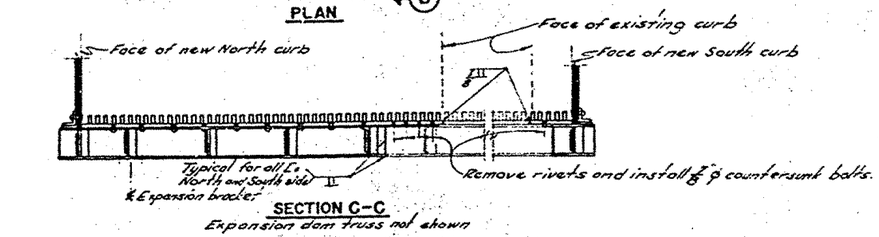
DESIGN
DETAILS
QUANTITIES
THE VIEW AND DESIGNS IN THIS DRAWING



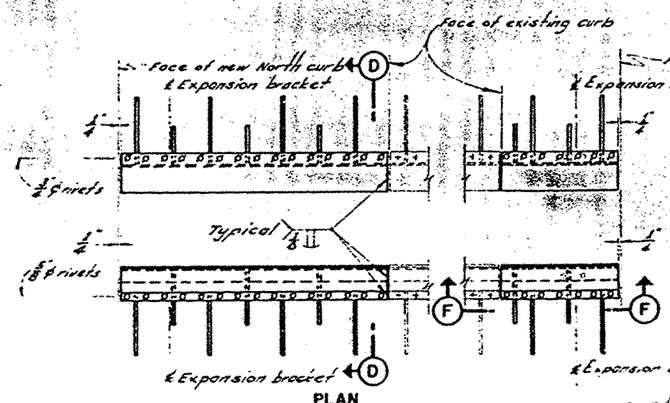


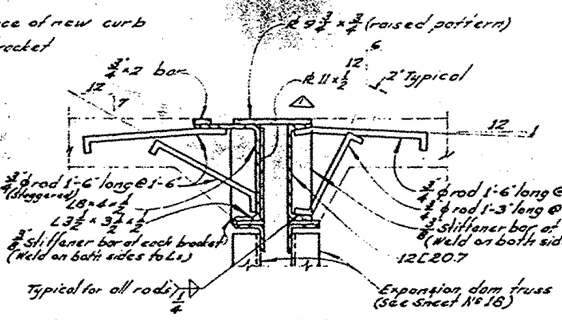


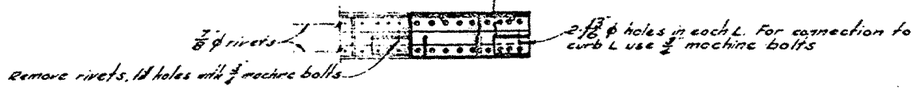




PIER YB1

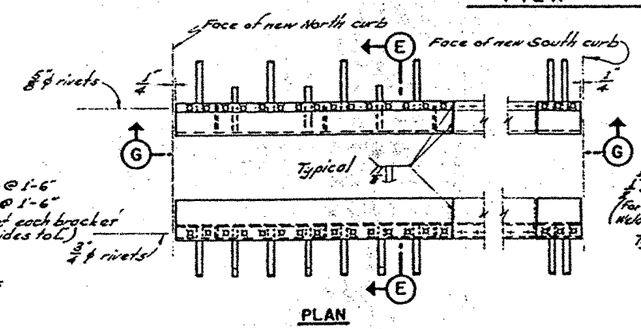


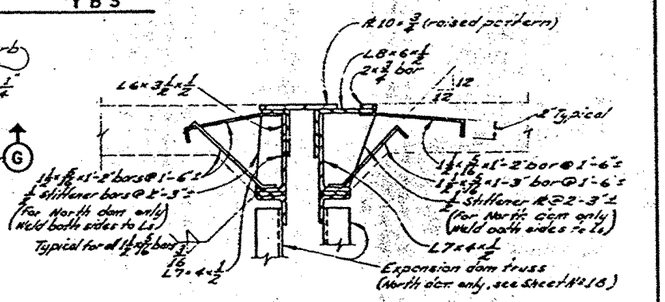


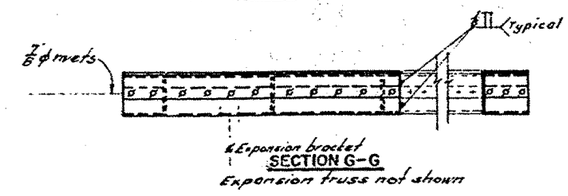


PIER YB2 AND YB4

PIER YB3







NOTES:

1. All holes for 7/8" ϕ - for 7/8" ϕ HS bearing bolts unless noted.
2. For expansion brackets see Sheet No 22.
3. The bottom surface of grating bars shall be in one plane, free of warps or distortions after fabrication and each bar shall have full bearing on supports.

△ ℄ For as-built record see ship drawings.

SCALE IN INCHES

PIER E10

MARK	DATE	DESCRIPTION REVISION	BY	CHK
2	11-5-62	As built with revisions	A.L.S.	E.E.F.
1	11-17-61	New plate designation added	E.E.F.	A.L.

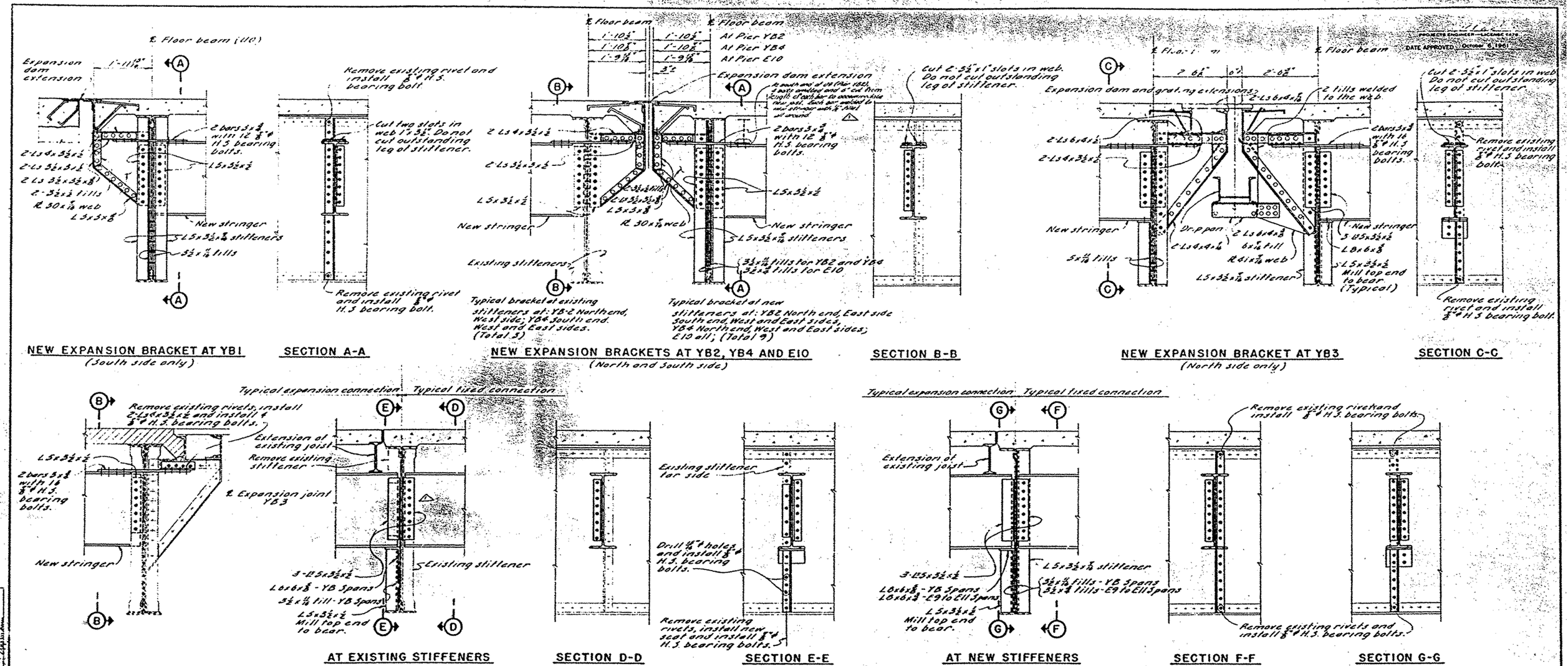
SUPPLEMENTAL CONTRACT DRAWING

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

EXPANSION DAM EXTENSIONS

UNLESS NOTED SCALE 1/4" = 1'-0" | BRIDGE 33-25 34-03 54-04 | SHEET No 26 | DRAWING C-4030-26R



NOTES

1. All new rivets to be ⅞"φ.
2. All new field connections to be ⅞"φ H.S. bearing bolts unless noted.
3. For expansion dam extensions see Sheet No. 26.
4. For work on drip pan at YB3 see Sheet No. 45.
5. New stringer end connections to floor beams to be 4 feet (±6") from ℄ Truss at YB Spans, and 5 feet (±3") from ℄ Truss at E9-E11 Spans. Existing stiffener angles may be used for stringer connections if feasible and practical.
6. For location of joist extensions see Sheet Nos. 16, 17, 18, 19 and 25.
7. For sizes of new stringers see Sheet Nos. 6 and 11.
8. △ For as-built record see shop drawings

MARK	DATE	DESCRIPTION	BY	CH'K
△	11-63	As built with revisions	LLS	EEF

REVISION

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

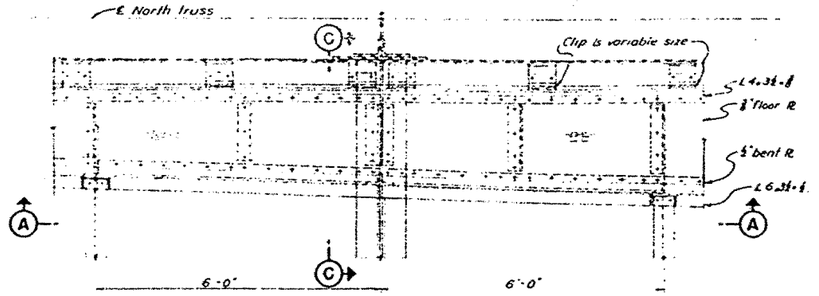
STEEL WORK- DECK WIDENING

Scale 3/4"=1'-0" | Bridge 33-25, 34-03, 34-04 | Sheet No 27 | Drawing C-4030-27R

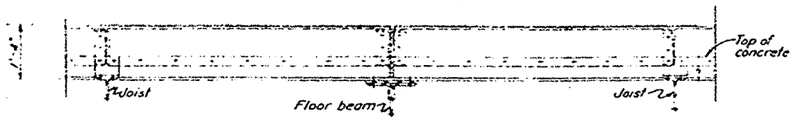
PROJECTS ENGINEER — CLAIRE E. TATE
DATE APPROVED October 6, 1961

APPROVAL RECOMMENDED BY: J. H. Rudy, Chief Engineer, Bridge Design

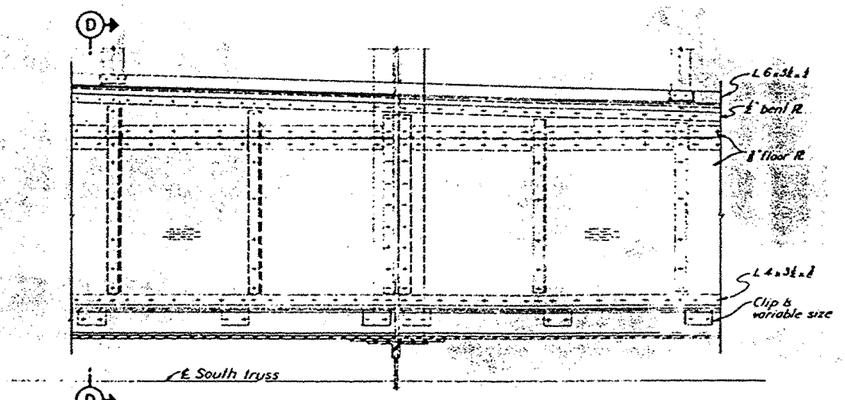
QUANTITIES CHECKED:
DESIGN AND DETAILS REVIEWED BY:



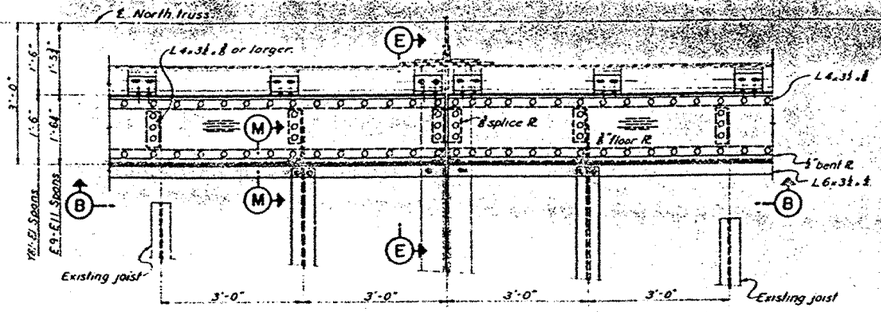
PLAN - NORTH CURB



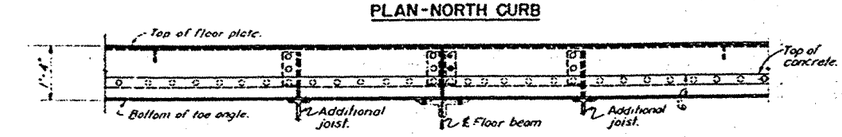
SECTION A-A



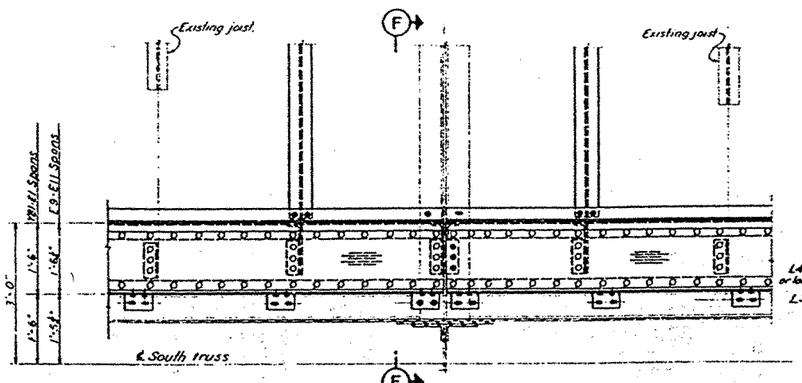
PLAN - SOUTH CURB



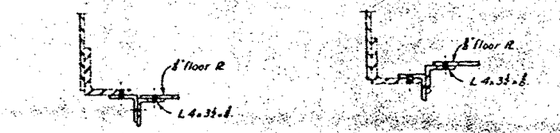
PLAN-NORTH CURB



SECTION B-B

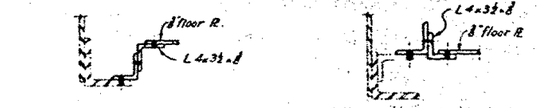


PLAN-SOUTH CURB



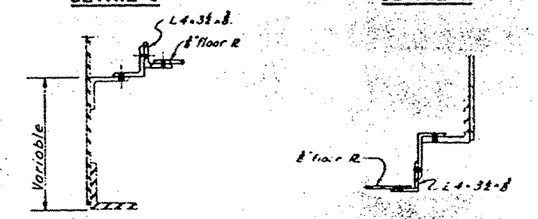
DETAIL G

DETAIL H



DETAIL J

DETAIL K

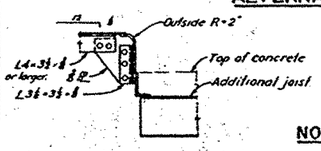


DETAIL L

DETAIL N

ALTERNATIVE CHORD CONNECTIONS

Scale: 1½" = 1'-0"



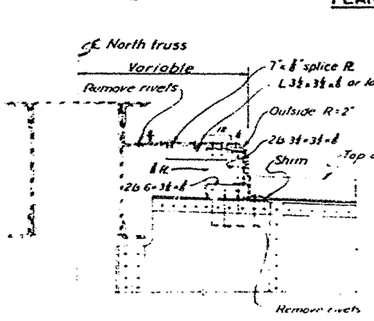
SECTION M-M

Typical curb detail at additional joist.

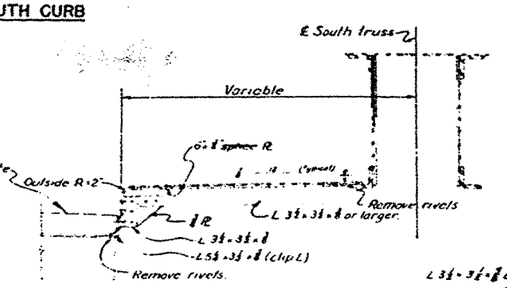
NOTES

1. All shop rivets ¾"ø, countersunk heads not over ⅜" high
2. All field connections of floor plate and of bent curb plate ¾"ø flat head bolts except as noted.
3. For curb to chord connections use either ⅝ bent plates or clip angles and ¾"ø machine bolts except for existing 1⅛"ø holes use 1"ø machine bolts.
4. For curb to floor beam and curb to joist connections use ⅝"ø machine bolts.
5. Deck slab concrete is omitted on all plan views
6. Details (G) (H) (J) (K) (L) and (N) show various connections between curb and chord.

⚠ 7 For as-built record see shop drawings

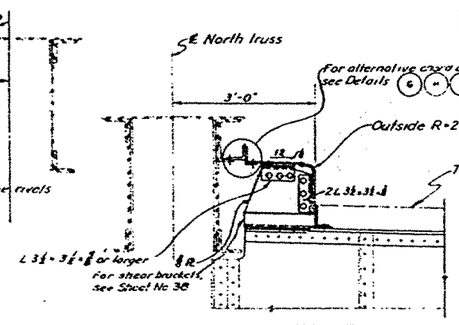


SECTION C-C
(At floor beam)

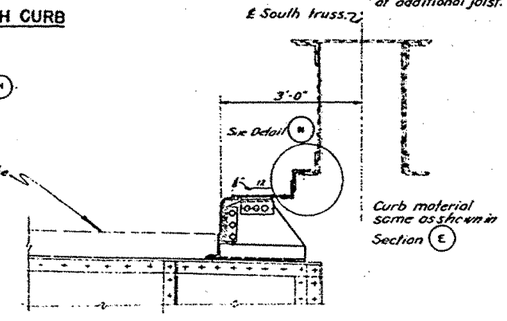


SECTION D-D
(At joist)

EXISTING CURB

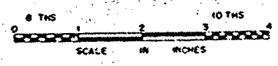


SECTION E-E
(At floor beam)



SECTION F-F
(At floor beam)

NEW CURB



MARK	DATE	DESCRIPTION	BY	CH'K
1	11-68	As built with revisions	L.L.S.	EEF

REVISION

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

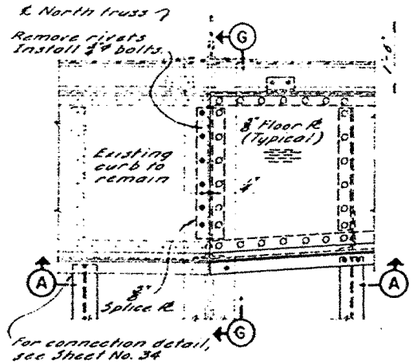
YB1 - E1 AND E9-E11 TYPICAL CURB DETAILS

UNLESS NOTED SCALE ¾" = 1'-0" | BRIDGE 33-25 34-03 34-04 | SHEET No. 28 | DRAWING C-4030-28A

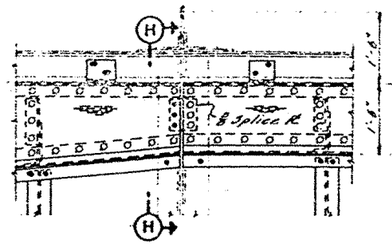
APPROVAL RECOMMENDED BY

DETAILS CHECKED DESIGN AND DETAILS REVIEWED BY

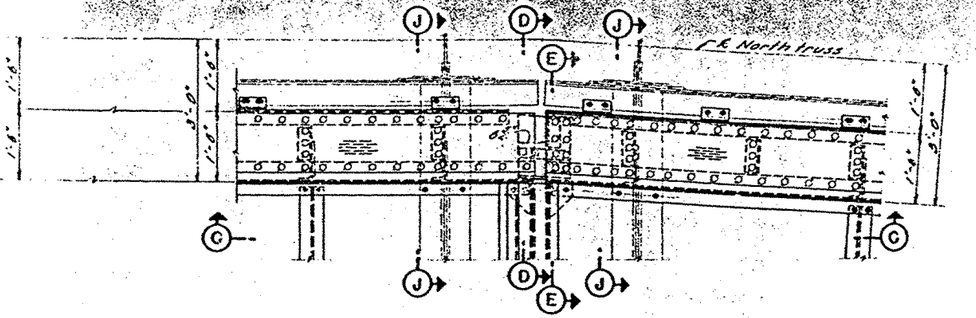
PROJECTS ENGINEER—LICENSE 7479
DATE APPROVED October 6, 1961



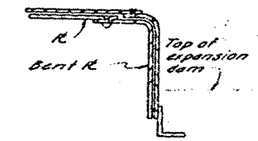
PLAN - NORTH CURB AT U1



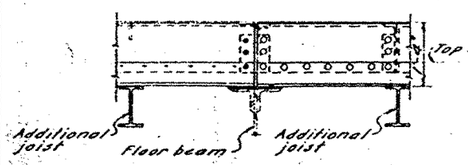
PLAN - NORTH CURB AT U2



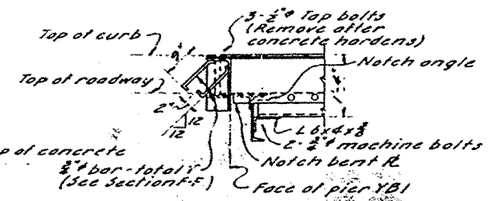
PLAN - NORTH CURB AT YB2 (U8 AND U9)



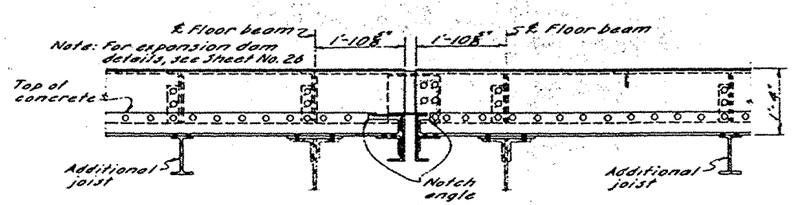
SECTION D-D
Scale: 1½" = 1'-0"



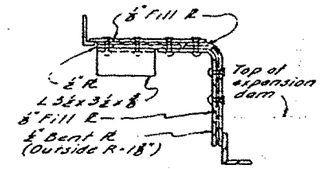
SECTION A-A



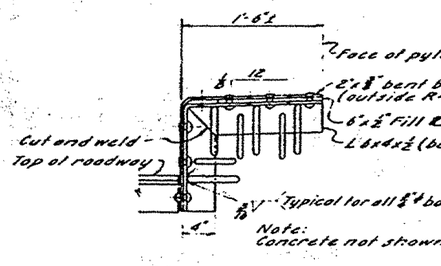
SECTION B-B



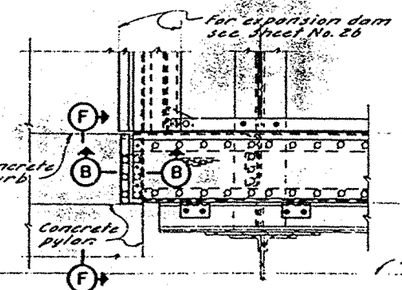
SECTION C-C



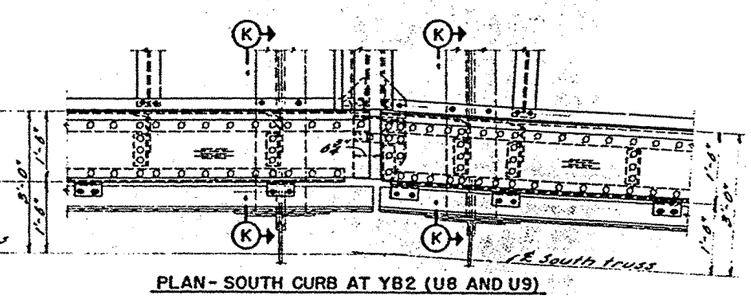
SECTION E-E
Scale: 1½" = 1'-0"



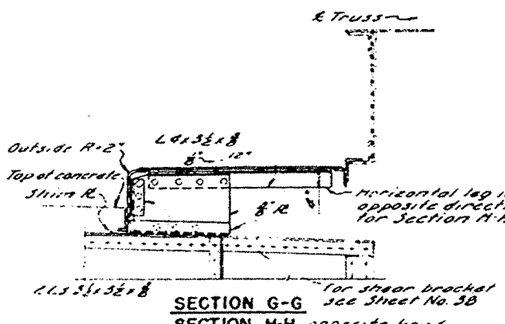
SECTION F-F
Scale: 1½" = 1'-0"



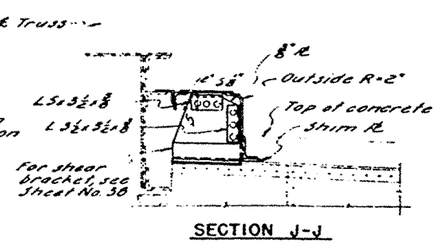
PLAN - SOUTH CURB AT YB1 (U0)



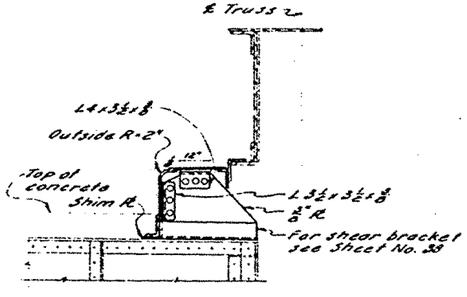
PLAN - SOUTH CURB AT YB2 (U8 AND U9)



SECTION G-G
SECTION H-H opposite hand.



SECTION J-J



SECTION K-K

NOTES

1. Notes 1 to 6 on Sheet No. 28 apply.
2. △ For as-built record see shop drawings

8 THS 10 THS
SCALE IN INCHES

MARK	DATE	DESCRIPTION	BY	CH'K
1	8.1.63	As built with revisions	K.L.S	E.E.F
		REVISION		

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

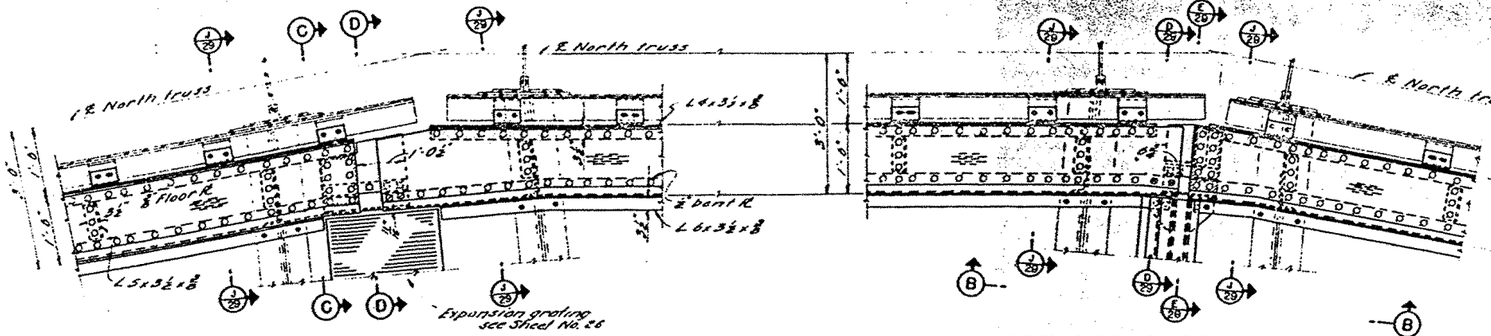
SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

YB1-YB2 CURB DETAILS

UNLESS NOTED
SCALE 3/4" = 1'-0"
BRIDGE 33-25 34-65 35-04
SHEET No 29
DRAWING C 4030 29R

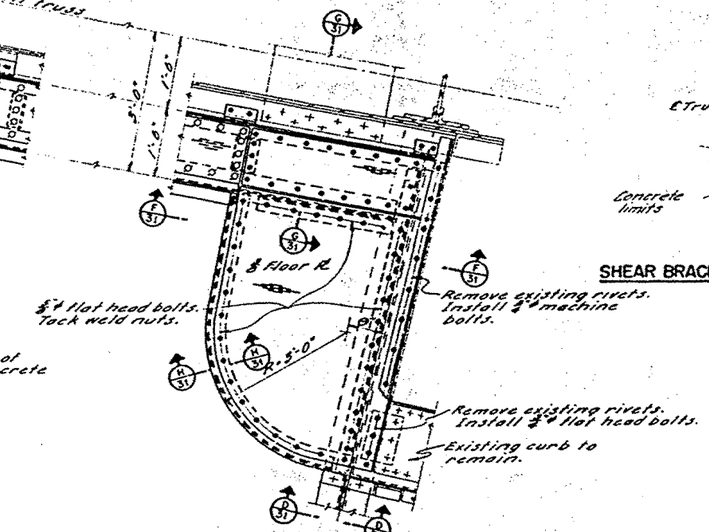
APPROVAL RECOMMENDED BY

PROJECTS ENGINEER — LICENSE 1479
DATE APPROVED October 6, 1961

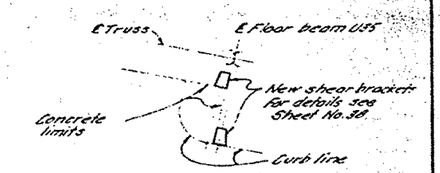


PLAN - NORTH CURB AT YB3

PLAN - NORTH CURB AT YB4

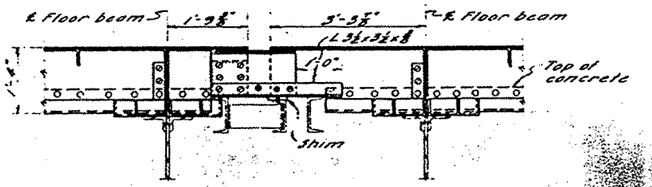


PLAN - NORTH CURB AT E1 (U35)

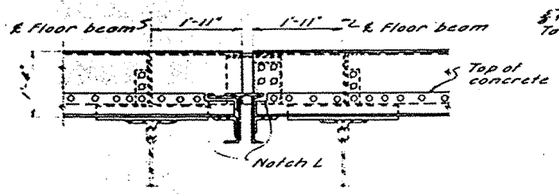


SHEAR BRACKET LAYOUT - E1 (U35) NORTH

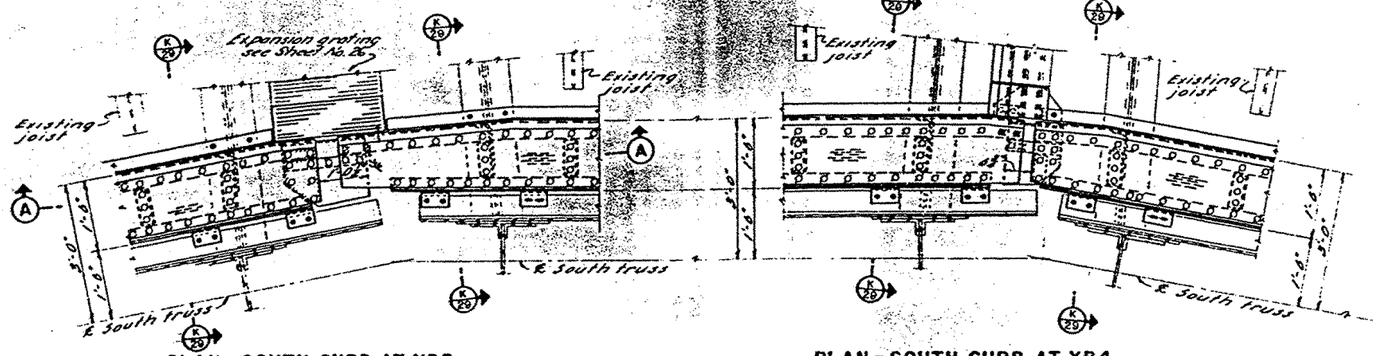
No Scale



SECTION A - A

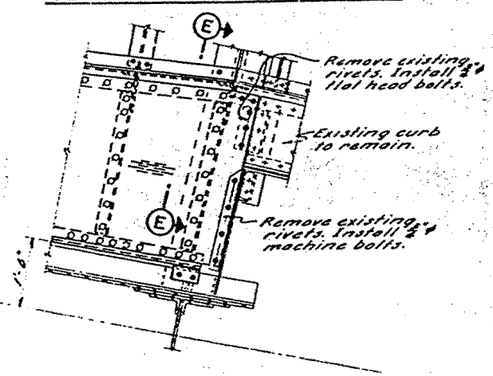


SECTION B - B



PLAN - SOUTH CURB AT YB3

PLAN - SOUTH CURB AT YB4

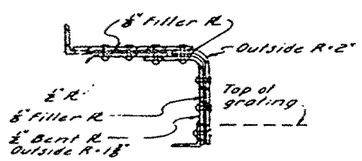


PLAN - SOUTH CURB AT E1 (U35)

NOTES

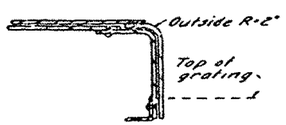
1. Notes 1 to 6 on Sheet No. 28 apply.
2. For material not called out, see Sheet No. 28.

△ 3 For as-built record see shop drawings



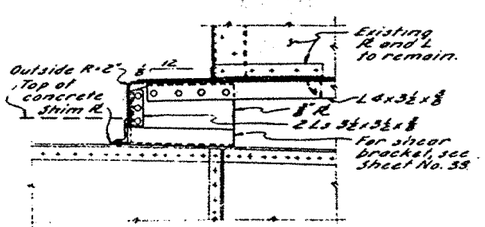
SECTION C - C

Scale 1½"=1'-0"



SECTION D - D

Scale: 1½"=1'-0"



SECTION E - E

MARK	DATE	DESCRIPTION	BY	CH'K
△	11/63	As built with revisions	LLS	EEF
		REVISION		

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

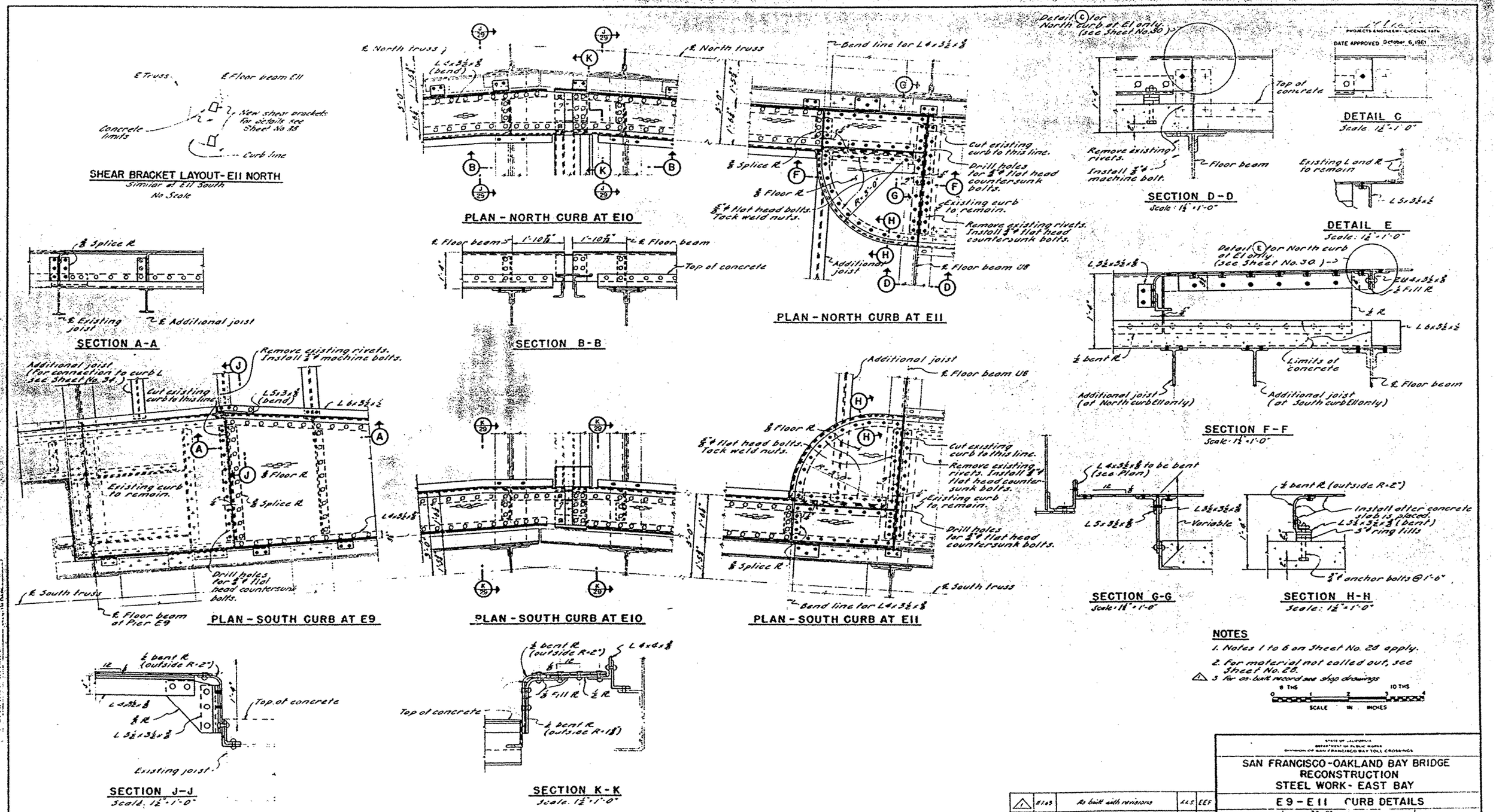
SAN FRANCISCO - OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

YB3 - E1 CURB DETAILS

UNLESS NOTED SCALE 3/4"=1'-0" | BRIDGE 33-25, 34-03, 34-04 | SHEET No 30 | DRAWING C-4030-309

APPROVAL RECOMMENDED BY — SUPERVISING BRIDGE ENGINEER — LICENSE 1787

DATE	DESCRIPTION	BY	CH'K
10/61	ISSUED FOR BID		
11/61	DESIGN AND DETAIL REVISIONS		
2/63	DESIGN AND DETAIL REVISIONS		



NOTES

1. Notes 1 to 6 on Sheet No. 28 apply.
2. For material not called out, see Sheet No. 28.
3. △ For as-built record see shop drawings

SCALE IN INCHES

MARK	DATE	DESCRIPTION	BY	CHK
1	8-1-63	As built with revisions	A.L.S.	E.E.F.
		REVISION		

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

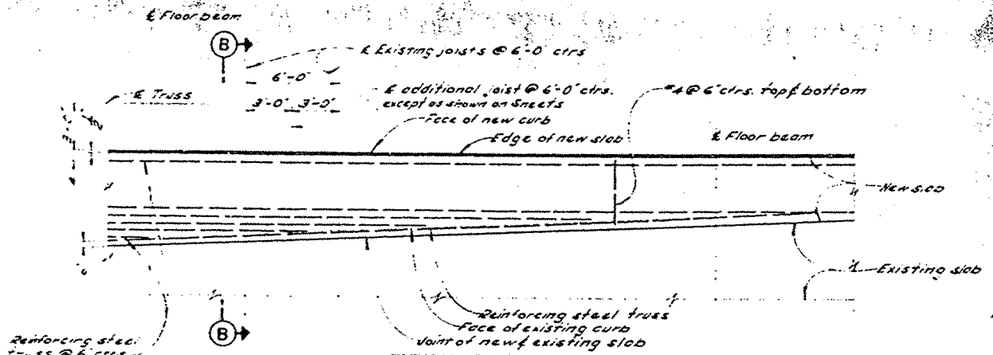
SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

E9 - E11 CURB DETAILS

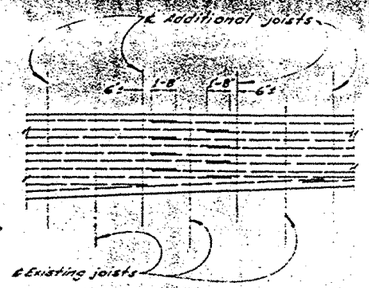
UNLESS NOTED SCALE 3/4"=1'-0" BRIDGE 33-25 34-03 34-04 SHEET No. 31 DRAWING C-4030-31R

PROJECT ENGINEER - LICENSE TITLE
DATE APPROVED October 6, 1961

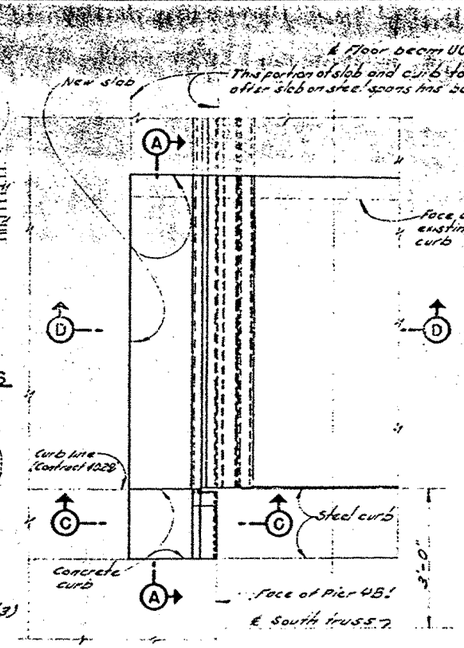
APPROVAL RECOMMENDED BY



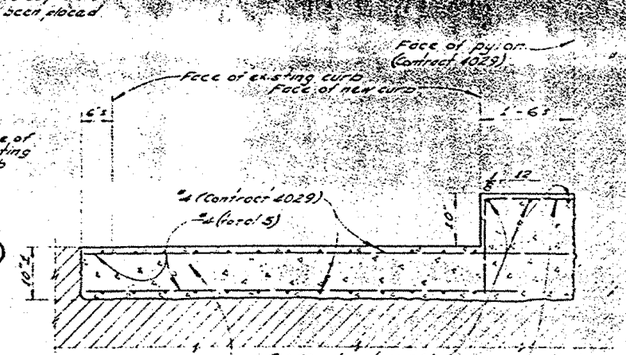
TYPICAL PLAN
North side shown. South side opposite hand.
Scale: 1/4" = 1'-0"



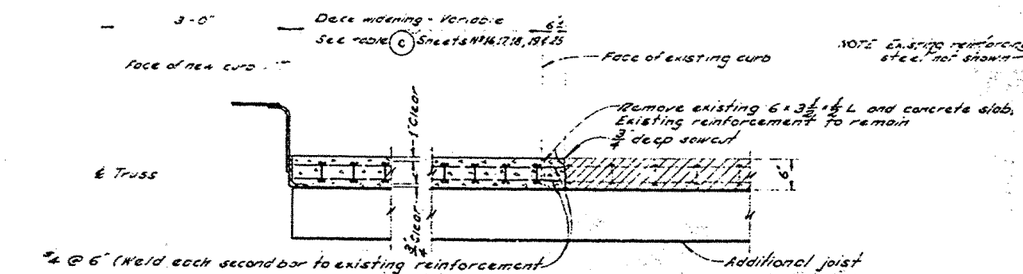
REINFORCING STEEL TRUSS SPLICES
Scale: 1/4" = 1'-0"



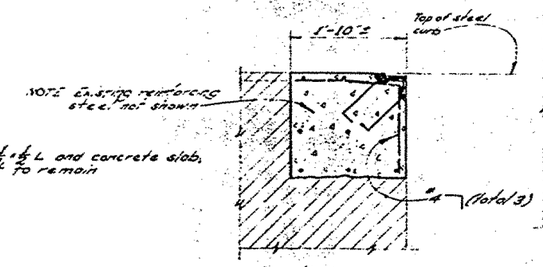
PLAN SOUTHSIDE-YB1
Scale 3/8" = 1'-0"



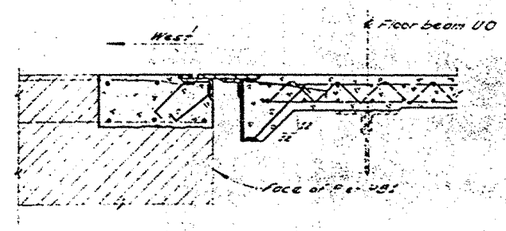
SECTION A-A
Scale: 1" = 1'-0"



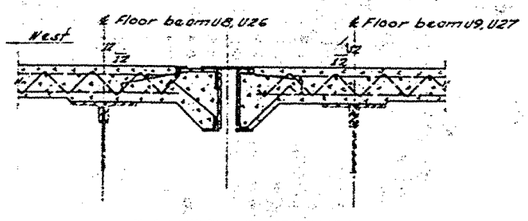
SECTION B-B
Scale: 1" = 1'-0"



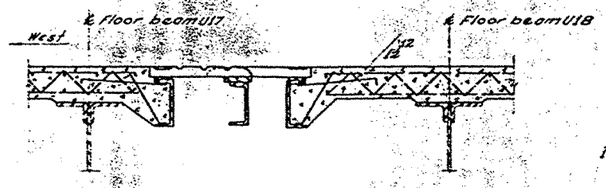
SECTION C-C
Scale: 1" = 1'-0"



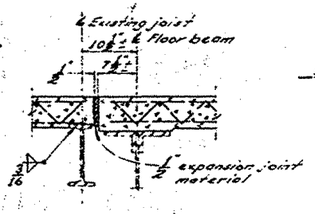
SECTION D-D
SLAB DETAIL AT YB1
Scale: 1" = 1'-0"



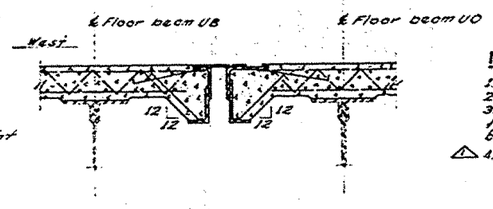
SLAB DETAIL AT YB2 & YB4
Scale: 1" = 1'-0"



SLAB DETAIL AT YB3
Scale: 1" = 1'-0"



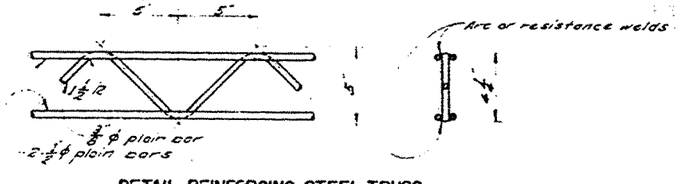
SLAB DETAIL
Scale 1" = 1'-0"
U4, U13, U22, U31 (YB1-E1 Spans)
U4 (E9-E10 Span)
U4 (E10-E11 Span)



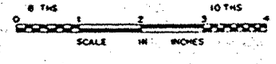
SLAB DETAIL AT E10
Scale: 1" = 1'-0"

NOTES

1. For details of expansion dams see Sheet No. 26.
2. All new concrete shall be light weight Class L.
3. Reinforcing steel trusses shall be fabricated from plain bars. All other reinforcing steel shall be deformed bars.
4. For as-built record see shop drawings.



DETAIL-REINFORCING STEEL TRUSS
Scale: 3" = 1'-0"



MARK	DATE	DESCRIPTION REVISION	BY	CHK
1	11.1.63	As built with revisions	GB	EEF

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

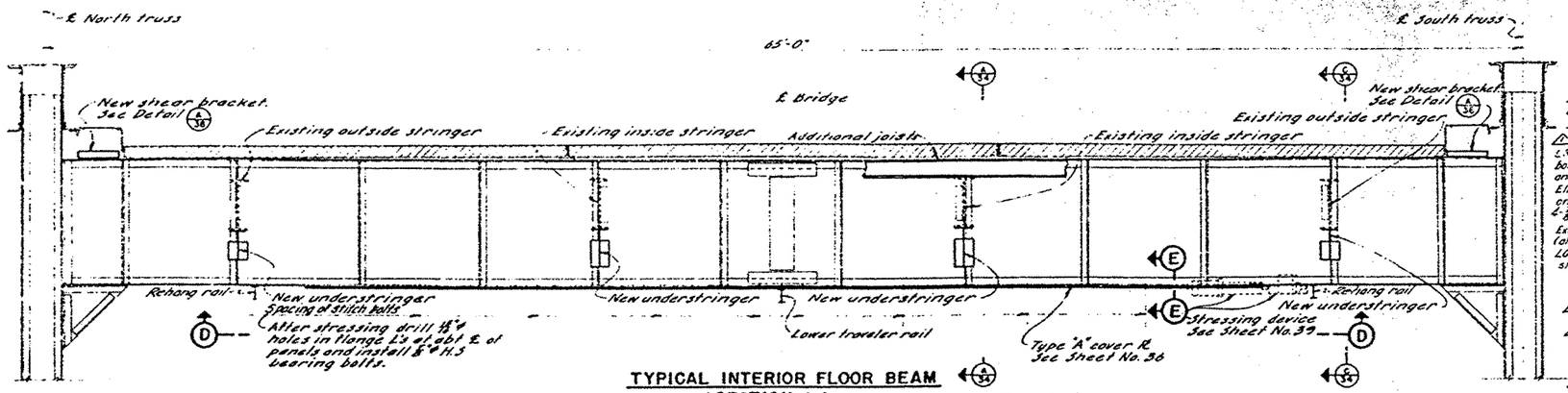
SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

YB1-E1 AND E9-E11 SLAB DETAILS

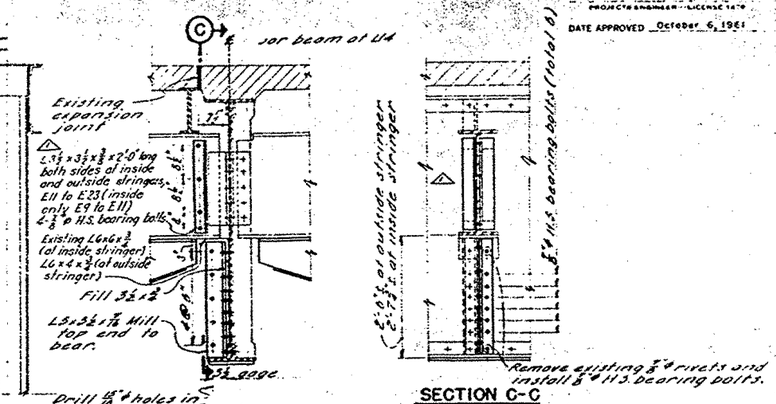
SCALE: AS SHOWN | BRIDGE 33-20, 34-03, 34-04 | SHEET No. 32 | DRAWING 4030-32R

APPROVAL RECOMMENDED BY ... Supervising Bridge Engineer

PROJECT ENGINEER LICENSE 16179
DATE APPROVED October 6, 1961

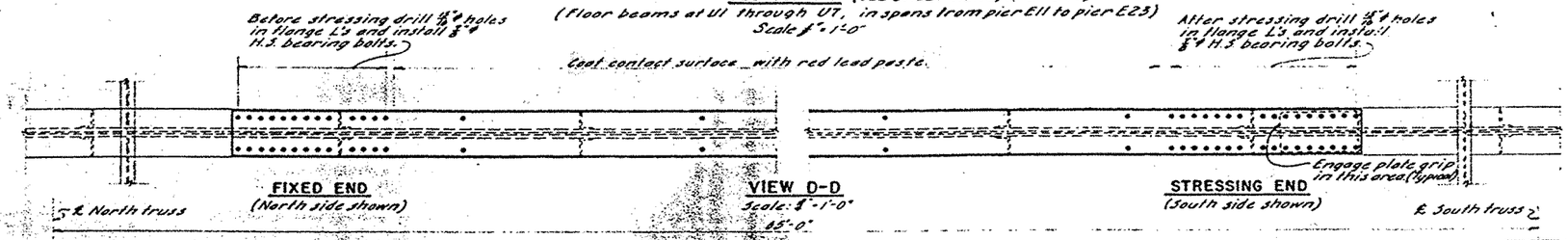


TYPICAL INTERIOR FLOOR BEAM
SECTION A A (See Sheet No. 12, 13 and 14)
(Floor beams at U1 through U7, in spans from pier E11 to pier E23)
Scale 3/8" = 1'-0"



SECTION C-C

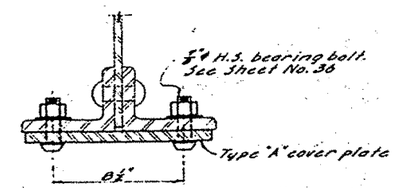
STRINGER SEAT STRENGTHENING
DETAIL B
(At interior expansion joints only; E9 to E23)
Scale: 3/8" = 1'-0"



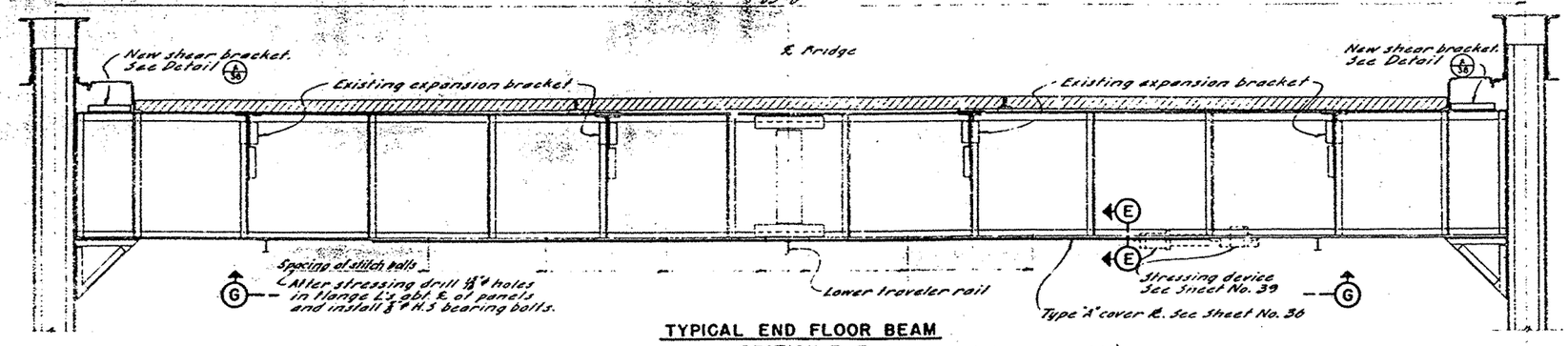
FIXED END
(North side shown)

VIEW D-D
Scale: 3/8" = 1'-0"

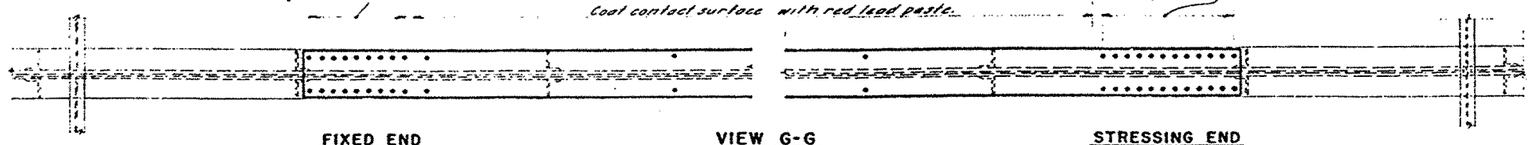
STRESSING END
(South side shown)



SECTION E-E
Scale: 3" = 1'-0"



TYPICAL END FLOOR BEAM
SECTION F-F (See Sheet No. 12, 13 and 14)
(Floor beam at U0 and at U8 in spans from Pier E11 to Pier E23)
Scale: 3/8" = 1'-0"



FIXED END
(North side shown)

VIEW G-G
Scale: 3/8" = 1'-0"

STRESSING END
(South side shown)

NOTES

1. For erection procedure of cover plates see Sheet No. 20.

8 THS 10 THS
0 1 2 3 4
SCALE IN INCHES

MARK	DATE	DESCRIPTION	BY	CH'K
1	11.1.63	As built with revisions	OB	EEF

REVISION

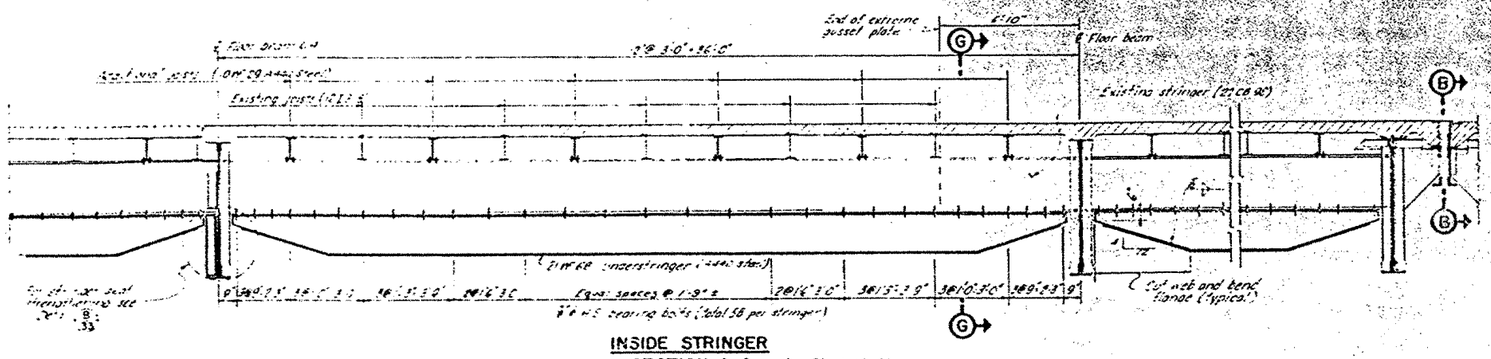
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

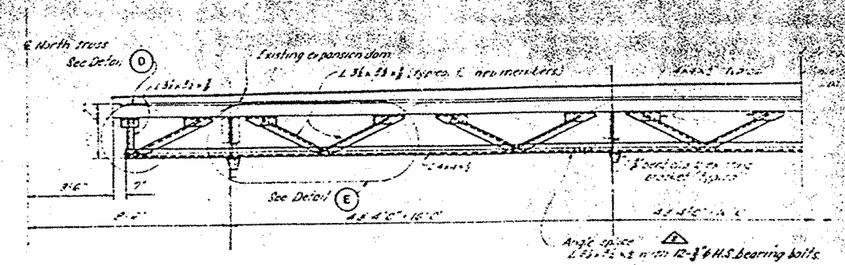
288 FOOT SPANS - FLOOR BEAMS

SCALE AS SHOWN | BRIDGE 33-25 34-03 34-04 | SHEET No 33 | DRAWING C4030-33R

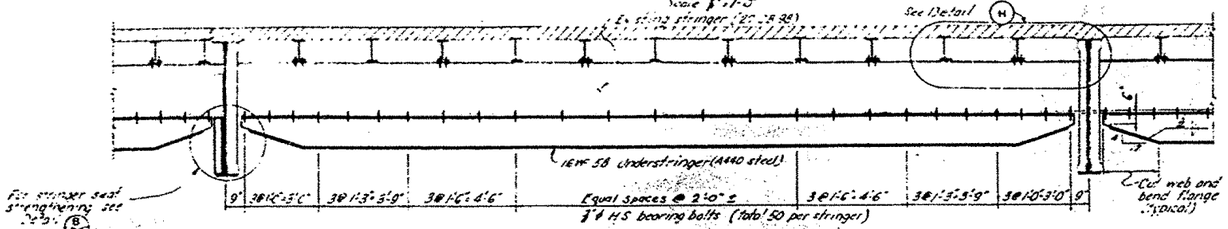
APPROVAL RECOMMENDED BY



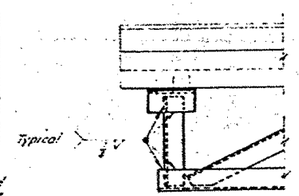
INSIDE STRINGER
SECTION A-A See Sheet No 33
Scale



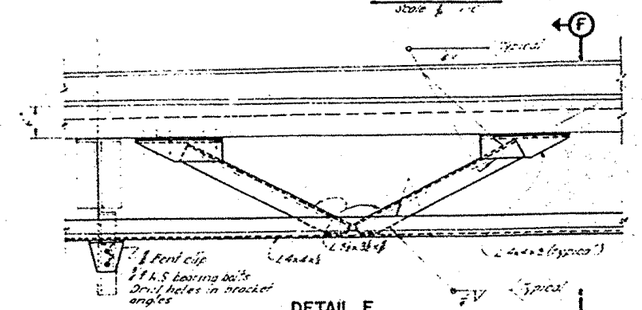
SECTION B-B
Scale



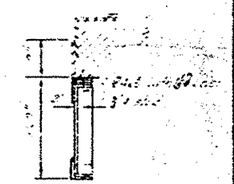
OUTSIDE STRINGER
SECTION C-C See Sheet No 33
Scale



DETAIL D
Scale

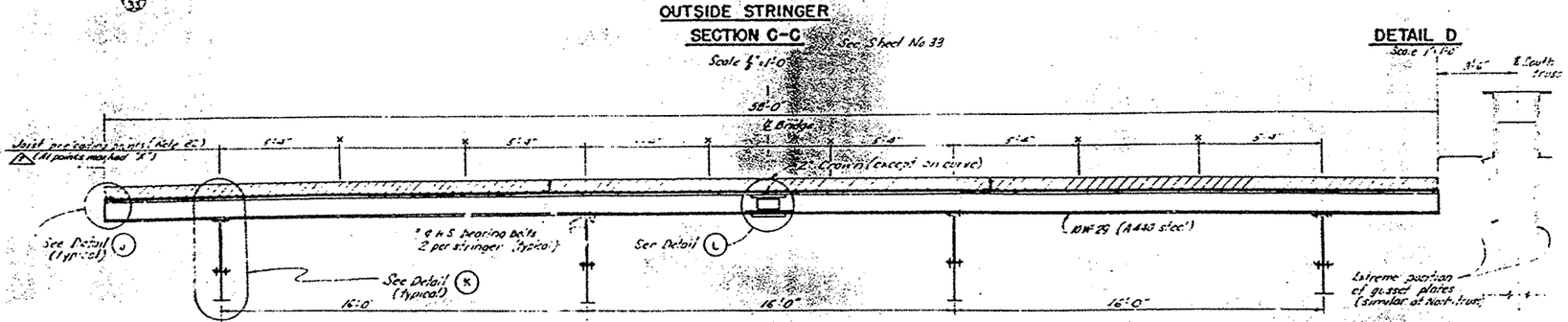


DETAIL E
Scale

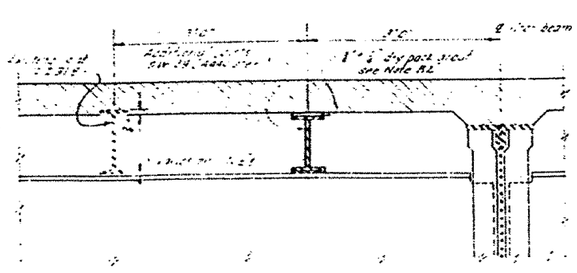


SECTION F-F
Scale

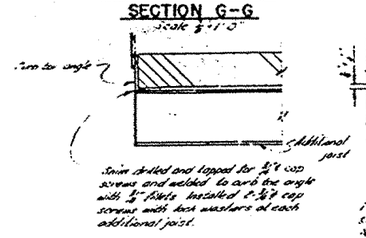
EXPANSION DAM TRUSSES (For 258' and 528' spans)



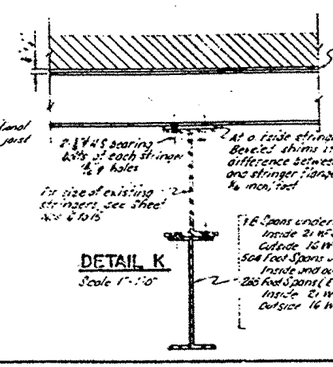
ADDITIONAL JOIST
SECTION G-G
Scale



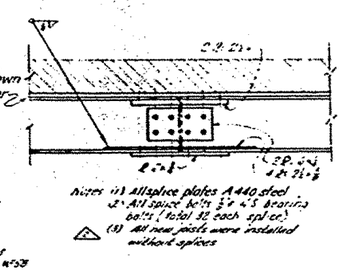
DETAIL H
Scale



DETAIL J
Scale



DETAIL K
Scale



DETAIL L
Scale

ERECTION PROCEDURE

A. Understringers:
1. Drill first eight flange holes at each end of existing stringers and bolt understringer through these holes before drilling and bolting remaining holes.
2. Rolled understringers shall be placed with the natural camber upward.
3. ⅞ inch diameter H.S. bearing bolts in 15/16 inch diameter holes shall be used for all field connections.

B. Additional Joists:
1. Clean underside of concrete deck as specified.
2. Erect joist in lieu of using one center splice, as shown, the Contractor may erect joists either more or with two splices at 1/3 points approved by the Engineer. In any event one splice will be used for computing pay weights.
3. Place shims on stringers of such thickness that the gap between concrete and joist will average about ½ inches, with a maximum of one inch and a minimum of ⅛ inch. Drill holes in top flange of stringer, place ⅞" H.S. bearing bolts (Detail K), install shims and shims at joists to make them weighing, jacking or screening as approved by the Engineer.
4. Fit end joist against the deck with spacers at each end and at points shown on section G-G.
5. After fitting the contact areas of the shims are not as specified but the gap with air blown mortar continuously and rapidly.
6. When the mortar has attained a strength of not less than twelve hundred pounds per square inch remove shims and wedges from nuts at curb line.

C. Expansion Dam Trusses:
1. All welded connections shall be ⅜ inch minimum fillet width.
2. All connections to existing expansion dam shall be ⅞ inch full base, threaded stud (Note H of B on sheet 33).

SCALE IN INCHES

SUPPLEMENTAL CONTRACT DRAWING

MARK	DATE	DESCRIPTION	BY	CHK
2	11-1-65	As built with revisions	A.L.B.	E.E.F.
1	1-11-67	B.2 note changed	E.E.F.	A.L.

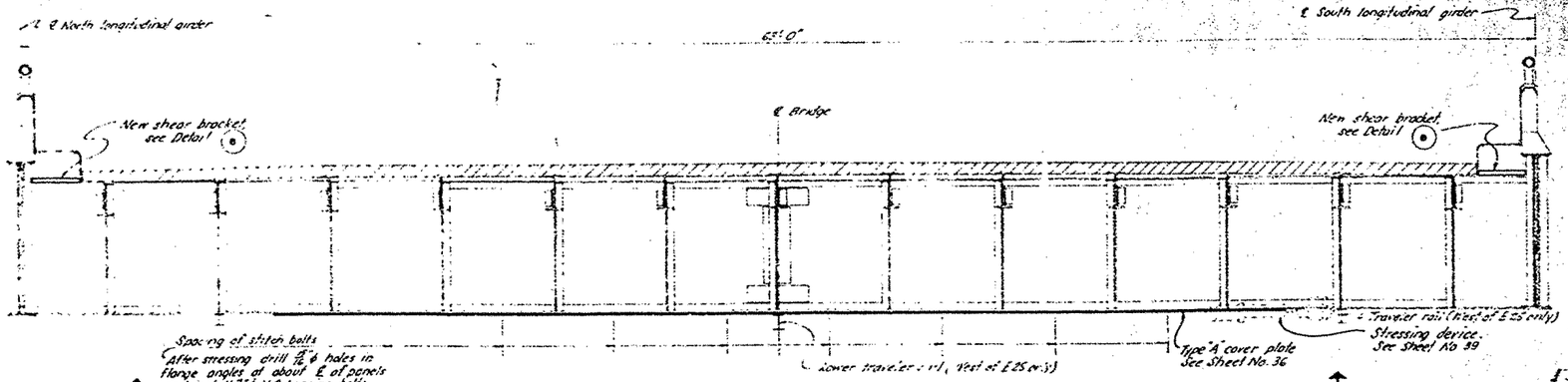
REVISION

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

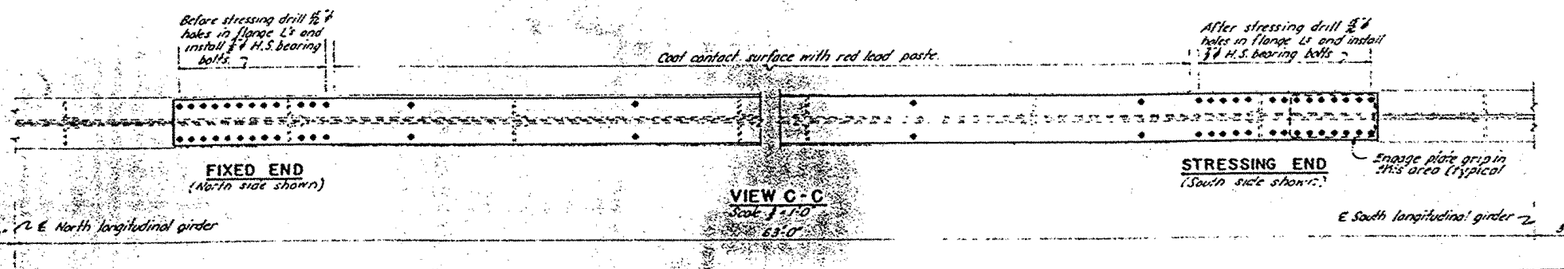
288 FOOT SPANS - STRINGERS AND JOISTS

SCALE AS SHOWN | BRIDGE 33-25 34-03 34-04 | SHEET NO 34 | DRAWING 34030 34R

APPROVAL RECOMMENDED BY



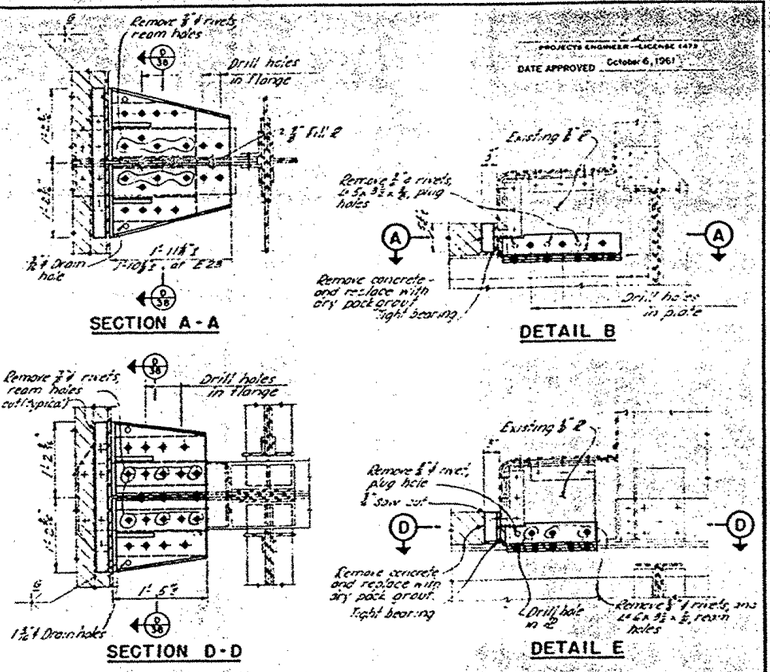
TYPICAL INTERMEDIATE FLOOR BEAM
(Floor beam at E23 similar between longitudinal girders
Scale ⅜"=1'-0"



FIXED END
(North side shown)

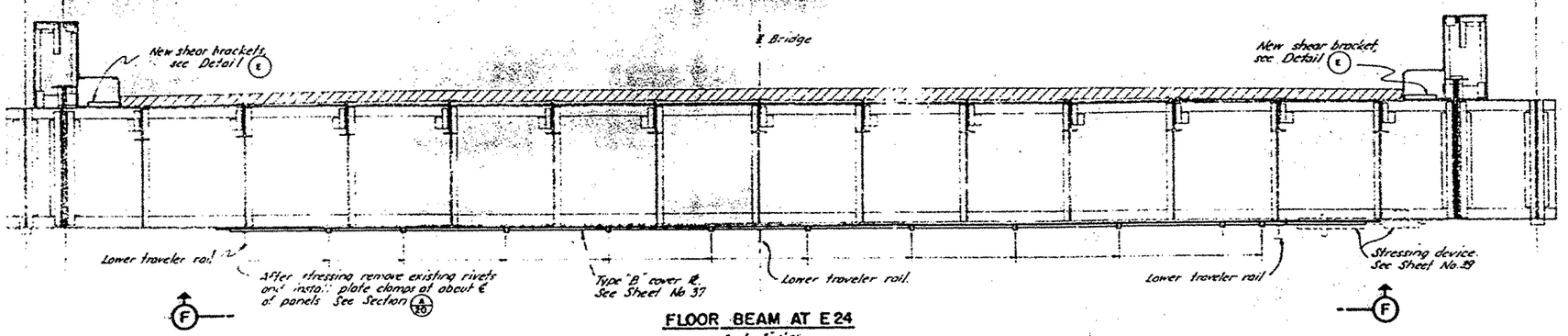
VIEW C-C
Scale ¼"=1'-0"
63'-0"

STRESSING END
(South side shown)

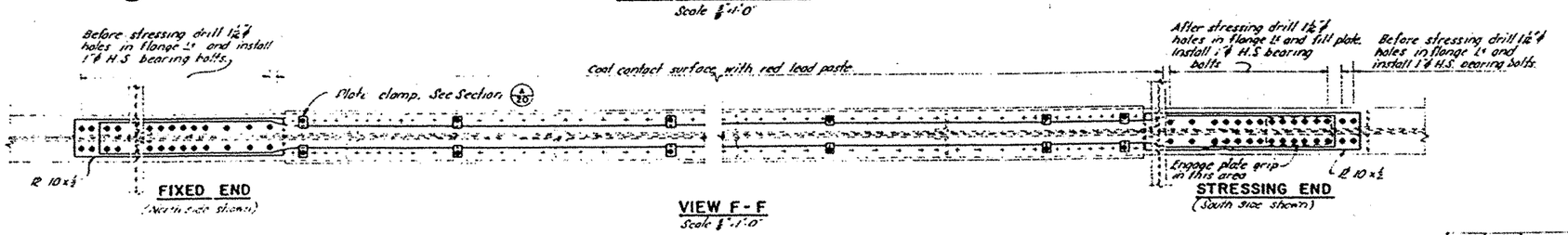


SHEAR BRACKETS
Scale 1"=1'-0"

PROJECT ENGINEER — LICENSE 14731
DATE APPROVED October 6, 1961



FLOOR BEAM AT E 24
Scale ⅜"=1'-0"



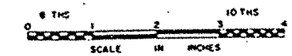
FIXED END
(North side shown)

VIEW F-F
Scale ⅜"=1'-0"

STRESSING END
(South side shown)

NOTES

1. For erection procedure of new cover plates see Sheet No 20.
2. Floor beams of the piers E5 thru E3 do not require strengthening under this contract.
3. For notes and erection procedure of shear brackets see Sheet No. 38.
4. For as-built record of shear brackets see shop drawings.



MARK	DATE	DESCRIPTION	BY	CHK
1	11.1.63	As built with revisions	J.L.S.	E.E.F.

REVISION

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

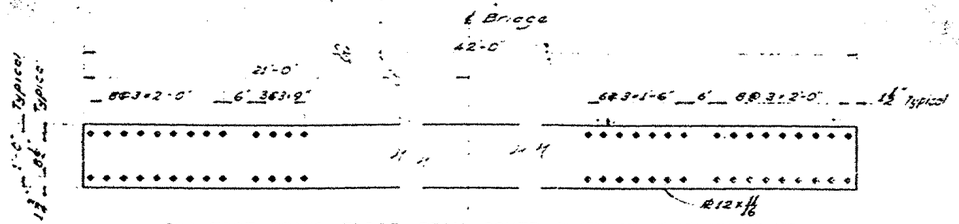
GIRDER SPANS – FLOOR BEAMS

SCALE AS SHOWN | BRIDGE 33-25, 34-03, 34-04 | SHEET NO 35 | DRAWING C-4030-35-5

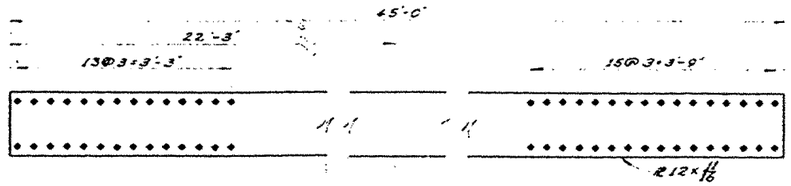
APPROVAL RECOMMENDED BY ... CHIEF, BRIDGE ENGINEER
LICENSE 14731

PROJECT ENGINEER — LICENSE 1879

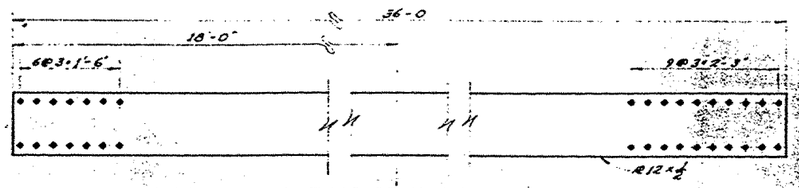
DATE APPROVED October 6, 1961



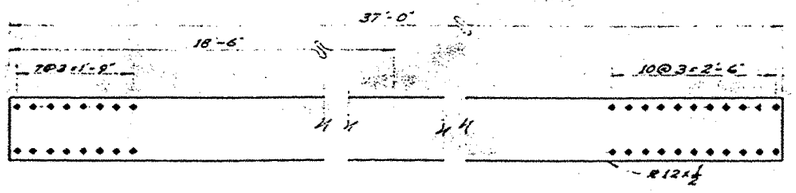
288 FOOT SPANS FLOOR BEAM COVER PLATE U1, U2, U3, U5, U6, U7
(E11 to E23)



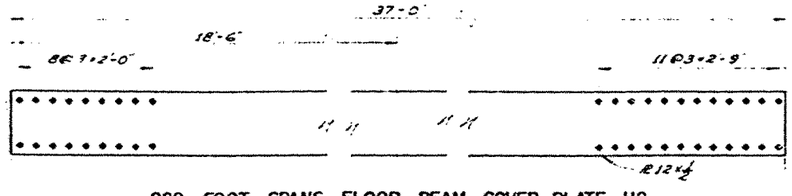
288 FOOT SPANS FLOOR BEAM COVER PLATE U4
(E11 to E23)



288 FOOT SPANS FLOOR BEAM COVER PLATES U0, U8
(At U0 of E11 to E12 and at U8 of E11 to E16)

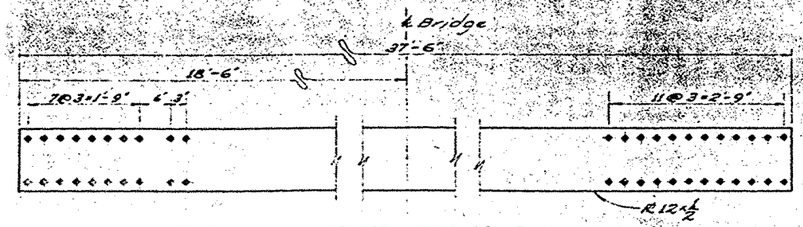


288 FOOT SPANS FLOOR BEAM COVER PLATES U0, U8
(At U0 of E12 to E23 and at U8 of E16 to E22)

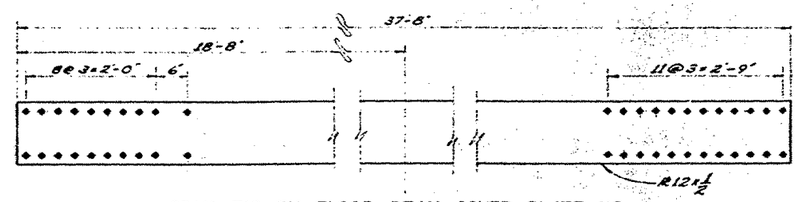


288 FOOT SPANS FLOOR BEAM COVER PLATE U8
(E22 to E23)

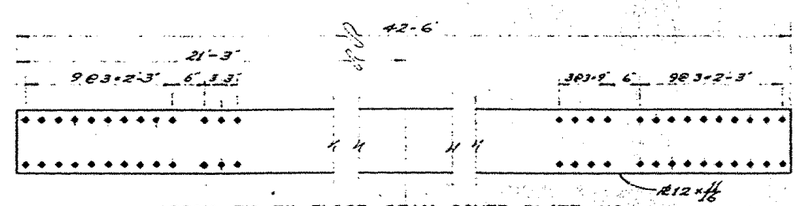
Fixed end — Stressing end



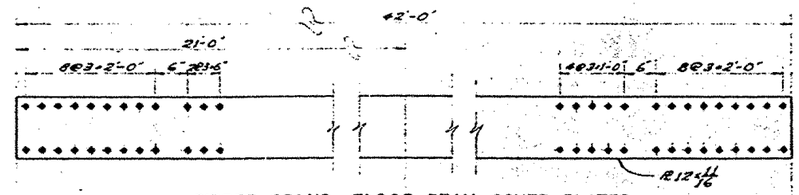
SPAN E9-E10 FLOOR BEAM COVER PLATE U8



SPAN E10-E11 FLOOR BEAM COVER PLATE U0



SPAN E10-E11 FLOOR BEAM COVER PLATE U8



GIRDER SPANS FLOOR BEAM COVER PLATES
(At intermediate floor beams of E23 to E33 and floor beam of E23)

Fixed end — Stressing end

NOTES

1. All cover plates shall be T1 steel.
2. One butt welded splice is permitted on 11/16 plates only, at not less than 1'-0" from holes.
3. All holes for type "A" cover plates shall be 15/16 ϕ.
4. For location of holes for stiffener bolts see Sheets 1733 to 1735.
5. For panel point designations (e.g. U1, U2) see Plan and Elevation Sheets No. 6-15.

8 THS — 10 THS
0 1 2 3 4
SCALE IN INCHES

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

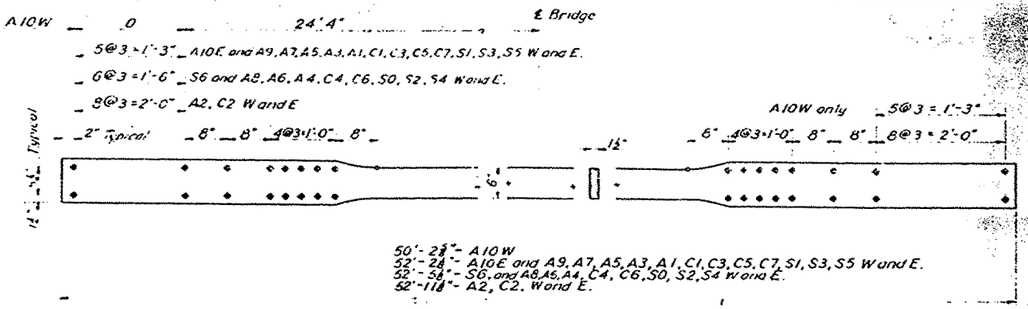
SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

TYPE "A" COVER PLATES

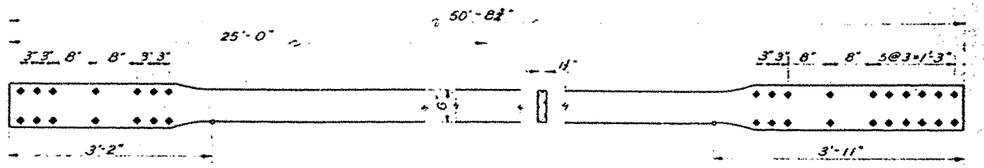
MARK	DATE	DESCRIPTION	BY	CH'K
1	11.1.63	As built without revisions	CB	EEF

REVISION

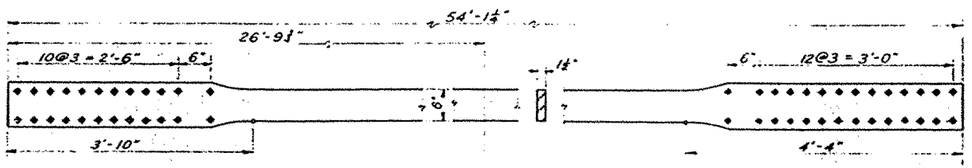
SCALE 1"=1'-0" | BRIDGE 33-25, 34-03, 34-04 | SHEET No 36 | DRAWING



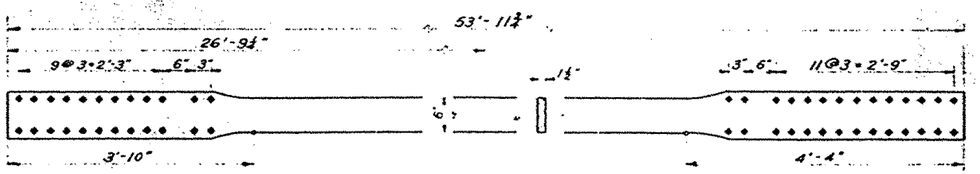
CANTILEVER STRUCTURE FLOOR BEAM COVER PLATES



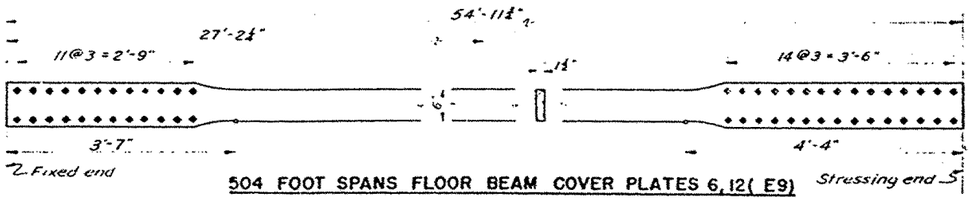
504 FOOT SPANS FLOOR BEAM COVER PLATES 0, 12



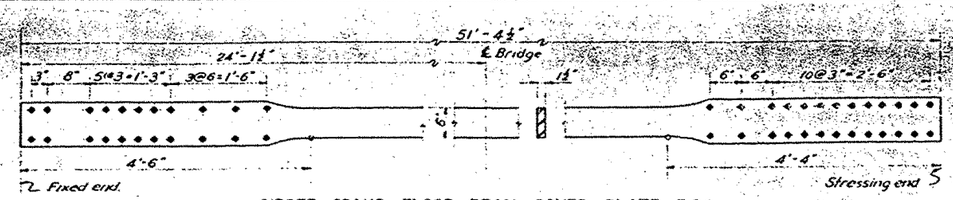
504 FOOT SPANS FLOOR BEAM COVER PLATES 2, 4, 8, 10



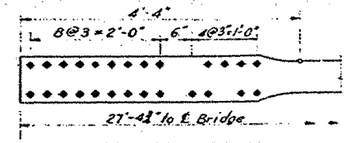
504 FOOT SPANS FLOOR BEAM COVER PLATES 1, 3, 5, 7, 9, 11



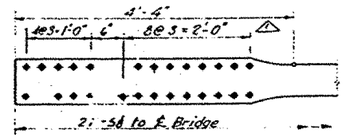
504 FOOT SPANS FLOOR BEAM COVER PLATES 6, 12 (E9)



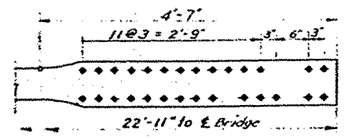
GIRDER SPANS FLOOR BEAM COVER PLATE E 24



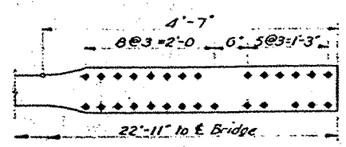
SPAN YB1 - YB2, U4
(Fixed end)



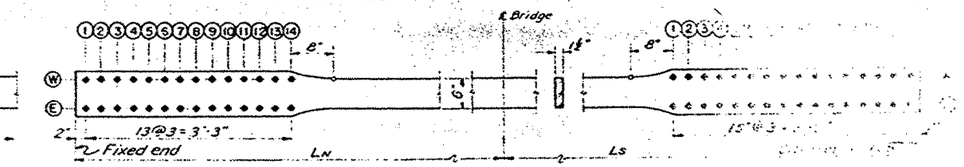
SPAN YB2 - YB3, U11
(Fixed end)



SPAN E9 - E10, U3 AND SPAN E10 - E11, U5
(Stressing end)



SPAN E9 - E10, U5 AND SPAN E10 - E11, U3
(Stressing end)



SPAN YB1 - YB2

FLOOR BEAM	LENGTH L_N	LENGTH L_S	HOLES OMITTED FIXED END	HOLES OMITTED STRESSING END
U0	27'-11½	27-6	6W-6E	13W-13E
U1	27-5⅝	27-5	4W-7E	15W-15E
U2	27-2	27-7	5W-8E	14W-14E
U3	27-2	27-2	7W-10E	1W-1E
U4	27-4¾	27-8	See Detail	1W-1E
U5	27-2	27-7	11W-14E	1W-3E
U6	27-2	27-4¾	13W-13E	3W-6E
U7	27-0	27-4¾	14W-14E	5W-8E
U8	27-0	27-4⅛	14W-14E	8W-8E

SPAN YB3 - YB4 △*

FLOOR BEAM	LENGTH L_N	LENGTH L_S	HOLES OMITTED FIXED END	HOLES OMITTED STRESSING END
U18	27-1½	27-2	10W-5E *	1W-1E
U19	27-2	27-5	12W-9E	3W-3E
U20	27-2	27-2	* 9W-2E	1W-1E
U21	27-3	27-6	2W-2E	10W-10E
U22	27-0	27-6	14W-14E	8W-8E
U23	27-1	27-5	2W-2E	10W-10E
U24	27-3½ *	27-2	2W-9E *	1W-1E
U25	27-0	27-4¾	8W-11E	2W-2E
U26	27-2	27-2	6W-6E	1W-1E

SPAN E9 - E10 △*

FLOOR BEAM	LENGTH L_N	LENGTH L_S	HOLES OMITTED FIXED END	HOLES OMITTED STRESSING END
U0	27-9	28-0	See Detail	See Detail
U1	23-0	22-11	14W-14E	1W-1E
U2	22-10	22-10	12W-12E	14W-14E
U3	22-10	22-11	8W-8E	See Detail left
U4	22-10	22-10	6W-6E	10W-10E
U5	22-11	22-11	8W-8E	See Detail left
U6	22-10½	22-8	11W-11E	14W-14E
U7	23-0	22-8¾	14W-14E	1W-1E
U8	TYPE "A" PLATE	See Sheet No. 36*		—

SPAN YB [illegible]

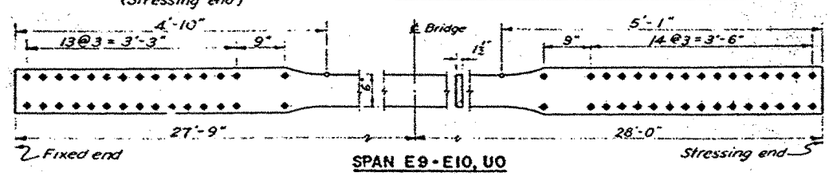
FLOOR BEAM	LENGTH L_N	LENGTH L_S	HOLES OMITTED FIXED END	HOLES OMITTED STRESSING END
U9	27-0	27-6	14W-14E	[illegible]
U10	27-2	27-2	6W-10E	[illegible]
U11	27-5⅝	27-2	See Detail	[illegible]
U12	27-5	27-5	2W-2E	10W-10E
U13	27-0	27-5	14W-14E	7W-7E
U14	27-0	27-6	14W-14E	5W-8E
U15	27-0	27-2	4W-4E	[illegible]
U16	27-2½	27-4¾	* 5W-11E	2W-2E
U17	27-0	27-1⅛	* 4W-9E	1W-1E

SPAN YB4 - E1 △*

FLOOR BEAM	LENGTH L_N	LENGTH L_S	HOLES OMITTED FIXED END	HOLES OMITTED STRESSING END
U27	27-1	27-2	6W-6E	1W-1E
U28	27-2	27-5	12W-9E	3W-3E
U29	28-6¾	27-2	8W-8E	1W-1E
U30	27-1	27-7	2W-2E *	13W-13E
U31	27-0	27-6	14W-14E	8W-8E
U32	27-1	27-6	2W-2E *	10W-10E
U33	27-0¾	27-2	2W-8E *	1W-1E
U34	27-0¾	27-7	12W-8E	2W-2E
U35	27-1	27-5¾	2W-2E	9W-9E

SPAN E10 - E11 △*

FLOOR BEAM	LENGTH L_N	LENGTH L_S	HOLES OMITTED FIXED END	HOLES OMITTED STRESSING END
U0	TYPE "A" PLATE	See Sheet No. 36*		—
U1	23-0	22-9	14W-14E	1W-1E
U2	22-10	22-8	11W-11E	14W-14E
U3	22-11	22-11	8W-8E	See Detail left
U4	22-10	22-10	6W-6E	10W-10E
U5	22-10	22-11	8W-8E	See Detail left
U6	22-10	22-10	12W-12E	14W-14E
U7	23-0	22-11	14W-14E	1W-1E
U8	TYPE "A" PLATE	See Sheet No. 36*		—



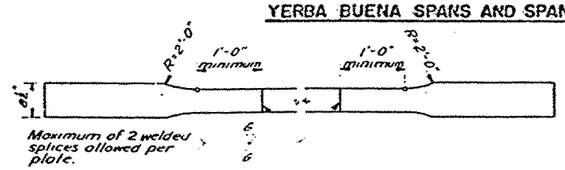
SPAN E9 - E10, U0

NOTES

1. All cover plates shall be T-1 steel.
2. Holes for type "B" cover plates shall [illegible]
3. For panel point designations (e.g. [illegible]) see Elevation, Sheets, No. 6 thru [illegible]
4. "Omitted Holes" were drilled [illegible] grip of outer end of bolt area [illegible] stressing was completed.

△ S * Indicates location [illegible] are changed due to [illegible]

YERBA BUENA SPANS AND SPANS E9 TO E11 FLOOR BEAM COVER PLATES



TYPICAL DETAIL
No scale

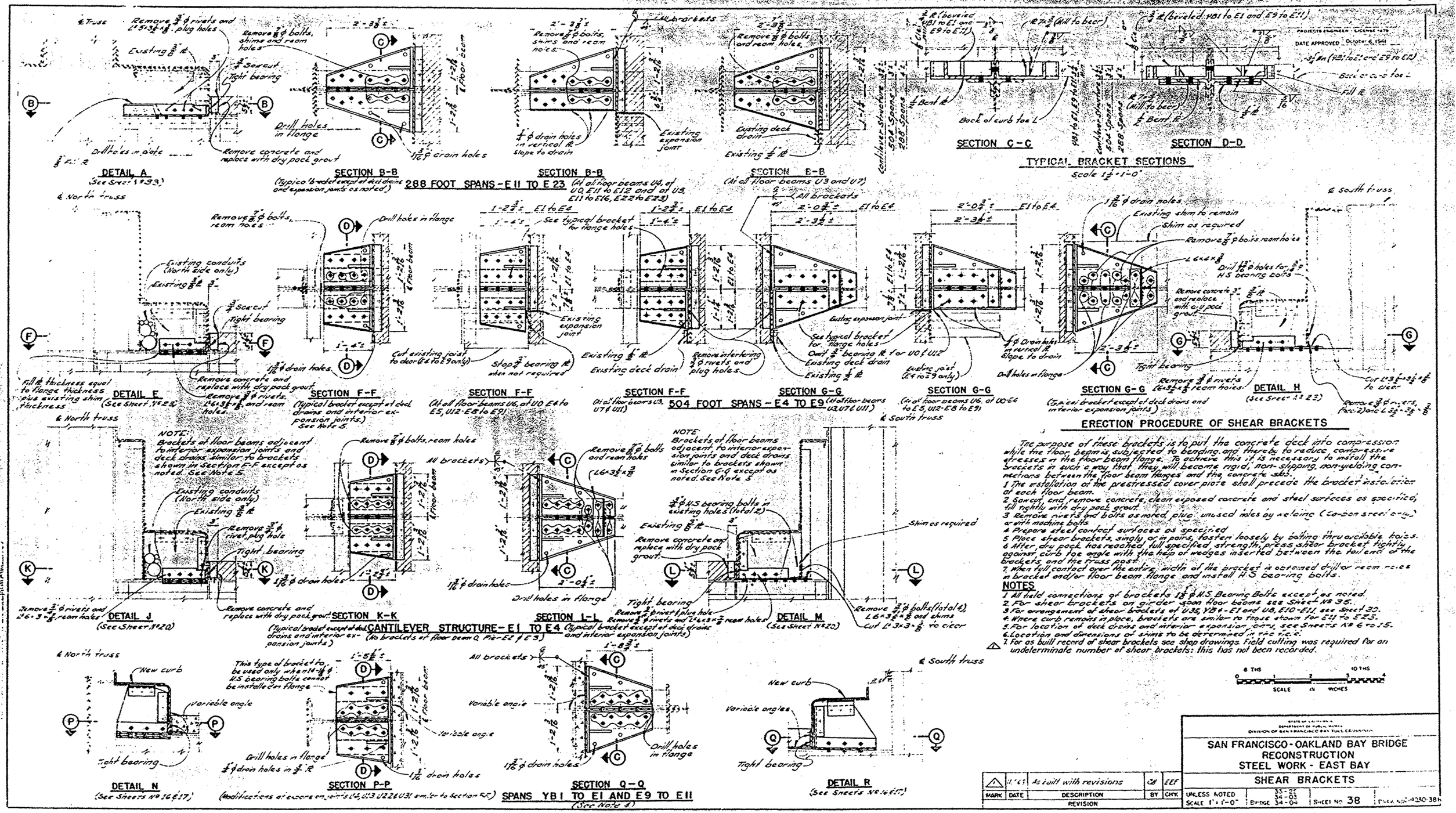
MARK	DATE	DESCRIPTION	BY	CHK
△	11.1.63	As built with revisions	dB	CEF

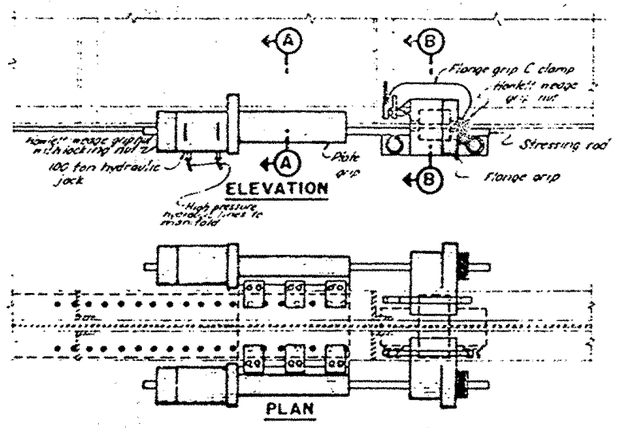
REVISION

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY
TYPE "B" COVER PLATES

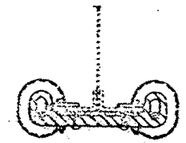
SCALE 1" = 1'-0"

APPROVAL RECOMMENDED BY

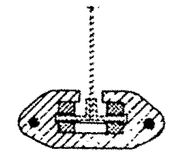

DETAIL A
(See Sheet No 33)
SECTION B-B
(Typical bracket except at deck drains and expansion joints as noted.)
288 FOOT SPANS - E11 TO E23
(At all floor beams U4, at U0, E11 to E12 and at U3, E11 to E16, E22 to E23)
SECTION B-B
(At all floor beams U3 and U7)
SECTION C-C
SECTION D-D
TYPICAL BRACKET SECTIONS
Scale 1½" = 1'-0"
DATE APPROVED October 6, 1961
DETAIL E
(See Sheet No 22)
SECTION F-F
(Typical bracket except at deck drains and interior expansion joints.) See Note 5.
SECTION F-F
(At all floor beams U6, at U0 E4 to E5, U12-E8 to E9)
SECTION F-F
(At all floor beams U3, U7 & U11)
504 FOOT SPANS - E4 TO E9
(At all floor beams U3, U7 & U11)
SECTION G-G
(At all floor beams U6, at U0-E4 to E5, U12-E8 to E9)
SECTION G-G
(Typical bracket except at deck drains and interior expansion joints)
DETAIL H
(See Sheet No 22)
ERECTION PROCEDURE OF SHEAR BRACKETS
The purpose of these brackets is to put the concrete deck into compression while the floor beam is subjected to bending and thereby to reduce compressive stresses in the floor beam flange. To achieve this it is necessary to install the brackets in such a way that they will become rigid, non-slipping, non-yielding connections between the floor beam flanges and the concrete slab.
1 The installation of the prestressed cover plate shall precede the bracket installation of each floor beam.
2 Sawcut and remove concrete, clean exposed concrete and steel surfaces as specified, fill tightly with dry pack grout.
3 Remove rivets and bolts as noted, plug unused holes by welding (Carbon steel only) or with machine bolts.
4 Prepare steel contact surfaces as specified.
5 Place shear brackets, singly or in pairs, fasten loosely by bolting thru available holes.
6 After dry pack has reached full specified strength, press shear bracket tightly against curb toe angle with the help of wedges inserted between the tail end of the brackets and the truss post.
7 When full contact over the entire width of the bracket is obtained drill or ream holes in bracket and/or floor beam flange and install H.S. bearing bolts.
NOTES
1 All field connections of brackets 1⅛" ϕ H.S. Bearing Bolts except as noted.
2 For shear brackets on girder span floor beams see Sheet No 35.
3 For arrangement of shear brackets at U35, YB1-E1 and U8, E10-E11, see Sheet 30.
4 Where curb remains in place, brackets are similar to those shown for E11 to E23.
5 For location of deck drains and interior expansion joints, see Sheets No 6 to 15.
6 Location and dimensions of shims to be determined in the field.
7 For as built record of shear brackets see shop drawings. Field cutting was required for an undeterminate number of shear brackets: this has not been recorded.
DETAIL J
(See Sheet No 20)
SECTION K-K
(Typical bracket except at deck drains and interior expansion joints)
CANTILEVER STRUCTURE - E1 TO E4
(No brackets at floor beam 0, Pier E2 & E3)
SECTION L-L
(Typical bracket except at deck drains and interior expansion joints)
DETAIL M
(See Sheet No 20)
DETAIL N
(See Sheets No 16 & 17)
SECTION P-P
(Modifications at expansion joints U2, U3, U22 & U31 similar to section F-F)
SECTION Q-Q
SPANS YB1 TO E1 AND E9 TO E11
(See Note 4)
DETAIL R
(See Sheets No 16 & 17)
SCALE IN INCHES
SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY
SHEAR BRACKETS
UNLESS NOTED
SCALE 1" = 1'-0"
SHEET No 38
MARK DATE DESCRIPTION BY CHK
REVISION
As built with revisions



ASSEMBLY
Scale: 1" = 1'-0"

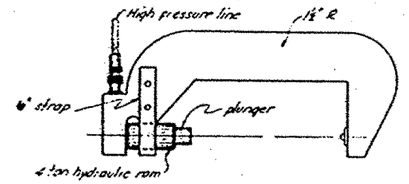


SECTION A-A

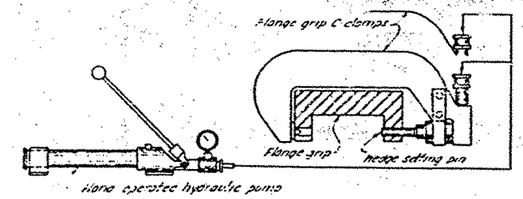


(Flange grip C-clamp not shown)

SECTION B-B



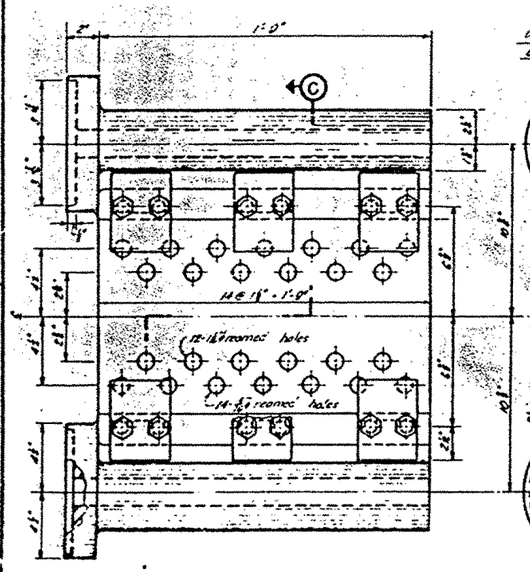
FLANGE GRIP C-CLAMP
(Two required)



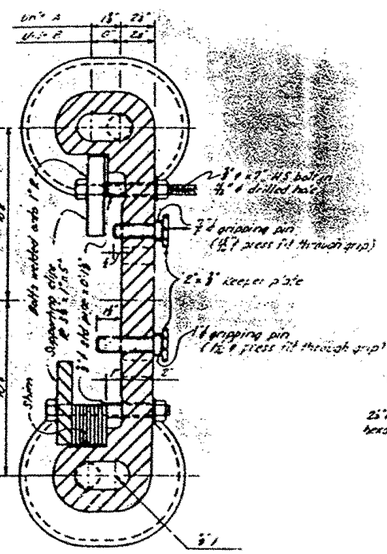
SETTING FLANGE GRIP WEDGES
No scale

LIST OF PARTS	
	Number
Plate grip complete with accessories	2
Flange grip complete with accessories	2
Flange grip C-clamp assemblies	2
Hand operated hydraulic pump	1
100 ton hydraulic jack	1
Pipe centering sleeve	1
Air operated hydraulic pump complete with pressure hose, ¾" hydraulic hose and fittings	1
Hewlett wedge grip hose cap complete with accessories	2
Hewlett wedge grip nut	2
Wedge grip spreader	2
[illegible] stress rod	2
[illegible] stress rod	2
[illegible] stress rod	2

These parts will be available at Oakland Toll Plaza.

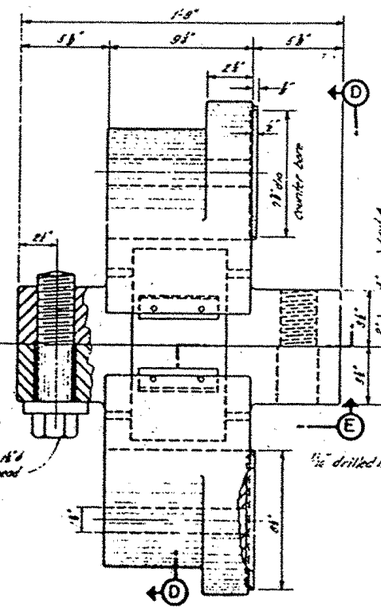


PLAN

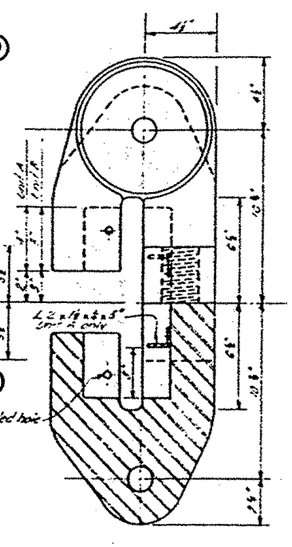


SECTION C-C

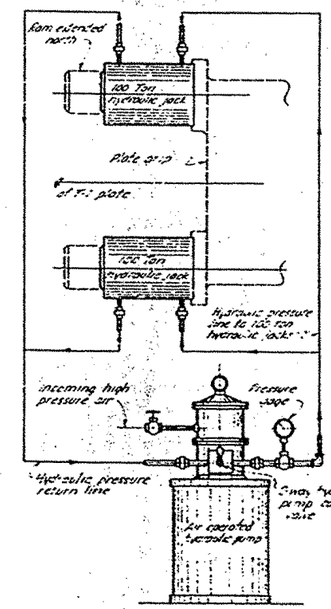
PLATE GRIP
Approximate weight [illegible] each



PLAN



SECTION D-D

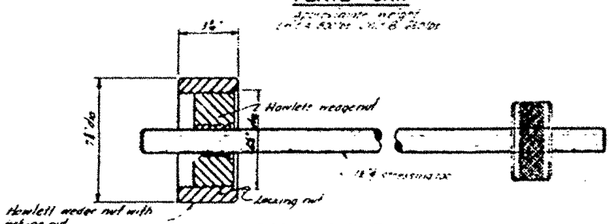


HYDRAULIC SYSTEM
No scale

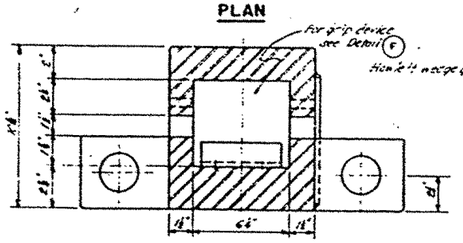
ERECTION PROCEDURE OF STRESSING DEVICE

Clean grip area on flange angles.

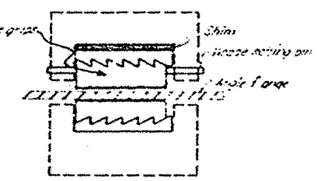
Place flange grip castings on flange angles, bolt them together, place Hewlett wedge grip teeth into flange angles, on the face of flange grip C-clamps. Place plate grip [illegible] stress rod on top plate with gripping pins engaged in first ¾" ø hole. Bar down 4 plates and place 18" plate frame on top of plates. Assembly now shall rest on flange angles. Place stressing rod, jacks and Hewlett wedge grip nuts and locking nuts. Connect jacks with pump and 3 manifold. Jacks may be placed either at the plate grip end or at the flange grip end of the stressing rod.



ROD AND NUTS
Approximate weight 135 lbs



SECTION E-E



DETAIL F

FLANGE GRIP
Unit A shown, Unit B similar
Approximate weight 49 lbs each

MARK	DATE	DESCRIPTION	BY	CH'K
		REVISION		
1	11-63	As built without revisions	J.C.	E.E.F.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO - OAKLAND BAY BRIDGE
RECONSTRUCTION
STEELWORK - EAST BAY

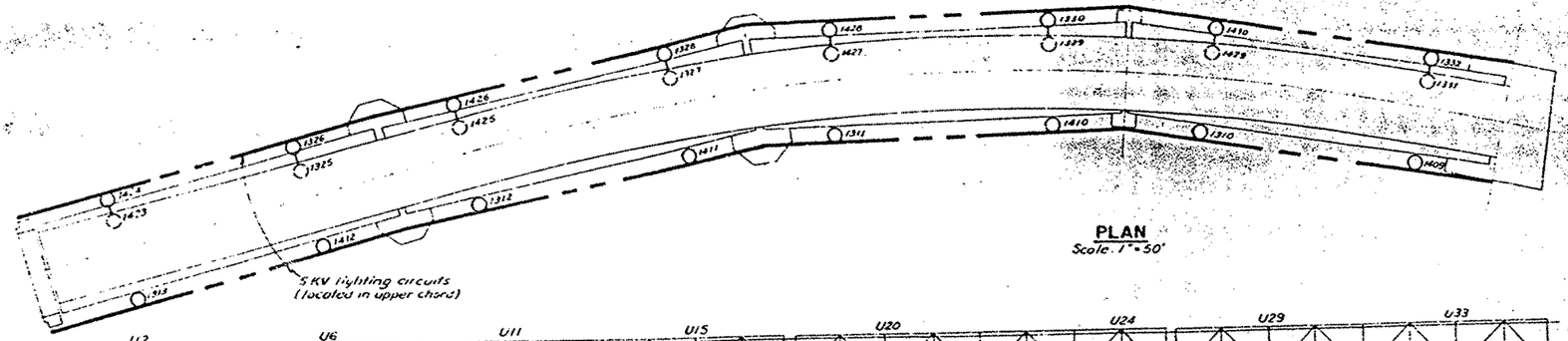
STRESSING DEVICES

UNLESS NOTED SCALE 3" = 1'-0" | BRIDGE 33-23, 34-03, 34-04 | SHEET No 39 | DRAWING [illegible]

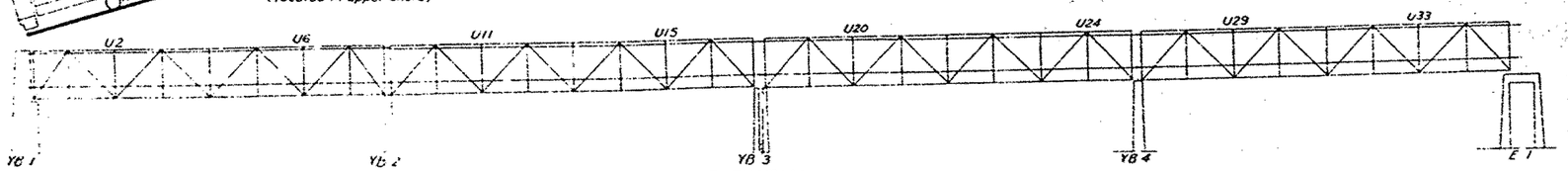
APPROVAL RECOMMENDED BY: [illegible] PROJECT ENGINEER
DATE APPROVED October 6, 1966

PROJECTS ENGINEER - LICENSE 14179

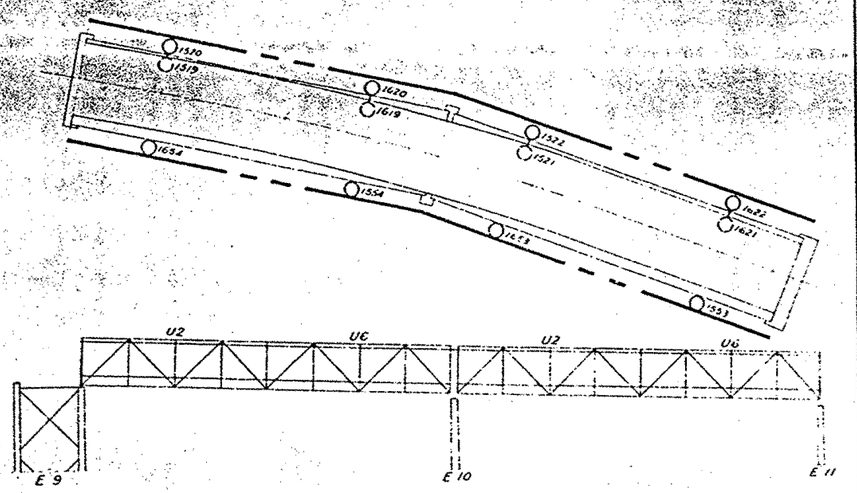
DATE APPROVED October 6, 1961



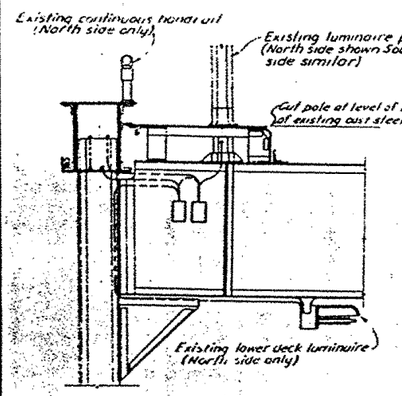
PLAN
Scale: 1" = 50'



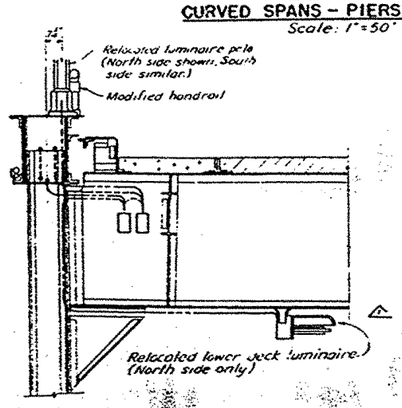
ELEVATION
CURVED SPANS - PIERS YB-1 TO E-1
Scale: 1" = 50'



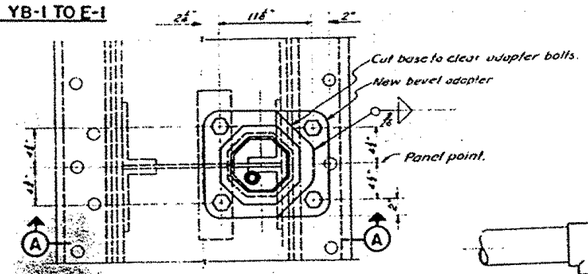
ELEVATION
CURVED SPANS - PIERS E 9 TO E 11
Scale: 1" = 50'



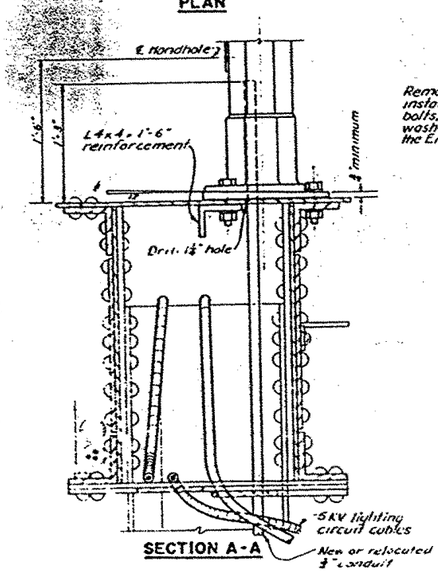
EXISTING LIGHTING INSTALLATION
Scale 1/4" = 1'-0"
(Panel point U 11 North shown, others similar)



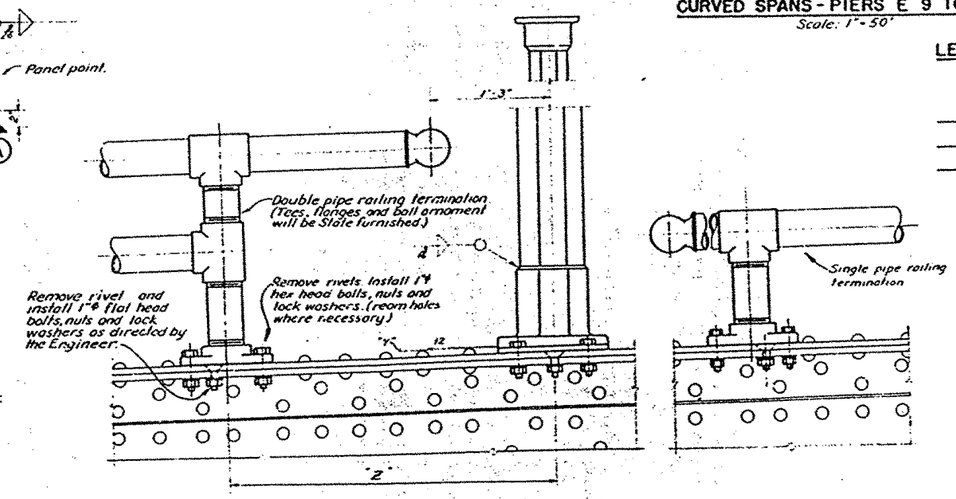
RELOCATED LIGHTING INSTALLATION
Scale 1/4" = 1'-0"
(Panel point U 11 North shown, others similar)



PLAN



SECTION A-A



PARTIAL ELEVATION

LEGEND

- ○ Upper deck pole mounted luminaire
- ○ Lower deck bracket mounted luminaire
- ——— 5 kV lighting circuits
- ——— Existing secondary lighting circuits
- ——— Relocated and new secondary lighting circuits.

NOTES

1. Dimension "Z" shall be such that not more than two rivets need be removed. "Z" maximum equals 3'-6" and "Z" minimum equals 2'-6".
2. Dimension "V" shall be as follows.
   Piers YB1 to YB3 ℄, YB3 to YB4 ℄
   YB4 to E1 ℄, E1 to E11 ℄.
3. Final alignment of poles shall be vertical. Grinding at base and use of single 1/4" maximum steel shims will be permitted.
4. All screwed fastenings shall be installed with approved locking devices.
5. For as-built record of luminaire relocation see shop drawings.

POLE MOUNTING DETAILS
Scale: 1 1/2" = 1'-0"

8 THS 10 THS
0 1 2 3 4
SCALE IN INCHES

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

ELECTRICAL - LIGHTING RELOCATION

MARK	DATE	DESCRIPTION	BY	CHK
1	8-1-63	As built with revisions	L.L.S.	E.E.T.

REVISION

SCALE AS SHOWN

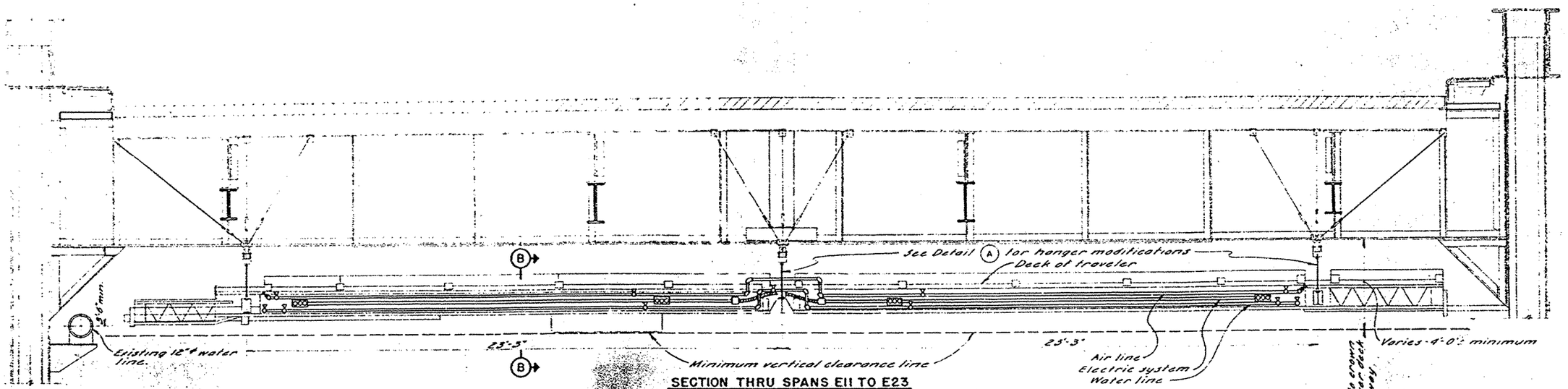
BRIDGE 33-25, 34-03, 34-04

SHEET NO 40

DRAWING C-4049-40R

PROJECTS ENGINEER - LICENSE NO.

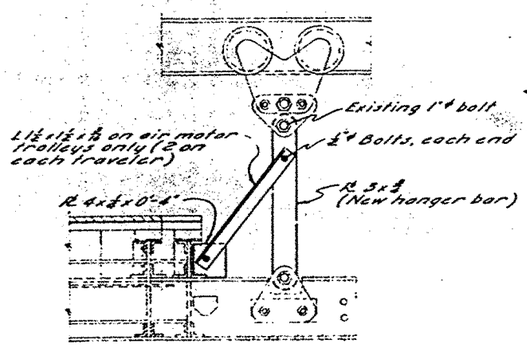
DATE APPROVED October 6, 1961



SECTION THRU SPANS E11 TO E23

(Showing new utilities on typical existing scaffold)

Scale: 1/2"=1'-0"

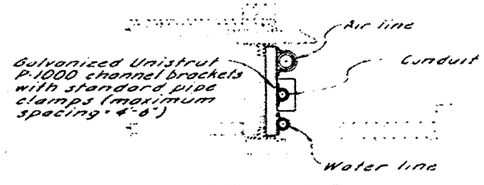


DETAIL A

HANGER MODIFICATION

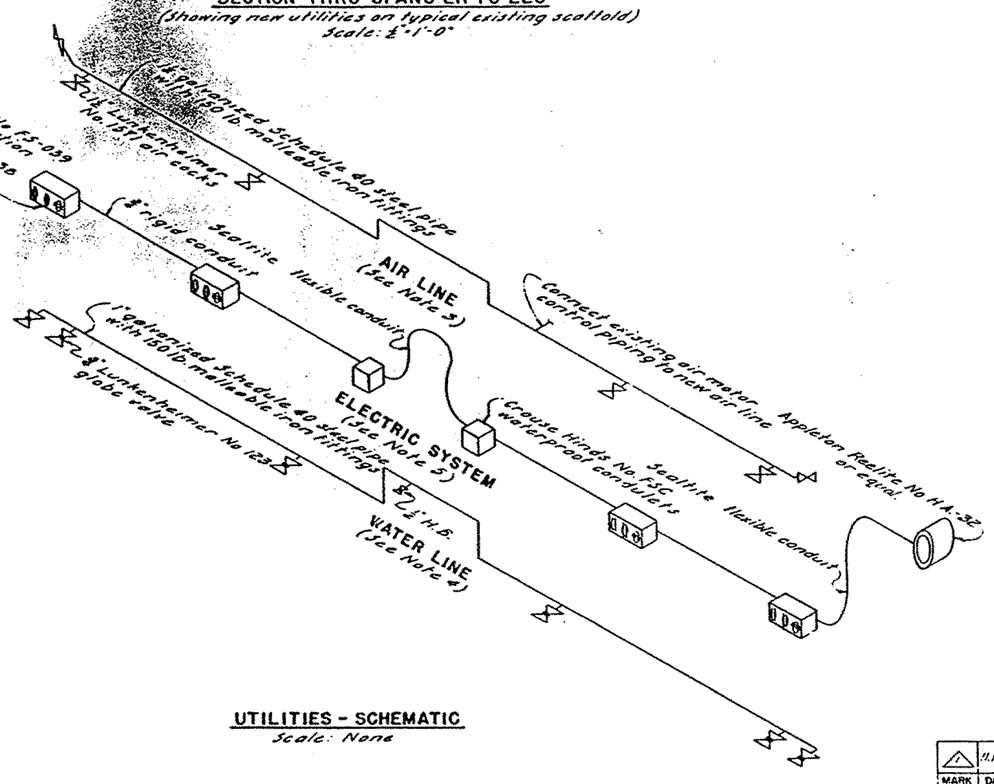
(Existing hanger bars to be removed and retained on traveler for future use.)

Scale: 1 1/2"=1'-0"



SECTION B-B

Scale: 1 1/2"=1'-0"



UTILITIES - SCHEMATIC

Scale: None

NOTES

1. Furnish and install a 1" water line, 1/2" air line and a 120/240 single phase electrical distribution system; including all wire, conduit and pipe; all fittings, clamps and supports; and all necessary devices for operation.
2. All rigid conduit and associated equipment shall be hot-dip galvanized.
3. Supply three 50' lengths of 1 1/2" Acme Gold Seal hose with Chicago Pneumatic No. C-15076 and No. C-15145 universal couplings as required on the air system.
4. Supply three 50' lengths of Acme Buffalo (200 p.s.i.) hose with Chicago Pneumatic No. C-15120 and No. C-15150 universal couplings as required on the water system.
5. Supply and install 150' of 14-3 S.J. cord with Crouse-Hinds No. WPB28 weatherproof plug on the electric system.

0 8 TH 10 THS 0 1 2 3 4 SCALE IN INCHES

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

TRAVELER SCAFFOLD MODIFICATIONS

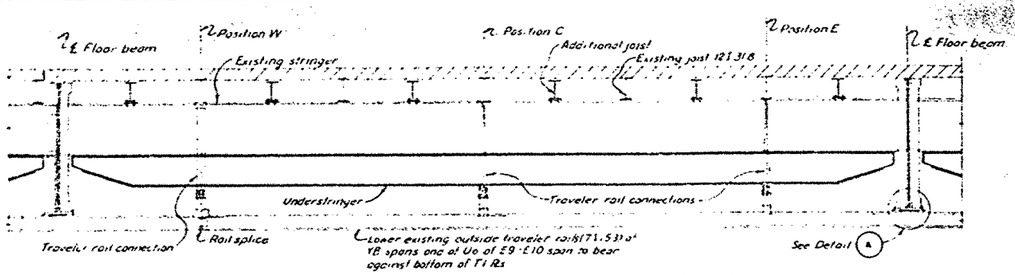
MARK	DATE	DESCRIPTION	BY	CHK
1	11.1.63	As built without revisions	CB	EEF

REVISION

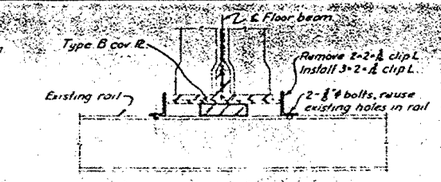
SCALE AS SHOWN | BRIDGE 33-02, 34-03, 34-04 | SHEET No. 41 | DRAWING C 3030 4.9

APPROVAL RECOMMENDED BY ... SUPERVISING BRIDGE ENGINEER LICENSE NO.

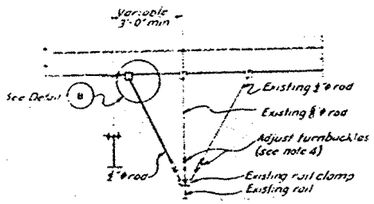
FILING DETAILS QUANTITIES DESIGN AND DETAILS REVIEWED BY ... DESIGN AND DETAILS REVIEWED BY ... DESIGN AND DETAILS REVIEWED BY ... DESIGN AND DETAILS REVIEWED BY ...



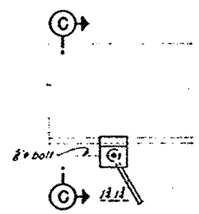
LOCATION OF TRAVELER RAIL CONNECTIONS
OUTSIDE RAIL ELEVATION
Scale 1/8" = 1'-0"



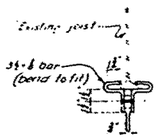
TYPICAL RAIL CONNECTION (Expansion Slop)
All interior floor beams under Type B cover Plate



OUTSIDE RAIL CROSS SECTION
Scale 1/8" = 1'-0"

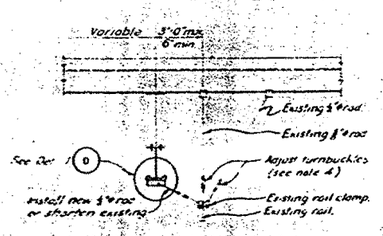


DETAIL B
Scale 1½" = 1'-0"

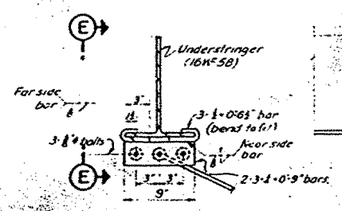


SECTION C-C
Scale 1½" = 1'-0"

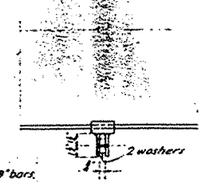
CONNECTION TYPE I



OUTSIDE RAIL CROSS SECTION
Scale 1/8" = 1'-0"

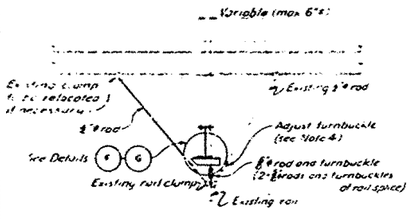


DETAIL D
Scale 1½" = 1'-0"

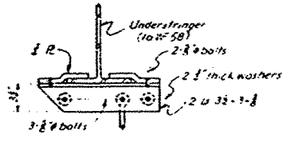


SECTION E-E
Scale 1½" = 1'-0"

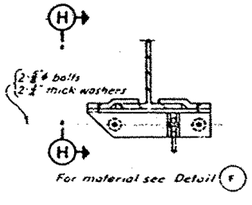
CONNECTION TYPE II



OUTSIDE RAIL CROSS SECTION
Scale 1/8" = 1'-0"

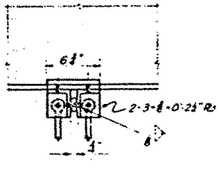


DETAIL F
For one vertical rod
Scale 1½" = 1'-0"



DETAIL G
At rail splice
Scale 1½" = 1'-0"

ROD DETAIL
Scale 3" = 1'-0"



SECTION H-H
Scale 1½" = 1'-0"

CONNECTION TYPE III

RAIL CONNECTION
For end floor beams of YB Spans

DETAIL A
Scale 1½" = 1'-0"

CONNECTION TYPES I, II AND III AT VARIOUS LOCATIONS

SPAN	PANEL	RAIL	POSITION IN PANEL W	C	E	AW	AE
YB1-YB2	U0-U1	N(North)	I	I	I		
		S(South)	II	II	II		
	U1-U2	N	II	II	II		
		S	II	II	II		
	U2-U3	N	II	II	II		
		S	II	II	II		
	U3-U4	N	II	II	II		
		S	III(S)	III	III		
	U4-U5	N	II	II	II		
		S	III(S)	III	III		
	U5-U6	N	II	II	II		
		S	II	II	II		
	U6-U7	N	III(S)	III	III		
		S	II	II	II		
	U7-U8	N	III(S)	III	III		
		S	II	II	II		
YB2-YB3	U9-U10	N	III	III	II	II	
		S	II	II	III		
	U10-U11	N	II	II	II		
		S	II	II	II		
	U11-U12	N	ETR	ETR	ETR		
		S	II	II	II		
	U12-U13	N	ETR	ETR	ETR		
		S	II	II	II		
	U13-U14	N	ETR	ETR	ETR		
		S	II	II	II		
	U14-U15	N	ETR	ETR	ETR		
		S	II	II	II		
	U15-U16	N	II	II	II		
		S	II	II	II		
	U16-U17	N	III(S)	II	II		II
		S	II	II	II		ETR
YB3-YB4	U18-U19	N	II	II	III	II	
		S	ETR	II	II		
	U19-U20	N	II	II	II		
		S	III(S)	III	III		
	U20-U21	N	ETR	ETR	ETR		
		S	II	II	II		
	U21-U22	N	ETR	ETR	ETR		
		S	II	II	II		
	U22-U23	N	ETR	ETR	ETR		
		S	II	II	II		
	U23-U24	N	ETR	ETR	ETR		
		S	II	II	II		
	U24-U25	N	II	II	II		
		S	III(S)	III	III		
	U25-U26	N	III(S)	II	II		II
		S	II	II	ETR		
YB4-E1	U27-U28	N	II	II	III	II	
		S	ETR	II	II		
	U28-U29	N	II	II	II		
		S	III(S)	III	III		
	U29-U30	N	I	I	I		
		S	II	II	II		
	U30-U31	N	ETR	ETR	ETR		
		S	II	II	II		
	U31-U32	N	ETR	ETR	ETR		
		S	II	II	II		
	U32-U33	N	I	—	I		
		S	II	II	II		
	U33-U34	N	II	II	II		
		S	III(S)	III	III		
	U34-U35	N	II	II	II		
		S	II	II	II		

SPAN	PANEL	RAIL	POSITION IN PANEL W	C	E	AW	AE
E9-E10	U0-U1	N(North)	II	II	II		
		S(South)	II	III	III		
	U1-U2	N	II	II	II		
		S	III(S)	III	III		
	U2-U3	N	II	II	II		
		S	II	II	II		
	U3-U4	N	ETR	ETR	ETR		
		S	II	II	II		
	U4-U5	N	ETR	ETR	ETR		
		S	II	II	II		
	U5-U6	N	II	II	II		
		S	II	II	II		
	U6-U7	N	II	II	II		
		S	III(S)	III	III		
	U7-U8	N	III(S)	III	II		II
		S	II	II	II		
E10-E11	U0-U1	N	II	III	III	II	
		S	II	II	II		
	U1-U2	N	II	II	II		
		S	III(S)	III	III		
	U2-U3	N	II	II	II		
		S	II	II	II		
	U3-U4	N	ETR	ETR	ETR		
		S	II	II	II		
	U4-U5	N	ETR	ETR	ETR		
		S	II	II	II		
	U5-U6	N	II	II	II		
		S	II	II	II		
	U6-U7	N	III(S)	III	III		
		S	III(S)	III	II		
	U7-U8	N	II	II	II		
		S	III(S)	III	II		

A.W. - Indicates : Additional position in panel west of W
A.E - Indicates : Additional position east of E
ETR - Indicates : Existing connection to remain
(S) - Indicates : Location of rail splice

NOTES

1. For typical center rail adjustment between floor beams, see Sect at (6/A5)
2. For adjustment of center rail under floor beam U8, span E9-E10 and U0 and U8, span E10-E11, see Detail (B/A5)
3. For adjustment of rails under floor beam at U0, span E9-E10, see Detail (C/A5)
4. Adjustment of turnbuckles is permitted if the hanger rods engage the full length of the turnbuckle threads. Where adjustment of turnbuckles is not feasible, rail shall be lowered by substituting rods of adequate length or by shimming rod brackets. (See Rail Connection Detail A)
5. Lock washers shall be furnished under the nuts of all bolts to be used in the iron work

8 THS 10 THS
0 1 2 3 4
SCALE IN INCHES

MARK	DATE	DESCRIPTION	BY	CHK
1	11.1.63	As built without revisions	ds	EEF

REVISION

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

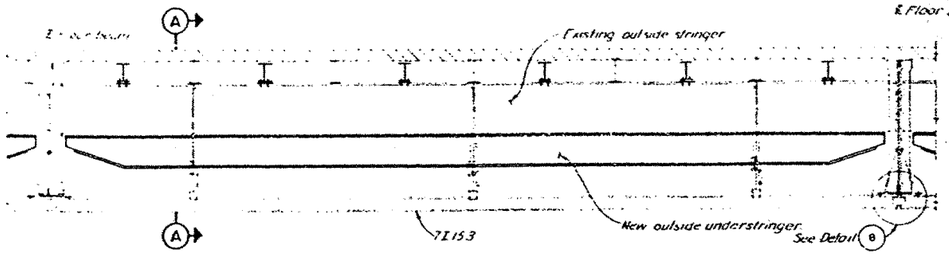
SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK - EAST BAY

TRAVELER RAIL ADJUSTMENT YB1-E1 AND E9-E11

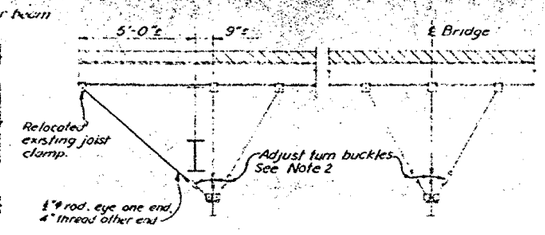
AS SHOWN
SCALE
BRIDGE 33-25 / 34-03 / 35-03 / 36-04
SHEET No 42
DRAWING 5-4130-42R

PROJECTS ENGINEER — LICENSE 1470
DATE APPROVED October 6, 1961

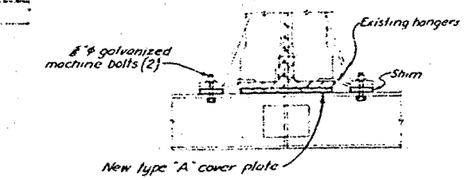
APPROVAL RECOMMENDED BY
SUPERVISING BRIDGE ENGINEER
LICENSE 1470



TYPICAL PANEL - 288 FOOT SPANS E11 TO E23

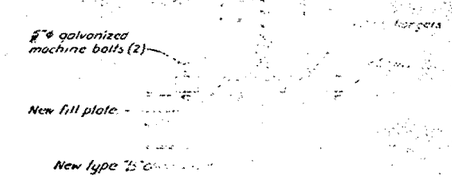


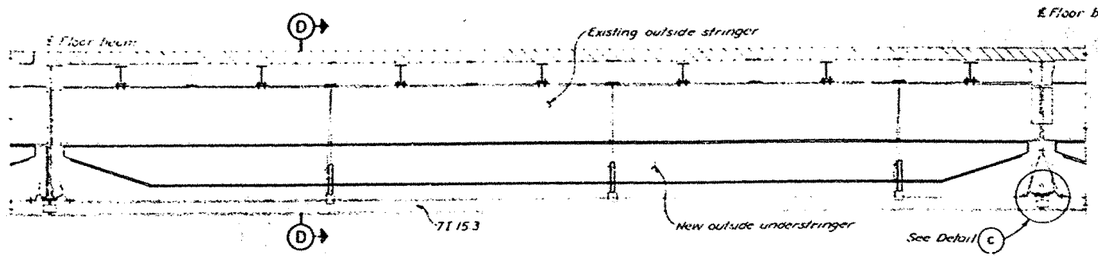
SECTION A - A



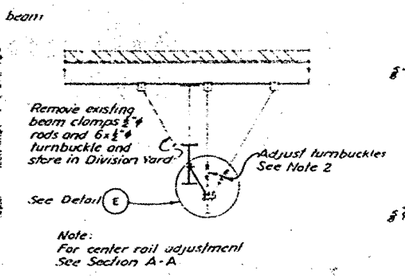
DETAIL B

Rail adjustment at type "A" cover plate.
Scale: 1½" = 1'-0"

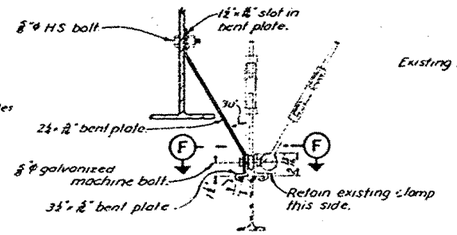




TYPICAL PANEL - 504 FOOT SPANS E4 TO E9

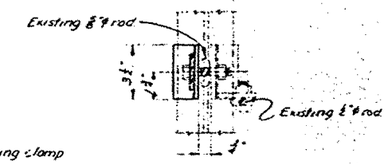


SECTION D-D



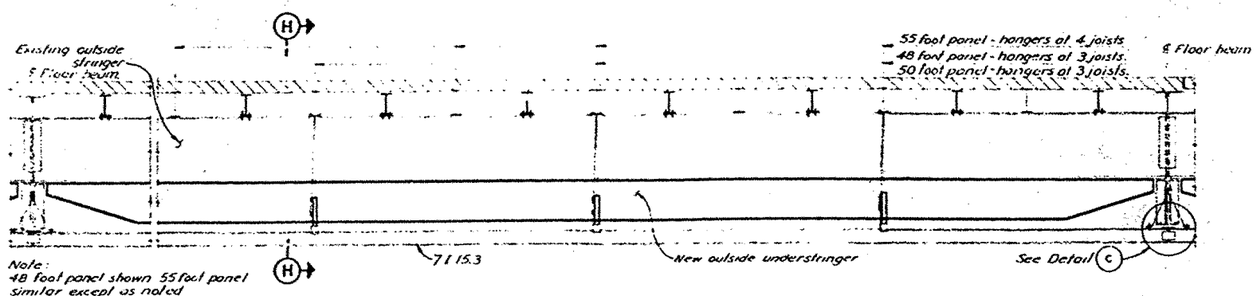
DETAIL E

Scale 1½" = 1'-0"

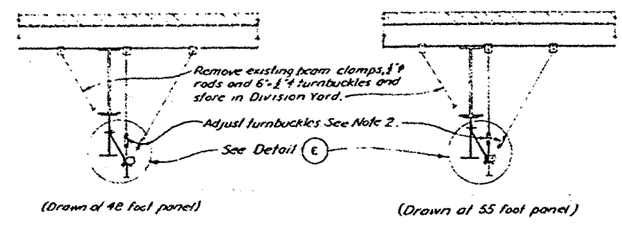


SECTION F-F

Scale 3" = 1'-0"



TYPICAL PANEL - CANTILEVER STRUCTURE E1 TO E4 AND TOWER E9

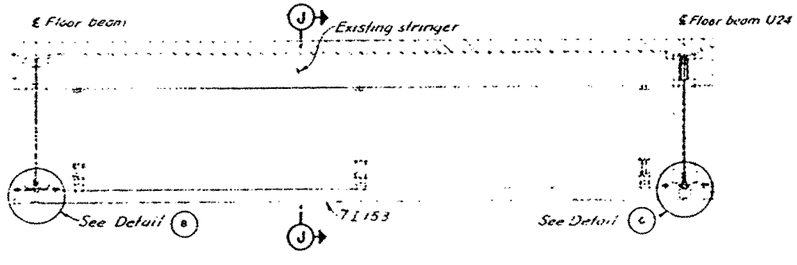


Note:
For center rail adjustment See Section A-A.

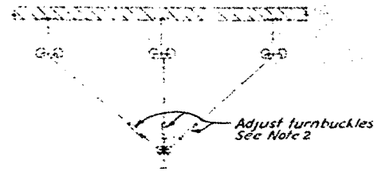
SECTION H-H

NOTES

1. For new rod details, see Sheet No 42.
2. Adjustment of turnbuckles is permitted if the hanger rods engage the full length of the turnbuckle thread. Where adjustment of turnbuckles is not feasible rod shall be lowered by substituting rods of adequate length.
3. Lock washers shall be furnished under the nuts of all machine bolts used in the new work.



TYPICAL PANEL-GIRDER SPANS E23-E25



SECTION J-J

MARK	DATE	DESCRIPTION	BY	CH'K
1	11.1.63	As built without revisions	CB	EEF

REVISION

SAN FRANCISCO-OAKLAND BAY BRIDGE
REGIONAL DIVISION
STEEL WORK - EAST BAY

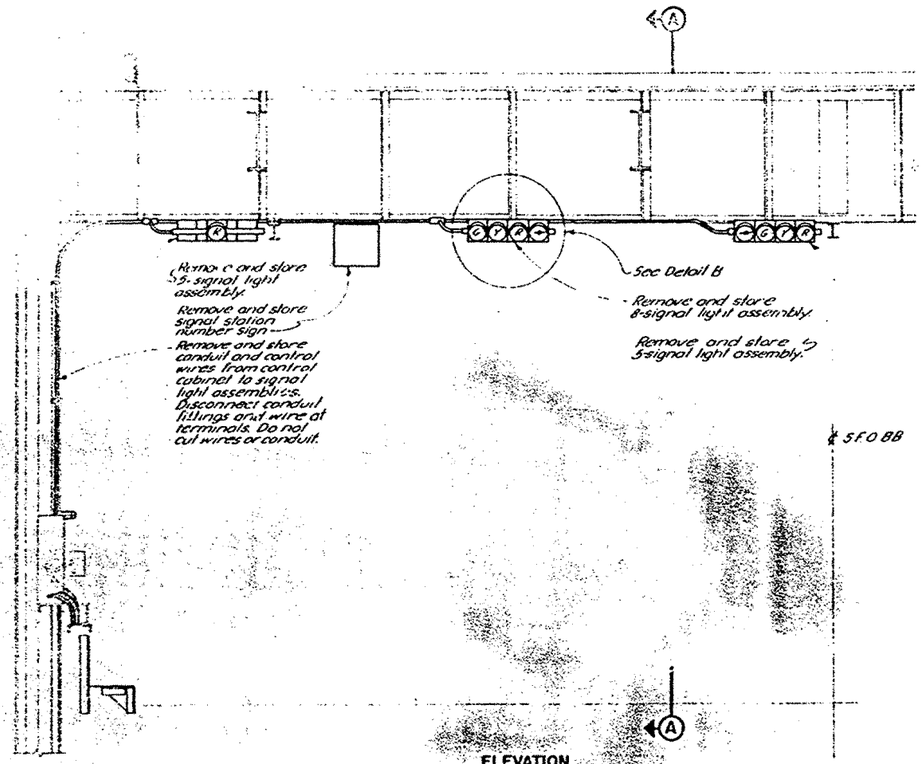
TRAVELER RAIL ADJUSTMENT E1-E9 AND C11-E25

UNLESS NOTED ...

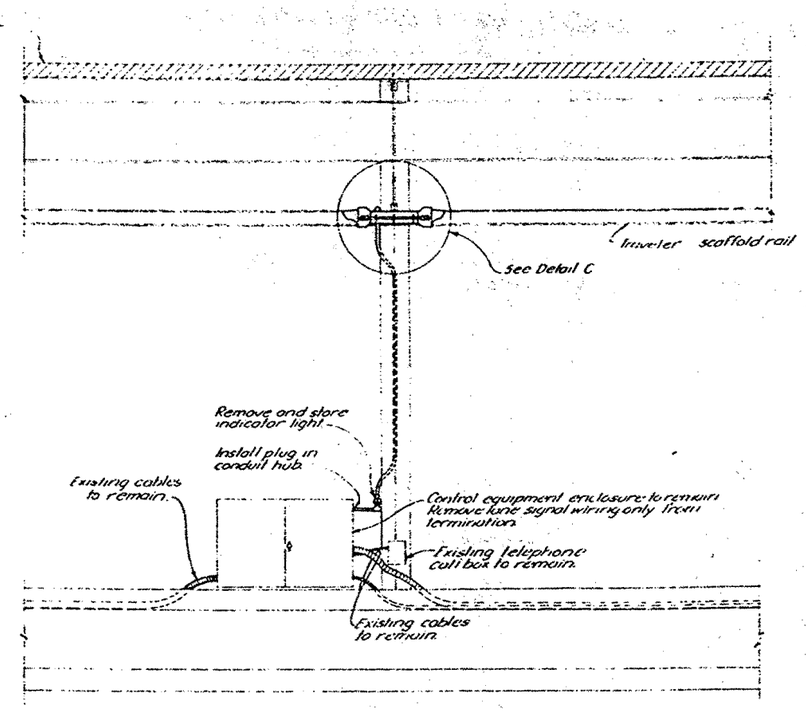
SCALE ... 43

APPROVAL RECOMMENDED BY

DATE APPROVED October 6, 1961



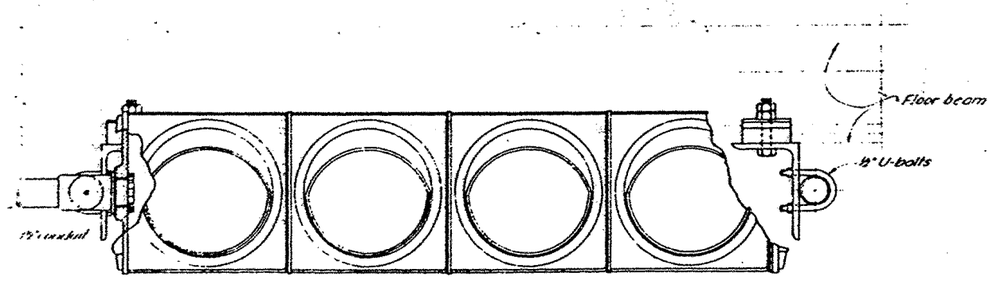
ELEVATION



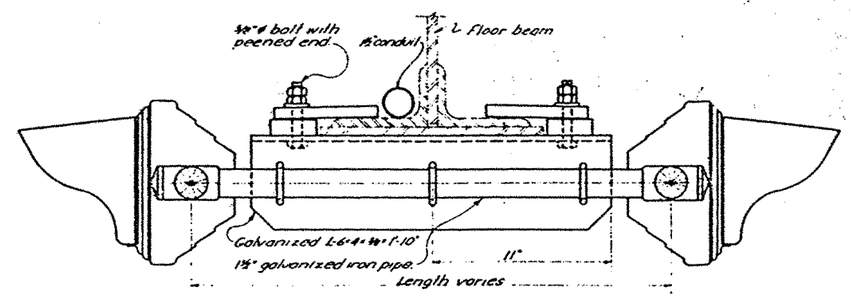
SECTION A-A

TYPICAL LANE SIGNAL INSTALLATION
Scale: 1/8"=1'-0"

SIGNAL LOCATIONS	
Signal Number	SFOBB Station No.
23	170+95
24	175+21
25	178+12
26	181+04
27	184+62
28	190+94
29	196+70
30	202+40
31	208+12
32	214+07
33	220+42
34	225+93
35	234+43
36	237+81
37	242+91
38	248+73
39	254+55
40	260+39
41	266+23
42	272+07
43	278+20



DETAIL B
Scale 3"=1'-0"



DETAIL C
Scale 3"=1'-0"

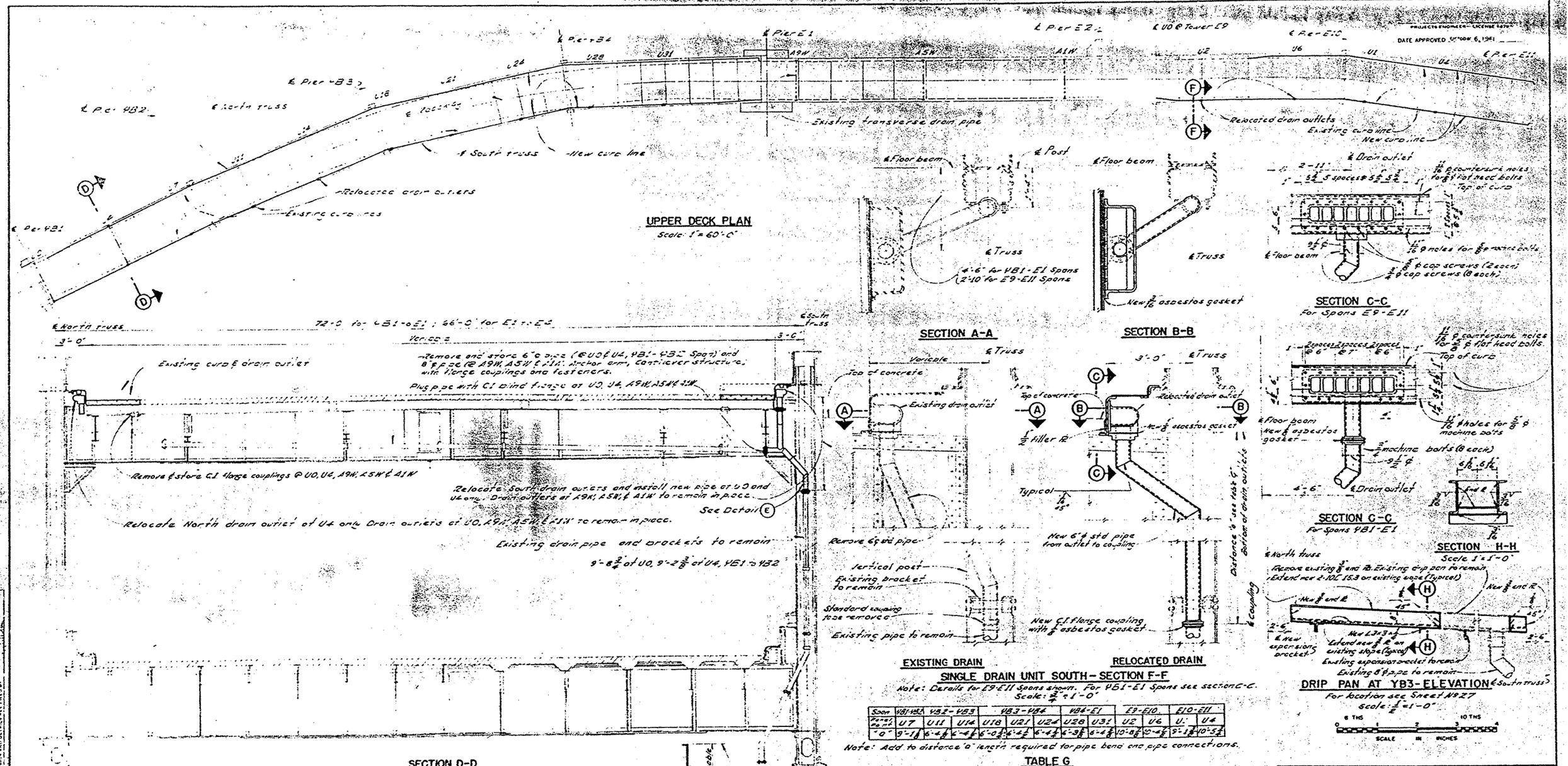
MARK	DATE	DESCRIPTION	BY	CH'K
1	11.1.63	As built without revisions	JB	EEF
		REVISION		

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

LANE SIGNAL SYSTEM REMOVAL

SCALE AS SHOWN | BRIDGE 33-25, 34-03, 34-04 | SHEET No. 44



Span	YB1-YB2	YB2-YB3	YB3-YB4		YB4-E1	E9-E10	E10-E11	
Pier	U7	U11	U14	U18	U21	U24	U28	U31	U2	U6	U.	U4
"D"	9'-1 1/8"	6'-4 1/8"	6'-4 1/8"	6'-0 1/2"	6'-4 1/2"	6'-4 1/2"	6'-3 1/8"	6'-4 1/8"	10'-8 1/8"	10'-8 1/8"	9'-1 1/8"	10'-5 1/2"

MARK	DATE	DESCRIPTION	BY	CH'K
1	11.1.63	As built without revisions	OB	EEF

REVISION

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF SAN FRANCISCO BAY TOLL CROSSINGS

SAN FRANCISCO-OAKLAND BAY BRIDGE
RECONSTRUCTION
STEEL WORK-EAST BAY

DRAIN PIPE RELOCATION

SCALE AS SHOWN | BRIDGE 33-25, 34-03, 34-04 | SHEET No 45 | DRAWING C-4030-45R

APPROVAL RECOMMENDED BY

STORM WATER INFORMATION HANDOUT
With Non storm water section

CONTRACT 04-0120T4

On U.S. Highway 80, City and County of San Francisco, from, east to west,
Kilometer Post (KP) 12.6 to KP 13.9

SFOBB Yerba Buena Island (YBI) Project

February 27, 2012

Disclaimer

Storm Water Information Handout is a guideline and is to be used for information purposes only and should not be considered a sole source document in storm water management and dewatering operations.

Contractor should use this information to comply to the requirements of the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP), Order No. 2009-0009-DWQ, Number CAS000002, adopted on September 2, 2009 from the State of California Water Quality Control Board. The contractor is required to provide water quality monitoring, sampling and implement best management practices (BMPs) based on standard industry operations, field conditions and conditions encountered based on the contractor's means and methods. Bidders and contractors are cautioned to make independent investigations and examinations as they deem necessary to satisfy the conditions encountered in performance of work, with respect to the following: sampling and monitoring locations, distribution of watershed areas for sizing of BMPs, and selection of BMPs in order to conform to the requirement of the contract documents and the CGP.

For dewatering operation of Non Storm water, contractor should develop a strategy for collection, conveyance, treatment and disposal of groundwater and storm water accumulated in excavations in accordance with the Dewatering and Non-Storm Water Discharge Control from Water Pollution Control (WPC), Relations with California Regional Water Quality Control Board, and Construction Site Management sections in the special provisions. Also refer to the San Francisco Bay Regional Water Quality Control Board's (RWQCB) Basin Plan and Waste Discharge Requirements (WDRs) Adopted Order Number R2-2002-0010 for Caltrans' Bay Bridge East Span Seismic Safety Project and General Permit for VOC and Fuel General Permit Order No. R2-2012-0012 Number CAG912002 (Permit).

CONTENTS:

1. Introduction
2. Summary of Requirements
3. Project Description
4. Receiving Water Bodies
5. Climate and Rainfall
6. Hazardous Waste
7. Construction General Permit
8. Risk Assessment
9. Run-On/Off Discharges
10. Notice of Intend (NOI)
11. Site Maps
12. 401 Permit and WDR

Non-Storm Water

1. Introduction
2. Non-Storm Water
3. Site Condition
3.1 Seepage Rate
3.2 Groundwater Quality
4.Options of Management of Non-Storm Water
4.1 Discharges to Sanitary Sewer
4.2 Discharges to Storm Drain System
4.3 Disposal/Reuse of Treat Groundwater
4.4 Disposal of Sediment/Solids Generated within the Treatment System

Attachment

A. Vicinity map
B. Rainfall data
C. Risk Assessment
D. Run-on Map
E. Draft NOI
F. Conceptual Water Pollution Control Plan, Sampling and Dewatering Location
G. 401 Permit and Waste Discharge Requirements
H. Seepage rate
I. Groundwater Quality Summary
J. POTW Service Areas and Contact Information
K. Water Quality Control Board Permit R2-2012-0012
L. Dewatering and Non Storm Water Discharge Control Specification

1. Introduction

The purposes of this section are: 1) summarize water quality information, 2) summarize updated requirements per Construction General Permit (CGP), 3) aid in developing the Storm Water Pollution Prevention Plan (SWPPP), and 4) highlight information necessary to file Project Registration Documents (PRD) to the State Water Resources Control Board via Storm water Multi Application Reporting and Tracking System (SMARTS), and 5) file the Notice of Intend (NOI) at the start of construction.

2. Summary of Requirements

The new National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP), Number CAS000002 (NPDES CAS000002) or CGP, regulates discharges from construction activities within the project.
CGP is based on risk level (RL) permitting approach. The RL is calculated by
1. Project sediment risk
2. Receiving water body risk.
Project will have to upload storm water data such as Notices of Intent (NOIs), SWPPPs, annual reports and monitoring data, as applicable into SMARTS.

3. Project Description

The project is to remove the detour structures, re-construct local roads and new approach of San Francisco-Oakland Bay Bridge (SFOBB) at Yerba Buena Island in the County and City of San Francisco. See **Attachment A**.

4. Receiving Water Bodies

The Project is within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (RWQCB). It is located within sub-area 204.40, which is within the South Bay Hydrologic Unit and the San Mateo Bayside Hydrologic Area.
The primary receiving water body is San Francisco Bay Central, which is on the 303(d) list, but is not impaired by sediment.

5. Climate and Rainfall

A National Oceanic and Atmospheric Administration (NOAA) weather station located near the project was used to obtain precipitation data below. **Attachment B**
Rainy days per year (precipitation 0.1 inches or greater) 42.4days
Qualifying rain events per year (precipitation 0.5 inches or greater) 14.1 days
Compliance Storm Event (rainfall total for the 5 year, 24 hour storm) 3 inches
Rainfall intensity report and 2 year curve are included in attachment

6. Hazardous Waste

The hazardous water studies for this project are presented in the Site Investigation Report-SFOBB East Span Seismic Safety Project volume 1 of 2. Oakland California, Geocon Project Task Order No. 04-012000-FC June 2001(SIR).

7. Construction General Permit

To minimize the potential effects of construction runoff on the quality of the receiving water bodies, construction activity disturbed more than 1 acre must obtain coverage under Construction General Permit (CGP). Applicants are required to prepare a SWPPP and implement BMPs to reduce construction effects on receiving water quality.

8. Risk Assessment

The CGP requires a risk assessment to determine the project's impact risk to receiving water bodies. Risk assessment uses project's sediment risk and the sensitivity of the receiving water bodies to determine the risk level. The project has a medium sediment risk level factor and a low receiving water risk factor, the combined risk is **Level 2**. The risk factors are detailed below with results in **Attachment C**

Sediment Risk Equation

A=(R) (K) (LS)

A=rate of sheet and rill erosion R=runoff erosivity factor, K=soil erodibility factor, LS=length-slope

The rainfall runoff erosivity factor R 126.7 was determined from the United States Environmental Protection Agency (EPA).

The weighted average of K is 0.28, based on the urbane land attribute and soil type (silty clay),

The length-slope factor LS of 1.66 was determined by the original grade delineated on the typical cross sections included in the Contract Project Plans.

Based on these factors, the rate of A is 58.89 tons/acre, because the value is between 15 and 75, the project sediment risk is medium sediment risk.

The receiving water body, San Francisco Bay, Central, is low risk because it is neither a 303(d) listed impaired water body by sediment nor has the beneficial uses of COLD.

9. Run-On/Off Discharges:

There are run-on discharges into the project. Actual run-on discharges should be determined by the contractor based on anticipated staging work.

This project uses the runoff coefficients from section 819.2A and, 819.2B of the Caltrans Highway Design Manual where Paved areas C=**0.95**, Unpaved areas C=**0.50**

Equation for run-on discharges Q=CiA

Q=run-on discharge feet^3/sec, C=runoff coefficient=**0.6** as some existing structural foundation pavement, i= 2-year, 24 hour rainfall intensity (inch/hour) = **0.09** from winidf3 program, A=drainage area Run on watershed map is included in **Attachment D**. Actual run-on discharges should be determined by the contractor based on staging and included in the SWPPP.

drainage area		c	I	A(m2)	A(acre)	Q
	1	0.6	0.09	4704	1.162383	0.0627687
	2	0.6	0.09	5293	1.307928	0.0706281
	3	0.6	0.09	7748	1.914571	0.1033868
	4	0.6	0.09	5025	1.241703	0.067052
	5	0.6	0.09	1690	0.417608	0.0225508
	6	0.6	0.09	4958	1.225147	0.066158

10. Notice of Intent (NOI)

Caltrans will be responsible for submitting the NOI to SMARTS. The contractor should provide Caltrans with information to complete the NOI. NOI must be submitted once the contractor submits the SWPPP. A draft NOI is included in **Attachment E**.

11. Site Maps

Conceptual Water Pollution Control Plan and Sampling and dewatering location are shown in **Attachment F**.

12. 401 Permit and WDR

A copy of SFOBB Water Quality Certification (401 Permit) and Waste Discharge Requirements (WDR) are attached as reference in **Attachment G**.

Non-Storm Water (NSW):

1. Introduction

The purpose of the NSW is to provide the Contractor additional information on:
1) groundwater condition 2) seepage rates 3) groundwater quality, and 4).options of discharge, handling, and disposal

2. Non-Storm Water

Accumulated precipitation and groundwater encountered in excavations will be considered as non-storm water. Non-storm water is expected to be encountered during construction activities at construction of Guard Booth with Canopy, West Tie-in, YBI EB on ramp structure, and retaining wall #51. They are not limited to the locations shown on the Water Pollution Control Drawings **Attachment F**.

3. Site Condition

- The YBI sub-surface conditions mentioned in the Site Investigation Report can be summarized as follows:-
- YBI topography is hilly with elevations ranging from the sea level to 338 feet (103 meters). Run-on is anticipated.
- Groundwater depths vary from 8.0 to 31 feet (2.4 to 9.5 meters) below existing grade.

3.1 Seepage Rate

The estimated groundwater seepage (flow) rates for the YBI East Span project areas are provided in **Attachment H.** Estimated flow rate varied from 0.53 to 1.59 (gallons/day/ft^2).

3.2 Groundwater Quality

SIR has been prepared, with excerpts of analytical results for the groundwater samples summarized in Tables 6-7.see **Attachment I**. The investigation shows the primary pollutant of concern is petroleum hydrocarbon diesel (TPHd). Entire SIR is provided as an information handout.

4. Options of Management of Non-storm Water

Management of non-storm water is addressed in the contract special provision sections of "Dewatering and Non-Storm Water Discharge Control", "Water Pollution Control" (WPC), and "Construction Site Management"

The non-storm water treatment and discharge system will need to have the capacity and the treatment system components that are capable of removing pollutants such as turbidity-producing suspended solids, petroleum hydrocarbons, and maintaining pH within Waste Discharge Requirements (WDRs) and basin plan's Environmental Screen Levels (ESL). It should also remove pollutants expected or introduced by the Contractor's construction methods and materials employed. Best Management Practices used for treatment of non storm water including but not limited to: desilting basins, temporary holding/settling tanks, sediment trap, activated carbon filters, in-line coagulant and flocculants.

4.1 Discharges to Sanitary Sewer

Non-storm water discharges to the sanitary sewer will be allowed upon obtaining a batch discharge permit from the San Francisco Public Utilities Commission (SFPUC)/Publicly Owned Treatment Works (POTW) facility. Any such discharge will require the Treasure Island Water Pollution Control Plant to accommodate a temporary additional pollutant load. Any discharge of groundwater to the sanitary sewer system will be required to comply with SFPUC pretreatment standards and other requirements for discharge to the district’s sewer system. Contact information for SFPUC Batch Discharge Permit and San Francisco County POTW Service Areas are included in **Attachment J**

4.2 Discharges to Storm Drain System

Non-storm water discharges to the storm drain system will need to comply with the general waste discharge requirements for R2-2012-0012, NPDES General Permit No. CAG912002(Permit), issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for "Discharge Or Reuse Of Extracted and Treated Groundwater polluted by Fuel Leaks and Other Related Wastes at Service Stations and Similar Sites". A copy of the Permit is included in **Attachment K**.

Monitoring requirements must be in conformance with the Monitoring and Reporting Program included in **Attachment K** of Permit. During periods when dewatering and discharge operation occur, document the results in a Daily Inspection Report per Inspection, Monitoring, and Reporting section in Dewatering and Non-Storm Water Discharge Control specification. **Attachment L.**

4.3. Disposal/Reuse of Treat Groundwater

Treated non-storm water may be used for dust control in active work areas when possible, or discharge the water to an inactive area where the grade prevents sheet flow and the soil will allow percolation. Refer to "Dewatering and Non-Storm Water Discharge Control" section and WDRs for further guideline.

5.4 Disposal of Sediments/Solids Generated Within the Treatment System

Disposal of sediments removed during maintenance of the treatment must comply with Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Attachment A

INDEX OF SHEETS

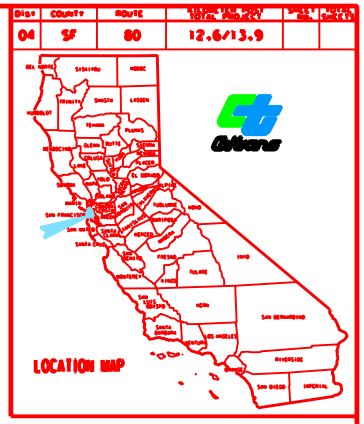
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

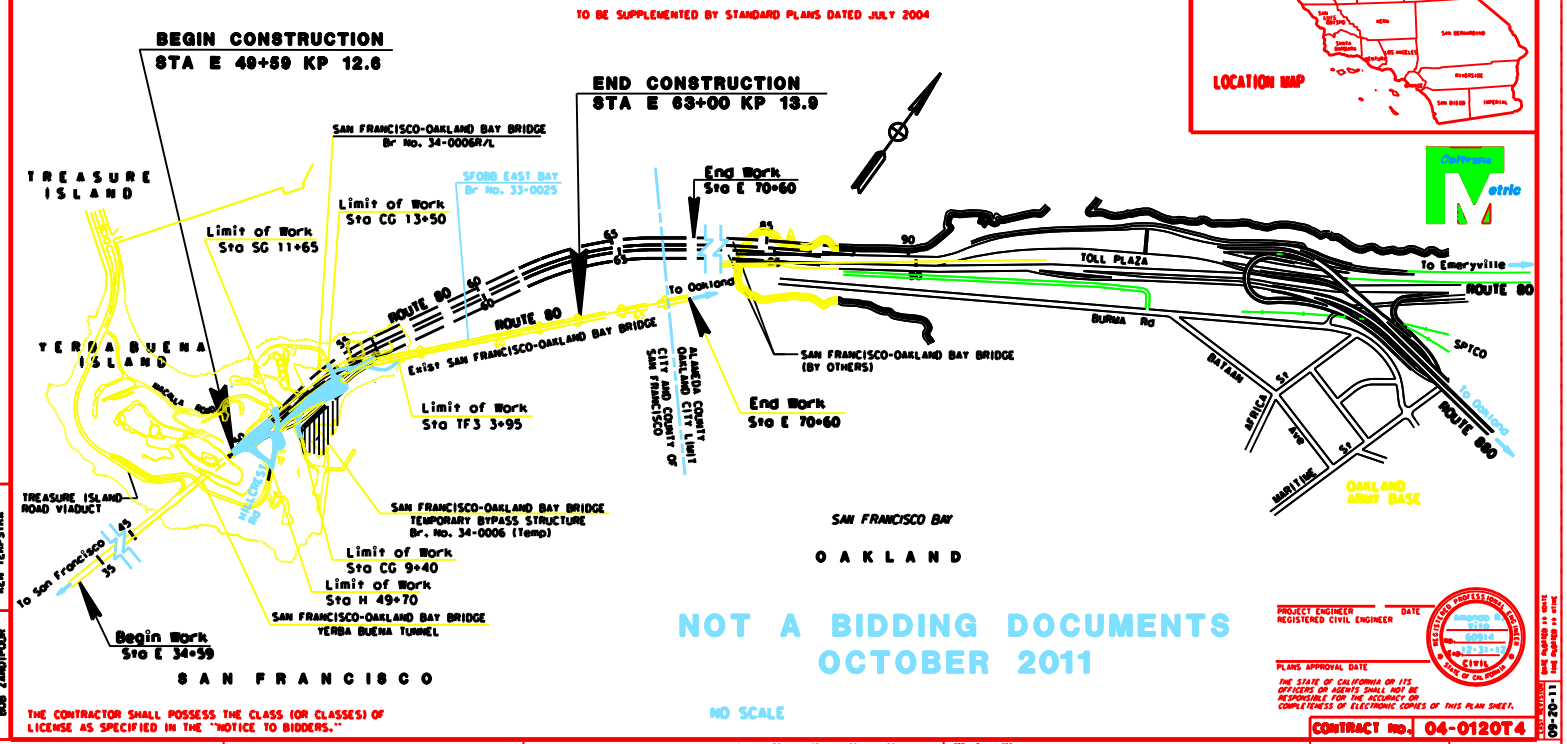
PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY

IN THE CITY AND COUNTY OF SAN FRANCISCO
FROM THE YERBA BUENA TUNNEL
TO 1.3 KM EAST OF THE YERBA BUENA TUNNEL

TO BE SUPPLEMENTED BY STANDARD PLANS DATED JULY 2004

Dist	County	Route	Total Project Length	Total Project Miles
04	SF	80	12.6/13.9	





NOT A BIDDING DOCUMENTS
OCTOBER 2011

NO SCALE

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

PROJECT ENGINEER REGISTERED CIVIL ENGINEER — DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — CIVIL — STATE OF CALIFORNIA

PROJECT MANAGER: KEN TEMPSTRA
DESIGN ENGINEER: BOB ZANDIPOUR

CONTRACT NO. 04-0120T4

BORDER LAST REVISED 3/1/2007 | CALTRANS WEB SITE IS: HTTP://WWW.DOT.CA.GOV/ | RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80 | USERNAME => USER | DGN FILE => UNEQUEST | CU 04251 | EA 0120T1

09-20-11

40120tab001.dgn 2/10/2012 3:58:35 PM

Attachment B

WINIDF v. 1.0 REPORT. 2/10/2012

GENERAL INFORMATION:

Input by: Caltrans WPC
Input date: 02/10/20
Project description: SFOBB KP 13.5

SITE DATA:

Latitude: 37.813 deg.
Longitude: 122.359 deg.
Return Period: 2 years

SELECTED STATIONS:

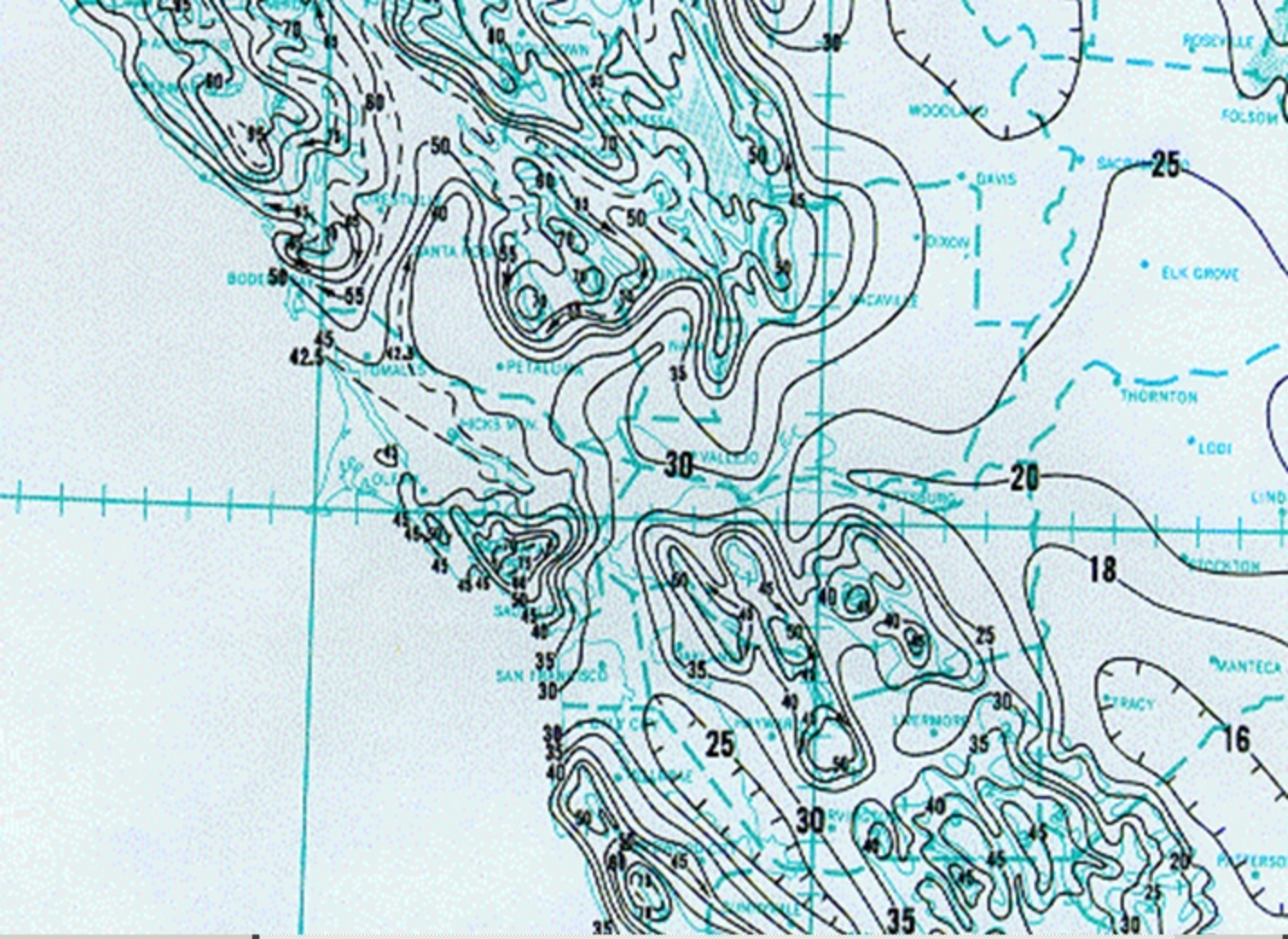
Station Name	Station ID	Elev. ft	Lat. deg.	Long. deg.	Dist. miles
SAN FRANCISCO #28	E707772028	50	37.807	122.406	2.60

COMPUTED INTENSITIES (INCHES/HOUR)

Return Period	2-yr	2-yr	10-yr	25-yr	50-yr	100-yr	10,000-yr
Duration							
5-min	2.008	1.995	3.443	4.069	4.539	5.047	8.060
10-min	1.373	1.364	2.353	2.781	3.102	3.450	5.509
15-min	1.099	1.092	1.884	2.226	2.483	2.761	4.410
30-min	0.751	0.746	1.288	1.522	1.697	1.887	3.014
60-min	0.513	0.510	0.880	1.040	1.160	1.290	2.060
120-min	0.351	0.349	0.601	0.711	0.793	0.882	1.408
4-hr	0.240	0.238	0.411	0.486	0.542	0.603	0.962
8-hr	0.164	0.163	0.281	0.332	0.370	0.412	0.658
16-hr	0.112	0.111	0.192	0.227	0.253	0.282	0.450
24-hr	0.090	0.089	0.154	0.182	0.203	0.225	0.360

OUTPUT COEFFICIENTS

a = 0.5133
b = -0.5490


FOLSOM
DAVIS
DIXON
ELK GROVE
THORNTON
LODI
MANTECA
TRACY
PETALUMA
SAN FRANCISCO
25
20
18
16
30
35

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data,
and Information Service

Climatography of the United States No. 20 1971-2000

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801
www.ncdc.noaa.gov

Station: SAN FRANCISCO DOWNTOWN, CA **COOP ID: 047772**

Climate Division: CA 4 **NWS Call Sign: 7772** **Elevation: 175 Feet** **Lat: 37°46N** **Lon: 122°26W**

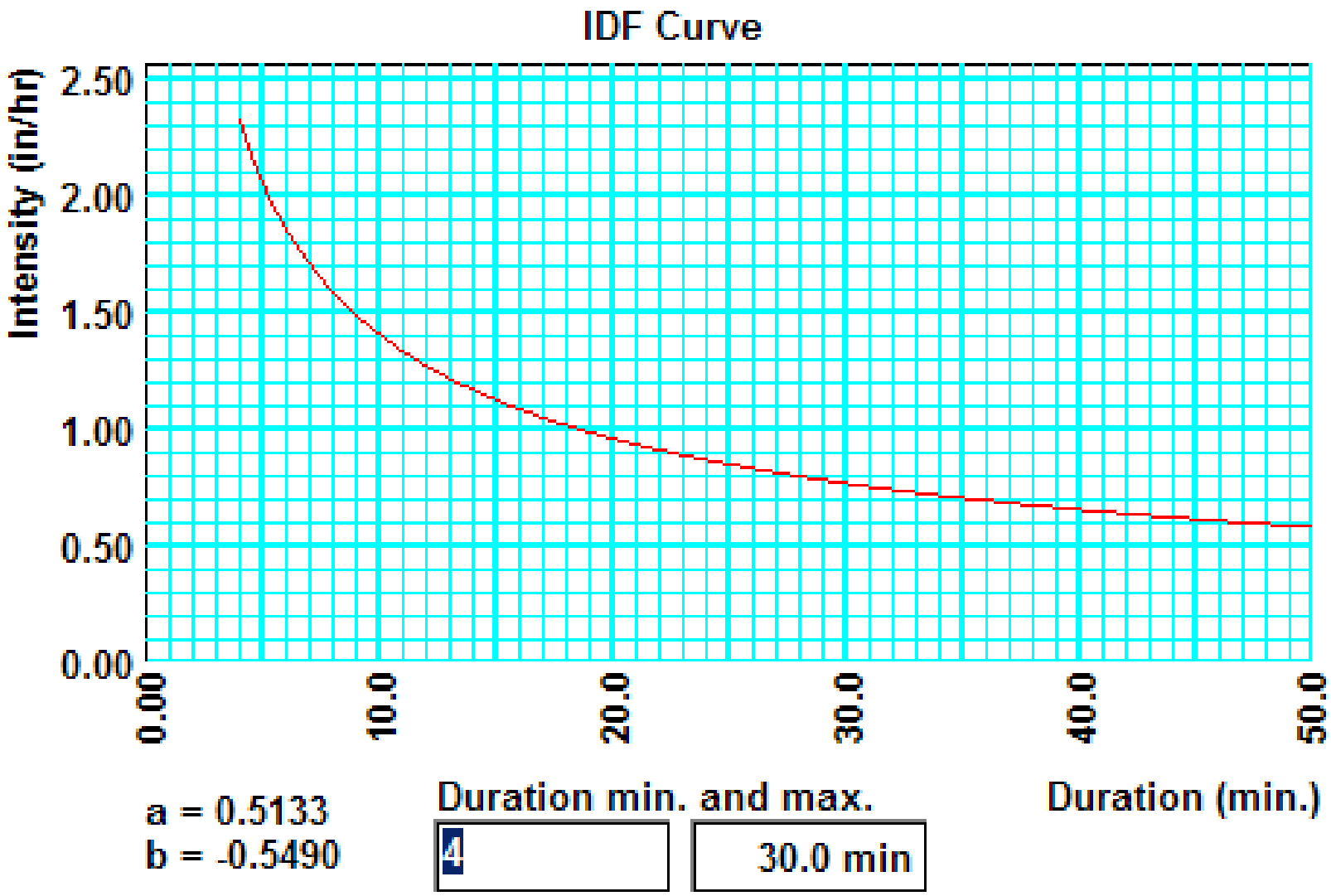
Precipitation (inches)

	Precipitation Totals									Mean Number of Days (3)				Precipitation Probabilities (1) Probability that the monthly/annual precipitation will be equal to or less than the indicated amount										
	Means/ Medians(1)		Extremes							Daily Precipitation				Monthly/Annual Precipitation vs Probability Levels These values were determined from the incomplete gamma distribution										
Month	Mean	Median	Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year	>= 0.01	>= 0.10	>= 0.50	>= 1.00	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	4.72	4.52	3.22	1956	14	12.08	1998	.31	1976	11.4	8.3	3.2	1.2	.55	.91	1.57	2.23	2.93	3.71	4.63	5.76	7.30	9.84	12.31
Feb	4.15	3.80	2.93	1998	2	14.89	1998	.24	1995	10.8	7.3	2.7	.9	.35	.63	1.17	1.75	2.38	3.11	3.97	5.06	6.56	9.07	11.54
Mar	3.40	2.59	2.50	1992	5	9.04	1983	.07	1988	11.2	6.6	2.2	.5	.30	.54	.99	1.46	1.98	2.56	3.26	4.14	5.34	7.35	9.32
Apr	1.25	1.00	2.04	1958	2	4.21	1978	.02	1973	6.2	3.1	.7	.2	.08	.15	.31	.48	.67	.90	1.17	1.52	2.00	2.82	3.63
May	.54	.16	1.42	1990	27	3.92	1998	.00+	1992	3.3	1.5	.3	.1	.00	.00	.00	.05	.12	.23	.38	.59	.92	1.53	2.17
Jun	.13	.06	1.34	1967	2	.70	1988	.00+	1996	1.4	.4	@	.0	.00	.00	.00	.00	.02	.05	.09	.15	.23	.37	.51
Jul	.04	.00	.03+	1986	23	.73	1974	.00+	1999	.4	.1	@	.0	.00	.00	.00	.00	.00	.00	.00	.00	.02	.11	.21
Aug	.09	.01	.54	1997	19	.78	1976	.00+	1996	.9	.3	@	.0	.00	.00	.00	.00	.00	.00	.02	.05	.13	.28	.45
Sep	.28	.16	2.01	1959	18	1.32	1986	.00+	1995	2.1	1.0	.1	.0	.00	.00	.00	.00	.06	.13	.22	.34	.51	.79	1.08
Oct	1.19	.92	2.29	1969	15	5.41	1972	.00+	1980	4.1	2.2	.9	.2	.00	.05	.20	.37	.57	.80	1.09	1.45	1.97	2.85	3.72
Nov	3.31	2.27	5.54	1994	5	10.49	1994	.08	1995	8.7	5.5	2.1	.7	.13	.29	.66	1.09	1.60	2.21	2.97	3.96	5.37	7.80	10.25
Dec	3.18	2.61	3.61	1995	11	8.13	1995	.00	1989	9.6	6.1	1.9	.6	.39	.79	1.33	1.78	2.24	2.73	3.27	3.92	4.79	6.17	7.47
Ann	22.28	21.01	5.54	Nov 1994	5	14.89	Feb 1998	.00+	Jul 1999	70.1	42.4	14.1	4.4	10.60	12.53	15.17	17.31	19.28	21.26	23.38	25.79	28.81	33.36	37.46

+ Also occurred on an earlier date(s)
# Denotes amounts of a trace
@ Denotes mean number of days greater than 0 but less than .05
** Statistics not computed because less than six years out of thirty had measurable precipitation

(1) From the 1971-2000 Monthly Normals
(2) Derived from station's available digital record: 1948-2001
(3) Derived from 1971-2000 serially complete daily data

Complete documentation available from:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html


IDF Curve
Intensity (in/hr)
2.50
2.00
1.50
1.00
0.50
0.00
0.00
10.0
20.0
30.0
40.0
50.0
Duration (min.)
a = 0.5133
b = -0.5490
Duration min. and max.
4
30.0 min

Attachment *C*

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		126.7
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.28
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		1.66
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	58.89016	
16	**Site Sediment Risk Factor**	**Medium**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Rainfall Erosivity Factor Calculator for Small Construction Sites

Facility Information

Facility Name: ybi2
Start Date: 12/01/2012
End Date: 3/1/2016
Latitude: 37.8110
Longitutde: -122.3642

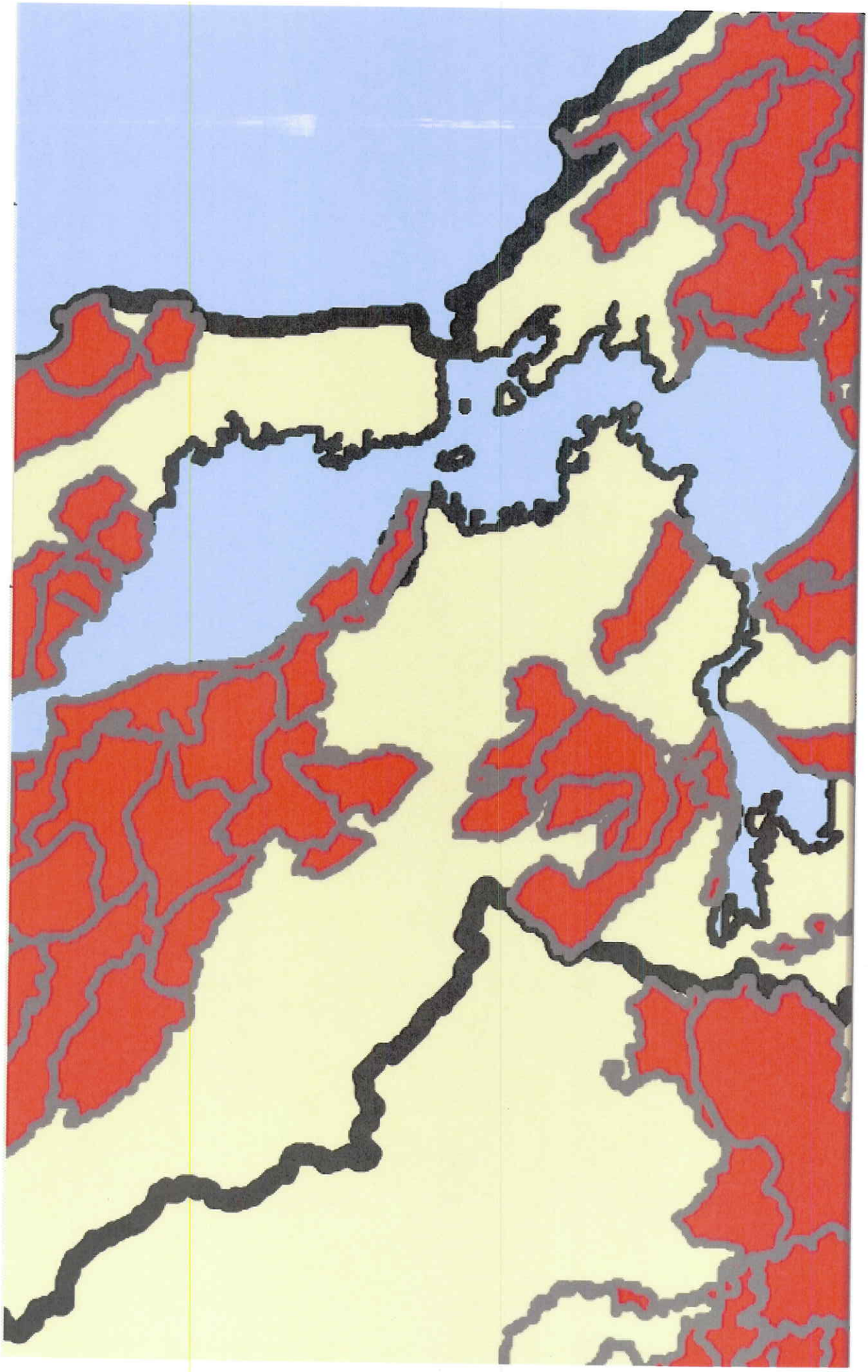
The Low Erosivity Waiver calculator could not calculate an R factor value for your location. You can use the Construction Rainfall Erosivity Waiver fact sheet (http://www.epa.gov/npdes/pubs/fact3-1.pdf) to try to calculate an R factor for your location.

Start Over

CENTRAL BASIN

COUNTY / Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
	Human Consumptive Uses						Aquatic Life Uses									Wildlife Use	Recreational Uses		
SAN FRANCISCO COUNTY																			
Golden Gate Channel																			
San Francisco Bay Central					E	E	E	E		E		E	E	E		E	E	E	E
Golden Gate Park Lakes															E	E		E	
MARIN COUNTY																			
San Rafael Creek									E						E	E		E	E
Corte Madera Creek									E			P	E	P	E	E	P	E	
Ross Creek																			
Cascade Creek																			
San Anselmo Creek																			
Sleepy Hollow Creek																			
Phoenix Lake		E							E					E	E	E	E	E	
Phoenix Creek																			
Bill Williams Creek																			
Richardson Bay					E		E	E		E		E	E	E		E	E	E	E
Arroyo Corte Madera del Presidio								E	E					E		E	P	E	
Old Mill Creek									E							E		E	
Coyote Creek (Marin)									E						E	E		E	
ALAMEDA COUNTY																			
Berkeley Aquatic Park Lagoon										E		E		P		E	E	E	
Lake Temescal									E					E	E	E	E	E	

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use



Site Specific Analysis of LS Factor

0120t ybi2

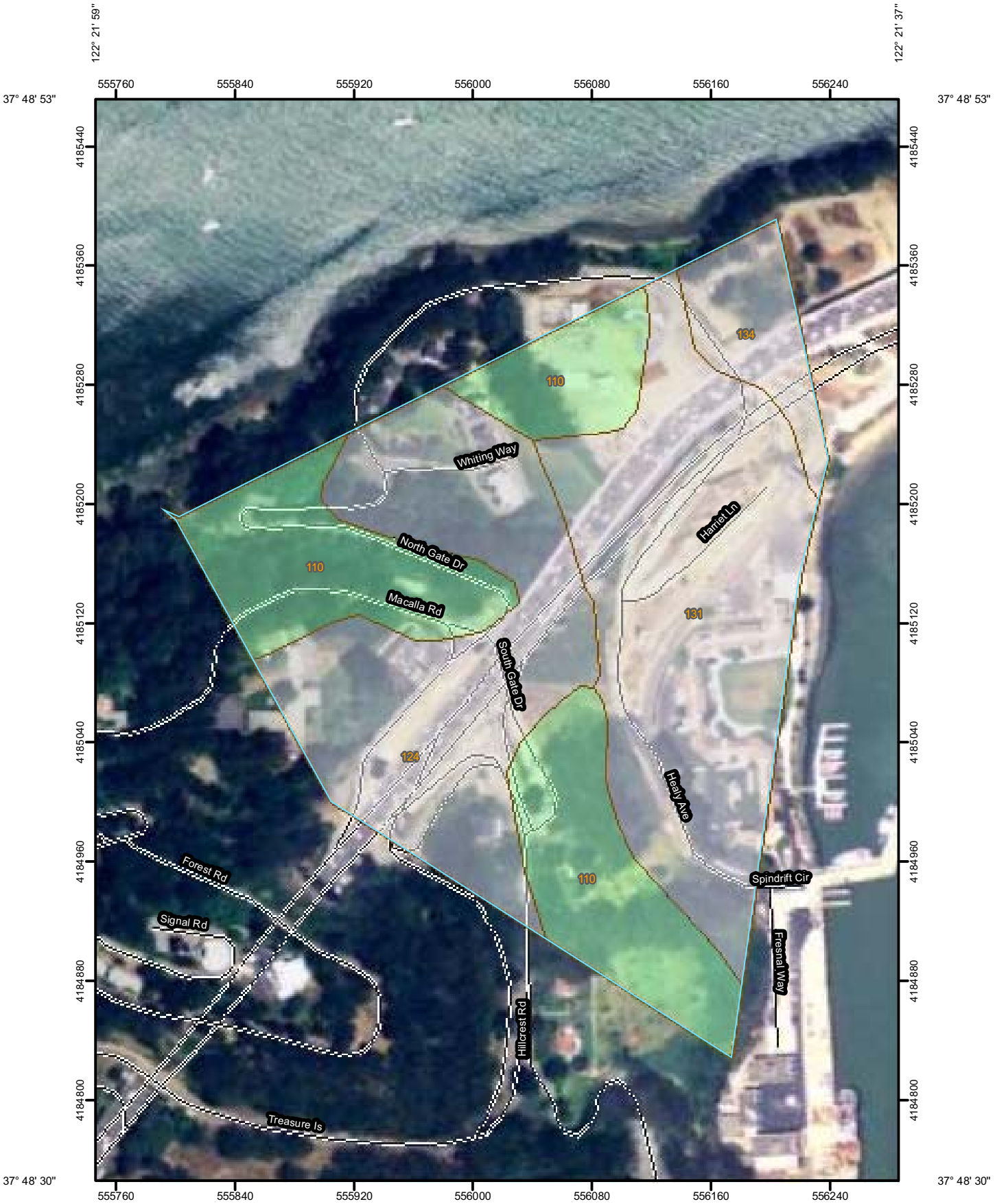
Number of X-Sections = 52

Alignment		#	Slope Segment 1				Slope Segment 2				Slope Segment 3				Weighted Average for All segments	
Station	Line	Seg-ment	Length (m)	Rise (m)	Steepness (%)	LS	Length (m)	Rise (m)	Steepness (%)	LS	Length (m)	Rise (m)	Steepness (%)	LS	Total Slope Length (m)	Weighted LS
50+72	h	3	3.550	1.650	46.48	1.62	2.690	0.110	4.09	0.20	1.370	0.390	28.47	0.60	7.610	0.93
50+90	h	2	10.223	0.326	3.19	0.25	7.778	0.319	4.10	0.26					18.001	0.25
51+00	r1	1	10.500	4.070	38.76	3.41									10.500	3.41
51+12	r1	1	16.300	5.100	31.29	3.22									16.300	3.22
50+20	r4	1	9.840	0.900	9.15	0.50									9.840	0.50
50+50	r4	1	8.660	0.333	3.85	0.26									8.660	0.26
50+60	r4	1	7.243	0.362	4.99	0.31									7.243	0.31
50+90	r4	1	9.014	0.500	5.55	0.32									9.014	0.32
51+20	r4	1	23.100	0.200	0.87	0.14									23.100	0.14
51+50	r4	2	2.465	0.721	29.23	0.85	12.684	0.139	1.10	0.12					15.149	0.24
51+80	r4	1	11.187	0.130	1.16	0.12									11.187	0.12
30+00/ 10+50	bP/sg	3	5.207	0.658	12.65	0.50	7.728	0.309	3.99	0.26	4.057	2.606	64.23	1.90	16.991	0.73
31+30	bp	2	25.068	1.804	7.20	0.80	17.355	2.461	14.18	1.45					42.423	1.07
10+60	sg	2	6.073	2.320	38.20	2.00	7.256	4.273	58.89	3.30					13.329	2.71
10+80	sg	3	11.487	0.384	3.34	0.24	2.880	1.519	52.74	1.32	4.772	1.642	34.41	1.40	19.139	0.69
11+10	sg	1	22.361	1.581	7.07	0.90									22.361	0.90
11+40	sg	1	34.034	17.450	51.27	9.12									34.034	9.12
11+60	sg	1	13.440	0.200	1.49	0.10									13.440	0.10
80+04	Ww	1	56.283	5.868	10.43	2.34									56.283	2.34
80+30	Ww	1	17.724	3.470	19.58	2.40									17.724	2.40
80+60	Ww	1	13.350	0.870	6.52	0.48									13.350	0.48
80+90	Ww	1	23.100	0.230	1.00	0.14									23.100	0.14
81+18	Ww	2	21.680	0.290	1.34	0.14	1.265	0.633	50.00	0.70					22.945	0.17
9+80	cg	1	8.435	0.259	3.07	0.22									8.435	0.22
10+20	cg	1	52.762	4.212	7.98	1.58									52.762	1.58
10+60	cg	1	53.267	5.403	10.14	1.10									53.267	1.10
10+90	cg	1	63.683	6.050	9.50	2									63.683	2.00
11+20	cg	1	46.847	3.492	7.45	1.25									46.847	1.25
11+50	cg	1	66.000	0.141	0.21	0.06									66.000	0.06
11+80	cg	1	71.162	1.688	2.37	0.38									71.162	0.38

12+40	cg	1	22.078	2.624	11.89	1.54									22.078	1.54
12+80	cg	1	36.112	0.594	1.64	0.20									36.112	0.20
13+20	cg	1	41.918	1.037	2.47	0.45									41.918	0.45
13+60	cg	1	71.326	1.695	2.38	0.50									71.326	0.50
11+00	cg1	1	20.654	0.645	3.12	0.32									20.654	0.32
11+40	cg1	1	31.109	4.295	13.81	2.00									31.109	2.00
11+80	cg1	1	33.393	4.424	13.25	2.11									33.393	2.11
12+20	cg1	1	31.780	2.812	8.85	1.20									31.780	1.20
9+20	W2	1	6.016	0.361	6.00	0.30									6.016	0.30
9+55	W2	1	6.008	0.320	5.32	0.27									6.008	0.27
1+20	tf3	1	18.174	2.556	14.07	1.55									18.174	1.55
1+60	tf3	1	18.780	5.996	31.93	3.78									18.780	3.78
2+20	tf3	1	8.504	0.915	10.76	0.60									8.504	0.60
2+60	tf3	1	5.808	0.080	1.38	0.13									5.808	0.13
2+80	tf3	1	6.802	0.020	0.29	0.06									6.802	0.06
3+20	tf3	1	6.795	0.063	0.93	0.10									6.795	0.10
3+60	tf3	1	6.832	0.145	2.12	0.16									6.832	0.16
3+80	tf3	1	4.575	1.509	32.97	1.24									4.575	1.24
0+40	rw51	1	20.063	15.983	79.66	8.30									20.063	8.30
0+700	rw51	1	22.460	17.698	78.80	8.40									22.460	8.40
1+00	rw51	1	18.691	12.251	65.54	7.50									18.691	7.50
1+14	rw51	1	24.046	16.915	70.35	8.37									24.046	8.37

Area Weighted LS = **#DIV/0!**

(Composite Weigthed LS / Number of X-Sections)



122° 22' 0"

122° 21' 38"

Map Scale: 1:3,460 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

.02

.05

.10

.15

.17

.20

.24

.28

.32

.37

.43

.49

.55

.64

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:3,460 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Mateo County, Eastern Part, and San Francisco County, California
Survey Area Data: Version 9, Jul 11, 2011

Date(s) aerial images were photographed: 6/12/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

K Factor, Rock Free

K Factor, Rock Free— Summary by Map Unit — San Mateo County, Eastern Part, and San Francisco County, California (CA689)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
110	Candlestick-Kron-Buriburi complex, 30 to 75 percent slo pes	.28	10.1	29.6%
124	Orthents, cut and fill-Urban land complex, 5 to 75 percent slopes		10.3	30.1%
131	Urban land		11.7	34.4%
134	Urban land-Orthents, reclaimed complex, 0 to 2 percent slopes		2.0	5.9%
Totals for Area of Interest			**34.1**	**100.0%**

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kf (rock free)" indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Layer Options: Surface Layer

not able to calculate R factor using http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm
calculation based on http://www.epa.gov/npdes/pubs/fact3-1.pdf examples on page 2
(storm water phase II final rule)

EI#,fig.1	construction period 12/1/12-3/1/16,difference in %, table 1	annual erosion index,fig.4	R-factor, 40x3.168
24	316.8%	40	**126.72**

construction period		difference in value %	
2012,12/1-12/30		89.6-81.3	8.3
2013		89.6	89.6
2014		89.6	89.6
2015		89.6	89.6
2016, 1/1-3/1		39.7-0.0	39.7
sum			316.8

Combined Risk Level Matrix

Receiving Water Risk	Sediment Risk: Low	Sediment Risk: Medium	Sediment Risk: High
Low	Level 1	Level 2	
High	Level 2		Level 3

Project Sediment Risk: **Medium**

Project RW Risk: **Low**

Project Combined Risk: **Level 2**

Attachment D

Dist	COUNTY	LOCATION CODE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Caltrans Metric

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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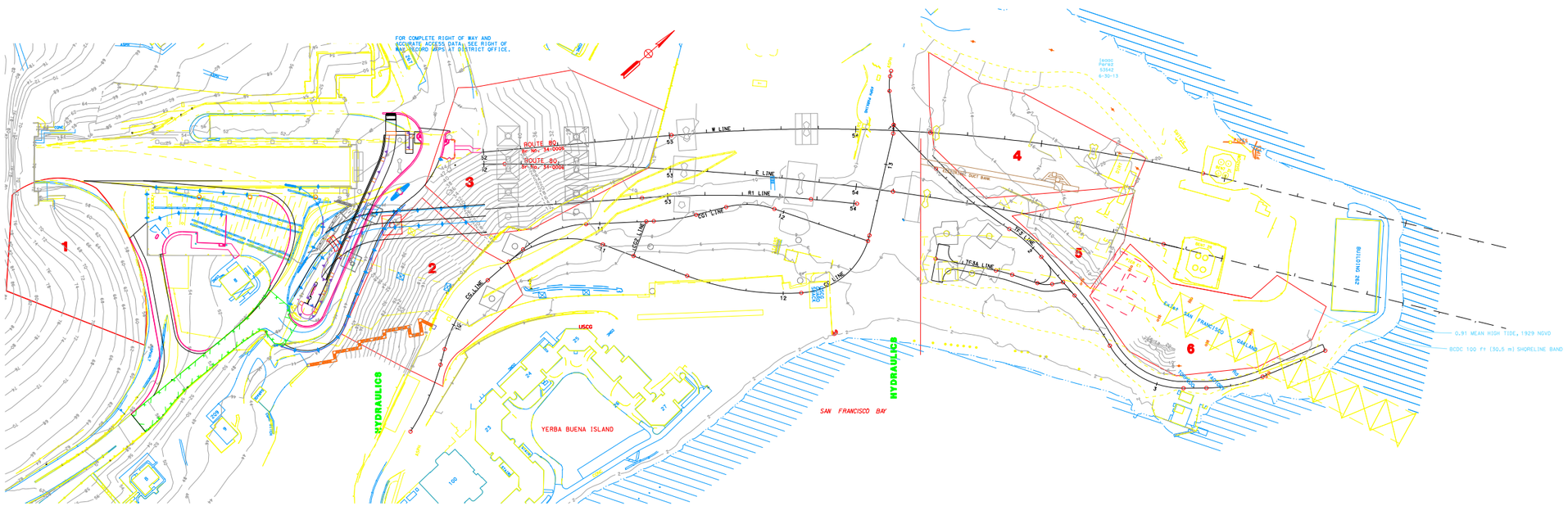

RUN-ON WATER SHED MAP

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

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REVISED BY

DATE REVISED

LAST REVISION 00-00-00

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TIME PLOTTED => $TIME

BORDER LAST REVISED 3/1/2007

RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => $USER
DGN FILE => $REQUEST

CU 00000

EA 000000

Attachment E

Submit by Email | Print Form

Attachment 2

State Water Resources Control Board

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF THE
GENERAL PERMIT TO DISCHARGE STORM WATER
ASSOCIATED WITH CONSTRUCTION ACTIVITY (WQ ORDER No. 99-08-DWQ)

I. NOI STATUS (SEE INSTRUCTIONS)

MARK ONLY ONE ITEM 1. ☑ New Construction 2. ☐ Change of Information for WDID#

II. PROPERTY OWNER

Name: Caltrans district 4		Contact Person: Bijan Sartipi	
Mailing Address: 111 grand avenue		Title: district director	
City: oakland	State: ca	Zip: 94623	Phone: (510) 286 -5900

III. DEVELOPER/CONTRACTOR INFORMATION

Developer/Contractor		Contact Person	
Mailing Address		Title	
City	State	Zip	Phone ( ) -

IV. CONSTRUCTION PROJECT INFORMATION

Site/Project Name: yerba buena transition structures (contract 2)		Site Contact Person	
Physical Address/Location: sf-80-kp12.6/kp 13.9	Latitude: 37.8122°	Longitude: 122.36°	County: San Francisco
City (or nearest City): San Francisco	Zip	Site Phone Number ( ) -	Emergency Phone Number ( ) -

A. Total size of construction site area: _____ Acres

B. Total area to be disturbed: 12 Acres (% of total _____)

C. Percent of site imperviousness (including rooftops):
Before Construction: 52 %
After Construction: 67 %

D. Tract Number(s): _____, _____

E. Mile Post Marker: _____

F. Is the construction site part of a larger common plan of development or sale?
☑ YES ☐ NO

G. Name of plan or development: san francisco east span seismic projec

H. Construction commencement date: 12 / 12 / 2012

I. % of site to be mass graded: _____

J. Projected construction dates:
Complete grading: ___/___/___ Complete project: 03 / 01 / 2016

K. Type of Construction (Check all that apply):
1. ☐ Residential 2. ☐ Commercial 3. ☐ Industrial 4. ☐ Reconstruction 5. ☑ Transportation
6. ☐ Utility Description: _____ 7. ☐ Other (Please List): _____

V. BILLING INFORMATION

SEND BILL TO: ☑ OWNER (as in II. above)	Name	Contact Person	
☐ DEVELOPER (as in III. above)	Mailing Address	Phone/Fax	
☐ OTHER (enter information at right)	City	State	Zip

VI. REGULATORY STATUS

A. Has a local agency approved a required erosion/sediment control plan? ☐ YES ☐ NO

Does the erosion/sediment control plan address construction activities such as infrastructure and structures? ☐ YES ☐ NO

Name of local agency: _____ Phone: ( ) --

B. Is this project or any part thereof, subject to conditions imposed under a CWA Section 404 permit of 401 Water Quality Certification? ☐ YES ☐ NO

If yes, provide details: 401 certification, water discharge requirements

VII. RECEIVING WATER INFORMATION

A. Does the storm water runoff from the construction site discharge to (Check all that apply):

1. ☐ **Indirectly to waters of the U.S.**
2. ☐ **Storm drain system - Enter owner's name:** _____
3. ☒ **Directly to waters of U.S. (e.g. , river, lake, creek, stream, bay, ocean, etc.)**

B. Name of receiving water: (river, lake, creek, stream, bay, ocean): san francisco bay central

VIII. IMPLEMENTATION OF NPDES PERMIT REQUIREMENTS

A. STORM WATER POLLUTION PREVENTION PLAN (SWPPP) (check one)

☐ A SWPPP has been prepared for this facility and is available for review: Date Prepared: ____/____/____ Date Amended: ____/____/____

☐ A SWPPP will be prepared and ready for review by (enter date): ____/____/____

☐ A tentative schedule has been included in the SWPPP for activities such as grading, street construction, home construction, etc.

B. MONITORING PROGRAM

☐ A monitoring and maintenance schedule has been developed that includes inspection of the construction BMPs before anticipated storm events and after actual storm events and is available for review.

If checked above: A qualified person has been assigned responsibility for pre-storm and post-storm BMP inspections to identify effectiveness and necessary repairs or design changes ☐ YES ☐ NO

Name: _____ Phone: ( ) --

C. PERMIT COMPLIANCE RESPONSIBILITY

A qualified person has been assigned responsibility to ensure full compliance with the Permit, and to implement all elements of the Storm Water Pollution Prevention Plan including:

1. Preparing an annual compliance evaluation ☐ YES ☐ NO

Name: _____ Phone: ( ) --

2. Eliminating all unauthorized discharges ☐ YES ☐ NO

IX. VICINITY MAP AND FEE (must show site location in relation to nearest named streets, intersections, etc.)

Have you included a vicinity map with this submittal? ☒ YES ☐ NO

Have you included payment of the annual fee with this submittal? ☐ YES ☐ NO

X. CERTIFICATIONS

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. In addition, I certify that the provisions of the permit, including the development and implementation of a Storm Water Pollution Prevention Plan and a Monitoring Program Plan will be complied with."

Printed Name: _____

Signature: _____ **Date:** _____

Title: _____

Attachment F

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.6/13.9		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Mark Grodzki No. 65594 Exp. 09/30/12 CIVIL STATE OF CALIFORNIA

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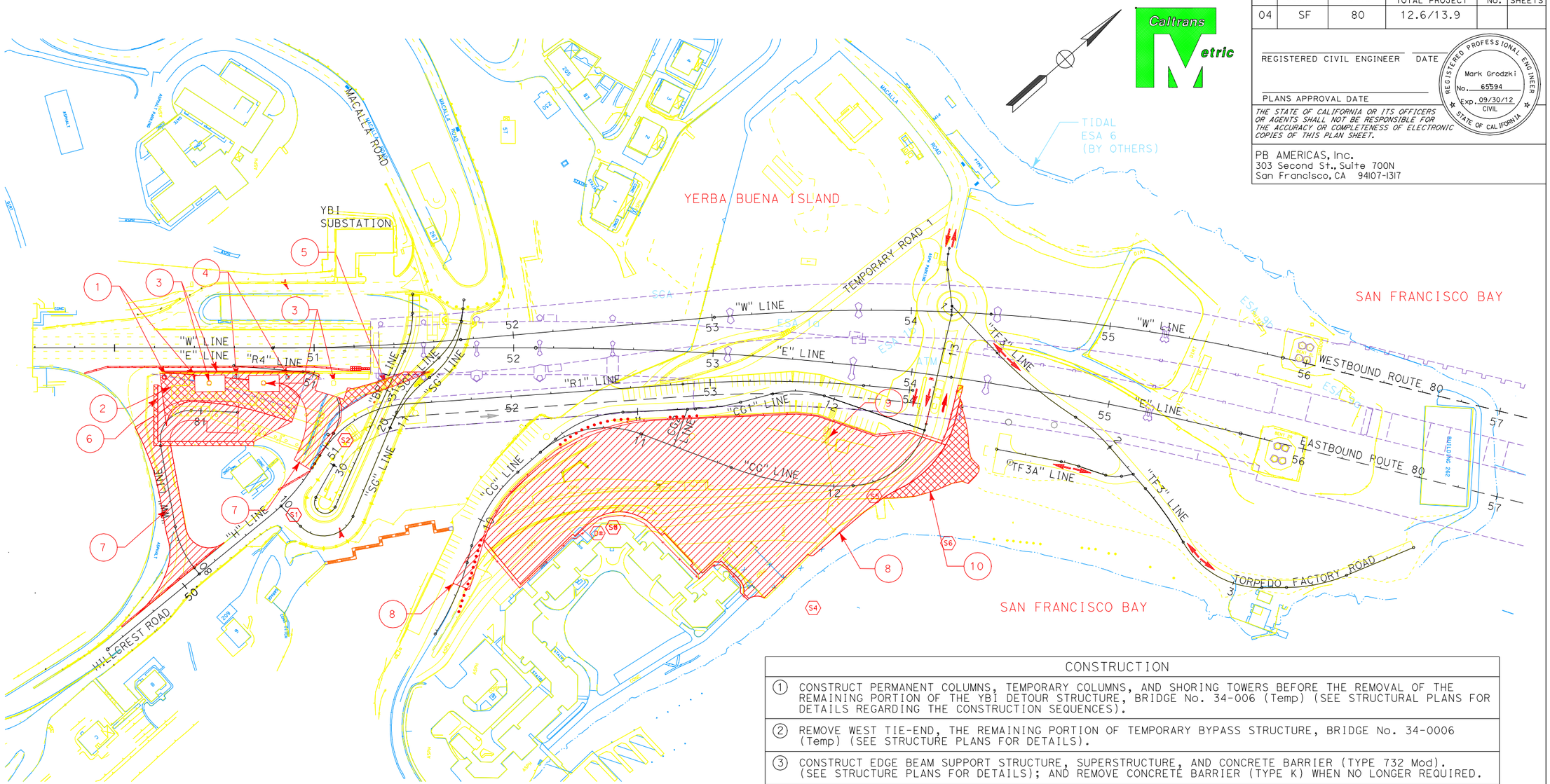

CONSTRUCTION	
1	CONSTRUCT PERMANENT COLUMNS, TEMPORARY COLUMNS, AND SHORING TOWERS BEFORE THE REMOVAL OF THE REMAINING PORTION OF THE YBI DETOUR STRUCTURE, BRIDGE No. 34-006 (Temp) (SEE STRUCTURAL PLANS FOR DETAILS REGARDING THE CONSTRUCTION SEQUENCES).
2	REMOVE WEST TIE-END, THE REMAINING PORTION OF TEMPORARY BYPASS STRUCTURE, BRIDGE No. 34-0006 (Temp) (SEE STRUCTURE PLANS FOR DETAILS).
3	CONSTRUCT EDGE BEAM SUPPORT STRUCTURE, SUPERSTRUCTURE, AND CONCRETE BARRIER (TYPE 732 Mod). (SEE STRUCTURE PLANS FOR DETAILS); AND REMOVE CONCRETE BARRIER (TYPE K) WHEN NO LONGER REQUIRED.
4	REMOVE TEMPORARY SUPPORTS AFTER THE COMPLETION OF THE EDGE BEAM SUPPORT STRUCTURE, WHEN NO LONGER REQUIRED (SEE STRUCTURE PLANS FOR DETAILS).
5	REMOVE TEMPORARY EB-80 ON-RAMP (T7 LINE).
6	REMOVE EXISTING RETAINING WALL.
7	CONSTRUCT EB-80 OFF-RAMP (R4 LINE), AND LOCAL STREET WENDY WAY (WW LINE).
8	CONSTRUCT USCG ROAD (CG LINE) INCLUDING HOT MIX ASPHALT CONCRETE SURFACING AND PARKING LOTS, RETAINING WALL No. 8, AND RETAINING WALL No. 9 (SEE ROADWAY PLANS).
9	REMOVE EXISTING USCG STAIRS, AND CONSTRUCT USCG ACCESS STAIRS (SEE ARCHITECTURAL PLANS).
10	REMOVE TEMPORARY USCG PARKING LOT.

CONCEPTUAL WATER POLLUTION CONTROL PLAN

STAGE 4

SCALE: 1:1000

FOR NOTES, ABBREVIATIONS AND/OR LEGEND SEE SHEET SC-1

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION ONLY.

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

SC-15

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: BOB ZANDIPOUR

CALCULATED-DESIGNED BY

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DATE REVISED

LAST REVISION 00-00-00

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TIME PLOTTED => $TIME

BORDER LAST REVISED 3/1/2007

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DGN FILE => $REQUEST

CU 04251

EA 0120T1

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.6/13.9		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Mark Grodzki No. 65594 Exp. 09/30/12 CIVIL STATE OF CALIFORNIA

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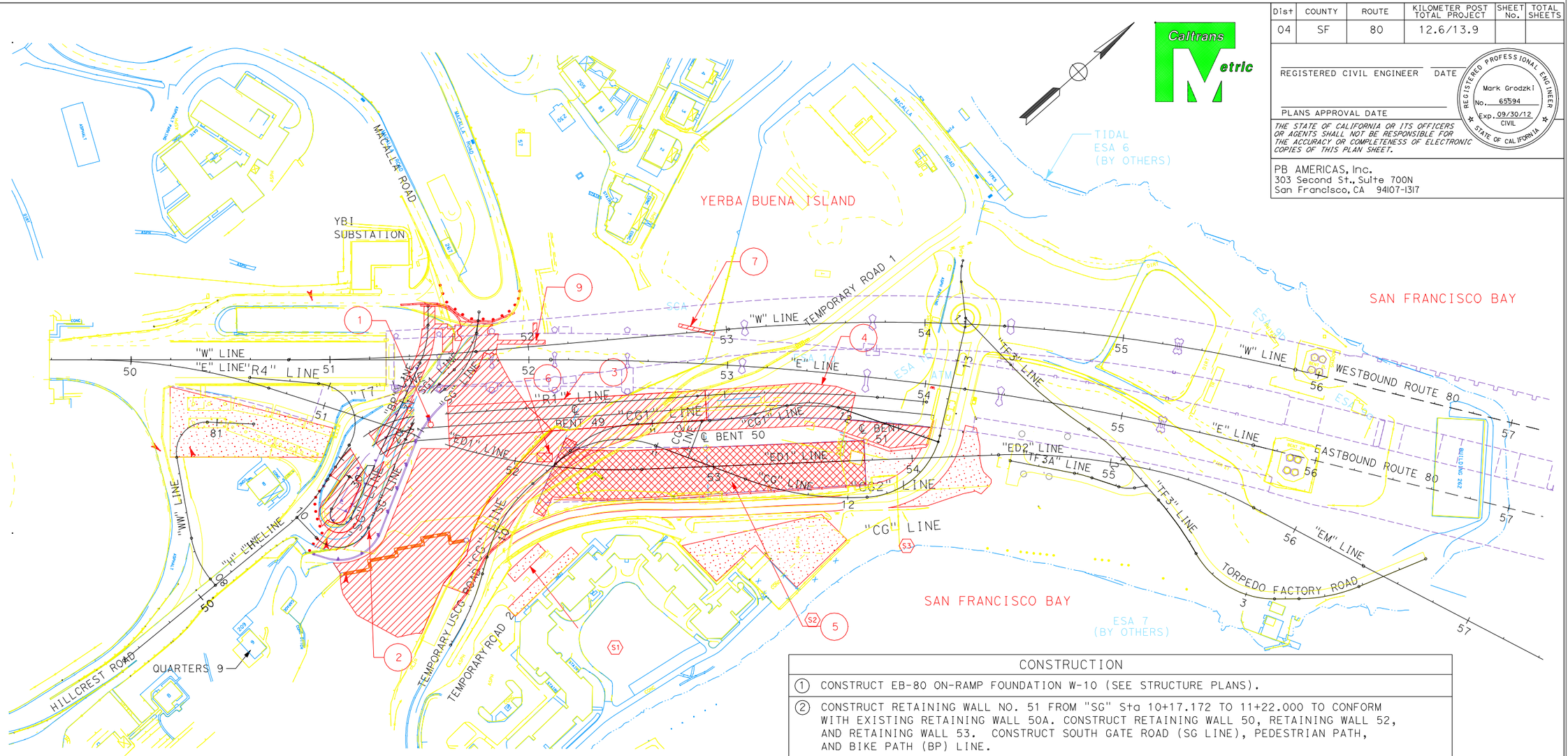

CONSTRUCTION	
1	CONSTRUCT EB-80 ON-RAMP FOUNDATION W-10 (SEE STRUCTURE PLANS).
2	CONSTRUCT RETAINING WALL NO. 51 FROM "SG" Sta 10+17.172 TO 11+22.000 TO CONFORM WITH EXISTING RETAINING WALL 50A. CONSTRUCT RETAINING WALL 50, RETAINING WALL 52, AND RETAINING WALL 53. CONSTRUCT SOUTH GATE ROAD (SG LINE), PEDESTRIAN PATH, AND BIKE PATH (BP) LINE.
3	CONSTRUCT EB-80 ON-RAMP (R1 LINE), BIKE PATH, BIKE PATH STRUCTURE, AND BIKE PATH LANDING AREA.
4	CONSTRUCT USCG ROAD (CG1 LINE), AND PARKING LOTS ALONG USCG ROAD (CG1 LINE), AND ALONG USCG ROAD (CG LINE) FROM Sta 9+65 TO Sta 10+85. REMOVE BASE AND SURFACING PORTION OF TEMPORARY ROAD 1.
5	DEMOLISH REMAINDER OF YBI DETOUR STRUCTURE FROM BENT 49 TO BENT 51
6	REMOVE GUARD BOOTH AT LOCATION AS SHOWN ON THE PLANS.
7	CONSTRUCT HISTORICAL STAIRS, (SEE ARCHITECTURAL PLANS).
8	CONSTRUCT GABION WALL AND REGRADE SLOPE (SEE STRUCTURAL PLANS).
9	CONSTRUCT UTILITY STAIRS AND CONCRETE PATH (SEE ARCHITECTURAL PLANS).

CONCEPTUAL WATER POLLUTION CONTROL PLAN

STAGE 3 PHASE 2

SCALE: 1:1000

FOR NOTES, ABBREVIATIONS AND/OR LEGEND SEE SHEET SC-1

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SC-12

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Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.6/13.9		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Mark Grodzki No. 65594 Exp. 09/30/12 CIVIL STATE OF CALIFORNIA

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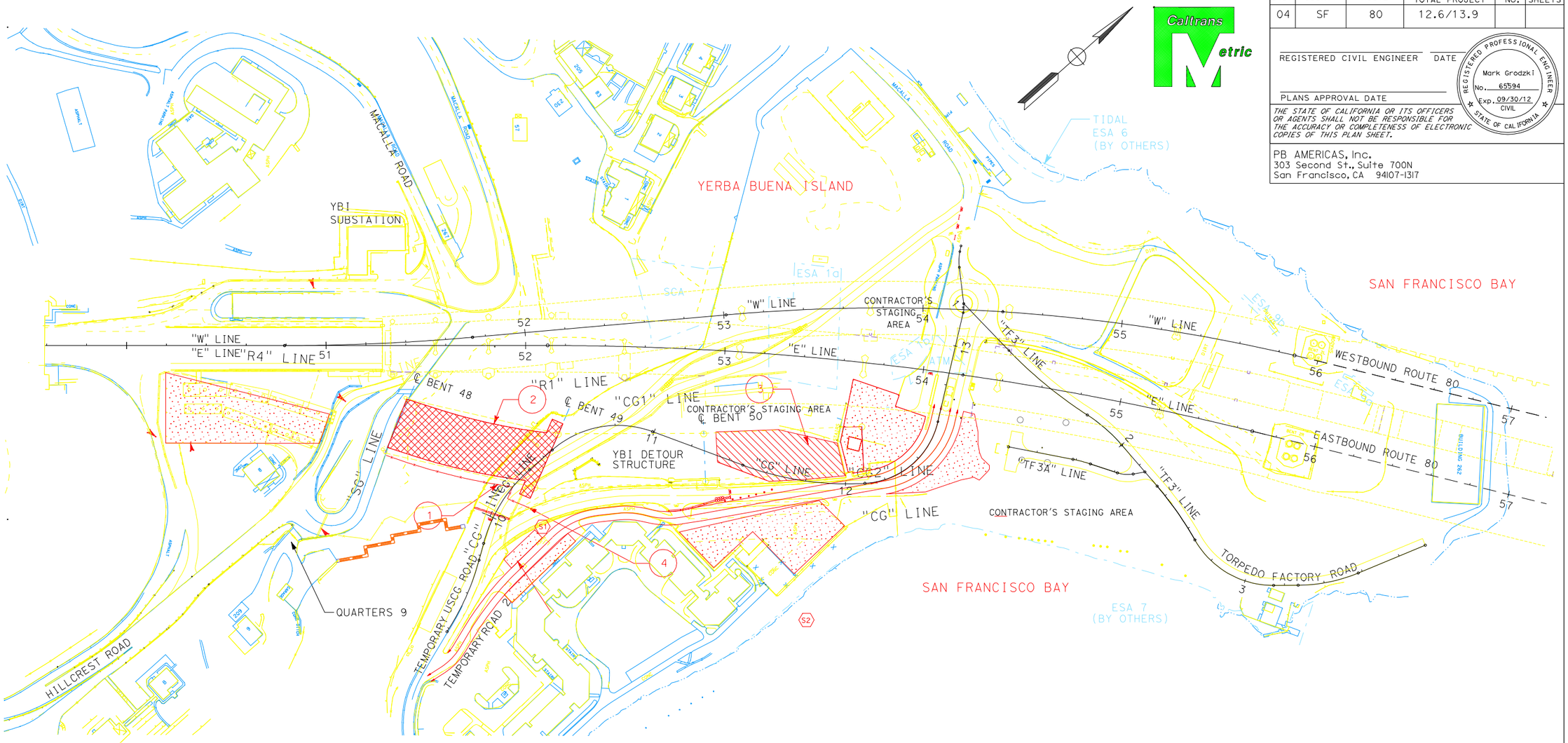

CONSTRUCTION	
1	INSTALL TEMPORARY DEBRIS NETTING PRIOR TO DEMOLITION.
2	REMOVE A PORTION OF YBI DETOUR STRUCTURE, BRIDGE No. 34-0006 (TEMPORARY) FROM BENT 48 TO BENT 49.
3	CONSTRUCT TEMPORARY USCG PARKING LOT.
4	REMOVE DEBRIS NETTING AFTER DEMOLITION.

CONCEPTUAL WATER POLLUTION CONTROL PLAN

STAGE 3 PHASE 1

SCALE: 1:1000

FOR NOTES, ABBREVIATIONS AND/OR LEGEND SEE SHEET SC-1

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SC-9

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Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.6/13.9		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Mark Grodzki No. 65594 Exp. 09/30/12 CIVIL STATE OF CALIFORNIA

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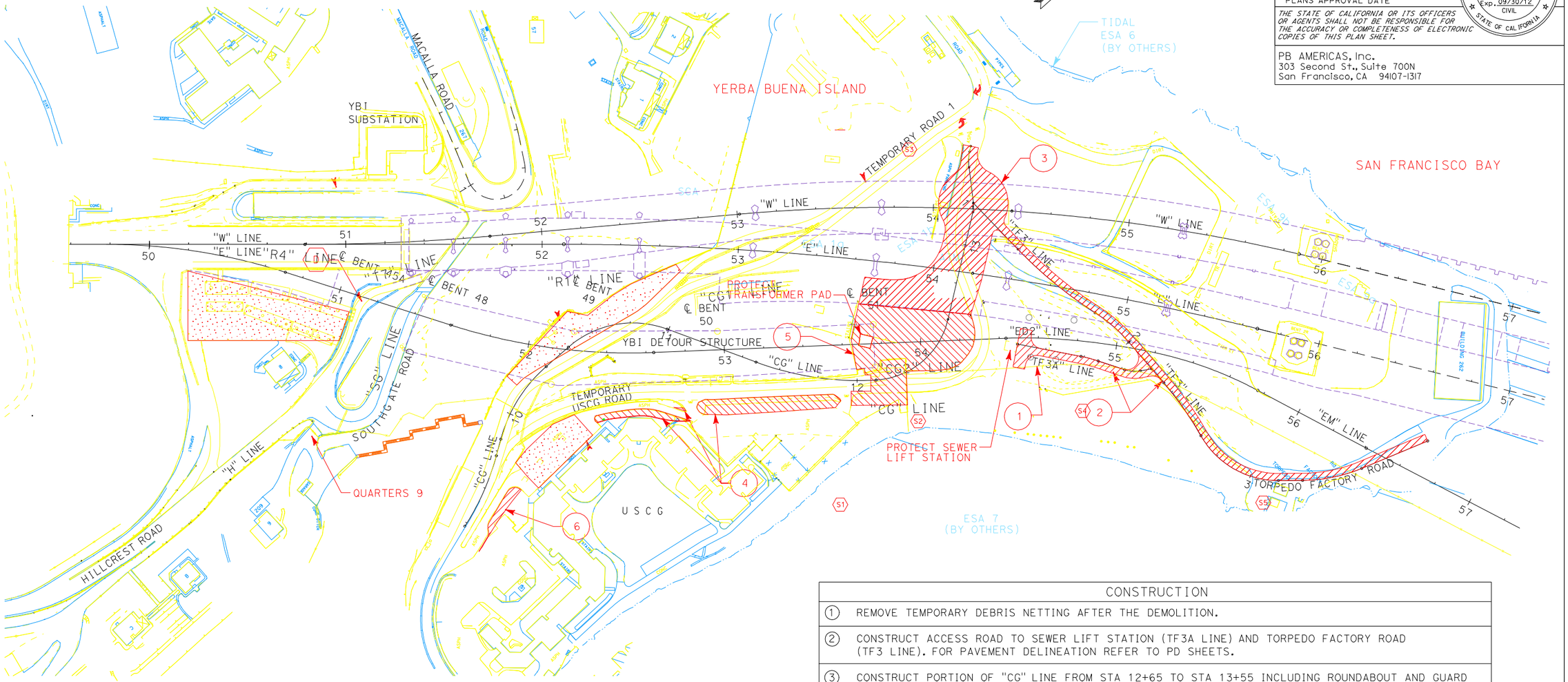

CONSTRUCTION	
1	REMOVE TEMPORARY DEBRIS NETTING AFTER THE DEMOLITION.
2	CONSTRUCT ACCESS ROAD TO SEWER LIFT STATION (TF3A LINE) AND TORPEDO FACTORY ROAD (TF3 LINE). FOR PAVEMENT DELINEATION REFER TO PD SHEETS.
3	CONSTRUCT PORTION OF "CG" LINE FROM STA 12+65 TO STA 13+55 INCLUDING ROUNDABOUT AND GUARD BOOTH (SEE ARCHITECTURAL PLANS).
4	WIDEN PORTIONS OF THE TEMPORARY USCG ROAD AND SHIFT SOUTH TO A TWO-LANE ROADWAY.
5	CONSTRUCT TEMPORARY USCG PARKING LOT. PROTECT TRANSFORMER PAD IN PLACE.
6	CONSTRUCT ROAD WIDENING OF USCG ACCESS ROAD (SEE ROADWAY PLANS).

CONCEPTUAL WATER POLLUTION CONTR5OL PLAN

STAGE 2 PHASE 2

SCALE: 1:1000

FOR NOTES, ABBREVIATIONS AND/OR LEGEND SEE SHEET SC-1

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION ONLY

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SC-6

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Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.6/13.9		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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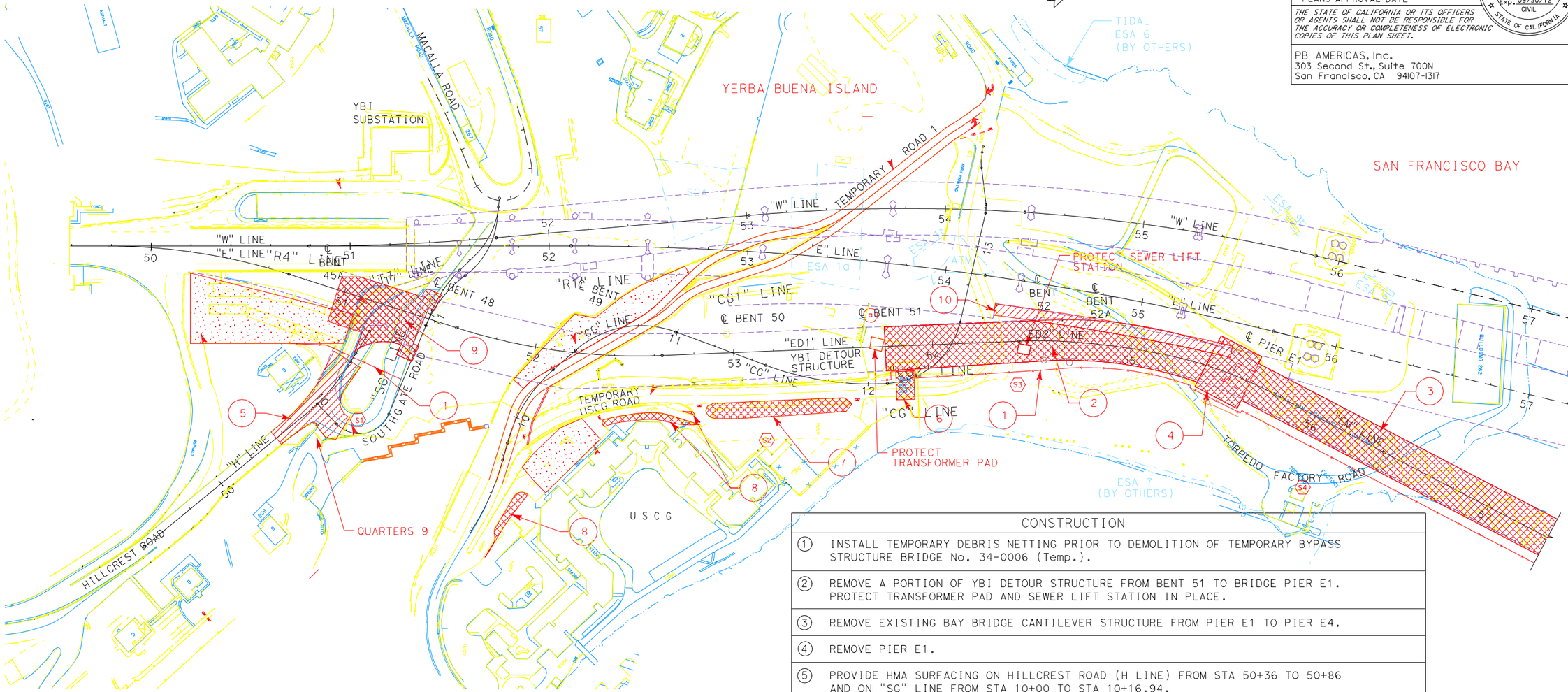

CONSTRUCTION

1	INSTALL TEMPORARY DEBRIS NETTING PRIOR TO DEMOLITION OF TEMPORARY BYPASS STRUCTURE BRIDGE No. 34-0006 (Temp.).
2	REMOVE A PORTION OF YBI DETOUR STRUCTURE FROM BENT 51 TO BRIDGE PIER E1. PROTECT TRANSFORMER PAD AND SEWER LIFT STATION IN PLACE.
3	REMOVE EXISTING BAY BRIDGE CANTILEVER STRUCTURE FROM PIER E1 TO PIER E4.
4	REMOVE PIER E1.
5	PROVIDE HMA SURFACING ON HILLCREST ROAD (H LINE) FROM STA 50+36 TO 50+86 AND ON "SG" LINE FROM STA 10+00 TO STA 10+16.94.
6	DEMOLISH AND REMOVE EXISTING GUARD BOOTH, CANOPY, AND ALL RELATED FOOTINGS. TEMPORARILY PAVE BACK TO OG.
7	DISSASSEMBLE PARKING CANOPY, TO BE RELOCATED ON BASE (AREA TBD).
8	REMOVE CONCRETE CURB TO WIDEN TO A TWO-LANE ROAD.
9	REMOVE A PORTION OF YBI DETOUR STRUCTURE, BRIDGE No. 34-0006 (Temp) FROM BENT 45A TO BENT 48.
10	CONSTRUCT A PORTION OF EB BIKE PATH STRUCTURE AND GIRDER EXTENSION OF EB TRANSITION STRUCTURE FROM STA "E" 54+27.150 TO STA "E" 55+47.850 (SEE STRUCTURE PLANS).

CONCEPTUAL WATER POLLUTION CONTROL PLAN

STAGE 2 PHASE 1

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION ONLY

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

SCALE: 1:1000

SC-3

REVISED BY | DATE REVISED

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LAST REVISION 00-00-00 | DATE PLOTTED => $DATE | TIME PLOTTED => $TIME

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.6/13.9		

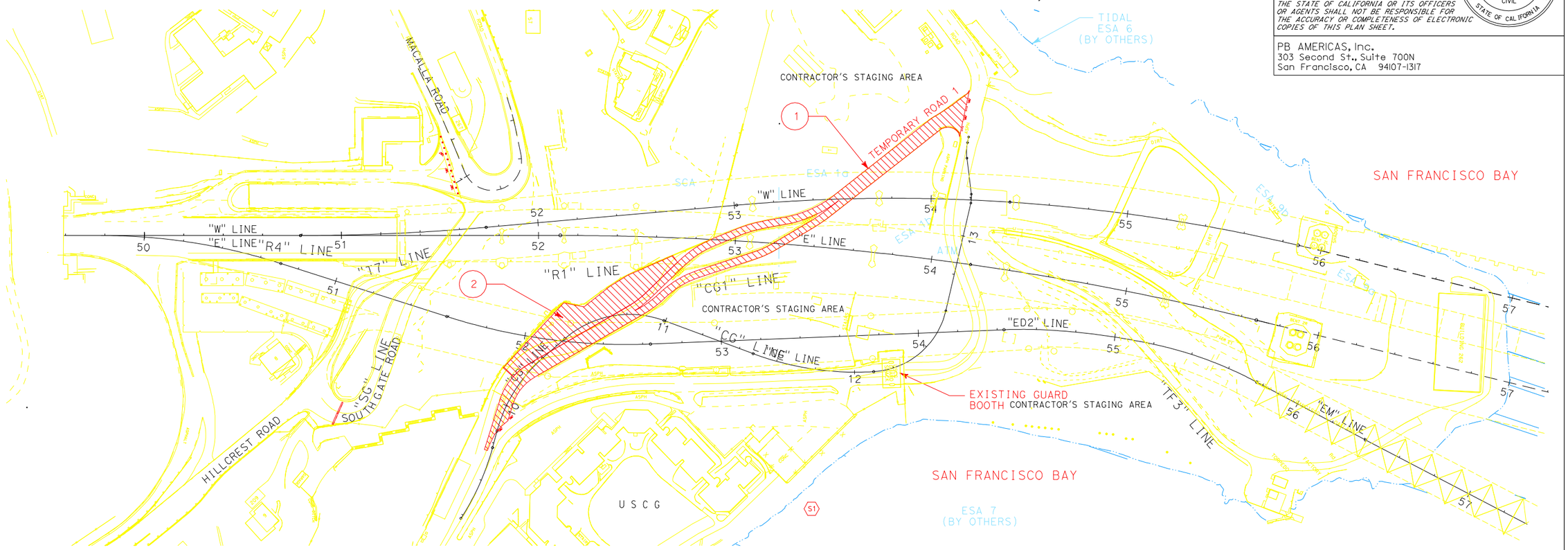
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Mark Grodzki No. 65594 Exp. 09/30/12 CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

PB AMERICAS, Inc.
303 Second St., Suite 700N
San Francisco, CA 94107-1317



ABBREVIATIONS

SFOBB SAN FRANCISCO OAKLAND BAY BRIDGE
USCG UNITED STATES COAST GUARD

LEGEND:

- CONSTRUCT THIS STAGE (PERMANENT)
- CONSTRUCT THIS STAGE (TEMPORARY)
- REMOVE THIS STAGE
- TEMPORARY USCG PARKING LOT

D# Discharge Location
S# Sampling Location

CONSTRUCTION THIS STAGE AND PHASE

CONSTRUCTION	
1	PLACE HMA SURFACING AND INSTALL PAVEMENT DELINEATION FOR TEMPORARY ROAD 1.
2	CONSTRUCT TEMPORARY USCG PARKING LOT.

CONCEPTUAL WATER POLLUTION CONTROL PLAN

STAGE 1

SCALE: 1:1000

THIS PLAN ACCURATE FOR STAGE CONSTRUCTION ONLY.

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

SC-1

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY
CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR
BOB ZANDIPOUR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION 00-00-00
DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

BORDER LAST REVISED 3/1/2007

RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => $USER
DGN FILE => $REQUEST

CU 04251

EA 0120T1

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF	80	12.6/13.9		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Mark Grodzki No. 65594 Exp. 09/30/12 CIVIL STATE OF CALIFORNIA

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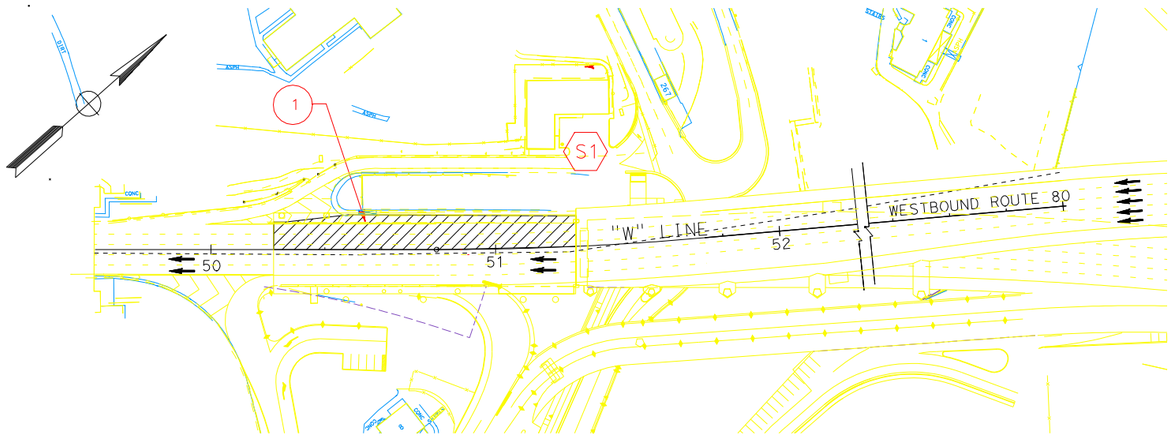
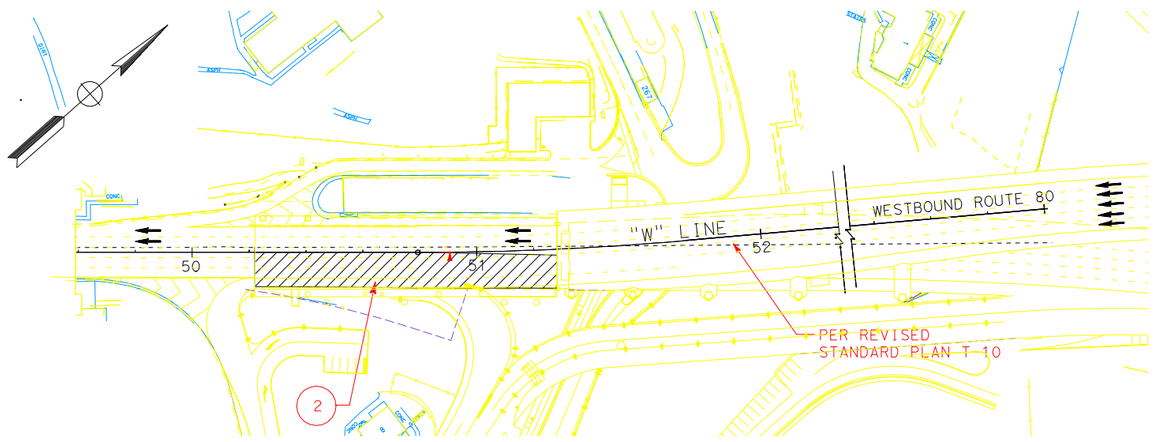
PB AMERICAS, Inc.
303 Second St., Suite 700N
San Francisco, CA 94107-1317



STAGE 5 - PHASE 1:
PROVIDE OVERLAY ON THE OUTSIDE LANES (SEE STRUCTURE PLANS FOR DETAILS).
WESTBOUND

CONSTRUCTION
(1) PROVIDE POLYESTER CONCRETE OVERLAY ON WB-80, UPPER DECK, FROM Sta (Lt) "W" 50+22.10 TO (Lt) "W" 51+28.340 (SEE STRUCTURE PLANS FOR DETAILS).



STAGE 5 - PHASE 2:
PROVIDE OVERLAY ON THE INSIDE LANES (SEE STRUCTURE PLANS FOR DETAILS).
WESTBOUND

CONSTRUCTION
(2) PROVIDE POLYESTER CONCRETE OVERLAY ON WB-80, UPPER DECK, FROM Sta (Rt) "W" 50+22.10 TO (Rt) "W" 51+28.340 (SEE STRUCTURE PLANS FOR DETAILS).

CONCEPTUAL WATER POLLUTION CONTROL PLAN
STAGE 5

FOR NOTES, ABBREVIATIONS AND/OR LEGEND SEE SHEET SC-1

SCALE: 1:1000

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

THIS PLAN ACCURATE FOR PAVEMENT DELINEATION WORK ONLY.

SC-18

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR: BOB ZANDIPOUR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DRAFT 95% SUBMITTAL (08/16/2011)

LAST REVISION 00-00-00 | DATE PLOTTED => $DATE | TIME PLOTTED => $TIME

Attachment G

California Regional Water Quality Control Board (RWQCB) Permit

For the

San Francisco-Oakland Bay Bridge East Span
Seismic Safety Project

October 2001

California Regional Water Quality Control Board
San Francisco Bay Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov
1515 Clay Street, Suite 1400, Oakland, California 94612
Phone (510) 622-2300 • FAX (510) 622-2460

Gray Davis
Governor

Date: OCT 19 2001
File No. 2198.11 (KHL)

Ms. Mara Melandry
Environmental Manager, Caltrans
Mail Station 12-C
P.O. Box 23660
Oakland, CA 94623-0660

Subject: Corps Interagency Meeting Comments Summary, Bay Bridge Replacement Project, Alameda County.

Dear Ms. Melandry:

Enclosed please find a copy of Order 01-120, which was adopted by the Board on October 17, 2001.

Please note the various required submittals and due dates for reports and plans that are a part of the Order. We look forward to working with Caltrans in the development of these reports. In addition, leading up to the Board's scheduled January 2002 consideration of Waste Discharge Requirements for the project, we will continue to work with you to develop plan schedules, details, and other information for elements of the project including self-monitoring plans during dredging, the post-construction storm water management plan, and the wetland mitigation plan.

If you have any questions, please contact Keith Lichten of my staff via email to khl@rb2.swrcb.ca.gov, or at (510) 622-2380.

Sincerely,

Bruce H. Wolfe, for
Loretta K. Barsamian
Executive Officer

cc: Bruce Wolfe, RWQCB
Dale Bowyer, RWQCB
Tim Vedlinsky, USEPA, WTR-8
Bob Smith, U.S. Army Corps of Engineers, Regulatory Division

cc (cont.):

Richard Smith, USFWS
Margaret Roper, CDFG
Bob Batha, BCDC
David Woodbury, NMFS

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER No. 01-120

WATER QUALITY CERTIFICATION FOR:

CALIFORNIA DEPARTMENT OF TRANSPORTATION

SAN FRANCISCO-OAKLAND BAY BRIDGE EAST SPAN SEISMIC SAFETY PROJECT (EAST SPAN PROJECT), CITY AND COUNTY OF SAN FRANCISCO AND CITY OF OAKLAND, ALAMEDA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter Board, finds that:

1. The California Department of Transportation (hereinafter, Caltrans) on September 12, 2001, applied to the Board for Water Quality Certification under Section 401 of the Clean Water Act for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (hereinafter, the Project). Caltrans proposes to replace the existing East Span of the San Francisco-Oakland Bay Bridge with a new bridge constructed north of that span. The Project will be located on San Francisco Bay between the cities of San Francisco, at Yerba Buena Island (YBI) and Oakland.

2. The existing East Span is not expected to withstand a maximum credible earthquake (MCE) on the San Andreas or Hayward fault. The Project will replace the East Span with a new bridge that will withstand a MCE and will meet current roadway design standards for operations and safety to the greatest extent possible.

3. Caltrans has indicated in its application for water quality certification that the Project is a seismic retrofit project subject to California Streets and Highways Code (CSHC) Section 180, et seq. CSHC Section 180.4 requires that all State and local agencies with permitting authority over a seismic retrofit project act on a permit application within 15 days of its submission. As stated in its October 3, 2001, letter to Board staff, Caltrans recognizes the Board's difficulty in meeting this permitting timeline and agrees to Board staff's strategy that the Board act on Caltrans' water quality certification application at the October 17, 2001, Board meeting and act on an application for waste discharge requirements (WDRs) at the January 16, 2002, Board meeting. As such, that letter states that Caltrans agrees to extend the 15-day action requirement to these dates.

Project Description and Impacts

4. Project construction will occur over a seven-year period, including five years to construct the new bridge and two years to remove the existing East Span. Construction of the new bridge will be divided among four separate contracts as follows: 1) Skyway contract, 2)

Self-Anchored Suspension Span and Transition Structures at Yerba Buena Island contract, 3) Oakland Approach Structures contract, and 4) Geofill contract at the Oakland Touchdown. There would be an additional demolition contract to remove the existing bridge. Caltrans intends to open bids on the Skyway contract on November 14, 2001, and award that contract shortly thereafter.

5. The Project would require the use of large-scale equipment and involve labor-intensive activities. Materials and equipment would arrive to the site by land and water. Dredging of approximately 615,000 cubic yards of Bay mud and soil will also be required.

6. This Order applies to the permanent and temporary direct and indirect impacts to waters of the State associated with the Project, which is comprised of the Project components listed above. Total direct permanent and temporary Project impacts to waters of the State are approximately 8.59 acres. These impacts occur in areas known as special aquatic sites. The majority of Project impacts will occur near the Oakland Touchdown area due to dredging for a temporary barge access channel, placement of fill to construct a new westbound roadway, relocation of Caltrans' existing maintenance road, and permanent shading from the new east and westbound roadways. Relatively minor impacts to eelgrass beds adjacent to YBI to construct a temporary barge dock will occur.

7. The Project's direct permanent impacts include elimination of approximately 3.24 acres of eelgrass habitat and approximately 4.19 acres of sand flat habitat. The Project's direct temporal impacts during construction include approximately 0.36 acres of eelgrass habitat and approximately 0.80 acres of sand flat habitat.

8. The Project may temporarily impact special aquatic sites, including eelgrass and sand flats, and open waters of the Bay over the estimated seven years of bridge construction and demolition. Impacts may occur through the discharge of construction and demolition materials and debris, indirect impacts from equipment access and changes to erosion and sedimentation during project dredging and fill placement.

9. The Project will directly impact the beneficial uses of waters of the State for estuarine habitat and preservation of rare and endangered species through construction stage impacts including pile driving. Pile driving was shown to cause fish kills during a pilot project for the new bridge. Caltrans will complete mitigation, including adaptive management to maximize mitigation effectiveness, to minimize these impacts, and is working with the National Marine Fisheries Service (NMFS) to develop a mitigation plan.

10. To mitigate for the Project's direct impacts, Caltrans plans to implement measures on-site to restore special aquatic sites affected during Project construction including:

    a. Harvesting approximately 0.54 acres of eelgrass from the footprint of the temporary barge access channel prior to dredging, planting test plots in adjacent eelgrass beds, and monitoring to evaluate performance;

b. Restoring to its pre-construction bathymetry up to approximately 1.73 acres of the barge access channel with dredge material and excavated sand to facilitate eelgrass colonization and then replanting with eelgrass. Caltrans will monitor replanted eelgrass to evaluate its performance;

c. Restoring approximately 0.80 acres of sand flats that are temporarily affected by the placement of a geotube or mud boils from engineered fill;

d. Implementing measures on-site to replace and/or restore shorebird roosting habitat and commorant habitat; and,

e. Implementing measures to minimize impacts to protected salmonids and to improve water quality at the Emeryville Crescent and portions of the Eastshore State Park.

11. Caltrans will provide additional mitigation for the Project's direct impacts at off-site locations. Caltrans will provide $10.5 million in funds to be divided between the following:

a. Provide funding to the East Bay Regional Park District (EBRPD) to restore, enhance or create new aquatic habitat and transitional uplands at the Eastshore State Park and within Central San Francisco Bay. Potential mitigation sites include:

- Radio Beach Area-potential shoreline restoration including intertidal habitat and upland transition zones;
- Brickyard Cove Area-potential shoreline restoration including intertidal habitat, the removal of riprap and upland transition zones;
- Albany Beach Area-potential beach restoration/nourishment including the removal of parking areas; and,
- Hoffman Marsh Area – potential tidal marsh restoration including the removal of fill and improving tidal action and water circulation.

b. Provide funding to the United States Fish and Wildlife Service (USFWS) to acquire, cleanup contaminants, and initiate restoration of approximately 3,000 acres of diked historic baylands at Skaggs Island, Sonoma County, to tidal marsh and seasonal wetlands.

12. Operation and maintenance of the Project's new bridge, roads, and reconfigured plaza area will indirectly impact beneficial uses through the discharge of polluted storm water and other urban runoff pollutants (e.g., oil and grease, heavy metals, pathogens, nutrients, etc.).

13. To address the Project's post-construction storm water impacts, Caltrans proposes to permanently capture and treat storm water runoff from a portion of the new bridge, the reconstructed metering lights and toll plaza area, and east to the Powell Street interchange in Emeryville. An area totaling approximately 155 acres is proposed for capture and

treatment. This treatment would improve the quality of water draining into the Emeryville Crescent and Central San Francisco Bay, and thus would enhance wildlife habitat.

14. This Order requires Caltrans to submit, acceptable to the Executive Officer, the following documents, reports, or plans prior to beginning construction of the Project, or within specified dates following contract award for the Skyway, to adequately mitigate the Project's impacts. As of the date of adoption of this Order, the items listed below either have been submitted to the Board and are not complete or not otherwise acceptable to the Board, or have not been submitted. Because of project phasing, some plans may be submitted separately, over time, prior to the beginning of construction for the Project's different contracts.
    a. On-site mitigation plan;
    b. Off-site mitigation proposal;
    c. Dredging Operations Plan;
    d. Storm Water Management Plan for activities identified in Finding 13;
    e. Storm Water Pollution Prevention Plan;
    f. Construction phasing schedule; and,
    g. Financial Assurance/Project Budget Authority.

15. This Order requires Caltrans to prepare and implement a post-construction Storm Water Management Plan for activities identified in Finding 13 (SWMP) and construction-stage Storm Water Pollution Prevention Plan or Plans (SWPPP), in compliance with its statewide NPDES permit for storm water runoff. Because of the Project's proximity to sensitive resources, including special status species habitat, and potential to discharge materials that could significantly impact those resources, this Order requires Caltrans to submit a SWPPP(s) for the Project, at least 30 days prior to the beginning of construction for the Project. As a part of the Board's consideration of appropriate mitigation measures for the Project's post-construction/ operation-stage direct and cumulative impacts, this Order requires Caltrans to submit, within one year of contract award for the Skyway, a site-specific SWMP, acceptable to the Executive Officer, including appropriate design measures and storm water treatment controls to minimize and mitigate these impacts.

16. This Order is conditioned upon Caltrans' compliance with waste discharge requirements (WDRs), to be adopted at a future Board meeting. WDRs are necessary to ensure implementation of the work described in the documents, reports, and plans listed in Finding 14 above to address water quality impacts; to further ensure protection of beneficial uses of waters of the State from the Project; and to allow the Board to timely address any changes to the Project and thus any material changes in the character, location and volume of any proposed waste discharges.

Regulatory Framework

17. The Board, on June 21, 1995, adopted, in accordance with CWC, Division 7, Chapter 3, Article 3, a revised Water Quality Control Plan, San Francisco Bay Basin (Basin Plan).

The State Water Resources Control Board and the Office of Administrative Law approved this updated and consolidated revised Basin Plan on July 20, 1995, and November 13, 1995, respectively. A summary of regulatory provisions is contained in 23 CCR Section 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwaters. This Order is in compliance with the Basin Plan.

18. The Project is located with the Central portion of San Francisco Bay. Central San Francisco Bay has the following existing beneficial uses defined in the Basin Plan: estuarine habitat, industrial service supply, fish migration, navigation, industrial process supply, preservation of rare and endangered species, water contact recreation, non-contact water recreation, shellfish harvesting, and fish spawning.

19. Caltrans submitted a Clean Water Act 404(b)(1) Alternatives Analysis in its application package, which demonstrates that appropriate effort was made to avoid and then to minimize impacts to waters of the State, as required by the Basin Plan. Board staff held extensive additional discussions with Caltrans regarding its Alternatives Analysis. The Board concurs with the conclusions of the Alternatives Analysis.

20. The Basin Plan Wetland Fill Policy (policy) establishes that there is to be no net loss of wetland acreage and no net loss of wetland value, and a long-term net gain in both, when the project and any proposed mitigation are evaluated together, and that mitigation for wetland fill projects is to be located in the same area of the Region, whenever possible, as the project. The policy further establishes that wetland disturbance should be avoided whenever possible, and if not possible, should be minimized, and only after avoidance and minimization of impacts should mitigation for lost wetlands be considered.

21. The goals of the California Wetlands Conservation Policy (Executive Order W-59-93, signed August 23, 1993) include ensuring "no overall loss" and achieving a "…long-term net gain in the quantity, quality, and permanence of wetland acreage and values…." Senate Concurrent Resolution No. 28 states that "[i]t is the intent of the legislature to preserve, protect, restore, and enhance California's wetlands and the multiple resources which depend on them for benefit of the people of the State." Section 13142.5 of the CWC requires that the "[h]ighest priority shall be given to improving or eliminating discharges that adversely affect…wetlands, estuaries, and other biologically sensitive areas."

22. The California Environmental Quality Act (CEQA) requires that all projects approved by State agencies comply with CEQA. On September 18, 1998, Caltrans filed a Notice of Exemption indicating that the Project, as an emergency project, is exempt from CEQA, pursuant to CSHC Section 180.2 and Pub. Res. Code Section 21080 and 14 Cal. Code of Regs. Section 15269. The Board finds that the Project is exempt from CEQA pursuant to 14 Cal. Code of Regs. Section 15269.

23. The Board has notified the U.S. Army Corps of Engineers (the Corps) and other interested agencies and persons of its intent to issue Water Quality Certification for the Project.

24. The Board, in a public meeting, heard and considered all comments pertaining to the Project.

IT IS HEREBY ORDERED that, with the incorporation of the following conditions, the Board certifies that any discharge from Caltran's Project described herein, will comply with the applicable provisions of sections 301 ("Effluent Limitations"), 302 ("Water Quality Related Effluent Limitations"), 303 ("Water Quality Standards and Implementation Plans"), 306 ("National Standards of Performance"), and 307 ("Toxic and Pretreatment Effluent Standards") of the Clean Water Act. The following conditions are associated with this certification:

1. Caltrans shall submit a Report of Waste Discharge Form 200 to the Board's Executive Officer by November 16, 2001. Upon the Board's issuance to Caltrans of Waste Discharge Requirements pursuant to CWC Section 13263 for the Project, Caltrans shall immediately comply with such requirements.

2. Caltrans shall comply with all necessary approvals and/or permits for the Project and its mitigation projects from applicable government agencies, including, but not limited to, Bay Conservation Development Commission, California Department of Fish and Game, NMFS, USFWS, and the Corps, and submit copies of such approvals and/or permits to the Board's Executive Officer prior to the start of construction activity.

3. Not later than 60 days prior to the beginning of construction activity, Caltrans shall submit a construction-phasing schedule.

4. Not later than 60 days prior to the beginning of dredging, Caltrans shall submit, acceptable to the Executive Officer, a Dredging Operations Plan. Upon the Executive Officer's determination that the Plan is acceptable, the Executive Officer may determine that work may begin sooner than 60 days following submittal of the acceptable Plan. Submittal of plans for later phases (e.g., dredging for demolition access) may be completed at future dates, but not later than 90 days prior to the beginning of construction activity/demolition, including staging and dredging, for those phases.

5. Not later than one year following the contract award for the Skyway, Caltrans shall submit, acceptable to the Executive Officer, a plan that addresses the proposed on-site mitigation for special aquatic sites including eelgrass beds and sand flats. The plan shall include all appropriate detail for earthwork and plantings, as well as an implementation schedule, performance standards, and monitoring.

6. Not later than 60 days prior to the beginning of construction activity, Caltrans shall submit, acceptable to the Executive Officer, a final implementation plan describing the additional mitigation activities to be undertaken with EBRPD and USFWS. The

implementation plan shall include detailed descriptions of the proposed activities, including appropriate project plans, an implementation schedule, and reporting. The plan or subsequent report shall demonstrate that Caltrans has fully funded $10.5 million or has $10.5 million in funds available for all activities identified in Finding 11 to be completed by a third party by no later than 60 days prior to the beginning of construction activity. Upon the Executive Officer's determination that the plan is acceptable, the Executive Officer may determine that work may begin sooner than 60 days following submittal of the acceptable plan.

7. Within one year of contract award for the Skyway, Caltrans shall submit, acceptable to the Executive Officer, a conceptual post-construction SWMP including appropriate design measures and storm water treatment controls to address the project's urban runoff impacts to waters of the State. The SWMP shall provide for the appropriate treatment of at least 85% percent of average annual runoff from the area to be treated and shall include appropriate design details, implementation and completion schedules, planting plans, maintenance plans, funding mechanism(s), and all other information, as appropriate.

8. Not later than 30 days prior to the beginning of construction activity of the design measures and treatment controls in the conceptual SWMP, Caltrans shall submit, acceptable to the Executive Officer, a final SWMP with final construction details and all other information, as appropriate, for all appropriate information included in the conceptual SWMP.

9. As soon as feasible following contract award for the Skyway, and not later than 30 days prior to the beginning of construction activity, Caltrans shall submit, acceptable to the Executive Officer, a SWPPP to address the Project's expected construction stage impacts. SWPPPs may be submitted separately for each phase of construction activity/demolition, but must all be submitted, acceptable to the Executive Officer, at least 30 days prior to beginning of each phase of construction activity/demolition.

10. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to CWC §13330 and 23 CCR §3867.

11. This certification action is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR Subsection 3855(b) and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

12. Certification is conditioned upon total payment of the full fee required in State regulations (23 CCR Section 3833) and owed by the applicant. The fee for this certification has been paid in full.

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on October 17, 2001.

Loretta K. Barsamian

Loretta K. Barsamian
Executive Officer

California Regional Water Quality Control Board
San Francisco Bay Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov
1515 Clay Street, Suite 1400, Oakland, California 94612
Phone (510) 622-2300 • FAX (510) 622-2460

Gray Davis
Governor

Date: JAN 30 2002
File Nos. 2198.11, 2199.9430
Site No. 02-01-C0528 (KHL)

Certified #7001 0320 0002 3610 0894

Ms. Mara Melandry
Environmental Manager, Caltrans
Mail Station 12-C
P.O. Box 23660
Oakland, CA 94623-0660

Subject: Transmittal of Adopted Order No. R2-2002-0011 for Caltrans' Bay Bridge East Span Seismic Safety Project.

Dear Ms. Melandry:

Enclosed please find a copy of the above-referenced Order, as adopted by the Board at its January 23, 2002, meeting.

Please note the various required submittals and due dates for reports and plans that are a part of the Order. We look forward to continue to work with Caltrans in the development of these reports.

If you have any questions or further comments, please contact Keith Lichten of my staff via email to khl@rb2.swrcb.ca.gov, or at (510) 622-2380.

Sincerely,

Loretta K. Barsamian
Executive Officer

Enclosure: Board Order No. R2-2002-0011
cc: Dale Bowyer, RWQCB
Bruce Wolfe, RWQCB
Tim Vedlinski, USEPA, WTR-8
Bob Smith, U.S. Army Corps of Engineers, Regulatory Division
Bob Batha, BCDC

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at http://www.swrcb.ca.gov.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER No. R2-2002-0011

WASTE DISCHARGE REQUIREMENTS FOR:

CALIFORNIA DEPARTMENT OF TRANSPORTATION

SAN FRANCISCO-OAKLAND BAY BRIDGE EAST SPAN SEISMIC SAFETY PROJECT (EAST SPAN PROJECT), CITY AND COUNTY OF SAN FRANCISCO AND CITY OF OAKLAND, ALAMEDA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter Board, finds that:

1. The California Department of Transportation (hereinafter Caltrans) on November 28, 2001, submitted a Report of Waste Discharge to the Board for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (hereinafter, the Project). Caltrans proposes to replace the existing East Span of the San Francisco-Oakland Bay Bridge with a new bridge constructed north of that span. The Project will be located on San Francisco Bay between the cities of San Francisco, at Yerba Buena Island (YBI), and Oakland.

2. The existing East Span is not expected to withstand a maximum credible earthquake (MCE) on the San Andreas or Hayward fault. The Project will replace the East Span with a new bridge that will withstand a MCE and will meet current roadway design standards for operations and safety to the greatest extent possible.

3. The Board issued Water Quality Certification for the Project at its October 17, 2001, meeting, as Order No. 01-120, with the understanding that waste discharge requirements would subsequently be adopted for the Project.

Project Description and Impacts

4. Project construction is proposed to occur over a seven-year period, including five years to construct the new bridge and two years to remove the existing East Span. Construction of the new bridge will be divided among four separate major contracts as follows: 1) Skyway contract, 2) Self-Anchored Suspension Span and Transition Structures at Yerba Buena Island contract, 3) Oakland Approach Structures contract, and 4) Geofill contract at the Oakland Touchdown. There will be an additional demolition contract to remove the existing East Span. Caltrans opened bids on the geofill contract on December 12, 2001, and on the skyway contract on December 19, 2001.

5. The Project would require the use of large-scale equipment and involve labor-intensive activities. Materials and equipment would arrive to the site by land and water. Dredging of approximately 617,000 cubic yards of Bay mud and soil will also be required.

6. This Order applies to the permanent and temporary direct and indirect impacts to waters of the State associated with the Project, which is comprised of the Project components listed above. Total direct permanent and temporary Project impacts to waters of the State are approximately 8.59 acres. These impacts occur in areas known as special aquatic sites. The majority of Project impacts to special aquatic sites will occur near the Oakland Touchdown area due to dredging for a temporary barge access channel, placement of fill to construct a new westbound roadway, relocation of Caltrans' existing maintenance road, and permanent shading from the new westbound roadway. Relatively minor impacts to eelgrass beds adjacent to YBI to construct a temporary barge dock will occur.

7. The Project's direct permanent impacts include elimination of approximately 3.24 acres of eelgrass habitat and approximately 4.19 acres of sand flat habitat. The Project's direct temporal impacts during construction include approximately 0.36 acres of eelgrass habitat and approximately 0.80 acres of sand flat habitat.

8. The Project may temporarily impact special aquatic sites, including eelgrass and sand flats, and open waters of the Bay over the estimated seven years of bridge construction and demolition. Impacts may occur through the discharge of construction and demolition materials and debris, indirect impacts from equipment access and changes to erosion and sedimentation during project dredging and fill placement.

9. The Project will directly impact the beneficial uses of waters of the State for estuarine habitat and preservation of rare and endangered species through construction stage impacts including pile driving. Approximately 259 large piles will be constructed, requiring an estimated 1,300 hours of pile driving time. An additional 1,030 to 2,060 smaller piles will be required for temporary structures, supports, falsework, docks, etc. Pile driving was shown to cause fish kills during a pilot project for the new bridge. In its Biological Opinion for the Project (File No. 151422-SWR99-SR-190), the National Marine Fisheries Service (NMFS) stated:

"Underwater sound pressure waves generated by [large] pile driving activities are expected to expose both adult and juvenile listed salmonids to lethal and injurious conditions. Most juvenile anadromous salmonids within a 69 m [meter]… radius of the pile during operation of large hammers will be killed instantaneously. …up to a distance of 440 m…from a pile driving operation, fish are expected to experience trauma in many organs including the inner ear, eyes, blood, nervous system, kidney, and liver. These injured fish are expected to have some difficulty in maneuvering or maintaining orientation in the water column, and many will be subject to delayed mortality. Still further out from the pile driving activity, up to possibly 4,400 m…during the driving of

large piles, fish may exhibit temporary abnormal behavior indicative of stress or exhibit a startle response, but not sustain permanent harm or injury."

Caltrans will complete mitigation, including: implementation of a fisheries and hydroacoustic monitoring plan; installation, operation, and maintenance of an air-bubble curtain noise attenuation device around pile driving activities; and funding, in the amount of $4 million, of an off-site steelhead restoration and enhancement fund, to be used to restore and enhance steelhead fisheries in central or south San Francisco Bay tributaries. However, up to $500,000 of the fund may be used for monitoring fisheries impacts, sound pressure levels, and other impacts associated with pile driving. The $4 million fund is in addition to the $10.5 million provided for off-site wetland mitigation, described in Finding 12.

10. To mitigate for the Project's permanent impacts to habitat, Caltrans plans to implement measures on-site to restore special aquatic sites affected during Project construction including:

    a. Harvesting approximately 0.55 acres of eelgrass from the footprint of the temporary barge access channel prior to dredging, planting test plots in adjacent eelgrass beds, and monitoring to evaluate performance;

    b. Restoring to its pre-construction bathymetry up to approximately 1.73 acres of the barge access channel with dredge material and excavated sand to facilitate eelgrass colonization and then replanting with eelgrass. Caltrans will monitor replanted eelgrass to evaluate its performance;

    c. Restoring approximately 0.80 acres of sand flats that are temporarily affected by the placement of a geotube or mud boils from engineered fill;

    d. Implementing measures on-site to replace and/or restore shorebird roosting habitat and cormorant habitat; and,

    e. Implementing measures to improve water quality at the Emeryville Crescent and portions of the Eastshore State Park.

11. Caltrans has committed to an eelgrass habitat mitigation effort negotiated with the National Marine Fisheries Service. This effort consists of a commitment of $800,000 to $1 million by Caltrans to the following elements: survey potential areas of eelgrass beds within San Francisco Bay; investigate appropriate methods to restore, enhance, or create new eelgrass beds; design appropriate studies such as a limiting factors analysis, to define critical elements of restoring eelgrass habitats; design and locate site-specific eelgrass pilot projects for future restoration; prepare a report and guideline for implementing eelgrass replacement in the Bay; and, fully restore two acres of eelgrass. This effort is expected to help guide eelgrass restoration efforts completed as parts of other Project

mitigation.

12. Caltrans will provide additional mitigation for the Project's direct impacts to habitat at off-site locations. Caltrans will provide $10.5 million in funds to be divided between the following:

    a. Provide funding (a minimum of $2.5 million) to the East Bay Regional Park District (EBRPD) to restore, enhance or create new aquatic habitat and transitional uplands at the Eastshore State Park and within Central San Francisco Bay, pursuant to the "Draft Work Plan for Central Bay Mitigation Sites within East Shore State Park," dated November 2001. Potential mitigation sites include:

    - Radio Beach Area – potential shoreline restoration including intertidal habitat and upland transition zones;
    - Brickyard Cove Area – potential shoreline restoration including intertidal habitat, upland transition zones, and the removal of rip-rap;
    - Albany Beach Area – potential beach restoration/nourishment including the removal of parking areas; and,
    - Hoffman Marsh Area – potential tidal marsh restoration including the removal of fill and improving tidal action and water circulation.

    b. Provide funding (a maximum of $8 million) to the United States Fish and Wildlife Service (USFWS), pursuant to the "Draft Work Plan for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Skaggs Island Restoration Program," dated November 2001, to acquire, cleanup contaminants, and initiate restoration of approximately 3,000 acres of diked historic baylands at Skaggs Island, Sonoma County, to tidal marsh and seasonal wetlands.

13. Operation and maintenance of the Project's new bridge, roads, and reconfigured plaza area will indirectly impact beneficial uses through the discharge of polluted storm water and other urban runoff pollutants (e.g., oil and grease, heavy metals, pathogens, nutrients, etc.).

14. To address the Project's post-construction stormwater impacts, Caltrans proposes to permanently capture and treat storm water runoff from a portion of the new bridge, the metering lights and toll plaza area, and east to the Powell Street interchange in Emeryville. An area totaling approximately 155 acres is proposed for capture and treatment. This treatment would improve the quality of water draining into the Emeryville Crescent and Central San Francisco Bay, and thus would enhance wildlife habitat.
reduced to 150 acres.

15. On November 28, 2001, Caltrans submitted a construction-phasing schedule for the Project, briefly describing the major project activities and their proposed scheduling from

2001 through 2008 (see Appendix A). This phasing schedule is acceptable to the Board.

16. On November 28, 2001, Caltrans submitted a finalized discussion of evidence of financial assurance for the success of the Project and its associated mitigation. This evidence is acceptable to the Board.

17. This Order requires Caltrans to submit, acceptable to the Executive Officer, the following documents, reports, or plans prior to beginning construction of the Project, or within specified dates following contract award for the Skyway, to adequately mitigate the Project's impacts. As of the date of adoption of this Order, the items listed below either have been submitted to the Board and are not complete or not otherwise acceptable to the Board, or have not been submitted. Because of project phasing, some plans may be submitted separately, over time, prior to the beginning of construction for the Project's different contracts.

    a. Dredging Operations Plan. On November 28, 2001, Caltrans submitted a proposed "Self-Monitoring Plan for Turbidity" for the Project. The Self-Monitoring Plan is part of the larger Dredging Operations Plan. The Turbidity Plan is acceptable to the Board, with the incorporation of the requirements of the SMP that is part of this Order;

    b. On November 28, 2001, Caltrans submitted a "Draft Work Plan for Central Bay Mitigation Sites within East Shore State Park," dated November 2001, and a draft Memorandum of Understanding between Caltrans and EBRPD for Central Bay mitigation. These documents provide substantial information on Caltrans' proposed Central Bay wetland mitigation activities. This Work Plan is acceptable to the Board, but may be subsequently amended with the approval of the Executive Officer;

    c. On November 28, 2001, Caltrans submitted a "Draft Work Plan for On-Site Eelgrass Restoration Program," dated November 2001. The Plan provides substantial information regarding Caltrans' proposed on-site eelgrass mitigation, but must be further developed with the participation of the involved agencies prior to acceptance.

    d. On December 3, 2001, Caltrans submitted the "Draft Work Plan for the [Project's] Skaggs Island Restoration Program," dated November 2001. This Work Plan is acceptable to the Board, but may be subsequently amended with the approval of the Executive Officer;

    e. This Order requires Caltrans to prepare and implement a post-construction Storm Water Management Plan for activities identified in Finding 13 (SWMP) and construction-stage Storm Water Pollution Prevention Plan or Plans (SWPPP), in compliance with its statewide NPDES storm water permit (State Water Resources Control Board Order No. 99-06-DWQ). Because of the Project's proximity to sensitive resources, including special status species habitat, and potential to

discharge materials that could significantly impact those resources, this Order requires Caltrans to submit a SWPPP(s) for the Project, at least 30 days prior to the beginning of construction for the Project, except that the Order requires submittal of a SWPPP for the geofill contract at least 21 days prior to the beginning of construction for that phase only. Separate SWPPPs may be submitted for each separate phase (i.e., major contract) of construction and demolition, but at least 30 days prior to the beginning of construction or demolition of each phase.

SWPPP at least 30 days prior to construction

On November 28, 2001, Caltrans submitted a proposed "Work Plan for Implementation of Stormwater Treatment Measures," dated November 2001, outlining the tasks that must be completed prior to the phased construction of post-construction storm water treatment controls from Fall 2003 to as late as summer 2009. The phasing proposed in this Plan is not acceptable to the Board, and this Order directs Caltrans to submit a finalized work plan, acceptable to the Executive Officer, no later than 60 days after the date this Order is adopted.

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18. The Board participates in the Dredged Material Management Office (DMMO); a working group with representatives of the state and federal agencies with regulatory authority over Bay Area dredging projects. Staff representatives of the Board, the U.S. Army Corps of Engineers (Corps), the U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Conservation and Development Commission (BCDC), and the California State Lands Commission meet regularly to jointly review dredging projects and make consensus-based recommendations to their respective agencies about permit conditions and the suitability of sediments for proposed disposal sites. Representatives from the California Department of Fish and Game (CDFG) and from the National Marine Fisheries Service (NMFS) also participate in the DMMO as commenting agencies. Each DMMO agency retains its independent decision-making authority, but the group has significantly reduced project review time by concurrent consideration of projects.

19. The DMMO has reviewed and made recommendations on the suitability of proposed disposal sites for the sediments to be dredged during construction of the new bridge span. The DMMO has not made any recommendations on material proposed for dredging during demolition of the existing span.

This Order requires that Caltrans submit technical information characterizing these sediments and receive a suitability recommendation from the DMMO and written approval of the Executive Officer prior to commencement of any dredging associated with the demolition of the existing span.

20. The major dredging-related construction features of the Project are described below. The Project would dredge a total of approximately 617,000 cubic yards of material. The major construction features are:

a. Dredging of approximately 216,230 cubic yards of material at the Oakland approach structures for a barge access channel adjacent to the existing East Span at the Oakland Touchdown, foundation construction, and pile cap construction. Immediately adjacent to the Oakland Touchdown, the barge access channel would be dredged to a depth of 12 feet. Elsewhere, the channel would be dredged to a depth of 14 feet. Material from this area is proposed to be disposed of at the San Francisco deep ocean disposal site (SF-DODS), approximately 50 nautical miles west of the Golden Gate Bridge, or beneficial reuse sites;

b. Dredging of approximately 187,087 cubic yards of material for installation of piers, footings, and foundations for the new bridge. A hydraulic or mechanical dredge may be used. Within piles, material will be dredged to a depth of about 164 feet below the Bay bottom. The upper 12 feet of Piers E1 through E6, and E15 through E18 will be disposed of at appropriate upland facilities. Otherwise, material is proposed to be disposed of at the Alcatraz disposal site (SF-11); and,

c. Dredging of approximately 190,680 cubic yards of material for creation of a barge access channel to dismantle the existing bridge and to remove piers from the existing bridge. This material must be appropriately characterized and final reports reviewed and approved by DMMO prior to the commencement of this phase of dredging. At present, this material is conceptually proposed to be disposed of at the deep ocean disposal site (SF-DODS), at an upland wetland reuse site, or at a landfill reuse site. For removal of the existing piers, approximately 22,724 cubic yards of material would be dredged. This material would be disposed of at the Alcatraz Island site (SF-11).

21. The Corps distinguishes the different types of material that will be dredged (or excavated) in the Project as follows:

a. Young Bay Muds. This is an upper layer of materials that was deposited beginning about 10,000 years ago, and which consists primarily of clay, with some silt, sand, and shell fragments. With the exception of pier construction, removed sediment is expected to be comprised of Young Bay Muds.

b. Other materials. Pier construction is expected to result in the removal of Young Bay Muds, Merritt Sands, Yerba Buena Mud, the upper and lower Alameda Formations, and Franciscan Bedrock.

22. **Sediment suitability determinations.**

a. The dredged material to be generated by the construction portion of the Project has been evaluated by Board staff in conjunction with the DMMO. Demolition-related material will subsequently be evaluated by DMMO. After approving the sediment sampling and analysis plan, the DMMO participants review the results of the testing and make recommendations to their respective agencies regarding the suitability of sediments for proposed disposal and reused locations.

b. Sediments to be dredged as part of the Project were or will be characterized to determine their suitability for various disposal options: ocean disposal, in-Bay disposal, wetland creation (cover and non-cover material[1]), construction material, and landfill disposal. None of the sediments were found to have levels of contaminants that would lead to their classification as hazardous waste, therefore requiring disposal in a landfill. However, landfill disposal or reuse of sediments as daily cover are potential disposal options for sediments generated by the Project. Sediments to be dredged for barge access to and pier removal during the demolition phase of the existing East Span have not yet been appropriately characterized, and this Order requires such characterization to be completed, and an acceptable proposal to be submitted before that work may commence.

c. The Board finds that material to be generated by the Project is suitable for placement at locations as described below. The majority of material has been determined to be suitable for aquatic disposal, based on pre-dredge testing. Additional testing may be completed to determine the final suitability of some material. While the DMMO also made suitability determinations relating to use of sediments in wetland restoration, each wetland restoration project will have sediment acceptance and testing criteria established by a site-specific Board action, which would be the final determinant of what sediments could be used at each site.

23. The proposed dredged material disposal sites for material to be generated by the Project are:

a. **San Francisco Deep Ocean Disposal Site (SF-DODS).** Located approximately 50 nautical miles offshore of the Golden Gate, at a depth of about 760 feet, and beyond the jurisdiction of the Board, this disposal site was established by the USEPA in 1994, designated under Section 102 of the Marine Protection, Research, and Sanctuaries Act. Publication of the final rule guiding its use and management in the Federal Register occurred in 1999. Only material determined to be suitable for ocean disposal may be disposed of at this site.

b. **Alcatraz Island Site (SF-11).** This site is located approximately 0.3 miles south of Alcatraz Island, approximately 5 miles from the Project site. The site was formally designated as a sediment disposal site in 1972.

24. Construction of the Project is expected to require construction-stage dewatering, including discharges of groundwater from areas of known groundwater and soil contamination, and other work in areas of known groundwater and soil contamination. These discharges and other work include:

[1] As defined in the 1992 Board staff report "Interim Sediment Screening Criteria and Testing requirements for Wetland Creation and Upland Beneficial Reuse," Wetland Non-Cover material is a category of dredged material suitable for use in wetland creation projects, but that must be covered by at least three feet of cleaner, Wetland Cover material.

a. Construction of piles in an existing landfill at YBI, to support a temporary bridge detour at YBI. Known landfill contaminants include heavy metals and hydrocarbons;

b. Construction of a new storm drain through an area of known hydrocarbon contamination from old pipelines and tanks in the Coast Guard area of YBI;

c. Construction in areas of known surficial lead contamination at YBI;

d. Pile cofferdam dewatering; and,

e. Other dewatering and/or construction activities at contaminated or potentially contaminated sites at YBI and/or at the Oakland Touchdown.

use discharge permit CAG912002 CAG912003

25. To mitigate for the Project's potential construction-stage impacts to water quality and beneficial uses of waters from discharges described in Finding 24, Caltrans has proposed to, separate from this Order, obtain coverage under and comply with the Board's General NPDES Permit No. CAG912002, for the discharge or reuse of extracted and treated groundwater resulting from the cleanup of groundwater polluted by fuel leaks and other related wastes, and/or NPDES Permit No. CAG912003, for the discharge or reuse of extracted and treated groundwater resulting from the cleanup of groundwater polluted by volatile organic compounds. The Board finds that Caltrans' use of these permits for the Project's proposed discharges described in Finding 24, where appropriate, is acceptable.

submit project phase

26. This Order requires Caltrans to submit, at least 30 days prior to the beginning of construction of a project phase in which dewatering is taking place, a dewatering plan that includes a description of how it will address and obtain appropriate approvals for the Project's discharges described in Finding 24.

27. The term "beginning of construction," as used in this Order, refers to the initiation of construction activities with the potential to discharge pollutants to waters of the State (e.g., on-site equipment and/or materials mobilization and staging, in-water construction-related activities, upland earth movement, etc.). It does not include activities without the potential to pollute (e.g., letting the contract and ordering structural steel).

28. The Board, on June 21, 1995, adopted, in accordance with CWC, Division 7, Chapter 3, Article 3, a revised Water Quality Control Plan, San Francisco Bay Basin (Basin Plan). The State Water Resources Control Board and the Office of Administrative Law approved this updated and consolidated revised Basin Plan on July 20, 1995, and November 13, 1995, respectively. A summary of revisions to the regulatory provisions is contained in 23 CCR Section 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwaters. This Order is in compliance with the Basin Plan.

29. The Project is located with the Central portion of San Francisco Bay. Central San Francisco Bay has the following existing beneficial uses defined in the Basin Plan: ocean, commercial and sport fishing, estuarine habitat, industrial service supply, fish migration, navigation, industrial process supply, preservation of rare and endangered species, water contact recreation, non-contact water recreation, shellfish harvesting, and fish spawning.

30. Caltrans submitted an Alternatives Analysis, prepared pursuant to federal guidelines, in its application package. The Alternatives Analysis demonstrates that appropriate effort was made to avoid and then to minimize impacts to waters of the State, as required by the Basin Plan. Board staff held extensive additional discussions with Caltrans regarding its Alternatives Analysis. The Board concurs with the conclusions of the Alternatives Analysis.

31. The Basin Plan Wetland Fill Policy (policy) establishes that there is to be no net loss of wetland acreage and no net loss of wetland value, and a long-term net gain in both, when the project and any proposed mitigation are evaluated together, and that mitigation for wetland fill projects is to be located in the same area of the Region, whenever possible, as the project. The policy further establishes that wetland disturbance should be avoided whenever possible, and if not possible, should be minimized, and only after avoidance and minimization of impacts should mitigation for lost wetlands be considered.

32. The goals of the California Wetlands Conservation Policy (Executive Order W-59-93, signed August 23, 1993) include ensuring "no overall loss" and achieving a "…long-term net gain in the quantity, quality, and permanence of wetland acreage and values…." Senate Concurrent Resolution No. 28 states that "[i]t is the intent of the legislature to preserve, protect, restore, and enhance California's wetlands and the multiple resources which depend on them for benefit of the people of the State." Section 13142.5 of the CWC requires that the "[h]ighest priority shall be given to improving or eliminating discharges that adversely affect…wetlands, estuaries, and other biologically sensitive areas."

33. With the successful implementation of the mitigation measures described in these findings, the Board finds that the Project will comply with the California Wetlands Conservation Policy and Basin Plan Wetland Fill Policy referenced in Findings 31 and 32.

34. The California Environmental Quality Act (CEQA) requires that all discretionary projects approved by State agencies comply with CEQA. On September 18, 1998, Caltrans filed a Notice of Exemption indicating that the Project, as an emergency project, is exempt from CEQA, pursuant to CSHC Section 180.2 and Pub. Res. Code Section 21080(b)(4) and 14 Cal. Code of Regs. Section 15269(e). The Board finds that the Project is exempt from CEQA pursuant to these statutory and regulatory exemptions.

35. The Board has notified the Corps and other interested agencies and persons of its intent to issue WDRs for the Project.

36. The Board, in a public meeting, heard and considered all comments pertaining to the WDRs.

37. Project files are maintained at the Board under file numbers 2198.11, 2199.9430, and site number 02-01-C0528. The Corps file number for the project is 23013S.

IT IS HEREBY ORDERED that Caltrans, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, shall comply with the following, pursuant to authority under CWC Sections 13263 and 13267:

A. Discharge Prohibitions

1. The direct discharge of wastes, including concrete, steel, drilling muds, rubbish, refuse, bark, sawdust, or other solid or liquid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plains, is prohibited.

2. The discharge of floating oil or other floating materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity, or discoloration in surface waters is prohibited.

3. The discharge of silt, sand, clay, or other earthen materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity, or discoloration in surface waters is prohibited.

4. The wetland fill activities subject to these requirements shall not cause a nuisance as defined in CWC §13050(m).

5. The discharge of decant water from active dredging or fill sites and dredged material stockpile or storage areas to surface waters or surface water drainage courses, and/or the discharge or potentially contaminated dewatered ground or surface water are prohibited, except as conditionally allowed following the submittal of a discharge plan or plans as described in the Provisions.

6. Surface and groundwater in the vicinity of the Project shall not be degraded as a result of the Project's activities or the placement of fill for the Project.

7. The discharge of materials other than storm water, which are not otherwise regulated by a separate NPDES permit or allowed by this Order, to waters of the State is prohibited.

B. Discharge Specifications

1. Caltrans shall ensure to the extent practicable that the turbidity generated by construction activities, including dredging, excavation, and placement in the Bay of solid materials permitted by this Order, does not exceed the following in waters of the State more than 100 feet beyond the Project Boundary for all areas of dredging, excavation, and/or fill placement, when that work occurs within 3200 feet (1000 meters) of an eelgrass bed or sand flat:

   Turbidity of the waters of the State, as measured in NTUs, shall not increase above background levels by more than the following, to the extent practicable. If turbidity does increase above the below levels, Caltrans shall follow remedial measures as described in the Self-Monitoring Program (SMP) that is part of this Order.

Receiving Waters Background	Incremental Increase
• ≥ 50 units	10% of background, maximum

   The Project Boundary for the dredged areas is to be defined by the silt curtain required by Caltrans of its contractors. In the event a silt curtain is not used to control turbidity, the Project Boundary shall be defined as the daily limit of dredging, excavation, and/or fill placement in any area where such work occurs.

2. In accordance with Section 13260 of the CWC, Caltrans shall file a report with the Board of any material change or proposed material change in the character, location, or volume of the discharge. Any proposed material change shall be reported to the Executive Officer at least 7 days in advance of implementation of any such proposal.

3. Caltrans' responsible representative shall immediately notify Board staff by telephone whenever an adverse condition occurs as the result of this discharge. An adverse condition includes, but is not limited to, a violation or threatened violation of the conditions of this Order, a significant spill of petroleum products or toxic chemicals, or damage to control facilities that could affect compliance. Pursuant to Section 13267(b) of the CWC, a written notification of the adverse condition shall be submitted to the Board within 30 days of occurrence. The written notification shall identify the adverse condition, describe the actions necessary to remedy the condition, and specify a timetable, subject to the modifications of the Board and/or Executive Officer, for the remedial actions.

C. Receiving Water Limitations

1. The dredging and/or disposal of sediments shall not cause:

a. floating, suspended or deposited macroscopic particulate matter or foam in waters of the State at any place more than 100 feet from the Project Boundary or point of discharge of return flow, except as authorized under Section B, Discharge Specifications, of this Order.

b. visible floating, suspended, or deposited oil or other products of petroleum origin in waters of the State at any place.

c. waters of the State to exceed the following quality limits at any time during construction activities:

i) Dissolved oxygen: 5.0 mg/l minimum. When natural factors cause lesser concentrations, then this discharge shall not cause further reductions in the concentration of dissolved oxygen.

ii) Dissolved sulfide: 0.1 mg/l maximum.

iii) pH: A variation of natural ambient pH by more than 0.5 pH units.

iv) Toxic or other deleterious substances: None shall be present in concentrations or quantities which may cause deleterious effects on aquatic biota, wildlife, or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.

2. The concentrations of chemicals of concern, as found in grab samples taken no more than 100 feet beyond the Project Boundary, shall not exceed the Receiving Water Limits in Table A-1 of the attached Self-Monitoring Program, unless it can be shown that site conditions are not significantly different from ambient concentrations of those chemicals (as measured in the open waters of the Central Bay in the vicinity of YBI).

D. Provisions

1. Caltrans shall comply with all Discharge Prohibitions, Discharge Specifications, Receiving Water Limitations, and Provisions of this Order immediately upon adoption of this Order or as provided below.

2. Caltrans shall obtain and comply with all necessary approvals and/or permits for the Project and its mitigation projects from applicable government agencies, including, but not limited to, BCDC, CDFG, NMFS, USFWS, and the Corps, and submit copies of such approvals and/or permits to the Board's Executive Officer prior to the start of construction activity. Additionally, Caltrans shall continue to comply with Water Quality Certification Order No. 01-120.

3. Prior to the beginning of construction of a project phase that includes dredging, Caltrans shall submit, a copy of the Dredging Operations Plan submitted to and as accepted by the Corps, and including all revisions required by the Corps.

4. Caltrans shall fully implement its submitted plans accepted in this Order, and plans required to be submitted in the future and that are accepted by the Executive Officer or approved by the Board (e.g., construction SWPPPs, its post-construction storm water management plan, dewatering plans, wetland mitigation work plans, etc.).

5. Not later than 18 months following the contract award for the Skyway, Caltrans shall submit, acceptable to the Executive Officer, a plan that addresses implementation of the proposed on-site mitigation for special aquatic sites including eelgrass beds and sand flats. The plan shall include all appropriate design details for earthwork and plantings, as well as an implementation schedule, performance standards, and monitoring. In the event eelgrass beds cannot be restored on-site, Caltrans shall propose alternate eelgrass and sand flat mitigation equivalent to the on-site mitigation presently proposed and accepted in this Order.

6. Caltrans shall implement its "Draft Work Plan for Central Bay Mitigation Sites within East Shore State Park," dated November 21, 2001, including complying with all dates and deadlines listed therein, and as may subsequently be incorporated into amended versions of the plan accepted by the Executive Officer. This Plan may be amended with the written approval of the Executive Officer. A minimum of $2.5 million shall be deposited into an interest-bearing escrow account no later than 120 days following adoption of this Order. All interest from this account shall be used for the funding of mitigation to be completed as a part of the referenced Work Plan.

7. Caltrans shall implement its "Draft Work Plan for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project: Skaggs Island Restoration Program," dated November 2001 (Skaggs Draft Work Plan), including complying with all dates and deadlines listed therein, and as may subsequently be incorporated into amended versions of the plan accepted by the Executive Officer. This Plan may be amended with the written approval of the Executive Officer. Caltrans shall fund this work with a maximum of $8 million dollars, which total amount shall be deposited into an interest-bearing escrow account no later than 120 days following adoption of this Order. All interest from this account shall be used for the funding of mitigation to be completed as a part of the referenced Work Plan or completed under the "Draft Work Plan for Central Bay Mitigation Sites within East Shore State Park," as referenced above.

8. The funding for the Skaggs Island restoration shall be redirected to other efforts as described below:

   a. If Skaggs Island restoration work fails to meet the dates set forth in the Skaggs Draft Work Plan, Section 5.13 *Contingency,* as may subsequently be amended, then Caltrans shall identify other potential mitigation sites and shall convene an interagency group to determine the acceptability of those sites, including acceptable designs and timing for their construction. Priority shall be given to

potential mitigation sites at the East Shore State Park not already part of the plan described in Provision E.5. Proposed alternative mitigation sites, including proposed plans for construction of alternative mitigation, shall be brought before the Board for its approval. Construction may not begin at alternative mitigation sites until the sites and plans have received approval by the Board.

b. If other funding is obtained for the Skaggs Island work, or it is otherwise determined that the funding for Skaggs Island is greater than that needed for the restoration project, then Caltrans shall identify other potential mitigation sites and shall convene an interagency group to determine the acceptability of those sites, including acceptable designs and timing for their construction. Priority shall be given to potential mitigation sites at the East Shore State Park not already part of the plan described in Provision E.5. Proposed alternative mitigation sites, including proposed plans for construction of alternative mitigation, shall be brought before the Board for its approval. Construction may not begin at alternative mitigation sites until the sites and plans have received approval by the Board.

9. Caltrans shall implement its "Draft Work Plan for On-Site Eelgrass Restoration Program," dated November 2001, including complying with all dates and deadlines listed both therein and below, and as may subsequently be incorporated into amended versions of the plan accepted by the Executive Officer. This Plan may be amended with the written approval of the Executive Officer.

a. Caltrans shall further develop mitigation monitoring standards and success criteria for its proposed on-site eelgrass mitigation as described in the Draft Work Plan, and shall submit a revised Work Plan or a Mitigation Plan/Conceptual Restoration Plan incorporating acceptable standards and criteria no later than August 1, 2002.

b. Preliminary design and engineering for on-site restoration shall be completed no later than October 1, 2002.

c. Other work shall be completed as per the timetable listed in the Draft Work Plan, as may subsequently be amended with the approval of the Executive Officer.

10. Not later than 60 days following adoption of this Order, Caltrans shall submit, acceptable to the Executive Officer, a final work plan for implementation of post-construction stormwater treatment measures (SWMP Work Plan). The SWMP Work Plan shall include:

done

a. Conceptual designs for all catchments, including proposed treatment measure types and conceptual designs, volumes of water to be treated (i.e., the water quality design storms), treatment times, and all other information, as appropriate. Proposed treatment measures utilizing detention shall have a minimum detention time of 48 hours for treated storms.

b. Completion of designs for catchments 2, 3, 4, 5, and 6 no later than December 2002. Designs shall provide for the appropriate treatment of at least 85% percent of average annual runoff from the area to be treated and shall include appropriate design details, implementation and completion schedules, planting plans, maintenance plans, funding mechanism(s), and all other information, as appropriate.

Keith May Stakeholders meeting May 22nd.

BCDC, East Bay RP.

c. Completion of designs for catchment 1 no later than August 2003, or concurrent with completion of design for the proposed EBRPD park, if that occurs later.

d. Construction of measures proposed for catchments 2, 3, 4, 5, and 6 beginning no later than July 2003, with completion of all related construction in those catchments no later than July 2004.

e. Completion of construction of measures proposed for catchment 1 no later than 1 year following the completion of the demolition contract to remove the existing East Span and no later than concurrently with the construction of the proposed EBRPD park.

f. A proposal to complete a water quality monitoring plan to appropriately monitor the effectiveness of all installed treatment measures for a minimum of 5 years following completion of their construction. The water quality plan shall include provisions for monitoring of removal of stormwater pollutants including, but not limited to, hydrocarbons, heavy metals, pathogens, nutrients, sediment, and trash, and shall include provisions for all other appropriate monitoring, including, but not limited to, treatment measure hydrology (e.g., amount of infiltration, ground water levels, etc.), maintenance requirements, effects of salinity, vegetation growth and survival, and vectors, and shall include provisions for annual reporting of this information to the Board. *

g. Not later than 30 days prior to the beginning of construction activity of the design measures and treatment controls specified in the SWMP Work Plan, Caltrans shall submit, acceptable to the Executive Officer, a final SWMP (storm water management plan) with final construction details and all other information, as appropriate, for all appropriate information included in the SWMP Work Plan.

11. As soon as feasible following contract award for each phase of construction and/or demolition, and not later than 30 days prior to the beginning of construction or demolition activity for that project phase, Caltrans shall submit, acceptable to the Executive Officer, a SWPPP to adequately address the Project's expected construction stage impacts. SWPPPs may be submitted separately for each phase of construction or demolition activity, but must all be submitted, acceptable to the Executive Officer, at least 30 days prior to beginning of each phase of construction or demolition activity. However, for the geofill contract only, Caltrans shall submit the required SWPPP for that contract, acceptable to the Executive Officer, at least 21 days prior to the beginning of construction

of that phase.

12. Caltrans shall conduct monitoring and reporting activities according to the Self-Monitoring and Reporting Program (SMP) attached to this Order, and as may be amended by the Executive Officer. At any time after adoption of this Order, Caltrans may file a written request proposing modifications to the attached SMP. If the proposed modifications are acceptable, the Executive Officer may issue a letter of approval incorporating the revisions into the SMP.

13. Caltrans shall provide technical monitoring reports regarding the impacts of the discharge on waters of the State, pursuant to Section 13267 of the California Water Code (CWC). This monitoring provides necessary information about Bay water quality, including both instantaneous data on the impacts of dredged material disposal and information about long-term impacts of that disposal. Caltrans may elect to participate in the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP) to fulfill this requirement or provide comparable data on an individual basis. Since 1992, many Bay Area dischargers have decided to provide this information through the RMP, rather than through individual monitoring programs. The San Francisco Estuary Institute (SFEI), located in Richmond, California, administers the program with oversight by the Board. Dischargers now contribute annually to the SFEI, and the Board recognizes these payments as fulfilling requirements to provide information on water quality impacts under Section 13267. The SFEI will send an invoice for $0.22 per cubic yard of material disposed in-Bay to all dischargers in July of the year following the disposal episode(s). Disposal volumes will be calculated using pre- and post-dredge surveys, or using bin volumes if surveys are not available.

14. Caltrans shall comply with the conditions of the Biological Opinion issued by NMFS and the Incidental Take Statement issued by CDFG for the Project. Additionally, from December 1 to March 31 of any construction year, a professional biologist will be present to identify herring spawning activity during all dredging operations. If herring spawning is detected at or within 200 meters of the dredging operations, dredging within 200 meters of the spawning activity shall cease within 8 hours of notification to the contractor for a minimum of 14 days, or until it can be determined that the herring hatch has been completed.

15. Discharges of dredged material shall comply with annual and seasonal volume target limits for disposal at in-Bay sites set in the Basin Plan.

16. Dredging shall be limited to the project depths described in the report: *Sediment Sampling and Analysis Report, San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, Alameda and San Francisco Counties, California*, dated June 2000.

17. Caltrans shall submit, on a monthly basis, a report summarizing all dredging and disposal activities and locations. Reports shall be submitted no later than the 15th day of the month following a month in which dredging takes place, and shall include: a summary of dredging and disposal volumes by location, a summary of dredging methods, maps showing dredge and disposal locations, a summary of related activities (e.g., associated dredged sediment dewatering), and all other information, as appropriate. Caltrans is requested to send a copy of these reports to the DMMO and all other interested agencies.

18. Not later than 30 days prior to the beginning of pile driving activities, Caltrans shall submit for Board staff review an effective fisheries and hydroacoustic monitoring plan. The fisheries and hydroacoustic monitoring plan shall include all related requirements of NMFS and CDFG, provision for reporting to the Board of information reported to other agencies, on a schedule consistent with that required by NMFS, and all other information, as appropriate. Staff shall work with NMFS and CDFG regarding the acceptability of the specified plans.

19. Caltrans shall notify the Board immediately whenever violations of this Order are detected.

20. Caltrans shall regularly, as described in the SMP that is part of this Order, monitor total suspended solids concentrations using turbidity meters during excavation/dredging of and/or placement of fill into channels or other project features that are within 1000 meters of mapped eelgrass beds. Turbidity meters shall be calibrated with enough grab samples to reduce the error in any measurement to less than 100 mg/L.

21. Caltrans shall use silt curtains or an equivalent method to effectively control turbidity for all proposed dredging activities.

22. No overflow or decant water shall be discharged from any barge, with the exception of spillage incidental to clamshell dredge operations.

23. To appropriately address potential impacts from its dewatering activities, Caltrans shall file for coverage under and comply with the Board's General NPDES Permit Nos. CAG912002 and/or CAG912003, as appropriate. The Board or Executive Officer may determine that Caltrans must obtain individual NPDES permits for the discharges, pursuant to the relevant NPDES permit provisions.

24. Caltrans shall submit, no later than 30 days prior to the beginning of construction of a project phase in which dewatering is taking place, a dewatering plan, acceptable to the Executive Officer, that includes a description of how it will address and obtain appropriate approvals for its proposed discharges. The dewatering plan shall include:

    a. A description of dewatering locations;

b. An estimate or estimates of discharge rates and volumes;

c. A listing of expected pollutants and concentrations;

d. The expected timing and scheduling of the proposed discharges; and,

e. All other information, as appropriate to mitigate for dewatering impacts (e.g., measures to mitigate the potential for erosion caused by dewatering discharges at their outfall(s)).

25. Caltrans shall install any additional monitoring devices required to fulfill the terms of any SMP issued to Caltrans, in order that the Board may evaluate compliance with the conditions of this Order.

26. Caltrans shall file with the Board a report of any material change or proposed change in the character, location, or quantity of this waste discharge. For the purpose of these requirements, this includes any proposed change in the boundaries of the disposal areas or the ownership of the site.

27. Dredging and disposal of dredged material associated with demolition of the existing East Span shall not commence until authorized in writing by the Executive Officer. The review process for this dredging shall occur through the DMMO by the same process as is used for other Bay Area dredging projects. Caltrans shall follow applicable federal and state guidance on a tiered testing framework and on the preparation of reports.

28. Caltrans shall maintain a copy or copies of this Order at the Project site so as to be available at all times to site operating personnel.

29. Caltrans is considered to have full responsibility for correcting any and all problems that arise in the event of a failure that results in an unauthorized release of waste or wastewater from the Project.

30. Caltrans shall maintain all devices and/or designed features installed in accordance with this Order such that they function without interruption for the life of the Project.

31. Caltrans shall permit the Board or its authorized representative, upon presentation of credentials:

a. Entry onto to premises on which wastes are located and/or in which records are kept.

b. Access to copy any records required to be kept under the terms and conditions of this Order.

c. Inspection of any treatment equipment, monitoring equipment, construction area(s), or monitoring method completed as part of the Project.

d. Sampling of any discharge or surface water covered by this Order.

e. This Order does not authorize commission of any act causing injury to the property of another or of the public; does not convey any property rights; does not remove liability under federal, state, or local laws, regulations or rules of other programs and agencies; nor does this Order authorize the discharge of wastes without appropriate permits from this agency or other agencies or organizations.

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on January 23, 2002.

Loretta K. Barsamian
Loretta K. Barsamian
Executive Officer

Attachments:

Appendix A: Project components: Schedule and brief description.
Appendix B: Self-Monitoring and Reporting Program.

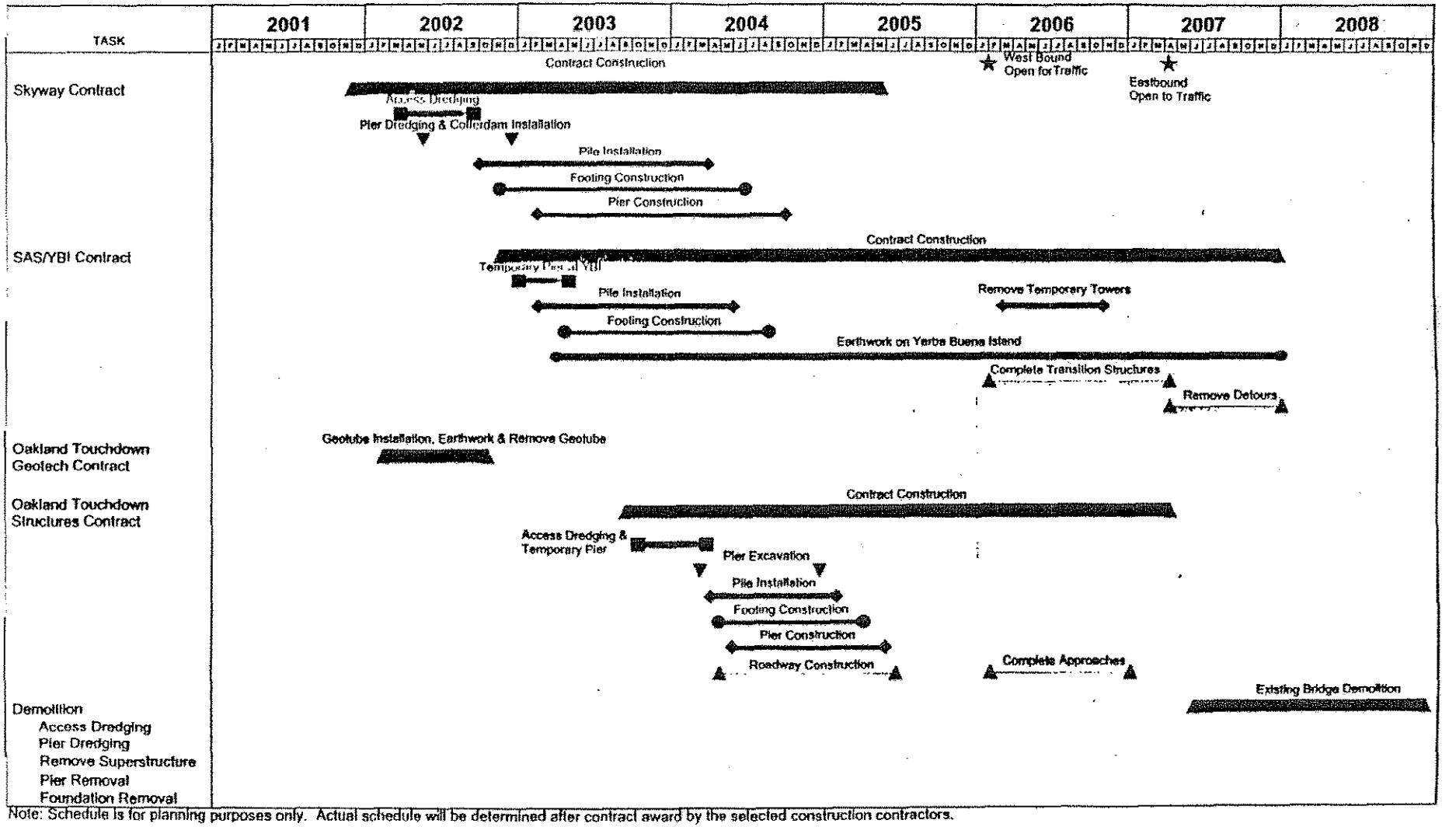
Order No. R2-2002-0011

Appendix A
East Span Project Components:
Schedule and Brief Description

SFOBB - East Span Seismic Safety Project

Construction Milestones

11/14/01



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

A Brief Explanation of Items listed in the Schedule

Access Dredging -

Dredging for barge access channels will occur twice during construction: first, to provide barge access for construction of a replacement structure, and later to provide barge access for dismantling of the existing structure. Approximately 216,230 cubic yards will be dredged for construction access early in the project and 190,680 cubic yards will be dredged late in the project for dismantling access.

Pier Dredging & Cofferdam Installation -

Cofferdams may be installed to construct over-water piers and on-land bents at the Oakland Touchdown and to dismantle the existing bridge piers. Cofferdams will be dewatered and sediment will be removed by reverse circulation drilling, jetting, airlifting or by clamshell excavation. Approximately 22,724 cubic yards may be dredged from cofferdams to remove the existing foundations and piles 1.5 feet below the mud line.

Pile Installation -

Hollow steel pipe piles will be driven and cleaned out. The shells will be filled with composite reinforced concrete. Approximately 187,087 cubic yards will be dredged for new pier construction.

Footing Construction -

For construction of the footings, piles will be driven, sheet pile, soldier piles and/or other temporary shoring may be used to excavate soil so forms can be built for pile caps; the forms will be filled with reinforcing steel and concrete and removed after the concrete has cured. The towers and bent caps will then be erected.

Geotube Installation, Earthwork & Remove Geotube -

At the Oakland Touchdown area, a portion of the new westbound roadway encroaches into the Bay, requiring the use of engineered fill. To construct the westbound roadway, a geotube will be placed north of the Oakland Touchdown to temporarily protect the work area from tidal and wave action. A geotube is a large diameter tube of permeable geotextile fabric into which Bay sand and water will be pumped.

Existing Bridge Demolition -

After the new bridge is constructed, the existing bridge will be dismantled. The techniques for dismantling the superstructure will involve separating and removing large, essentially intact pieces of the span. The pieces will be lowered onto barges, then transported to an upland site for appropriate disposal. The bridge foundations will then be removed and existing piles will be cut off below the mud line.

Temporary Pier at YBI -

Temporary detours will be required on YBI to construct the main span and skyway without interrupting traffic on the existing East Span. For construction of the bents, piles will be driven, forms will be built for pile caps or spread footings; the forms will be filled

with reinforcing steel and concrete and removed after the concrete has cured. The towers and bent caps will then be erected.

Earthwork on Yerba Buena Island -

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

Pier Construction -

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

Order No. R2-2002-0011

Appendix B:
East Span Project
Self-Monitoring Program

CALIFORNIA REGIONAL WATER QUALITY CONTROL PLAN
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM

FOR ORDER No. R2-2002-0011

Caltrans San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

construction

I. GENERAL

A. Basis

Reporting responsibilities of the Project Proponent as "waste discharger" are specified in Sections 13225(a), 13267(b), 13268, 13383, and 13387(b) of the California Water Code and this Regional Board's Resolution No. 73-16. This Self-Monitoring Program (SMP) is issued in accordance with the applicable Provisions of Board Order No. R2-2002-0011.

B. Purpose

The principal purposes of a monitoring program by a discharger, also referred to as a Self-Monitoring Program, are (1) to document compliance with effluent requirements and prohibitions established by this Board; (2) facilitate self-policing by the discharger in the prevention and abatement of pollution arising from improper effluent; (3) to develop or assist in the development of effluent or other limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards; (4) to prepare water and wastewater quality inventories; and, (5) to assist the discharger in complying with the requirements of the California Code of Regulations.

C. Sampling and Methods

Sample collection, storage and analysis shall be performed according to 40 CFR Section 136, or other methods approved by the Executive Officer.

Water analyses conducted on samples collected for laboratory analysis shall be performed by a laboratory approved by the State of California Department of Health Services (DHS) or a laboratory approved by the Executive Officer.

All monitoring instruments and equipment, including instruments and equipment used in field sampling and analysis, shall be properly calibrated and maintained to ensure accuracy of measurements.

Routine sampling shall follow Quality Assurance/ Quality Control procedures including the use of field, equipment and laboratory blanks and laboratory surrogate samples.

All Quality Assurance/Quality Control measures and results shall be reported along with the data.

II. DEFINITION OF TERMS

Grab Sample is defined as a discrete individual sample collected in a short period of time not exceeding 15 minutes. They are to be used primarily in determining compliance with receiving water limits. Grab samples only represent the condition that exists at the time the water and effluent are collected.

Receiving waters refers to any surface or groundwater which actually or potentially receives surface or groundwater, or which pass over, through, or under waste materials or contaminated soils. For these requirements, the samples to evaluate the condition of the receiving water should be taken within 100 feet of the Project Boundary.

Project Boundary, as defined in Board Order R2-2002-0011, is any point along the silt curtain at areas of dredging, excavation, or fill placement in the vicinity of eelgrass beds or mud flats, or, in the event a silt curtain is not used, the immediate limits of daily project work (e.g., daily limits of dredging).

Standard Observations refer to:

1. Receiving waters

    a. Evidence of floating and suspended materials generated by the construction and/or demolition activities, as recorded by visual observations, video or photographic records, continuous, fixed-turbidity meters that have been calibrated to total suspended solids and grab samples.
    b. Discoloration and turbidity: description of color, source, and size of affected area.
    c. Evidence of odors, presence or absence, characterization, source, and distance of travel from source.

Operations monitoring refers to the following information:

1. A description of and a map showing the area(s) dredged during the previous month, when dredging activity occurs in that month.
2. Estimates of the daily volume in cubic yards and the disposal location(s) of dredged materials removed during each day of the previous month, when dredging activity occurs in that month.

Construction activities refers to dredging, excavation, filling, construction, and demolition activities associated with the Project.

Duly Authorized Representative is one whose:

a. authorization is made in writing by a principal executive officer, or

b. authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity (e.g; field supervisor, project manager, chief engineer).

III. SPECIFICATIONS FOR SAMPLING AND ANALYSES

Caltrans is required to perform sampling and analyses as found in accordance with the following conditions and requirements:

A. Receiving Waters

1. At least once every 24 hours, and prior to start of dredging, excavation, or fill activities in waters of the State, depth-averaged background water samples shall be collected from at least 300 yards from active areas of the site. Background samples shall be collected such that they are representative of background conditions unaffected by potential discharges related to the Project.

   These samples shall be analyzed for the following constituents:

Constituents	Type of sample	Units
Turbidity	Grab	NTUs
pH	Grab	Not Applicable
Dissolved Oxygen	Grab	mg/l
Dissolved Sulfide	Grab	mg/l
Total Suspended Solids	Grab	mg/l
Temperature	-	degrees

2. Depth-averaged turbidity measurements shall be completed at established locations along the Project Boundary. Locations shall be established every 500 feet longitudinally along a line parallel to the Project Boundary and 100 feet away from the Project Boundary. Samples shall be taken, or measurements completed every 2 hours while work is being completed. Sampling shall continue after work has halted, if measured turbidity levels exceed the following, and for as long as measured turbidity levels exceed the following, measured in NTU:

Receiving Waters Background	Incremental Increase
≥ 50 units	10% of background, maximum

3. Samples shall be depth-integrated when possible, or otherwise taken at least one foot below the surface of the water body.

4. If analytical results for constituents analyzed on-site show that any grab sample exceeds any receiving water limit, confirmation samples shall be taken within 1 hour and every subsequent hour, and analyzed for all constituents for which on-site analysis is required. Sampling at this higher frequency shall continue until the exceedance has been corrected.

5. If any receiving water limit for a constituent or constituents is exceeded, then Caltrans shall follow the following process to address the exceedance:

    a. Identify source of exceedance;
    b. Correct source of exceedance;
    c. Resample to determine whether exceedance has been corrected.

6. If any receiving water limit for a constituent or constituents is exceeded for: a continuous period of 4 hours or more; or for 8 hours or more in any 1-week period from October 1 – March 31; or 16 hours or more in any 1 week period from April 1 – September 30; then Caltrans shall immediately suspend all dredging, excavation, or fill work causing or contributing to the exceedance, until turbidity levels have fallen below exceedance levels and remained there for a minimum of 4 consecutive hours. Additionally, Caltrans shall implement control measures necessary to prevent a reoccurrence of the exceedance when work is resumed, and shall immediately notify the Board by telephone and telefax of the exceedance and how it is correcting or will correct it.

7. If any receiving water limit for a consituent or constituents is exceeded for: 12 hours or more in any 1-week period from October 1 – March 31; or 24 hours or more in any 1 week period from April 1 – September 30, then Caltrans shall immediately halt the dredging, excavation, or fill causing the exceedance, until the cause of the violation is found and sampling demonstrates that the exceedance has been corrected or when Caltrans has provided the Board with a corrective action plan, acceptable to the Executive Officer, that provides alternative methods of compliance. Caltrans shall immediately notify the Board by telephone and telefax of the exceedance and of how they are correcting or will correct the exceedance.

8. For other violations, Caltrans shall notify the Board immediately whenever violations are detected and discharge shall not resume until Caltrans has provided the Board with a corrective action plan, acceptable to the Executive Officer, that provides alternative methods of compliance.

B. Standard Observations

The following observations shall be recorded by Caltrans on every day of operation:

1. Receiving Water:

    a. Floating and suspended materials of waste origin (to include oil, grease, algae, and other macroscopic particulate matter): presence or absence, source and size of affected area.

b. Discoloration and turbidity: description of color, source and size of affected area.

c. Odor: presence or absence, characterization, source, distance of travel and wind direction.

d. Hydrographic condition including: time and height of corrected low and high tides; and depth of water columns and sampling depths.

e. Weather condition including: air temperatures, wind direction and velocity and precipitation.

2. Progress and location of active dredging and control measures, noted on a map of the site.

C. Records to be Maintained

1. Written reports, strip charts, calibration and maintenance records, and other records shall be maintained by Caltrans and accessible at all times. Records shall be kept for a minimum of three years. Records shall include notes and observations for each sample as follows:

a. Identity of each sample, sampling station, and observation station by number.

b. Date and time of sampling.

c. Date and time analyses are started and completed and the name of personnel conducting analyses.

d. Complete procedure used, including methods of preserving and analyzing sample and identity and volumes or reagents used. A reference to a specific section of Standard Methods is satisfactory.

e. Calculations of results.

f. Results of analyses and/or observations, including a comparison of the laboratory and field results for duplicate samples, and detection limits for each analysis.

2. Records shall include a map or maps of the site showing the location sampling locations, work areas (e.g., coffer dams, dredging areas, etc.), and all other appropriate information.

3. If any receiving water limit for a constituent or constituents is exceeded, or if Caltrans otherwise violates any applicable water quality limits, then Caltrans shall maintain a tabulation showing the following flow data:

Total time of exceedance on a daily basis for each monitoring station in exceedance, and an estimate of the area of waters in exceedance (e.g., sketch map).

IV. REPORTS TO BE FILED WITH THE REGIONAL BOARD

A. Written monitoring reports shall be filed according to the schedule set forth in Table A-1. Reports shall be submitted no later than the 15th of the month following the month they are reporting on. The reports shall contain the following:

a. Letter of Transmittal

A letter transmitting the essential points in each report should accompany each report. Such a letter shall include a discussion of any requirement violations found during the last report period, and actions taken or planned for correcting the violations. If Caltrans has previously submitted a detailed time schedule for correcting requirement violations, a reference to the correspondence transmitting such schedule will be satisfactory. If no violations have occurred in the last report period, this shall be stated in the letter of transmittal. Monitoring reports and the letter transmitting the monitoring reports shall be signed by the Caltrans District Director or his duly authorized representative, if such represtentative is responsible for the overall operation of the facility from which the discharge originates. The letter shall contain a statement by the official, under penalty of perjury, that to the best of the signer's knowledge the report is true, complete, and correct.

b. Each monitoring report shall include a compliance evaluation summary. The summary shall contain:

i. An estimate of the volume of any Project discharge on a daily, weekly, and monthly basis.
ii. The method and time of measurement, equipment, and methods used to monitor turbidity and other monitored constituents in the field.

c. A map or aerial photograph shall accompany each report showing observation and monitoring station locations.

d. Laboratory statements of results of analyses specified in Part B must be included in each report. The director of the laboratory whose name appears on the laboratory certification shall supervise all analytical work in his/her laboratory and shall sign all reports of such work submitted to the Board.

i. The methods of analyses and detection limits must be appropriate for the expected concentrations. Specific methods of analyses must be identified. If methods other than USEPA-approved methods or Standard Methods are used, the exact methodology must be submitted for review and approved by the Executive Officer.

ii. In addition to the results of the analyses, laboratory quality assurance/quality control (QA/QC) information must be included in the monitoring report. The laboratory QA/QC information should include the method, equipment and

analytical detection limits, the recovery rates, an explanation for any recovery rate that is less than the recovery acceptance limits specified in the USEPA method procedures or the laboratory's acceptance limits, if they are more stringent than those in the USEPA method procedures; the results of equipment and method blanks; the results of spiked and surrogate samples; the frequency of quality control analysis; and the name and qualifications of the person(s) performing the analyses.

e. A summary and certification of completion of all Standard Observations for the Project, including the Project Boundary(ies) in the receiving waters.

f. A summary and certification of completion of all water quality analyses.

B. Contingency Reporting

a. A report to the Executive Officer and the Board case manager shall be made by telephone of any accidental discharge of whatever origin immediately after it is discovered. A written report shall be filed with the Board within five days thereafter. This report shall contain the following information:

i. A map showing the location(s) of discharge(s);
ii. Approximate flow rate and/or volume;
iii. Duration of discharge;
iv. Day and time of day of discharge;
v. Nature of effects (i.e., all pertinent observations and analyses); and,
vi. Corrective measures underway or proposed.

C. Final Reporting

Caltrans shall notify the Board by letter upon completion of each project phase and of the Project. Project completion is considered to be the date on which all dredged material has been deposited at its final disposal location(s), the new bridge has been completed and is open to traffic, the demolition of the existing East Span and removal of temporary structures have been completed, and construction equipment has been demobilized and staging areas have been restored. This date is considered separately from the required monitoring and implementation of other actions associated with post-construction stormwater and wetland mitigation. Caltrans shall also submit a final report containing the following information:

a. A comprehensive discussion of the compliance record, and the corrective actions taken or planned, which were needed for compliance with the Project's WDRs;
b. A comprehensive discussion of the effectiveness of receiving water monitoring methods;
c. An evaluation of the effectiveness of dredging and filling methods used (at minimizing water quality impacts);

d. An estimate of the total volume of material dredged or excavated from each discrete site during the project and the total volume of material placed at each disposal or reuse location; and,
e. An estimate of the total volume of decant water generated from dewatering of the dredged material, if applicable.

PART B: MONITORING AND OBSERVATION SCHEDULE

I. DESCRIPTION OF MONITORING STATIONS AND ANALYSES

1. RECEIVING WATERS

a. Number and locations of turbidity (optical backscatter) meters:[1]

i. Minimum of one turbidity meter no more than 100 feet beyond the Project Boundary and longitudinally every 500 feet parallel to the Project Boundary in environmentally sensitive areas (e.g., at eelgrass beds and mud flats) (monitoring for constituents other than turbidity is described in Table A-1);

ii. Minimum of one turbidity meter per construction area where dredging and/or pile driving are being completed, no more than 100 feet beyond the Project Boundary.

1. If simultaneous construction activities (e.g., multiple pile driving locations, multiple dredging locations or similar) occur more than 300 yards apart, each construction area will have a turbidity meter located no more than 100 feet beyond the boundary of that particular area, as defined by the silt curtain.

2. If simultaneous construction areas occur more than 100 feet, but less than or equal to 300 yards apart, Caltrans may deploy one turbidity meter for both areas.

iii. One turbidity meter located more than 300 yards from all construction activities to measure ambient conditions.

II. SCHEDULE OF SAMPLING AND ANALYSIS

The schedule of sampling and analysis is provided in the attached Table A-1.

III. REPORTING SCHEDULE

Reports submitted in compliance with this SMP shall be submitted by Caltrans on the following basis:

Monthly reporting: Monthly reports shall be submitted during all dredging and fill placement operations. Monthly reports shall be submitted by the 15th day of the month following the reporting period, beginning with the first month of dredging. Monthly reports shall include the measurements, observations, and monitoring as described in Table A-1.

Final reporting: Caltrans shall notify the Board by letter upon completion of project phases, within 60 days of completion of each project phase, and within 60 days of Project completion.

All reports shall be submitted to the Board case manager at

San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing Self-Monitoring Program:

1. Has been developed in accordance with the procedures set forth in this Board's Resolution No. 73-16, in order to obtain data and document compliance with discharge requirements established in Regional Board Order No. R2-2002-0011.

2. Was adopted by the Board on, January 23, 2002.

3. May be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the Discharger, and revisions will be ordered by the Executive Officer or Board.

Loretta K. Barsamian

Loretta K. Barsamian
Executive Officer

Attachment: Table A-1

SCHEDULE FOR SAMPLING, MEASUREMENTS, AND ANALYSIS

for

CALTRANS'
SAN FRANCISCO-OAKLAND BAY BRIDGE EAST SPAN SEISMIC SAFETY PROJECT
CITIES OF OAKLAND, ALAMEDA COUNTY, AND
SAN FRANCISCO, SAN FRANCISCO COUNTY.

ORDER No. R2-2002-0011

Table A-1: Surface Water Sampling Schedule for samples taken at near-environmentally sensitive area stations, as located pursuant to the SMP.

Sample Type	Sampling Frequency	Reporting Period[2]
Total Suspended Solids	Daily	Monthly
Turbidity	As specified in SMP	Monthly
pH (units) field	Daily	Monthly
Dissolved Oxygen	Daily	Monthly
Dissolved sulfide	Daily	Monthly
Water temperature & depth: surface, thermocline & bottom, or every 5 feet.	Daily	Monthly

[2] As specified in this table, or as otherwise specified in the SMP.

Attachment H

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. KAMRAN NAKHJIRI
Branch Chief
Water Pollution Control
Office of Water Quality

Date: November 02, 2011

Attention: J.Tsai

File: 04- SF- 80 PM 2.0/6.7
04 – 0120T
Yerba Buena Island (YB1#2)

From: RIFAAT NASHED RN
Engineering Geologist
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

RN for
GRANT WILCOX
Chief, Branch B
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject : Seepage Rate (Flow Rate) Estimate at Five Locations

This memo is in response to your request to provide the groundwater depth and seepage rate for the construction of Guard Booth with canopy, Parking Canopy, West Tie –in phase 3, YB1 EB On-Ramp structure, and Retaining Wall # 51 located in the project site. It is our understanding that this information will be used in estimating dewatering quantities.

It should be noted that in our estimate for the five locations, we considered the maximum depth of excavation under the groundwater elevation. It should be noted that the water elevation tidally could be influenced.

Guard Booth with Canopy

For this location, our estimates are limited to the excavation required for 10 CIDH piles, 24 inch diameter and 12 ft depth from the original ground surface to the bottom of the piles (pile tip elevation).

Based on the LOTB of boring (99-170) drilled in October 1999, the groundwater elevation is 21.65 ft (6.6 m) and the soil layer at and below the groundwater level and extending to the bottom of the CIDH piles is silty fine sand (SM).

By using the Coefficient of Permeability K value $2.7X10^{-1}$ ft /day, the seepage rate for this location is 0.5 gallon/day/ft^2.

Parking Canopy

The Parking Canopy is supported by 4 CIDH piles, 24 inch diameter and 7 ft depth from the ground surface to the bottom of the piles (pile tip elevation).

Based on the LOTB of boring (99-313) drilled in November 1999 at the project site, the pile tip elevation of 160.3 ft (48.87 m) is higher than the groundwater elevation 138.5 ft (42.2 m). Accordingly, all the pile excavations will be above the groundwater and dry.

West Tie-In Phase 3

For this location, our estimates are limited to the excavation required for 3 Bents. Bent 1 and Bent 2 will be constructed on one CIDH pile each with depth of 50.5 ft (15.4 m) for bent 1 and 74.0 ft (22.5 m) for Bent 2 and 7.9 ft (2.4 m) diameter. Bent 3 will be constructed using a concrete footing supported by 3 CIDH piles and a column. The depth of the 3 piles is 40.0 ft (12.5 m) and 5.0 (1.52 m) diameter.

Based on the LOTB of boring (99-402) drilled in November 1999 at the project site, the groundwater elevation is 140.7 ft (42.9 m). The soil at and below the groundwater level to the pile tips consist of silty sand, clay, fractured sandstone and Graywacke (Franciscan Complex).

The depth of Bent 3 column from the ground surface to the top of the concrete footing is 13.0 ft (4.0 m) and its tip elevation is 159.4 ft (48.6 m). Accordingly, the column excavation will be above the groundwater and dry.

By using the Coefficient of Permeability K value $2.7X10^{-1}$ ft /day for silty sand (SM), $2.7X10^{-3}$ ft /day for clay (CL) to silt (ML), and 0.00305 ft /day[1] for fractured rock, the <u>seepage rate for this location is 0.2 gallon/day/ft^2</u>.

YB1 EB On-Ramp

For this location, our estimates are limited to the excavation required for Bent 10 and Abutment 11 that will be supported by 4 piles (type HP 360 x 132) each.

Based on the LOTB of boring (99-313) drilled in November 1999 at the project site, the groundwater elevation is 138.5 ft (42.2 m) and the soil layer at and below the groundwater level and extending to the bottom of the piles consists of sand with silt (SP-SM), and sandy silt (SM).

1 Roy E.Hun,2005,Geotechnical Engineering Investigation Handbook, 2nd Edition- Page 167 table 3.12

By using the Coefficient of Permeability K value 0.14 ft /day for sandy silt (SM) and 0.700135 ft /day (an average of $2.7X10^{-4}$ and 1.4) for sand with silt (SP-SM), the seepage rate for this location is 1.0 gallon/day/ft^2.

Retaining Wall # 51

For this location, our estimates are limited to the excavation required for 36 piles of 36 inch (915 mm) diameter with different lengths: 62.3 ft (19 m) length for piles No.1 to 7, 52.5 ft (16.0 m) length for piles No.8 to 14 and 42.7 ft (13.0 m) length for piles No.15 to 36.

Based on the LOTB of boring (99-202) drilled in October 1999 at the project site, the groundwater elevation is 90.55 ft (27.6 m) and the soil layer at and below the groundwater level and extending to the bottom of the piles consists of sand (SP), silty sand (SM), and clayey sand (SP-SC).

By using the Coefficient of Permeability K value 1.4 ft /day for sand (SP), 0.27 ft /day for silty sand (SM), and 0.14 ft /day for clayey sand (SP-SC), the seepage rate for this location is 1.6 gallon/day/ft^2.

According to "The Federal Highway Report NO. FHWA-TS-80-224, Page 48-49" the Coefficient of Permeability K (ft./day) for all soils encountered in the Oakland Touchdown area are as follows:

Unified Soil Classification	Coefficient of Permeability K (ft./day)
Poorly graded sand (SP)	0.14 to 1.4
Silty sand (SM)	$2.7x10^{-4}$ to 1.4
Clayey sand (SC)	$2.7x10^{-5}$ to 0.14
Silt (ML)	2.7x10-5 to 0.14
Lean clay	$2.7x10^{-5}$ to $2.7x10^{-3}$

This seepage rate (flow rate) estimate is provided for cost estimate purposes only.

If you have any questions or need additional information, please call Rifaat Nashed at (510) 622-1773 or Grant Wilcox at (510) 286-4835.

c: TPokrywka, GWilcox, Route File, Daily File

RNashed/mm

YB1 #2-OAKLAND TOUCHDOWN - SEEPAGE RATE

Construction Elemen	Soil Type	Bed Thickness (ft)	No of Piles	A (ft^2)	K (ft/day)	H (ft)	H0 (ft)	dH (ft)	d S (ft)	i	q(ft3/day)	q total (Gallon/day)	Flow Rate (Gallon/day/ft2)	Average flow rate per sector(Gallon/day/ft2)
Guard Booth Canopy														
	Silty Fine Sand (SM)	9.15	10	606.02	0.27	21.65	12.5	9.15	34.77	0.26316	43.05931579	321.3381775	0.530243519	0.53
West Tie-in phase 3														
Bent 1	Silty Fine Sand (SM)	3.28	1	130.35	0.27	140.75	114.83	25.92	98.496	0.26316	9.261710526	69.11724273	0.530243519	
	Clay (CL) to Silt (ML)	1.31	1	81.49	0.0027	140.75	114.83	25.92	98.496	0.26316	0.057900789	0.432095444	0.005302435	
	Sandstone and Graywacke(Franciscan)	21.33	1	1215.25	0.00305	140.75	114.83	25.92	98.496	0.26316	0.975398026	7.279089749	0.005989788	
Bent 2	Silty Fine Sand (SM)	3.28	1	130.35	0.27	140.75	91.86	48.89	185.782	0.26316	9.261710526	69.11724273	0.530243519	
	Clay (CL) to Silt (ML)	1.31	1	81.49	0.0027	140.75	91.86	48.89	185.782	0.26316	0.057900789	0.432095444	0.005302435	
	Sandstone and Graywacke(Franciscan)	44.29	1	2010.59	0.00305	140.75	91.86	48.89	185.782	0.26316	1.613763026	12.04300766	0.005989788	
Bent 3	Silty Fine Sand (SM)	3.28	3	391.05	0.27	140.75	126.97	13.78	52.364	0.26316	27.78513158	207.3517282	0.530243519	
	Clay (CL) to Silt (ML)	1.31	3	244.47	0.0027	140.75	126.97	13.78	52.364	0.26316	0.173702368	1.296286332	0.005302435	
	Sandstone and Graywacke(Franciscan)	9.19	3	830.87	0.00305	140.75	126.97	13.78	52.364	0.26316	0.6668825	4.976735075	0.005989788	0.18
EB ON - RAMP														
Bent 10L&R	Sand with silt (SP-SM)	28.54	4	471.32	0.700135	138.45	59.05	79.41	301.739	0.26316	86.83884953	648.0511159	1.374970542	
	Sandy silt (ML)	50.85	4	835.6	0.14	138.45	59.05	79.41	301.739	0.26316	30.78526316	229.7407698	0.274941084	
Bent 11	Sand with silt (SP-SM)	28.54	4	471.32	0.700135	138.45	59.05	79.41	301.739	0.26316	86.83884953	648.0511159	1.374970542	1.01
Retaining Wall #51														
Piles No.1-7	Fine Sand (SP)	20.67	7	1412.43	1.4	90.55	62.34	28.21	107.198	0.26316	520.3689474	3883.350353	2.749410841	
	Silty fine sand (SM)	7.57	7	548.62	0.27	90.55	62.34	28.21	107.198	0.26316	38.98089474	290.9021995	0.530243519	
Piles No.8 -14	Fine Sand (SP)	20.67	7	1412.43	1.4	90.55	52.49	38.06	144.628	0.26316	520.3689474	3883.350353	2.749410841	
	Silty fine sand (SM)	9.51	7	676.52	0.27	90.55	52.49	38.06	144.628	0.26316	48.06852632	358.7203456	0.530243519	
	clayey fine sand (SP-SC)	5.25	7	395.64	0.14	90.55	52.49	38.06	144.628	0.26316	14.57621053	108.7776905	0.274941084	
	Find Sand(SP)	2.63	7	222.88	1.4	90.55	52.49	38.06	144.628	0.26316	82.11368421	612.7886881	2.749410841	
Piles No. 15 -36	Fine Sand (SP)	20.67	22	1412.43	1.4	90.55	42.65	47.90	182.02	0.26316	520.3689474	3883.350353	2.749410841	
	Silty fine sand (SM)	9.51	22	676.52	0.27	90.55	42.65	47.90	182.02	0.26316	48.06852632	358.7203456	0.530243519	
	clayey fine sand (SP-SC)	5.25	22	395.64	0.14	90.55	42.65	47.90	182.02	0.26316	14.57621053	108.7776905	0.274941084	
	Find Sand(SP)	12.47	22	2739.66	1.4	90.55	42.65	47.90	182.02	0.26316	1009.348421	7532.450903	2.749410841	1.59

q = KiA

Notes

Length = bed thickness
Perimeter = is the circumference of the pile (hole) = 2 PI r/or width of of hole - trench
A = The cylender surface area = 2 PI r x Length + the surface area of the base
k = Soil / Rock Permeability
H = ground water elevation
H0 = the pile tip (bottom of the hole) elevation
dH = water head
ds = gradient distance Li = 3.8x(H - H0).....Ref. FHWA-Ts-80-224 Page 66
"i" = dH/ds
q total = (gallon/day/ft2) = q total (gallon/day)/ total surface area

Attachment I

TABLE 6
SUMMARY OF TPHg, TPHd, TPHmo, AHVOCs, SVOCs
ANALYTICAL RESULTS - WATER
SFOBB EAST SPAN ON YBI, SAN FRANCISCO COUNTY

Sample ID	TPHg (mg/L)	TPHd (mg/L)	TPHmo (mg/L)	VOCs (µg/L)	SVOC (µg/L)
			Eastbound Detour Structures		
EB6R	<0.050*	160	---	<5.0	ND
EB7R	0.12*	1200	---	<5.0	ND
EB8L	0.3*	44	---	<5.0	2-Methylnaphthalene=13 Phenanthrene=12
EB9L	---	3.1	---	---	ND
EB10R	---	5.6	---	---	ND
EB13L	0.33*	36	---	<5.0	Phenanthrene=93
EB14R	0.48*	440	---	<5.0	ND
			Transition Structures		
W5LC	0.57	13	9.1	Benzene=0.88 m,p-Xylene = 0.80 o-Xylene=1.6 1,2,4-Trimethylbenzene=6.3 Naphthalene=39	2-Methylnaphthalene=68 Fluorene=11 Naphthalene=31 Phenanthrene=11

mg/L	milligrams per Liter
µg/L	micrograms per Liter
---	Not Analyzed
VOCs	Volatile Organic Compounds
ND	No analytes were reported above laboratory reporting limit
TPH	Total Petroleum Hydrocarbons as g=gasoline, d=diesel, mo=motor oil
SVOCs	Semi-Volatile Organic Compounds
*	Samples contain hydrocarbons within the Gasoline range, but do not match the Gasoline pattern. Quantitation is based on a Gasoline standard.

TABLE 7
SUMMARY OF TITLE 22 METALS ANALYTICAL RESULTS
ANALYTICAL RESULTS - GROUNDWATER
SFOBB EAST SPAN ON YERBA BUENA ISLAND IN SAN FRANCISCO COUNTY

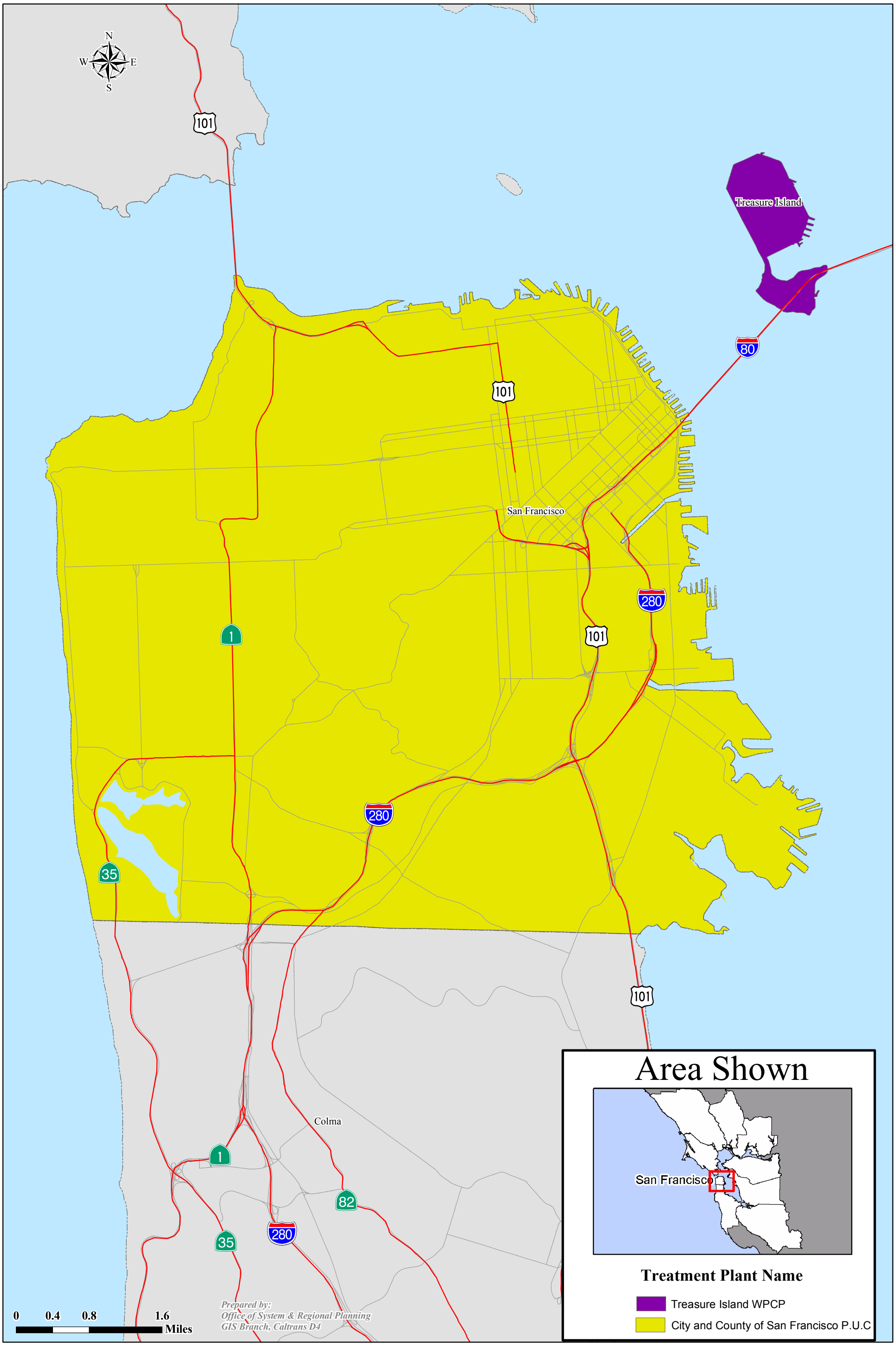
Sample ID	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
Transition Structures																	
W5L	0.010	0.22	2.5	<0.0030	<0.0030	1.2	0.34	0.27	0.10	<0.0040	<0.0050	1.4	<0.0050	<0.0030	<0.0050	0.66	0.71
Eastbound Detour Structures																	
EB13L	0.0093	0.010	0.67	<0.0010	<0.0030	<0.0030	0.0036	0.040	0.14	<0.0040	0.010	<0.0030	0.0079	0.0096	<0.0050	0.0041	0.21
EB14R	0.010	0.030	1.1	<0.0010	<0.0030	0.050	0.010	0.29	4.1	<0.0040	0.010	0.040	0.0060	0.010	<0.0050	0.040	2.4

Note: All data is reported in milligrams per Liter
< Analyte was not detected above the stated laboratory reporting limit

Attachment J

	City Discharger	Treatment Plant Name	WDR Discharger Name	Discharger Contact Name	Contact Phone No.	Contact Email	Mail Address	Ct Contact for Groundwater & De-Watering Discharges	Service Area of the POTW
n/a	Treasure Island WPCP	Treasure Island WPCP	SF PUC	Nathan Brennan	(415)242-2256 X1358	mcarlin@sfwater.org nbrennan@sfwater.org	Michael Carlin, SFPUC, Planning Bureau Manager, 1141 Market St., Suite 401, San Francisco, CA 94103, 415-934-5787	Best contact is Vic Vista @ 415-274-0318 at the "very small" plant on TI. Would want Chloride levels checked - and other sampling, and permit required.	Yerba Buena Island and Treasure Island

San Francisco County - POTW Service Areas



Attachment K

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
(510) 622-2300 • Fax: (510) 622-2460
http://www.waterboards.ca.gov

ORDER NO. R2-2006-0075
NPDES NO. CAG912002

GENERAL WASTE DISCHARGE REQUIREMENTS FOR: Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Fuel Leaks and Other Related Wastes at Service Stations and Similar Sites

Table 1. Administrative Information

This Order was adopted by the Regional Water Board on:	**November 13, 2006**
This Order shall become effective on:	**January 12, 2007**
This Order shall expire on:	**January 12, 2012**

The U.S. Environmental Protection Agency (USEPA) and the Regional Water Board have classified the discharges under this General National Pollutant Discharge Elimination System (NPDES) Permit as minor discharges.

To obtain coverage under this general permit, Dischargers must submit a Notice of Intent (NOI) Form as described in Attachments B and C and a filing fee equivalent to the first year's annual fee. If the NOI is complete, authorization to initiate discharge will be issued by the Regional Water Board Executive Officer.

The Dischargers who need to discharge treated groundwater after the expiration date of this Order shall file a complete Notice of Intent (NOI), as a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, and as an application for proposed discharge no later than July 15, 2011, which is 180 days in advance of the Order expiration date, as application for issuance of new waste discharge requirements (see Attachments B and C). The terms and conditions of this Order will be automatically continued after the expiration date of this Order for the Dischargers who submitted a complete NOI and will remain in effect until a new Order is adopted by the Regional Water Board. In order to assure no lapse in NPDES permit coverage for authorized discharges, the Dischargers who submitted a complete NOI will then be subject to the new Order pending receipt of a new discharge authorization.

IT IS HEREBY ORDERED, that this Order supercedes Order No. 01-100 except for enforcement purposes, and, in order to meet the provisions contained in division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder, the Dischargers shall comply with the requirements in this Order.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that this Order, Order No. R2-2006-0075, with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on November 13, 2006.

Bruce H. Wolfe, Executive Officer

California Regional Water Quality Control Board
San Francisco Bay Region

ORDER NO. R2-2006-0075
NPDES NO. CAG912002

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I. FACILITY INFORMATION

The regulated facilities under this Order are normally groundwater treatment facilities located at active or closed service stations or construction sites with the need for short or long term dewatering. These groundwater treatment facilities are in operation to extract and treat groundwater polluted mainly by fuel leaks. Facility information for each discharge shall be included in the Notice of Intent (NOI) Form submitted for that discharge (see Attachments B and C).

II. FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter Regional Water Board), finds:

A. Background. There are 55 underground fuel storage tanks operators, current property owners, or previous property owners (hereinafter current Dischargers) currently authorized to discharge pursuant to Order No. 01-100, NPDES Permit No. CAG912002. Of the current Dischargers, 37 submitted a Report of Waste Discharge and applied for a NPDES permit renewal to discharge up to 150 gallons per minute (gpm) of treated wastewater from their groundwater extraction and treatment facilities, hereinafter Facility or Facilities. The Regional Water Board will complete the review of these applications during the period starting after the adoption date of this Order and ending before effective date of this Order.

For the purposes of this Order, references to the "Discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger(s) herein.

B. Facility Description. Most Dischargers authorized under this general permit use aeration and/or granular activated carbon (GAC) systems to treat their pollutants of concern. Treated wastewaters are normally discharged through storm drain systems, rivers, and/or creeks to the Bay. A complete description of the treatment system installed at each facility is required to be completely documented in the Notice of Intent submitted by each Discharger (Attachments B and C).

C. Legal Authorities. This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. Environmental Protection Agency (USEPA) and chapter 5.5, division 7 of the California Water Code (commencing with section 13370). It shall serve as a NPDES permit for point source discharges from this facility to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to

article 4, chapter 4, division 7 of the Water Code (commencing with section 13260).

States may request authority to issue general NPDES permits pursuant to 40 CFR Section 122.28. On June 8, 1989, the State Water Resources Control Board (State Water Board) submitted an application to the USEPA requesting revisions to its NPDES Program in accordance with 40 CFR 122.28, 123.62, and 403.10. The application included a request to add general permit authority to its approved NPDES Program. On September 22, 1989, the USEPA, Region 9, approved the State Water Board's request and granted authorization for the State to issue general NPDES permits.

D. **Background and Rationale for Requirements**. The Regional Water Board developed the requirements in this Order based on information submitted as part of the applications, through monitoring and reporting programs, and other available environmental information. The Fact Sheet (Attachment F), which contains background information and rationale for Order requirements, is hereby incorporated into this Order and constitutes part of the Findings for this Order. Attachments A through E and G through I are also incorporated into this Order.

E. **California Environmental Quality Act (CEQA).** Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of CEQA, Public Resources Code sections 21100-21177.

F. **Technology-based Effluent Limitations.** Title 40 of the Code of Federal Regulations (Hereinafter 40 CFR) at section 122.44(a) requires that permits include applicable technology-based limitations and standards. This Order includes technology-based effluent limitations based on Best Professional Judgment (BPJ) in accordance with 40 CFR Section 125.3. A detailed discussion of the technology-based effluent limitations development and BPJ is included in the Fact Sheet (Attachment F).

G. **Water Quality-based Effluent Limitations.** 40 CFR Section 122.44(d) requires that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, water quality-based effluent limitations (WQBELs) may be established: (1) using USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) on an indicator parameter for the pollutant of concern; or (3) using a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in section 122.44(d)(1)(vi).

H. **Water Quality Control Plans.** The Regional Water Board adopted a Water Quality Control Plan for the San Francisco Bay Basin (hereinafter Basin Plan) on June 21, 1995, and amended this plan on January 2, 2004, and November 16, 2005. This later amendment will be final after approval from the State Water Board and Office of Administrative Law. The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. The Basin Plan at Page 2-5 states that the beneficial uses of any specifically identified water body generally apply to its tributary streams. The Basin Plan may not specifically identify beneficial uses for every receiving water regulated under this permit, but may identify present and potential uses for the downstream water body, to which the receiving water, via an intermediate water body, is tributary. These potential and existing beneficial uses are municipal and domestic supply, fish migration and fish spawning, industrial service supply, navigation, industrial process supply, marine habitat, agricultural supply, estuarine habitat, groundwater recharge, shellfish harvesting, water contact and non-contact recreation, ocean, commercial, and sport fishing, wildlife habitat, areas of special biological significance, cold freshwater and warm freshwater habitat, and preservation of rare and endangered species for surface waters and municipal and domestic supply, industrial service supply, industrial process supply, agricultural supply, and freshwater replenishment for groundwaters. In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Requirements of this Order implement the Basin Plan.

The State Water Board adopted a *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California* (Thermal Plan) on May 18, 1972, and amended this plan on September 18, 1975. This plan contains temperature objectives for surface waters. Requirements of this Order implement the Thermal Plan.

I. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995, and November 9, 1999. About forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants.

J. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Board in the

Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

K. Compliance Schedules and Interim Requirements. (Not applicable)

L. Alaska Rule. On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards (WQS) become effective for CWA purposes. (40 CFR § 131.21; 65 Fed. Reg. 24641 (April 27, 2000).) Under the revised regulation (also known as the Alaska rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

M. Antidegradation Policy. 40 CFR Section 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the state and federal antidegradation policies. As discussed in detail in the Fact Sheet, the permitted discharge is consistent with the antidegradation provision of section 131.12 and State Water Board Resolution No. 68-16.

N. Anti-Backsliding Requirements. Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at title 40, Code of Federal Regulations section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. All effluent limitations in this Order are at least as stringent as the effluent limitations in the previous Order.

O. Monitoring and Reporting. 40 CFR Section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code sections 13267 and 13383 authorizes the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (MRP) establishes monitoring and reporting requirements to implement federal and State requirements. This Monitoring and Reporting Program is provided in Attachment E.

P. **Standard and Special Provisions.** Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR section 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR section 122.42 and as modified for this general permit, are provided in Attachment D. The Discharger must comply with all standard provisions and with those additional conditions that are applicable under section 122.42. The Regional Water Board has also included in this Order special provisions applicable to the Dischargers. A rationale for the special provisions contained in this Order is provided in the attached Fact Sheet.

Q. **Provisions and Requirements Implementing State Law.** The provisions/requirements in subsections IV.B, IV.C, V.B, and VI.C of this Order are included to implement state law only. These provisions/requirements are not required or authorized under the federal CWA; consequently, violations of these provisions/requirements are not subject to the enforcement remedies that are available for NPDES violations.

R. **Notification of Interested Parties.** The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe Waste Discharge Requirements for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet of this Order.

S. **Consideration of Public Comment.** The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet of this Order.

III. DISCHARGE PROHIBITIONS

A. The discharge of extracted and treated groundwater polluted by fuel leaks and other related wastes at service stations and similar sites and related wastes to surface waters is prohibited unless an NOI application for proposed discharge has been submitted and the Executive Officer has provided the Discharger with an authorization to initiate the discharge.

B. The discharge shall be limited to extracted and treated groundwater and those added treatment chemicals approved by the Executive Officer which do not adversely affect the environment and comply with the requirements of this Order.

C. The discharge of extracted and treated groundwater from a specific site in excess of the flow rate specified in the authorization to discharge by the Executive Officer is prohibited.

D. The discharge shall cause no scouring or erosion at the point where the storm drain discharges into the receiving waters.

E. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance, as defined by Section 13050 of the California Water Code.

F. Bypass or overflow of untreated or partially treated groundwater polluted by fuel leaks or other wastes to waters of the State either at the treatment system or from any of the collection or transport systems or pump stations tributary to the treatment system is prohibited.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations (Surface water discharges only)

1. **Organic Pollutants:** The discharge of the effluent shall maintain compliance with the following effluent limitations at a discharge point after full treatment but before it joins or is diluted by any other waste stream, body of water, or substance:

Table 2. Effluent Limitations for Toxics Pollutants

No.	Compound	CAS Number	Column A: Discharge to Drinking Water Areas (see Note 2)		Column B: Discharge to Other Surface Water Areas	
			Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)	Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)
1	Benzene	71432		1		5
2	Carbon Tetrachloride	56235	0.25 (see Note 1)	0.50	4.4	5
3	Chloroform	67663		5		5
4	1,1-Dichloroethane	75343		5		5
5	1,2-Dichloroethane	107062	0.38 (see Note 1)	0.5		5
6	1,1-Dichloroethylene	75354	0.057 (see Note 1)	0.11 (see Note 1)	3.2	5
7	Ethylbenzene	100414		5		5
8	Methylene Chloride (Dichloromethane)	75092	4.7	5		5
9	Tetrachloroethylene	127184	0.8	1.6		5
10	Toluene	108883		5		5
11	Cis 1,2-Dichloroethylene	156592		5		5
12	Trans 1,2-Dichloroethylene	156605		5		5
13	1,1,1-Trichloroethane	71556		5		5
14	1,1,2-Trichloroethane	79005	0.6	1.2		5

No.	Compound	CAS Number	Column A: Discharge to Drinking Water Areas (see Note 2)		Column B: Discharge to Other Surface Water Areas	
			Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)	Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)
15	Trichloroethylene	79016	2.7	5		5
16	Vinyl Chloride	75014		0.5		1
17	Total Xylenes	1330207		5		5
18	Methyl Tertiary Butyl Ether (MTBE)	1634044		5		5
19	Total Petroleum Hydrocarbons (as Gasoline or as Diesel)			50		50
20	Ethylene Dibromide (1,2-Dibromoethane)	106934		0.05 (see Note 1)		5
21	Trichloro-trifluoroethane	76131		5		5

Notes:
1) If reported detection level is greater than effluent limit, then a non-detect result using a 0.5 ug/L detection level will not be deemed to be out of compliance.
2) Drinking water areas are defined as surface waters with the existing or potential beneficial uses of "municipal and domestic supply" and "groundwater recharge" (the latter includes recharge areas to maintain salt balance or to halt salt water intrusion into fresh water aquifers).

2. **pH:** The pH of the discharge shall not exceed 8.5 nor be less than 6.5.

3. **Toxicity:** The survival of rainbow trout test fish in 96-hour static renewal bioassays (EPA-821-R-02-012 Test method 2019.0) of the discharge shall be not less than a three sample moving median of 90% survival and a single test value of not less than 70% survival.

B. Land Discharge Specifications. (Not applicable)

C. Reclamation Specifications – Water Reuse

1. Reuse Policy: The Regional Water Board adopted Resolution No. 88-160 on October 19, 1988. The Resolution urges Dischargers of extracted groundwater from site cleanup projects to reclaim their effluent and that when reclamation is not technically and/or economically feasible, to discharge to a publicly owned treatment works (POTW). If neither reclamation nor discharge to a POTW is technically or economically feasible and if beneficial uses of the receiving water are not adversely affected, it is the intent of the Regional Water Board to authorize the discharge of treated extracted groundwater in accordance with the requirements of this Order.

2. Reuse Allowed: This Order permits reuse or reclamation of extracted treated groundwater in conjunction with the discharge to surface water, except for purposes of recharge or reinjection. Reuse of extracted treated groundwater

can take many forms, such as irrigation of landscaping or agriculture, dust control or soil compaction on construction sites, and industrial water supply.

3. Water Reclamation Specifications (water reuse only)

   a. Water reclaimed for beneficial reuse as applied shall meet the requirements in Section B- Effluent Limitations.
   b. The water reclamation activities shall be described in the Discharger's NOI, including method of any additional treatment and location and type of water reuse.
   c. No reclaimed water shall be allowed to escape from the authorized use area by airborne spray, nor by surface flow except in minor amounts associated with good irrigation practice, nor from conveyance facilities.
   d. Reclamation involving irrigation shall not occur when the ground is saturated.
   e. The use of reclaimed water shall not impair the quality of waters of the State, nor shall it create a nuisance as defined by Section 13050(m) of the California Water Code.
   f. Adequate measures shall be taken to minimize public contact with reclaimed water and to prevent the breeding of flies, mosquitoes, and other vectors of public health significance during the process of reuse.
   g. Appropriate public warnings must be posted to advise the public that the water is not suitable for drinking. Signs must be posted in the area, and all reclaimed water valves and outlets appropriately labeled.
   h. There shall be no cross-connection between the potable water supply and piping containing treated groundwater intended for reuse.
   i. Water reclamation consisting of recharge or reinjection is not authorized under this Order.

V. RECEIVING WATER LIMITATIONS

A. Surface Water Limitations

Receiving water limitations are based on water quality objectives contained in the Basin Plan and are a required part of this Order. The discharge shall not cause the following in surface receiving waters:

1. Narrative Limits: The discharge shall not cause the following conditions to exist in waters of the State at any place:

   a. Floating, suspended, or deposited macroscopic particulate matter or foam;
   b. Bottom deposits or aquatic growths;
   c. Alteration of temperature, turbidity, taste, odor, or apparent color beyond present natural background levels;

d. Visible, floating, suspended, or deposited oil or other products of petroleum origin;

e. Toxic or other deleterious substances to be present in concentrations or quantities that will cause deleterious effects on aquatic biota, wildlife, or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentration.

2. Numerical Limits: The discharge shall not cause the following limits to be exceeded in waters of the State in any place within one foot of the water surface:

   a. Dissolved oxygen:

      For all tidal waters:

      In the Bay downstream of Carquinez Bridge - 5.0 mg/l minimum

      Upstream of Carquinez Bridge - 7.0 mg/l minimum

      For nontidal waters:

      Waters designated as cold water habitat - 7.0 mg/l minimum

      Waters designated as warm water habitat - 5.0 mg/l minimum

      For all inland surface waters:

      The median dissolved oxygen concentration for any three consecutive months shall not be less than 80% of the dissolved oxygen content at saturation. When natural factors cause concentrations less than that specified above, then the discharge shall not cause further reduction in ambient dissolved oxygen concentrations.

   b. pH: The pH shall not be depressed below 6.5 nor raised above 8.5, nor caused to vary from normal ambient pH by more than 0.5 pH units.

3. More Stringent Standards May Apply: The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters adopted by the Regional Water Board or the State Water Board as required by the Clean Water Act and regulations adopted there under. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the Clean Water Act, or amendments thereto, the Regional Water Board will revise and modify this Order in accordance with such more stringent standards.

B. Groundwater Limitations

The discharge shall cause no violation of the Basin Plan water quality standards for receiving groundwaters.

VI. PROVISIONS

A. Standard Provisions.

The Dischargers shall comply with all Federal and all Standard Provisions for General Permits Standard Provisions included in Attachment D of this Order.

B. Monitoring and Reporting Program Requirements.

1. The Dischargers shall comply with the Monitoring and Reporting Program (MRP), and future revisions thereto, in Attachment E of this Order.

2. Dischargers authorized under this permit, especially the Dischargers with flow rate exceeding 10 gpm, may be required to comply with additional monitoring requirements. The Executive Officer will specify such additional monitoring requirements in the authorization letter. Examples of additional monitoring that could be required are listed below:

    a. Monitoring Required to Respond to a Complaint received about a Facility authorized to discharge under this permit,
    b. Storm Water Monitoring,
    c. Dioxins and Furans Monitoring,
    d. Regional Monitoring Program Monitoring,
    e. Additional Discharge Observations, and
    f. Additional Effluent and Ambient Priority Pollutant Scans.

C. Special Provisions.

1. Reopener Provisions. The Regional Water Board may modify or reopen this Order prior to its expiration date in any of the following circumstances:

    a. If present or future investigations demonstrate that the discharge(s) governed by this Order will, or cease to, have adverse impacts on water quality and/or beneficial uses of the receiving waters;

    b. As new or revised WQOs come into effect for the San Francisco Bay estuary and contiguous water bodies (whether statewide, regional, or site-specific). In such cases, effluent limitations in this Order will be modified as necessary to reflect updated WQOs;

    c. If translator or other water quality studies provide a basis for determining that a permit condition(s) should be modified;

    d. An administrative or judicial decision on a separate NPDES permit or WDR that addresses requirements similar to this discharge; and

e. as authorized by law.

The Dischargers may request permit modification based on the above. The Dischargers shall include in any such request an antidegradation and antibacksliding analysis.

2. Notice of Intent (NOI) or Modified NOI Application: The NOI or Modified NOI application for each point of proposed discharge to a storm drain system shall contain the information required in the Notice of Intent Form as explained in Attachments B and C of this Order and as may be amended by the Executive Officer.

3. NOI Review: Upon receipt of a complete NOI application package for proposed discharge, the Executive Officer will review the application to determine whether the proposed Discharger is eligible to discharge waste under this general permit. The application package shall document that:

   a. The proposed discharge results from the cleanup of groundwater polluted by fuel leaks and other related wastes at service stations and similar sites with similar wastes;
   b. The proposed Discharger has met the provisions of Resolution No. 88-160; and
   c. The proposed treatment system and associated operation, maintenance, and monitoring plans are capable of ensuring that the discharge will meet the provisions, prohibitions, effluent limitations, and receiving water limitations of this Order.

4. Discharge Authorization: If the Executive Officer determines that the proposed Discharger is eligible to discharge waste under this general permit, the Executive Officer will authorize the proposed discharge. This discharge authorization may be terminated by the Executive Officer at any time.

5. Non-Compliance As A Violation: Upon receipt of the Executive Officer's discharge authorization, the Discharger(s) shall comply with all applicable conditions and limitations of this Order and its Attachments. Any permit noncompliance (violations of requirements in this Order or Monitoring Program) constitutes a violation of the Clean Water Act and the California Water Code and is grounds for enforcement action, permit or authorization termination, revocation and reissuance, modification, the issuance of an individual permit, or denial of a renewal application.

6. Triggers: The following triggers are not effluent limitations, and should not be construed as such. Instead, they are levels at which additional investigation is warranted to determine whether a numeric limit for a particular constituent is necessary. If any constituent in the effluent of a discharge exceeds the

corresponding trigger as listed in the Table 3 below, then the Discharger shall take three additional samples (three influent and three effluent) for each exceeded constituent during the following calendar quarter and conduct activities as explained in the Provisions VI.C.7, VI.C.8, or VI.C.9. If this monitoring activity has already been completed in the past, then summarize the results including the design of any installed treatment unit.

Table 3. Trigger Compounds or Constituents

Compound	CAS Number	Trigger (ug/L)
Antimony	7440360	6
Arsenic	7440382	10
Beryllium	7440417	1
Cadmium	7440439	0.07
Chromium (total)	18540299	11 (See Note 1)
Chromium (VI)	18540299	11
Copper	7440508	3.1
Lead	7439921	2.0
Mercury	7439976	0.025
Nickel	7440020	8.2
Selenium	7782492	5.0
Silver	7440224	1.9
Thallium	7440280	0.1
Zinc	7440666	35
Cyanide	57125	1.0
Asbestos	1332214	7 MFibers/L
2,3,7,8-TCDD (Dioxin)	1746016	0.000000013
Acrylonitrile	107131	2.0
Bromoform	75252	4.3
Chlorodibromomethane	124481	0.401
Dichlorobromomethane	75274	0.56
1,2-Dichloropropane	78875	0.50
1,3-Dichloropropylene	542756	0.2
1,1,2,2-Tetrachloroethane	79345	0.1
Pentachlorophenol	87865	0.28
2,4,6-Trichlorophenol	88062	2.1
Benzidine	92875	0.00012
Benzo(a)Anthracene	56553	0.0044
Benzo(a)Pyrene	50328	0.004
Benzo(b)Fluoranthene	205992	0.0044
Benzo(k)Fluoranthene	207089	0.0044
Bis(2-Chloroethyl)Ether	111444	0.031
Bis(2-Ethylhexyl)Phthalate	117817	1.8
Chrysene	218019	0.0044
Dibenzo(a,h)Anthracene	53703	0.0044
3,3'-Dichlorobenzidine	91941	0.04
2,4-Dinitrotoluene	121142	0.11
1,2-Diphenylhydrazine	122667	0.04

Compound	CAS Number	Trigger (ug/L)
Hexachlorobenzene	118741	0.00075
Hexachlorobutadiene	87683	0.44
Hexachloroethane	67721	1.9
Indeno(1,2,3-cd)Pyrene	193395	0.0044
N-Nitrosodimethylamine	62759	0.00069
N-Nitrosodi-n-Propylamine	621647	0.005
Aldrin	309002	0.00013
alpha-BHC	319846	0.0039
beta-BHC	319857	0.014
gamma-BHC	58899	0.019
Chlordane	57749	0.00057
4,4'-DDT	50293	0.00059
4,4'-DDE	72559	0.00059
4,4'-DDD	72548	0.00083
Dieldrin	60571	0.00014
alpha-Endosulfan	959988	0.0087
beta-Endosulfan	33213659	0.0087
Endrin	72208	0.0023
Endrin Aldehyde	7421934	0.76
Heptachlor	76448	0.00021
Heptachlor Epoxide	1024573	0.0001
Polychlorinated biphenyls (PCBs) total	1336363	0.00017
Toxaphene	8001352	0.0002
1,4-Dioxane	123911	3
Perchlorate	14797730	5
Freon 12 (Dichlorodifluoromethane)	75718	0.19
Other Oxygenates (Other than MTBE)	-	5
Other VOCs	-	5
Other SVOCs	-	5
Turbidity (Units)	-	5
Odor-Threshold (Units)	-	3
Total Petroleum Hydrocarbons other than Gasoline and Diesel	-	50 (See Note 2)
Sulfate	-	250,000
Foaming Agents	-	500
Color (Units)	-	15

Legend:
CAS = Chemical Abstract System or Service
Notes:
1) If total chromium concentration exceeds 11 then Chromium (VI) analysis shall also be done.
2) If a Discharger is reporting monitoring data with a detection level higher than 50 ug/l, the reason for a higher detection level shall be fully explained in the monitoring report.

7. Triggers Case 1: If the results of the three additional samples for the effluent **do not** exceed the triggers, the Discharger shall report the results to the Executive Officer in the next Monitoring Report, and shall return to the schedule of sampling and analysis in the attached MRP (Attachment E).

8. Triggers Case 2: If the results of **any one of the three** additional samples

exceed the triggers, the Discharger has two options. Option one is submitting a rationale for not doing the special studies as described in the last paragraph of VI.C.9. Option two is performing the following three tasks listed below:

a. Calculate the median and maximum concentration values for the exceeded trigger constituent, using the three recent samples **and** all samples collected and analyzed for that constituent in the previous 12-month period.

b. Estimate the mass load discharged in the previous 12-month period for the exceeded trigger constituent. Report the results in grams per day and in kilograms per year, using the average discharge rate for the previous 12-month period.

c. Report the results to the Executive Officer in the next Self-Monitoring Report, and return to the schedule of sampling and analysis in the Self-Monitoring Program.

9. Triggers Case 3: If the results of **two or three** of the additional samples exceed the triggers, the Discharger shall perform the following:

a. Calculate median and maximum concentration values and mass load for the constituent, as described in Case 2 above.

b. Explain or identify source(s) of the trigger constituent. If the trigger constituent is a byproduct of a decomposed compound, list all of the byproduct components and when each of these components will be formed during the decomposition process.

c. Define the properties of the exceeded trigger constituent and, if applicable, the decomposing compound with all of its byproduct components. Attach Material Safety Data Sheets, if available or applicable.

d. Document what standard or customized EPA approved test methods are used to detect this compound.

e. List and evaluate all available technologies for treatment or pre-treatment of this exceeded trigger constituent and, if applicable, the decomposing compound with all of its byproduct components. This evaluation may include the cost of increased treatment to reduce the exceeded trigger constituent and any applicable the decomposing compound with all of its byproduct components and the amount of reduction in terms of concentration.

f. Discuss any proposed plan for pilot bench scale and field tests for treatment of this exceeded trigger constituent and, if applicable, the

decomposing compound with all of its byproduct components and associated timetable.

g. Determine the best available technology economically achievable for treatment of this exceeded trigger constituent and, if applicable, the decomposing compound with all of its byproduct components, or propose the next step after obtaining the results of the pilot tests.

h. If the results of the evaluation indicate that the additional treatment of the discharge does not appear to be a feasible option, then:

   1) Perform an evaluation of the potential adverse impacts to the beneficial uses of the receiving water. The evaluation should include, but need not be limited to, description of the beneficial uses specific to the receiving water, physical and chemical characteristics of the water body and sediment, and the physical, chemical, or biological effects from the constituent(s) on the beneficial uses. For inorganic compounds (also known as metals), include discussions regarding effects related to total or dissolved fraction (i.e., metals translators) and hardness with hardness-dependent objectives. If exceedances are only for metals with hardness-dependent objectives, then the Discharger may conduct a hardness study prior to completing this task.

   2) If the receiving water study finds that the discharge has potential to cause adverse impacts to beneficial uses of the receiving water, then evaluate control measures other than treatment to reduce the constituent(s) of concern in the discharge, such as re-evaluating options for re-use, discharge to POTW, or alternatives to groundwater extraction.

i. Within 180 days of the Discharger receiving results of the confirmation sampling, report the results of tasks (a) through (h) above to the Executive Officer, including a proposed method to eliminate or minimize future exceedances, or provide a rationale for why no change to the existing treatment program should take place. The Discharger may be required to perform additional evaluations or take additional actions, as deemed necessary by the Executive Officer. The Discharger may apply or may be required to apply for an individual NPDES permit. If the Executive Officer determines that additional numeric limits are necessary for a particular compound or constituent (including but not limited to a VOC), these limits will be calculated using the procedures specified in the SIP, Basin Plan, and applicable USEPA regulations.

As an alternative, the Discharger may submit a specific technical rationale for not conducting the above special studies, subject to the Executive Officer's approval. Examples of acceptable rationales to the Executive Officer could be submitting a copy of a technical report prepared previously or if the

Discharger is contributing funds for a joint special studies addressing the same questions discussed above for this exceeded trigger constituent and, if applicable, the decomposing compound with all of its byproduct components.

10. Exceedance of the same Triggers: If an exceedance of the same trigger in Table 3 occurs less than 60 months after completion of the required tasks in Provisions VI.7, VI.8 or VI.9, then the Executive Officer may waive the evaluation required above. This waiver will not apply if a different constituent or compound exceeds the triggers set in Tables 3. In that case, the Discharger shall perform an evaluation for that constituent or compound. During and after any additional monitoring, the Discharger shall continue the required schedule of sampling and analysis as required in the MRP (Attachment E).

11. Individual NPDES Permit May Be Required: The USEPA Administrator may request the Regional Water Board Executive Officer to require any Discharger authorized to discharge waste by the general permit to subsequently apply for and obtain an individual NPDES permit. The Executive Officer may require any Discharger authorized to discharge waste by a general permit to subsequently apply for and obtain an individual NPDES permit. An interested person may petition the Executive Officer or the Regional Administrator to take action under this provision. Cases where an individual NPDES permit may be required include the following:

    a. The Discharger is not in compliance with the conditions of this Order or as authorized by the Executive Officer;
    b. A change has occurred in the availability of demonstrated technology or practices for the control or abatement of pollutants applicable to the point source;
    c. Effluent limitation guidelines are promulgated for point sources covered by the general NPDES permit;
    d. A water quality control plan containing requirements applicable to such point sources is approved; or
    e. The requirements of 40 CFR 122.28(a), as explained in Finding No. II.C, are not met.

12. Treatment Reliability: The Dischargers shall, at all times, retain a professional engineer certified in State of California to oversee the design, and operation and maintenance of the treatment system to properly operate and maintain all facilities that are used by the Dischargers to achieve compliance with this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. All of these procedures shall be described in an Operation and Maintenance manual. The Discharger shall keep in a state of readiness all systems necessary to achieve compliance with the conditions of this Order. All systems, both those in service and reserve, shall be inspected and maintained on a regular basis.

Records shall be kept of the tests and made available to the Regional Water Board for at least five years. Additional requirements for compliance with this provision are explained in Attachments B and C of the Order.

13. **No Preemption**. This Order permits the discharge of treated groundwater to waters of the State subject to the prohibitions, effluent limitations, and provisions of this Order. It does not pre-empt or supersede the authority of municipalities, flood control agencies, or other local agencies to prohibit, restrict, or control discharges of waste to storm drain systems or other watercourses subject to their jurisdiction.

VII. COMPLIANCE DETERMINATION

Compliance with the effluent limitations contained in Section IV of this Order will be determined as specified below:

A. General.

Compliance with effluent limitations for priority pollutants shall be determined using sample reporting protocols defined in the MRP and Attachment A of this Order. For purposes of reporting and administrative enforcement by the Regional and State Water Boards, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reporting level (RL).

B. Multiple Sample Data.

When determining compliance with an AMEL **or** MDEL for priority pollutants and more than one sample result is available, the Discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of "Detected, but Not Quantified" (DNQ) or "Not Detected" (ND). In those cases, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

1. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

2. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

ATTACHMENT A – DEFINITIONS

Arithmetic Mean (μ), also called the average, is the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$ where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples.

Average Monthly Effluent Limitation (AMEL): the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Bioaccumulative pollutants are those substances taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Carcinogenic pollutants are substances that are known to cause cancer in living organisms.

Coefficient of Variation (CV) is a measure of the data variability and is calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Detected, but Not Quantified (DNQ) are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

Dilution Credit is the amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Duly Authorized Representative is one whose:

a. Authorization is made in writing by a principal executive officer or ranking elected official;

b. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as general partner in a partnership, sole proprietor in a sole proprietorship, the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company (A duly authorized representative may thus be either a named individual or any individual occupying a named position).

Effluent Concentration Allowance (ECA) is a value derived from the water quality criterion/objective, dilution credit, and ambient background concentration that is used, in conjunction with the coefficient of variation for the effluent monitoring data, to calculate a long-

term average (LTA) discharge concentration. The ECA has the same meaning as waste load allocation (WLA) as used in USEPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

Estimated Chemical Concentration is the estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

Field Blank is defined as an individual sample demonstrated to be free from the contaminants of interest and other potentially interfering substances, and treated as a sample in all respects, including exposure to grab-sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the field blank is to determine if the field or sample transporting procedures and environments have contaminated the sample.

Flow Sample is defined as the accurate measurement of the average daily flow volume using a properly calibrated and maintained flow-measuring device.

Grab Sample is defined as an individual sample collected in a short period of time not exceeding 15 minutes. Grab samples shall be collected during normal peak loading conditions for the parameter of interest, which may or may not be during hydraulic peaks. It is used primarily in determining compliance with maximum daily limits and average monthly limits. Grab samples represent only the condition that exists at the time the wastewater is collected.

Instantaneous Maximum Effluent Limitation: the highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation: the lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Maximum Daily Effluent Limitation (MDEL) means the highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median is the middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the n/2 and n/2+1).

Method Detection Limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in title 40 of the Code of Federal Regulations, Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML) is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample

that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Not Detected (ND) are those sample results less than the laboratory's MDL.

Ocean Waters are the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Water Board's California Ocean Plan.

Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Reporting Level (RL) is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from Appendix 4 of the SIP in accordance with section 2.4.2 of the SIP or established in accordance with section 2.4.3 of the SIP. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Source of Drinking Water is any water designated as municipal or domestic supply (MUN) in a Regional Water Board Basin Plan.

Standard Deviation (σ) is a measure of variability that is calculated as follows:

$$\sigma = (\Sigma[(x - \mu)^2]/(n - 1))^{0.5}$$

where:

x is the observed value;

μ is the arithmetic mean of the observed values; and

n is the number of samples.

Toxicity Reduction Evaluation (TRE) is a study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

ATTACHMENT B - NOTICE OF INTENT APPLICATION FORM
To Receive
Authorization to Discharge Treated Groundwater under the Requirements of
ORDER NO. R2-2006-XXXX
NPDES PERMIT NO. CAG912002 (FUEL)

For Groundwater Treatment Facility located at:

_____

Type or Print Facility Address above the line
File No: 1210.44

This is an application for discharge or reuse of extracted and treated groundwater resulting from the cleanup of groundwater polluted by fuel leaks and other related wastes at service stations and similar sites. Please mark one of the applicable lines:

Table 1. Mark only one as applicable

1	Notice of Intent for an Existing Discharge (for Permit Reissuance)	
2	Notice of Intent for a previously regulated Discharge (provide the Order and NPDES permit numbers here in this row)	
3	Notice of Intent for a New Discharge	
4	Modified Notice of Intent (if modified, complete all sections in this Form and indicate information on which item(s) below are modified):	
	Discharger's Certification	
	Administrative Information	
	Condition 1	
	Condition 2	
	Condition 3	
	Condition 4	
	Condition 5	
	Condition 6	
	Condition 7	
	Condition 8	
	Condition 9	
	Condition 10	
	Condition 11	
	Condition 12	
	Attachment 1	
	Attachment 2	
	Attachment 3	
	Attachment 4	
	Attachment 5	

Discharger's Certification

I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the design engineer whose signature and engineering license number is documented in this notice, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Name (print) _____ Signature and Date _____

Title/Organization _____ Address _____

Complete Table 2. Facility Information

1	Discharger's Name	
2	Name of Facility	
3	Facility Address	
4	Facility Contact, Title, and Phone	
5	Authorized Person to Sign & Submit Reports	
6	Mailing Address	
7	Billing Address	
8	Type of site or project. For example: Active Service Station, Closed Service Station, Short Term Dewatering Project, Long Term	

	Dewatering Project, or other (please explain if "Other")	
9	Watershed	
10	Receiving Water	
11	Receiving Water Type. For example, eenclosed bay, estuary, inland surface water, or Sacramento-San Joaquin Delta	

I understand that if this discharge is eligible under the requirements of Order No. R2-2006-xxxx (Order), authorization to discharge treated groundwater from the above facility will be granted providing the following conditions are met:

1. I must comply with all applicable requirements of the Order and the associated Self-Monitoring Program (SMP). The effluent shall not contain constituents in excess of the limits listed under:

Complete Table 3. Mark only one as applicable

1	Discharge to Drinking Water Areas (Column A, Table 2, Page 7 of the Order)	
2	Discharge to Other Surface Water Areas (Column B, Table 2, Page 7 of the Order)	

2. A treatment system including the elements described in Table 4 below and the schematic shown in Attachment 1 will treat the extracted groundwater.

Complete Table 4. Treatment System Description

	Unit	Number	Size, or capacity (e.g. pounds of GAC), Further Description (If Applicable)
1	Extraction Well(s)		
2	Extraction Wells with Dedicated Treatment Unit(s)		
3	Dedicated Treatment Unit(s)		
4	Settling Tank(s) in series		
5	Settling Tank(s) in parallel		
6	Oil/Water Separator(s)		
7	Filter(s)		
8	Air Strippers with Air Filters		
9	Air Strippers without Air Filters		
10	Advanced Treatment Unit(s) for Oxygenates such Tertiary Butyl Alcohol, Ethanol, and Methanol		
11	Advanced Treatment Unit(s)		
12	Liquid-phase Granular Activated Carbon (GAC) vessel(s) in series		
13	GAC vessel(s) in parallel		
14	Effluent reuse Infrastructure (If so, provide additional detail)		

3. I understand that I shall, at all times, retain a professional engineer certified in the State of California to oversee the design, and proper operation and maintenance of the treatment system, including all facilities necessary to achieve compliance with the Order. I also understand that proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures and all of these procedures shall be described in an Operation and Maintenance (O&M) Manual. Table 5 includes the names of all professionals who will keep the treatment system - including all facilities necessary to achieve compliance with the conditions of the Order - in a state of readiness. All treatment system components, both those in service and those in reserve, shall be inspected and maintained on a regular basis.

4. Attachment 2 is a report certifying the adequacy of each component of the proposed treatment system, and including the table of contents of the associated O&M manual. This certification report contains an item-by-item analysis, based on accepted engineering practice, of how the process and physical design of the treatment system will ensure compliance with the Order. This report also certifies that:

   i. All treatment facility startup and operation instruction manuals are adequate and available to operating personnel.

   ii. Adequate treatment facility maintenance and testing schedules are included in the treatment facility O&M Manual.

   iii. Influent and effluent sampling locations or ports are located in areas where samples representative of the waste stream to be monitored can be obtained.

   iv. The residual concentration of any chemical additive or additives used in the treatment process is designed to be zero and will never exceed the No Adverse Effect Concentration (NOEC) as documented in the ecological section of the applicable Material Safety Data Sheet (MSDS). A copy of the MSDS for every chemical used is provided as an attachment in the O&M Manual.

   v. If any chemical used in the treatment process may cause pH variances in the effluent, the frequency of pH monitoring in the effluent will be increased as explained in the Legends for Table E.2 of Attachment E – Monitoring and Reporting Program.

   vi. The design engineer has affixed his/her signature and engineering license number to this certification report in Attachment 2.

Complete Table 5. Professional Engineer(s) and Other Information

1	Design Engineer's Name, California License Number, address, and phone number	
2	Operation and Maintenance Responsible Engineer's Name, California License Number, address, and phone number	
3	Name, phone number, and email of the Discharger's assigned staff to investigate the cause(s) of errors and the corrective actions taken, or date when actions will be completed to eliminate or reduce future data error (applicable if any monitoring data for the sample(s) taken on or after January 1, 2006, were claimed to be invalid)	

5. The maximum discharge rate from the groundwater treatment system shall not exceed _____ gallons per minute (gpm). The groundwater treatment system is designed for _____ gpm. I understand this discharge shall not cause pollution, contamination, or nuisance. For example, the discharge shall cause no scouring or erosion at the point where the storm drain or outfall-pipe discharges into the receiving water(s).

6. Treated water will be discharged through a storm drain to the receiving water(s) described in Table 6 below and shown on the aerial map in Attachment 3.

Complete Table 6. Discharge Location

Discharge Point Location	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
Storm-Drain Location:			Storm-Drain
Outfall Location:			

7. A copy of the Order, a complete copy of this Notice of Intent, documentation of the authorization to discharge received from the Regional Water Board, a full copy of the O&M Manual, and any other documents recommended by the engineer or the QA officer shall be stored at or near the treatment facility. These documents shall be made available to Regional Water Board staff during inspections. No O&M Manual shall be submitted to the Regional Water Board office, unless requested.

8. Self-Monitoring Reports shall be submitted by uploading it on Geo-Tracker on a quarterly calendar basis, no later than 45 days following the last day of the quarter. The laboratory results shall be summarized in tabular form, but the laboratory data sheets need not be included in the reports (unless requested). The reports shall summarize the monitoring data and include information such as the sample location (extraction well(s), influent, effluent, or receiving water); the constituents analyzed; the analytical methods used; the laboratory reporting limits in micrograms per liter (ug/l); the sample results (ug/l); the date sampled; and the date samples were analyzed. A summary of quality assurance/quality control data such as field, trip, and laboratory blank results shall be reported for each analyzed constituent or group of constituents. These reports shall also include a description of the operation and maintenance of the groundwater extraction and treatment system. An annual report summarizing system operation and maintenance for the last four quarters shall be prepared and submitted no later than February 15 of the following year. The last calendar quarter monitoring report may be combined with the annual report. The annual report shall document that the annual fee has been paid.

9. I understand that it is the responsibility of any person proposing to discharge to a storm drain system or other watercourses to obtain authorization to discharge from the agency having jurisdiction over the use of the storm drain system or watercourse. I also understand any discharge authorization granted by the Regional Water Board is conditional and may be terminated at any time.

10. A Check for $5,688 is attached.

11. Tables ___ through ____ in Attachment 5 of this NOI list all pollutants of concern in each extraction well, influent or projected influent, and effluent or projected effluent including the data suggested in Table 7. Unless requested, no laboratory reports have been included in this NOI.

Table 7. Suggested format for listing pollutants

	Pollutant 1	Pollutant 2	Pollutant 3	Add Columns and/or tables as needed
Number of Samples				
Maximum Concentration				

	Pollutant 1	Pollutant 2	Pollutant 3	Add Columns and/or tables as needed
Average Concentration				
Median Concentration				
Minimum Concentration				
Number of Non-Detects				
Lowest Reporting Limit				
Highest Reporting Limit				
Number of Samples with Lowest Reporting Limit				
Sample Date 1, Method Number				
Sample Date 2, Method Number				
Sample Date 3, Method Number				
Add rows as needed				

12. Any other relevant information about this project that may be necessary to evaluate the eligibility of this discharge under the Order is included in Attachment 6.

13. Add the following five attachments to this form:

    Attachment 1: Flow Schematics
    Attachment 2: Engineering Certification Report
    Attachment 3: Aerial Map (highlight the discharge path)
    Attachment 4: Check for $5,688
    Attachment 5: Tables listing Pollutants of Concern at this Site
    Attachment 6: Other Information (If applicable)

Note: The Regional Water Board may modify this form at any time to reflect any new fees and other needed improvements as applicable.

ATTACHMENT C - INSTRUCTIONS FOR COMPLETING NOTICE OF INTENT (NOI) FORM

to Receive Authorization to Discharge Treated Groundwater under the Requirements of
ORDER NO. R2-2006-XXXX
NPDES PERMIT NO. CAG912002 (FUEL)

Facility Address: Please include Zip code and County for the Groundwater Treatment Facility Address.

Table 1. Please mark only one as is applicable:

	Table 1.	Explanation
1	Notice of Intent for An Existing Discharge authorized under this Order (For Permit Reissuance)	If you need to discharge after November 13, 2011, you need to submit this NOI no later than May 13, 2011.
2	Notice of Intent for a previously regulated Discharge	Provide the Order and NPDES permit numbers if this Discharge is currently or was previously regulated under this general permit, another general permit, or regulated under an individual NPDES permit.
3	Notice of Intent for a New Discharge	If this Discharge was never authorized under any of the Regional Water Board permits.
4	Modified Notice of Intent (if modified, submit NOI Form all sections completed and indicate which item(s) modified)	If this Discharge is currently regulated under this Order and you need to modify one or more items in the NOI.

Discharger's Certification

This form must be signed by an appropriate corporate officer, general partner, principal executive officer, or ranking elected official. In no case should the consultant sign the forms.

Administrative Information

Complete Table 2. Facility Information

1	Discharger's Name	
2	Name of Facility	Please use the Facility address as the name of the Facility and then add the name that Discharger prefers. For example: 123 Main Street, San Jose Oilco No. 987
3	Facility Address	
4	Facility Contact, Title, and Phone	
5	Authorized Person to Sign & Submit Reports	
6	Mailing Address	
7	Billing Address	
8	Type of site or project.	For example: Active Service Station, Closed Service Station, Short Term Dewatering Project, Long Term Dewatering Project, or other (please explain if "Other")
9	Watershed	If you do not know, you may check web sites such as "San Francisco Bay Area Creek & Watershed Finder", at

		http://www.museumca.org/creeks/resc.html.
10	Receiving Water	
11	Receiving Water Type	<enclosed bay, estuary, inland surface water, or Sacramento-San Joaquin Delta>

Condition 1. Unless you have specific information to select otherwise, select discharge to source of drinking water because most discharges of treated groundwater regulated under this Order are to storm drain systems that discharge to creeks and streams. Many of these creeks and streams are dry during the summer months. Therefore, for many months of the year, these discharges may represent all or nearly all of the flow in some portions of the receiving creeks or streams. These discharges therefore have the potential to recharge groundwaters that are normally protected as drinking waters. There are surface waters in the Region that serve beneficial uses such as groundwater recharge and municipal and domestic, industrial process and service, or agricultural water supplies. A few examples are most creeks in Santa Clara County, Napa River, Alameda Creek, San Mateo Creek, and San Lorenzo Creek.

Condition 2. The treatment system shall be fully described. The reuse of the effluent shall be in compliance with Specification IV.C of the Order.

Complete Table 2. Treatment System Description

	Unit	No.	Size, or capacity (e.g. pounds of GAC), Further Description (If Applicable)
1	Extraction Well(s)		
2	Extraction Wells with Dedicated Treatment Unit(s)		
3	Dedicated Treatment Unit(s)		
4	Settling Tank(s) in series		
5	Settling Tank(s) in parallel		
6	Oil/Water Separator(s)		
7	Filter(s)		
8	Air Strippers with Air Filters		
9	Air Strippers without Air Filters		
10	Advanced Treatment Unit(s) for Oxygenates such Tertiary Butyl Alcohol, Ethanol, and Methanol		
11	Other Advanced Treatment Unit(s)		
12	Liquid-phase Granular Activated Carbon (GAC) vessel(s) in series		
13	GAC vessel(s) in parallel		
14	Effluent reuse Infrastructure (If so, provide additional detail such as producer and user name and address, rate, volume, and frequency of reuse)		

Condition 3. This permit requires a professional engineer (PE) certified in the State of California to oversee the design, and proper operation and maintenance of the treatment system. If you reported any invalid monitoring data for the sample(s) taken on or after

January 1, 2006, the name, phone number, and email of the assigned staff to investigate the cause(s) of errors and the corrective actions taken, or date when actions will be completed to eliminate or reduce future data error shall be documented in this Form.

Condition 4. A PE shall certify the adequacy of each component of the proposed treatment system. Other relevant information such as the reason(s) if any chemical additive or additives are needed to be used in the treatment system, method of application and disposal shall also be fully explained in the PE certification. Please note that the design engineer has the authority to reject usage of any chemical which has an inadequate MSDS or may cause an adverse effect on most sensitive residents of the receiving water.

Condition 5. If you have a batch discharge, provide the frequency, volume, and maximum flow rate.

Condition 6. Some of this information may be obtained from the municipalities. The discharge path shall be highlighted from the facility to the final receiving water.

Condition 7. All documents needed by your technicians to properly operate or maintain the treatment facility shall be at or near the facility.

Condition 8. Late Self-Monitoring Reports are considered in violation of the permit's requirements and are subject to mandatory minimum penalty if more than 30 days late.

Condition 9. Prepare a contact List.

Condition 10. No application will be considered complete without the applicable fee.

Condition 11. No application will be considered complete without complete delineation of pollutants of concern. The NOI shall include analytical results, including the date the samples were taken, for influent (except for mercury, this may be a weighted average of individual extraction wells for non-operating facilities) and effluent (not required for proposed discharges with no prior operating experience). In case of detecting mercury in any well in excess of 0.025 microgram per liter, the Discharger shall install a dedicated treatment unit for that well and check with Regional Water Board staff if an application for an individual NPDES permit shall be submitted. Table below lists the suggested analytical methods.

Follow the instruction in Table 3.

Analyses	Method of Analysis (See Note 1)
MTBE, Benzene, Toluene, Ethylbenzene, and Total Xylenes	USEPA Method 8020

Analyses	Method of Analysis (See Note 1)
Petroleum Hydrocarbons	Modified USEPA Method 8015
Volatile Organic Compounds	USEPA Method 8260
Polynuclear Aromatic Hydrocarbon	USEPA Method 610
Semi-Volatile Organic Compounds(See Note 2)	USEPA Method 8270
Ethylene Dibromide (See Note 2)	USEPA Method 504
Perchlorate (See Note 3)	USEPA Method 314
Mercury	USEPA Method 1631
Cadmium, Silver, Antimony, Beryllium, Chromium, Copper, Lead, Nickel, Selenium, Thallium, Zinc, Arsenic, and Cyanide.	USEPA Methods (various)
Others (if there is evidence of a release or being present)	USEPA Methods (various)
Notes: 1: All chemical analyses shall be performed according to the appropriate USEPA Methods by a certified laboratory and copies of laboratory analytical reports must be submitted (equivalent methods are accepted). 2: Not required if no evidence of this release. 3: Not required if no evidence of solid rocket fuel release or other Perchlorate use.	

Condition 12. Other information such as vicinity to a highly polluted site shall be provided. For example, if this is a dewatering project of a site adjacent to a site with documented groundwater pollution, then the information about how the engineer in charge of this dewatering project will manage the risk of moving the contaminated groundwater plume from that site into the treatment facility.

Condition 13. All attachments are mandatory.

Please upload the completed NOI Form and all attachments on Geo-Tracker and send a confirmation email with a PDF copy of the package attached to the email to the responsible staff member at the Regional Water Board office. At this time, the responsible staff member is Lourdes Gonzales and her email address is lgonzales@waterboards.ca.gov

New Dischargers may obtain access rights to Geo-Tracker from:
http://www.waterboards.ca.gov/ust/cleanup/electronic_reporting/index.html

Note: The Regional Water Board may modify this instruction at any time as needed.

ATTACHMENT D –STANDARD PROVISIONS

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ATTACHMENT D –STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. (40 CFR § 122.41(a).)

2. The Discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 CFR § 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 CFR § 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 CFR § 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order. (40 CFR § 122.41(e).)

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 CFR § 122.41(g).)

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 CFR § 122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Regional Water Board, State Water Board, United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (40 CFR § 122.41(i); Wat. Code, § 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (40 CFR § 122.41(i)(1));

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (40 CFR § 122.41(i)(2));

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (40 CFR § 122.41(i)(3)); and

4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (40 CFR § 122.41(i)(4).)

G. Bypass

1. Definitions

   a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR § 122.41(m)(1)(i).)

   b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR § 122.41(m)(1)(ii).)

2. Bypass of uncontaminated extracted groundwater. During a dewatering project, the Discharger may allow any bypass of uncontaminated extracted groundwater to occur which originates from uncontaminated extraction well(s). The Discharger shall monitor the water quality of these extractions wells to confirm that the extracted water remains uncontaminated.

3. Prohibition of bypass. Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless (40 CFR § 122.41(m)(4)(i)):

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 CFR § 122.41(m)(4)(i)(A));

b. There were no feasible alternatives to the bypass, such as turning off the extraction wells pump(s), discharge to a POTW, retention of untreated wastes, maintenance during normal periods of equipment downtime, or the use of auxiliary treatment facilities. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 CFR § 122.41(m)(4)(i)(B)); and

c. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance I.G.5 below. (40 CFR § 122.41(m)(4)(i)(C).)

4. The Regional Water Board may not take enforcement action against a Discharger for bypass, if the Regional Water Board determines that the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above have been met. (40 CFR § 122.41(m)(4)(ii).)

5. Notice

a. Anticipated bypass of uncontaminated extracted groundwater. If the Discharger knows in advance of the need for a bypass of uncontaminated extracted groundwater, it shall submit the necessary information in the initial or modified Notice of Intent, if possible at least 45 days before the date of the bypass. The necessary information includes but not limited to the name and number of extraction wells, flow rates for each well, the distance to other contaminated wells, and monitoring data such as turbidity, color, conductivity, pH, temperature, metals, TPH, VOC, SVOC, PAHs, Oxygenates.

b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). (40 CFR § 122.41(m)(3)(ii).)

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 CFR § 122.41(n)(1).)

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance I.H.2 below are met. No determination made during administrative review of claims that noncompliance was

caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 CFR § 122.41(n)(2).).

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 CFR § 122.41(n)(3)):

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 CFR § 122.41(n)(3)(i));

   b. The permitted facility was, at the time, being properly operated (40 CFR § 122.41(n)(3)(ii));

   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 CFR § 122.41(n)(3)(iii)); and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 CFR § 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 CFR § 122.41(n)(4).)

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 CFR § 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must submit a completed Notice of Intent form (see Attachment B), 180 days in advance of the Order expiration date, **to** obtain a new permit. (40 CFR § 122.41(b).)

C. Transfers

Any authorization to discharge issued under this Order is not transferable to any person except after filing a modified Notice of Intent with the Regional Water Board. If the new Discharger has a different professional engineer, the modified Notice of Intent shall be revised accordingly.

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 CFR § 122.41(j)(1).)

B. Monitoring results must be conducted according to test procedures under Part 136 or other test procedures specified in this Order. (40 CFR § 122.41(j)(4); § 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS – RECORDS

A. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least five (5) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time (40 CFR § 122.41(j)(2).)

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 CFR § 122.41(j)(3)(i));
2. The individual(s) who performed the sampling or measurements (40 CFR § 122.41(j)(3)(ii));
3. The date(s) analyses were performed (40 CFR § 122.41(j)(3)(iii));
4. The individual(s) who performed the analyses (40 CFR § 122.41(j)(3)(iv));
5. The analytical techniques or methods used (40 CFR § 122.41(j)(3)(v)); and
6. The results of such analyses. (40 CFR § 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 CFR § 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 CFR § 122.7(b)(1)); and
2. Permit applications and attachments, permits and effluent data. (40 CFR § 122.7(b)(2).)

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Regional Water Board, State Water Board, or USEPA within a reasonable time, any information which the Regional Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or USEPA copies of records required to be kept by this Order. (40 CFR § 122.41(h); Wat. Code, § 13267.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, and V.B.5 below. (40 CFR § 122.41(k).)

2. All permit applications shall be signed by a responsible person as explained below:

   a. **For a corporation.** All permit applications shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. (40 CFR § 122.22(a)(1).)

   b. **For a partnership or sole proprietorship.** All permit applications shall be signed by a general partner or the proprietor, respectively. (40 CFR § 122.22(a)(2).)

   c. **For a municipality, State, federal, or other public agency.** All permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a

principal geographic unit of the agency (e.g., Regional Administrators of USEPA). (40 CFR § 122.22(a)(3).).

3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 CFR § 122.22(b)(1));

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 CFR § 122.22(b)(2)); and

   c. The written authorization is submitted to the Regional Water Board and State Water Board. (40 CFR § 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting V.B.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 CFR § 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.3 above shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 CFR § 122.22(d).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 CFR § 122.22(l)(4).)

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form (40 CFR § 122.41(l)(4)(i).) or paper or electronic forms provided or specified by the Regional Water Board or State Water Board.

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under Part 136 or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or other reporting form specified by the Regional Water Board. (40 CFR § 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 CFR § 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 CFR § 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be uploaded on GeoTracker within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. (40 CFR § 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 CFR § 122.41(l)(6)(ii)):

   a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 CFR § 122.41(l)(6)(ii)(A).)

   b. Any upset that exceeds any effluent limitation in this Order. (40 CFR § 122.41(l)(6)(ii)(B).)

3. The Regional Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours. (40 CFR § 122.41(l)(6)(iii).)

F. Planned Changes

The discharger shall file with the Executive Officer an amended Notice of Intent at least 60 days before making any material change in the character, location, or volume of the discharge. In case of proposing any change of treatment system or operation and maintenance procedures, a professional engineer certified in State of California shall certify the adequacy of the design and/or the procedures. A modified Notice of Intent is required under this provision only when (40 CFR § 122.41(l)(1)) the alteration or addition could significantly change the nature or increase the quantity of pollutants discharged (pollutants regulated or not regulated by this Order).

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with the requirements in this Order. (40 CFR § 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above. (40 CFR § 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information. (40 CFR § 122.41(l)(8).)

VI. STANDARD PROVISIONS – ENFORCEMENT

The Regional Water Board is authorized to enforce the terms of this permit under several provisions of the Water Code, including, but not limited to, sections 13385, 13386, and 13387.

ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

The Code of Federal Regulations section 122.48 requires that all NPDES permits specify monitoring and reporting requirements. Water Code Sections 13267 and 13383 also authorize the Regional Water Quality Control Board (Regional Water Board) to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements, which implement the federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. Reporting responsibilities of waste Dischargers are specified in Sections 13225(a), 13267(b), 13268, 13383 and 13387(b) of the California Water Code and this Regional Water Board's Resolution No. 73-16 and the Environmental Protection Agency's Discharge Monitoring Report (Form 3320-1).

B. The principal purposes of a monitoring program by a waste Discharger, also referred to as self-monitoring program, are: (1) to document compliance with waste discharge requirements and prohibitions established by the Regional Water Board, (2) to facilitate self-policing by the waste Discharger in the prevention and abatement of pollution arising from waste discharge, (3) to develop or assist in the development of effluent or other limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards, and (4) to prepare water and wastewater quality inventories.

C. Laboratories analyzing monitoring samples shall be certified by the Department of Health Services, in accordance with the provision of Water Code section 13176, and must include quality assurance/quality control data with their reports.

D. Written reports, strip charts, calibration and maintenance records, and other records shall be maintained by the Discharger and accessible and retained for a minimum of five years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Water Board or Regional Administrator of the U.S. Environmental Protection Agency, Region IX. Such records shall show the following for **each** sample:

1. Identity of sampling and observation stations by number.
2. Date and time of sampling and/or observations.
3. Method of sampling.
4. Full report for rainbow trout bioassay test (96-hour static bioassay).
5. Date and time that analyses are started and completed, and name of personnel performing the analyses.
6. Complete procedure used, including method of preserving sample and identity and volumes of reagents used. A reference to a specific section of

Standard Methods (SM) or the standard USEPA method number is satisfactory.

7. Calculations of results.
8. Results of analyses and/or observations.

E. Monthly discharge flow volume shall be recorded, as well as totalized quarterly and annual flow.

F. A tabulation reflecting bypassing and accidental waste spills shall be maintained.

G. A copy of this Order, a complete copy of the Notice of Intent filed, documentation of the authorization to discharge received from the Regional Water Board, a full copy of the O&M Manual, and any other documents relevant to the operation and maintenance of the treatment facility shall be stored at or near the treatment facility. These documents help the Dischargers' staff responsible for compliance assurance activities and shall be made available to Regional Water Board staff during inspections. The Dischargers' staff responsible for compliance assurance activities shall inspect the Facility as frequent as required by the O&M Manual. No O&M Manual shall be submitted to the Regional Water Board office, unless requested.

II. MONITORING LOCATIONS

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order:

Table E.1 - Monitoring Station Locations

Discharge Point Name	Monitoring Location Name	Monitoring Location Description (include Latitude and Longitude when available)
--	INF-001	At a point in the extraction system immediately prior to inflow to the treatment unit.
	EFF-001	At a point in the discharge line immediately following treatment and before it joins or is diluted by any other waste stream, body of water, or substance.
	RSW-001U	At a point 50 feet upstream from the point of discharge into the receiving water, or if access is limited, at the first point upstream which is accessible.
	RSW-001D	At a point 50 feet downstream from the point of discharge into the receiving water, or if access is limited, at the first point downstream which is accessible.
	REU-001	At a point immediately prior to reuse location. Not Applicable if reused reclaimed water is the same as effluent or reclamation is in place.

III. INFLUENT MONITORING REQUIREMENTS

The Discharger shall perform sampling and analyses according to the schedule in Table E-2 and no Influent samples shall include any treatment system recirculation.

IV. EFFLUENT MONITORING REQUIREMENTS

The Discharger shall perform sampling and analyses according to the schedule in Table E-2 in accordance with the following conditions:

A. Samples of effluent shall be collected on days coincident with influent sampling.

B. When any type of bypass occurs, grab samples shall be collected on a daily basis for all constituents at all affected discharge points that have effluent limits for the duration of the bypass.

V. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS

The Discharger shall perform sampling and analyses according to the schedule in Table E-2 in accordance with the following conditions:

A. Fish bioassay samples shall be collected on days coincident with effluent sampling.
B. Bioassay tests should be performed on effluent samples after chlorination-dechlorination.
C. Total ammonia nitrogen of the effluent shall be analyzed and un-ionized ammonia calculated whenever fish bioassay test results fail to meet the specified percent survival.
D. If the final or intermediate results of any single bioassay test indicate a threatened violation (i.e. the percentage of surviving test organisms is less than the required survival percentage), a new test will begin and the Discharger shall investigate the cause of the mortalities and report the finding in the next self-monitoring report.

TABLE E.2 - Schedule for Sampling, Measurements, and Analysis

Sampling Station	Minimum Sampling Frequency for Influent INF-001	Minimum Sampling Frequency for Effluent EFF-001 or Effluent for Reuse REU-001	Minimum Sampling Frequency for Receiving Surface Water RSW-001U and RSW-001D	Required Analytical Test Method Number, Technique, SM, USEPA Report Number, 40 CFR Part (or equivalent)
Unit is "µg/L" and Type of Sample is "Grab" unless noted otherwise	**Grab**	**Grab**	**Grab**	
Fish Toxicity, 96-hr (% survival)		Q/Y		EPA-821-R-02-012 Test, Method

Sampling Station	Minimum Sampling Frequency for Influent INF-001	Minimum Sampling Frequency for Effluent EFF-001 or Effluent for Reuse REU-001	Minimum Sampling Frequency for Receiving Surface Water RSW-001U and RSW-001D	Required Analytical Test Method Number, Technique, SM, USEPA Report Number, 40 CFR Part (or equivalent)
Unit is "µg/L" and Type of Sample is "Grab" unless noted otherwise	**Grab**	**Grab**	**Grab**	
				2019.0
All Applicable Standard Observations (No Unit)		M	V	
Benzene	D/Q	D/M	V	8020
Toluene	D/Q	D/M	V	8020
Ethyl benzene	D/Q	D/M	V	8020
Total Xylenes	D/Q	D/M	V	8020
Methyl Tertiary Butyl Ether (MTBE)	D/Q	D/M	V	8020
Total Petroleum Hydrocarbons as Gasoline	D/Q	D/M	V	8015 Modified
Total Petroleum Hydrocarbons as Diesel	D/Q	D/M	V	8015 Modified
Total Petroleum Hydrocarbons other than Gasoline and Diesel (required if Petroleum Hydrocarbons other than Gasoline and Diesel present in the soil and groundwater)	D/Q	D/M	V	8015 Modified
Polynuclear Aromatic Hydrocarbons (PAHs)	Q	Q	V	8310
Ethylene Dibromide (EDB)	Y	Y	V	504
Volatile Organic Compounds	Y	Y	V	8260b
Tertiary Amyl Methyl Ether (TAME)	Y	Q See Note1		8260b
Dilsopropyl Ether (DIPE)	Y	Q See Note1		8260b
Ethyl Tertiary Butyl Ether (ETBE)	Y	Q See Note1		8260b
Tertiary Butyl Alcohol (TBA)	Y	Q See Note1		8260b
Ethanol	Y	Q See Note1		8260b
Methanol	Y	Q See Note1		8260b
Semi Volatile Organic Compounds except PAHs	Y	Y		8270c
Antimony Total (See Note 2)	D/Y	D/Y		204.2
Arsenic Total (See Note 2)	D/Y	D/Y		206.3
Beryllium Total (See Note 2)	D/Y	D/Y		GFAA or ICPMS
Cadmium Total (See Note 2)	D/Y	D/Y		GFAA or ICPMS
Chromium Hexavalent and Total Chromium (See Note 2)	D/Y	D/Y		Standard Method (SM) 3500
Copper Total (See Note 2)	D/Y	D/Y		200.9
Cyanide Total (See Note 2)	D/Y	D/Y		SM 4500-CN⁻ C or

Sampling Station	Minimum Sampling Frequency for Influent INF-001	Minimum Sampling Frequency for Effluent EFF-001 or Effluent for Reuse REU-001	Minimum Sampling Frequency for Receiving Surface Water RSW-001U and RSW-001D	Required Analytical Test Method Number, Technique, SM, USEPA Report Number, 40 CFR Part (or equivalent)
Unit is "µg/L" and Type of Sample is "Grab" unless noted otherwise	**Grab**	**Grab**	**Grab**	
				I
Lead Total (See Note 2)	D/Y	D/Y		200.9
Mercury Total (See Note 2)	D/Y	D/Y		1631
Nickel Total (See Note 2)	D/Y	D/Y		249.2
Selenium Total (See Note 2)	D/Y	D/Y		SM 3114B or C
Silver Total (See Note 2)	D/Y	D/Y		272.2
Thallium Total (See Note 2)	D/Y	D/Y		279.2
Zinc Total (See Note 2)	D/Y	D/Y		200 or 289
Flow Rate (gpm & gpd)		Continuous		
Turbidity		D/Q/Y		
pH	D/M/Q/Y	D/M/Q/Y	V	
Dissolved Oxygen (mg/L)			V	
Total Dissolved Solids (mg/L) (construction and dewatering projects)		D/M		
Temperature (°C)	D	D/M/Q/Y		
Electrical Conductivity	D	D/M/Q/Y		
Hardness (mg/L as $CaCO_3$)			T	SM
Salinity (parts per thousand)			T	SM

Notes for Table E2-

Note 1: If not detected at 5 ug/l, annual sampling is sufficient

Note 2: Inorganic compounds samples shall be analyzed for total (unfiltered) constituents with the reporting levels not exceeding the following: 0.002 ug/l for Mercury; 0.25 ug/l for Cadmium and Silver; 1 ug/l for Nickel, Thallium, and Zinc; 2.0 ug/l for Arsenic and Selenium; 1 ug/l for Cyanide; and 0.5 ug/l for Antimony, Beryllium, Total Chromium, Copper, and Lead (SIP Appendix 4 Minimum Levels http://www.waterboards.ca.gov/iswp/docs/final.pdf). If the Discharger exceeds the trigger for mercury of 0.025, the Discharger may consider re-sampling and re-analyzing another sample using ultra-clean techniques as described in USEPA methods 1669 and 1631 to eliminate the possibility of artifactual contamination of the sample.

Definitions: ug/L = microgram per liter or parts per billion (ppb), g/day = grams per day, gpm = gallons per minute, mg/L = milligram per liter or parts per million (ppm), gpd = gallons per day, MFL = million fibers per liter

GC = Gas Chromatography; GCMS = Gas Chromatography/Mass Spectrometry; FAA = Flame Atomic Absorption; GFAA = Graphite Furnace Atomic Absorption; Hydride = Gaseous Hydride Atomic Absorption; ICP = Inductively Coupled Plasma; and ICPMS = Inductively Coupled Plasma/Mass Spectrometry.

Legends

D Once during the first and fifth day of start up.

M Once each month.

Y Once during the first week of start up; annually thereafter.

D/M Once during the first and fifth day of start up; monthly thereafter.

D/Q Once during the first and fifth day of start up; quarterly thereafter.

D/Y Once during the first and fifth day of start up; annually thereafter.

Q/Y Quarterly for first year of operation, annually thereafter.

D/Q/Y Once during the first and fifth day of start up; quarterly for first year of operation, annually thereafter.

D/M/Q/Y Once during the first and fifth day of start up; monthly for first year of operation, quarterly for the second year, and annually thereafter. In case of pH analysis, this monitoring requirement is only for facilities with a treatment process that would cause no pH variances in the effluent. If any chemical used in the treatment process may cause pH variances in the effluent, the

frequency of pH monitoring in the effluent shall be increased to twice per week for the first month of operation and weekly thereafter if pH monitoring data for the first month of operation demonstrate compliance with pH effluent limits.
V Sampling should be performed within 24 hours after an effluent limit violation is confirmed in E-001.
T Sampling should be performed when Cadmium, Chromium (total), Copper, Lead, Nickel, Silver, or Zinc triggers are exceeded.

VI. LAND DISCHARGE MONITORING REQUIREMENTS. (NOT APPLICABLE)

VII. RECLAMATION MONITORING REQUIREMENTS

The same as effluent and see section IX-E.

VIII. RECEIVING WATER MONITORING REQUIREMENTS – SURFACE WATER AND GROUNDWATER

The Discharger is required to perform sampling and analyses according to the schedule in Table E-2 in accordance with the following conditions:

A. Receiving Waters sampling should be performed within 24 hours after an effluent limit violation is confirmed in the effluent.

B. Receiving water samples shall be collected at each station on each sampling day during the period within 1 hour following low slack water. Where sampling at lower slack water period is not practical, sampling shall be performed during higher slack water period. Samples shall be collected within the discharge plume and 50 feet down current of the discharge point so as to be representative, unless otherwise stipulated.

C. Samples should be collected within one foot below the surface of the receiving water body. Explanation shall be provided in the monitoring report if this specification could not be met.

IX. OTHER MONITORING REQUIREMENTS

A. Start Up Phase Monitoring. During the original start up for the treatment system, sampling of the effluent must occur on the first day and fifth day of operation.

1. On the first day of the original start up, the system shall be allowed to run until at least three to five well volumes are removed and until three consecutive readings for pH, conductivity, and temperature are within five percent of each other; then, the influent and effluent shall be sampled and submitted for analyses. Prior to receipt of the results of the initial samples, all effluent shall be discharged into a holding tank (that is contained, not discharged to the receiving water) or discharged to the sanitary sewer until the results of the analyses show the discharge to be within the effluent limits established in this Order and/or as authorized by the Executive Officer. The treatment system may be shut down after the first day's

sampling to await the analyses results and, thereby, reduce the amount of storage needed. For the stored effluent, if the results of the analyses show the discharge to be in violation, the effluent shall: (1) be retreated until the retreated effluent is in compliance, or (2) be disposed in accord with the provisions of Chapter 15, Title 23, California Code of Regulations.

2. If the first day's sampling shows compliance, the treatment system shall be operated for a total of five days with the discharge to the storm sewer or other conveyance system leading to the receiving water, and be sampled again during the fifth day. While the fifth day's samples are being analyzed, the effluent may be discharged to the receiving water as long as the analyses are received within 72 hours of sampling, and then, continue to be discharged to the receiving water if the analyses show compliance. If the treatment system is shut down more than 72 hours during the original start up (awaiting analyses results, etc.), the original start up procedures and sampling must be repeated.

B. **Chemical Additives Monitoring**: If applicable, monitoring related to chemical usage shall be conducted by the Discharger as required in its treatment system design specification and Operation and Maintenance Manual.

C. **Standard Observations for Receiving Water**
   1. Floating and suspended materials of waste origin (to include oil, grease, algae, and other macroscopic particulate matter): presence or absence, source, and size of affected area.
   2. Discoloration and turbidity: description of color, source, and size of affected area.
   3. Odor: presence or absence, characterization, source, distance of travel, and wind direction.
   4. Evidence of beneficial water use: presence of waterfowl or wildlife, people fishing, and other recreational activities in the vicinity of the site.
   5. Hydrographic condition, if relevant:
      a. Time and height of corrected high and low tides (corrected to nearest National Oceanic and Atmospheric Administration (also known as NOAA) location for the sampling date and time of sample and collection).
      b. Depth of water columns and sampling depths.
   6. Weather condition:
      a. Air temperature.
      b. Wind direction and estimated velocity.
      c. Total precipitation during the previous five days and on the day of observation.

E. **Standard Observations for Onsite Usage of Reclaimed Water**
   1. Floating and suspended materials of waste origin (to include oil, grease, algae, and other macroscopic particulate matter): presence or absence,

source, and size of affected area.

2. Discoloration and turbidity: description of color, source, and size of affected area.
3. Odor: presence or absence, characterization, source, distance of travel, and wind direction.
4. Weather condition:
    a. Air temperature.
    b. Wind direction and estimated velocity.
    c. Total precipitation during the previous five days and on the day of observation.
5. Deposits, discolorations, and/or plugging in the conveyance system that could adversely affect the system reliability and performance.
6. Operation of the valves, outlets, sprinkler heads, and/or pressure shutoff valves in conveyance system.

F. Standard Observations for Groundwater Treatment System

1. Odor: presence or absence, characterization, source, distance of travel, and wind direction.
2. Weather condition: wind direction and estimated velocity.
3. Deposits, discolorations, and/or plugging in the treatment system (stripping tower, carbon filters, etc.) that could adversely affect the system reliability and performance.
4. Operation of the float and/or pressure shutoff valves installed to prevent system overflow or bypass.

X. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

The Discharger shall comply with all Standard Provisions in Attachment D and in this document related to monitoring, reporting, and recordkeeping.

B. Self Monitoring Reports (SMRs)

1. At any time during the term of this permit, the State or Regional Water Board may notify the Dischargers to electronically submit Self-Monitoring Reports (SMRs) using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site, and will also provide additional directions for SMR submittal in the event there will be service interruption for electronic submittal (http://www.waterboards.ca.gov/ciwqs/index.html). Until such notification is given, the Dischargers shall upload an electronic copy of the SMR on GeoTracker (http://www.geotracker.swrcb.ca.gov).

2. The Dischargers shall report in the SMR the results for all monitoring specified in this MRP under sections III through IX. The Dischargers shall submit quarterly SMRs, uploaded on GeoTracker, no later than 45 days after end of each calendar quarter, including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this Order. If the Discharger monitors any pollutant more frequently than required by this Order, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR.

3. Monitoring periods and reporting for all required monitoring shall be completed according to the following schedule:

Table E.3 - Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On...	Monitoring Period	SMR Due Date
Continuous	Effective start up date	All	See Note 1
Daily	Effective start up date	(Midnight through 11:59 PM) or any 24-hour period that reasonably represents a calendar day for purposes of sampling.	See Note 1
Weekly	Effective start up date	Effective start up day through one week after Effective start up date	See Note 1
Monthly	First day of calendar month following the last day of the start up date	1st day of calendar month through last day of calendar month	See Note 1

Quarterly	**Closest of January 1, April 1, July 1, or October 1 following (or on) the last day of the start up date**	**January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31**	**See Note 1**
Semiannually	**Closest of January 1 or July 1 following (or on) the last day of the start up date**	**January 1 through June 30 July 1 through December 31**	**See Note 1**
Annually	**January 1 following (or on) the last day of the start up date**	**January 1 through December 31**	**See Note 1**
Note 1: A report on the start up phase shall be submitted to the Regional Water Board by uploading it on GeoTracker no more than fifteen (15) days after the end of the start up phase. Quarterly Self-Monitoring Reports shall also be submitted the Regional Water Board by uploading it on GeoTracker on a quarterly calendar basis, no later than forty five (45) days following the last day of the quarter. Annual Reports shall be uploaded on GeoTracker by February 15 of each year, covering the previous calendar year. The annual report shall contain all data required for the fourth quarter in addition to summary data required for annual reporting. This report may be submitted in lieu of the report for the fourth quarter of a calendar year.			

4. Reporting Protocols. The Discharger shall report with each sample result the applicable Reporting Level (RL) and the current Method Detection Limit (MDL), as determined by the procedure in Part 136. The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

   a. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

   b. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported. For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

   c. Sample results less than the laboratory's MDL shall be reported as "Not Detected," or ND.

   d. Dischargers are to instruct laboratories to establish calibration standards so that the ML value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical

data derived from *extrapolation* beyond the lowest point of the calibration curve.

5. The Discharger shall upload SMRs on GeoTracker in accordance with the following requirements:

   a. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the facility is operating in compliance with the effluent limitations.

   b. The Discharger shall attach a cover letter to the monitoring reports. The information contained in the cover letter shall clearly identify violations of the permit; discuss corrective actions taken or planned; and the proposed time schedule for corrective actions. Identified violations must include a description of the requirement that was violated and a description of the violation.

   c. Monitoring reports must be submitted to the Regional Water Board signed, and certified as required by the Standard Provisions (Attachment D) to the address listed below:

      California Regional Water Quality Control Board
      San Francisco Bay Region
      1515 Clay Street, Suite 1400
      Attn: NPDES Wastewater Division
      Fuel General NPDES NO. CAG912002

   d. The monitoring reports shall also include a description of operation and maintenance (O&M) of the groundwater extraction and treatment system consistent with the O&M manual, which shall be available to all personnel who are responsible for operation and maintenance activities.

   e. The monitoring reports shall include the results of analyses and observations as follows:
      1. Calculations for all limitations that require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.
      2. A table identifying by method number the analytical procedures used for analyses. Any special methods shall be identified and should have prior approval of the Regional Water Board's Executive Officer.
      3. Laboratory results shall be summarized in tabular form but do not need to be included in the report. A summary of quality assurance/quality control activities data such as field,

travel, and laboratory blanks shall be reported for each analyzed constituent or group of constituents.

4. A summary of the monitoring data to include information such as source of the sample (influent, effluent, or receiving water); the constituents; the methods of analysis used; the laboratory reporting limits in ug/l; the sample results (ug/l); the date sampled; and the date sample was analyzed.
5. Flow (in gpm) and mass removal data (in kilograms).
6. Summary of treatment system status during the reporting period (e.g. in operation/on standby) and reason(s) for non-routine treatment system shut down.
7. The annual reports shall contain tabular summary of the monitoring data obtained during the previous year. In addition, the annual reports shall contain a comprehensive discussion of the compliance record and the corrective actions taken or planned which may be needed to bring the Discharger into full compliance with the waste discharge requirements. The annual report shall document that the annual fee has been paid.
8. If, during any calendar quarter, a Discharger becomes aware that any monitoring data obtained for compliance with this Order are invalid, the Discharger shall submit a claim of invalid monitoring data, as uploaded on GeoTracker with a confirmation email to the Regional Water Board staff in charge of this permit, within 45 days after end of that calendar quarter. The Discharger shall include with this claim, the name, phone number, and email of its assigned staff to investigate the cause(s) of errors and the corrective actions taken, or date when actions will be completed to eliminate or reduce future data errors. The Discharger shall also provide, in this claim, a date that the Operation and Maintenance Manual will be updated to include errors prevention measures. These preventive measures shall include but not be limited to accelerated monitoring (e.g. twice a month monitoring for at least one month) to provide valid monitoring data indicating the effectiveness of the proposed preventive measures.

C. Discharge Monitoring Reports (DMRs) Not Applicable

D. Other Reports

1. Trigger Study Report: The Discharger shall report the results of any trigger study required by Special Provisions – VI.C.6 and the progress in satisfaction of compliance schedule dates specified in Special Provisions VI.C.7, VI.C.8, and VI.C.9 of this Order. The Discharger shall upload

these reports on GeoTracker.

2. Start Up Notification Report: The Discharger shall notify the Executive Officer by uploading on GeoTracker the completed Form provided in Attachment G - Notice of Startup or Re-Startup Form. no later than 14 days before planned start up date.

3. Start-up Report: A report on the start up phase shall be uploaded on GeoTracker no more than fifteen days after the end of the start up phase. This report shall include a certification that a professional engineer certified in the State of California oversees the treatment system operation and maintenance activities including the start up work.

4. Spill Reports: If any hazardous substance is discharged in or on any waters of the state, or discharged and deposited where it is, or probably will be discharged in or on any waters of the state, the Discharger shall report such a discharge to this Regional Water Board, at (510) 622-2300 on weekdays during office hours from 8 a.m. to 12 p.m. and 1 p.m. to 5 p.m, and to the Office of Emergency Services at (800) 852-7550 during non-office hours. A written report shall be uploaded on GeoTracker, with an confirmation email to staff, within five (5) working days and shall contain information relative to:

    a. Nature of waste or pollutant,
    b. Quantity involved,
    c. Duration of incident,
    d. Cause of spilling,
    e. Spill Prevention, Control, and Countermeasure Plan (SPCC) in effect, if any,
    f. Estimated size of affected area,
    g. Nature of effects (i.e., fish kill, discoloration of receiving water, etc.),
    h. Corrective measures that have been taken or planned, and a schedule of these activities, and
    i. Persons/agencies notified.

5. Reports of Treatment Unit Bypass and Permit Violation: In the event the Discharger violates or threatens to violate the conditions of the waste discharge requirements and prohibitions or intends to permit a treatment unit bypass due to:
    a. Maintenance work, power failures, or breakdown of waste treatment equipment,
    b. Accidents caused by human error or negligence,
    c. The self-monitoring program results exceeding effluent limitations,
    d. Any activity that would result in a frequent or routine discharge of any toxic pollutant not limited by this Order, or
    e. Other causes, such as acts of nature.

The Discharger shall notify the Regional Water Board within 24 hours of when the Discharger or Discharger's agent has knowledge of the incident and confirm this notification in writing and uploaded on GeoTracker with a confirmation email to staff, within 5 working days of the initial notification. The written report shall include time, date, duration and estimated volume of waste bypassed, method used in estimating volume and person notified of the incident. The report shall include pertinent information explaining reasons for the noncompliance and shall indicate what steps were taken to prevent the problem from recurring.

If a violation of the effluent limitations should occur, the Discharger shall direct the effluent to a holding tank and contained, or the extraction and treatment system shall be shut down. The confirmation sampling shall be conducted when the discharge is directed to a holding tank and contained or right before the extraction and treatment system is shut down. The content of the holding tank shall be retreated until the retreated effluent is in compliance, or be disposed in accord with the provisions of Chapter 15, Title 23, California Code of Regulations.

If the treatment system is shut down for more than 120 consecutive hours after the start up period (maintenance, repair, violations, etc.) the reason(s) for shut down, proposed corrective action(s) and estimated start up date shall be orally reported to the Regional Water Board within five days of shut down and a written submission through GeoTracker shall also be provided within 15 days of shut down.

If feasible, the corrective action(s) taken and the proposed start up procedures shall be reported to the Regional Water Board at least 15 days before start up.

ATTACHMENT F – FACT SHEET

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ATTACHMENT F – FACT SHEET

This Order is intended to cover discharges of extracted and treated groundwater resulting from the cleanup of groundwater polluted by fuel leaks and other related wastes at service stations and similar sites.

This Fact Sheet includes the legal basis and technical rationale for the requirements of the Order. This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for Dischargers in California. Only those sections or subsections of this Order that are specifically identified as "not applicable" have been determined not to apply to this Discharger. Sections or subsections of this Order not specifically identified as "not applicable" are fully applicable to the Dischargers.

In 1991, the Regional Water Board issued a National Pollutant Discharge Elimination System (NPDES) General Permit for allowing the discharge of extracted and treated groundwater resulting from the cleanup of groundwater polluted by fuel leaks and other related wastes at service stations and similar sites. The permit was reissued twice in 1996 and 2001.

The 2001 permit expired on September 19, 2006, and needs to be reissued because approximately 9,700 sites with underground fuel storage tanks within the San Francisco Bay Region are known to be leaking or have leaked in the past. Fuel is also discharged to groundwater from other sources (surface spills, pipeline breaks or leakages, etc.). Within the next five years, approximately 300 of these sites will be conducting groundwater cleanups by extracting contaminated groundwater, treating, and discharging treated groundwater, particularly in Santa Clara County. Because some Publicly Owned Treatment Works (POTWs) do not accept new discharges from groundwater cleanups, approximately 75 of these sites will require Waste Discharge Requirements from the Regional Water Board for discharge to surface water. These cleanups will exceed the capacity of available staff to develop and bring individual waste discharge requirements to the Regional Water Board for adoption. These circumstances create the need for an expedited system to process the anticipated numerous requests. The renewal of the fuel general NPDES permit will expedite the processing of requirements, enable the Regional Water Board to better utilize limited staff resources, and permit cleanups to begin promptly.

The following fuel-cleanup discharges are normally not eligible for coverage: discharges from cleanups involving significant contamination by metals, pesticides, or other conservative pollutants; discharges from cleanups involving reinjection of treated groundwater; and discharges from sites with other NPDES discharges (e.g. process waste). A fuel-cleanup discharger that combines extracted groundwater with stormwater before treatment is normally not eligible for coverage under this Order because amount of rainwater varies and may exceed the treatment system capacity.

I. PERMIT INFORMATION

The following Table (Table F-1) and paragraphs summarize administrative information related to the facilities. As applicable, Table F-1 provides cross-references to the specific sections of the Notice of Intent (NOI) Form, in the Attachment B, that each Discharger enrolled under this Order must initially complete and submit as part of the NOI.

Table F-1. Facility Information

WDID	A waste discharge identification number will be assigned to a facility when the Executive Officer issues the authorization to discharge
Discharger	Row 1 of Table 2 of NOI Form in Attachment B
Name of Facility	Row 2 of Table 2 of NOI Form in Attachment B
Facility Address	Row 3 of Table 2 of NOI Form in Attachment B
Facility Contact, Title and Phone	Row 4 of Table 2 of NOI Form in Attachment B
Authorized Person to Sign and Submit Reports	Row 5 of Table 2 of NOI Form in Attachment B
Mailing Address	Row 6 of Table 2 of NOI Form in Attachment B
Billing Address	Row 7 of Table 2 of NOI Form in Attachment B
Type of Facility	Row 8 of Table 2 of NOI Form in Attachment B
Major or Minor Facility	Minor
Threat to Water Quality	Category 2 (based on three categories 1, 2, and 3)
Complexity	Category B (based on three categories A, B, and C)
Pretreatment Program	Not Applicable
Reclamation Requirements	Producer (See Row 14 of Table 4 of NOI in Attachment B)
Facility Permitted Flow	Condition 4 of NOI Form in Attachment B (in gallons per minute (gpm))
Facility Design Flow	Condition 4 of NOI Form in the Attachment B (in gpm)
Watershed	Row 9 of Table 2 of NOI Form in the Attachment B
Receiving Water	Row 10 of Table 2 of NOI Form in the Attachment B
Receiving Water Type	Row 11 of Table 2 of NOI Form in the Attachment B

A. Site Owners or Operators who will apply for an authorization to discharge under this Order and who may be granted such authorization are hereinafter called Discharger(s). The groundwater treatment facility is considered the Facility regulated under this Order (hereinafter Facility). For the purposes of this Order, references to the "Discharger(s)" or "permittee(s)" in applicable federal and state

laws, regulations, plans, or policy are held to be equivalent to references to the Discharger(s) herein.

B. The Facilities currently regulated under the previous general NPDES permit, Order No. 01-100, discharge wastewater to different receiving waters of the United States, mainly in Santa Clara County. Order No. 01-100, which was adopted on September 19, 2001, expired on September 19, 2006. The terms and conditions of the previous Order were automatically continued in effect until new Waste Discharge Requirements and NPDES permit are adopted pursuant to this Order. During the life of the previous Order, 114 facilities were authorized to discharge treated groundwater to the receiving water documented in the NOI submitted for each discharge.

C. As of June 2006, 37 Dischargers filed a report of waste discharge by submitting an NOI application for renewal of their discharge authorization under this General Waste Discharge Requirements (GWDRs), NPDES permit. At least 38 more NOIs may be submitted during the next five years. In the process of reviewing and approving NOIs, supplemental information may be requested from a subset of these facilities. It may also be necessary to visit facilities for which an NOI has been submitted, to observe operations and collect additional data to determine the eligibility of authorizing those discharges under this Order. This Order requires the Dischargers to submit monitoring data per Attachment E. A few Dischargers authorized under this Order may be required to apply for an individual NPDES permit if monitoring data indicate significant contamination by metals, pesticides, or other conservative pollutants.

II. FACILITY DESCRIPTION

The regulated facilities under this Order are normally groundwater treatment facilities located at active or closed service stations or construction sites with the need for short or long term dewatering. These groundwater treatment facilities are in operation to extract and treat groundwater polluted mainly by fuel leaks.

A. Description of Wastewater Treatment

Dischargers authorized under this Order typically use aeration and/or granular activated carbon (GAC) systems to treat their pollutants of concern. The most common pollutants contained in the influent of these treatment systems are benzene, ethylbenzene, toluene, total xylenes, Methyl Tertiary Butyl Ether (MTBE), and other petroleum hydrocarbons collectively named as total petroleum hydrocarbons (TPH). Less commonly inorganic compounds may also be present in the influent and effluent. Other volatile or semi volatile organic compounds may also be present in the influent of a subset of facilities regulated under this permit. Approximately 75% of the 37 facilities that applied for permit re-issuance designed their treatment facilities for a flow rate less than 10 gpm.

Except for some inorganic compounds and oxygenates other than MTBE, the concentrations of organic pollutants in the effluents of the discharges are usually below detectable levels. The reported detection limit for benzene, ethylbenzene, toluene, total xylenes, and most volatile organic compounds (VOCs) is 0.5 microgram per liter (ug/l); for MTBE the reported detection limit ranges from 0.5 to 5.0 ug/l; for TPH the reported detection limit is mostly 50.0 ug/l; and the reported detection limits for semi volatile organic compounds are mostly 5.0 or 10.0 ug/l.

B. Discharge Points and Receiving Waters

Condition No. 6 of the NOI Form (Attachment B) requires the Discharger to provide discharge location data and a map with the discharge path highlighted.

C. Summary of Existing Requirements

With two exceptions, the effluent limitations contained in the previous Order have been continued into this Order as summarized in Table F-4. These exceptions are: MTBE reduced from 13 ug/l to 5 ug/l, and Vinyl Chloride reduced from 5 ug/l to 1 ug/l, for Discharge to Other Surface Water Areas.

D. Compliance Summary

In order to collect compliance history information, the Regional Water Board staff reviewed the 37 permit renewal applications submitted, and the annual reports from those same 37 facilities, from the previous permit period, 2001-2006. Except for Total Petroleum Hydrocarbon as diesel (TPHd), the Dischargers have reported almost a 100% compliance rate with the effluent limitations in the permit. In the case of TPHd, the Dischargers reported 15 TPHd exceedances in the cover letter to the annual reports. These same Dischargers reported 52 TPHd exceedances in the NOI applications submitted in March 2006. The Dischargers reported 46 of those 52 TPHd exceedances (about 90%) were due to false positives - in other words, sampling and reporting errors of various nature. A number of oil companies also reported some of the TPHd exceedances were due to false positive results caused by sampling errors and problems with EPA method 8015 for diesel. These false positive concerns were summarized in an August 18, 2003, report titled "Diesel False Positives and Related Regulatory Policy for NPDES Effluent Dischargers," prepared by Tim Utterback and Richard Weiss for Wetern States Petroleum Association (WSPA). This report summarizes the WSPA members' concerns about the potential for enforcement actions based on invalid monitoring data, and finds it beneficial to the Regional Water Board and Dischargers to have a standardized procedure to prevent, identify, and report diesel false positives. This Order provides the Dischargers with requirements to prevent, identify, and report diesel false positives as explained in the following sections of the Order:

1. Section X.B.5.e.3 of Attachment E requires the reporting of quality assurance/quality control activities data such as field, travel, and laboratory blanks for each analyzed constituent or group of constituents,

2. Table E.2 of Attachment E requires the Dischargers to monitor TPH other than gasoline and diesel separate from TPHd which will minimize TPHd false positives,
3. Section X.B.5.e.8 of Attachment E requires the Dischargers to report every discovered invalid monitoring data, including TPHd false positives,
4. Section X.B.5.e.8 of Attachment E provides the Dischargers with additonal time, 45 days instead of 15 days in the 2001 permit, to identify, verify, and report any monitoring errors, and
5. Table 5 of Attachment B and Section X.B.5.e.8 of Attachment E require the Dischargers to assign a specific person to investigate the cause(s) of errors and implement corrective actions.

E. Planned Changes

As required in Attachment D, a Discharger authorized under this Order shall submit a modified NOI before making any material change in the character, location, or volume of the discharge.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in the Order are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. Environmental Protection Agency (USEPA) and chapter 5.5, division 7 of the California Water Code (commencing with section 13370). It shall serve as a NPDES permit for point source discharges from this facility to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to article 4, chapter 4, division 7 of the Water Code (commencing with section 13260). States may request authority to issue general NPDES permits pursuant to Code of Federal Regulations, Title 40, Chapter 1, Subchapter D, part 122.28 (40 CFR 122.28). 40 CFR 122.28 provides for the issuance of general permits to regulate discharges of waste which result from similar operations, are the same types of waste, require the same effluent limitations, require similar monitoring, and are more appropriately regulated under a general permit rather than individual permits. This general permit meets the requirements of 40 CFR 122.28 because the discharges and proposed discharges:

1. result from similar operations (all involve extraction, treatment, and discharge of groundwater),
2. are the same types of waste (all are groundwater containing petroleum hydrocarbons and other related wastes due to leaks and spills from service stations and similar sites),

3. require similar effluent limitations for the protection of the beneficial uses of surface waters in the San Francisco Bay Region (this general permit does not cover direct discharges to the Pacific Ocean),
4. require similar monitoring, and
5. are more appropriately regulated under a general permit rather than individual permits.

This Order shall become effective about two months after the date of its adoption provided the Regional Administrator, USEPA, has no objection. If the Regional Administrator objects to its issuance, the permit shall not become effective until such objection is withdrawn.

B. **California Environmental Quality Act (CEQA).** Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of CEQA, Public Resources Code sections 21100-21177.

C. State and Federal Regulations, Policies, and Plans

a. **Water Quality Control Plans.**
The Regional Water Board adopted a Water Quality Control Plan for the San Francisco Bay Basin (hereinafter Basin Plan) on June 21, 1995, and amended this plan on January 2, 2004, and November 16, 2005. The 2005 amendment will be final after approval from the State Water Board and Office of Administrative Law. The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. The Basin Plan (Page 2-5) states that the beneficial uses of any specifically identified water body generally apply to its tributary streams. The Basin Plan may not specifically identify beneficial uses for every Receiving Water regulated under this permit, but identifies present and potential uses for the downstream water body, to which the Receiving Water, via an Intermediate water body, is tributary. These potential and existing beneficial uses are: municipal and domestic supply, fish migration and fish spawning, industrial service supply, navigation, industrial process supply, marine habitat, agricultural supply, estuarine habitat, groundwater recharge, shellfish harvesting, water contact and non-contact recreation, ocean, commercial, and sport fishing, wildlife habitat, areas of special biological significance, cold freshwater and warm freshwater habitat, and preservation of rare and endangered species for surface waters and municipal and domestic supply, industrial service supply, industrial process supply, agricultural supply, and freshwater replenishment for groundwaters. In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply.

All beneficial uses listed in the Order are from Basin Plan, Tables 2-1 through 2-7 (pages 2-11, 2-13, 2-15, 2-17, 2-19, 2-21, and 2-23, respectively). The tributary rule is explained on Page 2-5. The beneficial uses for the groundwater basins are listed in Table 2-9 (page 2-28). Requirements of this Order implement the Basin Plan.

b. **Thermal Plan.**
The Regional Water Board has included this Plan in Page 3-4 of the Basin Plan.

c. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995 and November 9, 1999. About forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants.

d. **State Implementation Policy.**
On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Board in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

e. **Alaska Rule.**
On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards (WQS) become effective for CWA purposes. (40 C.F.R. § 131.21; 65 Fed. Reg. 24641 (April 27, 2000).) Under the revised regulation (also known as the Alaska rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

f. **Antidegradation Policy.** Section 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. The permitted discharge is consistent with the antidegradation provision of section 131.12 and State Water Board Resolution No. 68-16. Discharges regulated by this Order should not lower water quality if the terms and conditions of this Order are met. Therefore the permitted discharges are consistent with the antidegradation provision of 40 CFR Section 131.12 and State Water Board Resolution No. 68-16.

g. **Anti-Backsliding Requirements.** Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at title 40, Code of Federal Regulations section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed. All effluent limitations in this Order are at least as stringent as the effluent limitations in the previous Order.

D. Impaired Water Bodies on CWA 303(d) List

On June 6, 2003, the USEPA approved a revised list of impaired water bodies prepared by the State (hereinafter referred to as the 303(d) list). The SIP requires final effluent limitations for all 303(d)-listed pollutants to be based on total maximum daily loads and associated waste load allocations.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source Dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the Code of Federal Regulations: section 122.44(a) requires that permits include applicable technology-based limitations and standards; and section 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. Where reasonable

potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, water quality-based effluent limitations (WQBELs) may be established: (1) using USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) on an indicator parameter for the pollutant of concern; or (3) using a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in section 122.44(d)(1)(vi).

The proposed effluent limitations are required to protect Beneficial Uses of the surface waters and ground waters of the San Francisco Bay Region. The Clean Water Act (CWA) requires technology-based effluent limits (Section 301) unless more stringent limits are required in order to achieve water quality objectives. Section 301 of the CWA also requires that technology-based effluent limits include the application of best available technology economically achievable (BAT) for the pollutants being discharged. Technology based effluent limits were developed for the suite of volatile organic compounds (VOCs) to be regulated, and then water quality based effluent limits were developed for those VOCs whose lowest value from the CTR and Basin Plan was less than the respective technology based effluent limit.

A. Discharge Prohibitions

The proposed prohibitions are required to protect beneficial uses of the surface waters and ground waters of the San Francisco Bay Region.
Prohibition III.A, no unauthorized discharge of extracted and treated groundwater, is the same as in the previous permit and is based on CWC Section 13260, which requires filing of a report of waste discharge (ROWD) before discharges can occur. The Dischargers submitted a ROWD for the discharges described in this Order; therefore discharges not described in this Order are prohibited.
Prohibition III.B, no discharge other than the one approved by the Executive Officer which do not adversely affect the environment and comply with the requirements of this Order, is based on the same rationale documented for Prohibition A.1.
Prohibition III.C, no discharge of extracted and treated groundwater in excess of the authorized flow rate, is based on the same rationale documented for Prohibition A.1. The Dischargers submitted a ROWD for the discharges which included a treatment facility designed for a specific maximum flow rate by a professional engineer certified in the State of California, therefore flow rates exceeding the designed/authorized flow rates are prohibited.
Prohibition III.D, no scouring or erosion due to discharge of extracted and treated groundwater, is based on Basin Plan (page 4-40) goal of reducing and preventing (human-caused) erosion.
Prohibition III.E, no pollution, contamination, or nuisance, is based on the Basin Plan (page 2-1).

Prohibition III.F, no bypass or overflow of untreated or partially treated polluted groundwater, is based on 40 CFR 122.41(m)(ii)(4).

B. Technology-Based Effluent Limitations

1. Scope and Authority

The CWA requires that technology-based effluent limitations are established based on several levels of controls:

- Best practicable treatment control technology (BPT) represents the average of the best performance by plants within an industrial category or subcategory. BPT standards apply to toxic, conventional, and non-conventional pollutants.

- Best available technology economically achievable (BAT) represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and non-conventional pollutants.

- Best conventional pollutant control technology (BCT) represents the control from existing industrial point sources of conventional pollutants including BOD, TSS, fecal coliform, pH, and oil and grease. The BCT standard is established after considering the "cost reasonableness" of the relationship between the cost of attaining a reduction in effluent discharge and the benefits that would result, and also the cost effectiveness of additional industrial treatment beyond BPT.

- New source performance standards (NSPS) represent the best available demonstrated control technology standards. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

The CWA requires USEPA to develop effluent limitations, guidelines and standards (ELGs) representing application of BPT, BAT, BCT, and NSPS. Section 402(a)(1) of the CWA and section 125.3 of the Code of Federal Regulations authorize the use of BPJ to derive technology-based effluent limitations on a case-by-case basis where ELGs are not available for certain industrial categories and/or pollutants of concern. Where BPJ is used, the permit writer must consider specific factors outlined in section 125.3.

2. Applicable Technology-Based Effluent Limitations

BPJ was used in developing technology-based effluent limits in this Order. BPJ is defined as the highest quality technical opinion developed by a permit writer after consideration of all reasonably available and pertinent data or information that forms the basis for the terms and conditions of a NPDES permit. The authority for BPJ is contained in Section 402(a)(1) of the CWA.

In the treatment systems regulated by this permit, organic compounds are typically removed from groundwater through either aeration processes or through adsorption processes (e.g. granular activated carbon). When properly designed and operated, most aeration and/or granular activated carbon (GAC) systems can lower the concentration of petroleum pollutants and VOCs to below detection limits. Limits established in the tentative order for the petroleum pollutants and VOCs can be met if GAC/air stripper treatment systems are properly operated.

In 1986, U.S. EPA Region 9 in a document titled "NPDES Permit Limitations for Discharge of Contaminated Groundwater: Guidance Document" (USEPA 1986) concluded that the cost of attaining effluent levels to non-detect (5 ug/l detection levels except 1 ug/l for Vinyl Chloride) for all organic compounds that are commonly detected in contaminated groundwater is considered economically achievable. This permit was originally issued in 1991. The suite of pollutants to be regulated with effluent limits in this permit was selected by reviewing USEPA 1986 and the 1989 State of California document titled "Leaking Underground Fuel Tank Field Manual" and using the compounds called out by those documents as most likely to be detected at a fuel or groundwater cleanup site and for which a Maximum Contaminant Level (MCL) has been promulgated. In addition, the Regional Water Board staff, using BPJ, added Trichlorotrifluoroethane (Freon 113) in a previous permit reissuance, and Methyl Tertiary Butyl Ether (MTBE) in the 2001 permit reissuance.

MTBE has a secondary MCL of 5 ug/l. The discharges regulated under this permit have the potential to recharge groundwaters designated as drinking waters. The Basin Plan requires these groundwaters to be protected to both the primary and secondary MCLs. Therefore, it is appropriate to limit discharges that may recharge these groundwaters to secondary MCL levels. In 2001, the previous permit was re-issued with two MTBE effluent limits: one 5 ug/l limit for discharging to drinking water areas and another 13 ug/l limit (based on MTBE primary MCL) for discharging to other surface water areas. Data collected over 18 months, ending in 2001, showed that out of 443 effluent samples analyzed for MTBE during that period, 432 were "non-detect" and one sample detected MTBE above 5 ug/l, suggesting that a limit of 5 ug/L would be reasonably achievable. Additionally, the MTBE monitoring data provided by the Dischargers during the 2001-2006 period, confirm the limit of 5 ug/l for MTBE is

technologically feasible and economically achievable. Most Dischargers authorized under this permit were already required to comply with the 5 ug/l limit and almost all MTBE monitoring data confirm the Dischargers' ability to comply with the 5 ug/l technology-based limit. Therefore, consistent with the USEPA 1986 guidance, the maximum daily effluent limitation for MTBE for discharge to other surface water areas is changed from 13 ug/l to 5 ug/l.

Similarly, consistent with the USEPA 1986 guidance, the maximum daily effluent limitation for Vinyl Chloride for discharge to other surface water areas is corrected from 5 ug/l to 1 ug/l.

Even though information exists to show that the reporting limit and removal technology for many of the effluent constituents is now lower (0.5 ug/l), USEPA Region 9 has not updated its original guidance to adjust limits downward. The Regional Water Board staff's BPJ, at this time, is to remain consistent with EPA's original limits. The technology-based effluent limits in this permit are consistent with, or more stringent than, the USEPA 1986 guidance.

This Order has also effluent limits for Total Petroleum Hydrocarbons (TPH) as gasoline or as diesel. USEPA 1986 guidance has no mention of TPH as gasoline or as diesel. The expired permit had a limit of 50.0 ug/l for TPH and a monitoring requirement for TPH as Gasoline and Diesel. TPH does not have an MCL and typically has a reporting limit of 50 ug/l.

In 1991, the most significant group of pollutants in the groundwater cleanup facilities regulated under this permit were the pollutants associated with gasoline and diesel fuels. However, since 2001, Dischargers have submitted groundwater treatment facilities influent and effluent monitoring data that indicate petroleum hydrocarbons other than gasoline and diesel fuel have contaminated groundwater. For example, the West Base Realignment and Closure Program Management Office of the Department of Navy (Navy) reported detected levels of TPH Bunker-C in the influent and non-detect TPH Bunker-C monitoring data with a reporting level as high as 300 ug/l in the effluent.

In this case, the Regional Water Board staff do not have sufficient information to require a reporting limit of 50 ug/l for TPH Bunker C. In addition, even if a reporting limit of 50 ug/l is achieved, the Navy may need additional time to improve its groundwater treatment system to remove TPH Bunker-C to a non-detect level of 50 ug/l.

In general, the Regional Water Board staff need to gather information regarding the detection and treatment limitations for those TPH components other than Gasoline and Diesel. For this reason, instead of setting a new limit, a trigger (called TPH other than Gasoline and Diesel) and a monitoring requirement has been added in the permit. This trigger and monitoring requirement would allow Dischargers such as the Navy to continue their groundwater cleanup while improving their reporting levels to 50 ug/l and/or upgrading their treatment facility to remove TPH other than Gasoline and Diesel category to a 50 ug/l non-detect level. By the next permit reissuance in 2011, the Regional Water Board staff should have a better understanding of the range of constituents included in this new TPH other than Gasoline and Diesel category and whether a new effluent limit would be appropriate at that time.

Table F-2 shows that the technology based effluent limits for discharge to drinking water areas were derived by picking the lowest limit from the State promulgated MCL, Federal promulgated MCL, and USEPA 1986 guidance for each of the listed compounds. The last column of Table F-2 shows that the technology based effluent limits for discharge to other surface water areas are the same as USEPA 1986 BAT.

Table F-2. Summary of Technology-based Effluent Limitations

No.	Compound	SMCL ug/L	FMCL ug/L	USEPA 1986 BAT ug/L	Technology-based Effluent Limitations for Discharge to Drinking Water Areas ug/L	Technology-based Effluent Limitations For Discharge to Other Surface Water Areas ug/L
1	Benzene	1	5	5	1	5
2	Carbon Tetrachloride	0.5	5	5	0.5	5
3	Chloroform	80	80	5	5	5
4	1,1-Dichloroethane	5	-	5	5	5
5	1,2-Dichloroethane	0.5	5	5	0.5	5
6	1,1-Dichloroethylene	6	7	5	5	5
7	Ethylbenzene	300	700	5	5	5
8	Methylene Chloride (Dichloromethane)	5	5	5	5	5
9	Tetrachloroethylene	5	5	5	5	5
10	Toluene	150	1000	5	5	5
11	Cis 1,2-Dichloroethylene	6	70	5	5	5
12	Trans 1,2-Dichloroethylene	10	100	5	5	5
13	1,1,1-Trichloroethane	200	200	5	5	5
14	1,1,2-Trichloroethane	5	5	5	5	5
15	Trichloroethylene	5	5	5	5	5
16	Vinyl Chloride	0.5	2	1	0.5	1
17	Total Xylenes	1750	10000	5	5	5
18	Methyl Tertiary Butyl Ether (MTBE)	5	-	5	5	5
19	Total Petroleum Hydrocarbons (TPH) as Gasoline or as Diesel	-	-	-	50 (proposed)	50 (proposed)
20	Ethylene Dibromide (1,2-Dibromoethane)	0.05	0.05	5	0.05	5
21	Trichlorotrifluoroethane	1200	-	5	5	5

LEGEND: FMCL - Federal Maximum Contaminant Level and MCL - California Maximum Contaminant Level

Effluent Limitations A.2 for pH is based on Table 4-2 (Page 4-69) of the Basin Plan.

C. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

As specified in section 122.44(d)(1)(i), permits are required to include WQBELs for pollutants (including toxicity) that are or may be discharged at levels that cause, have reasonable potential to cause, or contribute to an in-stream excursion above any state water quality standard. The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the CTR and NTR.

If any extracted and treated groundwater receive less than proper treatment, the Benzene, Carbon Tetrachloride, Chloroform, 1,1-Dichloroethane, 1,2-Dichloroethane, 1,1-Dichloroethylene, Ethylbenzene, Methylene Chloride (Dichloromethane), Tetrachloroethylene, Toluene, Cis 1,2-Dichloroethylene, Trans 1,2-Dichloroethylene, 1,1,1-Trichloroethane, 1,1,2-Trichloroethane, Trichloroethylene, Vinyl Chloride, Total Xylenes, Methyl Tertiary Butyl Ether (MtBE), Total Petroleum Hydrocarbons, Ethylene Dibromide (1,2-Dibromoethane), and/or Trichloro-trifluoroethane concentration in the effluent of those discharges do cause, have a reasonable potential to cause, or contribute to an exceedance of any applicable criterion established by the USEPA pursuant to CWA Section 303.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The water quality criteria applicable to the discharge(s) regulated under the Order are based on protecting the beneficial uses described in Section III of the Order. The WQOs/WQC applicable to the receiving water bodies of these discharges are from the Basin Plan, CTR, and NTR.

(1) The Basin Plan specifies numeric WQOs for 10 priority toxic pollutants, as well as narrative WQOs for toxicity and bioaccumulation in order to protect beneficial uses. The pollutants for which the Basin Plan specifies numeric objectives are arsenic, cadmium, chromium (VI), copper in fresh water, and lead, mercury, nickel, silver, zinc, and total polynuclear aromatic hydrocarbons (PAHs) in salt water. The narrative toxicity objective states in part "[a]ll waters shall be maintained free of toxic substances in concentrations that are lethal to

or that produce other detrimental responses in aquatic organisms." The bioaccumulation objective states in part "[c]ontrollable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered." Effluent limitations and provisions contained in this Order are designed to implement these objectives, based on available information.

(2) The CTR specifies numeric aquatic life criteria for 23 priority toxic pollutants and numeric human health criteria for 57 priority toxic pollutants. These criteria apply to inland surface waters and enclosed bays and estuaries such as San Francisco Bay, except where the Basin Plan's Tables 3-3 and 3-4 specify numeric objectives for certain of these priority toxic pollutants. The Basin Plan's numeric objectives apply over the CTR (except in the South Bay south of the Dumbarton Bridge).

(3) The NTR established numeric aquatic life criteria for selenium, numeric aquatic life and human health criteria for cyanide, and numeric human health criteria for 34 toxic organic pollutants for waters of San Francisco Bay upstream to, and including, Suisun Bay and the Sacramento-San Joaquin Delta. This includes the receiving water for this Discharger.

3. Determining the Need for WQBELs

The CWA requires water quality based effluent limits if technology based effluent limits are not sufficiently stringent to meet water quality objectives. In the suite of VOCs regulated by the Order, several VOCs have water quality criteria (WQC) in the CTR that are below the respective technology based effluent limit. The effluent limit for those VOCs is set to be the CTR WQC as shown in Table F-3. A blank cell in Table F-3 denotes that no California Toxics Rule criterion is available for that pollutant.

4. WQBEL Calculations

No dilution credit is given in establishing effluent limits in this permit because all discharges of treated groundwater regulated under this Order are to storm drain systems that discharge to rivers, creeks, and streams. Many of these creeks and streams are dry during the summer months. Therefore, for many months of the year, these discharges may represent all or nearly all of the flow in some portions of the receiving creeks or streams. These discharges therefore also have the potential to recharge groundwaters protected as drinking waters.

In explanation of the procedure for WQBEL calculations: if the detection limit for the VOC is greater than the CTR WQC then the effluent limit is set at the CTR WQC. Pursuant to SIP 2.4.5, the Regional Water Board will deem a discharge out of compliance if a sample result is above the reporting level. There should be no significant adverse impact on water quality from those VOCs whose detection limit is above the CTR WQC because these are low volume discharges and because the treatment used, aeration or GAC, reduces concentrations of VOCs to non-detectable levels.

For the pollutants that have a water quality objective less than the 5 ug/l technology based limit, monthly average effluent limit and maximum daily effluent limits have been included consistent with the SIP. Monthly average effluent limits for discharge to areas of drinking water usage utilize CTR criteria for consumption of water and organisms. Monthly average effluent limits for discharge to other surface water areas utilize CTR criteria for consumption of organisms. For those pollutants that have water quality objectives less than 5 ug/l, the maximum daily effluent limit was computed according to SIP Procedure 1.4B, Step 6, without dilution, utilizing a multiplier of 2.01 times the monthly average effluent limit. In cases where the value of the maximum daily effluent limit is equivalent to the monthly average effluent limit, no monthly average effluent limit is necessary.

For the effluent limits for "Discharge to Other Surface Water Areas," the rationale for these limits is the same as for the effluent limits for "Discharge to Drinking Water Areas".

Table F-3. Summary of Water Quality-based Effluent Limitations

No.	Compound	CTR Criteria Water and Organisms	CTR Criteria Organisms Only	Discharge to Drinking Water Areas (See Note 1)		Discharge to Other Surface Water Areas	
		(ug/L)	(ug/L)	Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)	Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)
1	Benzene	1.2	71	1.2	2.4	71	142.7
2	Carbon Tetrachloride	0.25	4.4	0.25	0.5	4.4	8.8
3	Chloroform	-	-	-	-	-	-
4	1,1-Dichloroethane	-	-	-	-	-	-
5	1,2-Dichloroethane	0.38	99	0.38	0.8	99	199
6	1,1-Dichloroethylene	0.057	3.2	0.057	0.1	3.2	6.4
7	Ethylbenzene	3100	29000	3100	6231	29000	58290
8	Methylene Chloride (Dichloromethane)	4.7	1600	4.7	9.4	1600	3216
9	Tetrachloroethylene	0.8	8.85	0.8	1.6	8.85	17.8
10	Toluene	6800	200000	6800	13668	200000	402000
11	Cis 1,2-Dichloroethylene	-	-	-	-	-	-
12	Trans 1,2-Dichloroethylene	700	140000	700	1407	140000	281400
13	1,1,1-Trichloroethane	-	-	-	-	-	-

No.	Compound	CTR Criteria Water and Organisms	CTR Criteria Organisms Only	Discharge to Drinking Water Areas (See Note 1)		Discharge to Other Surface Water Areas	
		(ug/L)	(ug/L)	Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)	Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)
14	1,1,2-Trichloroethane	0.6	42	0.6	1.2	42	84.4
15	Trichloroethylene	2.7	81	2.7	5.4	81	162.8
16	Vinyl Chloride	2	525	2	4	525	1055
17	Total Xylenes	-	-	-	-	-	-
18	Methyl Tertiary Butyl Ether (MTBE)	-	-	-	-	-	-
19	Total Petroleum Hydrocarbons (TPH)	-	-	-	-	-	-
20	Ethylene Dibromide (1,2-Dibromoethane)	-	-	-	-	-	-
21	Trichlorotrifluoroethane	-	-	-	-	-	-

Note 1: Drinking water areas are defined as surface waters with the existing or potential beneficial uses of "municipal and domestic supply" and "groundwater recharge" (the latter includes recharge areas to maintain salt balance or to halt salt water intrusion into fresh water aquifers).

5. Whole Effluent Toxicity (WET)

The basis for Effluent Limitations A.3 (toxicity) is Table 4-4 (Chapter 4, Page 70) of the Basin Plan. The basis for using rainbow trout and 96-hour static renewal bioassays is in Chapter 4, Page 9, of the Basin Plan. The basis for repeating the toxicity testing if the percentage of surviving test organisms is less than the required survival percentage, and the requirements to investigate the cause of mortality is based on 40 CFR 122.41(d), which is needed to minimize adverse impacts from discharges in violation of requirements. Non-compliance is also a cause for termination of the authorization to discharge (40 CFR 122.64).

D. Final Effluent Limitations

For both drinking water and non-drinking water areas of discharge, the final effluent limitations were derived by picking the most protective value, between the technology based effluent limits and WQBELs, in situations where both exist. The technology based effluent limits together with the water quality based effluent limits are sufficiently stringent to protect water quality and beneficial uses. The summary of the final effluent limitations is included in the Table F-4 below:

Table F-4. Summary of Final Effluent Limitations

		Technology-based Effluent Limitations		Water Quality-based Effluent Limitations				Final Effluent Limitations			
No.	Compound	Discharge to Drinking Water Areas (See Note 2)	Discharge to Other Surface Water Areas	Discharge to Drinking Water Areas (See Note 2)		Discharge to Other Surface Water Areas		Discharge to Drinking Water Areas (See Note 2)		Discharge to Other Surface Water Areas	
	See Note 1	ug/L	ug/L	Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)	Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)	Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)	Average Monthly Effluent Limitation (ug/L)	Maximum Daily Effluent Limitation (ug/L)
1	Benzene	1	5	1.2	2.4	71	142.7	-	1	-	5
2	Carbon Tetrachloride	0.5	5	0.25	0.5	4.4	8.8	0.25 (See Note 3)	0.50	4.4	5
3	Chloroform	5	5	-	-	-	-	-	5	-	5
4	1,1-Dichloroethane	5	5	-	-	-	-	-	5	-	5
5	1,2-Dichloroethane	0.5	5	0.38	0.8	99	199	0.38 (See Note 3)	0.5	-	5
6	1,1-Dichloroethylene	5	5	0.057	0.1	3.2	6.4	0.057 (See Note 3)	0.11 (See Note 3)	3.2	5
7	Ethylbenzene	5	5	3100	6231	29000	58290	-	5	-	5
8	Methylene Chloride (Dichloromethane)	5	5	4.7	9.4	1600	3216	4.7	5	-	5
9	Tetrachloroethylene	5	5	0.8	1.6	8.85	17.8	0.8	1.6	-	5
10	Toluene	5	5	6800	13668	200000	402000	-	5	-	5
11	Cis 1,2-Dichloroethylene	5	5	-	-	-	-	-	5	-	5
12	Trans 1,2-Dichloroethylene	5	5	700	1407	140000	281400	-	5	-	5
13	1,1,1-Trichloroethane	5	5	-	-	-	-	-	5	-	5
14	1,1,2-Trichloroethane	5	5	0.6	1.2	42	84.4	0.6	1.2	-	5
15	Trichloroethylene	5	5	2.7	5.4	81	162.8	2.7	5	-	5
16	Vinyl Chloride	0.5	1	2	4	525	1055	0.5	0.5	-	1
17	Total Xylenes	5	5	-	-	-	-	-	5	-	5
18	Methyl Tertiary Butyl Ether (MTBE)	5	5	-	-	-	-	-	5	-	5
19	Total Petroleum Hydrocarbons (TPH)	50 (proposed)	50 (proposed)	-	-	-	-	-	50	-	50
20	Ethylene Dibromide (1,2-Dibromoethane)	0.05	5	-	-	-	-	-	0.05 (See Note 3)	-	5
21	Trichlorotrifluoroethane	5	5	-	-	-	-	-	5	-	5

LEGEND: FMCL - Federal Maximum Contaminant Level & SMCL - California Maximum Contaminant Level

Notes for Table F-4:

Note 1: A blank cell in this Table denotes no criterion for that compound.

Note 2: Drinking water areas are defined as surface waters with the existing or potential beneficial uses of "municipal and domestic supply" and "groundwater recharge" (the latter includes recharge areas to maintain salt balance or to halt salt water intrusion into fresh water aquifers).

Note 3: If reported detection level is greater than effluent limit, then a non-detect result using a 0.5 ug/L detection level is deemed to be in compliance.

Some organic and inorganic compounds, other than pollutants with effluent limitations in Table F-4, may also be detected in the effluent of some of the treatment systems. While this permit does not establish effluent limits for these compounds (summarized as "Trigger Pollutants") Dischargers are required to monitor for them, and follow procedures outlined in Provision VI.6.

The following paragraphs provide additional information regarding these pollutants.

Some organic compounds such as Tertiary Butyl Alcohol (TBA), Ethanol, and Methanol have been detected in the effluent of a few facilities exceeding the 5 ug/L expected treatment level. At this time, these pollutants have no water quality objective or criteria below 5 ug/L. Also, many Dischargers are actively involved in pilot testing innovative treatment technologies for removal of these compounds. For example, one Discharger added two bioreactors to its treatment systems that contain the TBA-degrading bacteria. Although this method has been proven to successfully degrade TBA, the Discharger reported these bioreactors are sensitive to various factors and need fine-tuning. The Trigger provisions of this Order allow for data to be collected on the prevalence of these compounds, while allowing Dischargers to develop a body of available technologies for their removal. Since the main objective of this permit is to allow the Dischargers to cleanup petroleum-related pollutants from groundwater, the trigger system allows treatment to move forward while additional information about relatively minor pollutants is being collected.

Some inorganic compounds such as antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc (hereinafter called inorganic compounds) are sometimes present in fuel-cleanup discharges, primarily due to background concentrations in the shallow groundwater being cleaned up. The discharge volume and effluent concentrations of inorganic compounds discharges from facilities regulated by this permit are low. In the Regional Water Board staff's BPJ, the Bay-wide loading of inorganic compounds from fuel cleanup discharges -- representing a very small portion of total inorganic compounds loadings from sources within the Region (including municipal and industrial point-source discharges and stormwater discharges) -- shall cause no impairment of beneficial uses or potential exceedances of inorganic compounds objectives in receiving waters. Facilities where inorganic compounds have adversely impacted groundwater are not eligible for coverage under this Order.

In conclusion, as discussed in detail in section VII.C.6 of this Fact Sheet, the Dischargers with detected pollutants with concentrations exceeding 5 ug/L or the most stringent water quality criteria, shall comply with the Special Study Provisions VI.C.6 through VI.C.10 of the Order.

E. Interim Effluent Limitations. (Not Applicable)

F. Land Discharge Specifications. (Not Applicable)

G. Reclamation Specifications

Basis for Water Reclamation Specifications is the Regional Water Board Resolution No. 88-160.

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

The proposed receiving water limitations are intended to protect beneficial uses of the surface waters and ground waters of the San Francisco Bay Region and are based on the Basin Plan.

A. Surface Water: These limitations are based on the narrative/numerical objectives contained in Chapter 3 of the Basin Plan as explained below:

The basis for V.A.1.a is on page 3-3 of the Basin Plan;
The basis for V.A.1.b is on page 3-2 of the Basin Plan;
The basis for V.A.1.c is on pages 3-3 and 3-4 of the Basin Plan
The basis for V.A.1.d is on page 3-3 of the Basin Plan;
The basis for V.A.1.e is on pages 3-2, 3-3, and 3-4 of the Basin Plan;
The basis for V.A.2.a is on page 3-3 of the Basin Plan;
The basis for V.A.2.b is on page 3-3 of the Basin Plan;
The basis for V.A.2.c is on page 3-3 of the Basin Plan;
The basis for V.A.2.d is on pages 3-4 of the Basin Plan; and
The basis for V.A.3 is on pages 3-5 of the Basin Plan.

B. Groundwater: These limitations are on Page 3-6 of the Basin Plan.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

Section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code sections 13267 and 13383 authorizes the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (MRP), Attachment E of this Order, establishes monitoring and reporting requirements to implement federal and state requirements. The following provides the rationale for the monitoring and reporting requirements contained in the MRP for this facility.

A. Influent Monitoring

The purpose of influent monitoring is to provide documentation that the pollutants loadings are below the level that the treatment system was designed for and provide warnings should one or more new pollutants being extracted that the as built treatment system was not designed to remove them. Except PAHs, the influent monitoring has been reduced in this permit. PAHs monitoring frequency

has been changed to quarterly because a few PAHs have been detected in the influent of a few facilities.

B. Effluent Monitoring

The purpose of effluent monitoring is to provide documentation that the treatment system adequately removed all pollutants of concern in compliance with the limits in the permit. These effluent monitoring data also provide warnings should one or more pollutants detected, even though below the limits, that may be a sign of poor maintenance or other unexpected problems. Except PAHs, the effluent monitoring has been reduced in this permit. PAHs monitoring frequency has been changed to quarterly because a few PAHs have been detected in the effluent of a few facilities.

C. Whole Effluent Toxicity Testing Requirements

The selected test species and frequency of testing are the same as previous permit and appropriately cost effective for these discharges.

D. Receiving Water Monitoring

The purpose of receiving water monitoring is to provide documentation about the condition of the receiving water should any effluent limit violations occur that may harm the life in the receiving water. The receiving water monitoring frequency is the same as previous permit.

E. Other Monitoring Requirements

The purpose of additional monitoring requirements is to investigate complaints, identify the discharges that should be regulated by individual NPDES permits, coordinate storm water monitoring with municipalities, and quantify potential impacts of extracted and treated groundwater discharge on the receiving water and the ambient conditions of the receiving waters.

F. Additional Quality Assurance/Quality Control Requirements

As explained in section II.D of this Fact Sheet, the purpose of the additional quality assurance/quality control requirements is to prevent generation and reporting of invalid monitoring data, such as TPHd false positives, that the Dischargers reported discovering during the term of the previous permit. Although everyone involved in the compliance assurance activities including the Discharger's staff and PE shall pay close attention to quality assurance/quality control activities, Table 5 of Attachment B and Section IV.C of Attachment E require the Dischargers who claim invalid monitoring data to assign a specific person to investigate the cause(s) of errors, to lead the required corrective

actions development, and to implement the Discharger's proposed measures to prevent future invalid monitoring data.

The Tentative Order before its final revision required a "Quality Assurance Officer" – meaning, a qualified individual who was not otherwise involved in sample collection, transport, or analysis (please refer to the following web site for a more detailed description: http://www.waterboards.ca.gov/swamp/docs/swampqapp_template032404.doc) to investigate the cause of data error. This Order has no Quality Assurance Officer" requirement so that a Discharger's staff person involved in generating monitoring data could also oversee quality assurance/quality control aspects of data generation. If, however, a Discharger were to continue to generate invalid monitoring data, the Regional water Board Executive Officer may require that Discharger to assign an individual independent from those generating the data, to oversee the data generation process.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions.

Standard Provisions provided in Attachment D are in accordance with section 122.41 and additional conditions applicable to the discharges under this permit are in accordance with section 122.42. Section 123.25(a)(12) allows the state to omit or modify conditions to impose more stringent requirements. In accordance with section 123.25, this Order omits federal conditions that address enforcement authority specified in sections 122.41(j)(5) and (k)(2) because the enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates by reference Water Code section 13387(e).

B. Monitoring and Reporting Program Requirements.

The basis for "Monitoring and Reporting Program Requirements" Provision is 40CFR 122.41, 122.48, 122.62, 122.63, and 124.5, CWC Sections 13267 and 13383, and BPJ.

C. Special Provisions.

1. **Basis for Reopener Provisions.** The Basis for "Reopener Provisions" is 40CFR122.41(f).

2. **Basis for Notice of Intent (NOI) Application.** Provision VI.C.2, Notice of Intent (NOI) Application, is based on 40 CFR 122.28(b).

3. **Basis for NOI Review.** Provision VI.C.3, NOI Review, is based on 40 CFR 122.28(b).

4. **Basis for Discharge Authorization.** Provision VI.C.4, Discharge Authorization, is based on 40 CFR 122.28(b).

5. **Basis for Non-Compliance as a Violation.** Provision VI.C.5, Non-Compliance as a Violation, is based on 40 CFR 122.41(a).

6. **Basis for Provisions VI.C.6 through VI.C.10.** The Dischargers authorized under this Order are expected to use BAT and treat their volatile organic pollutants to non-detectable levels. However, some compounds, other than pollutants with effluent limitations, may be detected in the effluent of some of the treatment systems. These pollutants include both organic and inorganic compounds. The purpose of these provisions is to require Dischargers to do additional activities should any pollutants exceed the triggers in Table F-3. These triggers are not effluent limitations, and should not be construed as such. Instead, they are levels at which additional investigation is warranted to determine whether a numeric limit for a particular constituent is necessary. The Table F-3 concentration-based triggers are set at the lowest value of the State Maximum Contaminant Level, Federal Maximum Contaminant Level, State Public Health Goal in Drinking Water, California Toxics Rule lowest criterion, or Basin Plan water quality objective but mostly not exceeding 5 ug/l as referenced in Table F-3 below. The reason for this approach is explained in section IV.D of this Fact Sheet, and further explained below.

   a. **Triggers for Inorganic Compounds.** Antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc (hereinafter called inorganic compounds) are present in fuel-cleanup discharges, primarily due to background concentrations in the shallow groundwater being remediated. The discharge volume and effluent inorganic compounds concentrations are low before the effluent is discharged into the storm drain system. In staff judgment, Bay-wide inorganic compounds loading from fuel cleanup discharges, represent a very small portion of total inorganic compounds loadings from sources within the Region (including municipal and industrial point-source discharges and stormwater discharges), and therefore, shall cause no impairment of beneficial uses or potential exceedances of inorganic compounds objectives in receiving waters. Facilities where inorganic compounds have adversely impacted groundwater are not eligible for coverage under this Order. Each Discharger shall submit, as part of the application for proposed discharge, analytical results including inorganic compounds concentrations in the influent and effluent, if available, or maximum concentrations in any individual extraction wells, if not operating yet. Based on these data, the Discharger may receive a discharge authorization letter. In some cases after starting up an extraction and treatment system, the effluent concentration of some inorganic compounds may exceed the triggers listed in Table F-3. In this case, the Discharger shall take three additional samples and have them analyzed for the inorganic compound of concern and comply with the Provisions VI.C.7, VI.C.8, or VI.C.9. For example, if the results of two or three of the

additional samples exceed the triggers, then the Discharger shall investigate the toxicity and treatment of the constituent of concern. Dischargers who cannot comply with these provisions will lose their authorization to discharge under this Order. The Table F-3 "concentration-based triggers" are set at the lowest value of the State Maximum Contaminant Level, Federal Maximum Contaminant Level, State Public Health Goal in Drinking Water, California Toxics Rule lowest criterion, or Basin Plan water quality objective, except for Arsenic and Chromium. The median of reported maximum Arsenic levels in the effluent of all authorized discharges is non-detect with a 5 ug/L reporting limit. The total Chromium trigger is to trigger additional testing for Chromium (VI) when the total Chromium concentration exceeds 11 as referenced in the Table F-3. The expired Order had inorganic mass-based triggers. The mass-based triggers are replaced with concentration based triggers to make this Order consistent with the Regional Board Order No. R2-2004-0055, NPDES NO. CAG912003, General Waste Discharge Requirements for Discharge or Reuse of Extracted and Treated Groundwater Resulting From the Cleanup of Groundwater Polluted by Volatile Organic Compounds. A few other parameters were also added to the triggers list to accommodate special cases that may occur during a dewatering project authorized under this Order.

b. **Triggers for Organic Compounds.** Dischargers authorized under this Order are expected to use BAT and treat their volatile organic pollutants to non-detectable levels. Sites where pesticides or other conservative pollutants have adversely impacted groundwater are not eligible for coverage under this Order. Each Discharger shall submit, as part of the application for proposed discharge, analytical results including volatile and semi volatile organic compounds concentrations in the influent and effluent if available or maximum concentrations in any individual extraction wells, if not operating yet. In addition, each Discharger shall submit a report, to the satisfaction of Executive Officer, certifying the adequacy of the proposed treatment system in removal of all organic pollutants of concern. Based on these data and information, the Discharger may receive a discharge authorization letter. However, some organic compounds, other than pollutants with effluent limitations, may be detected in the effluent of some of the treatment systems. This could be due to the movement of the contaminated groundwater from a neighboring site into the capture zone of the treatment facility authorized under this permit. Table F-3 contains concentration-based triggers for conducting additional activities for a list of pollutants reported by Dischargers or listed in the CTR. This provision would allow Dischargers to continue groundwater cleanup while investigating the toxicity and ability to treat any detected volatile or semi volatile organic compounds, in excess of Table F-3 triggers.

Table F-5. Basis for Table 3 Trigger Compounds

Compound	CAS Number	State MCL ug/L	Federal MCL ug/L	State PHG in Drinking Water ug/L	CTR Lowest Criterion unless noted ug/L	Trigger (ug/L)
Antimony	7440360	6	6	20	14	6
Arsenic	7440382	50	10	NA	36	10
Beryllium	7440417	4	4	1	NA	1
Cadmium	7440439	5	5	0.07	2.2	0.07
Chromium (total)	18540299	50	100	-	180	11 (See Note 1)
Chromium (VI)	18540299	-	-	-	11	11
Copper	7440508	1000	1000	170	3.1	3.1
Lead	7439921	15	15	2	2.5	2.0
Mercury	7439976	2	2	1.2	0.025 (See Note 2)	0.025
Nickel	7440020	100	-	12	8.2	8.2
Selenium	7782492	50	50	-	5.0	5.0
Silver	7440224	100	100	-	1.9	1.9
Thallium	7440280	2	2	0.1	1.7	0.1
Zinc	7440666	5000	5000	-	81	81
Cyanide	57125	200/150	200	-	1	1.0
Asbestos	1332214	7 MFL	7 MFL	-	7 MFL	7 MFibers/L
2,3,7,8-TCDD (Dioxin)	1746016	0.00003	0.00003	-	1.3E-08	0.000000013
Acrylonitrile	107131	-	-	-	0.059	2.0
Bromoform	75252	100/80	100/80	-	4.3	4.3
Chlorodibromomethane	124481	100/80	100/80	-	0.401	0.401
Dichlorobromomethane	75274	100/80	100/80	-	0.56	0.56
1,2-Dichloropropane	78875	5	5	0.5	0.52	0.50
1,3-Dichloropropylene	542756	0.5	-	0.2	10	0.2
1,1,2,2-Tetrachloroethane	79345	1	-	0.1	0.17	0.1
Pentachlorophenol	87865	1	1	0.4	0.28	0.28
2,4,6-Trichlorophenol	88062	-	-	-	2.1	2.1
Benzidine	92875	-	-	-	0.00012	0.00012
Benzo(a)Anthracene	56553	-	0.1	-	0.0044	0.0044
Benzo(a)Pyrene	50328	0.2	0.2	0.004	0.0044	0.004
Benzo(b)Fluoranthene	205992	-	-	-	0.0044	0.0044
Benzo(k)Fluoranthene	207089	-	-	-	0.0044	0.0044
Bis(2-Chloroethyl)Ether	111444	-	-	-	0.031	0.031
Bis(2-Ethylhexyl)Phthalate	117817	-	-	-	1.8	1.8
Chrysene	218019	-	-	-	0.0044	0.0044
Dibenzo(a,h)Anthracene	53703	-	-	-	0.0044	0.0044
3,3'-Dichlorobenzidine	91941	-	-	-	0.04	0.04
2,4-Dinitrotoluene	121142	-	-	-	0.11	0.11
1,2-Diphenylhydrazine	122667	-	-	-	0.04	0.04
Hexachlorobenzene	118741	1	1	0.03	0.00075	0.00075
Hexachlorobutadiene	87683	-	-	-	0.44	0.44
Hexachloroethane	67721	-	-	-	1.9	1.9
Indeno(1,2,3-cd)Pyrene	193395	-	-	-	0.0044	0.0044
N-Nitrosodimethylamine	62759	-	-	-	0.00069	0.00069

Compound	CAS Number	State MCL ug/L	Federal MCL ug/L	State PHG in Drinking Water ug/L	CTR Lowest Criterion unless noted ug/L	Trigger (ug/L)
N-Nitrosodi-n-Propylamine	621647	-	-	-	0.005	0.005
Aldrin	309002	-	-	-	0.00013	0.00013
alpha-BHC	319846	-	-	-	0.0039	0.0039
beta-BHC	319857	-	-	-	0.014	0.014
gamma-BHC	58899	0.2	0.2	-	0.019	0.019
delta-BHC	319868	-	-	-	-	5.0
Chlordane	57749	0.1	2	0.03	0.00057	0.00057
4,4'-DDT	50293	-	-	-	0.00059	0.00059
4,4'-DDE	72559	-	-	-	0.00059	0.00059
4,4'-DDD	72548	-	-	-	0.00083	0.00083
Dieldrin	60571	-	-	-	0.00014	0.00014
alpha-Endosulfan	959988	-	-	-	0.0087	0.0087
beta-Endosulfan	33213659	-	-	-	0.0087	0.0087
Endrin	72208	2	2	1.8	0.0023	0.0023
Endrin Aldehyde	7421934	-	-	-	0.76	0.76
Heptachlor	76448	0.01	0.4	0.008	0.00021	0.00021
Heptachlor Epoxide	1024573	0.01	0.2	0.006	0.0001	0.0001
Polychlorinated biphenyls (PCBs) total	1336363	0.5	0.5	-	0.00017	0.00017
Toxaphene	8001352	3	3	0.03	0.0002	0.0002
1,4-dioxane	123911	3 (See Note 4)	-	-	-	3
Perchlorate	14797730	-	-	6	-	5
Freon 12 (Dichlorodifluoromethane)	75718	-	-	-	0.19 (See Note 3)	0.19
Other Oxygenates (Other than MTBE)	-	-	-	-	-	5
Other VOCs	-	-	-	-	-	5
Other SVOCs	-	-	-	-	-	5
Turbidity (Units)	-	5	5	-	-	5
Odor-Threshold (Units)	-	3	3	-	-	3
Total Petroleum Hydrocarbons other than Gasoline and Diesel	-	-	-	-	-	50 (see Note 5)
Sulfate	-	250,000	250,000	-	-	250,000
Foaming Agents	-	500	500	-	-	500
Color (Units)	-	15	15	-	-	15

Legend:
CAS = Chemical Abstract System
PHG = Public Health Goal
CTR = California Toxics Rule
NA = Not Applicable
MCL = Maximum Contaminant Level
BPJ = Best Professional Judgment

Notes:
1 If total chromium concentration exceeds 11 then Chromium (VI) analysis shall also be done
2 Basin Plan
3 USEPA National Recommended Ambient Water Quality Criteria
4 California Department of Health Services Action Level for Drinking Water
5 The 50 ug/l trigger is based on BPJ. If a Discharger is reporting monitoring data with a detection level higher than 50 ug/l, the reason for a higher detection level shall be fully explained in the monitoring report.

7. **Basis for Individual NPDES Permit may be Required.** Provision VI.C.11, Individual NPDES Permit may be Required, is based on 40 CFR 122.28(b)(3).

8. **Basis for Treatment Reliability Requirement.** Provision VI.C.11, Treatment Reliability, is mostly based on 40 CFR 122.41. The basis for the requirement for a certified engineer to oversee the treatment and operation of the treatment system is to ensure that qualified professionals perform this work. Service stations operators are generally not qualified for this technical level of oversight.

VIII. PUBLIC PARTICIPATION

The California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) is considering the reissuance of general waste discharge requirements (GWDRs) that will serve as a National Pollutant Discharge Elimination System (NPDES) permit. As a step in the GWDR adoption process, the Regional Water Board staff has developed tentative GWDRs. The Regional Water Board encourages public participation in the GWDR adoption process.

A. Notification of Interested Parties

The Regional Water Board has notified the Dischargers and interested agencies and persons of its intent to prescribe waste discharge requirements for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Notification was provided through a legal notice published in the Recorder.

B. Written Comments

The staff determinations are tentative. Interested persons are invited to submit written comments concerning these tentative GWDRs. Comments should be submitted either in person or by mail to the Executive Office at the Regional Water Board at the address above on the cover page of this Order.

To be fully responded to by staff and considered by the Regional Water Board, written comments should be received at the Regional Water Board offices by 5:00 p.m. on October 2, 2006.

C. Public Hearing

The Regional Water Board will hold a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date:	November 13, 2006
Time:	10:00 AM
Location:	Elihu Harris State Building (1st Floor auditorium) 1515 Clay Street (Walking distance from City Center 12th Street BART station) Oakland, CA 94612

Interested persons are invited to attend. At the public hearing, the Regional Water Board will hear testimony, if any, pertinent to the discharge, GWDRs, and permit. Oral testimony will be heard; however, for accuracy of the record, important testimony should be in writing.

Please be aware that dates and venues may change. Our web address is http://www.waterboards.ca.gov/sanfranciscobay where you can access the current agenda for changes in dates and locations.

D. Waste Discharge Requirements Petitions

Any aggrieved person may petition the State Water Resources Control Board to review the decision of the Regional Water Board regarding the final GWDRs. The petition must be submitted within 30 days of the Regional Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

E. Information and Copying

The Report of Waste Discharges (RWD), related documents, tentative effluent limitations and special provisions, comments received, and other information are on file and may be inspected at the address above during regular office hours, which are generally weekdays from 8:00 a.m. to 5:00 p.m., excluding 12:00 p.m. to 1:00 p.m. lunch hours and holidays. Copying of documents may be arranged through the Regional Water Board by calling (510) 622-2300.

F. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference this facility, and provide a name, address, and phone number.

G. Additional Information

Requests for additional information or questions regarding this order should be directed to **Farhad Azimzadeh at (510) 622-2310 or by e-mail at fazimzadeh@waterboards.ca.gov.**

ATTACHMENT G - NOTICE OF STARTUP OR RE-STARTUP

A PDF electronic copy of this Form shall be uploaded on GeoTracker

A Groundwater Treatment System authorized to Discharge under the Requirements of
ORDER NO. R2-2006-XXXX
NPDES PERMIT NO. CAG912002 (FUEL)

Submitted by:
Name and Title: _____ Phone &Email: _____

For Groundwater Treatment Facility located at:

_____ _____
Type or Print Facility Address above the line
File No: 1210.44

WDID No.
Please refer to Authorization Letter

Please mark one of the applicable lines:

Table 1. Mark only one as applicable

No.	Action	Date
1	Initial Startup. Are you providing at least two weeks notification? If not, change the date to provide at least two weeks notification.	
2	Re-Startup (Shut Down occurred more than 120 Hours before re-start date) and start up phase monitoring requirements in Section IX.A of the Attachment E will be repeated	
3	Re-Startup (Shut Down occurred less than 120 Hours before re-start date)	No need to file this notice

Table 2. Please explain if answer is "No" to any questions listed in the Check List below:

No.	Question	Yes or No	Comments
1	Is a copy of the Order and SMP kept at the facility?		
2	Is a copy of the Authorization kept at the facility?		
3	Is a copy of the Operation and Maintenance (O&M) Manual kept at the facility?		

No.	Question	Yes or No	Comments
4	Is this O & M Manual certified by a California registered engineer?		
5	Does the O&M Manual include names of the operators and those who take sample at this facility?		
6	Are adequate treatment facility maintenance and inspection schedules and procedures included in the O & M Manual?		
7	Are sampling procedures described in the O & M Manual?		
8	Does discharger maintain a log of all sampling events?		
9	Are the operators familiar with the O&M Manual?		
10	Does O&M Manual include procedures for receiving water sampling? Are they followed?		
11	Do O&M Manual sampling procedures include quality assurance activities?		
12	Do the sampling procedures include field and trip blanks?		
13	Can operator explain what will happen in case of a power outage?		
14	Can operator explain what will happen in case of a pump failure?		
15	Is there an automatic shut down system in case of any component's failure?		
16	Are the sampling procedures followed during a sampling event?		
17	Is the influent sample being collected at a point in the extraction system immediately prior to inflow to the treatment unit?		
18	Is the effluent sample being collected at a point immediately following the treatment facility?		
19	Are influent and effluent sampling ports properly marked?		
20	Is the treatment facility adequately fenced and gated?		
21	Is receiving water accessible for inspection? If so, did you conduct standard observations? (see page 5 of the SMP or the other side of this sheet)		

ATTACHMENT H - NOTICE OF TEMPORARY SHUT DOWN

A PDF electronic copy of this Form shall be uploaded on GeoTracker and after GeoTracker upload a confirmation email shall be sent to the responsible staff member at this office, currently Lourdes Gonzales, at lgonzales@waterboards.ca.gov.

This form is for the Groundwater Treatment Facility located at:

Type or Print Facility Address above the line File No: 1210.44	WDID No. Please refer to Authorization Letter

This Groundwater Treatment System is authorized to Discharge under the Requirements of
ORDER NO. R2-2006-XXXX
NPDES PERMIT NO. CAG912002 (FUEL)

Please explain the following:

1) Temporary Shut Down Date?
2) Expected Re-Start Date?
3) Is the difference between 1 and 2 above more than 120 business hours?
   If so, do you understand that start up phase monitoring requirements in Section IX.A of the Attachment E shall be repeated?
4) If the difference between 1 and 2 above is not more than 120 business hours, no need to file this notice.

Note: The Regional Water Board may modify this form at any time to reflect the new requirements and other needed improvements.

ATTACHMENT I - NOTICE OF TERMINATION

A PDF electronic copy of this Form shall be uploaded on GeoTracker and after GeoTracker upload a confirmation email shall be sent to the responsible staff member at this office, currently Lourdes Gonzales, at lgonzales@waterboards.ca.gov.

For Facilities Permitted to Discharge Treated Groundwater under the Requirements of
ORDER NO. R2-2006-XXXX
NPDES PERMIT NO. CAG912002 (FUEL)
For Groundwater Treatment Facility located at:

_____ _____

Type or Print Facility Address above the line
File No: 1210.44

WDID No.
Please refer to Authorization Letter

Table 1. Mark only one as applicable

1	Groundwater cleanup works have been completed	
2	Method of groundwater cleanup has been changed with no need to discharge treated groundwater	
3	Extract and treat method of groundwater cleanup will be stopped for a while and only groundwater will be monitored at this site. In this case, documentation shall be attached to this Notice that the cleanup overseeing agency has no objection to have this authorization rescinded. Otherwise complete Notice Temporary Shut Down (Attachment H)	
4	Dewatering cleanup project has been completed	
5	Other reasons such as discharge to POTW has been granted	

Table 2. If you have marked number one in Table 1, please add the name, address, and phone number of the agency and agency staff finding the clean up work to be complete and you have also provided a copy of this termination notice:

	Name, address, and phone number of the agency and agency staff finding your clean up work to be complete	Have you provided a copy of this termination notice to this staff? (Yes/No. If No, please explain the reason)
1		
2		

I certify under penalty of law that this notice is prepared under my direction or supervision and the effective termination date of this Discharge is _____. I am aware that discharging without a discharge authorization is in violation of California Water Code.

_____ _____

Name (print) Signature and Date

_____ _____

Title/Organization Address

Note: The Regional Water Board may modify this form at any time to reflect the new requirements and other needed improvements.

Attachment L

11-13-11, Incorporated Final-Final spec version from Water Quality, HKT**

11-11-11, Revisions per Jeng Tsai, BMW**
11-07-11, Par 1b: Ok A.Ochoa, HKT**
11-06-11, Pending Par 1b, HKT**
11-06-11, Incorporated Spec from CDS** and JT** (11-03-11) HKT**
2-22-12, Updated water board Order JT**

DOE's Note - Project Handouts:

Water Quality Information Handout (per Par 8)

Site Investigation Report (per Par 11)

This NSSP is needed to address dewatering of contaminated groundwater. There is no SSP available that specifies the reqirements for treatment or discharge of contaminated water.

ALL NEW
07DNSW

Item Code: 074059A Dewatering and Non-Storm Water Discharge Control (LS)
$300,000

Consult with Construction to verify the need for a permit or appropriate water quality limitations.

Use with SSP S5-630 "Relations with California Regional Water Quality Control Board. Include the name of the permit or order in S5-630.

Use for constituents other than sediment and turbidity, edit for the constituents to be treated.

Edit for the dewatering operations anticipated.

Edit for the treatment system components anticipated. Reference POTW Monitoring and Reporting Requirements, or the General NPDES permit with Order No., Monitoring and Reporting Program requirements

10-1.__ DEWATERING AND NON-STORM WATER DISCHARGE CONTROL

GENERAL

Summary

Edit for the dewatering operations anticipated.

11-07-11, Par 1b: Ok A.Ochoa, HKT**

11-06-11, Propose to Make the last 2 para as Par 1b, and start with "Contractor's action" instead for "work includedes - twice", HKT**

CDS**

This work includes collection, conveyance, treatment, and discharge or disposal of accumulated precipitation and groundwater encountered during excavations for structures, roadways, and appurtenances. Site investigations within the project area have determined that contaminant levels of petroleum hydrocarbons, metals and other constituents exist therefore water discharges are subject to regulatory restrictions. ~~This work includes designing, implementing, monitoring, maintaining, and later removing a dewatering and non-storm water discharge treatment system. Comply with "Water Pollution Control," and "Construction Site Management," of these special provisions. Maintenance includes disposal of sediments and other material removed from the collection, conveyance and treatment systems.~~

1b

11-07-11, Par 1b: Ok A.Ochoa, HKT**

11-06-11, Make the last 2 para as Par 1b, and start with "Contractor's action" instead for "work includes - twice", HKT**

The Contractor must design, implement, monitor, maintain, and later remove a dewartering and non-storm water discharge treatment system in compliance ~~This work includes designing, implementing, monitoring, maintaining, and later removing a dewatering and non-storm water discharge treatment system. Comply~~ with "Water Pollution Control," and "Construction Site Management," of these special provisions. Maintenance includes disposal of sediments and other material removed from the collection, conveyance and treatment systems.

2

The Department's "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual" (Preparation Manual) are available at:

Updated manual. CDS**

http://www.dot.ca.gov/hq/construc/stormwater/SWPPP_Prep_ManualJune2011.pdf
~~http://www.dot.ca.gov/hq/construc/SWPPP_WPCP_Preparation.pdf~~

3*. Edit for General NPDES permit/order or permits from POTW facility that apply to discharge of non-stormwater or other treated water.

2-22-12, Updated water board Order JT**

Discharge groundwater, impounded construction site water, or both, using any of the following methods:

1. Discharge into a Publicly Owned Treatment Works (POTW) facility (sanitary sewer) under a batch discharge permit. Apply for and comply with the provisions contained in the permit and pay all fees assessed by the POTW facility in connection with the discharge.
2. Discharge into a storm drain system under Order No. ~~R2-2006-0075~~R2-2012-0012 adopted by the San Francisco Bay Regional Water Quality Control Board (RWQCB). Comply with "Relations with California Regional Water Quality Control Board," of these special provisions for discharges to the storm drain system. If the discharge is to the storm drain system, comply with the provisions of Order No. ~~R2-2006-0075~~R2-2012-0012 and pay all fees in connection with obtaining coverage under the Order No. ~~R2-2006-0075~~R2-2012-0012.
3. Use water treated under Order No. ~~R2-2006-0075~~R2-2012-0012 for dust control.

4. Percolate water treated under Order No. ~~R2-2006-0075~~R2-2012-0012 into soil in inactive work areas.

4

Maintain copies of the permits at the job site and make them available during construction.

5

Submittals

2-22-12, Updated water board Order JT**

Before discharging submit:

1. Dewatering and D~~d~~ischarge plan
2. POTW permit if applicable
3. Notice of Intent (NOI) of discharge under Order No. ~~R2-2006-0075~~R2-2012-0012 if applicable
4. A report describing each component of the planned Groundwater Treatment System and an Operation and Maintenance Manual in conformance with Order No. ~~R2-2006-0075~~R2-2012-0012 and these special provisions if applicable

6*. Edit for the DDP contents, i.e. special requirements in permit requirements, estimated volume of water/groundwater seepage rates and disposal facility information

Dewatering and Discharge Plan

The D~~d~~ewatering and D~~d~~ischarge P~~p~~lan (DDP) must include:

1. Title sheet
2. Table of contents
3. Certification and approval sheet (Section 100 of the Preparation Manual)
4. Amendment log and format (Section 200 of the Preparation Manual)
5. Description and schedule of the dewatering and discharge operations
6. Description of discharge alternatives, including POTW, dust control, percolation, storm sewers, and surface waters
7. Description of any treatment system components including an Operations and Maintenance Manual providing for all requirements in the applicable Discharge Permit

11-13-11, Replaced Item 8, per BMW (11-11-11)/JT**, and Format, HKT****
11-11-11, Minor edits - Deleted extra spaces, BMW**
CDS**
JT 9/20/11**
AO 11/8/11**

~~8. If you use chemical coagulants, in-line flocculants, or both, in the treatment system, submit a Coagulant Pollution Prevention Plan (CPPP) with the DDP. Chemical coagulants and flocculants proposed for use in the treatment of non-stormwater must comply with all provisions under "Active Treatment System (ATS) Requirements" within Attachment F Provisions D and E, in the National Pollutant Discharge Elimination System (NPDES) General Permit For Storm Water Discharges, associated with~~

~~Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ, NPDES No. CAS000002, available at:~~

~~http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml~~

~~The CPPP must include:~~

8. If you use chemical coagulants, in-line flocculants, or both, in the treatment system, submit a Coagulant Pollution Prevention Plan (CPPP) with the DDP.
The CPPP must include:

8.1. Description of the best management practices (BMPs) to prevent:

8.1.1. Accidental spillage
8.1.2. Overfeeding into the treatment system
8.1.3. Other mishandling of coagulant agents

8.2. Coagulant monitoring plan that complies with the following Residual Chemical and Toxicity Requirements:

8.2.1 The discharger shall utilize a residual chemical test method that has a method detection limit (MDL) of 10% or less than the maximum allowable threshold concentration (MATC) for the specific coagulant in use and for the most sensitive species of the chemical used.
8.2.2. The discharger shall utilize a residual chemical test method that produces a result within one hour of sampling.
8.2.3. The discharger shall have a California State certified laboratory validate the selected residual chemical test. Specifically the lab will review the test protocol, test parameters, and the detection limit of the coagulant. The discharger shall electronically submit this documentation as part of the ATS Plan.
8.2.4. If the discharger cannot utilize a residual chemical test method that meets the requirements above, the discharger shall operate the ATS in Batch Treatment **4** mode
8.2.5. A discharger planning to operate in Batch Treatment mode shall perform toxicity testing in accordance with the following:

8.2.5.1. The discharger shall initiate acute toxicity testing on effluent samples representing effluent from each batch prior to discharge 5. All bioassays shall be sent to a laboratory certified by the Department of Health Services (DHS) Environmental Laboratory Accreditation Program (ELAP). The required field of testing number for Whole Effluent Toxicity (WET) testing is E113.6.
8.2.5.2. Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, USEPA-841-R-02-012" for Fathead minnow, *Pimephales promelas* (fathead minnow). Acute

toxicity for *Oncorhynchus mykiss* (Rainbow Trout) may be used as a substitute for testing fathead minnows.

8.2.5.3. All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.

8.2.5.4. The discharger shall electronically report all acute toxicity testing.

8.3. Description of the agent (chemical and trade name description)

Chemical coagulants and flocculants proposed for use in the treatment of non-stormwater must comply with the following:

8.3.1. Jar tests shall be conducted using water samples selected to represent typical site conditions and in accordance with ASTM D2035-08 (2003).

8.3.2. The discharger shall conduct, at minimum, six site-specific jar tests (per polymer with one test serving as a control) for each project to determine the proper polymer and dosage levels for their ATS.

8.3.3. Single field jar tests may also be conducted during a project if conditions warrant, for example if construction activities disturb changing types of soils, which consequently cause change in storm water and runoff characteristics.

8.4. Pure product freshwater and marine aquatic toxicity data for the agent

9. Estimated flow rates
10. Operation and system maintenance procedures and example maintenance log for any treatment system
11. Field-recorded data, visual inspection, and calibration procedures and example logs including a sample Daily Inspection Report form
12. Measuring equipment descriptions
13. Working drawings of dewatering and discharge operations showing:

13.1. Section and plan views of any effluent treatment system
13.2. Location of sampling points for water quality measurements
13.3. Flow path and placement of pipes, hoses, pumps, holding tanks, and other equipment used to convey water
13.4. General position of dewatering, and discharge components relative to excavations or other operations requiring dewatering
13.5. Point of discharge

7*. RWQCB(s) require 30-day review period for the DDP, before beginning any dewatering activities. Deviation from the timeframes indicated are allowed only with the approval of the District Construction Storm Water Coordinator.

CDS**

Within 30 ~~15~~ days after contract approval, submit 3 copies of the DDP to the Engineer. Allow 30 ~~15~~ days for the Engineer's review. If revisions are required, the Engineer will provide comments and specify the date that the review stopped. Revise and resubmit the DDP within 7 days of receipt of the Engineer's comments. The Engineer's review will resume when the

complete DDP is resubmitted. When the Engineer approves the DDP, submit 4 copies with compact discs of the approved DDP to the Engineer. After approval, the Engineer will submit one copy of the approved DDP to the RWQCB for their review and comment. If the RWQCB provides comments to the DDP, the Contractor must amend the DDP. Dewatering activities may begin no sooner than 45 days after the Engineer approves the DDP. If the Engineer fails to complete the review within the time allowed and if, in the opinion of the Engineer, completion of the work is delayed or interfered with because of the Engineer's or the RWQCB's review, you will be compensated for resulting losses, and an extension of time will be granted, as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

8*. Edit for the Non-Stormwater Information Package contents, i.e. General NPDES permit requirements and permits from POTW facility that will apply to dewatering discharges, estimated volume of water/groundwater seepage rates

11-11-11, Revisions per Jeng Tsai, BMW**
CDS**
2-22-12, Updated water board Order and revision for information handout JT**

A Storm Water Information Handout has been prepared for this contract and is available as described in "Supplemental Project Information" of these special provisions. This Information Package includes:

1. Estimated groundwater seepage rates in the project area
2. RWQCB General Waste Discharge Requirements for Order No. ~~R2-2006-0075~~R2-2012-0012 NPDES General Permit No. CAG912002
3. Local POTW facility information
4. Soil and groundwater sampling results

9

MATERIALS

Non-Storm Water Treatment and Discharge System

Design and implement an appropriate water treatment system for the site conditions and your estimated flow rate to achieve and maintain compliance with receiving water limitations and discharge effluent limitations. System components may include:

1. Treatment system.
2. Collection and conveyance system.
3. Temporary holding tanks.
4. Discharge attenuator.

10*. Edit for the constituents to be treated, or include the Title of the Investigation Report that lists the constituents to be treated, and provide location where this Report can be found.

Treatment Systems

CDS**

Treatment systems must be designed to remove turbidity-producing suspended solids and petroleum hydrocarbons as listed in the soil and groundwater sampling results.

11

Attention is directed to "Supplemental Project Information," of these special provisions for obtaining a copy of the Site Investigation Report.

12

Primary and secondary treatment may be required, or the design of the treatment system may require combined use of the various treatment components in series to achieve effective treatment. Ensure that the treatment system components are steam cleaned to remove any residual contaminants. Treatment system components may include:

1. Desilting basins
2. Weir tanks
3. Settling tanks
4. Sediment traps
5. Gravity bag filters
6. Sand media filters
7. Pressurized bag filters
8. Cartridge filters
9. In-line chemical coagulants and/or flocculants
10. Activated clay filters
11. Activated carbon filters
12. A combination of these systems to provide primary and secondary treatment

13

Chemical coagulants and/or flocculants proposed for use in the treatment of groundwater must be approved by the RWQCB. You are fully and solely responsible for securing approval from the RWQCB. Written approval from the RWQCB must be submitted to the Engineer for review prior to any use of flocculants on this project. The Information Package includes an outline of the information required by the RWQCB for approval of the chemical coagulants and/or flocculants for use in the Treatment System.

14

Disposal of sediments removed during maintenance of the Treatment System must comply with Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

15

If necessary, treat water discharged to surface water or storm drainage systems to adjust the pH, dissolved oxygen, and residual chemicals introduced by the treatment system. Treatment for water with high pH may include the addition of carbon dioxide, sulfuric acid, phosphoric acid, citric acid, or nitric acid in conformance with the supplier's specifications. Treatment for water with low pH may include filtration through a limestone bed or the addition of sodium hydroxide. Treatment for water with low dissolved oxygen may include aeration.

16*. Edit for location where information on anticipated flow rate per Geotech Design recommendations is available. Use flow rate units per Geotech Design. Edit the last sentence if well points will not cause migration of groundwater contaminant plumes.

CDS**

~~Attention is directed to "Supplemental Project Information," in these special provisions for "Log of Test Borings," and the "Non-Stormwater Information Package," for estimating the~~

~~groundwater seepage (flow rate) in the area to design the treatment facilities to accommodate anticipated flow rates. Continuous pumping from well points outside the excavation is prohibited.~~

17

The various components must be maintained to prevent leaks and provide proper function. If a component of the dewatering equipment is not functioning properly, the dewatering operation must be discontinued and the component must be repaired or replaced.

18. Edit for the collection and conveyance system components anticipated for the project.

Collection and Conveyance System

CDS**

~~You may divert the water pumped during dewatering operations from one footing excavation to another footing excavation. Prior to backfilling the excavation, the remaining groundwater must be pumped from the excavation and treated prior to discharge.~~

19

Provide all pumps and piping to convey the water to temporary holding tanks and the point of discharge.

20

Use a flow meter, as described in "Flow Rate Monitoring" of this section, to measure all discharges from dewatering operations.

21

Materials must conform to the provisions in Section 6, "Control of Materials," Section 7-1.16, "Contractor's Responsibility for the Work and Materials," and Section 74-2, "Drainage Pumping Equipment," of the Standard Specifications and these special provisions.

22. Include para 15-19 if holding tanks are anticipated for the project.

Temporary Holding Tanks

CDS**

Water pumped during dewatering operations ~~that is not diverted to other excavations~~ must be stored in temporary holding tanks placed at the work area for treatment to remove sediment.

23

Use temporary holding tanks including transportable closed top holding tanks or tanker trucks. A sufficient number of holding tanks shall be provided based on the following:

1. Anticipated flow rate
2. Pumping rates
3. Capacity inefficiencies due to sediment retention within the holding tanks
4. Sediment settling rates
5. Sediment removal frequency
6. Anticipated water loss or reuse rates

24

Provide temporary holding tanks with a holding capacity sufficient to handle the water removed from dewatering operations, and prevent delay of work.

25

Each temporary holding tank must have an inlet and outlet capable of receiving and discharging flows at a sufficient rate to dewater the excavation.

26

Maintain a minimum freeboard of 0.3 meter in each of the temporary holding tanks at all times. Clean the holding tanks when 25 percent of the tank's volume is filled with sediments.

27

CONSTRUCTION

Discharging Water

Use discharged treated water or uncontaminated ground or surface water for dust control in active work areas when possible, or discharge the water to an inactive area where the grade prevents sheet flow and the soil will allow percolation. The discharge point in the inactive area must include a velocity dissipater. The discharge volume must not exceed the area's capacity for percolation.

28

Do not discharge into a body of water where erosion, scour, or sedimentary deposits could occur that impact natural bedding or aquatic life. Monitor the water at the discharge point using water quality measurements and visual observation in conformance with the regulatory permit and these special provisions.

29

Storm water must be diverted away from excavations that would require dewatering.

30*. Edit to include General NPDES permit No/Order No. that includes monitoring and reporting requirements

Inspection, Monitoring, and Reporting

2-22-12, Updated water board Order JT**

If treated groundwater is discharged to the storm drain system, perform compliance monitoring in conformance with the Monitoring and Reporting Program (MRP) included in Attachment E of the Order No. ~~R2-2006-0075~~R2-2012-0012. If a batch discharge permit is obtained from a POTW, comply with the provisions contained in the batch discharge permit including all monitoring and reporting requirements.

31

During periods when the dewatering and non-storm water discharge operations occur, document the results in a Daily Inspection Report (DIR). The DIR form must include the discharge volume records and water quality monitoring records. In developing the DIR, refer to the Department's Dewatering Guide. The DIR form must be approved by the Engineer before use. The DIR must be provided weekly or as directed to the Engineer.

32

All information and recorded data collected or submitted as part of the DIR must be certified as true and accurate and signed by those who gather the information.

33

Visual Inspection

During each day of discharge, perform daily inspection of the effluent at the discharge site and include, in the DIR, observations of:

1. Date and Time.
2. Weather conditions,
3. Wind direction and velocity,
4. The presence or absence of water fowl or aquatic wildlife,
5. The color and clarity of the effluent discharge, and
6. Erosion or ponding downstream of the discharge site.

34

The DIR must include photographs of the discharge point and areas downstream of the discharge location. These photographs must be labeled with the time, date, and location.

35

Flow Rate Monitoring

A flow meter that has been approved by the Engineer for exclusive use in dewatering during construction must be used to measure all excavation discharges. All calibrations must be done in conformance with the manufacturer's instructions in the presence of the Engineer.

36

Record the flow-meter totalizer readings and compute average daily volumes for every day that dewatering is conducted.

37

Penalties and Withholdings

Know and comply with provisions of Federal, State, and local regulations and requirements that govern the work and storm water and non-storm water discharges from the job site and areas of disturbance outside the project limits during construction under Section 7-1.01, "Laws to be Observed," Section 7-1.11, "Preservation of Property," and Section 7-1.12, "Indemnification and Insurance," of the Standard Specifications.

38

You are responsible for all penalties assessed as a result of your failure to comply with the provisions in "Water Pollution Control" of these special provisions or with the applicable provisions of the Federal, State, and local regulations and requirements.

39

Penalties include fines, penalties, and damages, whether proposed, assessed, or levied against the Department or you, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Quality Control Act, by governmental agencies or as a result of citizen suits. Penalties also include payments made or costs incurred in settlement for alleged violations of applicable laws, regulations, or requirements. Costs incurred could include sums spent instead of penalties, in mitigation or to remediate or correct violations.

40

The Department withholds payment, in an amount estimated by the Department, to include the full amount of penalties and mitigation costs proposed, assessed, or levied as a result of a violation of the permits, or Federal or State law, regulations, or requirements. Funds will be withheld until final disposition of these costs has been made. You remain liable for the full amount until the potential liability is finally resolved with the entity seeking the penalties. Instead of the withhold, you may provide a suitable bond in favor of the Department to cover the highest estimated liability for any disputed penalties proposed as a result of the violation of the permits, law, regulations, or requirements.

41

If a regulatory agency identifies a violation of the permits and modifications thereto, or other Federal, State, or local requirements, the Department will withhold payment as follows:

1. The Department will give you 30 days notice of the Department's intention to withhold funds from payments that may become due before acceptance of the contract. After acceptance of the contract, funds will be withheld without prior notice.
2. If the amount being withheld from partial payments under Section 9-1.06, "Partial Payments," of the Standard Specifications exceeds the amount to be withheld for violations, no additional payment will be withheld.
3. If the Department withholds funds and it is subsequently determined that the State is not subject to the entire amount of the costs and liabilities assessed or proposed in connection with the matter for which the withhold was made, the Department will return the excess amount withheld in the progress payment following the determination. If the matter is resolved for less than the amount withheld, the Department will pay interest at a rate of 6 percent per year on the excess withhold.

42

Notify the Engineer immediately upon request from a regulatory agency to enter, inspect, sample, monitor, or otherwise access the job site or obtain records pertaining to water pollution control work. Provide copies of correspondence, notices of violation, enforcement actions, or proposed fines by regulatory agencies to the requesting regulatory agency.

43

PAYMENT

The contract lump sum price paid for dewatering and non-storm water discharge control includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in dewatering, including preparing the dewatering and discharge plan, implementing the MRP, obtaining all required permits, payment of fees for all permits and payment for discharge fees for disposal of treated water and sediments removed during maintenance of the treatment system as specified in the Standard Specifications, and these special provisions, and as directed by the Engineer.

San Francisco – Oakland Bay Bridge

East Span Seismic Safety Project

CALIFORNIA DEPARTMENT OF TRANSPORTATION

BIRD MANAGEMENT PLAN FOR BRIDGE DISMANTLING

Supplement to the 2003 Final (Revised) Bird Monitoring and Management Plan

February 23, 2012

Alameda and San Francisco Counties
District 4 – Interstate 80
EA 04-0120T1 & 04-012091

For individuals with sensory disabilities, this document is available in Braille, large print, on audiocassette, or computer disk. To obtain a copy in one of these alternate formats, please call or write to Caltrans, Attn: Stefan Galvez-Abadia, Environmental Compliance Manager, Biological Sciences and Permits, 111 Grand Avenue, Oakland, CA 94612; (510)-867-6785 Voice, or use the California Relay Service TTY number (800)-735-2

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Acronyms and Abbreviated Terms

BCDC	San Francisco Bay Conservation and Development Commission
2003 BMMP	2003 Final (Revised) Bird Monitoring and Management Plan
2012 BMP	Bird Management Plan for Bridge Dismantling (Supplement to the 2003 Final (Revised) Bird Monitoring and Management Plan)
BPP	Bird Protection Plan
CDFG	California Department of Fish and Game
CFGC	California Fish and Game Code
CESA	California Endangered Species Act
Department	California Department of Transportation
FEIS	Final Environmental Impact Statement
FESA	Federal Endangered Species Act
MBTA	Migratory Bird Treaty Act
NMFS	National Marine Fisheries Service
OTD	Oakland Touchdown
RWQCB	Regional Water Quality Control Board
SAS	Self-Anchored Suspension
SCPBRG	Santa Cruz Predatory Bird Research Group
SFOBB	San Francisco-Oakland Bay Bridge
SFOBB Project	San Francisco-Oakland Bay Bridge East Span Seismic Safety Project
SWPPP	Storm Water Pollution Prevention Plan
USFWS	United States Fish and Wildlife Service
YBI	Yerba Buena Island
YBI Detour	Yerba Buena Island Detour

CHAPTER 1 – INTRODUCTION

1.1 Project Description

The California Department of Transportation (Department) is in the process of replacing the east span of the San Francisco-Oakland Bay Bridge (SFOBB) with a new bridge immediately to the north of the existing span. The SFOBB East Span Seismic Safety Project (SFOBB Project) site is located in the central San Francisco Bay, between Yerba Buena Island (YBI) in the City and County of San Francisco, and the City of Oakland, in Alameda County, in California (Figure 1.1). The SFOBB Project includes both the construction of the new east span and the dismantling of the existing east span (Figure 1.2 and Appendix I). The SFOBB Project is a multi-year effort that involves a number of construction activities on land as well as in San Francisco Bay. Some of these activities could potentially affect protected bird species.

Figure 1.1. SFOBB Project and Vicinity

Figure 1.2. SFOBB new and existing east spans

To address impacts to environmental resources and protected species, the Department obtained permits from applicable regulatory agencies authorizing all activities associated with both the construction of the new east span and the dismantling of the existing east span. Permits obtained from the United States Fish and Wildlife Service (USFWS), the California Department of Fish and Game (CDFG), and the San Francisco Bay Conservation and Development Commission (BCDC) specifically addressed impacts to birds. CDFG Incidental Take Permit (No. 2081-2001-021-03) required a bird management plan to address bird management and monitoring during the construction of the new east span and dismantling of the existing east span.

In compliance with the CDFG permit requirement, the Department prepared the Final (Revised) Bird Monitoring and Management Plan (2003 BMMP) (Appendix II), which outlined the bird monitoring and management associated with construction of the new SFOBB east span. The 2003 BMMP provided a general discussion of measures to avoid impacts to birds during the dismantling. In addition, the 2003 BMMP stated that a separate plan will be prepared to address impact avoidance measures during the dismantling of the existing east span. As much of the work on the new SFOBB east span is nearing completion, with an anticipated bridge opening date in late 2013, this Bird Management Plan for Bridge Dismantling (2012 BMP) is necessary to address bird monitoring and management during the dismantling of the existing SFOBB east span.

1.2 Implementation of the 2003 Final (Revised) Bird Monitoring and Management Plan

The Final (Revised) Bird Monitoring and Management Plan for the SFOBB Project was prepared in September 2002 and revised in September 2003 to address endangered or threatened bird species and other protected bird species. The 2003 BMMP was prepared pursuant to the following agency requirements:

- United States Fish and Wildlife Service's Biological Opinion (Letter 1-1-02-F-0002),
- California Department of Fish and Game's Incidental Take Permit (No. 2081-2001-021-03),
- San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Final Environmental Impact Statement/Statutory Exemption and Final Section 4(f) Evaluation (FEIS), and
- San Francisco Bay Conservation and Development Commission Permit No. 2011.008.32 (formerly Permit No. 8-01).

These permits identify five bird species occurring and/or breeding in the SFOBB Project area:

- American peregrine falcon (*Falco peregrinus anatum*)
- California brown pelican (*Pelecanus occidentalis californicus*)
- California least tern (*Sterna antillarum browni*)
- Double-crested cormorant (*Phalacrocorax auritus*)

- Western gull (*Larus occidentalis*)

In addition to birds identified in SFOBB Project permits, the Department also observes other applicable state and federal regulations to protect birds within the SFOBB Project area. The Department has conducted bird monitoring and management activities since construction activities were initiated in 2002 to the present, under the guidance of the 2003 BMMP, which specifically addresses the following:

- Monitoring of active construction areas during pile driving, dredging, and general construction activities to assess potential effects on the five target bird species.
- Monitoring of peregrine falcon nests to assess the potential effects on the species from construction activities.
- Nest surveys on YBI by a Department biologist prior to vegetation removal.
- A bird management strategy that briefly outlines avoidance and minimization measures and scheduling guidelines to help avoid the take of (and minimize adverse effects on) birds that nest on the SFOBB. These birds include peregrine falcon, double-crested cormorant, and western gull.

1.3 Purpose of the 2012 Bird Management Plan for Bridge Dismantling

The 2003 BMMP requires the development of "a plan designed to minimize adverse impacts to… [peregrine falcons, double-crested cormorants, and western gulls] …within known nesting areas on the existing bridge ... prior to the beginning of dismantling activities. This plan will address impact avoidance measures such as appropriate scheduling of work activities, the timing of measures to prevent nesting on the existing east span, and buffer zones around the breeding colony" (Caltrans 2003:10). This 2012 BMP fulfills both the requirements of the 2003 BMMP and those presented by agency permits.

The 2012 BMP contains the following:

- Review of the protected bird species in the SFOBB Project area and all applicable permits and regulatory requirements guiding the monitoring and management of these birds.
- Outline of the bird management strategy during the removal of the existing east span. The management strategy focuses on surveys and monitoring, impact avoidance, adaptive management, and reporting.
- Recommendations for the use of seasonal avoidance, buffers, and deterrence measures to prevent birds from nesting on the existing east span prior to, and during, dismantling activities.
- An overview of all staging areas and structures that will be removed during the dismantling of the existing east span, bird species expected to be found in staging areas and on these structures, and adaptive bird management techniques recommended to minimize impacts to birds during the dismantling activities.

- Procedures to follow if a nest is established within the SFOBB Project area during active construction.

CHAPTER 2 – APPLICABLE PERMITS AND REGULATIONS

2.1 Overview

In addition to following state and federal statutes applicable to the management of bird species, the Department has obtained permits from the CDFG, USFWS, and BCDC. The permits and statutes both require management and protection of bird species and their active nests during the construction of the new SFOBB east span and the dismantling of the existing SFOBB east span.

For the purposes of this Bird Management Plan and compliance with agency permits, an "active nest" is a completed nest that contains any eggs or chicks and has not been abandoned. An "abandoned nest" is a nest that is either empty or that contains nonviable eggs, dead young, or an egg that has been "dumped" (i.e., cold and unattended). A "nest start" is defined as an incomplete nest that is currently under construction by birds, but that does not yet contain eggs. Nests of non-native, non-game birds occurring within the SFOBB Project area that are not covered under agency permits or laws may be removed and disposed of at any time in the breeding cycle. The bird nesting season is from February 1 to August 31, however, nesting may occur at any time of the year for some species in the SFOBB Project area.

Permits and applicable regulations include:

- CDFG Incidental Take Permit No. 2081-2001-021-03
- USFWS Biological Opinion No. 1-1-02-F-0002
- BCDC Permit No. 2011.008.32 (formerly Permit No. 8-01)
- Migratory Bird Treaty Act (MBTA)
- California Fish and Game Code (CFGC)
- California Endangered Species Act (CESA)
- Federal Endangered Species Act (FESA)

Brief summaries of these applicable permits and regulations are given below.

2.2 California Department of Fish and Game Incidental Take Permit

According to this permit (No. 2081-2001-021-03; issued November 19, 2001, as amended), specific bird populations in the SFOBB Project area must be monitored during construction and dismantling activities. The permit states that if, through monitoring, it is determined that SFOBB Project construction activities have resulted in the take (see MBTA, section 2.5) of one or more least terns or brown pelicans, the Department shall identify measures to avoid additional take. In addition, the permit states the Department will work with CDFG and USFWS to develop a plan to protect least terns or brown pelicans, should impacts and take occur. Furthermore, under this permit, the Department, in consultation with the CDFG "shall develop a management plan that addresses potential impacts to peregrine falcons and cormorants. The management plan shall discuss all bridge construction, removal, and maintenance activities and develop schedules for activities in order to avoid the take of peregrine falcons and cormorants,

especially during their critical nesting seasons." Finally, the permit stipulates that the Department "conduct compliance inspections at least once every week to…avoid the take of the covered species…" (CDFG 2001:8).

2.3 United States Fish and Wildlife Service Biological Opinion

The Biological Opinion (Number No. 1-1-02-F-0002; issued October 29, 2001) provides directives for all five of the above-listed species. It calls for monitoring and release efforts of the peregrine falcon. If construction or dismantling activities disturb nesting peregrines, monitors will collect eggs and/or capture and release any chicks present to a natural off-site location. Under this permit, the Department is required to monitor the double-crested cormorant colony and prevent nesting on the existing bridge where potential impacts by construction activities could occur. The Department is also required to monitor western gull during the nesting season and avoid impacts to active nests. In addition, the Biological Opinion advises the Department to conduct nesting bird surveys on YBI for species protected under the MBTA prior to vegetation clearing scheduled to occur during the nesting season. To reduce the potential for impacts, the Biological Opinion advises the Department to remove trees prior to the nesting season as much as possible, and avoid trees with active nests. The Department is also required to monitor for take of least tern and brown pelican. If the Department determines that take occurs, the Department is required to take action to address impacts (USFWS 2001).

2.4 San Francisco Bay Conservation and Development Commission Permit

Under BCDC Permit No 2011.008.32 (formerly Permit No. 8-01), issued November 20, 2001, as amended, the Department is required to work with USFWS to minimize or mitigate for impacts to birds. This permit specifically addresses the brown pelican, least tern, and double-crested cormorant. Under this permit, BCDC requires the Department to submit "evidence, such as a contract and/or agreement with the U.S. Fish and Wildlife Service, the UC Santa Cruz Predatory Bird Research Group (SCPBRG), and/or the Point Reyes Bird Observatory, that will ensure compliance with the terms of the Biological Opinion ... with respect to the California least tern and the brown pelican." Furthermore, this permit requires the Department to provide "evidence that a plan designed to minimize adverse impacts, such as monitoring procedures approved by the California Department of Fish and Game, in consultation with the Point Reyes Bird Observatory, to the double-crested cormorant colony ... and other migratory bird nesting and breeding on the structure is in place." (BCDC 2001:25-26).

2.5 The Migratory Bird Treaty Act

The MBTA (16 U.S.C., §703, Supp. I, 1989) prohibits killing, possessing, trading, or other forms of take of migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. "Take" is defined as the pursuing, hunting, shooting, capturing, collecting, or killing of birds, their nests, egg or young (16 U.S.C. §703 and §715n). This act encompasses whole birds, parts of birds, and bird nests and eggs. The MBTA does not protect non-native species.

The "Migratory Bird Permit Memorandum" issued by USFWS in 2003 provides some clarification of the MBTA. The removal of nests, without eggs or birds, is legal under the MBTA, provided no possession (interpreted in the memorandum as holding the nest with the intent of retaining it) occurs during the destruction (USFWS 2003). Abandoned eggs, such as

those "dumped" by birds would be considered an "abandoned nest" under MBTA policy; no possession of such eggs is allowed without a permit, but the eggs can be destroyed on-site.

2.6 California State Fish and Game Code

Native migratory birds are protected by the State of California under CFGC §3503. CFGC §3503 prohibits the take of all native bird nests and eggs. The CFGC also prohibits any disturbance that may cause nest abandonment and result in the loss of eggs or young. Nesting raptors are specifically protected under CFGC §3503.5, which states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." CFGC §3511 also defines certain bird species as "fully protected." Birds occurring in the SFOBB Project area that are considered "fully protected" include peregrine falcon, brown pelican, and least tern. The "fully protected" status affords legal protection against take irrespective of any other special status designation, or lack thereof (CFGC § 3500-3806).

To avoid take, the CDFG typically recommends buffers between active nests and construction activities. During the nesting season, the CDFG typically recommends a minimum buffer of 15 meters (50 feet) around active nests of non-raptors and 76 meters (250 feet) around active nests of raptors.

2.7 California Endangered Species Act

The CESA, as defined in CFGC §§ 2050-2116, prohibits the take of any plant or animal listed, or proposed for listing, as rare, threatened, or endangered. In accordance with the CESA, the CDFG has jurisdiction over state-listed species (CFGC §2070). The CDFG regulates all activities that may result in take of listed individuals, where "take" is defined as to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

2.8 Federal Endangered Species Act

The FESA protects federally listed wildlife species from harm or "take," which is broadly defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct" (USFWS 1973). Take can also include habitat modification or degradation that directly results in death or injury to a listed wildlife species. An activity can be defined as "take" even if it is unintentional or accidental. The USFWS and National Marine Fisheries Service (NMFS) have jurisdiction over federally listed, threatened and endangered species under the FESA.

CHAPTER 3 – BIRD SPECIES IN THE SFOBB PROJECT AREA

The species that were identified in agency permits as occurring and/or nesting within the SFOBB Project area, and were subsequently addressed in the 2003 BMMP, are:

- American peregrine falcon (MBTA, CFGC fully protected)
- California brown pelican (MBTA, CFGC fully protected)
- California least tern (federally and state endangered, MBTA, CFGC fully protected)
- Double-crested cormorant (MBTA, CFGC)
- Western gull (MBTA, CFGC)

In addition to those species called out in the 2003 BMMP, this 2012 BMP takes into account all bird species observed during ongoing monitoring and pre-dismantling surveys of the existing east span. This plan also considers common local species with a potential to breed in the SFOBB Project area in order to address species protections under the MBTA and the CFGC. The MBTA and the CFGC both cover a myriad of species occurring in the western hemisphere, many of which are not likely to occur, much less breed, within the SFOBB Project area. Table 3.1 provides a summary of species that are known to nest on the bridge or are considered likely to nest on, or adjacent to, the existing bridge.

Table 3.1. Potentially Impacted Bird Species within the SFOBB Project Area

Species	Federal/ State Status[1]	Nesting Season[2]	Presence	Nest Status	Known or Potential Nesting Locations
Species Identified in Agency Permits					
American peregrine falcon (*Falco peregrinus anatum*)	CFGC, MBTA	Feb 1 – Jun 30	Observed	Observed	Known to nest at Piers E2, E3, and E4.
California brown pelican (*Pelecanus occidentalis californica*)	CFGC, MBTA	Jan 1 – Jul 31	Observed	None	None. Foraging individuals regularly observed in SFOBB Project vicinity.
California least tern (*Sternula antillarum brownii*)	FE, SE, CFGC, MBTA	Apr 15 – Aug 31	Observed	None	Rarely observed foraging in SFOBB Project vicinity. No nesting habitat in SFOBB Project area.
Double-crested cormorant (*Phalacrocorax auritus*)	CFGC, MBTA	Mar 1 – Aug 31	Observed	Observed	Known to nest on bridge substructure between Piers E3 and E16.
Western gull (*Larus occidentalis*)	CFGC, MBTA	Mar 1 – Aug 31	Observed	Observed	Known to nest on marine foundations and other flat surfaces throughout the SFOBB Project vicinity.
Species Protected Under MBTA and CFGC, Not Identified in Agency Permits					
Anna's hummingbird (*Calypte anna*)	CFGC, MBTA	Dec 1 – Jun 30	Observed	Unknown	May nest in *Eucalyptus* and other trees (or large shrubs) on YBI.
Barn owl (*Tyto alba*)	CFGC, MBTA	Jan 1 – Oct 31[3]	Observed	Unknown	May nest on protected, flat areas under the bridge.
Black phoebe (*Sayornis nigricans*)	CFGC, MBTA	Feb 1 – Jul 31	Observed	Unknown	May nest on any vertical or horizontal surfaces on the bridge.
Brandt's cormorant (*Phalacrocorax penicillatus*)	CFGC, MBTA	Mar 1 – Jul 15	Observed	Observed	Known to nest on the cable-crossing structure immediately south of the bridge. May nest on bridge substructure within the double-crested cormorant colony between Piers E5 and E15.
Common raven (*Corvus corax*)	CFGC, MBTA	Mar 1 – Jul 15	Observed	Observed	Known to nest on bridge in vicinity of the YBI Detour.

Table 3.1. Potentially Impacted Bird Species within the SFOBB Project Area

Species	Federal/ State Status[1]	Nesting Season[2]	Presence	Nest Status	Known or Potential Nesting Locations
House finch (*Carpodacus mexicanus*)	CFGC, MBTA	Feb 15 – Aug 31	Observed	Unknown	May nest on any flat, horizontal surface on bridge especially over land. May also nest in trees and shrubs on YBI.
Killdeer (*Charadrius vociferus*)	CFGC, MBTA	Mar 1 – Aug 31	Potential	Unknown	May nest on gravel roads and ruderal staging areas.
Mourning dove (*Zenaida macroura*)	CFGC, MBTA	Feb 1 – Aug 31[3]	Potential	Unknown	May nest on any flat, horizontal surface on the bridge; may also nest in trees and shrubs on YBI.
Pigeon guillemot (*Cepphus columba*)	CFGC, MBTA	Apr 15 – Jul 31	Observed	Unknown	May nest in weep holes in footing at Pier E9 or other cavities on the bridge.

[1] Federal/State protective status designations for species in Table 3.1:

FE = Federally Endangered (protected under the Federal Endangered Species Act)

SE = State Endangered (protected under the California Endangered Species Act)

CFGC = Protected by Section 3503 of the California Fish and Game Code

MBTA = Protected by the Federal Migratory Bird Treaty Act

[2] Refers to the period when the species could have eggs or young in the nest.

[3] Anecdotal evidence suggests that some individuals may initiate breeding at any time of the year.

3.1 American Peregrine Falcon

Prior to 1999 the peregrine falcon was identified as a state and federally listed species. The USFWS delisted the peregrine falcon from the FESA in 1999 and the CDFG delisted it from the CESA in 2008. The peregrine falcon is recognized as "fully protected" by the CFGC, is identified federally as a "Bird of Conservation Concern," and is protected under the MBTA.

The nesting season for the peregrine falcon occurs from February through June. Breeding behavior is marked by territorial defense (chasing or attacking of other birds within the territory), increased vocalizations, "bowing" courtship displays, food transfers between male and female adults, and copulation. While the peregrine falcon does not build a nest of sticks, a "scrape" or "nesting depression" is made at the chosen location for egg-laying. Nest locations that occur on man-made structures like buildings or bridges are often enhanced by biologists, who add gravel to the nest area. Eggs are often laid in a scrape in this gravel (Cade et al. 1996). This species may double-clutch (i.e., initiate nesting after an initial failed nest attempt).

Peregrine falcons were known to nest on the east span prior to SFOBB Project construction. Since the mid-1980s observations have been made of an established, historic peregrine falcon territory that is located on the east side of YBI in the vicinity of the cantilever structure (i.e., Piers E2 to E4). The peregrines in this territory generally initiate nesting in March and lay eggs during mid- to late March. Eggs are incubated by both adults for approximately 33 days. After hatching, the adults care for and feed the young for an additional 30 to 35 days until fledging (leaving the nest). During 2003 to 2011, fledging at the SFOBB east span has typically occurred during late May to early June.

During monitoring conducted for the SFOBB Project from 2003 to 2011, the nest site for this territory has been located below the lower deck of the bridge in multiple locations (Table 3.2). For the past three years (2009-2011), the nest site has been located in a trapezoid-shaped alcove below the lower deck, on the north side of Pier E2 (Figure 3.1).

The birds in this territory appear to be tolerant of high ambient levels of noise, vibration and activities associated with construction. From 2009 to 2011, construction of the Self-Anchored Suspension (SAS) span has occurred directly north of the Pier E2 nest site within a range of 45 meters (98 feet) in 2009 to 29 meters (95 feet) in 2011. During this period of intense construction activity, the peregrine falcons have continued to successfully produce and fledge young. Currently, the construction area extends throughout the east span territory and heavy construction activities are occurring directly north of the Pier E2 nest site. Both adult and juvenile peregrine falcons have been observed in close proximity to construction activity. On several occasions, construction workers have passed within a few meters of an adult peregrine without causing the birds to flush (Figure 3.2).

While peregrine falcons within the east span territory appear habituated to routine sounds, vibrations, and visual disturbances associated with bridge construction, they are sensitive to unpredictable disturbances in close proximity to roost locations. Loud noises or sudden movements may cause the birds to flush. Juvenile birds are most susceptible to such disturbances, which may be fatal given their poorly-developed flying skills and the dangerous environment (e.g., vehicle traffic, open water and construction activities)

Figure 3.1. Peregrine falcon nestlings at 2009 nest site on the north side of Pier E2, located in a trapezoid-shaped alcove below the lower deck of the SFOBB.

Figure 3.2. Peregrine falcon perched on 6/23/2009 on walkway structure tolerant of construction worker.

Table 3.2. SFOBB Peregrine Falcon Nest Monitoring Summary from 2003-2011.

Year	Nest Location	Status	Approx. Lay Date*	Hatch Date	Fledge Date	Comments
2003	Pier E3 on the south side of the bridge facing YBI	Failed, did not re-nest	March 26 to April 4	n/a	n/a	First year of monitoring of the east span peregrine falcon territory.
2004	Pier E3 on the south side of the bridge facing YBI	Failed, did not re-nest	March 26	n/a	n/a	The adult female (Corona) was banded in September 2003 after being picked up off the Coronado Bridge in San Diego. She was rehabilitated and released in November 2003 in Santa Cruz.
2005	Trapezoid-shaped cavity on north side of Pier E2, below the lower deck of the bridge	Failed, did not re-nest, see below	March 16	April 22	n/a	Nest site not visible from YBI. An inspection of the nest on May 12 by the Santa Cruz Predatory Bird Research Group (SCPBRG) found one egg was laid, which was removed and later determined to be infertile.
2006	North leg of Pier E3, below the lower deck of the bridge	Failed, re-nested	March 17	n/a	n/a	This initial nesting attempt failed. See below for re-nesting information.
2006	Second gusseted plate west of Pier E2 on the south side of the bridge.	Young hacked off-site	June 3	July 7	n/a	On July 31, the nest was inspected by SCPBRG and contained 1 male nestling. This male was removed and transferred to a hack site in Santa Barbara County by SCPBRG and was ultimately killed by a coyote.
2007	Pier E3 below the lower deck of the bridge	Young hacked off-site	March 16	April 21	n/a	Nestlings removed from nest on May 15 and hacked out at SCPBRG facilities in Santa Cruz. Adults did not re-nest.**
2008	n/a	n/a	n/a	n/a	n/a	A single adult peregrine falcon was observed on five occasions. No nesting attempt occurred at the east span territory during 2008.
2009	South side of Pier E4 in an oval-shaped recess below the lower deck of the bridge	Failed, re-nested, see below	mid-March	April 21	n/a	The female of this new pair was banded at San Jose City Hall in 2007 and named Esperanza. Nest failed, pair re-nested; see below.
2009	Trapezoid-shaped cavity on north side of Pier E2, below the lower deck of the bridge	Successful	April 8	May 13	June 18 - 20	Three nestlings were observed. One nestling fledged on June 18 and the other two fledged around June 20. Two of these young peregrine falcons were observed subsequently during July and were assumed to have survived. The third fledgling was assumed to have died of unknown causes.
2010	Trapezoid-shaped cavity on north side of Pier E2, below the lower deck of the bridge	Successful	March 1-7	Mid-April	June 1 - 4	The same pair from 2009 nested again in 2010 at Pier E2 on the existing bridge. Four eggs were laid in late March to early April. Three of the eggs hatched. Three juveniles were banded prior to fledging: 1 female (16/R) and 2 males (78/S, 65/P). All successfully fledged.
2011	Trapezoid-shaped cavity on north side of Pier E2, below the lower deck of the bridge	Successful	March 16-21	April 19	May 30	Three juveniles were banded prior to fledging: 1 female (77/Z) and 2 males (92/S, 96/S). All fledged successfully.

*The lay-date is defined as the date at which the 3rd egg is laid. With an egg laid every other day, it takes approximately 8 days to lay a typical 4-egg clutch. Full time incubation usually begins on day 6, after the 3rd egg is laid.

**Following the removal of the 2007 nestlings, the adult peregrine falcons from the east span territory (known as Corona and Dapper Dan) were observed attacking a resident peregrine falcon (known as Gracie) near the West Span of the Bay Bridge; part of this attack was captured by photographer Glenn Nevill (http://www.raptor-gallery.com/05-18-07/index.htm). Dapper Dan nested on the West Span in 2008 and at the PG&E nest box in downtown San Francisco in 2009 and 2010.

3.2 California Brown Pelican

The brown pelican was formerly was listed as an endangered species under the CESA and the FESA due to population declines associated with pesticide residues in the environment. The brown pelican was delisted from both the CESA and the FESA in 2009; however, it is still protected under the MBTA and the CFGC. The CDFG includes brown pelican on their list of "fully protected" species.

The nesting season for brown pelican is from January through July. Nests take approximately four to ten days to complete. Clutch size is three eggs. Eggs hatch after 30 days of incubation and the young leave the nest when 11 to 12 weeks old (Poole 2005). Brown pelicans are commonly observed flying in and around the SFOBB Project area (Figure 3.3), but have not been documented as breeding within the SFOBB Project area, and the San Francisco Bay Area is not considered to be within the breeding range of the species. Individuals observed within the SFOBB Project area during the nesting season are likely non-breeders.

Figure 3.3. Adult brown pelican flying near the SFOBB construction area.

3.3 California Least Tern

The least tern (Figure 3.4) is federally and state-listed under both the FESA and CESA and is also protected by the MBTA and fully protected by the CFGC. During bird monitoring conducted from 2002 to 2011, least terns have been observed foraging primarily in the Port of Oakland Outer Harbor and south of the Oakland Touchdown (OTD). Least tern observations have consistently occurred near the shore, towards the various marinas and harbors along the waterfront of the East Bay. Monitors have made no observations of least terns foraging in the eelgrass beds off the eastern side of YBI.

The nesting season for least tern is from April through August. Nests occur on barren to sparsely vegetated places near water, normally on sandy or gravelly substrates. Clutch size is generally two to three eggs. The time from egg-laying to fledging is approximately seven weeks (Poole 2005). There is no historic record of least tern nesting within the SFOBB Project area and none is anticipated. An existing colony of least tern is located on the decommissioned Alameda Naval Air Station.

Figure 3.4. Least tern.

3.4 Double-crested Cormorant

Double-crested cormorants were first documented nesting on the existing SFOBB east span in the early 1980s. This species nests colonially between Piers E3 and E16, on the steel girders below the lower deck (Figures 3.5 and 3.6). In the past decade, the number of nests has fluctuated from a high of 814 in 2007 to a low of 83 in 2009.

The double-crested cormorant has no status under the federal or state Endangered Species acts, but is protected under the MBTA and the CFGC. Double-crested cormorant nest colonies are included on a CDFG "Watch List." The nesting season for cormorants is from March through August and nesting may be initiated at any time during this period. Nests are typically constructed on the remains of nests from previous years. Nest building takes two to four days to complete depending on the availability of nests from previous years. On average, four eggs are laid. Eggs hatch after 30 days of incubation and the young leave the nest when six to seven weeks old (Poole 2005). This species may double-clutch. A breeding colony typically includes cormorants at many different stages from nest building to egg laying, incubation and fledging. Nest construction typically begins at the center of the colony and expands outward. Older and more experienced cormorants initiate nesting earliest in the season, while less experienced birds begin later and occupy the periphery of the colony (Meier 1981).

While the double-crested cormorant colony on the SFOBB east span is habituated to noise and vibration, dismantling activities will ultimately displace the colony. To mitigate for this lost nesting habitat, the Department installed specially designed structures on the new east span to serve as nest platforms for the displaced colony. These structures were installed during construction of the skyway in 2006 and have been available (i.e., not covered to exclude nesting) since 2009. To date, no cormorants have been observed utilizing these structures.

Figure 3.5. Typical locations of double-crested cormorant nests on existing east span of SFOBB.

Figure 3.6. Double-crested cormorant nests on the steel girders under the existing SFOBB east span.

3.5 Western Gull

The western gull has no status under federal or state Endangered Species acts. The western gull is protected as a migratory bird under the MBTA and the CFGC. The nesting season for western gulls is from March through August. Both male and female adults are involved in nest building, which takes several days before the first egg is laid. As many as three nests may be initiated before the pair chooses one to finish and use. Nests are constructed with a variety of materials including dried grass, forbs, and woody debris. Egg-laying takes four to six days for a three-egg clutch. Incubation begins with the first egg and hatching occurs 30 to 32 days later. Chicks fledge when they are 40 to 50 days old (Poole 2005).

Western gulls are present within the SFOBB Project area year-round. Individuals may be extremely persistent in their attempts to nest on the bridge. In some cases eggs may be laid without the presence of any nest or nesting material. Nests are constructed on ledges or other flat surfaces including the marine foundations (Figure 3.7), on pilings, and other locations where they are protected from terrestrial predators. Western gulls have been observed nesting on the Torpedo Building on YBI, falsework structures, footings of the new East Span and, in 2008, a pair nested on the T1 foundation (Figure 3.8). No other gull species has been documented nesting or is likely to nest within the SFOBB Project area.

Figure 3.7. Nesting habitat for western gull on the existing SFOBB east span.

Figure 3.8. Western gull nest on the T1 foundation.

3.6 Other Protected Nesting Birds

Since implementation of the 2003 BMMP, additional bird species have been observed nesting and/or potentially nesting in the SFOBB Project area. These species are the common raven (*Corvus corax*), pigeon guillemot (*Cepphus columba*), house finch (*Carpodacus mexicanus*), Anna's hummingbird (*Calypte anna*), and Brandt's cormorant (*Phalacrocorax penicillatus*). Future surveys may discover others as well. Other commonly occurring local species that may nest in the SFOBB Project area include, but are not limited to, mourning dove (*Zenaida macroura*), black phoebe (*Sayornis nigricans*), killdeer (*Charadrius vociferus*), and barn owl (*Tyto alba*). These species are included in this 2012 BMP due to their presence and potential to nest within the SFOBB Project area.

All of these nesting birds are protected under the MBTA and the CFGC; non-native species (not protected under MBTA or the CFGC) are discussed in Section 3.7, "Other Unprotected Birds," below. Under the MBTA, the SFOBB Project may remove all nests that are not active and deter birds from attempting to nest within the SFOBB Project area. Active nests of all birds covered by MBTA and the CFGC are to be protected. Nests of bird species not covered under the MBTA may be removed at any time in the breeding cycle.

Common Raven

A common raven (Figure 3.9) territory has been observed centered on the eastern side of YBI. The common raven is a very adaptable bird that thrives in a variety of environments, including areas heavily impacted by human activities. Since 2002, weekly bird monitors and the peregrine falcon monitors have observed year-round presence of common raven at YBI, including nesting in the YBI Detour (E. Lichtwardt, LSA Associates, pers. comm. 2011). In addition, recent surveys found common raven individuals active within the construction area at YBI and perched at a stick nest in the understructure of the YBI Detour, between Bents 49 and 50 (Figure 3.10). The nest is located on top of a gusseted plate, two crossbeams west of Bent 50. The nesting season for common raven in the San Francisco Bay Area is March through mid-July. Breeding behavior is marked by increased activity in the nest area, nest building, calling, and copulation. Individual ravens often may be seen carrying sticks to the nest area and actively adding to the nest. Nest-building takes approximately one to three weeks to complete. The average clutch size is five eggs. Incubation lasts 20 to 25 days and fledging occurs when the young are five to seven weeks old (Poole 2005). This species may double-clutch if the nest fails early in the nesting season.

Figure 3.9. Common raven.

Figure 3.10. The customary nest location of a common raven territory at the YBI portion of SFOBB.

Pigeon Guillemot

The nesting season for pigeon guillemots in the San Francisco Bay Area is from mid-April through July. Nesting behavior is not well studied for this species, but nesting can be inferred by regular presence of one or both adult birds and copulation at the potential nest site. Adult guillemots are distinguished by large white wing-patches on a black body and bright orange feet (Figure 3.11).

In 2010 and 2011 pigeon guillemots have been observed at the existing bridge, in the area of Pier E22 and entering weep holes in the footing at the base of Pier E9 (Figure 3.12). On one occasion, an adult pigeon guillemot was seen entering the Pier E9 weep hole with fish in its bill, which may be an indication of nesting, but no juveniles were observed at this location. Thus, while not confirmed, this species may nest at Pier E9.

Figure 3.11. Pigeon guillemot adult.

Figure 3.12. Potential pigeon guillemot nest locations in weep holes at base of Pier E9 in 2011.

House Finch

The house finch is a common resident of the San Francisco Bay Area (Figure 3.13). This species has been observed exhibiting nesting behavior and entering the existing bridge structure at YBI, YBI Detour, and the OTD (E. Lichtwardt, pers. comm. 2011). The nesting season is from late February through August. Nest building takes two to six days to complete. A typical clutch size is three to five eggs. Incubation lasts approximately 14 days. Nestlings fledge approximately 12 to 19 days after hatching. Re-nesting may occur multiple times in a season (Poole 2005).

Figure 3.13. Female (left) and male house finch (right).

Anna's Hummingbird

Anna's hummingbird (Figure 3.14) is a common breeding bird in the San Francisco Bay Area. The nesting season may begin as early as December and extends through June. Nest construction may take one or more weeks to complete. Clutch size averages two eggs. Incubation lasts approximately16 days. Fledging occurs after 18 to 26 days (Poole 2005). This small hummingbird is assumed to nest in the *Eucalyptus* trees on YBI but may also nest on the existing bridge structure.

Figure 3.14. Anna's hummingbird

Brandt's Cormorant

Brandt's cormorant (Figure 3.15) is regularly observed in the SFOBB Project area, but nesting has not been documented on the existing east span. A single Brandt's cormorant nest was observed on the utility cable-crossing structure (directly south of the existing east span, near E9) in 2011. Nesting on the cable-crossing structure has been observed in previous years, but not documented (E. Lichtwardt, pers. comm. 2011). Two nests have been observed on the west side of YBI and there is a small breeding colony on Alcatraz Island (San Francisco Field Ornithologists 2003). Nests may also occur within the double-crested cormorant colony between Piers E3 and E16. The nesting season is from March through mid-July. Nests are constructed from grass, seaweed, and driftwood, and may take between two and ten days to complete. Clutch size averages between one and four eggs. Eggs hatch in 28 to 32 days. Fledging date is variable (33 to 42 days) and dependent on food availability. Fledging may also be gradual, with the young initially left alone by adults, then later forming "crèches" (groups of young birds) within the nesting area. Like the double-crested cormorant, Brandt's cormorant also nests colonially and is sensitive to human presence within the colony.

Figure 3.15. Brandt's cormorant.

Mourning Dove

Mourning doves (Figure 3.16) are regularly observed in the SFOBB Project area but have not been documented nesting on the existing SFOBB east span. Mourning doves could potentially nest on any flat, horizontal surface such as shelves, nooks, and cables on the bridge. They may also nest in trees, shrubs or other vegetation. The nesting season is from February through August, however some individuals may initiate nesting at any time of the year. Nests are

typically constructed with small amounts of vegetation but may also be devoid of nest material. Nest construction typically takes two to four days; however, some individuals may lay an egg with no structure present. Squabs hatch approximately 14 days after laying and normally fledge 12 to 15 days after hatching (Poole 2005). Although no nests have been documented to date, mourning doves may nest on the existing east span, as well as in vegetation and structures on YBI and the OTD.

F**igure 3.16.** Mourning dove

Black Phoebe

Black phoebe (Figure 3.17) is a common nesting bird in the San Francisco Bay Area. Nests are constructed with grass and mud on vertical or horizontal surfaces. Nest construction takes five days to three weeks to complete. Clutch size is three to five eggs. Eggs hatch 15 to 18 days after laying and normally fledge 18 to 21 days after hatching (Poole 2005). The nesting season for black phoebe is February through July. Re-nesting may occur multiple times in a season.

Figure 3.17. Black phoebe

Killdeer

Killdeer (Figure 3.18) are a common shorebird species in the San Francisco Bay Area. Killdeer nest in open, gravelly areas with sparse vegetation; bare ground is the preferred nesting substrate. Killdeer nests consist of a simple scrape on the ground and no nest materials are used. The average clutch size is four eggs. Eggs hatch approximately 25 days after laying and the precocial young leave the nest almost immediately after hatching (Poole 2005). The nesting season for killdeer is from March through August. In the SFOBB Project area, suitable nesting habitat is limited to bare ground at the OTD and on YBI.

Figure 3.18. Killdeer.

Barn Owl

Barn owls (Figure 3.19) have been observed incidentally in the SFOBB Project vicinity and may nest on the existing east span structure. Nests may be on any flat horizontal surface on the bridge, especially in sheltered areas. The nesting season is mainly from January through October, but individuals may nest at any time of the year. No nest building occurs and eggs are laid directly on the substrate of the nest location. Clutch size varies between three and seven eggs. Eggs hatch approximately 31 days after laying. Fledging is a slow process with first flights occurring approximately 55 days after hatching and independence of adults at day 76 to 86 (Poole 2005).

Barn owls are nocturnal and rarely observed during daytime. If barn owls occur or nest on the existing east span structure, they likely only will be observed through investigations of potential nest and roost sites. These sites may become evident by the accumulation of white guano spreading below them and/or pellets at their base. The presence of caches of dead prey may also be an indication of nesting in that area.

Figure 3.19. Barn owl.

CHAPTER 4 – SURVEYS, MONITORING, AND REPORTING

Surveys and monitoring will continue to be performed by the Department in the manner outlined in the 2003 BMMP including: (1) weekly monitoring of birds in the active construction areas; (2) focused peregrine falcon monitoring during the nesting season; and (3) nesting surveys on YBI prior to vegetation removal.

With the start of bridge dismantling, the active construction area for the SFOBB Project will shift from the new east span to the existing east span. As previously discussed, the existing span is known to serve as nesting habitat for a number of bird species.

The Department is committed to avoiding impacts to nesting birds during dismantling activities. As part of this effort, the Department, in partnership with the contractor, will expand and intensify its monitoring program to include focused bird nesting surveys of all structures with the potential to support nesting birds.

4.1 Contractor-supplied Biologists

The contractor will be required to retain the services of at least two full-time qualified bird biologists that are approved by the Department. Contractor biologists must have a Bachelor's degree in biology, or related field, and a minimum of two years of relevant experience monitoring birds during construction. The contractor's biologists will monitor construction and all construction-related activities to protect regulated bird species. Construction activities shall not commence until the Department approves the contractor's biologists.

4.2 Contractor-supplied Bird Protection Plan

Within 15 days after contract approval, the contractor will provide the Department with a Bird Protection Plan (BPP). This BPP will detail the contractor's strategies for avoiding impacts to birds for the duration of the dismantling contract. The BPP must be prepared by a Department-approved biologist and be consistent with methods outlined in this 2012 BMP. The BPP is subject to approval by the Department. The BPP will include the following:

- Information and protection measures consistent with the 2012 BMP
- List of bird species and nesting habitats expected in the SFOBB Project area
- Specific protection measures for regulated bird species likely to occur in the project site
- Protective radii for regulated bird species encounters
- Implementation plan for specific protection measures, including monitoring schedule
- Monitoring duties and schedule for submittal of monitoring reports
- Justification for each instance where protection measures and an implementation plan are not necessary for a regulated bird species
- Schedule for inspection, maintenance, and removal of bird protection and exclusion measures

- Response plan for instances where occupied nests are encountered
- Location and schedule of specific bird protection and exclusion measures to be implemented over the life of the project

The BPP will be updated and resubmitted annually, no later than January 15 during each year of construction. The purpose of the annual BPP is to update the Department on all items addressed in the contractor's original protection plan.

4.3 Contractor Monitoring Duties

Bird nesting surveys will include the following duties:

- Monitor for regulated bird species within the SFOBB Project area.
- Assure that construction activities do not result in the take of regulated species.
- Assure that construction activities comply with all applicable permits and laws.
- Immediately notify the Resident Engineer of any take of regulated species.
- Prepare, submit, and sign notifications and reports.

During bird nesting surveys, the contractor's biologists will pay special attention to signs of breeding and nesting activities including courtship, copulation, defending territories, gathering of nesting material, selecting nesting sites, nest building, foraging, caching food, and carrying food to young. The contractor's biologists will inspect all structures with the potential to support nesting birds, including, but not limited to: ledges, alcoves, crevices, crossbeams, weep holes, drain structures, foundations, and vegetation. In addition, the contractor's biologists will be responsible for removing nest starts, unoccupied nests, and food caches.

The contractor's biologists will also be responsible for inspecting and evaluating the effectiveness of deterrence measures that are installed and maintained by the contractor (see Chapter 5). This will include identifying required maintenance, and determining where and when new deterrence measures need to be installed or removed.

During each survey, the biologists will inspect the bridge superstructure (including the YBI Detour), the underside of the existing bridge (including the YBI Detour), steel towers E2 through E16, and the marine foundations E2 through E23. To accomplish this, the contractor's biologists may need to do the following:

- Walk the upper and lower bridge decks
- Access steel structures below the lower deck, including crossbeams and tower legs (via catwalks, rappelling, hydraulic lifts, quick deck scaffolding, etc.)
- Access the underside of the YBI Detour (via rappelling, articulating hydraulic lifts, etc.)
- Access steel elements above the decks

- Walk the bike path of the new east span to monitor the north side of the existing bridge
- Access the marine foundations
- Access any areas not called out in the bullets above to properly inspect the existing east span during bird nesting surveys and deterrence evaluations

If an active nest is found during a nesting survey or deterrence evaluation, the Resident Engineer and contractor will be notified immediately and all work within an initial radius of 76 meters (250 feet) of the nest will be stopped. Upon consultation with the regulatory agencies, this no-work buffer may be adjusted. See Chapter 7 for procedures to follow in the event of nest establishment.

4.4 Contractor Pre-construction Survey Report

The contractor's biologists will perform a pre-construction survey prior to beginning bridge dismantling activities. The pre-construction survey procedure will be performed in the manner outlined in Section 4.3, Contractor Monitoring Duties. Their findings will be presented in a Pre-construction Survey Report, submitted within 14 days before beginning construction activities.

4.5 Contractor Reporting

The contractor's biologists are required to submit monitoring reports in writing to the Resident Engineer per the schedule described in Section 4.6, Contractor Survey and Reporting Schedule. These monitoring reports will include:

- Name(s) of the biologist(s) conducting the biological activity
- Name and signature of biologist(s) preparing the report
- Date(s) and time(s) of monitoring
- Locations and activities monitored
- Representative photographs
- Findings
- Recommended actions to protect regulated bird species

Monitoring report findings will include evaluation of deterrence measure effectiveness, maintenance issues, and nesting activity throughout the existing SFOBB Project area.

4.6 Contractor Survey and Reporting Schedule

Once construction begins, the contractor's biologists will perform regular bird nesting surveys. The bird nesting season is generally from February 1 to August 31, however, some birds may nest year-round. For this reason, nesting surveys and deterrence evaluations will be conducted by the contractor's biologists year-round, with varying frequency. During the bird nesting season, the frequency of surveys will be greater than the months outside of the bird nesting season with the exception of January. During January, the contractor's biologists prepare for

bird nesting season by monitoring bird activities, identifying potential nesting locations, evaluating the condition of existing deterrents (i.e., determine if maintenance is required), and determining areas were new deterrents are necessary.

For the reasons outlined above, the contractor's biologists will conduct bird nesting surveys and deterrence evaluations a minimum of five times a week, with one monitoring event occurring on the weekend, from January 1 through August 31. From September 1 to December 31, nesting surveys will be conducted at least one day per week (Table 4.1). The contractor's biologists will submit monitoring reports in writing on a weekly basis for the preceding week to the Resident Engineer.

Table 4.1. Monitoring Schedule

Monitoring Type	Schedule
Migratory bird monitoring January 1 to August 31	Monitor at least 5 days during a 7-day period. One monitoring event must take place on a Saturday or Sunday.
Migratory bird monitoring September 1 to December 31	Monitor at least 1 day per week.

The contractor's biologists will continually work with the Resident Engineer to determine the most effective frequency of bird nesting surveys and deterrence evaluations required or needed. As the nesting season progresses, or as construction in a given area progresses, the results of nesting surveys and deterrence evaluations will inform subsequent monitoring and management decisions. Adjustments to the monitoring program may include adding field staff and increasing the frequency of monitoring.

4.6.1 Incident Reporting

In addition to weekly reporting, the contractor will be required to submit a separate incident report to the Department within 24 hours of an incident. An incident report will include:

- Description of any take incident
- Species name and number taken
- Details of required notifications with contact information
- Corrective actions proposed or taken
- Disposition of taken species

The Department will determine the significance of the incident and whether agency notification is necessary.

4.7 Coordination with Department Biologists

The Department will also have an active bird monitoring program that will be implemented concurrently with the contractor's monitoring. Communication between the Department and the contractor may be facilitated by the Resident Engineer. During January 1 to August 31 of each year, the contractor's biologists will hold weekly meetings with the Resident Engineer, Department biologists, and the contractor. From September 1 to December 31 of each year, these meetings will be held once every two weeks. The following will be discussed at these meetings:

- Dismantling activities scheduled for the following week
- A monthly dismantling schedule
- A weekly schedule for bird nesting surveys and deterrence evaluations
- Maintenance of deterrence measures
- Removal of deterrence measures
- Issues that have arisen in the field
- Troubleshooting
- Other relevant information

4.8 Safe Access to Project Site

The contractor must ensure that both Department- and contractor-supplied biologists are provided safe access in compliance with applicable safety regulations. Examples of safe access include, but are not limited to, ladders, quick deck scaffolding, elevators, barge-based hydraulic lifts, boat access, articulating hydraulic lifts, and the use of other construction equipment to facilitate access. For portions of the project area that are difficult to access (e.g., the underside of the bridge), the contractor may choose to have a SPRAT-certified rope access work contractor on retainer to assist with climbing access. In addition, all biologists must have Fall Protection training so they can access all locations on the bridge in a safe manner. Specialized equipment such as fall protection equipment and personal floatation devices will be required. In areas where inhalation hazards exist due to bird guano, full-face respirators with high energy particulate air filters or supplied air may be required to comply with applicable safety regulations.

CHAPTER 5 – IMPACT AVOIDANCE STRATEGIES

There are several strategies to avoid impacts to nesting birds during the dismantling of the existing east span. These strategies are generally categorized into the following:

- Seasonal Avoidance
- Buffers
- Deterrence Measures

The contractor will be responsible for implementation of all strategies to minimize impacts to nesting birds. Each of these strategies is discussed in detail below.

5.1 Seasonal Avoidance

Conducting work outside the bird nesting season is the most effective method to avoid impacts to nesting birds. In general, the period from February 1 through August 31 encompasses the nesting season for most species in the SFOBB Project area. Work conducted during September to January would therefore avoid potential impacts to most nesting birds. Additionally, each species has its own discrete nesting season (i.e., period of time that viable eggs and/or chicks occupy a nest), which will be considered when attempting to avoid impacts to the species' nests. For example, the east span peregrine falcon territory nesting period is from February to June. Work conducted in the vicinity of a peregrine falcon nest site between late July and February would likely avoid impacts to eggs or young.

The contractor, in coordination with the Department, will establish a schedule and sequencing for dismantling work that takes into consideration anticipated active nesting seasons (see Table 5.1).

Table 5.1. Bird Nesting Season

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
General Bird Nesting Season												
Peregrine Falcon												
Western Gull												
Double-crested Cormorant												

Red - occupied nest period
Green - unoccupied nest period

It should be noted that impact pile-driving is also restricted to a work window of June 1 through November 30 to avoid impacts to fish, as noted in the special provisions and applicable agency permits. The establishment of an active nest with a no-work buffer of up to 76 meters (250 feet)

(see section 5.2 for an explanation of no-work buffers) could impact the installation of piles. Due to the restricted window to impact drive piles, this could cause significant delays. The overlap between the impact pile-driving work window and the bird nesting season occurs in June, July, and August.

5.2 Buffers

No-work buffers will be established around active nests to avoid impacts. The size of the buffer will be dependent on the species, nest location, and type of construction activities. Typically, CDFG recommends 76 meters (250 feet) for raptors (including peregrine falcon) and 15 meters (50 feet) for non-raptors. All no-work buffers will be determined on a case-by-case basis. All species that nest on the existing bridge are likely acclimated to noise and vibration associated with heavy traffic. In the case of both the peregrine falcon and the common raven, both species appear acclimated to construction activities within a short distance of their nests. In such cases, it may be possible to negotiate reduced buffers with CDFG.

The USFWS and CDFG may allow reduced buffers (i.e., less than 15 meters (50 feet) for non-raptors and less than 76 meters (250 feet) for raptors). Such exceptions may be appropriate if the presence of a nest poses a particular constraint to SFOBB Project activities, the activity is of limited duration and/or low magnitude, or the circumstances of the nest reduces the likelihood of disturbance (e.g., if the nest is shielded from view by the activity or is located in an area already subject to high human activity). In such cases, the agencies may determine that a qualified biologist can monitor the nesting birds during SFOBB Project activities, and that such activities may continue as long as the biologist does not observe evidence that the birds are so disturbed that abandonment could occur.

Some SFOBB Project activities outside of no-work buffers may cause abandonment and thus violate the CFGC or the MBTA. For example, activities that generate vibrations (such as jack-hammering on piers) may shake the substrate supporting a nest or dislodge eggs or young. Prior to the initiation of the activity in question, buffer distances will be reevaluated in consultation with the USFWS and CDFG on a case-by-case basis.

5.3 Deterrence Measures

Deterrence measures are the physical means by which birds are deterred from nesting within an area. The contractor will be responsible for the implementation and maintenance of all deterrence measures. The Resident Engineer, in consultation with the contractor's biologists and the Department biologist, will make deterrence measure installation, maintenance, and removal recommendations to the contractor. Deterrence measures include:

- Nest Removal and Disturbance
- Filling/Blocking Potential Nest Sites
- Netting
- Slope Panels and Other Surface Modifications
- Auditory Deterrents

- Visual Deterrents
- Water Cannon
- Paint Ball Gun
- Bird Spikes
- Sticky Substances

5.3.1 Nest Removal and Disturbance

Old nests used in prior years may be re-used by birds in subsequent years, or may encourage birds to establish nests near them. Thus, all old nests must be removed from the SFOBB Project area prior to the start of the nesting season. Nest starts without eggs should also be removed throughout the nesting season. Unoccupied nests and nest starts can only be removed by the contractor's biologists or the Department biologist. It should be noted that any removed nest must be disposed of properly. No nest materials (or any other materials from the SFOBB Project area) are allowed to enter the bay (California Regional Water Quality Control Board Order R2-2002-0011. 2002, p. 12). Nest removal in places that are difficult to access may be facilitated by the use of a telescoping fiberglass or aluminum pole (Figure 5.1).

Figure 5.1. Telescoping pole with detachable Z-hook.

5.3.2 Filling/Blocking Potential Nest Sites

Horizontal platforms and other surfaces that may provide nesting sites for birds can be effectively filled or blocked with fabric (Figure 5.2), hardware cloth (Figure 5.3) or other materials so that there is not sufficient space for construction of a nest. This measure should be completed prior to the nesting season, and monitored throughout the year to ensure that the nest blocks remain in place. Such areas include niches at connection points in the steel structures below the lower deck. However, due to the large area and limited access, filling all niches across the entire east span is not feasible. The contractor may block off nest sites on a case-by-case basis to prioritize for sites with the greatest potential for nesting.

Figure 5.2. Cloth secured with wire.

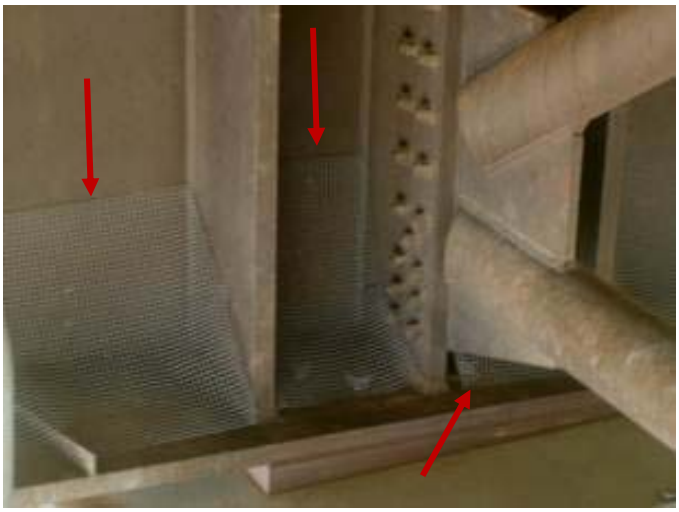

Figure 5.3. Hardware cloth in corner joint.

There may be other cavities and crevices on the piers that provide suitable nesting habitat for birds. Weep holes and other cavities could be blocked by screens (Figure 5.4) if it can be determined that they are not being actively used by nesting birds through the use of a fiber-optic camera or careful observation. Unless cavities are known to be unoccupied, one-way doors should be installed to block the entrances; these doors allow birds to exit but not re-enter the cavity. One-way doors are not recommended if there is an active nest within the cavity. Filling or blocking of potential nest cavities may be accomplished from a hydraulic lift (for lower holes or crevices), or by rappelling to the pertinent locations on the bridge.

Figure 5.4. Blocked weep hole in concrete footing for the seismic retrofit of the Antioch Bridge.

5.3.3 Netting

Portions of the bridge where nesting bird activity is concentrated may be covered with netting to preclude birds from accessing potential nesting areas. Nets used for bird exclusion on bridges are typically 1.9-centimeter (0.75-inch) mesh made of ultraviolet-resistant polyethylene twine that is attached to a tensioned cable securely bolted to the bridge surface or otherwise affixed to beams or other parts of the bridge (Nixalite 2011). Nets are tightened with turnbuckles, and round staples are used to attach the nets to steel cables (Figure 5.5). Netting is often installed from the roadway surface using hydraulic lifts (Figure 5.6), but may also be installed from below the bridge in certain circumstances (e.g., from travelers, hydraulic lifts, or articulating hydraulic-lifts).

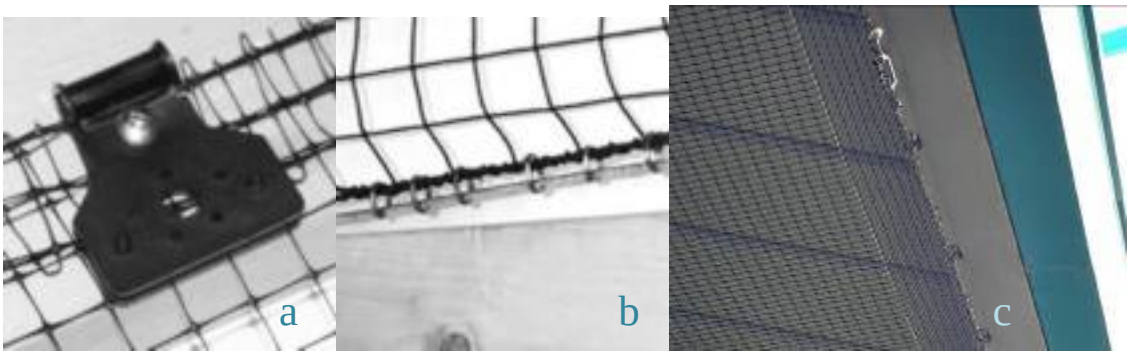

Figure 5.5. Net attachment types: (a) plastic clip, (b) rings, (c) with turnbuckle.

Figure 5.6. Net installation with hydraulic lift.

Installation of netting would substantially decrease the likelihood of birds nesting in treated areas and minimize the amount of regular (i.e., daily or every-other-day) disturbance of nests or removal of nest starts that may be needed in a given area. However, netting also has some major drawbacks: it is susceptible to being ripped by high wind and it may trap and kill birds. Daily monitoring and prompt repair and maintenance would be required to ensure the functionality of installed netting.

5.3.4 Slope Panels and Other Surface Modifications

Surface modifications including attachment of polycarbonate polymers (i.e., Lexan), PVC plastic, or clear acrylic slope panels (Figure 5.7) can be used to exclude birds such as rock pigeon and black phoebe that build their nests on surfaces with 90º angles (Figure 5.8). These panels create a slippery and angled surface to which birds cannot attach nest material. Panels may be attached to either vertical or horizontal surfaces. The panels are typically fastened to concrete using a power-actuated tool. They also may be attached to steel beams with outdoor polyurethane adhesives (BirdBGone 2011). The panels would need to be installed without openings at their ends to prevent European starlings and other birds from nesting in these openings. Other applications to concrete, such as high gloss lacquer, could be used as nesting deterrents on corners of structures. A fairly high level of effort is initially required to install these devices, but other than periodic maintenance, they should not have to be re-installed. Due to the vast number of angled surfaces that would be suitable for nesting birds, slope panels would be most useful in specific instances where nesting is likely to impact or delay dismantling efforts. Blanket installation across the entire SFOBB east span would be prohibitive in both cost of

materials and installation, so limiting them to specific problem areas would be an effective use of slope panels.

Figure 5.7. Slope panel

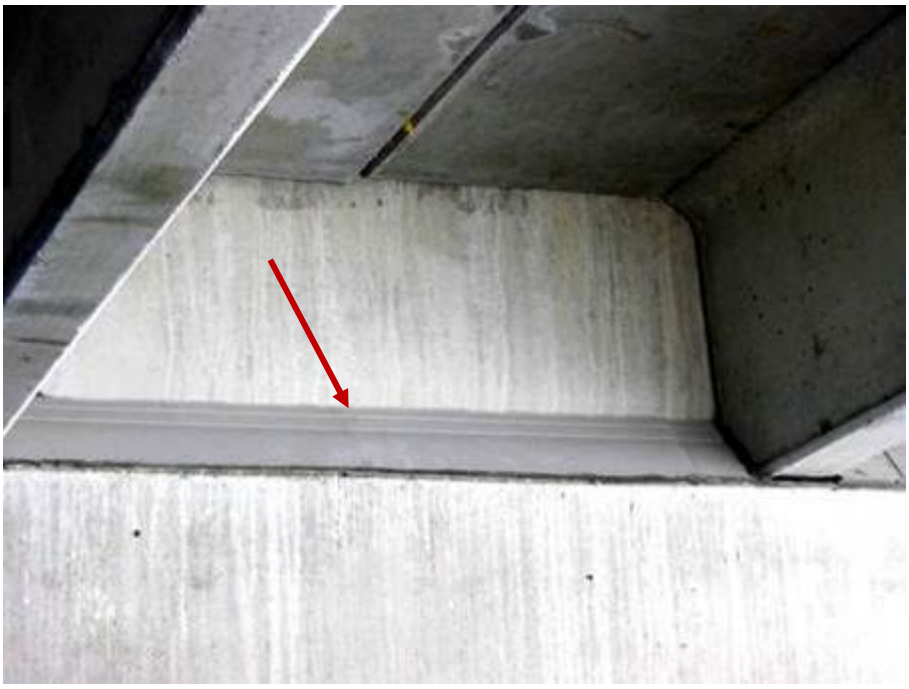

Figure 5.8. A slope panel installed on a concrete ledge under a bridge.

5.3.5 Auditory Deterrents

A variety of auditory repellent devices, including pyrotechnics and noise cannons, as well as bioacoustic devices that emit recorded distress and predator calls, are commercially available for bird deterrence. These devices typically use AC power, although it is possible for them to be powered by solar panels. Pyrotechnics have been successfully used to repel birds at airports and landfills, and propane noise cannons also have been effective in some situations (U.S. Dept. of the Air Force 2004). However, birds can become habituated to these noisemakers, particularly if the noises are not accompanied by other deterrence measures (Stickley and Andrews 1989).

Distress calls have been shown to be more effective, and have lower rates of habituation, than other noisemakers, likely due to the strong biological imperative for birds to respond to such calls. Distress calls have been used at airports, landfills, and reservoirs (Payson and Vance 1984, Transport Canada 1986, BSCE 1988, Howard 1992). Their effectiveness is substantially

increased when combined with pyrotechnics, models of dead or injured birds, or other deterrence measures. Taped raptor calls have also been effective in dispersing gulls from airports.

The use of auditory deterrents would avoid the logistical difficulties associated with netting and slope panels, such as the need for rappelling and working road-based lifts (requiring temporary road closure). However, auditory deterrents may have limited success due to habituation by birds to the deterrents. Rather than being relied on solely for nest deterrence in a given area, this measure should be tested or used in combination with other measures.

5.3.6 Visual Deterrents

Objects such as kites, balloons, streamers, flags, scarecrows, and raptor effigies may be used to deter nesting at specific locations. Devices such as raptor effigies and inflatable objects can be programmed to activate at regular or random intervals, or can be radar activated (operating when a bird approaches), which has been shown to increase effectiveness (Ronconi et al. 2004, Ronconi and St. Clair 2006). These devices are likely to have a greater impact when used simultaneously with other techniques or moved periodically because birds will quickly habituate without the presence of humans or other perceived threats.

Visual deterrents such as glitter tape may be ineffective in preventing birds from nesting within construction sites. As with auditory deterrents, the cost of visual deterrents and the effort required to deploy them is substantially less than the cost of using netting or slope panels, but due to habituation by birds, this measure should be used in combination with other measures.

5.3.7 Water Cannon

Water cannons have been used successfully to remove bird nest starts from the Antioch Bridge (A. Arakozie, pers. comm. 2011). The effective range of the cannon depends on the power of the pump and configuration of the cannon, as well as wind conditions that can affect the force of the water stream. Water cannons, in calm conditions, may be able to remove nest starts at heights up to 30 meters (100 feet). Windy conditions may greatly reduce this range. As the vertical clearance of much of the east span of the SFOBB is in excess of 30 meters (100 feet), this option may not be viable for this project unless a barge-based hydraulic-lift or other lifting device is utilized. If water were available via conduit along the east span roadway, it would be possible to reach more areas irrespective of bridge height. However, pressurized water may not be a legitimate option due to stringent limitations on water quality in the Bay. In particular, removal of nesting material must not result in the deposition of material into the Bay or other waters of the state. If a water cannon is utilized as a deterrent, notification of the Regional Water Quality Control Board (RWQCB) will be necessary and a Storm Water Pollution Prevention Plan (SWPPP) amendment may be required. The contractor must coordinate with the Resident Engineer and Department biologist to ensure proper permit compliance is addressed in advance of using water cannons.

5.3.8 Paint Ball Gun

Paint ball guns were used successfully to remove cliff swallow nest starts on the Antioch Bridge during seismic retrofitting (A. Arakozie, pers. comm. 2011). They could be equally effective for species such as black phoebe, which can nest on vertical surfaces that are difficult to access (Figure 5.9). Paint balls that have been used on other bridge projects over water include clear training paint balls. These paint balls are composed of biodegradable colorless gelatin liquids

and shells, made of vegetable oil, that are designed to dissolve in water and therefore do not pose a water-quality hazard. Paint balls can knock down targets up to 30 meters (100 feet) distant, although they are likely to be more effective at closer range. Paint ball guns would be particularly effective for use when a nest start is encountered that is difficult to remove using other means. Paint balls containing vegetable oil may also be effective in preventing nesting in certain locations by leaving an oil-residue on the substrate. Restrictions on water quality in the Bay would apply to the use of paint ball guns.

Figure 5.9. Black phoebe nest.

5.3.9 Bird Spikes

Bird spikes may be placed on surfaces commonly used as nesting or roosting sites to prevent birds from using these areas. Bird spikes are used most commonly for pigeon exclusion in urban areas. During retrofitting of the Antioch Bridge, spikes were used effectively in preferred perching areas (Figure 5.10). Bird spikes are manufactured in a variety of configurations and sizes that can be used in a number of settings. Spikes may be useful in cormorant nesting areas and areas where peregrine falcons or other platform-nesting birds take an interest in platform surfaces on the bridge. They can also be used in areas that have particularly high bird use, or persistent birds that are not deterred by other means.

Figure 5.10. Bird spikes installed in a preferred nesting area on the Antioch Bridge.

5.3.10 Sticky Substances

A variety of commercially available substances, including transparent liquids and gels, may be applied to surfaces that experience frequent bird roosting or nesting (Figure 5.11). These substances are non-toxic but create an uncomfortable, sticky sensation on birds' feet. Airborne dust can reduce the stickiness of these products, and regular reapplication would therefore be necessary. These products are more likely to be effective in drier climates than in wet coastal areas and, as a result, may not work on the SFOBB. However, these substances could be used in very limited areas on the bridge that have particularly high bird use or for persistent birds that are not deterred by other means.

Figure 5.11. Sticky substance bird repellants.

CHAPTER 6 – BRIDGE DISMANTLING AND NESTING BIRDS

6.1 Existing East Span Dismantling Plan Details

Construction of the existing east span connecting YBI and the Oakland shoreline was completed in 1936. The east span is a double-deck structure 3,696 meters (12,127 feet) in length and approximately 18 meters (58 feet) wide, carrying five traffic lanes in east- and westbound directions. The east span is supported by 22 marine foundations (Piers E2 through E23), as well as land-based bridge piers and bents on both YBI and the Oakland shoreline.

The structures to be removed during the dismantling of the existing east span (Figure 6.1) include the following:

- YBI Detour
- Cantilever Superstructure
- 504-foot and 288-foot Segments
- Marine Foundations (piers)
- Pile-supported Access Trestles and Falsework

In addition, construction activities will continue on YBI during the dismantling of the existing east span. This will include, but is not limited to, the construction of on and off ramps, public access facilities, buildings, realignment of roads, and restoration of areas affected by the SFOBB Project.

Figure 6.1. Sections of the existing east span San Francisco-Oakland Bay Bridge.

6.2 Dismantling Tasks and Nesting Birds

Dismantling activities are scheduled to begin immediately after vehicle traffic is rerouted to the new east span. Some preparatory dismantling work (e.g., falsework construction) may begin prior to the opening of the new span. Dismantling activities will vary in both type of activity and schedule. Impacts to nesting birds will therefore vary at different locations on the bridge and bird management options need to be tailored for this variation. The following sections address individual dismantling priorities and their short- and long-term impacts to nesting birds. While a project-wide set of general impact avoidance measures is recommended below, additional measures designed for focal species are presented within each section.

General Impact Avoidance Recommendations:

- Implement seasonal avoidance during the nesting season. This is the best way to avoid impacts to breeding birds. By restricting some construction activities to the non-nesting period between September 1 and January 31, the contractor can minimize the potential for take of most nesting birds. Since the SFOBB Project involves an extensive, multi-year effort, seasonal avoidance may be complemented with other impact avoidance measures.

- Conduct project-wide breeding bird surveys throughout the nesting season to ensure that nests or nesting activities may be identified early and that nests may be removed without resulting in take.

- Identify potential nesting locations before the nesting season begins.

- Remove all inactive nests that occur within the scheduled work activity areas.

- Implement exclusions, modifications, and other deterrence measures to reduce access or attractiveness for potential nesting birds. Modifications include blocking of access or adding slope paneling such as plastic, plywood or welded wire mesh to create an angled surface, which would be unsuitable for nesting.

- Implement buffers around active nests. Should one or more nests become established within the construction area, the contractor, as directed by the Resident Engineer, will implement a buffer around each nest and have the contractor's biologists observe the nest to ensure take does not occur.

6.2.1 YBI Detour

The YBI Detour was installed to route traffic around construction activities associated with the new east span on YBI. It is located between Pier E1 of the existing SFOBB and the YBI tunnel on the south side of the existing east span and consists of a double-deck bypass structure that carries traffic in both directions (Figure 6.2). Common ravens have been observed nesting in this area for several years and there is also a high potential for many other birds to nest in this area.

Figure 6.2. YBI Detour Bents 49, 50, 51, 52, and 52A.

Common Raven and Other Nesting Birds

Common ravens have nested on the bridge where it meets YBI and there is evidence of their having nested on the southeast side of the Detour, between Bents 49 and 50 underneath the lower deck (Figure 6.3). Copious guano is evident underneath perches in this area. Common ravens have a high tolerance to construction activities and will likely require focused effort to deter any nesting attempts in this area. While construction activities in the nesting area may not impact these birds, dismantling activities will eventually remove nesting sites.

Figure 6.3. YBI Detour is a common raven nest location.

Since the YBI Detour runs overland, there is potential for land-based birds such as killdeer, rock pigeon, mourning dove, barn owl, Anna's hummingbird, black phoebe, common raven, European starling, and house finch to nest within or around its structure. Preliminary surveys have identified the following as high-potential nesting locations for these species: flat surfaces at the top of each bent (Figure 6.4); cavities within the steel structure of the YBI Detour (Figure 6.5); ledges and protected corners, particularly at intersections of crossbeams within the steel structure of the YBI Detour (Figure 6.6); weep holes in the concrete supports located on the underside of YBI Detour at each bent (Figure 6.7); tree foliage surrounding the YBI Detour structure (Figure 6.8); and gravel staging areas around YBI Detour. Dismantling of the YBI Detour is expected to impact some or all of the potentially nesting species noted above. Other species may be present as well.

Specific Impact Avoidance Recommendations:

- Schedule work around the nesting season to avoid impacts to the common raven and other breeding birds in the YBI Detour area. Since the SFOBB Project involves an extensive, multi-year effort, seasonal avoidance may be complemented with other impact avoidance measures.

- Prior to the dismantling of the YBI Detour, remove nests and install deterrence measures. If the construction of falsework is anticipated to impact the nest area, this activity will need to occur prior to falsework installation.

- Survey the YBI Detour structure daily for caches of dead prey that may be food sources for nesting barn owls and remove them.

Figure 6.4. An example of a potential nesting location on a flat surface at the top of Bent 49.

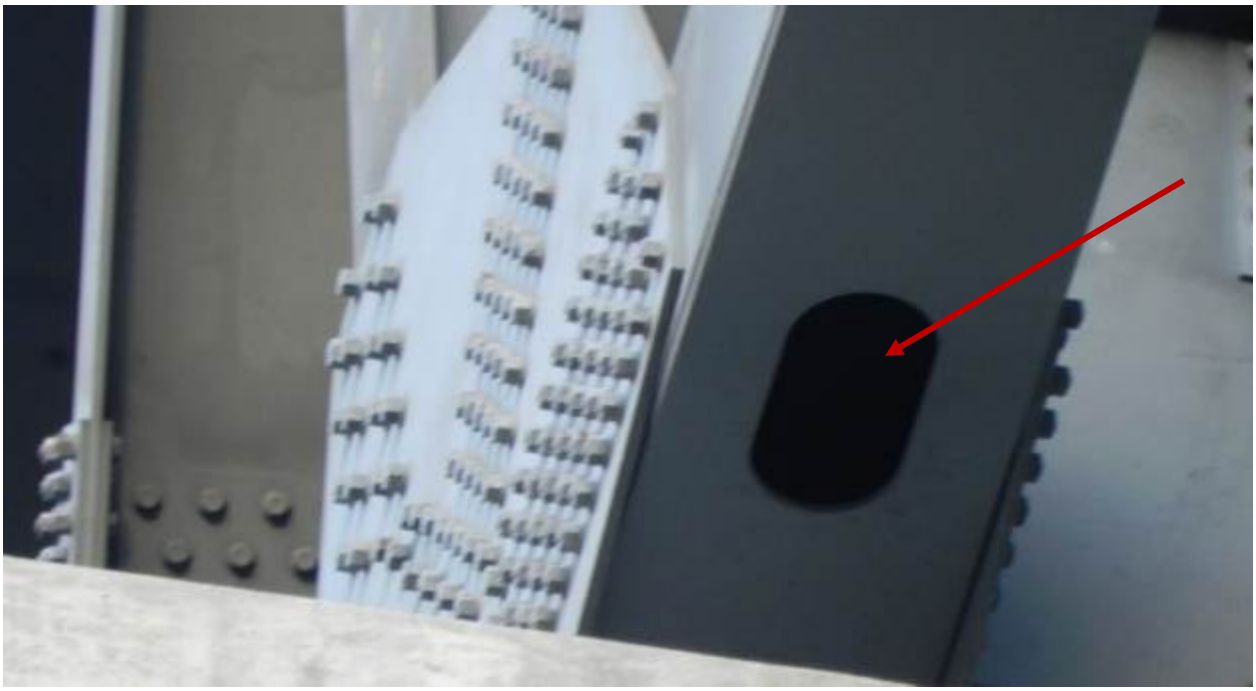

Figure 6.5. An example of a potential cavity nesting location above Bent 52.

Figure 6.6. An example of a potential nesting location at a joint within a steel structure at the YBI Detour connection to Pier E1.

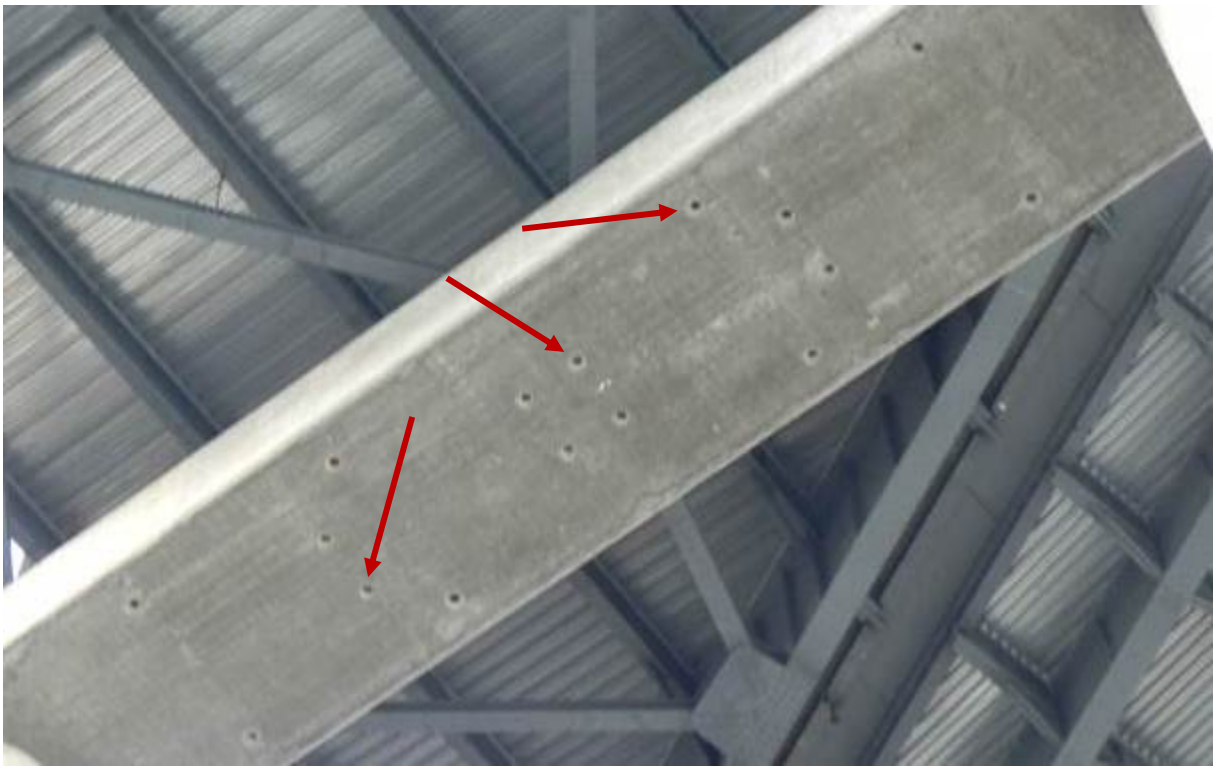

Figure 6.7. An example of potential nesting locations within weep holes in a concrete support at Bent 52.

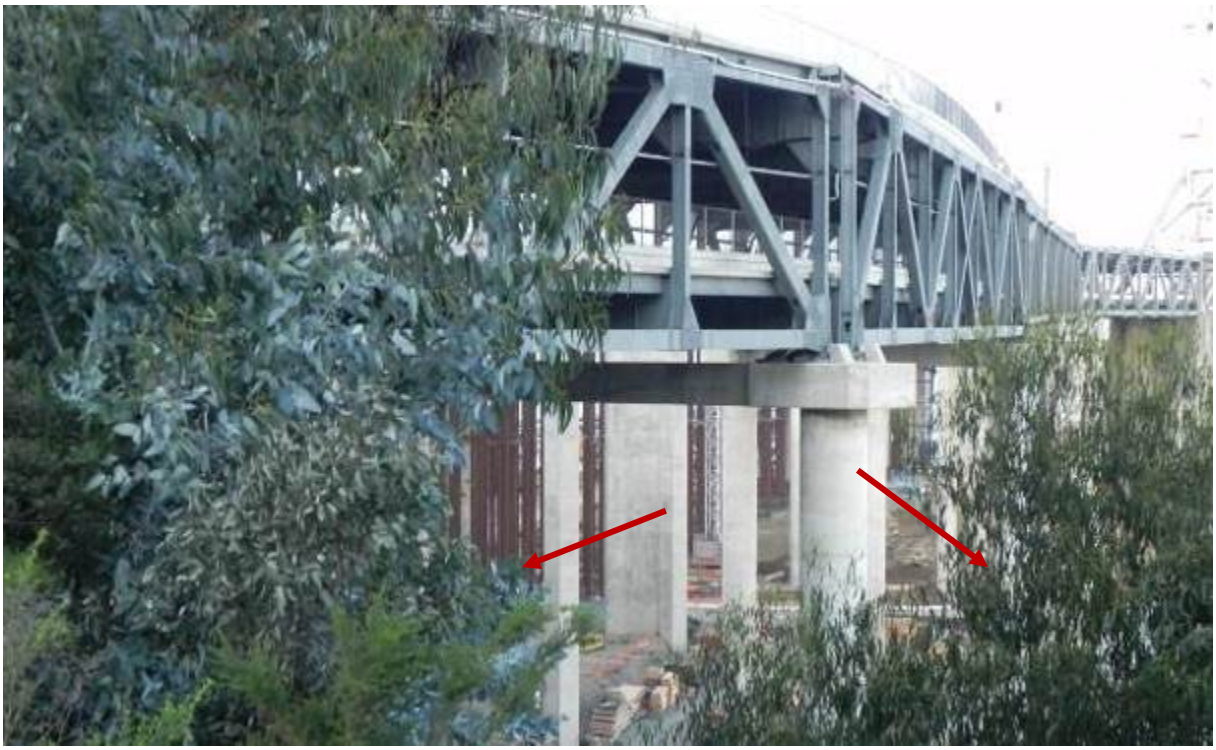

Figure 6.8. An example of potential nesting locations within foliage of trees adjacent to YBI Detour.

6.2.2 Cantilever Superstructure

The Cantilever section is comprised of three major elements: two cantilever anchor arm elements that are 154.8 meters (508 feet) long and 156 meters (512 feet) long, respectively; and a 426.7-meter (1,400-foot) long main span over the navigation channel consisting of a suspended segment which is supported on either side by anchor arms. The superstructure of this segment includes the trusses, road deck, and steel support towers. The Cantilever section spans from Piers E1 to E4 (Figure 6.9). This segment has been used by nesting peregrine falcons since the mid-1980s and may also support other nesting birds including house finch.

Figure 6.9. Cantilever (Piers E1-E4).

Peregrine Falcon and Other Nesting Birds

Peregrine falcons have occupied a territory centered on the cantilever structure of the SFOBB east span since the mid-1980s, and have been the subject of monitoring since 2003 as part of the new east span construction. In recent years, the preferred nest site in this territory has been a north-facing trapezoid-shaped alcove on the north facing leg of Pier E2 below the lower deck.

Activities during the dismantling of the existing bridge could have an adverse effect on this species. Potential impacts as identified in the FEIS include disruption of breeding activity due to construction work, and equipment traffic on and around the bridge. These activities could induce defensive reactions by the peregrine falcons during the nesting season that could result in increased energy expenditure, diverting adult energies away from breeding activity (i.e., egg laying, incubation, and rearing) or causing nest abandonment (Department 2001). As dismantling activities encroach on the nest area, the potential for impacting these birds will increase. Ultimately, the SFOBB east span peregrine falcon territory will lose all of its historic nesting sites; however, the tower on the new bridge may serve as an alternate nest site location.

Other nesting birds that may use the Cantilever structure include mourning dove, European starling, rock pigeon, black phoebe, barn owl, house finch, and western gull.

Specific Impact Avoidance Recommendations:

- Monitor during the nesting season. In addition to the contractor's biologists, a Department biologist will continue observations of peregrine falcon behavior and nesting activities within the SFOBB Project area.

- Implement seasonal avoidance for the peregrine falcon during the nesting season until the dismantling of the east span occurs. If deterrence measures are implemented early in the dismantling process, the peregrine falcons may move to an alternate site that is more difficult to monitor. For the sake of monitoring, it is best to leave them in their preferred (and predictable) nesting location at Pier E2 until exclusion measures are absolutely necessary. This strategy may be followed until as late as February. If exclusion measures are implemented (see below), the peregrine falcons will have fewer options to re-nest within the structure of the existing east span.

- Implement nest removal and exclusion measures. The following measures are recommended before dismantling the structure where the peregrine falcons have nested in recent years and shortly before the nesting season: (1) remove the nest and nest enhancements (gravel) from the traditional nest location (If eggs or nestlings are present, approved bird experts may be available to remove and hack out young.); and (2) place exclusion measures in preferred, alternate, and potential nesting locations on the existing span to encourage the birds to nest elsewhere. If the construction of falsework is anticipated to impact the nest area or if direct impacts to nesting are observed, nest removal and exclusion measures may need to occur earlier.

6.2.3 504-foot and 288-foot Segments

The portion of the existing SFOBB that extends from the Cantilever section (Pier E4) to the OTD at Pier E23 is composed of two segments: a 504-foot segment and a 288-foot segment. The 504-foot segment of the bridge is comprised of five 153.6-meter (504-foot) long steel truss spans (Figure 6.10). The vertical clearance beneath the 504-foot spans (504's) is approximately 50 meters (165 feet) above the mean high water level. The 288-foot segment is comprised of fourteen 87.8-meter (288-foot) long steel truss spans (Figure 6.11). The vertical clearance beneath the 288-foot spans (288's) decreases as the structure descends towards the Oakland shoreline. The superstructure of both segments includes the trusses, road deck and steel and/or concrete support towers. The double-crested cormorant nesting colony will be affected by dismantling these sections, as will marine nesting birds and land-based nesting birds near the OTD.

Figure 6.10. 504-foot sections (Piers E4-E9).

Figure 6.11. 288-foot sections (Piers E9 – E23).

Double-Crested Cormorant and Other Nesting Birds

The double-crested cormorant nesting colony is concentrated in the area from Piers E4 to E10, and at its greatest extent in 2007, spanned from E3 to E16. The colony has the highest number of nests in the vicinity of Pier E9, which is at the junction of the 504-foot segment and the 288-foot segment. SFOBB Project-related impacts to double-crested cormorants as identified in the FEIS include disruption of breeding activity resulting from construction work and equipment traffic on and around the bridge. As a result, dismantling activities may cause reduced breeding success due to nest abandonment and a reduced number of healthy offspring.

While this colony is already acclimated to the noise and vibrations from regular vehicle traffic on the bridge, the dismantling activities will impact the colony. Dismantling work in the vicinity of Piers E3 through E16 during the nesting season (March to August) is likely to disrupt some, or all of, the nesting activities. Falsework construction and dismantling in the vicinity of Piers E3 through E16 will also likely impact breeding cormorants. Finally, dismantling of the existing bridge will result in a loss of nesting sites.

Other potential nesting birds on the over-water portion of the 504-foot and 288-foot segments include western gull, pigeon guillemot, and Brandt's cormorant. Potential nest sites for these

species are present in the myriad of recessed shelves, ledges, cavities, and crossbeams located within the superstructure of the existing east span (Figure 6.12) and its steel support-towers (Figure 6.13). At the eastern end of the 288-foot segment other land-based birds may nest, including barn owl, black phoebe, house finch, killdeer, mourning dove, European starling, house sparrow, and rock pigeon.

Figure 6.12. Potential nest locations within the superstructure of the existing SFOBB east span.

Figure 6.13. Potential nesting locations at Pier E9.

Specific Impact Avoidance Recommendations:

- Conduct breeding bird surveys throughout the nesting season to ensure that nests or nesting activities may be identified early and that nests may be removed without resulting in take (i.e., prior to egg laying).

- Monitor during the nesting season. All double-crested cormorant nesting activities on the existing SFOBB east span should be monitored.

- Remove nests at the historic cormorant colony site. When dismantling activities are anticipated to impact nesting double-crested cormorants, the Department and the contractor should begin active removal of the nests within the existing colony prior to the nesting season. Ideally, a full sweep of the entire colony is recommended. Multiple passes likely will be necessary to identify and remove nests that are under construction.

- Construct temporary access walkways (catwalks) to allow regular and safe access for implementation of deterrence measures. On the Antioch Bridge Seismic Retrofit Project, the presence of catwalks along the length of the bridge was crucial to allow the Department biologist and the contractor access to implement deterrence measures (A. Arakozie, pers. comm. 2011). A single catwalk along the center of the bridge may suffice; however, two parallel catwalks in the "number 2" and "number 4" lane positions would allow for greater access (Figure 6.14).

- Implement physical deterrents prior to the nesting season to encourage the birds to nest elsewhere (subject to strict compliance with the MBTA). A combination of visual (effigies, streamers) and auditory (alarm calls, predator calls, loud "booms") deterrence measures is likely to be most effective in discouraging the use of the existing bridge. Animals that are exposed to deterrence measures that are applied in a

predictable and routine way often become inured to the deterrent. An unpredictable regime of noise and visual disturbance in the area of the colony will likely be most effective.

- Establish human presence. Human activity at the nest site is cited often as a main component of cormorant deterrence (Stickley and Andrews 1989, J. Ozard, pers. comm. 2011). Use of this measure must be implemented in strict compliance with the MBTA.
- Install structural barriers such as netting, welded wire mesh, or monofilament.
- Identify potential nesting locations before the nesting season begins.
- Remove all inactive nests that fall within the scheduled work activity areas.
- Implement buffers around active nests. Should one or more nests become established within the construction area, the contractor will need to implement buffers around each nest, as directed by the Resident Engineer, and have the contractor's biologists observe the nest to ensure take does not occur.
- Check structures near the OTD daily for caches of dead prey left by barn owls.
- Remove any caches of dead prey found within the bridge structure.
- Block access to cache locations with exclusion measures.

Figure 6.14. Recommended temporary catwalks on underside of the existing bridge.

6.2.4 Marine Foundations (Piers E2-E23)

The marine foundations of the existing SFOBB are from Pier E2 to Pier E23, and vary in type (Figure 6.15). Piers E2 through E5 consist of concrete caissons founded on deep bedrock. Piers E6 through E23 consist of reinforced concrete foundations that are supported by timber piles.

Figure 6.15. Marine Foundations (blue).

The marine foundations for the existing east span will be removed after the superstructure has been dismantled and removed. There is a chance that, as dismantling of the existing east span structure continues, displaced double-crested cormorants or other birds may colonize and initiate nesting on the exposed foundations. This will likely depend upon the amount of human activity around the foundations. Western gulls also can be expected to nest on the marine foundations.

Western Gull and Other Birds

Western gulls have nested on the concrete foundations of both the new and existing SFOBB spans in recent years. Construction activities during the dismantling of the existing bridge could thus have an adverse effect on this species. Potential impacts include disruption of breeding activity and removal of nest sites due to construction work and equipment traffic on and around the bridge. These activities could result in a decrease in nest productivity or nest abandonment. Observations of western gulls nesting within the construction area on the new east span show that this species is sensitive to construction activities occurring near the nest. Other potential nesting bird species include double-crested cormorant and Brandt's cormorant.

Specific Impact Avoidance Recommendations:

- Implement buffers around active nests. Should nesting western gulls occur within the construction area despite deterrence efforts, buffers will need to be implemented around active nests. The contractor will need to implement buffers around each nest, as directed by the Resident Engineer, and have the contractor's biologists observe the nest to ensure take does not occur.

6.2.5 Pile-Supported Access Trestles and Falsework

Two temporary trestles will be built to facilitate access for dismantling. The Oakland Access Trestle, running from the Oakland shoreline into the Bay, is expected to be an approximately 8,920 square-meter (96,000 square-foot) pipe pile-supported trestle. The trestle will be constructed parallel to the south side of the existing east span and extend west, potentially as far as Pier E9 of the existing east span. The trestle will likely have structures that extend under the bridge, perpendicular to the main trestle, to allow for access during the dismantling of the superstructures and marine foundations. The YBI Access Trestle, which will extend into the Bay from the YBI shoreline, is expected to be an approximately 650 square-meter (7,000 square-foot), H-pile supported trestle. This trestle will be constructed on the southeast side of YBI, and will primarily be used for off-hauling of materials during the dismantling of the cantilever superstructure. This trestle will be built over the existing footprint of a previous trestle, extending out into the Bay from YBI just south of the existing span. The trestles will likely be in place for four to five years.

To remove the structures described in Sections 6.2.1 through 6.2.4 above, cofferdams and additional in-water falsework may be required to support the existing east span until it is completely removed. Since the temporary structures will be contractor-designed, their exact nature (size, type, number of piles, etc.) will not be known until the dismantling begins.

Peregrine Falcon, Double-crested Cormorant, Western Gull and Other Birds

Construction and subsequent dismantling of trestles and falsework may adversely affect peregrine falcon, double-crested cormorant, western gull, Anna's hummingbird, black phoebe, Brandt's cormorant, common raven, house finch, killdeer, mourning dove, and pigeon guillemot. General impact avoidance measures are recommended.

6.2.6 Future YBI Structures

Construction activities will continue on YBI during the dismantling of the existing east span. This will include, but is not limited to, the construction of on and off ramps, public access facilities, buildings, realignment of roads, and restoration of the island. The BCDC permit requires nesting bird surveys in areas of construction and tree cutting on YBI. Failure to complete breeding bird surveys in a timely manner could result in nest failure and take of breeding bird species in this area.

Miscellaneous Birds

There is high potential for land-based birds such as mourning dove, Anna's hummingbird, European starling, rock pigeon, common raven, black phoebe, house finch, barn owl, killdeer or other birds to nest in the trees, shrubs, grassland, and open ground around the areas where these structures will be built. General impact avoidance measures are recommended.

CHAPTER 7 – PROCEDURES IN THE EVENT OF NEST ESTABLISHMENT

This Plan identifies measures which will be taken to prevent the establishment of active bird nests within the SFOBB Project's work areas and to avoid take of birds protected under the MBTA. Despite deterrent measures, it is possible that some nests may become established within the SFOBB Project. This can be attributed to the duration of the SFOBB Project, the number of nesting birds present in and adjacent to the SFOBB Project area, and the anticipated persistence of some birds, particularly those already habituated to, or tolerant of, disturbance currently associated with the bridge.

In the event that an active nest is detected in the SFOBB Project area, the contractor will immediately stop work within an initial radius of 76 meters (250 feet) of the nest and contact the Resident Engineer. The Department, in consultation with the USFWS, CDFG, and the contractor, will determine the appropriate buffer width to avoid potential impacts.

After establishing the 76 meter (250 foot) stop-work buffer, options for addressing an active nest that becomes established in the SFOBB Project area might include the following:

- Maintain a no-work buffer (76 meters [250 feet] for raptors and 15 meters [50 feet] for non-raptors) around the nest.
- Maintain a reduced no-work buffer around the nest. The size of the buffer would be determined by the Department, in consultation with CDFG, USFWS, and the contractor.
- Allow construction activities, which were ongoing when the nest was constructed, to continue. New activities will be restricted from commencing within the buffer zone.
- Remove nest contents. In certain circumstances, if the nest of a bird species will result in undue delay of SFOBB Project activities, the CDFG and USFWS may permit removal of a specific nest and its contents. It may either be destroyed and disposed of, or transferred to a wildlife care facility, where the young birds would be raised and released. Such situations are expected to be dealt with on a case-by-case basis and would require close communication with agencies. This course of action would also require an agency depredation permit; however, the Department biologist should make arrangements with a local wildlife care center prior to east span dismantling.

CHAPTER 8 – REFERENCES

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[USFWS] U.S. Fish and Wildlife Service. 2003. Migratory Bird Permit Memorandum, Dated April 15, 2003.

CHAPTER 9 – PERSONAL COMMUNICATIONS

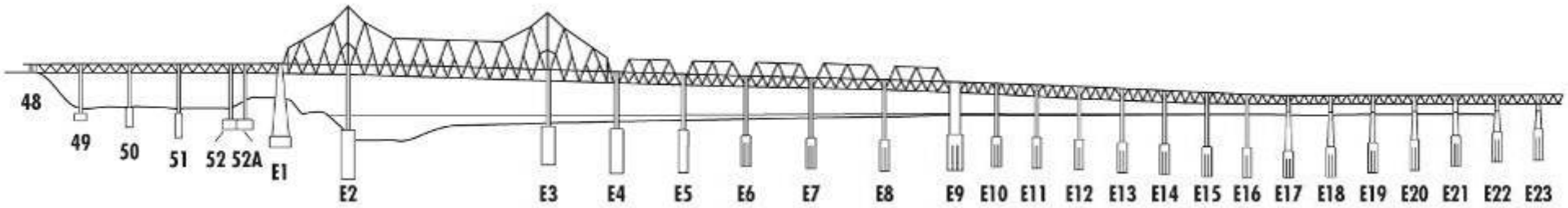
Abdullah Arakozie, California Department of Transportation; meeting with Eric Jepsen, December 2, 2011.

Eric Lichtwardt, LSA Associates, Inc; email communication with Ivy Edmonds-Hess, Parsons Brinckerhoff, November 14, 2011.

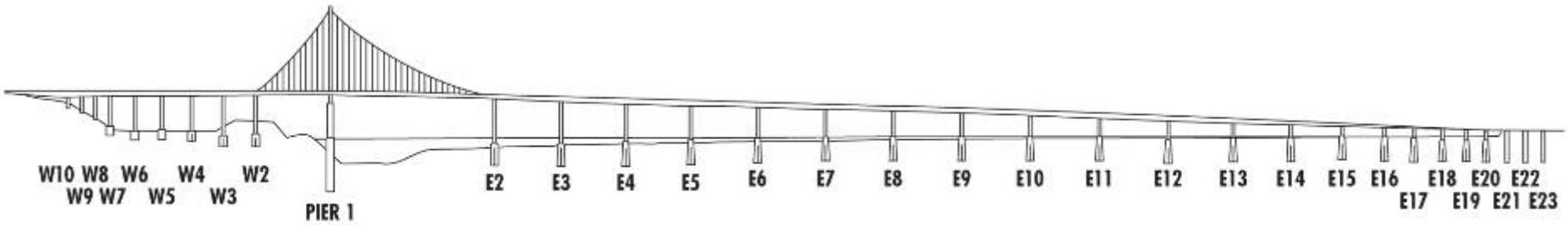
John Ozard, New York State Department of Environmental Conservation (NYSDEC); email communication with Eric Jepsen, October 5, 2011.

APPENDIX I. An Illustration of the Existing East Span and the New East Span San Francisco-Oakland Bay Bridge.

Existing East Span



New East Span



APPENDIX II. Final (Revised) Bird Monitoring and Management Plan (2003).

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. BOB ZANDIPOUR
District Branch Chief
Toll Bridge Design

Date: December 12, 2011

Attention: N. Horng

File: 04- SF- 80 PM 2.0/6.7
04 – 0120T
Yerba Buena Island (YB1#2)
Gassy Nongassy Classification

From: RIFAAT NASHED RN
Engineering Geologist
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

GRANT WILCOX GW
Chief, Branch B
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject : Tunnel Classification for the Proposed Excavation at three Locations

This memo is in response to your request to provide a memorandum to gain a gassy/nongassy classification for the construction work to be performed as part of the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project in the City of Oakland, Alameda County on Highway 80.

YB1 EB On-Ramp

This location will include the excavation required for Bent 10 and Abutment 11 that will be supported by spread footing and HP 360 x 132 piles.

According to the California Code of Regulations (CRR), Title 8, Subchapter 20 – Tunnel Safety Orders (TSO), Bent 10 and Abutment 11 piles are not subject to the requirements for Tunnel Safety orders. The spread footing excavation is not deep enough to be considered and the HP piles will be driven.

Parking Canopy

The Parking Canopy is supported by 4 CIDH piles, 36 inch (915 mm) diameter and 7 ft in depth below the ground surface (pile tip elevation).

According to the California Code of Regulations (CRR), Title 8, Subchapter 20 – Tunnel Safety Orders (TSO), the CIDH pile excavations are not subject to the requirements for Tunnel Safety order. The boring depth is only 7.0 ft in depth (< 20 ft required to need Tunnel Safety Orders).

Guard Booth with Canopy

This location will include the excavation required for 10 CIDH piles, 36 inch (915 mm) in diameter and 12 ft in depth from the original ground surface (pile tip elevation).

According to California Code of Regulations (CRR), Title 8, Subchapter 20 – Tunnel Safety Orders (TSO), the CIDH pile excavations are not subject to the requirements for Tunnel Safety Orders. The boring depth will be only12.0 ft (< 20 ft required to need Tunnel Safety Orders).

If you have any questions or need additional information, please call Rifaat Nashed at (510) 622-1773 or Grant Wilcox at (510) 286-4835.

c: TPokrywka, GWilcox, Route File, Daily File

RNashed/

STATE OF CALIFORNIA EDMUND G. BROWN, JR., Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT
2211 Park Towne Circle, Suite 2
Sacramento, California 95825

Telephone (916) 574-2540
FAX (916) 574-2542

June 7, 2011

Department of Transportation
111 Grand Avenue
Oakland, CA 94612

Attention: Rifaat Nashed (via e-mail: Rifaat_nashed@dot.ca.gov)

Subject: Underground Classification #'s: C157-075-11T thru C158-075-11T

Interstate 80 – Yerba Buena Island – Beam Structure

Mr. Nashed:

The information provided to this office relative to the above project has been reviewed. On the basis of this analysis, Underground Classification of "Potentially Gassy with Special Conditions" has been assigned to the shaft(s) identified on your submittal. Please retain the original Classification for your records and deliver a true and correct copy of the Classification to the shaft contractor(s) for posting at the job site.

When the contractor who will be performing the work is selected, please advise them to notify this office to determine if a mandated Prejob Conference with the Division is required prior to commencing any activity associated with drilling of the shaft(s).

Should you have another bore under construction that is not required to have an Underground Classification (i.e.: less than 30 inches in diameter), please contact the Mining and Tunneling Unit prior to any employee entry of such a space.

If you have any questions on this subject, please contact this office at your earliest convenience.

Sincerely,

John R. Leahy
Senior Engineer

cc: R. Brockman
File

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT

Underground Classification

C157-075-11T

DEPARTMENT OF TRANSPORTATION
NAME OF TUNNEL OR MINE AND COMPANY NAME

of 111 Grand Avenue, Oakland, CA 94612
MAILING ADDRESS

at INTERSTATE 80 - YERBA BUENA ISLAND - BEAM STRUCTURE
LOCATION

has been classified as ***POTENTIALLY GASSY with Special Conditions***
CLASSIFICATION

as required by the California Labor Code § 7955.

The Division shall be notified if sufficient quantities of flammable gas or vapors have been encountered underground. Classifications are based on the California Labor Code Part 9, Tunnel Safety Orders and Mine Safety Orders.

SPECIAL CONDITIONS

1. A Certified Gas Tester shall perform pre-entry and continuous monitoring of the underground environment to measure Oxygen and detect explosive, flammable, and toxic gasses whenever an employee is working in the underground environment.
2. Mechanical ventilation shall provide for continuous exhaust of fumes and air at any time an employee is working in the underground environment. The primary ventilation fans must be located outside of the underground environment and shall be reversible by a single switch near the fan location.
3. The Division shall be notified immediately if any **Flammable Gas** or **Petroleum Vapor** exceeds 5% of the Lower Explosive Limit.
4. All utilities that may be in conflict with the project shall be identified and physically located (potholed) prior to the start of project operations.

The two 94-inch diameter by 50 to 74 feet deep drilled shafts (Bents 1 and 2) located on the southwest edge of the eastbound off-ramp of Interstate 80, approximately 1,000 feet northeast of the Yerba Buena Tunnel at Southgate Road, San Francisco, San Francisco County.

Date June 7, 2011

John R. Leahy, Senior Engineer

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT

Underground Classification

C158-075-11T

DEPARTMENT OF TRANSPORTATION
NAME OF TUNNEL OR MINE AND COMPANY NAME

of 111 Grand Avenue, Oakland, CA 94612
MAILING ADDRESS

at INTERSTATE 80 - YERBA BUENA ISLAND - BEAM STRUCTURE
LOCATION

has been classified as ***POTENTIALLY GASSY with Special Conditions***
CLASSIFICATION

as required by the California Labor Code § 7955.

The Division shall be notified if sufficient quantities of flammable gas or vapors have been encountered underground. Classifications are based on the California Labor Code Part 9, Tunnel Safety Orders and Mine Safety Orders.

SPECIAL CONDITIONS

1. A Certified Gas Tester shall perform pre-entry and continuous monitoring of the underground environment to measure Oxygen and detect explosive, flammable, and toxic gasses whenever an employee is working in the underground environment.
2. Mechanical ventilation shall provide for continuous exhaust of fumes and air at any time an employee is working in the underground environment. The primary ventilation fans must be located outside of the underground environment and shall be reversible by a single switch near the fan location.
3. The Division shall be notified immediately if any **Flammable Gas** or **Petroleum Vapor** exceeds 5% of the Lower Explosive Limit.
4. All utilities that may be in conflict with the project shall be identified and physically located (potholed) prior to the start of project operations.

The three 60-inch diameter by 40 feet deep drilled shafts (Bent 3) located on the southwest edge of the eastbound off-ramp of Interstate 80, approximately 1,000 feet northeast of the Yerba Buena Tunnel at Southgate Road, San Francisco, San Francisco County.

Date June 7, 2011

John R. Leahy, Senior Engineer

STATE OF CALIFORNIA EDMUND G. BROWN, JR., Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT
2211 Park Towne Circle, Suite 2
Sacramento, California 95825

Telephone (916) 574-2540
FAX (916) 574-2542

February 18, 2011

Department of Transportation
PO Box 23660
Oakland, CA 94623

Attention: Rifaat Nashed(via e-mail: rifaat_nashed@dot.ca.gov)

Subject: Underground Classification #: C091-075-11T

Route 80 – Yerba Buena Island – Wall #51A

Mr. Nashed:

The information provided to this office relative to the above project has been reviewed. On the basis of this analysis, Underground Classification of "Potentially Gassy with Special Conditions" has been assigned to the shaft(s) identified on your submittal. Please retain the original Classification for your records and deliver a true and correct copy of the Classification to the shaft contractor(s) for posting at the job site.

When the contractor who will be performing the work is selected, please advise them to notify this office to determine if a mandated Prejob Conference with the Division is required prior to commencing any activity associated with drilling of the shaft(s).

Should you have another bore under construction that is not required to have an Underground Classification (i.e.: less than 30 inches in diameter), please contact the Mining and Tunneling Unit prior to any employee entry of such a space.

If you have any questions on this subject, please contact this office at your earliest convenience.

Sincerely,

John R. Leahy
Senior Engineer

cc: R. Brockman
File

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT

Underground Classification

C091-075-11T

DEPARTMENT OF TRANSPORTATION
NAME OF TUNNEL OR MINE AND COMPANY NAME

of PO Box 23660, Oakland, CA 94623
MAILING ADDRESS

at ROUTE 80 - YERBA BUENA ISLAND - WALL #51A
LOCATION

has been classified as ***POTENTIALLY GASSY with Special Conditions***
CLASSIFICATION

as required by the California Labor Code § 7955.

The Division shall be notified if sufficient quantities of flammable gas or vapors have been encountered underground. Classifications are based on the California Labor Code Part 9, Tunnel Safety Orders and Mine Safety Orders.

SPECIAL CONDITIONS

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3. The Division shall be notified immediately if any **Flammable Gas** or **Petroleum Vapor** exceeds 5% of the Lower Explosive Limit.
4. All utilities that may be in conflict with the project shall be identified and physically located (potholed) prior to the start of project operations.

The thirty-six 36-inch diameter by 52 feet deep drilled shafts (soldier piles) located along Southgate Road at the eastern approach of Route 80 to the Yerba Buena tunnel, San Francisco, San Francisco County.

Date February 18, 2011

John R. Leahy

John R. Leahy, Senior Engineer