FOR CONTRACT NO.: 04-174414
ROUTE: 04-Ala-84-KP 19.5/ 19.9, 20.5/21.2

INFORMATION HANDOUT

WATER QUALITY

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY SECTION (401 CERTIFICATION)
BOARD ORDER NO.: 2003-0017-DWQ
SITE NO.: 02-01-C0849 (BT)
CIWQS PLACE NO.: 728681

PERMITS

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME (1602 AGREEMENTS)
NOTIFICATION NO. 1600-2009-0370-3

UNITED STATES ARMY CORPS OF ENGINEERS
NATIONWIDE 404 PERMIT
FILE NO. SPN-2004-286510 S

AGREEMENTS

UNITED STATES FISH AND WILDLIFE SERVICE (BIOLOGICAL OPINION)

UNITED STATES NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

STRUCTURES REPORTS

FOUNDATION REPORT FOR STONYBROOK CREEK BRIDGE DATED 09-25-2009

FOUNDATION REPORT FOR NILES CANYON ROUTE 84
RETAINING WALL N1-CATCHER SYSTEM DATED 01-06-2010

REVISED UPDATED FINAL FOUNDATION REPORT FOR
RETAINING WALLS DATED 10-13-2009

FOUNDATION REVIEW DATED 12-28-2009

FINAL HYDRAULIC REPORT DATED 09-17-2009

MATERIALS INFORMATION

LEAD INVESTIGATION REPORT

RETAINING WALL - LOG OF TEST BORINGS (TOTAL 3 SHEETS)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD (RWQCB) 401 CERTIFICATION

California Regional Water Quality Control Board
San Francisco Bay Region

Linda S. Adams
Secretary for Environmental Protection

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

Arnold Schwarzenegger
Governor

June 22, 2010
Site No. 02-01-C0849 (BT)
CIWQS Place No. 728681

California Department of Transportation
Attn: Mr. Ron Kiaaina
Ron_Kiaaina@dot.ca.gov
111 Grand Avenue
Oakland, CA 94612

Subject: Water Quality Certification for the Niles Canyon State Route 84 Widening Project, unincorporated Alameda County

Department Project No.: EA 04-17440

Dear Mr. Kiaaina:

San Francisco Bay Regional Water Quality Control Board (Water Board) staff have reviewed the 401 water quality certification application submitted by the California Department of Transportation (Department) for the Niles Canyon State Route 84 Roadway Widening Project (Project). The Department has received a Project permit from the U.S. Army Corps of Engineers (ACOE) pursuant to Clean Water Act (CWA) Section 404 Nationwide Permit No. 14 (*Linear Transportation Projects*). You applied to this office under Section 401 of the CWA for water quality certification verifying that the Project does not violate State water quality standards.

Project: The Department proposes to make various safety improvements along an approximately one mile length of State Route 84 (SR 84) in Niles Canyon, alongside Alameda Creek, between the Rosewarnes and Farwell railroad underpasses. Primary project elements include the following:

- Reconstruction of the Palomares Road/SR 84 intersection to the south by approximately 20 feet to provide additional vehicle sight distance;
- Replacement of the existing box culvert at Stonybrook Creek, which is a fish passage barrier, with a bridge;
- Construction of retaining walls between SR 84 and Alameda Creek, above the ordinary high water mark of Alameda Creek;

- Widening of the existing roadway shoulders to meet current highway standards; and
- Construction of a northbound turn lane on SR 84 at Palomares Road.

Impacts: The proposed Project will result in permanent impacts to approximately 0.016 acres of jurisdictional wetlands and approximately 189 linear feet (0.046 acres) of jurisdictional waters as a result of roadway widening and riprap installation.

Proposed permanent impacts to jurisdictional waters are the result of placement of riprap at the base of retaining walls for scour protection within Alameda Creek (118 linear feet, 0.013 acres), and placement of riprap at the base of the Rosewarnes railroad bridge pier (71 linear feet, 0.033 acres). Proposed permanent impacts to jurisdictional wetlands are the result of roadway widening.

The proposed Project will result in temporary impacts to approximately 353 linear feet (0.123 acres) of jurisdictional waters due to construction access at Alameda and Stonybrook Creeks.

The proposed Project will also result in approximately 1.2 acres (2,923 linear feet) of permanent impacts to riparian habitat along Alameda and Stonybrook Creeks. Permanent impacts are primarily the result of roadway widening into the existing Alameda Creek riparian buffer area. Riparian impacts will not result in the loss of coldwater habitat within Alameda Creek. Permanent impacts to native riparian tree species within the riparian impact areas include 10 white alder, 9 California bay laurel, 13 big leaf maple, 17 California sycamore, and 21 willow.

The proposed Project will also result in temporary impacts to approximately 0.35 acres (3,336 linear feet) of riparian habitat due to construction access for construction of Alameda Creek retaining walls (0.051 acres), construction of the Stonybrook Creek bridge (0.347 acres), and construction access for removal of abandoned in-stream structures (0.206 acres).

Hydromodification impacts: Added impervious areas may result in alterations to existing hydrologic regimes, resulting in erosion and/or changes of sediment transport in receiving waters (hydromodification). Project implementation would result in approximately 1.14 acres of added impervious area and therefore the Department is required to mitigate potential hydromodification impacts.

Mitigation: To compensate for permanent impacts to approximately 0.016 acres of jurisdictional wetlands and approximately 189 linear feet (0.046 acres) of jurisdictional waters, the Department shall remove the existing SR 84 box culvert at Stonybrook Creek, which is currently a fish passage barrier, and install a bridge with abutments placed wider than the active channel width and above the ordinary high water mark. The creek channel will be modified at this location to repair a scour hole that has formed at the downstream end of the box culvert. Additionally, three remnant structures shall be removed from Stonybrook Creek between SR 84 and its confluence with Alameda Creek (an old rock weir grade control structure, bridge abutment, and roadway remnant).

To mitigate for permanent impacts to riparian habitat on-site, the Department shall plant 5 big leaf maples and 63 willow trees within a 0.19 acre (560 linear foot) area. To mitigate for permanent impacts to riparian habitat off-site, the Department shall restore no less than 1.5 acres, and enhance no less than 3.0 acres of riparian habitat along the Arroyo Mocho, in the city of Livermore, adjacent El Granada High School.

Temporarily impacted riparian areas shall be re-vegetated within the first growing season following cessation of construction activities in those areas.

Roadway Pollutant Mitigation: As mitigation for increased pollutant loads associated with impervious areas, the Department is required to provide treatment of stormwater runoff from no less than 2.6 acres of impervious area. Due to space constraints within the Project area, the Department was unable to provide filtration-based treatment of stormwater (e.g., grass filter strips, biofiltration swales). As such, the Department has proposed underground pipe storage and settling of stormwater from an approximately 2.7-acre impervious shed area. Because contaminant removal using settling is significantly less effective than filtration-based treatment, the Department shall receive 1.3 acres of stormwater treatment credit for its treatment proposal. Appropriately, this certification requires the Department provide an additional 1.4 acres of stormwater treatment, plus an additional 50% of that area for temporal loss of treatment (total 2.1 acres), within the Alameda Creek watershed no later than five years from Project completion (certification condition no. 14).

Hydromodification Mitigation: To mitigate for potential hydromodification impacts, the Department shall install underground detention pipes with control structures at the outfall to detain Project peak stormwater flows from added impervious areas (see plans in Attachment B).

Wetland Tracker System: It has been determined through regional, State, and national studies that tracking of mitigation/restoration projects must be improved to better assess the performance of these projects, following monitoring periods that last several years. In addition, to effectively carry out the State's No Net Loss Policy for wetlands, the State needs to closely track both wetland losses and mitigation/restoration project success. Therefore, as specified under Condition No. 2 of this certification, we require that the Department to use a standard form to provide Project information related to restoration measures. An electronic copy of the form and instructions can be downloaded at: http://www.waterboards.ca.gov/sanfranciscobay/certs.shtml. Project information concerning impacts and mitigation/restoration will be made available at the web link: http://www.californiawetlands.net.

CEQA Compliance: On June 16, 2006, the Department filed a Negative Declaration for the Project.

Certification: I hereby issue an order certifying that any discharge from the referenced project 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, and with other applicable requirements of State law. This discharge is also regulated under State Water Resources Control Board Order No. 2003 - 0017 – DWQ, "General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received State Water Quality Certification" which requires compliance with all conditions of this Water Quality Certification. The following conditions are associated with this certification:

1. Project construction, including construction of contractor yards and clearing and grubbing activities, shall be prohibited until a final, signed co-operative agreement between the Department and all appropriate agencies with legal responsibilities at the Arroyo Mocho El Granada High School mitigation site, has been submitted and found acceptable by Water Board staff;

2. Caltrans shall not commence construction within the riparian corridor if the work and its associated erosion control measures cannot be completed prior to the onset of a 72-hour storm event. 72-hour weather forecasts from the National Weather Service shall be consulted prior to beginning any Project phase;

3. Erosion control measures shall be utilized throughout all phases of construction where sediment runoff from disturbed areas threatens to enter waters of the State, regardless of date. At no time shall silt-laden runoff be allowed to enter waters of the State;

4. Project construction within waters of the State shall occur only between June 15 and October 15. Regardless of the date, Project construction within waters of the State is prohibited during rain events capable of mobilizing sediment;

5. All temporarily disturbed areas shall be restored to pre-construction or enhanced conditions, using only native plant species, within the first growing season following cessation of construction activities in those areas;

6. Construction of all on- and off-site mitigation shall be completed prior to completion of Project construction. The Department shall provide additional mitigation, subject to the acceptance of the Water Board Executive Officer, if it fails to meet this timeline;

7. A final on-site Mitigation and Monitoring Plan (On-site MMP) shall be submitted and found acceptable to the Water Board Executive Officer no later than March 31, 2011. The on-site MMP shall be implemented. The On-site MMP shall include:
    a. A proposal to plant no fewer than 5 big leaf maples and 63 willow trees on-site within four areas totaling no less than 0.19 acres (560 linear feet);
    b. A detailed planting plan;
    c. An invasive plant removal plan; and

d. A minimum 5-year monitoring plan with survivorship, percent cover, vigor, and reproductive signs metrics, success criteria and commitment to submit periodic monitoring reports to the Water Board. Five maples and fifty percent of the willows shall survive after five years. At a minimum, the Department shall propose a timeline to submit monitoring reports for years 0, 1, 3, and 5.

Site maps shall be prepared with photo-documentation points. Prior to implementing the Project, the Department shall photographically document the condition of the Project site. Following installation of the mitigation, the immediate post-construction condition of the site shall be photo-documented and a report shall be submitted to the Water Board including the pre-construction photographs, the post-construction photographs, and the map with the locations of the photo-documentation points clearly marked (Year 0 report);

8. A final off-site Mitigation and Monitoring Plan (Off-site MMP) shall be submitted and found acceptable to the Water Board Executive Officer no later than March 31, 2011. The accepted Off-site MMP shall be implemented. The Off-site MMP shall include:
    a. A proposal to restore high-quality riparian habitat along the Arroyo Mocho. The Off-site MMP shall include no less than 1.5 acres of restoration and 3.0 acres of riparian enhancement mitigation;
    b. A detailed planting plan using herb, shrub, and tree species, including willow, oak, alder, bay-laurel, big leaf maple, and sycamore;
    c. An invasive plant removal plan;
    d. Site maintenance plan;
    e. Adaptive management plan;
    f. A legal mechanism to protect the mitigation area in perpetuity;
    g. A plan to prevent and/or limit pedestrian activity in the mitigation area; and
    h. A minimum 10-year monitoring plan with survivorship, native and invasive percent cover, vigor, and hydrology metrics, success criteria and commitment to submittal of periodic monitoring reports to the Water Board. Monitoring metrics and success criteria shall be established for herb, shrub, and tree layers. At a minimum, the Department shall propose a timeline to submit monitoring reports for years 0, 1, 2, 3, 5, 7, and 10.

Site maps shall be prepared with photo-documentation points. Prior to implementing the Project, the Department shall photographically document the condition of the Project site. Following installation of the mitigation, the immediate post-construction condition of the site shall be photo-documented and a report shall be submitted to the Water Board including the pre-construction photographs, the post-construction photographs, and the map with the locations of the photo-documentation points clearly marked (Year 0 report);

9. Any planting established as part of a Project mitigation plan shall not be considered successfully established until supplemental irrigation systems have been terminated for two or more full growing seasons;

10. The Department shall remove the existing box culvert from Stonybrook Creek, install a bridge per the plans in Attachment A, and implement the following in-channel improvements within Stonybrook Creek:
    a. Remove the remnant rock weir, roadway, and abutment structures. These structures shall be removed by hand. Jackhammers or other hand-operated equipment may be used to break apart the material;
    b. Fill the scour hole immediately downstream of the existing Stonybrook Creek box culvert with appropriately sized cobble; and
    c. Grade the new channel section to meet upstream and downstream channel elevations. The new channel section shall be backfilled with native material and overlaid with native rock material.

11. All work in Stonybrook Creek shall be completed before completion of Project construction. The Department shall provide the following reports to the Water Board that address work within Stonybrook Creek:
    a. An implementation timeline for all mitigation activities within Stonybrook Creek, to be submitted not later than March 30, 2011. Please also include a timeline for overall Project implementation;
    b. Before and after photo-documentation of creek areas where the remnant structures were removed, to be submitted no later than sixty days after their removal;
    c. A photographic report showing the entire restored channel section and new bridge, to be submitted no later than sixty days from completion; and
    d. A Stonybrook Creek geomorphic assessment report detailing the stability of the restored channel section, to be submitted no later than July 15, three rainy seasons after mitigation completion. This report shall be subject to the acceptance of the Executive Officer, and shall include any mitigation measures necessary to improve channel stability (e.g., replacement of cobble).

12. Not later than 30 days prior to the beginning of construction of any Project component, the City shall submit, acceptable to the Executive Officer, a final SWPPP to address the Project's expected construction stage impacts, prepared pursuant to the State Water Resources Control Board Water Quality Order No. 99-06-DWQ, the NPDES Statewide Permit for Storm Water Discharges From the State of California City of Transportation Properties, Facilities, and Activities;

13. All on- and off-site mitigation shall not be considered to satisfy the conditions of this certification until final mitigation success reports have been submitted to the Water Board and found acceptable by the Executive Officer;

14. The Department shall provide 2.1 acres of stormwater treatment from impervious areas within the Alameda Creek watershed. A treatment proposal shall be submitted, subject to the acceptance of the Executive Officer, and be implemented no later than five years from the date of Project completion;

15. The Department shall mitigate potential hydromodification impacts from the Project's added impervious areas by installing underground detention facilities per the plans included in Attachment B of this certification;

16. Not later than 20 days prior to any dewatering and diversion activities, the Department shall submit a dewatering and/or diversion plan, subject to the acceptance of Water Board staff. The plan shall present a time schedule for dewatering activities and include a commitment to have all diversion structures removed from waters of the State, including stabilization and restoration in areas where diversion occurred, prior to October 15;

17. This certification does not allow for the take, or incidental take, of any special status species. The City shall use the appropriate protocols, as approved by the California Department of Fish and Game and the U.S. Fish and Wildlife Service, to ensure that Project activities do not impact the Beneficial Use of the Preservation of Rare and Endangered Species;

18. The Department shall maintain a copy of this water quality certification at the Project site so as to be available at all times to site operating personnel. It is the responsibility of the Department to assure that all personnel (employees, contractors, and subcontractors) are adequately informed and trained regarding the conditions of this certification;

19. The Department shall adhere to the Standard and Regional conditions imposed by Nationwide Permit No. 14 (File No. SPN-2004-286510 S) and the terms of the Streambed Alteration Agreement between the Department and the California Department of Fish and Game (Notification no. 1600-2009-0370-3);

20. This Certification applies to the Project as proposed in the application materials. Please be advised that failure to implement the Project as proposed is a violation of this water quality certification;

21. The Department is required to use the California Wetlands Standard Form to provide Project information and a map of the enhancement and restoration site no later than six weeks from the date of this certification. The completed form shall be submitted electronically to wetlandsdata@waterboards.ca.gov or shall be submitted as a hard copy to both: 1) The Water Board to the attention of Wetland Tracker; and 2) The San Francisco Estuary Institute, 7770 Pardee Lane, Oakland, CA 94621-1424, to the attention of Mike May;

22. No fueling, cleaning, or maintenance of vehicles or equipment shall take place within any areas where an accidental discharge to waters of the State may occur; construction materials and heavy equipment must be stored outside waters of the State;

23. Except as expressly allowed in this Certification, the discharge, or creation of the potential for discharge, of any soil materials including fresh concrete, cement, silts, clay, sand and other organic materials to waters of the State is prohibited;

24. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to Section 13330 of the California Water Code (CWC) and Section 3867 of Title 23 of the California Code of Regulations(23 CCR);

25. This certification action does not 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 California Code of Regulations (CCR) Title 23, 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; and,

26. Certification is conditioned upon total payment of the full fee required in State regulations (23 CCR Section 3833). Water Board staff received full payment of $720.00 on December 16, 2009.

We anticipate your cooperation in implementing these conditions. However, please be advised that any violation of water quality certification conditions is a violation of State law and subject to administrative civil liability pursuant to California Water Code (CWC) section 13350. Failure to respond, inadequate response, late response, or failure to meet any condition of this certification may subject you to civil liability imposed by the Water Board to a maximum of $5,000 per day per violation or $10 for each gallon of waste discharged in violation of this certification.

Conditions 7, 8, 11, 12, and 14 are requirements for information or reports. Any requirement for a report made as a condition to this action is a formal requirement pursuant to CWC section 13267, and failure or refusal to provide, or falsification of such required report is subject to civil liability as described in CWC section 13268.

Should new information come to our attention that indicates a water quality problem with this project, the Water Board may issue Waste Discharge Requirements pursuant to 23 CCR Section 3857.

If you have any questions, please contact Brendan Thompson at (510) 622-2506, or via e-mail to BThompson@waterboards.ca.gov.

Sincerely,

Dale Bowyer

Digitally signed by Dale Bowyer
DN: cn=Dale Bowyer, o=S.F. Bay Water Quality Control Board, ou=Watershed Division, email=dbowyer@waterboards.ca.gov, c=US
Date: 2010.06.22 15:14:32 -07'00'

For Bruce H. Wolfe
Executive Officer

cc (via e-mail):

Mr. Bill Orme SWRCB-DWQ
Mr. Hal Durio, USACE
Ms. Jane Hicks, USACE
Mr. Cameron Johnson, USACE
Ms. Holly Costa, USACE
Mr. Jerry Roe, USFWS
Mr. Dale Bowyer, Water Board
Mr. Jason Brush, USEPA
Mr. Hardeep Takhar, Caltrans
Mr. Cyrus Vafai, Caltrans
Ms. Andrea Meier, USACE

Attachment A
Plans for Stonybrook Creek Improvements

Attachment B
Plans for Underground Detention Facilities

FOR COMPLETE RIGHT OF WAY DATA,
SEE RIGHT OF WAY RECORD MAPS
AT DISTRICT OFFICE.

Caltrans Metric

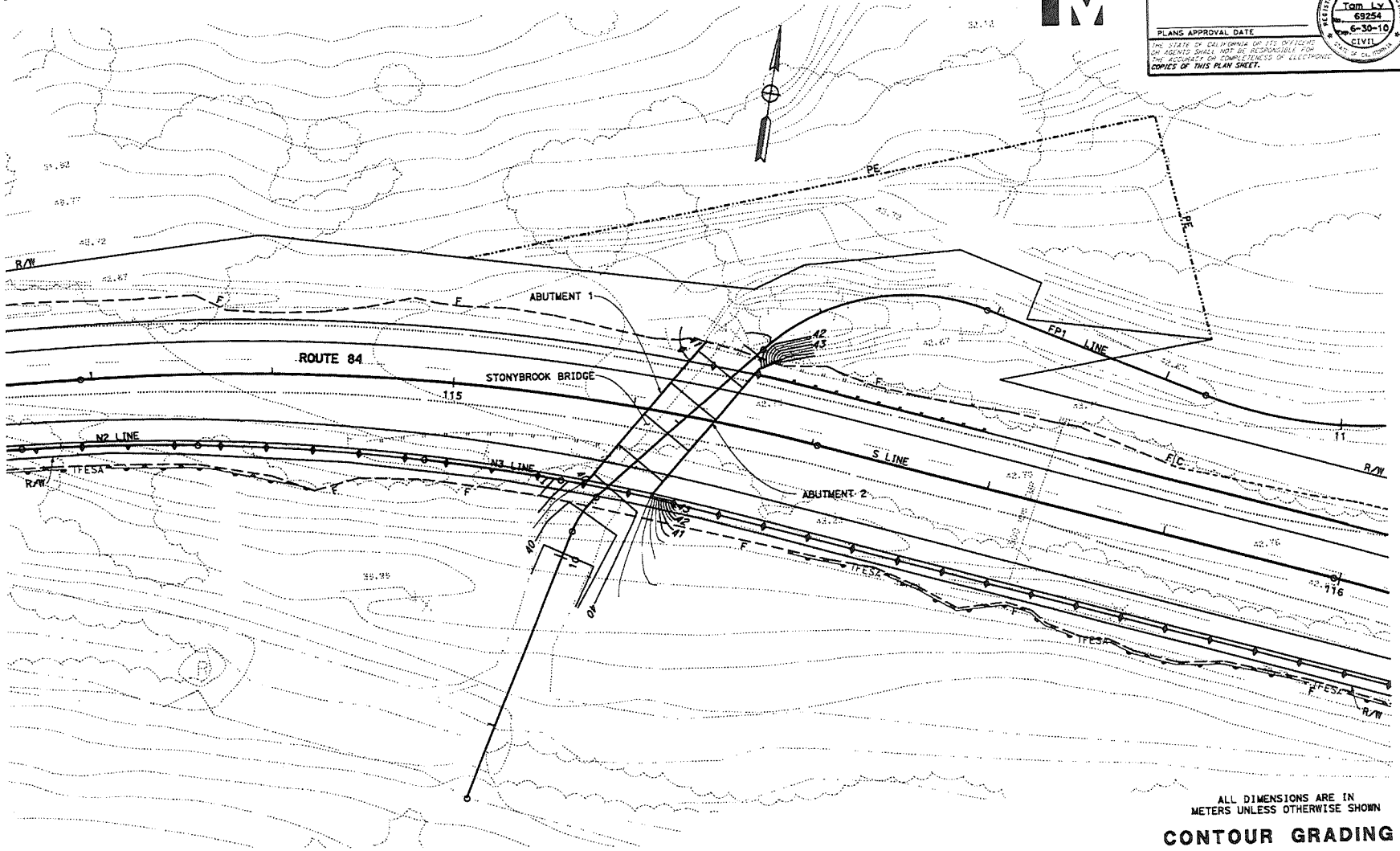
DIST	COUNTY	ROUTE	TOTAL PROJECT	NO.	SHEETS
04	Alc	84	19.5/19.9, 20.5/21.2		

REGISTERED CIVIL ENGINEER — DATE 3-8-10

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tam Ly 69254 — 6-30-10 — 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.



ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

CONTOUR GRADING

SCALE 1:200

THIS PLAN ACCURATE FOR CONTOUR GRADING WORK ONLY

G-1

REVISED BY	DATE REVISED

CALCULATED DESIGNED BY	TAM LY
CHECKED BY	GHULAM POPAL

FUNCTIONAL SUPERVISOR: GHULAM POPAL

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER San Thanh Ly No. 72584 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA

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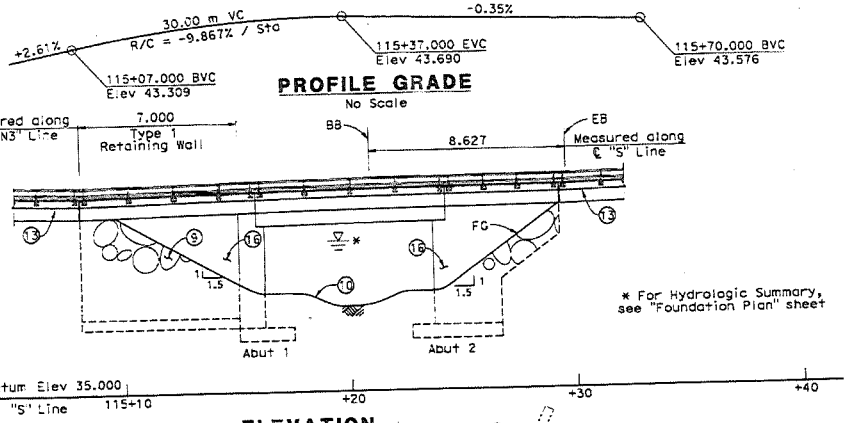


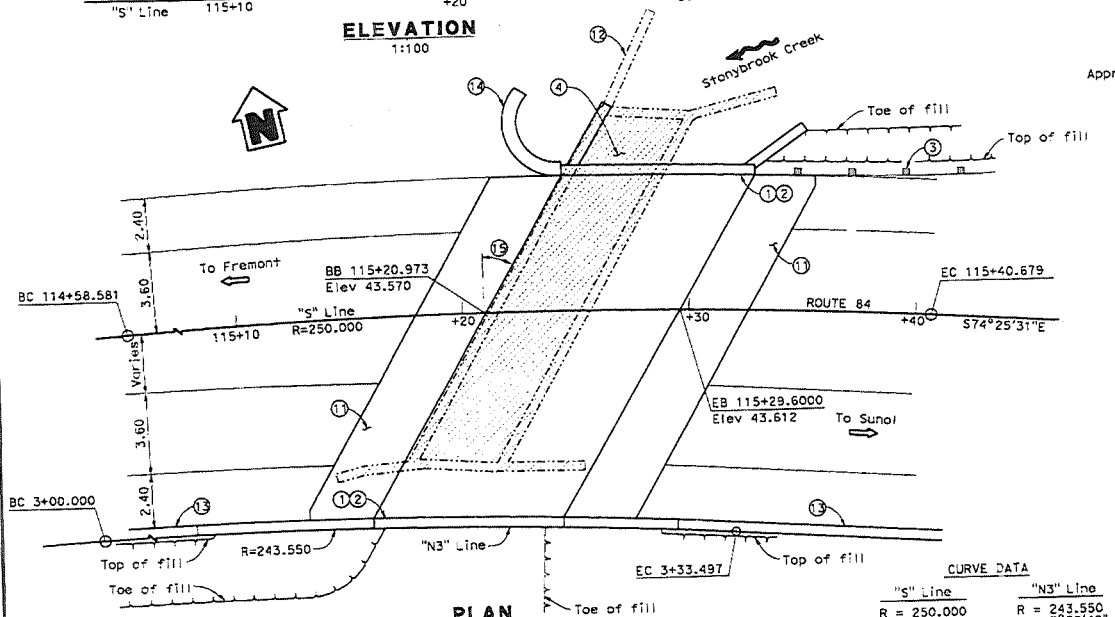
PROFILE GRADE

No Scale

* For Hydrologic Summary, see "Foundation Plan" sheet

ELEVATION

1:100



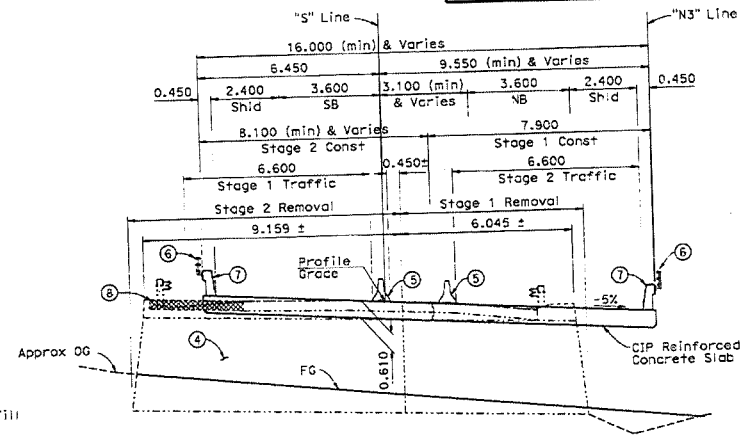
PLAN

1:100

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

CURVE DATA

"S" Line	"N3" Line
R = 250.000	R = 243.550
Δ = 18°45'13"	Δ = 7°52'49"
T = 41.283	T = 16.775
L = 81.282	L = 33.497



TYPICAL BRIDGE SECTION

1:80

Notes:

1. -Paint "Stonybrook Creek Bridge"
2. -Paint "Br No. 33-0731"
3. -MBGR, see "ROAD PLANS"
4. -Remove existing RCB Culvert 3100 x 2200 and retaining walls
5. -Temporary Railing (Type K), see "ROAD PLANS"
6. -Tubular Bicycle Railing
7. -Concrete Barrier Type 736
8. -HMA (Type A), see "ROAD PLANS"
9. -Rock Slope Protection, see "ROAD PLANS"
10. -Chanel Lining (150mm Cobble), see "ROAD PLANS"
11. -Structure Approach ED(3)D
12. -Existing retaining wall to remain
13. -Concrete Barrier Type 736B with Bicycle Railing, see "ROAD PLANS"
14. -Concrete Barrier Type 60, see "ROAD PLANS"
15. -30°16'53"± Skew Rt
16. -Architectural Treatment not shown
17. -For Quantities Decal, see "INDEX TO PLANS" sheet

Legends:

-·-·-·- Denotes existing structure

▨ Denotes bridge removal

Caltrans Metric	1-28-2010 Samad Hamoud DESIGN ENGINEER	DESIGN BY A. Yazdani/S. Ly	CHECKED S. Hamoud	LOAD & RESISTANCE FACTOR DESIGN	LIVE LOADING: HL93 w/"LOW-BOY"; PERMIT DESIGN VEHICLE
		DETAILS BY L. Mc/F. Maagma	CHECKED S. Ly	LAYOUT BY A. Yazdani/S. Ly	CHECKED S. Hamoud
		QUANTITIES BY W. Singh/A. Perez	CHECKED S. Ly	SPECIFICATIONS BY J. Jiang	PLANS AND SPECS COMPARED J. Jiang

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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 ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH 16

BRIDGE NO. 33-0731

KILOMETER POST 20.90

CU 04 EA 174411

FILE => 33-e0731-c-gp0*.dgn

STONYBROOK CREEK BRIDGE
GENERAL PLAN

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 10-08 10-09-09 11-07-09 01-06-10 02-26-10 03-26-10 11-24-10 7-14-03

SHEET 1 OF 20

STRUCTURES DESIGN GENERAL PLAN SHEET (METRIC) (REV.07-24-06)

DATE PLOTTED => 11-FEB-2010 TIME PLOTTED => 17:31

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Son Thanh Ly No. 72584 EXP. 6-30-10 CIVIL STATE OF CALIFORNIA

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INDEX TO PLANS

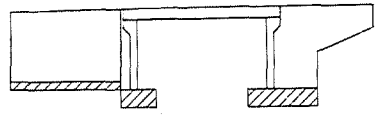
SHEET NO.	TITLES
1.	GENERAL PLAN
2.	INDEX TO PLANS
3.	DECK CONTOURS
4.	FOUNDATION PLAN
5.	REMOVAL DETAILS
6.	ABUTMENT 1 LAYOUT
7.	ABUTMENT 2 LAYOUT
8.	ABUTMENT DETAILS NO.1
9.	ABUTMENT DETAILS NO.2
10.	ABUTMENT DETAILS NO.3
11.	TYPICAL SECTION
12.	SLAB REINFORCEMENT
13.	STRUCTURE APPROACH TYPE EQ (3D)
14.	STRUCTURE APPROACH DRAINAGE DETAIL
15.	ARCHITECTURAL TREATMENT
16.	TUBULAR BICYCLE RAILING
17.	LOG OF TEST BORINGS 1 OF 4
18.	LOG OF TEST BORINGS 2 OF 4
19.	LOG OF TEST BORINGS 3 OF 4
20.	LOG OF TEST BORINGS 4 OF 4

STANDARD PLANS JULY 2004

A10A	ACRONYMS AND ABBREVIATIONS (A-L)
A10B	ACRONYMS AND ABBREVIATIONS (M-Z)
A10C	SYMBOLS (SHEET 1 OF 2)
A10D	SYMBOLS (SHEET 2 OF 2)
A62B	LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL BRIDGE SURCHARGE AND WALL
A62C	LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL BRIDGE
B0-1	BRIDGE DETAILS
B0-3	BRIDGE DETAILS
B0-5	BRIDGE DETAILS
B0-13	BRIDGE DETAILS
B3-1	RETAINING WALL TYPE 1
B3-8	RETAINING WALL DETAILS NO. 1
RSP B6-21	JOINT SEALS (MAXIMUM MOVEMENT RATING = 50MM)
B11-47	CABLE RAILING
B11-56	CONCRETE BARRIER TYPE 736

STANDARD PLAN SHEET NO.

DETAIL NO.



CONCRETE STRENGTH AND TYPE LIMITS

No Scale

Legend:

Structural Concrete, Bridge (fc' = 28 MPa @ 28 days)

Structural Concrete, Bridge Footing fc' = 25 Mpa

GENERAL NOTES
LOAD RESISTANCE FACTOR DESIGN

DESIGN: AASHTO LRFD Bridge Design Specifications, Fourth Edition with Interims through 2007 and Caltrans Amendments, except that geotechnical design of deep foundations, earth retaining systems, bridge (incl. barrier and railing) details taken from Standard Plans July 2004 and earlier version, Standard Bridge Details XS sheets, etc) are designed using Bridge Specifications ('96 AASHTO w/Revisions by Caltrans).

SEISMIC DESIGN: CALTRANS SEISMIC DESIGN CRITERIA (SDC), VERSION 1.4 JUNE 2004

DEAD LOAD: Includes 1680 Pa for Future Wearing Surface

LIVE LOADING: HL-93 and and Permit Design Load

SEISMIC LOADING: Soil Profile Type C
Magnitude Group 7.25 ± 0.25
Peak Rock Acceleration = 0.6g

REINFORCED CONCRETE: fy = 420 MPa
fc = 25 MPa
n = 8

FOOTING DATA TABLE

	Working Stress Design (WSD)	
	Permissible Gross Contact Stress (Settlement) (kPa)	Allowable Gross Bearing Capacity (kPa)
Abut 1	588	196
Abut 2	588	196

QUANTITIES

BRIDGE REMOVAL	LUMP SUM	
STRUCTURE EXCAVATION (BRIDGE)	425	m^3
STRUCTURE EXCAVATION (RETAINING WALL)	51	m^3
STRUCTURE BACKFILL (BRIDGE)	276	m^3
STRUCTURE BACKFILL (RETAINING WALL)	58	m^3
PERVIOUS BACKFILL MATERIAL	44	m^3
PERVIOUS BACKFILL MATERIAL (RETAINING WALL)	4	m^3
STRUCTURAL CONCRETE, BRIDGE FOOTING	75	m^3
STRUCTURAL CONCRETE, BRIDGE	189	m^3
STRUCTURAL CONCRETE, RETAINING WALL	21	m^3
STRUCTURAL CONCRETE, APPROACH SLAB (TYPE EQ)	22	m^3
ARCHITECTURAL TREATMENT	39	m^2
JOINT SEAL (MR 13 MM)	37	m
BAR REINFORCING STEEL (BRIDGE)	30,010	kg
BAR REINFORCING STEEL (RETAINING WALL)	1373	kg
CLEAN AND PAINT BRIDGE RAILING	LUMP SUM	
PREPARE AND STAIN CONCRETE	117	m^2
TUBULAR BICYCLE RAILING	30	m
CABLE RAILING	6	m
CONCRETE BARRIER (TYPE 736)	30	m

DESIGN	BY A. Yazdani/S. Ly	CHECKED S. Hamoud	
DETAILS	BY L. Ma/F. Maagma	CHECKED S. Ly	
QUANTITIES	BY H. Singh/A. Perez	CHECKED S. Ly	

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH 16

BRIDGE NO. 33-0731 KILOMETER POST 20.90

STONYBROOK CREEK BRIDGE

INDEX TO PLAN

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04
EA 174411

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 03-09-04 03-08-05 03-20-06 12-21-06 03-30-09 12-21-10

SHEET 2 OF 20

FILE => 33-0731-B-IP3.dgn

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV.03-17-04)

USER NAME => DATE PLOTTED => 11-FEB-2010 TIME PLOTTED => 14:31

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

PLANS APPROVAL DATE

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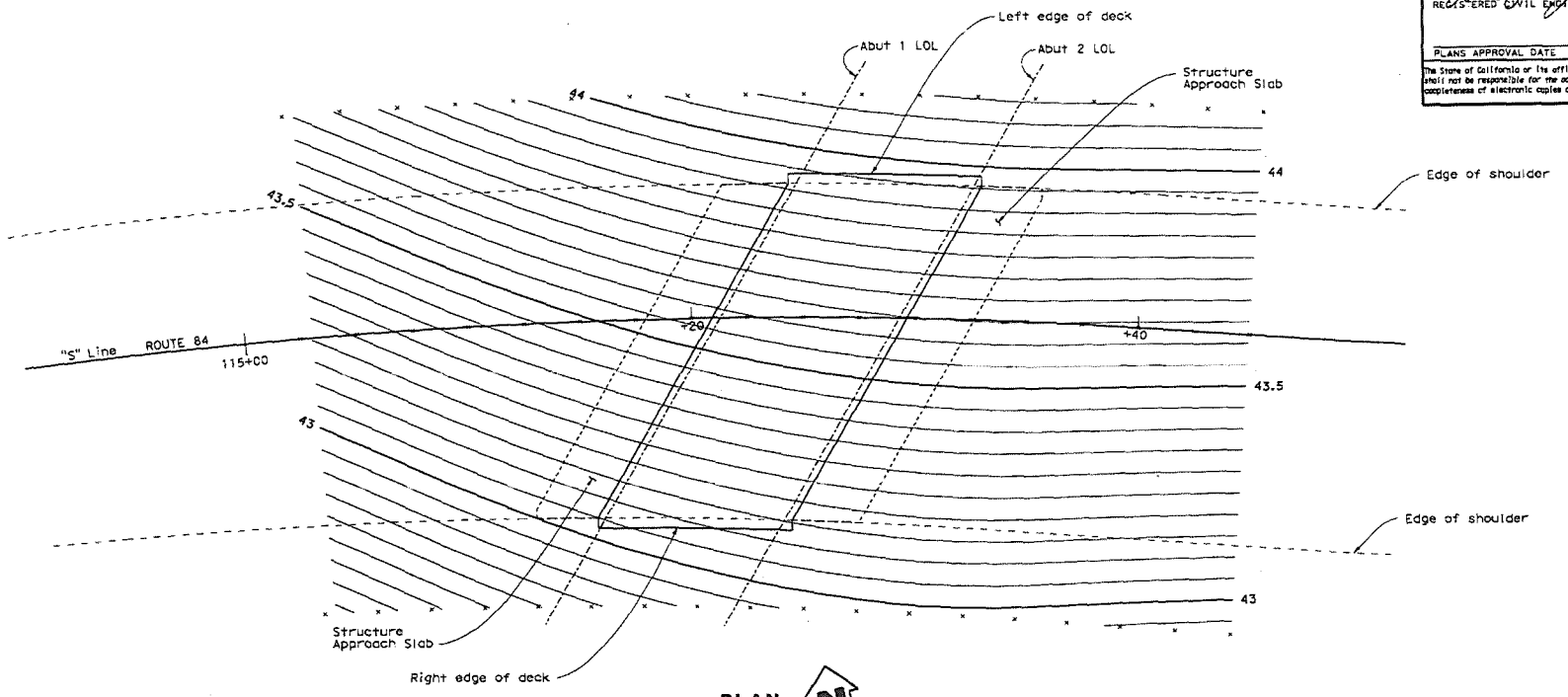
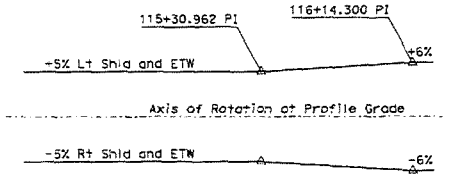
REGISTERED PROFESSIONAL ENGINEER Son Thanh Ly No. 72584 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA



PLAN
1:100

Notes:
0.05 m Contour Interval
x - 2.50 m Station Increment
Contours do not include camber



SUPERELEVATION DIAGRAM
No Scale

DESIGN	BY A. Yazdani/S. Ly	CHECKED S. Hamoud	
DETAILS	BY L. Ma/ F. Maagma	CHECKED S. Ly	
QUANTITIES	BY H. Singh/A. Perez	CHECKED S. Ly	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES
STRUCTURE DESIGN
DESIGN BRANCH 16

BRIDGE NO. 33-0731
KILOMETER POST 20.90

STONYBROOK CREEK BRIDGE
DECK CONTOURS

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04
EA 174411

FILE => 33-e0731-c-cc01.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 03-30-06 01-30-09 4-29-09 11-30-09 12-30-09 1-28-10

SHEET 3 OF 20

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV.03-17-04)

DATE PLOTTED -> 11-30-2009 TIME PLOTTED -> 17:31

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

PLANS APPROVAL DATE

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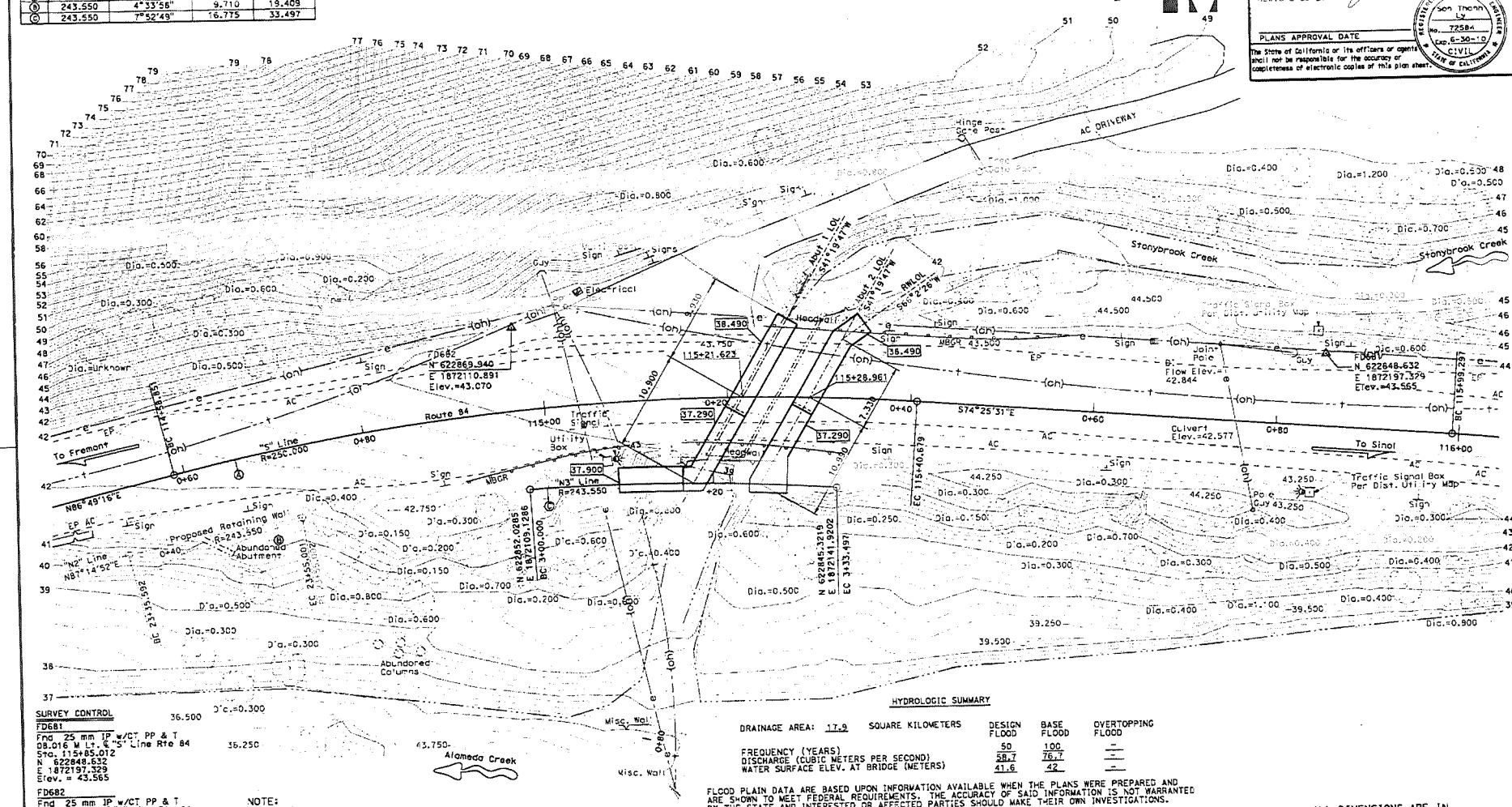
REGISTERED PROFESSIONAL ENGINEER Son Thanh Ly No. 72584 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA

Caltrans Metric

CURVE DATA

No.	R	Δ	T	L
Ⓐ	250.000	18°45'13"	41.283	81.828
Ⓑ	243.550	4°33'58"	9.710	19.409
Ⓒ	243.550	7°52'49"	16.775	33.497



HYDROLOGIC SUMMARY

DRAINAGE AREA: 17.9 SQUARE KILOMETERS

	DESIGN FLOOD	BASE FLOOD	OVERTOPPING FLOOD
FREQUENCY (YEARS)	50	100	—
DISCHARGE (CUBIC METERS PER SECOND)	58.7	76.7	—
WATER SURFACE ELEV. AT BRIDGE (METERS)	41.6	42	—

FLOOD PLAIN DATA ARE BASED UPON INFORMATION AVAILABLE WHEN THE PLANS WERE PREPARED AND ARE SHOWN TO MEET FEDERAL REQUIREMENTS. THE ACCURACY OF SAID INFORMATION IS NOT WARRANTED BY THE STATE AND INTERESTED OR AFFECTED PARTIES SHOULD MAKE THEIR OWN INVESTIGATIONS.

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

SURVEY CONTROL

FD681
Fnd 25 mm IP w/CT PP & T
08.016 M Lt. ℄ "S" Line Rte 84
Sta. 115+85.012
N 622848.632
E 1872197.329
Elev. = 43.565

FD682
Fnd 25 mm IP w/CT PP & T
09.208 M Lt. ℄ "S" Line Rte 84
Sta. 114+87.397
N 622869.940
E 1872110.891
Elev. = 43.070

NOTE:
- Indicates Bottom of Footing Elevation
- Indicates Existing Structure

PRELIMINARY INVESTIGATION SECTION							
SCALE 1:200	VERT. DATUM NAVD88	PHOTOGRAMMETRY AS OF:					
	HORIZ. DATUM NAD83 (1991.35)	SURVEYED	BY DISTRICT/ C.FASSETT	CHECKED	BY T.GILLETT	09/2007	
ALIGNMENT TIES DIST.TRAVERSE SHEET		DRAFTED	BY T.ZOLNIKOVA 09/2007	CHECKED	BY J.PALLARES	01/2008	

STRUCTURES FOUNDATION PLAN SHEET (METRIC) (REV.10-27-05)

DESIGN	BY A. Yazdani/S. Ly	CHECKED	S. Hamoud
DETAILS	BY L. Wo	CHECKED	S. Ly
QUANTITIES	BY H. Singh/A. Perez	CHECKED	S. Ly

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 ENGINEERING SERVICES
STRUCTURE DESIGN
DESIGN BRANCH 16

CU 04
EA 174411

BRIDGE NO. 33-0731
KILOMETER POST 21.90

STONY BROOK CREEK BRIDGE
FOUNDATION PLAN

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 4 OF 20

FILE => 33-0731-m-fp01.dgn

DATE PLOTTED => 11-FEB-2010 TIME PLOTTED => 17:31

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

PLANS APPROVAL DATE

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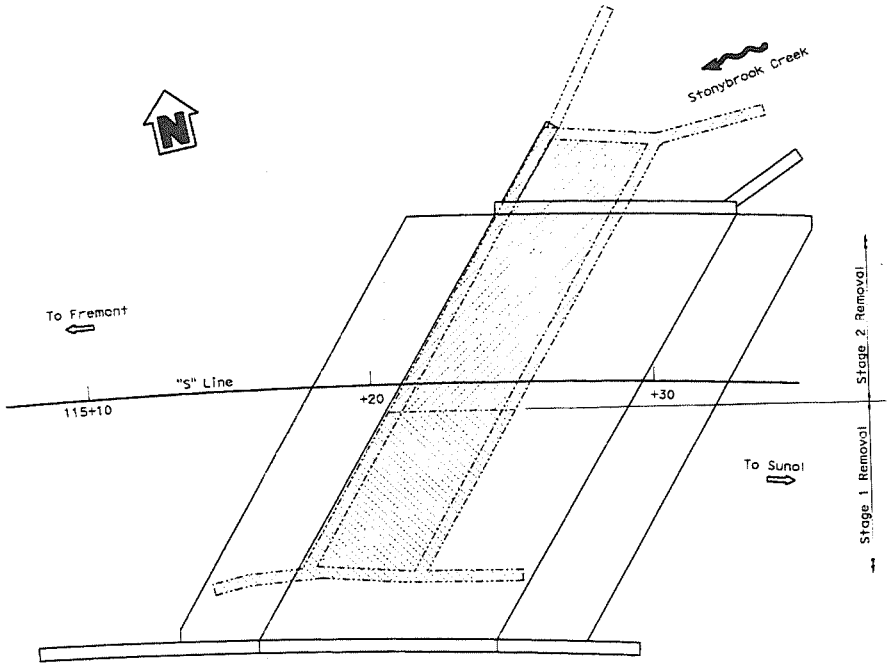
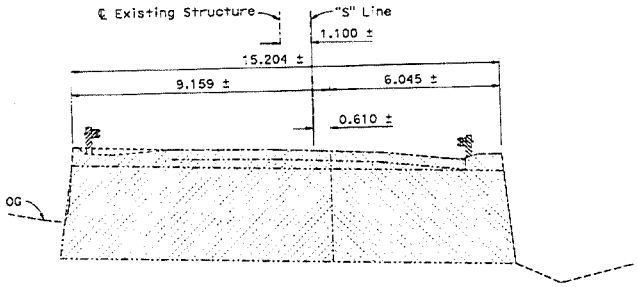


PLAN
1:80



TYPICAL SECTION
1:80

LEGEND:

Stage 1 Removal:

Denotes limits of removal of existing reinforced concrete box culvert and foundation, retaining walls and foundation, structural roadway section, earthen cover and MBGR during Stage 1

Stage 2 Removal:

Denotes limits of removal of existing reinforced concrete box culvert and foundation, retaining walls and foundation, structural roadway section, earthen cover and MBGR during Stage 2

Notes:

A. Removal of existing structure paid for as "Bridge Removal"

B. Structure Excavation for existing footing and structure will be included as "Bridge Removal"

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

California Metric

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

	BY	CHECKED	
DESIGN	A. Yazdani/S. Ly	S. Hamoud	
DETAILS	L. Ma/F. Magma	S. Ly	
QUANTITIES	H. Singh/A. Perez	S. Ly	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES
STRUCTURE DESIGN
DESIGN BRANCH 16

BRIDGE NO. 33-0731
KILOMETER POST 20.90

CU 04
EA 174411
FILE => 33-e0731-c-rem01.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 1-28-10

STONYBROOK CREEK BRIDGE
REMOVAL DETAILS

SHEET 5 OF 20

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV.03-17-04)

DATE PLOTTED => 11-FEB-2010 TIME PLOTTED => 17:37

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	ALC	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

PLANS APPROVAL DATE

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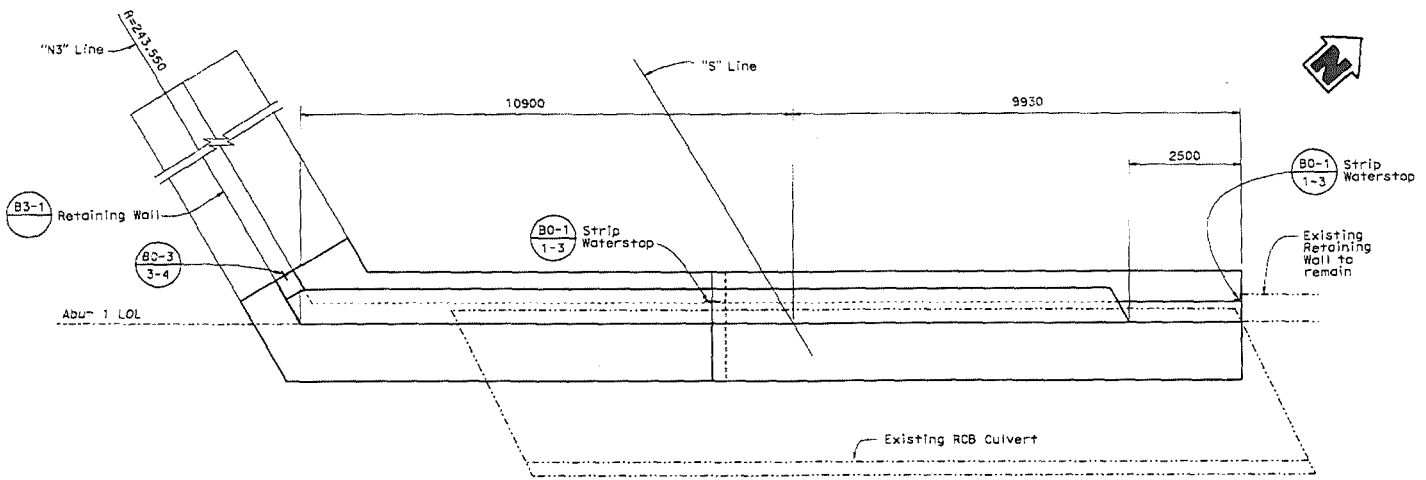
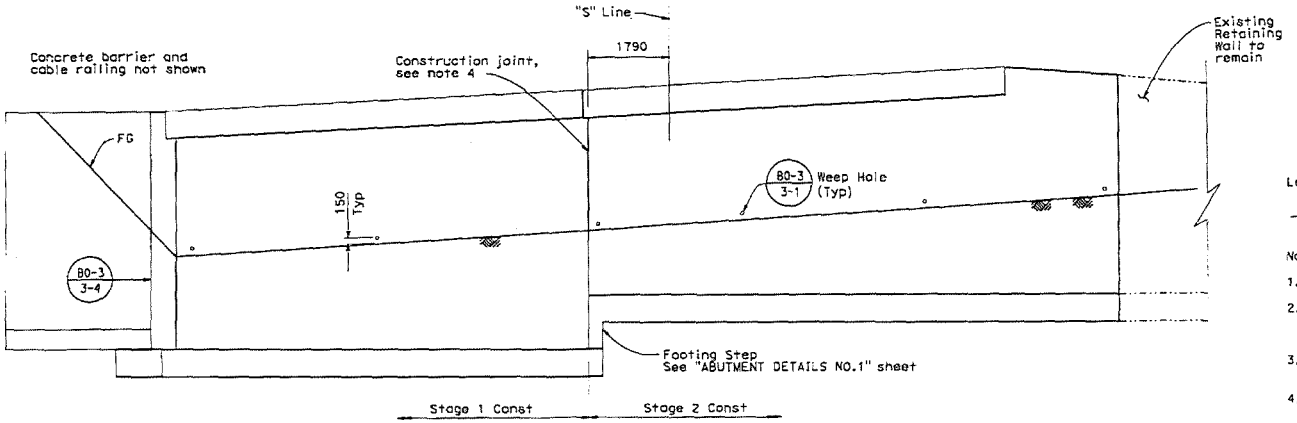
REGISTERED PROFESSIONAL ENGINEER Son Thanh Ly No. 72584 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA



PLAN
1:50



ELEVATION
1:50

Legend:

-·-·-·- Denotes existing structure

Notes:

1. Finish Grade, see "ROAD PLANS".
2. Backfill shall be placed simultaneously at both abutments after the deck is completed.
3. For architectural treatment, see "ARCHITECTURAL TREATMENT" sheet.
4. Reinforcing steel shall be continuous thru all construction joints.

DESIGN	A. Yazdani/S. Ly	CHECKED	S. Hamouc
DETAILS	L. Wo	CHECKED	S. Ly
QUANTITIES	H. Singh/A. Perez	CHECKED	S. Ly

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES
STRUCTURE DESIGN
DESIGN BRANCH 16

BRIDGE NO. 33-0731
KILOMETER POST 20.80

STONYBROOK CREEK BRIDGE
ABUTMENT 1 LAYOUT

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04
EA 174411

DISREGARD PRINTS BEARING EARLIER REVISION DATES

SHEET 6 OF 20

FILE => 33-0731-f_c01 - a01.dgn

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV.05-17-04)

DATE PLOTTED => 11-18-2010 TIME PLOTTED => 17:32

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

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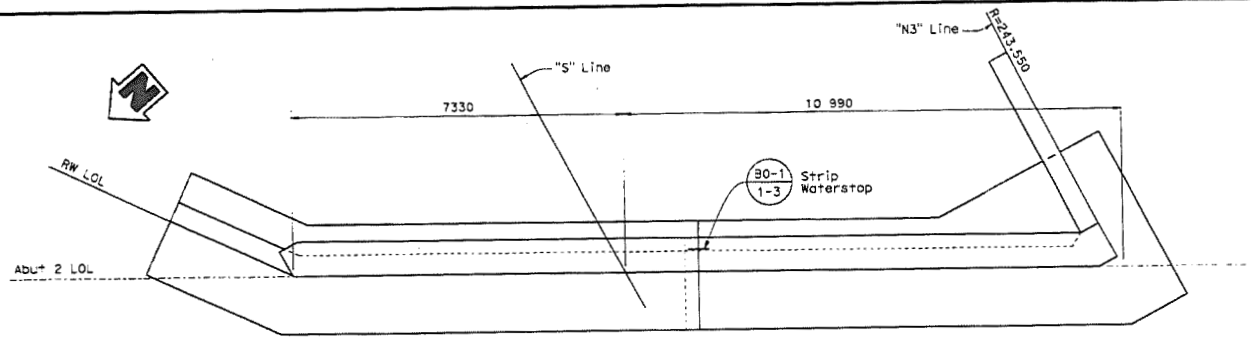
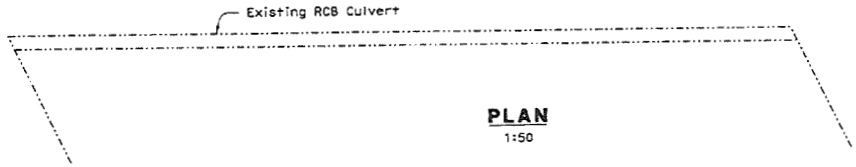
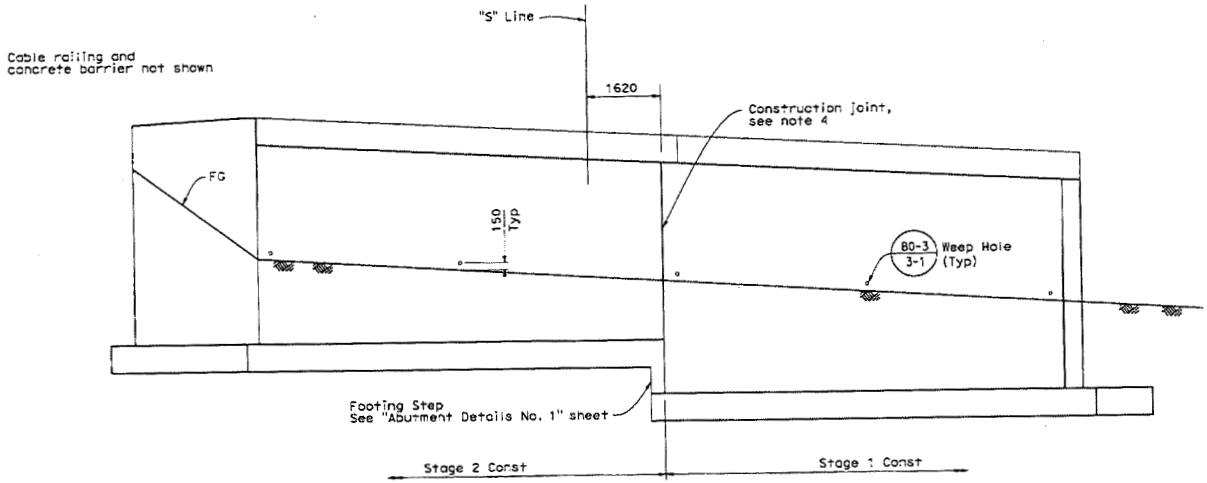




PLAN
1:50



ELEVATION
1:50

Legend:

-.-.-.- Denotes existing structure

Notes:

1. Finish Grade, see "ROAD PLANS".
2. Backfill shall be placed simultaneously at both abutments after the deck is completed.
3. For architectural treatment, see "ARCHITECTURAL TREATMENT" sheet.
4. Reinforcing steel shall be continuous thru all construction joint.

Caltrans Metric

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

	BY	CHECKED
DESIGN	A. Yazdani/S. Ly	S. Hanouc
DETAILS	L. Vo	S. Ly
QUANTITIES	H. Singh/A. Perez	S. Ly

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH 16

CU 04
EA 174411

BRIDGE NO. 33-0731
KILOMETER POST 20.90

DISREGARD PRINTS BEARING EARLIER REVISION DATES

STONYBROOK CREEK BRIDGE
ABUTMENT 2 LAYOUT

SHEET 7 OF 20

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV.03-17-04)

FILE -> 33-0731-F_CO1-002.dgn

DATE PLOTTED -> 11-FEB-2010 TIME PLOTTED -> 17:32

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Aic	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Son Thanh Ly No. 72584 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA

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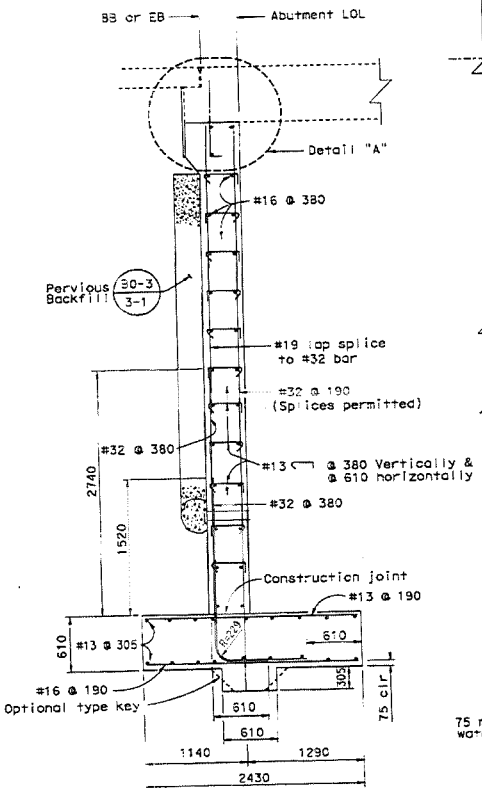
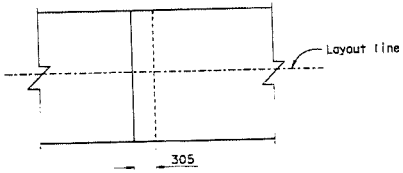


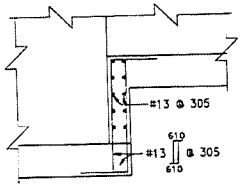
TYPICAL SECTION

1:25



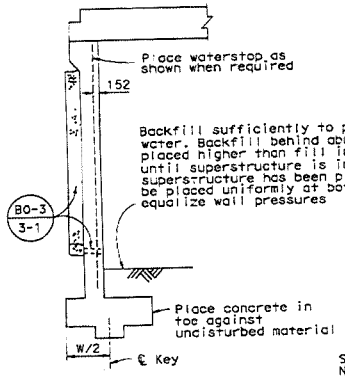
PLAN FOOTING STEP

No Scale



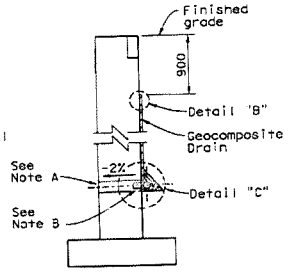
ELEVATION FOOTING STEP

No Scale

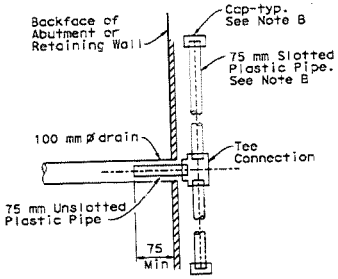


DRAINAGE AND BACKFILL

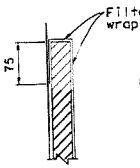
No Scale



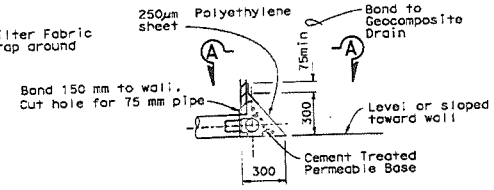
WALL SECTION



SECTION A-A



DETAIL "B"



DETAIL "C"

WEEP HOLE AND GEOCOMPOSITE DRAIN

No Scale

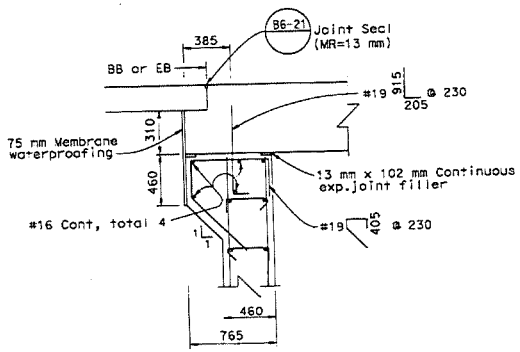
ALTERNATIVE TO BRIDGE DETAIL B0-3 / 3-1

Notes:

A. 100mm ø drains at intermediate sag points and at 7.60 meters center to center (2.75 meters c-c for Type 3 and 2.80 meters c-c for Type 4 retaining walls). For walls adjacent to sidewalks or curbs, provide 100 mm cast iron or asbestos cement pipe under the sidewalk to discharge through curb face. Exposed wall drains shall be located 75 mm above finished grade.

B. Geocomposite drain, cement treated permeable base, and 75 mm ø slotted plastic pipe continuous behind retaining wall or abutment. Cap ends of pipe. Provide "Tee" connection at each 100 mm ø drain.

C. Connect the low end of plastic pipe to the main outlet pipe as applicable.



DETAIL "A"

No Scale

Notes:

1. Finish Grade, see "ROAD PLANS"
2. For slab reinforcement, see "TYPICAL SECTION" and "SLAB REINFORCEMENT" sheets

DESIGN	BY A. Yazdani/S. Ly	CHECKED S. Hamoud	
DETAILS	BY L. Ma	CHECKED S. Ly	
QUANTITIES	BY H. Singh/A. Perez	CHECKED S. Ly	

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH 16

BRIDGE NO. 33-0731 KILOMETER POST 20.90

STONYBROOK CREEK BRIDGE

ABUTMENT DETAILS NO.1

SHEET 8 OF 20

CU 04 EA 174411

FILE -> 33-0073-F-00-0-0-0.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

STRUCTURE DESIGN DETAIL SHEET (METRIC) (REV.03-17-06)

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

TIME PLOTTED -> 11:18:2010

DATE PLOTTED -> 11/18/2010

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

PLANS APPROVAL DATE

San Thonh Ly No. 72584 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA REGISTERED PROFESSIONAL ENGINEER

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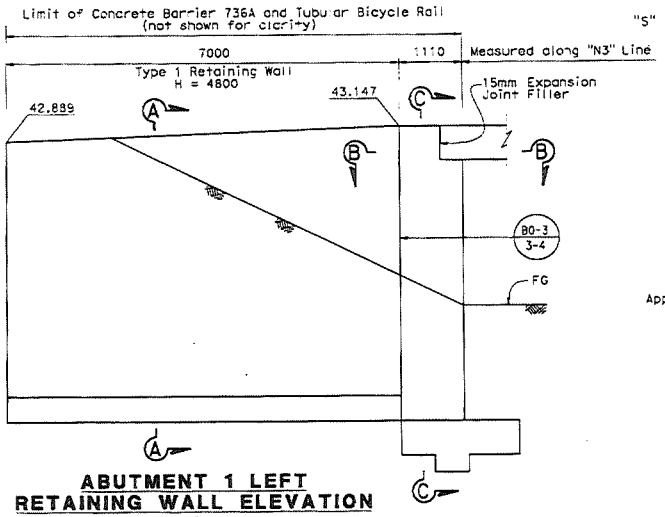
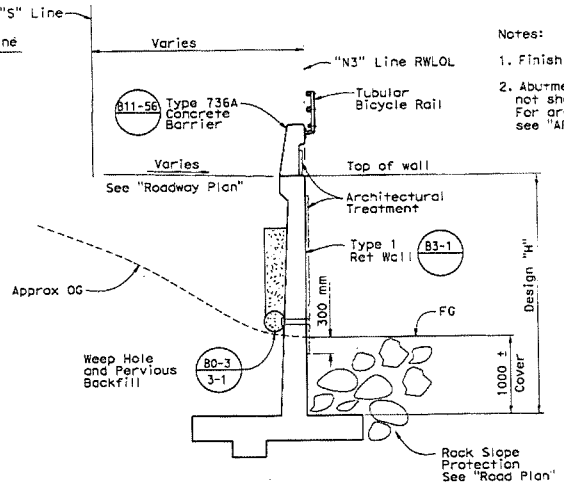
Notes:

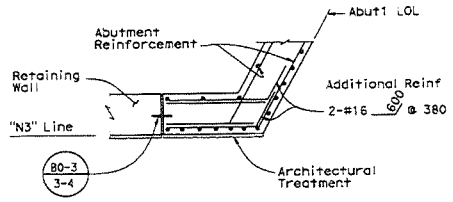
1. Finish Grade, see "ROAD PLANS".
2. Abutment architectural treatment not shown on Elevation for clarity. For architectural treatment details, see "ARCHITECTURAL TREATMENT" sheet.



ABUTMENT 1 LEFT RETAINING WALL ELEVATION
1:40

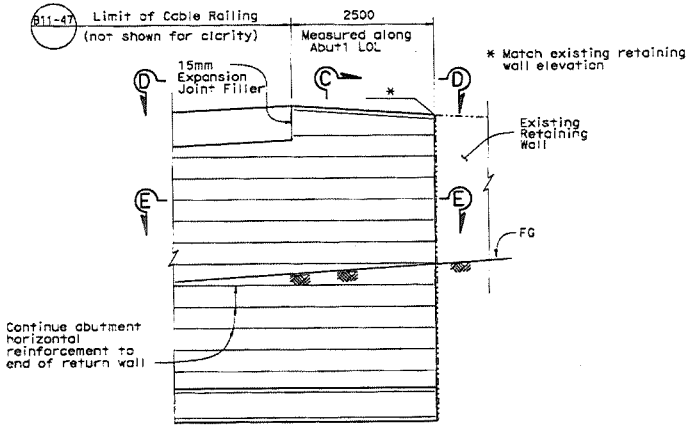


SECTION A-A
1:40

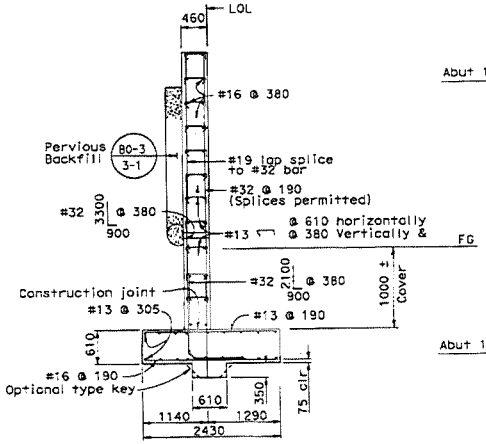


SECTION B-B
1:25

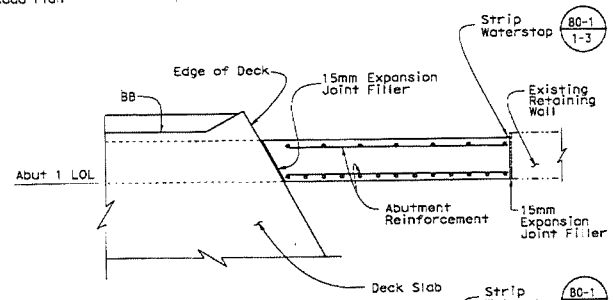
NOTE: For General Notes, see "Standard Plans B3-8"



ABUTMENT 1 RIGHT RETURN WALL ELEVATION
1:40



SECTION C-C
1:40



SECTION D-D
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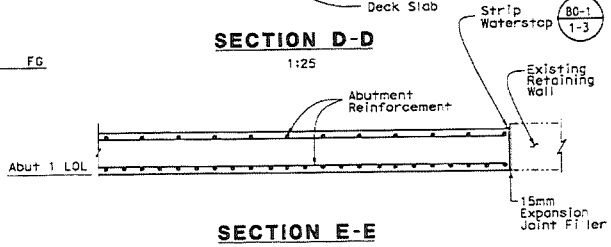


SECTION E-E
1:25

DESIGN	A. Yazdani/S. Ly	CHECKED	S. Hatoud
DETAILS	L. Ma	CHECKED	S. Ly
QUANTITIES	H. Singh/A. Perez	CHECKED	S. Ly

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES
STRUCTURE DESIGN
DESIGN BRANCH 16

BRIDGE NO. 33-0731
KILOMETER POST 20.90
CU 04
EA 174411

STONYBROOK CREEK BRIDGE
ABUTMENT DETAILS NO.2

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

DISREGARD PRINTS BEARING EARLIER REVISION DATES 10-08-09 10-09-09 11-09-09 12-09-09 1-29-10

REVISION DATES

SHEET 9 OF 20

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV.03-17-04)

FILE => 33-0731-f-a01-a02.dgn

USERNAME => lmai

DATE PLOTTED => 11-FEB-2010 TIME PLOTTED => 11:32

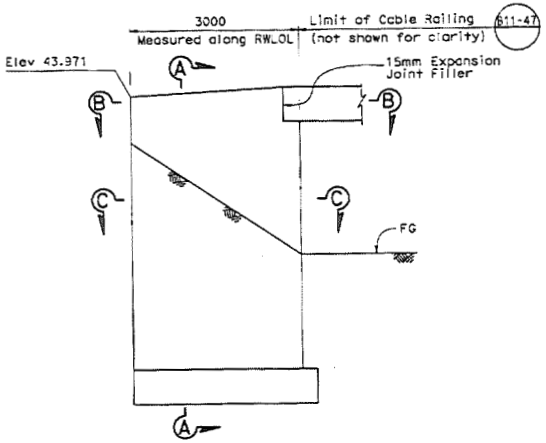
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	ALA	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

PLANS APPROVAL DATE

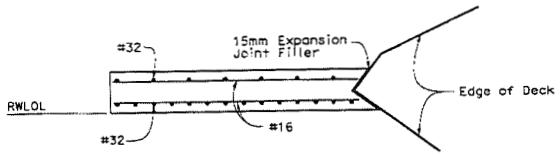
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

REGISTERED PROFESSIONAL ENGINEER Son Thanh Ly No. 72584 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA



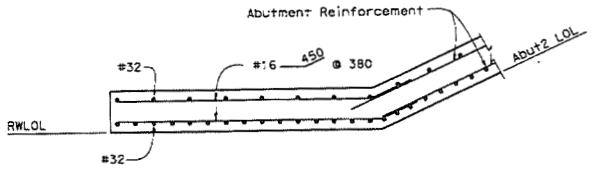
ABUTMENT 2 LEFT RETURN WALL ELEVATION

1:40



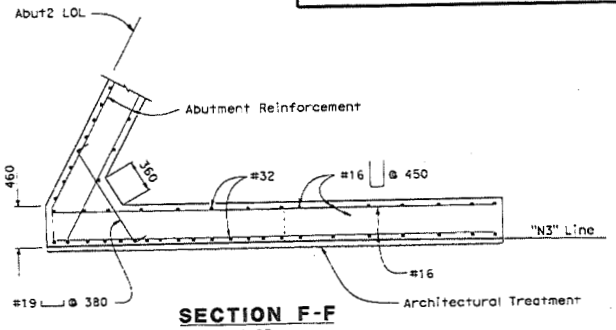
SECTION B-B

1:25



SECTION C-C

1:25



SECTION F-F

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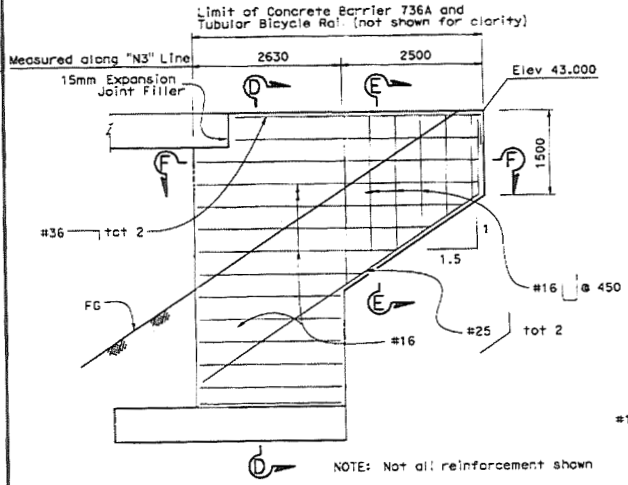
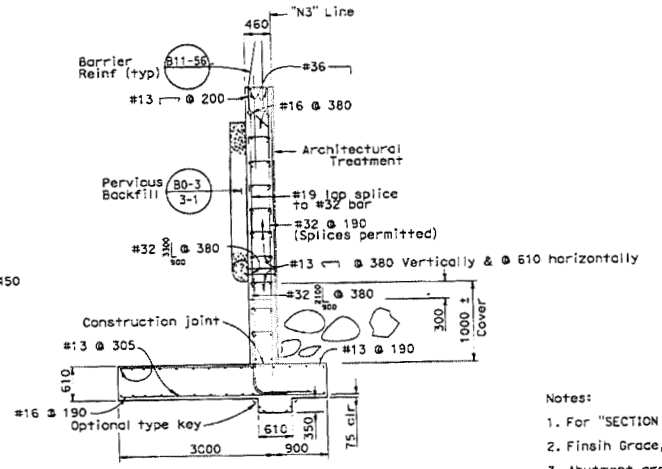


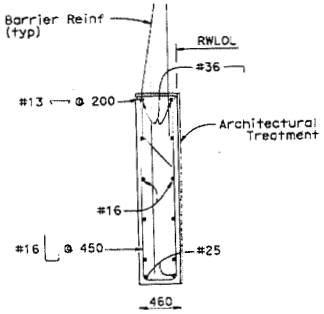
ABUTMENT 2 RIGHT RETURN WALL ELEVATION

1:40



SECTION D-D

1:40



SECTION E-E

1:25

Notes:

1. For "SECTION A-A", see "ABUTMENT DETAILS NO.2" sheet "SECTION C-C".
2. Finsih Grade, see "ROAD PLANS".
3. Abutment architectural treatment not shown on Elevation for clarity. For architectural treatment details, see "ARCHITECTURAL TREATMENT" sheet.

Caltrans Metric

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

DESIGN	BY A. Yazdani/S. Ly	CHECKED S. Hamoud	
DETAILS	BY L. Wa/F. Maggio	CHECKED S. Ly	
QUANTITIES	BY H. Singh/A. Perez	CHECKED S. Ly	

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN

DESIGN BRANCH 16

CU 04
EA 174411

BRIDGE NO. 33-0731
KILOMETER POST 20.90

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 01-28-10 03-26-09 11-24-08 11-20-08 12-20-05 1-21-12

FILE => 33-e0731-*-a01-cy03.dgn

STONYBROOK CREEK BRIDGE
ABUTMENT DETAILS NO.3

SHEET 10 OF 20

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV.03-17-04)

DATE PLOTTED => 11-FEB-2010 TIME PLOTTED => 17:33

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Son Tham Ly No. 72584 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA

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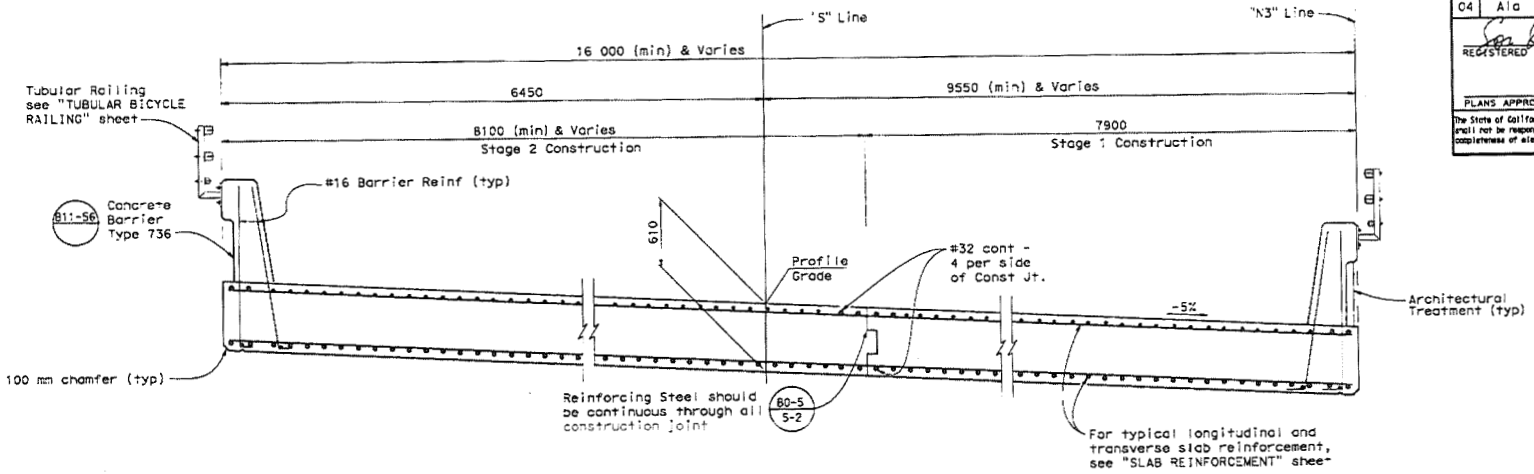
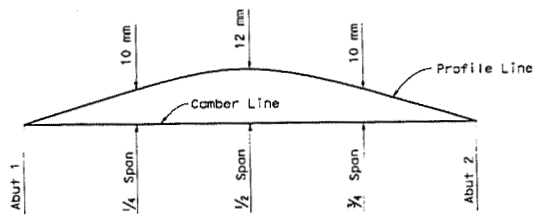


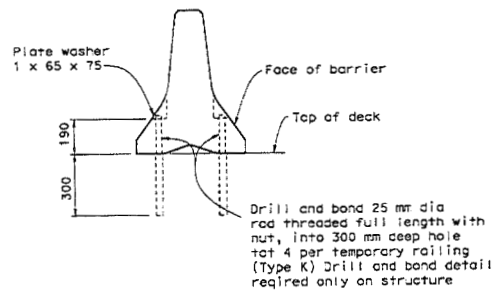
TYPICAL SECTION

1:20



CAMBER DIAGRAM

No Scale



TEMPORARY RAILING (TYPE K) ATTACHMENT DETAIL

No Scale

DESIGN	BY A. Yazdani/S. Ly	ENGINEER S. Hamoud	
DETAILS	BY L. Ma/F. Maogne	CHECKED S. Ly	
QUANTITIES	BY H. Singh/A. Perez	CHECKED S. Ly	

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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 ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH 16

BRIDGE NO. 33-0731

KILOMETER POST 20.90

CU 04 EA 174411

DISREGARD PRINTS BEARING EARLIER REVISION DATES

FILE => 33-e0731-K-TaD*.dgn

STONYBROOK CREEK BRIDGE

TYPICAL SECTION

SHEET 11 OF 20

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV.03-17-04)

DATE PLOTTED => 11-FEB-2010 TIME PLOTTED => 17:55

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 1-28-10 DATE

PLANS APPROVAL DATE

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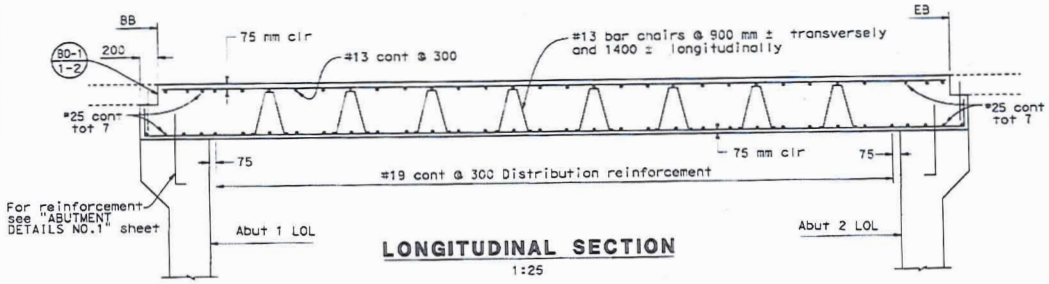
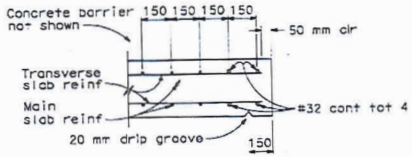
REGISTERED PROFESSIONAL ENGINEER Son Thanh Ly No. 72584 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA



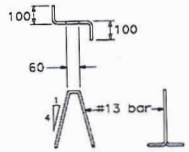
LONGITUDINAL SECTION

1:25



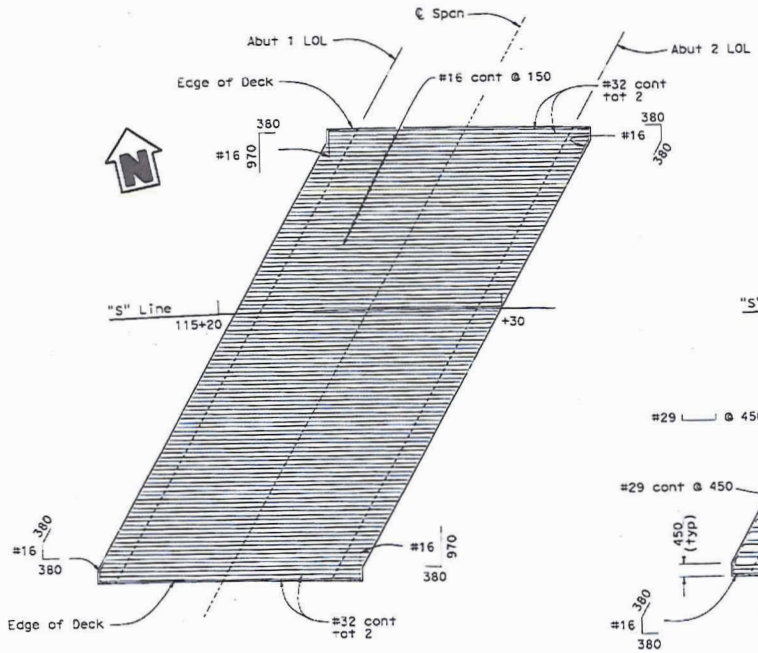
EDGE OF SLAB DETAILS

No Scale



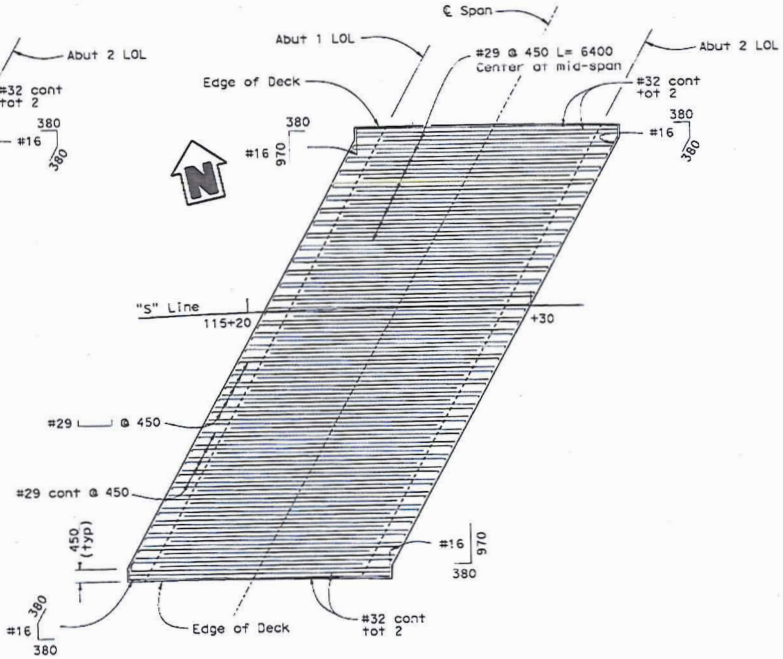
BAR CHAIR DETAIL

No Scale



TOP REINFORCEMENT

1:80



BOTTOM REINFORCEMENT

1:80

DESIGN	BY A. Yazdani/S. Ly	CHECKED S. Hamoud	
DETAILS	BY L. Ma	CHECKED S. Ly	
QUANTITIES	BY H. Singh/A. Perez	CHECKED S. Ly	

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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 ENGINEERING SERVICES STRUCTURE DESIGN

DESIGN BRANCH 16

BRIDGE NO. 33-0731

KILOMETER POST 20.90

CU 04
EA 174411

FILE => 33-e0731-o-gpor01.dgn

STONYBROOK CREEK BRIDGE
SLAB REINFORCEMENT

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET 12 OF 20

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV.03-17-04)

DATE PLOTTED => 11-11-2010 TIME PLOTTED => 17:33

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	84			

REGISTERED ENGINEER - CIVIL 1-28-10

Son Trann Ly No. 72584 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA

PLANS APPROVAL DATE

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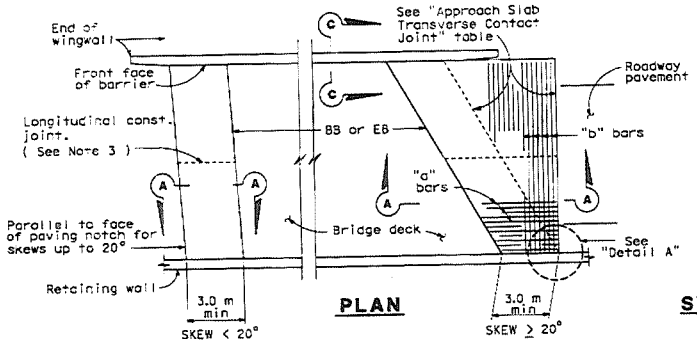
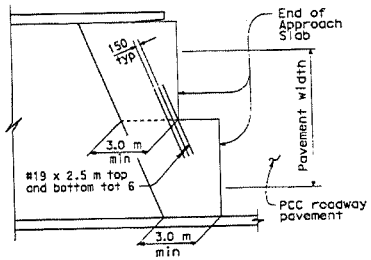
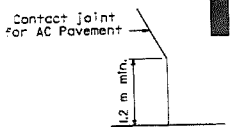
Caltrans Metric



PLAN

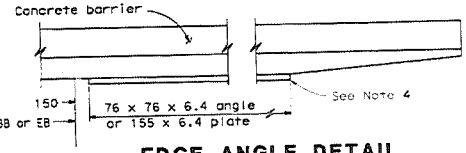


STRUCTURE APPROACH - END STAGGER DETAIL

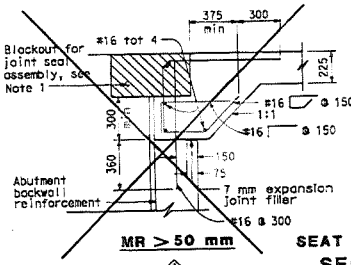


DETAIL A

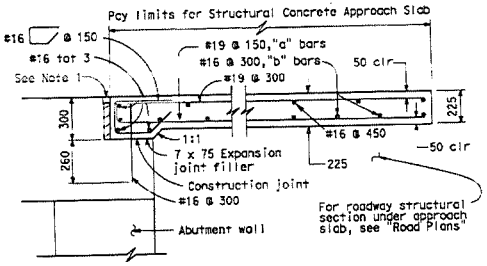
APPROACH SLAB TRANSVERSE CONTACT JOINT		
STRUCTURE SKEW	AC APPROACH PAVEMENT	PCC APPROACH PAVEMENT
< 20°	Parallel to face of paving notch	Parallel to face of paving notch
20°- 45°	Parallel to face of P N use (Detail A)	Stagger lines 7.2 m to 10.8 m apart
> 45°	Parallel to face of P N use (Detail A)	Stagger at each lane line



EDGE ANGLE DETAIL



MR > 50 mm ①

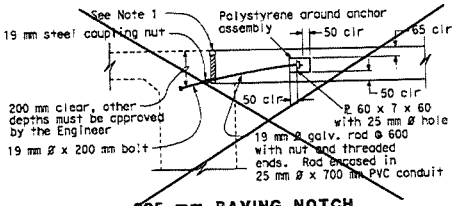


MR ≤ 50 mm ②

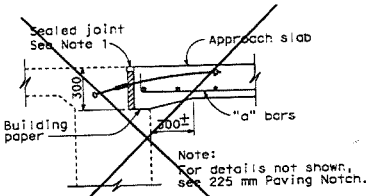
SEAT TYPE ABUTMENT

SECTION A-A

Note: Seat Type Abutment shown, for Diaphragm Type Abutment, see "Abutment Tie Details".



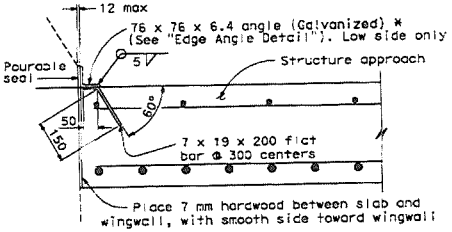
225 mm PAVING NOTCH ①



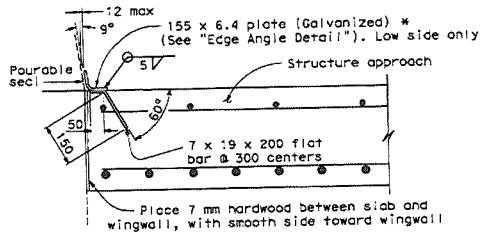
300 mm PAVING NOTCH ①

DIAPHRAGM TYPE ABUTMENT

ABUTMENT TIE DETAILS

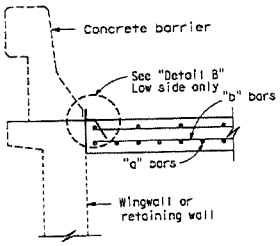


*(TO BE USED WITH TYPE 25 OR TYPE 27 CONCRETE BARRIER)



*(TO BE USED WITH TYPE 732 OR TYPE 736 CONCRETE BARRIER)

DETAIL B



SECTION C-C

NO SCALE

NOTES:

1. For details not noted or shown, see Structure Plans. Adjust bar reinforcement to clear a sawcut for sealed joint, when required.
2. For transverse contact joint with new PCC paving, refer to Standard Plan P10.
3. Longitudinal construction joints, when permitted by the Engineer, shall be located on lane lines.
4. End angle or plate at beginning of barrier transition, end of wing wall or end of structure approach as applicable.
5. At the contractor's option, approach slab transverse reinforcement may be placed parallel to paving notch. Spacing of transverse reinforcement is measured along ℄ roadway.
6. For drainage details, see Structure Plans.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

① Delete detail
② Modify detail

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES

BRIDGE NO. 33-0731

KILOMETER POST 20.90

STONYBROOK CREEK BRIDGE

STRUCTURE APPROACH TYPE EQ(3)

STANDARD DRAWING				
RELEASE DATE 3/14/05	DESIGN BY N. TRAFFALIS	CHECKED E. THORWILDSEN	MILLIMETERS BY	
	DETAILS BY R. YEE	CHECKED E. THORWILDSEN		
FILE NO. XS3-150	SUBMITTED BY M. HA	DRAWING DATE 6/93	OFFICE CHIEF	

CU 04
EA 174411

DISPLAYED PRINTS BEARING EARLIER REVISION DATES 01-26-06 4-27-06 1-26-10

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 13 OF 20

33-0073-0-A0.cgn

DATE PLOTTED => 11-FEB-2010 TIME PLOTTED => 17:54

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS

JSERNAVE => IPO

35 DES 2147A (METRIC) (REV. 2/21/97)

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Alc	84			

REGISTERED ENGINEER - CIVIL 1-28-10

PLANS APPROVAL DATE

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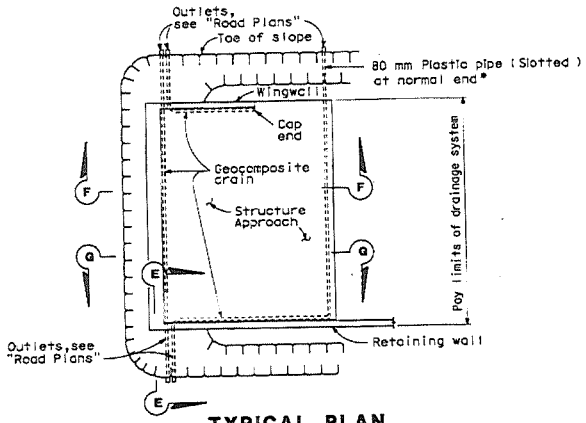
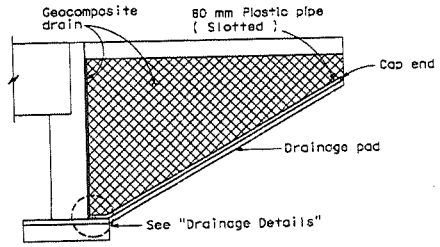
REGISTERED PROFESSIONAL ENGINEER Son Thanh Ly No. 72584 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA

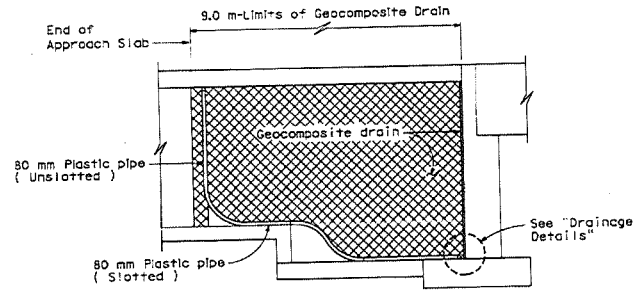


TYPICAL PLAN

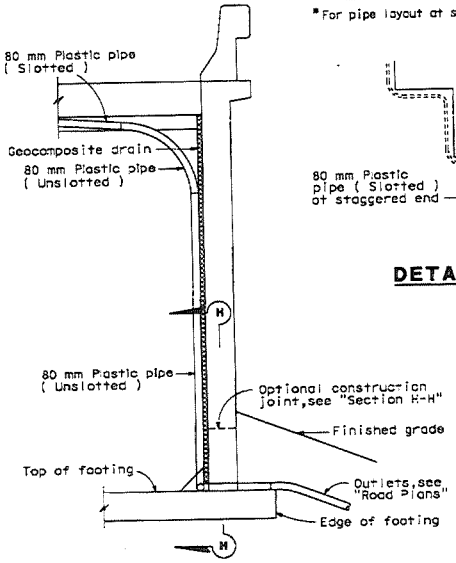
*For pipe layout at staggered end, see "Detail B".



CANTILEVER WINGWALL
SECTION F-F

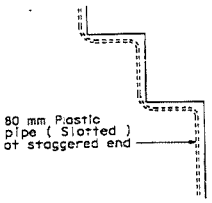


RETAINING WALL WINGWALL
SECTION G-G

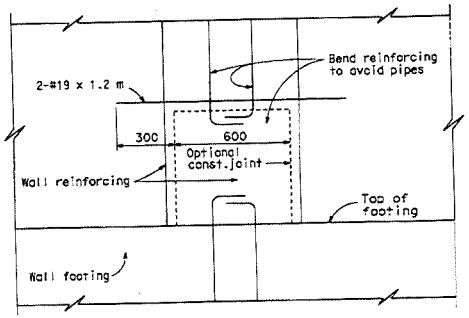


SECTION E-E

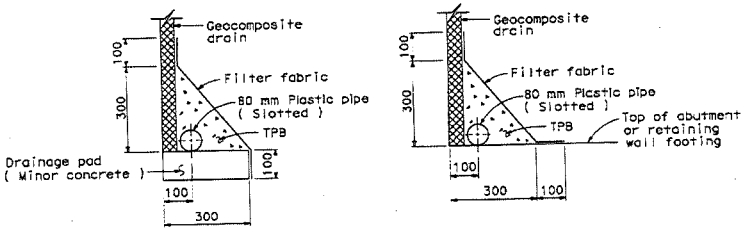
NOTE: Bends and junctions in 60 mm plastic pipe are 750 mm radius min.



DETAIL B



SECTION H-H



WITHOUT FOOTING — WITH FOOTING

DRAINAGE DETAILS

NO SCALE
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

STANDARD DRAWING				
RELEASE DATE 4/23/98	DESIGN BY M. TRAFFALIS	CHECKED E. THORKILDSEN	RELEASED BY	
	DETAILS BY R. YEE	CHECKED E. THORKILDSEN		
FILE NO. xs3-110	SUBMITTED BY M. HA	CHECKED 4/98		

DS DED 3147A (METRIC) (REV. 2/25/97)

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 ENGINEERING SERVICES

CU 04
EA 174411

BRIDGE NO. 33-0731
KILOMETER POST 20.90

STONYBROOK CREEK BRIDGE
STRUCTURE APPROACH DRAINAGE DETAILS

SHEET 14 OF 20

33-60731-8-ACCO.cg

USERNAME => THCT

DATE PLOTTED => 11-FEB-2010 TIME PLOTTED -> 17:34

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	84	19.5/19.9, 20.5/21.2		

REGISTERED CIVIL ENGINEER 3-8-10 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 Tam Ly 69254 6-30-10 CIVIL STATE OF CALIFORNIA

Metric

FOR COMPLETE RIGHT OF WAY DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

NOTES:

1. THE PROJECT VERTICAL DATUM IS NAVD 1988.
2. TOP OF GRATE ELEVATION (TG) IS FINISHED GRADE MINUS GUTTER DEPRESSION, AS APPLICABLE.
3. THE LOCATIONS OF EXISTING DRAINAGE FACILITIES ARE APPROXIMATE ONLY. CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION BEFORE MODIFYING EXISTING FACILITIES. DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
4. CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.
5. FOR DRAINAGE INLET OFFSET AND TG REFERENCE LOCATIONS, SEE SHEET DD-1.

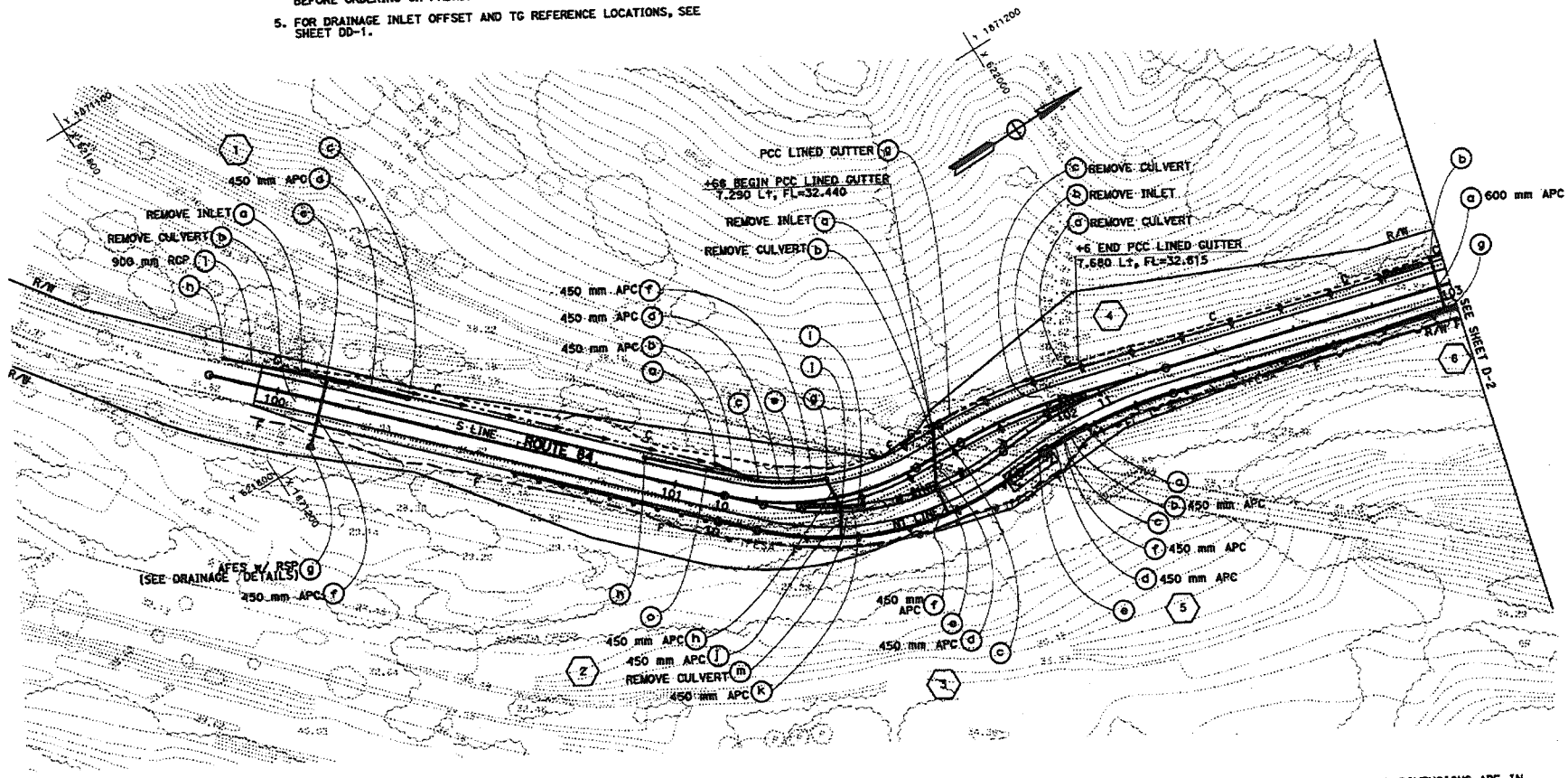
LEGEND:

(No.) DRAINAGE SYSTEM NUMBER

(a) DRAINAGE UNIT

ABBREVIATIONS:

SO SIDE OPENING
PE PERMANENT EASEMENT
TCE TEMPORARY CONSTRUCTION EASEMENT



ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

THIS PLAN IS ACCURATE FOR DRAINAGE WORK ONLY

DRAINAGE PLAN

SCALE 1:500

D-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR: GHULAM POPAL

CALCULATED-DESIGNED BY: TAM LY

CHECKED BY: GHULAM POPAL

REVISED BY

DATE REVISED

DATE PLOTTED => 15 JUN 2010
TIME PLOTTED => 11:02

03-08-10

FOR COMPLETE RIGHT OF WAY DATA,
SEE RIGHT OF WAY RECORD MAPS
AT DISTRICT OFFICE.

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Alo	84	19.5/19.9, 20.5/21.2		

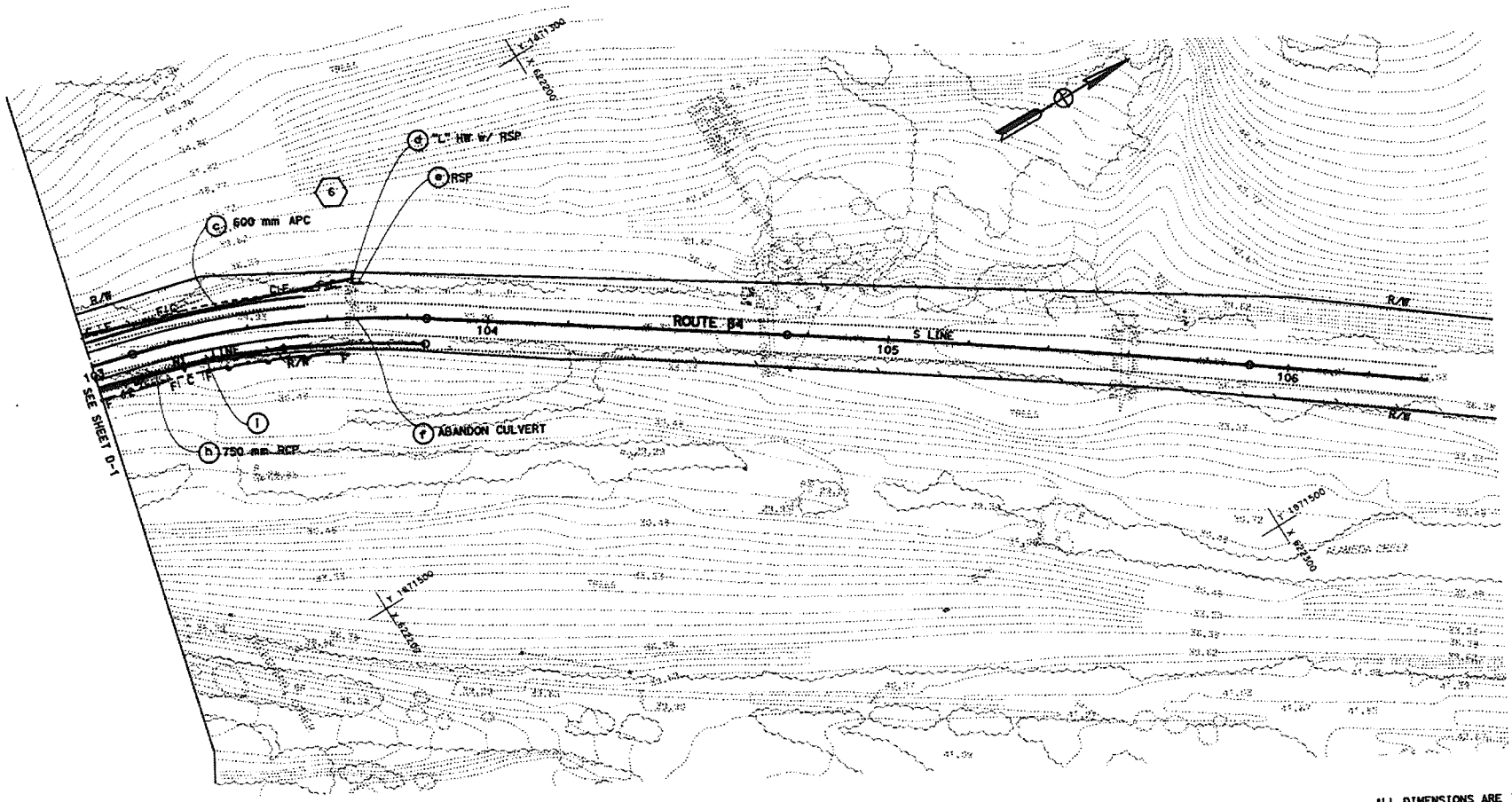
REGISTERED CIVIL ENGINEER 3-8-10 DATE

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 Tam LV 69254 6-30-10 CIVIL STATE OF CALIFORNIA

Caltrans Metric



ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DRAINAGE PLAN

SCALE 1:500

D-2

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET D-1

THIS PLAN IS ACCURATE FOR DRAINAGE WORK ONLY

REVISED BY	DATE REVISED
TAM LV	GHULAM POPAL
CALCULATED-DESIGNED BY	CHECKED BY
FUNCTIONAL SUPERVISOR	GHULAM POPAL

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DESIGN

DATE PLOTTED => 15-JUN-2010
TIME PLOTTED => 11:52
03-08-10

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	84	19.5/19.9, 20.5/21.2		

REGISTERED CIVIL ENGINEER — DATE 3-8-10

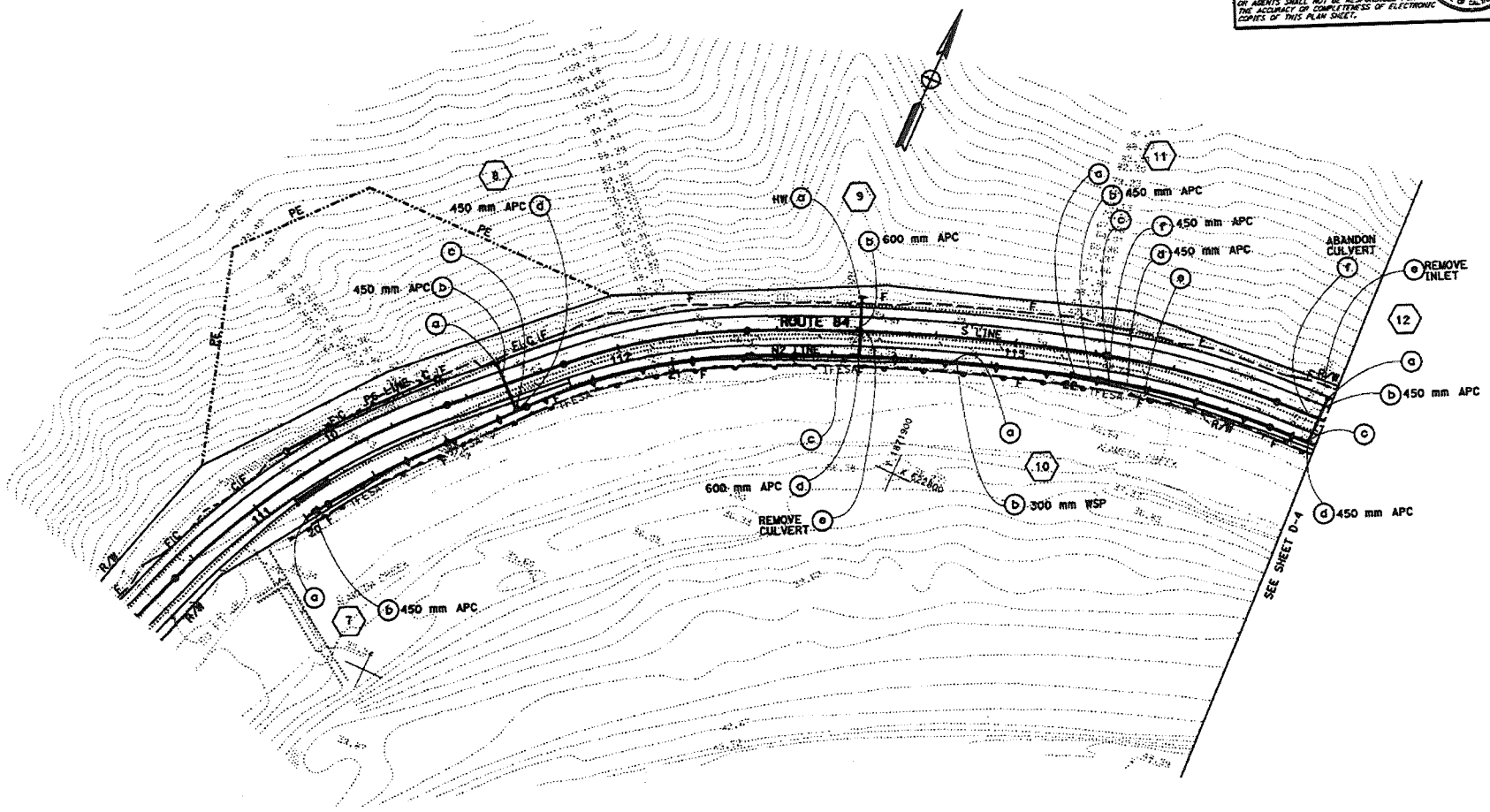
PLANS APPROVAL DATE

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 — Tam Ly 69254 — Exp. 6-30-10 — CIVIL — STATE OF CALIFORNIA

Caltrans Metric

FOR COMPLETE RIGHT OF WAY DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.



ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DRAINAGE PLAN

SCALE 1:500

D-3

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET D-1

THIS PLAN IS ACCURATE FOR DRAINAGE WORK ONLY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR: GHULAM POPAL

CALCULATED-DESIGNED BY: TAM LY

CHECKED BY: GHULAM POPAL

REVISED BY | DATE REVISED

DATE PLOTTED => 16 JUN 2010

TIME PLOTTED => 11:02

LAST REVISION 03-23-09

FOR COMPLETE RIGHT OF WAY DATA,
SEE RIGHT OF WAY RECORD MAPS
AT DISTRICT OFFICE.

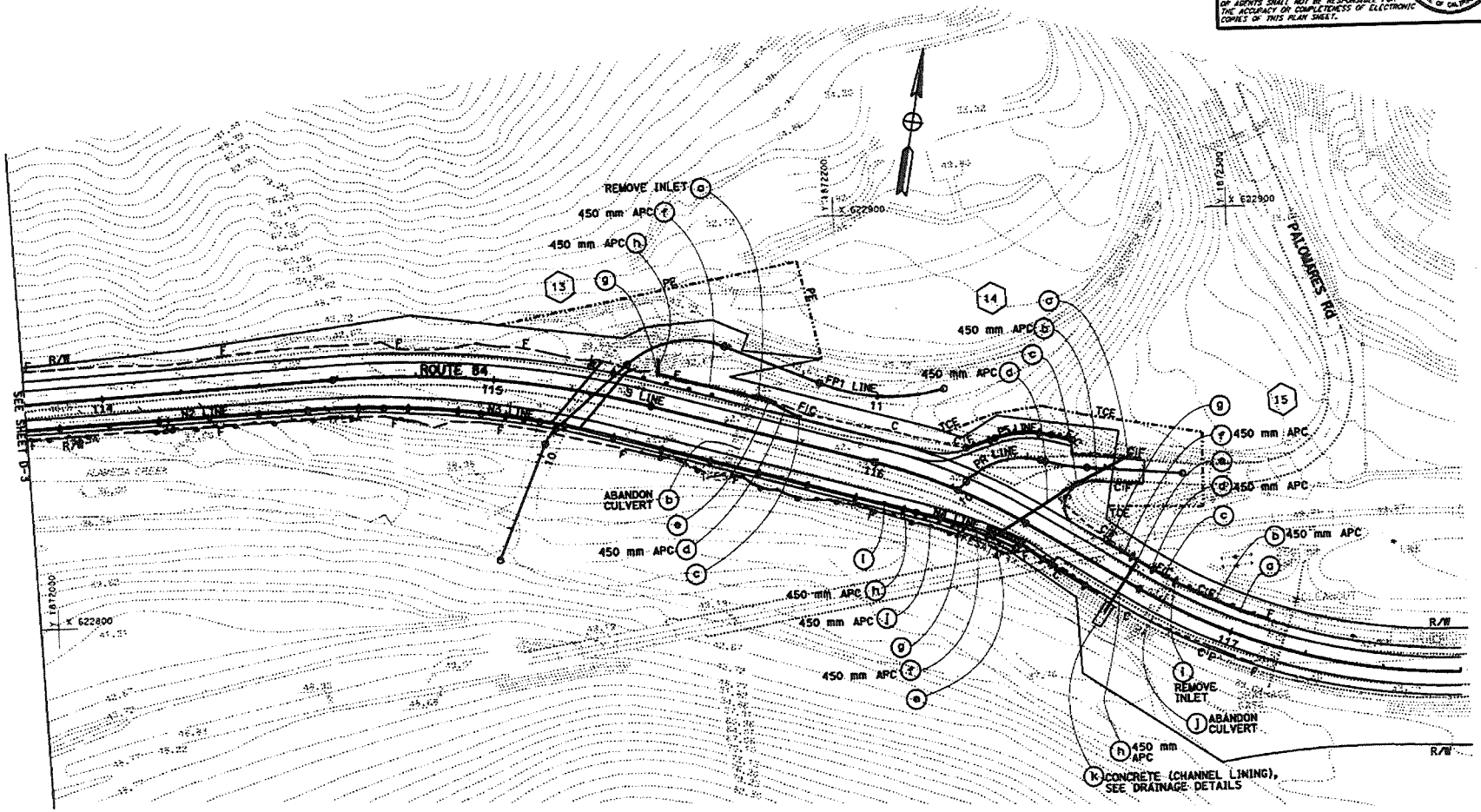
Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	84	19.5/19.9, 20.5/21.2		

REGISTERED CIVIL ENGINEER 3-8-10 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 Tam Ly 69254 6-30-10 CIVIL STATE OF CALIFORNIA



ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DRAINAGE PLAN

SCALE 1:500

D-4

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET D-1

THIS PLAN IS ACCURATE FOR DRAINAGE WORK ONLY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR: GHULAM POPAL

CALCULATED-DESIGNED BY: TAM LY

CHECKED BY: GHULAM POPAL

REVISED BY

DATE REVISED

LAST REVISION DATE PLOTTED => 16 JUN 2010

09-23-09 TIME PLOTTED => 11:07

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	84	19.5/19.9, 20.5/21.2		

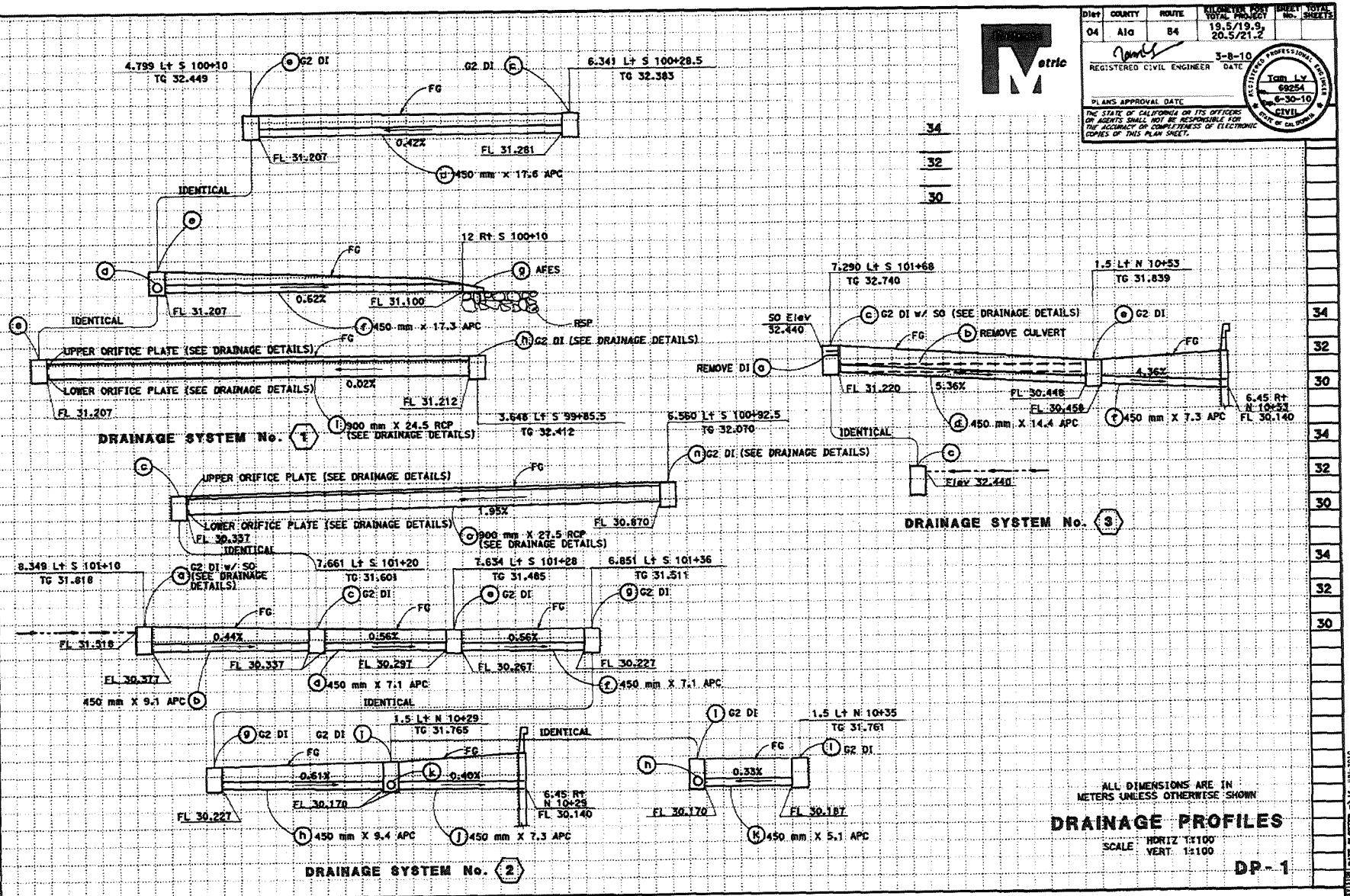
REGISTERED CIVIL ENGINEER 3-8-10 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Tom Lv 69254 6-30-10 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.

Metric



ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DRAINAGE PROFILES

SCALE HORIZ 1:100 VERT 1:100

DP-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

REVISED BY | DATE REVISED

TAM LY | GHULAM POPAL

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR | GHULAM POPAL

Sheet No. | Date | Sub

DATE PLOTTED => 16-JUN-2010
TIME PLOTTED => 11:02
02-04-10

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	84	19.5/19.9, 20.5/21.2		

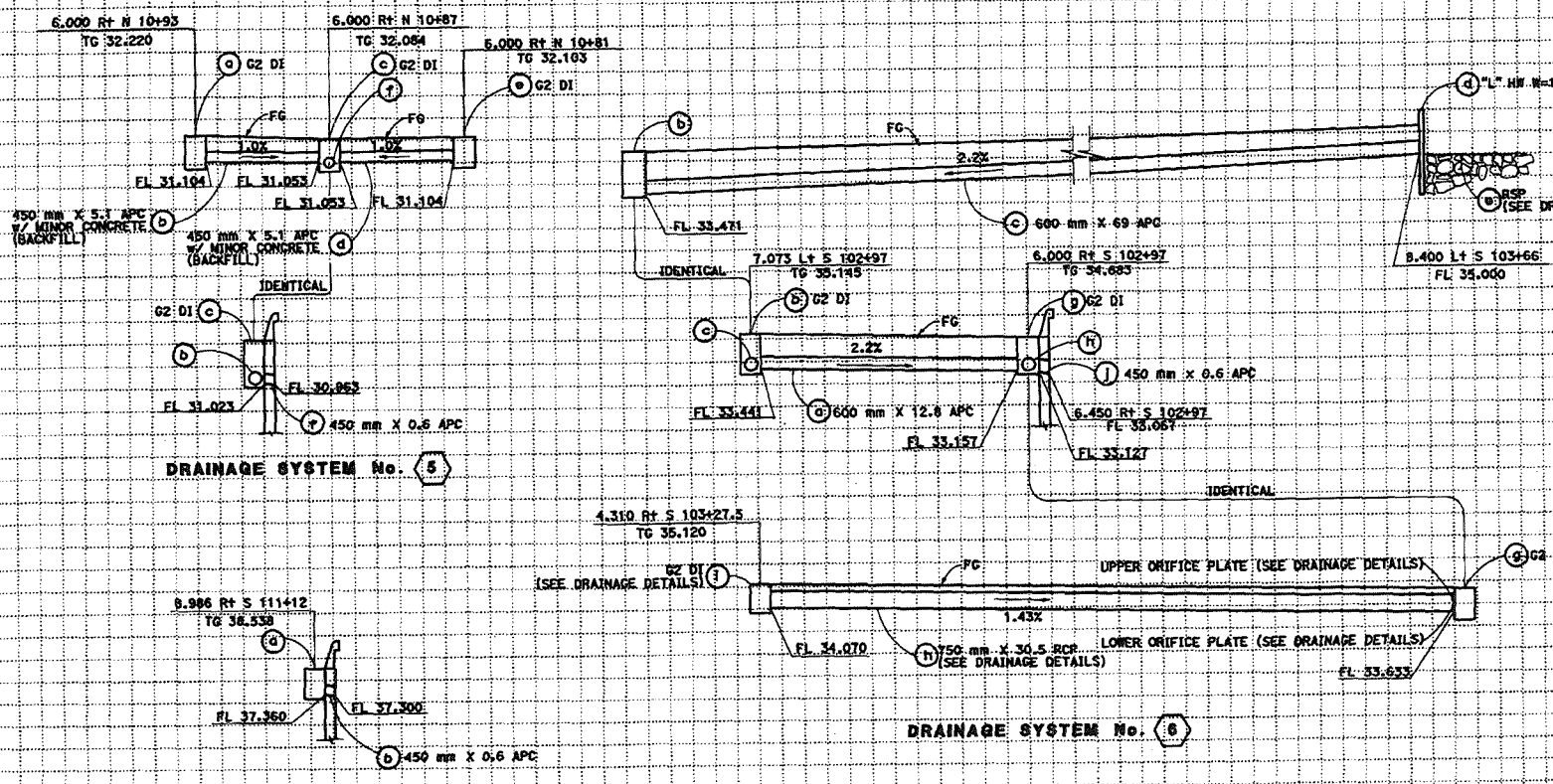
REGISTERED CIVIL ENGINEER — DATE 3-8-10

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tom Ly 69254 — 6-30-10 — 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.

Metric



ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DRAINAGE PROFILES

SCALE HORIZ 1:100 VERT 1:100

DP-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR: GHULAM POPAL

CALCULATED-DESIGNED BY: TAM LY

CHECKED BY: GHULAM POPAL

REVISED BY

DATE REVISED

DATE PLOTTED => 15-JAN-2010

TIME PLOTTED => 11:02

02-04-10

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	84	19.5/19.9, 20.5/21.2		

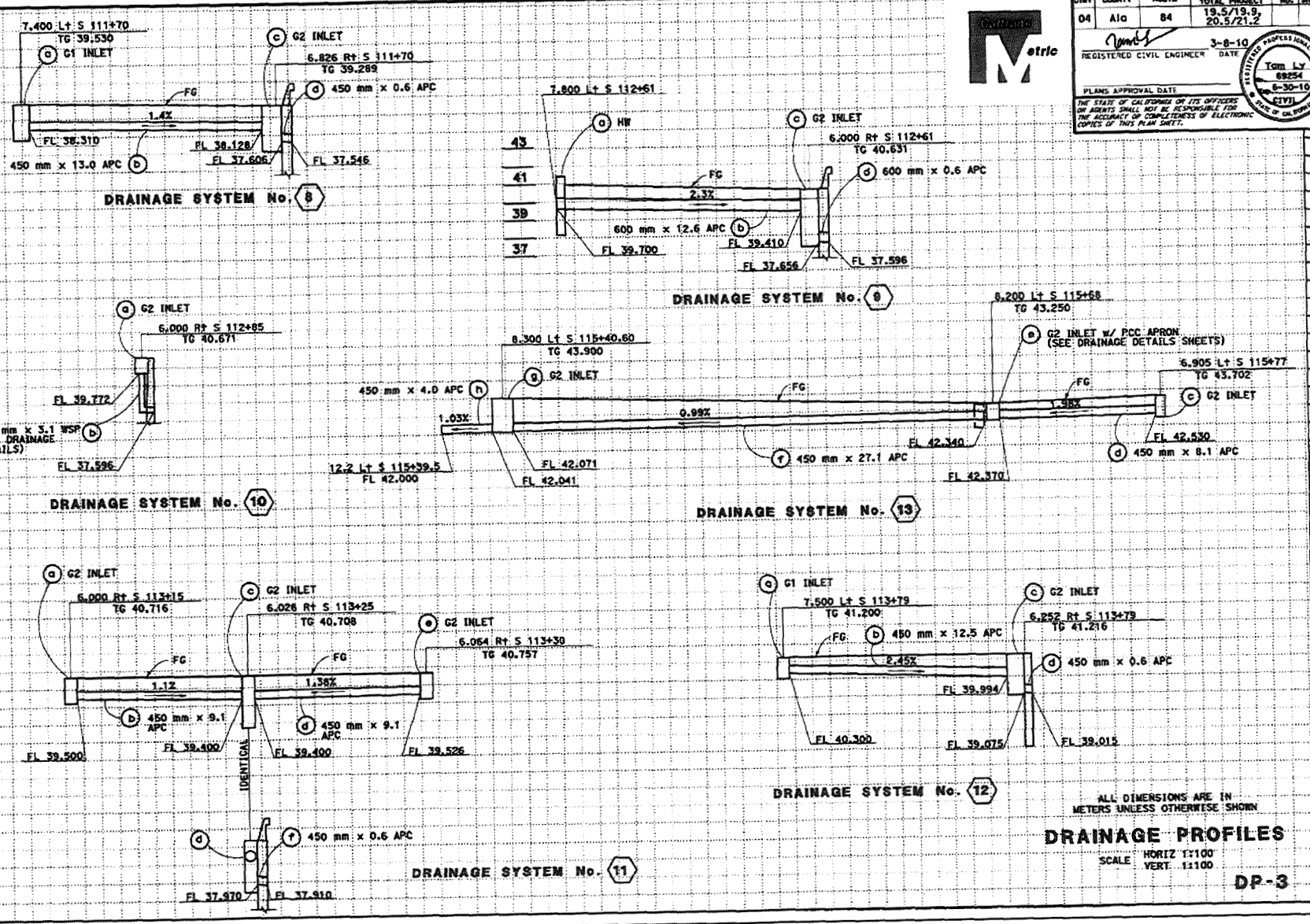
REGISTERED CIVIL ENGINEER 3-8-10 DATE

PLANS APPROVAL DATE

Tom Ly 69254 6-30-10 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.

Metric



ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DRAINAGE PROFILES

SCALE HORIZ 1:100
VERT 1:100

DP-3

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
DESIGN

FUNCTIONAL SUPERVISOR: GHULAM POPAL
CALCULATED-DESIGNED BY: TAM LY
CHECKED BY: GHULAM POPAL
REVISED BY
DATE REVISED

DATE PLOTTED 15-JUN-2010
TIME PLOTTED 11:02
10-26-09

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	84	19.5/19.9, 20.5/21.2		

REGISTERED CIVIL ENGINEER — DATE 3-8-10

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — TOM LY 69254 — 6-30-10 — CIVIL — STATE OF CALIFORNIA

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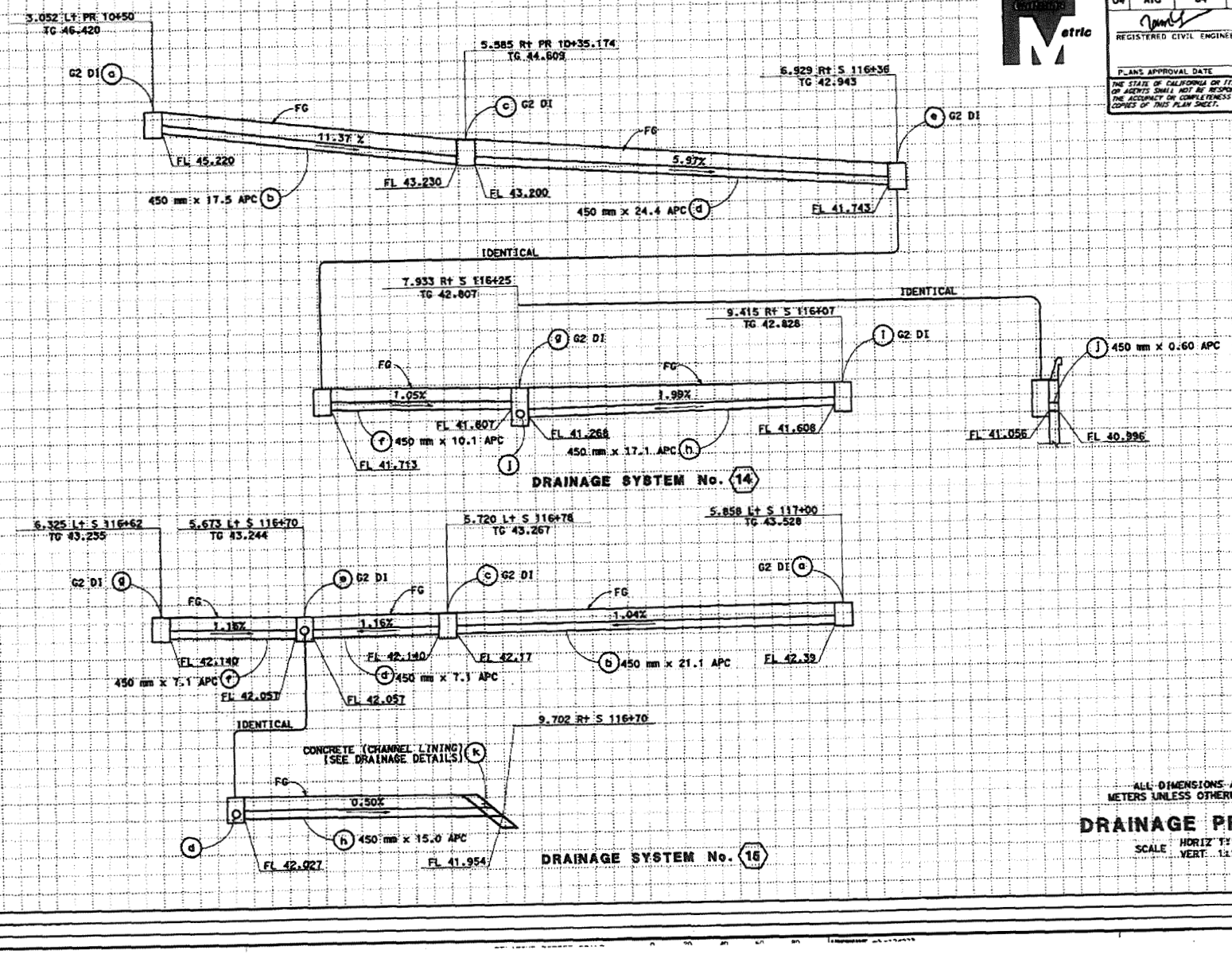
Caltrans Metric



ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DRAINAGE PROFILES

SCALE HORIZ 1:100 VERT 1:100

DP-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — DESIGN

FUNCTIONAL SUPERVISOR: GHULAM POPAL

CALCULATED-DESIGNED BY: TAM LY — DATE REVISED — REVISED BY

CHECKED BY: GHULAM POPAL

LAST REVISION DATE PLOTTED => 16-JUN-2010
09-23-09 TIME PLOTTED => 11:03

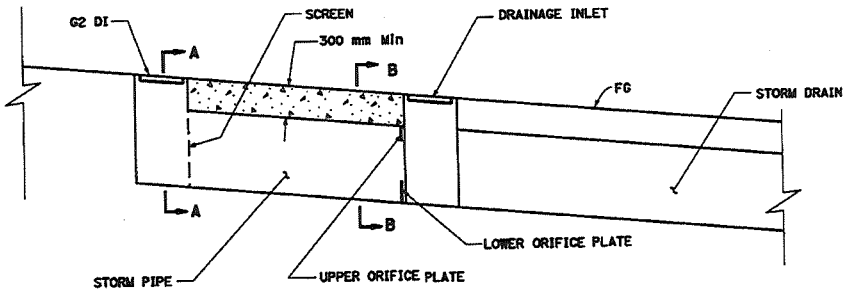
Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	84	19.5/19.9, 20.5/21.2		

REGISTERED CIVIL ENGINEER 3-8-10 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.

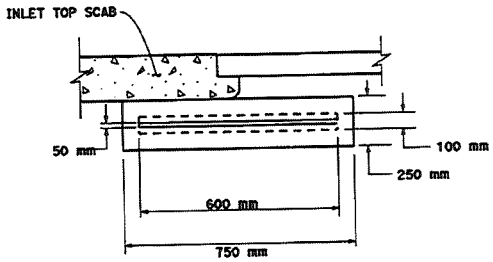
REGISTERED PROFESSIONAL ENGINEER Tam Ly 69254 6-30-10 CIVIL STATE OF CALIFORNIA



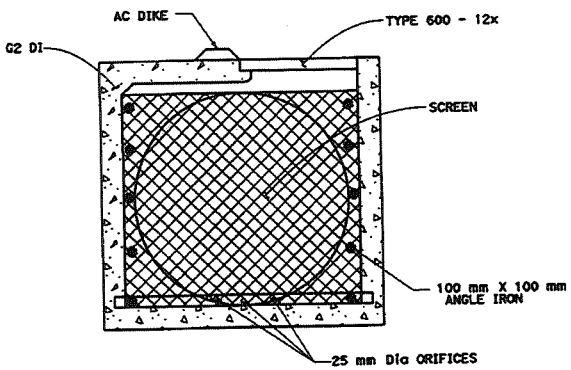
PLAN

UNDERGROUND STORAGE PIPE FOR STORMWATER BMPs

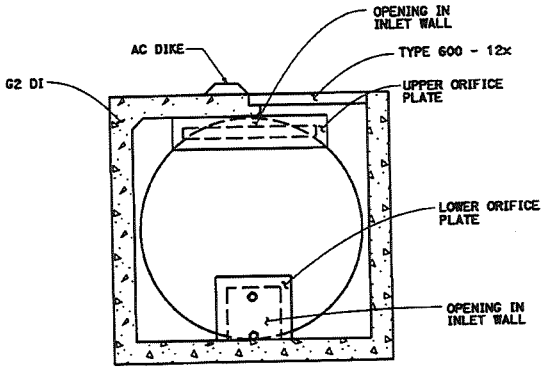
1 h i 2 n o 6 h i



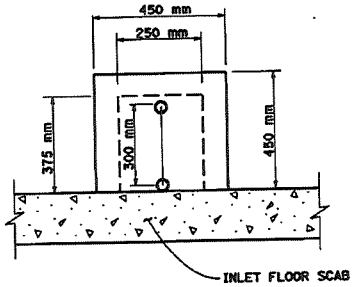
UPPER ORIFICE PLATE



SECTION A-A



SECTION B-B



LOWER ORIFICE PLATE

DRAINAGE DETAILS
(STORMWATER BMPs STORAGE PIPES)

NO SCALE

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DD-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

FUNCTIONAL SUPERVISOR: GHULAM POPAL

CALCULATED-DESIGNED BY: TAM LY

CHECKED BY: GHULAM POPAL

REVISED BY

DATE REVISED

LAST REVISION 03-08-10

DATE PLOTTED => 16-JUN-2010

TIME PLOTTED => 11:03

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	84	19.5/19.9, 20.5/21.2		

REGISTERED CIVIL ENGINEER 3-8-10 DATE

PLANS APPROVAL DATE

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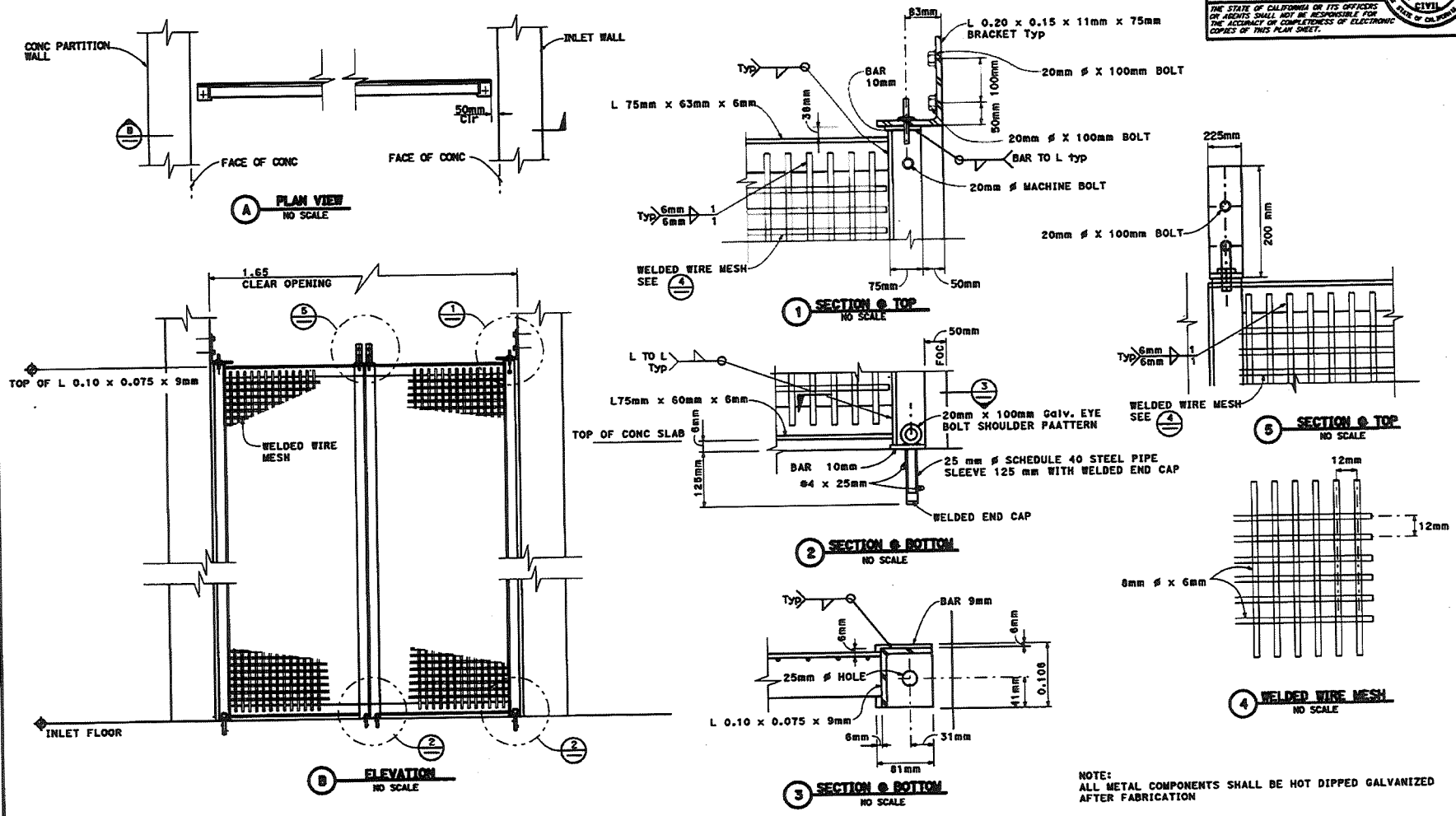
REGISTERED PROFESSIONAL ENGINEER Tom Lv 69254 Exp. 6-30-10 CIVIL STATE OF CALIFORNIA

Metric



NOTE:
ALL METAL COMPONENTS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DRAINAGE DETAILS

NO SCALE

DD-5

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans DESIGN

FUNCTIONAL SUPERVISOR: GHULAM POPAL

CALCULATED-DESIGNED BY: TAM LY

CHECKED BY: GHULAM POPAL

REVISED BY / DATE REVISED

DATE PLOTTED => 15-JUN-2010

TIME PLOTTED => 11:02

DATE RELEASED 12-07-09

STATE OF CALIFORNIA DEPARTMENT OF FISH AND GAME (1602 AGREEMENTS)

State of California – The Natural Resources Agency ARNOLD SCHWARZENEGGER, Governor
DEPARTMENT OF FISH AND GAME
Bay Delta Region
Post Office Box 47
Yountville, California 94599
(707) 944-5520
www.dfg.ca.gov

June 16, 2010

Jeffrey G. Jensen
California Department of Transportation
111 Grand Avenue
Oakland, CA 94623

Subject: Final Lake or Streambed Alteration Agreement
Notification No. 1600-2009-0370-R3
State Route 84 Niles Canyon Safety Widening Project

Dear Mr. Jensen:

Enclosed is the final Streambed Alteration Agreement ("Agreement") for the State Route 84 Niles Canyon Safety Widening Project ("Project"). Before the Department may issue an Agreement, it must comply with the California Environmental Quality Act ("CEQA"). In this case, the Department, acting as a responsible agency, filed a notice of determination ("NOD") on June 16, 2010, based on information contained in the Negative Declaration the lead agency prepared for the Project.

Under CEQA, filing a NOD starts a 30-day period within which a party may challenge the filing agency's approval of the project. You may begin your project before the 30-day period expires if you have obtained all necessary local, state, and federal permits or other authorizations. However, if you elect to do so, it will be at your own risk.

If you have any questions regarding this matter, please contact Melissa Escaron, Staff Environmental Scientist at (707) 339-0334 or mescaron@dfg.ca.gov.

Sincerely,

Scott Wilson

Scott Wilson
Environmental Program Manager
Bay Delta Region

cc: Melissa Escaron

STATE OF CALIFORNIA THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, GOVERNOR
DEPARTMENT OF FISH AND GAME
BAY DELTA REGION
(707) 944-5520
Mailing address:
POST OFFICE BOX 47
YOUNTVILLE CALIFORNIA 94599
Street address:
7329 SILVERADO TRAIL
NAPA CALIFORNIA 94558

June 16, 2010

Notification Number: 1600-2009-0370-3

Mr. Jeffrey G. Jensen
California Department of Transportation
111 Grand Avenue
Oakland, CA 94623

1602 LAKE AND STREAMBED ALTERATION AGREEMENT

This agreement is issued by the Department of Fish and Game pursuant to Division 2, Chapter 6 of the California Fish and Game Code:

WHEREAS, the Applicant Mr. Jeffrey G. Jensen/California Department of Transportation submitted a signed NOTIFICATION proposing to substantially divert or obstruct the natural flow of, or substantially change the bed, channel, or bank of, or use material from the streambed of following water: Alameda and Stonybrook creeks in the county of Alameda, State of California; and

WHEREAS, the Department has determined that such operations may substantially adversely affect existing fish and wildlife resources including water quality, hydrology, aquatic or terrestrial plant or animal species; and

WHEREAS, the project has undergone the appropriate review under the California Environmental Quality Act; and

WHEREAS, the Applicant shall undertake the project as proposed in the signed PROJECT DESCRIPTION and PROJECT CONDITIONS (attached). If the Applicant changes the project from that described in the PROJECT DESCRIPTION and does not include the PROJECT CONDITIONS, this agreement is no longer valid; and

WHEREAS, the agreement shall expire on December 31, 2014; with the work to occur between June 15 and October 15; and

WHEREAS, nothing in this agreement authorizes the Applicant to trespass on any land or property, nor does it relieve the Applicant of the responsibility for compliance with applicable Federal, State, or local laws or ordinances. Placement, or removal, of any material below the level of ordinary high water may come under the jurisdiction of the U. S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act;

THEREFORE, the Applicant may proceed with the project as described in the PROJECT DESCRIPTION and PROJECT CONDITIONS. A copy of this agreement, with attached PROJECT DESCRIPTION and PROJECT CONDITIONS, shall be provided to contractors and subcontractors and shall be in their possession at the work site.

Failure to comply with all conditions of this agreement may result in legal action.

This agreement is approved by:

Scott Wilson
Environmental Program Manager
Bay Delta Region

cc: Melissa Escaron
Lieutenant Christensen

California Natural Resources Agency
DEPARTMENT OF FISH AND GAME
BAY DELTA REGION
(707) 944-5520
Mailing address:
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
Street address:
7329 SILVERADO TRAIL
NAPA, CALIFORNIA 94558

Notification Number: 1600-2009-0370-3
Alameda and Stonybrook Creeks, Alameda County

Mr. Jeffrey G. Jensen
California Department of Transportation District 4
111 Grand Ave.
Oakland, Ca
94623

PROJECT DESCRIPTION and PROJECT CONDITIONS

Description

The California Department of Transportation (Caltrans) proposes to widen State Route (SR) 84 in Niles Canyon from post mile 12.1 to 13.3 in Alameda County. The California Department of Fish and Game (Department) is issuing this Streambed Alteration Agreement #1600-2009-0370-3, for the project described herein.

Project elements include improving sight distance and vertical clearances at the Rosewarnes and Farwell underpasses, widening shoulders to meet current standards, relocating the Palomares Road/State Route 84 intersection approximately 62.3 feet to the south, providing a northbound left turn pocket at Palomares Road, and replacing the box culvert at Stonybrook Creek with a free span bridge.

The new bridge at Stonybrook Creek will provide improved flow capacity to meet storm flow requirements while facilitating fish passage in Stonybrook Creek. The new bridge is also designed to allow bed load transport through the site, reduce channel maintenance requirements, and respond to the creek's normal aggradation and degradation cycles. In addition to the bridge replacement, the following structures will be removed from the stream channel: an old rock weir on Stonybrook Creek, remnants of an old road, asphalt bank protection, and a bridge abutment at the confluence of Stonybrook and Alameda Creeks.

Approximately 1.946 acres of temporary and 1.898 acres of permanent riparian impacts will result from the construction of access and working benches in Alameda Creek, retaining wall construction in Alameda Creek, and armoring of the retaining walls with rock slope protection.

The three retaining walls will have a combined length of approximately 2064 feet. This work will result in the removal of approximately 101 riparian trees.

Additionally, Caltrans proposes to replace several lateral culverts within the project limits with larger sized units. Other related drainage elements of the project include construction drainage inlets, headwalls, endwalls, laterals, horizontal drains, and utility access openings in retaining walls as needed. These drainage improvements will facilitate movement of stormwater from the roadway and side slopes to Alameda and Stonybrook Creeks.

Caltrans and/or its designee shall comply with the following conditions:

1. Caltrans shall obtain final design approval for proposed work within Alameda and Stonybrook Creeks from the Department prior to construction. Caltrans shall allow 2 months for a hydro-geomorphologic review by the Department. Caltrans shall schedule sufficient time into the project schedule to accommodate the design review process with the Department.

2. A Caltrans Designated On-site Biologist, approved by the Department, shall monitor weather forecasts for rain events in coordination with the Department. The Designated On-site Biologist and Caltrans Water Quality staff shall work together to ensure protection of aquatic resources before and during rain events. Storm Water Pollution Prevention Plan measures shall be monitored for proper installation and maintained to prevent sediment transport into the creek. The Resident Engineer shall make corrections suggested by the Designated On-site Biologist and Caltrans Water Quality staff to ensure compliance with this Agreement.

3. Caltrans and/or its Designees shall conduct all work within the riparian corridors between June 15 and October 15. Work outside of the June 15 to October 15 window will be allowed on a case by case basis with Department approval. For the purposes of this project, the riparian corridor is defined as: the area beyond the creekside edge of the edge of the unpaved shoulder.

4. Caltrans shall submit a Riparian Mitigation Plan to the Department for approval including success criteria for percent cover and percent survival prior to start of ground disturbing activities. Mitigation ratios for tree impacts and linear feet impacts shall be determined in consultation with the Department. All required mitigation planting shall be in place within 1 year following completion of construction activities. Any on-site riparian mitigation design shall be informed by photos documenting pre-construction conditions. Off-site mitigation lands shall be approved by the Department and shall be protected and managed in perpetuity.

5. Caltrans and/or its Designee shall be in compliance with Migratory Bird Treaty Act (MBTA) and Fish and Game Code 3503. To avoid potential impacts to nesting birds, Caltrans and/or its Designee shall, to the extent practicable, remove vegetation or install exclusion measures during the time period of August 15 to February 15. If construction activities that have the potential to violate MBTA and Fish and Game Code 3503 are scheduled during the nesting season (February

15-August 15), focused surveys for active nests shall be conducted within 72 hours of said construction activities. If active nests are identified, a 50-foot no-work buffer for non-raptors and a 300-foot no-work buffer for raptors shall be established. If active nests are found, Caltrans shall consult with the Department and the United States Fish and Wildlife Service (USFWS) regarding appropriate action to comply with the MBTA of 1918 and the Fish & Game Code of California.

6. Within 48 hours prior to construction, the active work area, within the riparian corridor, shall be surveyed by the Caltrans Designated On-site Biologist for special status species. If any Alameda whipsnake (AWS) or California red legged frog (CRLF) are found, work within the riparian corridor shall not start until the Department and USFWS have been contacted and have given their approval for work to continue.

7. Within 48 hours prior to construction, the active work area, within the riparian corridor, shall be surveyed by the Caltrans Designated On-site Biologist, at the appropriate time of day for presence of the western pond turtle (WPT), *Clemmys marmorata*. If any individuals are found, the biologist shall relocate the WPT downstream from the construction site and email Melissa Escaron, Staff Environmental Scientist, at mescaron@dfg.ca.gov, to incorporate protection measures into the project for WPT.

8. Caltrans and/or its Designee shall allow any wildlife encountered during the course of construction to leave the construction area unharmed.

9. If any state or federal listed species, or state species of special concern, are observed during project surveys or during construction activities, Caltrans shall submit California Natural Diversity Data Base (CNDDB) forms to the CNDDB for all survey data or observations within five working days of the sightings, and provide DFG Region 3 with copies of the CNDDB forms and survey maps.

10. Caltrans and/or its Designee shall install and maintain high-visibility Environmentally Sensitive Area fencing to protect sensitive resources. Caltrans and/or its Designee shall remove as little vegetation as is necessary to conduct construction activities.

11. Caltrans shall conduct an employee orientation program for all persons who will work on-site during construction and landscape establishment activities. The program shall consist of a brief presentation from the Caltrans Designated On-site Biologist about the biology of the species listed in this agreement, their habitat needs, and their status.

12. The Designated On-site Biologist shall be present during initial ground disturbing activities within the riparian corridor. The Resident Engineer shall stop work at the request of the Designated On-site Biologist to ensure protection of AWS, CRLF and WPT, and compliance with the Migratory Bird Treaty Act.

13. Caltrans and/or it Designee shall have readily available plastic sheeting or visquine and will cover exposed spoil piles and exposed areas to prevent these areas from losing loose soil into the stream. These covering materials shall be available and applied when it is evident rainy conditions threaten to erode loose soils into the stream.

14. Permittee shall not use temporary or permanent erosions control devices containing plastic netting, including photo- or bio-degradable plastic netting.

15. Caltrans and/or its Designee shall not commence construction within the riparian corridor if the work and its associated erosion control measures cannot be completed prior to the onset of a storm event. 72-hour weather forecasts from the National Weather Service shall be consulted prior to start up of any phase of the project.

16. Caltrans and/or its Designee shall not operate equipment or vehicles in water-covered portions of the stream, or where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as otherwise provided for in this Agreement and as necessary to complete authorized work.

17. Caltrans and/or its Designee shall locate staging and storage areas for equipment, materials, fuels, lubricants and solvents, outside of the stream channel and banks and outside areas protected by high visibility Environmentally Sensitive Area fencing. Stationary equipment such as motors, pumps, generators, compressors and welders, located within or adjacent to the stream will be positioned over drip pans. Any equipment or vehicles driven and/or operated within or adjacent to the stream will be checked and maintained daily, to prevent leaks of materials that if introduced to water could be deleterious to aquatic life. Vehicles will be moved away from the stream prior to refueling and lubrication.

18. Caltrans and/or its Designee shall prevent raw cement/concrete or washings thereof, asphalt, straw, paint or other coating material, oil or other petroleum products, or any other substances related to project activities which could be hazardous to aquatic life, wildlife, or riparian habitat from contaminating the soil and/or entering the waters of the State. Caltrans and/or its Designee may be subject to a citation for placing materials where they may enter a stream or lake.

19. Caltrans and/or its designee shall not dump any litter, waste, or construction debris within the riparian corridor. All such debris, waste, and litter shall be picked up daily and properly disposed of at an appropriate site.

20. Caltrans and/or its designee shall remove any materials placed in seasonally dry portions of a stream or lake, that could be washed downstream or could be deleterious to aquatic life, wildlife, or riparian habitat, prior to inundation by high flows.

21. Caltrans shall submit to the Department for approval, any stream diversion plans at least 3 weeks prior to installation. Diversion gravel bag fabric shall be non-woven polypropylene

geotextile (or comparable polymer) and shall conform to the following requirements:

Mass per unit area, grams per square meter, min.
ASTM Designation: D 5261 - 270
Grab tensile strength (25-mm grip), kilonewtons, min.
ASTM Designation: D4632* 0.89
Ultraviolet stability, percent tensile strength retained after 500 hours,
ASTM Designation: D4355, xenon arc lamp method 70
* or appropriate test method for specific polymer
Gravel bags shall be between 600 mm and 800 mm in length, and between 400 mm and 500 mm in width.

Yarn used in construction of the gravel bags shall be as recommended by the manufacturer or bag supplier and shall be of a contrasting color. Gravel shall be between 10 mm and 20 mm in diameter, and shall be clean and free from clay balls, organic matter, and other deleterious materials. The opening of gravel-filled bags shall be secured to prevent gravel from escaping. Gravel-filled bags shall be between 13 kg and 22 kg in mass. Plastic or visqueen sheeting shall not be used in the diversion, strong filter fabric or pond liner is allowed.

22. Caltrans shall provide a copy of this Agreement to all contractors, subcontractors and all Resident Engineers. The Caltrans Resident Engineer shall make available copies of this Agreement at the project site during all periods of active work and must be presented to Department personnel upon demand. Department personnel shall be allowed onto the work site at any time during and after construction of the project for the purposes of establishing compliance with this Agreement.

23. Caltrans and/or its Designee are liable for compliance with the terms of this Agreement, including violations committed by the contractors and/or subcontractors. The Department reserves the right to suspend construction activity described in this Agreement if the Department determines any of the following has occurred:
A) Failure to comply with any of the conditions of this Agreement;
B) Information provided in support of the Agreement is determined by the Department to be inaccurate;
C) Information becomes available to the Department that was not known when preparing the original conditions of this Agreement (including, but not limited to, the occurrence of State or federally listed species in the area or risk to resources not previously observed); and
D) The project as described in the Agreement has changed or conditions affecting fish and wildlife resources change.

To the extent that any provisions of this Agreement provide for activities that require Caltrans to traverse another owner's property, such provisions are agreed to with the understanding that Caltrans possesses the legal right to so traverse. In the absence of such right, any such provision is void.

In the event that the project scope, nature, or environmental impact is altered by the imposition of subsequent permit conditions by any local, state or federal regulatory authority, Caltrans shall notify the Department of any imposed project modifications that interfere with compliance to Department conditions.

If Caltrans needs more time to complete the authorized activity, the work period may be extended on a day-to-day basis by Melissa Escaron, Staff Environmental Scientist, at (707) 339-0334 or the Yountville office at (707) 944-5520.

A copy of this agreement must be provided to the contractor and all subcontractors who work within the riparian corridor and must be in their possession at the work site.

Amendments and Extensions

Caltrans shall notify the Department before any modifications are made in the project plans submitted to the Department. Project modifications may require an amendment or a new notification.

This Agreement is transferable to subsequent owners of the project property by requesting an amendment.

To extend the Agreement beyond the expiration date, a written request or completed "Request to Extend Lake or Streambed Alteration Agreement" form, with an appropriate fee, must be submitted to the Department (1600 Program, Post Office Box 47, Yountville, California 94599) for consideration at least 30 days before the Agreement expiration date. An extension requires a fee. The Fee Schedule and Extension form can be obtained at www.dfg.ca.gov/habcon/1600/Forms.html or by phone at (707) 944-5520. Extensions of the original Agreement are issued at the discretion of the Department.

To modify the project, a written request for an amendment or a completed "Request to Amend Lake or Streambed Alteration Agreement" form, with an appropriate fee, must be submitted to the Department (1600 Program, Post Office Box 47, Yountville, California 94599). An amendment requires a fee. The Fee Schedule and Amendment form can be obtained at www.dfg.ca.gov/habcon/1600/Forms.html or by phone at (707) 944-5520. Amendments to the original Agreement are issued at the discretion of the Department.

Please note that you may not proceed with construction until your proposed project has undergone CEQA review and the Department signs the Agreement.

I, the undersigned, state that the above is the final description of the project I am

submitting to the Department for CEQA review, leading to an Agreement, and agree to implement the conditions above required by the Department as part of that project. I will not proceed with this project until the Department signs the Agreement. I also understand that the CEQA review may result in the addition of measures to the project to avoid, minimize, or compensate for significant environmental impacts:

Applicant's name (print): Jeffrey G. Jensen

Applicant's signature: _____

Signed the 9th **day of** June**, 2010**

UNITED STATES ARMY CORPS OF ENGINEERS NATIONWIDE 404 PERMIT

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

REPLY TO

JUN 15 2010

Regulatory Division

SUBJECT: File Number SPN-2004-286510 S

Mr. John Yeakel
Office of Biological Sciences and Permits
California Department of Transportation
PO Box 23660
Oakland, California 95623-0660

Dear Mr. Yeakel:

This letter supersedes the previous authorization letter dated February 24, 2010, and is written in response to your May 20, 2010, request for reauthorization of the State Route 84, Niles Canyon Safety Widening Project under Nationwide Permit 14 for Linear Transportation Projects. The project is located in Niles Canyon between Sunol and Fremont, on State Route 84 in Alameda County, California.

Modifications to the project's design have changed the impacts to waters of the U.S. Permanent impacts to waters of the U.S. have increased 0.030 acres to 0.046 acres. Temporary impacts to waters of the U.S. have decreased by 0.276 acres to 0.123 acres. Permanent impacts have increased in order to accommodate additional rock slope protection around a pier on the railroad bridge near the Rosewarnes Underpass. Temporary impacts have decreased by removing the temporary earthen benches in Alameda Creek for construction equipment access.

The State Route 84, Niles Canyon Project will correct horizontal and vertical alignment deficiencies on the highway between Rosewarnes Underpass and the Farewell Underpass (between post mile 12.1 and 13.3), in Alameda County, California. The roadway is an undivided two-lane rural highway with narrow shoulders on a curving alignment through rolling terrain. The existing pavement width from the centerline to the edge of the pavement is less than current standards, increasing the chances of a tire dropping off the road. The posted speed limit in the project area is 50 miles per hour with speeds reduced to 25 miles per hour at sharp turns. Traffic must stop on State Route 84 to exit off on Palomares Road, generating another safety concern.

The purpose of the project is to improve sight distance and vertical clearances at Rosewarnes Underpass and Farwell Underpass, widen existing shoulders to current standards, relocate the Palomares Road intersection, and provide a left turn pocket off State Route 84 to Palomares Road.

The project will result in permanent impacts to 0.016 acres of wetlands and 0.046 acres of waters of the U.S. and 0.123 acres of temporary impacts to waters of the U.S. A majority of the permanent impacts will result in the placement of rock slope protection below the ordinary high water mark of Alameda Creek. Clearing, grubbing, access, and staging will account for most of the temporary impacts to waters of the U.S., including wetlands.

Based on a review of the information you submitted, your project qualifies for authorization under Department of the Army Nationwide Permit 14 for Linear Transportation Projects (72 Fed. Reg. 11092, March 12, 2007), pursuant to Section 404 of the Clean Water Act (33 U.S.C. Section 1344). See Enclosure 1. All work shall be completed in accordance with the "State Route 84 Niles Canyon Safety Widening Project Drawings", dated June 2, 2010. Copies of these drawings are enclosed.

The project must be in compliance with the General Conditions cited in Enclosure 2 for this Nationwide Permit authorization to remain valid. Non-compliance with any condition could result in the suspension, modification or revocation of the authorization for your project, thereby requiring you to obtain an Individual Permit from the Corps. This Nationwide Permit authorization does not obviate the need to obtain other State or local approvals required by law.

This authorization will remain valid for two years from the date of this letter unless the Nationwide Permit is modified, suspended or revoked. If you have commenced work or are under contract to commence work prior to the suspension, or revocation of the Nationwide Permit and the project would not comply with the resulting Nationwide Permit authorization, you have twelve (12) months from that date to complete the project under the present terms and conditions of the Nationwide Permit. Upon completion of the project and all associated mitigation requirements, you shall sign and return the Certification of Compliance, Enclosure 3, verifying that you have complied with the terms and conditions of the permit.

This authorization will not be effective until you have obtained a Section 401 water quality certification from the San Francisco Bay Regional Water Quality Control Board (RWQCB). If the RWQCB fails to act on a valid request for certification within two months after receipt of a complete application, the Corps will presume a waiver of water quality certification has been obtained. You shall submit a copy of the certification to the Corps prior to the commencement of work.

To ensure compliance with this Nationwide Permit authorization, the following special conditions shall be implemented:

1. This Corps permit does not authorize you to take an endangered species. In order to legally take a listed species, you must have a separate authorization under the Endangered Species Act (ESA) (e.g., an ESA Section 10 permit or a Biological Opinion (BO) under ESA Section 7 with "incidental take" provisions with which you must comply). The enclosed U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) BOs dated May 24, 2006, and April 18, 2006, respectively contain mandatory

terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BOs. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take authorized by the attached BOs, whose terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BOs, where a take of the listed species occurs, would constitute an unauthorized take and it would also constitute non-compliance with this Corps permit. The FWS and NMFS are the appropriate authorities to determine compliance with the terms and conditions of their BOs and with the ESA.

2. You shall notify the Corps in writing of the anticipated start and stop dates of construction, at least 5 days prior to the initiation of construction.

3. If there are any changes in the project design, materials, or construction methods, those modifications must be approved by the Corps in writing.

4. During construction, erosion control materials, including silt fences, erosion control blankets/mats, and sandbags will be on hand and utilized as deemed necessary.

5. Environmentally sensitive areas (ESA) shall be clearly delineated on the construction plans and demarcated in the field with high-visibility fencing prior to commencement of construction activities. ESA fencing shall be properly maintained throughout the duration of the project. The ESA shall be off limits to construction activity and personnel at all times.

6. No debris, oil, petroleum products or other organic material resulting from construction activities shall be allowed to enter or be placed where it may be washed by rainfall or runoff into areas subject to the jurisdiction of the Corps.

7. In the event of any unanticipated discoveries of potential cultural/historic resources, you shall immediately halt work in the vicinity of the discovery and contact the appropriate regulatory authorities. You shall complete consultation pursuant to 36 CFR 800 to the satisfaction of the SHPO prior to resuming work.

8. Mitigation for temporary impacts to waters of the U.S., including wetlands, shall be accomplished by revegetating temporarily impacted areas with appropriate locally collected native seeds and cuttings adapted for the site's conditions. Restored areas shall be monitored for a minimum of 3 years. The Corps shall receive a copy of the final restoration and monitoring plan that is required by the U.S. Fish and Wildlife Service in their May 24, 2006, biological opinion. This document shall be submitted to our office prior to construction. The plan shall include quantifiable criteria to evaluate the success of the restoration work.

9. You shall provide a post-construction report 45 days after the completion of construction

activities. The report shall include a description and photos of the site prior to construction and the condition of the site after construction.

Should you have any questions regarding this matter, please call Andrea Meier of our Regulatory Division at 415-503-6798 or email her at andrea.j.meier@usace.army.mil. Please address all correspondence to the Regulatory Division and refer to the File Number at the head of this letter. If you would like to provide comments on our permit review process, please complete the Customer Survey Form available online at http://per2.nwp.usace.army.mil/survey.html.

Sincerely,
ORIGINAL SIGNED
BY Cameron Johnson
ACTING CHIEF, REG. DIV., SOUTH BR.
FOR Jan Hicks
Chief, Regulatory Division

Enclosures

Copy furnished (w/o enclosures):

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

CF:

CESPN-R (Rdg File)
CESPN-R (Meier)

6/9/10
MEIER
CESPN-R-S
-6798
06/09/10

JOHNSON
CESPN-R-S

MARTEL
CESPN-R

HICKS
CESPN-R
6/15/10

UNITED STATES FISH AND WILDLIFE SERVICE (BIOLOGICAL OPINION)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

IN REPLY REFER TO:
1-1-06-F-0125

MAY 2 4 2006

Mr. Gene Fong
Federal Highway Administration
Department of Transportation
650 Capital Mall, Suite 4-100
Sacramento, California 95814

Subject: Biological Opinion on the Proposed State Route 84, Niles Canyon Safety Widening Project, Alameda County, California

Dear Mr. Fong:

This is in response to your October 7, 2005, request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed road widening, intersection realignment, and other road safety improvement measures to State Route 84 (Niles Canyon) in Alameda County, California. Your request was received in this Field Office on October 19, 2005. This document represents the Service's biological opinion on the effects of the action on the threatened California red-legged frog (*Rana aurora draytonii*) and the threatened Alameda whipsnake (*Masticophis lateralis euryxanthus*); and conference opinion on the effects of the action on proposed critical habitat for the Alameda whipsnake. This document is issued pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act).

The proposed State Route 84, Niles Canyon Project is not likely to adversely affect the threatened California tiger salamander (*Ambystoma californiese*) due to an apparent lack of suitable habitat for this listed animal in the action area.

This biological opinion is based on: (1) a letter from the Federal Highway Administration (FHWA) to the Service dated November 8, 2004; (2) *State Route 84 Niles Canyon Safety Widening Project Biological Evaluation (04-ALA-84, KP 19.5-20.9/PM 12.1-13.3, EA 174400, USFWS Reference # 1-1-03-SP-2424)* dated September 2004; (3) *Niles Canyon (SR 84) Safety Widening Project Technical Memorandum for Listed Herpetofauna Occurrences and Effects* dated June 2005; (4) a meeting on August 2, 2005, between Ryan Olah and John Cleckler of the Service, and Margaret Gabil and Amy Fowler of the California Department of Transportation (Caltrans); (5) additional project description information provided by Amy Fowler of Caltrans on January 4, March 14, and March 17, 2006; (6) electronic mail and telephone conversations between Caltrans and the Service; and (7) other information available to the Service.

TAKE PRIDE IN AMERICA

CONSULTATION HISTORY

November 8, 2004:	The Service received the *State Route 84 Niles Canyon Safety Widening Project Biological Evaluation (04-ALA-84, KP 19.5-20.9/PM 12.1-13.3, EA 174400, USFWS Reference # 1-1-03-SP-2424).*
January 27, 2005:	The Service submitted a request to Caltrans for additional project information. The communication also included the statement that the Service does not concur with the not likely to adversely affect determination for the California red-legged frog and the Alameda whipsnake.
June 27, 2005:	The Service received the *Niles Canyon (SR 84) Safety Widening Project Technical Memorandum for Listed Herpetofauna Occurrences and Effects* from Caltrans. This memorandum was submitted in response to the Service's January 2005, request for additional information.
August 2, 2005:	The Service met with Caltrans to discuss the State Route 84, Niles Canyon Project at the Sacramento office of the Service.
August 11, 2005:	John Cleckler of the Service met Caltrans and their consultants at the State Route 84, Niles Canyon Project site.
August 12, 2005:	The Service sent Caltrans a request for additional project information via electronic mail.
August 25, 2005:	The Service received an electronic mail from Caltrans in response to the Service's August 12, 2005, request for information.
September 6, 2005:	The Service sent an additional request for information to Caltrans via electronic mail in response to information provided by Caltrans on August 25, 2005.
September 7, 2005:	The Service sent a message to Caltrans via electronic mail expressing the need to consult on "maximum forcasted effects" should Caltrans wish to continue consultation without the final project description in regards to the bridge design at Stonybrook Creek.
September 13, 2005:	The Service sent Caltrans the project description section from the draft biological opinion via electronic mail to review for accuracy.
September 14, 2005:	The Service received additional information from Caltrans via electronic mail in response to select previous information requests.

September 16, 2005: The Service received an electronic mail from Caltrans which included contact information for representatives of other Federal and State agencies involved in the State Route 84, Niles Canyon Project.

October 6, 2005: The Service received additional information from Caltrans via electronic mail in response to select previous information requests.

October 14, 2005: The Service received additional project description information from Caltrans via electronic mail along with a notice that the project was on hold due to potential project design changes.

October 18, 2005: The Service informed Caltrans via electronic mail that critical habitat had been reproposed for the Alameda whipsnake.

October 19, 2005: The Service received a letter from FHWA, dated October 7, 2005, requesting initiation of formal consultation for the California red-legged frog, the California tiger salamander, and the Alameda whipsnake. The letter was accompanied by additional copies of the September Biological Evaluation and the June 2005 Technical Memorandum; responses to the Services' August 12, 2005 request for additional information; and three associated reports prepared by Sam McGinnis in 2002.

January 4, 2006: The Service received the final project description from Caltrans via electronic mail.

February 10, 2006: The Service received an updated project effects map from Caltrans.

February 14, 2006: The Service received verification of values provided for habitat loss from Caltrans via electronic mail.

March 14, 2006: The Service received additional project description information from Caltrans via electronic mail.

March 17, 2006: The Service received additional project description information from Caltrans via electronic mail.

March 16, 2006: The Service received the species habitat compensation statement from Caltrans via electronic mail.

BIOLOGICAL OPINION

Description of Proposed Action

The State Route 84, Niles Canyon Project is intended to correct existing horizontal and vertical alignment deficiencies on SR 84 between the Rosewarnes Underpass (Bridge No. 33-0034), post mile (PM) 121 (kilometer post [KP] 19.5), and the Farwell Underpass (Bridge No. 33-0035), PM 13.3 (KP 21.4), in Alameda County, California.

This existing section of State Route 84 is an undivided, two-lane rural highway with narrow shoulders on a typically curving horizontal alignment through rolling terrain. The existing pavement width from the centerline to the edge of pavement typically measures between 11.8 and 15.7 feet (3.6 and 4.8 meters), yielding 11.81 feet (3.6 meter) lanes with up to 3.93 feet (1.2 meter) shoulders. The posted speed limit is 49.7 miles per hour (80 kilometers per hour) along most of State Route 84 within the project boundaries. The speed limit is reduced to 24.85 miles per hour (40 kilometers per hour) at non-standard horizontal curve locations.

Palomares Road is a two-lane County road, located between State Route 84 and Interstate 580, which passes through rolling terrain with minimal to nonexistent shoulders. At its intersection with State Route 84, Palomares Road widens to accommodate a right turn lane onto southbound State Route 84 and a left turn onto northbound State Route 84. Presently, State Route 84 does not have a protected turn pocket for northbound traffic turning left onto Palomares Road.

The purpose of the project is to: (1) improve sight distance and vertical clearances at Rosewarnes Underpass and Farwell Underpass; (2) widen existing shoulders to current standards; (3) relocate the Palomares Road / State Route 84 Intersection approximately 62.34 feet (19 meters) to the south; (4) provide a northbound left turn pocket on State Route 84 at Palomares Road, thereby reducing the accident rate for this corridor. The project will also include the bridge replacement at Stonybrook Creek that may enhance fish passage. These proposed construction activities are further described as follows.

According to Caltrans, the proposed approximately 7.69 acre (3.11 hectares) project footprint includes approximately 4.28 acres (1.73 hectares) of existing hardscape, approximately 1.34 acres (0.55 hectares) of permanent effects to non-hardscape land features, and approximately 2.07 acres (0.84 hectares) of temporary effects to non-hardscape land features. The 1.34 acres (0.55 hectares) of permanent effects will result from construction of hardscape features such as additional roadway, retaining walls, engineered drainages, and bridge installation. Areas of temporary effects are those that will be restored to pre-construction conditions following construction completion. These areas are expected to regain their previous habitat values within one year following restoration actions.

Clear and Grub

The objective of clearing and grubbing is to remove organic material that prevents successful compaction of soil around structures and pavement. The contractor's personnel will use cutting tools (e.g. chain saws) and loaders to remove vegetation from the action area prior to construction. The contractor will be responsible for properly disposing of any material hauled out of the action area.

Caltrans will install Environmentally Sensitive Area (ESA) fencing prior to clearing and grubbing, by hand to discourage construction workers, debris, and equipment from entering habitat outside the action area. Rootballs extending beyond the action area will be cut at the limit of excavation to minimize soil disturbance. Existing willows will be cut at ground level during vegetation clearing to promote rapid re-growth and the cuttings will be salvaged for future planting.

Rosewarnes Underpass

To improve sight distance and create standard shoulders and lanes under the Rosewarnes railroad overpass, Caltrans proposes to construct a new northbound lane around the existing column associated with the rail road overpass within the state right-of-way. The existing roadway will become the southbound lane with a standard-width shoulder. The design of the underpass includes construction of a new retaining wall between the existing roadway and Alameda Creek. Caltrans also proposes to lower the profile of the roadway in order to achieve standard vertical clearance through the Rosewarnes Underpass.

Construction of the concrete retaining wall will require a temporary access road between the wall and Alameda Creek. Excavation to the bottom of the retaining wall foundation will be performed by a scraper, excavator and / or motor grader. If needed, piles will be driven or drilled and poured to support the retaining wall. Concrete will be hauled in and poured or pumped into forms created by plywood, lumber, and reinforcing steel. The forms will be removed after the concrete cures and fill will be brought in to support the toe of the retaining wall. Backfill material will also be used to reestablish the grade for the stream bank, primarily above the ordinary high water mark of Alameda Creek.

Upon completion of the retaining walls, material will be compacted behind the retaining walls to form the sub-grade of the new roadway. The sub-base (a controlled mixture of rock, dirt and water) will be laid and compacted, and then asphalt concrete will be placed in layers and compacted. A reinforced concrete safety shape barrier with tubular steel bicycle railing will be placed on top of the creekside retaining walls. The safety shape barrier requires placement of reinforcing steel and steel mounting plates and bolts, placing formwork (plywood and lumber, aluminum or steel), pouring concrete, stripping forms, curing, texturing and colorizing concrete, and mounting tubular bicycle railing.

Niles Dam to Farwell Underpass

Caltrans plans to lower the existing road profile under the Farwell railroad overpass to meet standard vertical clearance requirements. In order to achieve this, Caltrans proposes to construct retaining walls on both sides of the existing roadway from north of the San Francisco Public Utilities Commission Niles Dam to the Farwell railroad overpass. The retaining walls are designed to facilitate roadway widening, which will provide standard shoulders, lane widths, and left turn channelization. Caltrans will build the southbound retaining wall into the hillside from the roadway for approximately 148 feet (45 meters). The northbound retaining wall, located between the existing roadway and Alameda Creek, will extend for approximately 1706 feet (520 meters).

Caltrans plans to install a soil nail wall for the southbound retaining wall. First, the hillside will be cut back at 1 horizontal to 10 vertical. Then holes will be drilled into the embankment for the soil nails. Nails with tension bars will be inserted into the holes and grout is pumped in to hold them in place. The wall is then created with a reinforcing steel framework and concrete. The completed retaining wall will be textured and stained to match existing features. The same method will be used to install the northbound retaining wall as described for the Rosewarnes Underpass.

State Route 84/Palomares Road Intersection

Caltrans proposes to relocate the State Route 84/Palomares Road intersection to the south by approximately 63 feet (19 meters) to create greater sight distance to oncoming vehicles (traveling southbound on State Route 84) for motorists turning onto southbound State Route 84 from Palomares Road. The relocation of the State Route 84/Palomares Road intersection will involve construction of a retaining wall between the realigned Palomares Road and Stonybrook Creek.

Safety improvements at the intersection will also include the addition of a northbound (or left) turn pocket on State Route 84 at Palomares Road. The turn pocket is intended to increase safety for motorists turning left off of northbound State Route 84 onto Palomares Road. The construction of the turn pocket will require additional widening of State Route 84 in this area.

Miscellaneous Drainage Facilities

Caltrans plans to replace several lateral culverts within the project limits with larger sized units. Other related drainage elements of the project include constructing drainage inlets, headwalls, endwalls, laterals, horizontal drains, and utility access openings in retaining walls as needed.

Drainage improvements will facilitate movement of stormwater from the roadway and side slopes to Alameda and Stonybrook creeks. Construction of these facilities will be within the roadway prism and will extend to slope protected outfalls at the base of the retaining walls adjacent to Alameda and Stonybrook creeks. The bulk of this work includes excavating trenches,

placing pipe and backfilling the trench to roadway sub-grade. Reinforced concrete drainage inlets and asphalt concrete dikes will be located to collect water at intervals along the roadway shoulder and to channel runoff into drainage pipes. The drainage pipes will be designed to outfall through the retaining walls prior to flowing in to Alameda and Stonybrook creeks. Erosion control measures will be incorporated into the outfall designs.

Bridge/Culvert Replacement at Stonybrook Creek

Caltrans plans to replace the existing 57 foot (17.5 meter) long reinforced box culvert, that serves as a bridge crossing for State Route 84 over Stonybrook Creek, with a clear span bridge. The new structure will provide capacity to meet design storm requirements and facilitate passage of fish between Alameda Creek and Stonybrook Creek. The new bridge is also designed to pass a higher design flow (100-year event), allow bedload transport through the site, reduce channel maintenance requirements, and respond to the creeks normal aggradations and degradation cycles.

Following construction, the bridge will be straighter than the existing skewed culvert alignment. The profile of the creek, including that under the bridge, will be graded to match the existing slopes both upstream and downstream of the crossing. The bridge will be designed to accommodate future changes to the creek profile (including scour). The vertical bridge abutments will be spaced wider than the active channel width to allow unimpeded bedload transport under the bridge. The regraded Stonybrook Creek channel bottom section will be shaped to resemble upstream channel sections. The bedding will be overlayed with local rock materials. A slight centerline depression in the channel section will allow for a low flow channel to form. While the bed will be allowed to aggrade or degrade over time, the creek slopes will be hardened as necessary to protect adjacent structures and embankments. The new bridge will permanently shade an additional 15 feet (4.5 meters) of Stonybrook Creek on the Alameda Creek side of State Route 84.

Cofferdams will be used where necessary to dry out workspaces within Alameda Creek and Stonybrook Creek. The upstream end of any cofferdam would be installed prior to installation of the downstream end. Any equipment used to transport water around and downstream of the construction zone, or used to pump water to baker tanks will be screened with fine enough mesh to avoid the intake of fish or other of wildlife. Any encountered groundwater or water seeping into a cofferdam will be temporarily held in the on-site contaminant removal devices such as Baker tanks to ensure the sediment level meets the regulatory standards before the water is discharged into Alameda Creek.

Proposed retaining wall construction will extend along Alameda Creek to the confluence with Stonybrook Creek and the proposed bridge over Stonybrook Creek. The contractor will construct the Alameda Creek retaining wall and the new bridge in the first stage, placing traffic behind K-rail in the existing southbound direction, and then build the roadway section behind the Alameda Creek retaining wall so as to move both lanes of traffic over to the new roadway section for stage

two. This will allow the contractor to complete the bridge construction on the upstream side in stage two. The work in both stages includes clearing and grubbing; removing manmade objects (i.e. the existing headwalls, retaining walls and slope paving); making subgrade for the various structures and elements; placing piles; reinforcing bar, formwork; pouring concrete; compacting soil; and finish grading. The equipment used to complete the bridge construction will likely include an excavator, hoe ram, backhoe, loader, manually operated, wheeled and /or tracked compactor, material handling trucks (pickup, flatbed truck with crane, end dump tractor trailer), concrete truck and tremmy. In-stream work will probably be limited to the use of an excavator or loader and a compactor(s) to prepare sub-grade and finish grades.

Approximately 14 new drainage culverts will also be placed under and across State Route 84 to replace existing damaged culverts. These new culverts will be placed approximately every 200 feet (60 meters) along the roadway and will be from 18 to 24 inches (46 to 61 centimeters) or more in diameter. The culvert outlets will have erosion protection treatments and energy dissipaters.

Bank Stabilization

Caltrans also plans to stabilize a portion of the Stonybrook Creek bank that has become unstable due to erosion, upstream of the culvert. Caltrans will stabilize a portion of the Stonybrook Creek bank, upstream of the new bridge. This activity is not related to the roadway improvement design. The proposed bank stabilization is intended to protect the integrity of Stonybrook Creek from an adjacent, private driveway. Erosion created by runoff from the private drive has created a situation that could eventually result in the collapse of the roadway into Stonybrook Creek. Stabilization is intended to minimize continued discharge of silt and debris into Stonybrook Creek.

Temporary Effects

According to Caltrans, project construction will result in approximately 2.07 acres (0.84 hectares) of areas defined by temporary effects. Construction of retaining walls along Alameda Creek and along the realigned Palomares Road will require temporary construction accesses and working benches to provide entry for contractor's personnel, equipment and materials. Temporary fill will be placed to build construction accesses, working benches and footings for retaining wall foundations. The working benches (including fill used to form the benches) within the Alameda Creek riparian corridor will be removed at the close of each construction season.

In Stonybrook Creek, demolition of the existing box culvert and construction of the bridge and retaining walls will require the contractor's personnel, equipment and materials to work directly on the creek bed. At the end of construction, the creek bed will be restored to its pre-construction condition.

Restoration

Caltrans plans to restore the contours and revegetate all areas of temporary effects in the action area. Before construction begins, the project site will be photographed to document the existing vegetation. The photos will serve as an aid for the revegetation design and implementation. Stream banks will be regraded to their pre-construction contours and secured to minimize erosion. Temporary workspaces within the Stonybrook Creek and Alameda Creek riparian corridors will be replanted with native trees and understory plant species including California sycamore (*Platanus racemosa*), alder (*Alnus* species), willow (*Salix* species), California bay (*Umbellularia californica*), and big leaf maple (*Acer macrophyllum*). Coast live oak (*Quercus agrifolia*) and California buckeye (*Aesculus californica*) will be planted at the outer edges of the riparian corridors. Removed riparian trees will be replaced at 3:1 and oak trees will be replaced at 5:1. A more detailed restoration and revegetation plan will be developed and submitted to the Service. The replanted areas will be monitored for a minimum of three years. Remedial actions will be taken as necessary to ensure plant survival.

Scheduling

Caltrans does not expect to phase the improvement activities but expects activities to proceed in the following order: (1) identification and delineation of Environmentally Sensitive Areas; (2) clearing and grubbing; (3) culvert installation and concrete retaining wall construction; (4) Stonybrook Creek bank stabilization, bridge construction, and fish passage improvements; (5) soil nail retaining wall construction; (6) roadway improvements; and (7) drainage improvements.

Caltrans expects project construction to follow a two-year time table that will roughly begin in December 2007 and be completed by December 2009. The two-year construction schedule includes seasonal restrictions in particular habitat areas as defined in Caltrans' proposed Avoidance and Protection Measures. Caltrans does expect to conduct nighttime construction.

Avoidance and Conservation Measures

According to information provided in the June 2005 Technical Memorandum, Caltrans proposes to avoid, minimize, and compensate for effects to listed fish species. These fish species are not under Service jurisdiction but the following associated measures likely will serve as effective conservation measures for the California red-legged frog and the Alameda whipsnake:

1. As a first order of work, Caltrans will install ESA fencing to ensure that construction workers, debris, and equipment do not enter aquatic habitat outside the described project footprint.

2. Construction within Alameda Creek and Stonybrook Creek will be limited to a June 15 to October 15, dry season work window.

3. An on-site biological monitor will be present during the cofferdam installation in Stonybrook Creek to minimize the potential for resident rainbow trout (*Oncorhynchus mykiss*) fingerlings that will be affected by the installation. Should a fingerling be encountered, a qualified biologist will flush the fish from the area of impact.

4. Caltrans will implement standard Best Management Practices (BMPs) that will be used to reduce pollutants in storm water discharges throughout construction. Dewatering may be necessary if ground water is encountered during excavation activities or if water is present in the work areas within Alameda Creek and Stonybrook Creek. Dewatering BMPs and temporary holding devices such as Baker Tanks will be included in the contract provisions. Grading of existing slopes will be minimized by retaining walls. Temporary silt fence, stockpile cover, and other temporary erosion and water pollution control measures will be utilized.

5. Caltrans will incorporate standard BMPs into the project design to reduce pollutants in storm water discharges during long-term operation of the new roadway features. The Permanent design pollution prevention BMPs are intended to improve storm water quality by reducing erosion, stabilizing disturbed soil areas, and maximizing vegetated surface.

6. Before construction begins, the project site will be photographed to document the existing vegetation. The photos will serve as an aid for the revegetation design and implementation. Stream banks will be regraded to their pre-construction contours and secured to minimize erosion. Temporary workspaces within the Alameda Creek and Stonybrook Creek riparian corridors will be replanted with native trees and understory plant species, including California sycamore, alder, willow, California bay, and big leaf maple. Coast live oak and California buckeye will be planted at the outer edges of the riparian corridors. Existing willows will be cut at ground level during vegetation clearing to promote rapid regrowth. A more detailed restoration and revegetation plan will be developed.

Avoidance and Protection Measures – Listed Species

According to the June 2005 Technical Memorandum, Caltrans proposes to avoid, minimize, and compensate for effects to listed species through the following measures:

Compensation

1. The permanent effects to 1.34 acres of California red-legged frog habitat will be compensated at 3:1 (3.99 acres [1.61 hectares]) with occupied California red-legged frog habitat. The permanent effects to 1.34 acres of Alameda whipsnake habitat will be compensated at 3:1 (3.99 acres [1.61 hectares]) with occupied Alameda whipsnake habitat.

2. The temporary effects to 2.07 acres (0.84 hectares) of California red-legged frog habitat will be compensated at 1.1:1 (2.28 acres [.092 hectares]) with occupied California red-legged frog habitat. The temporary effects to 2.07 acres (0.84 hectares) of Alameda whipsnake habitat will be compensated at 1.1:1 (2.28 acres [0.92 hectares]) with occupied Alameda whipsnake habitat.

3. Caltrans will seek a 1:1 credit (2.07 acres [0.84 hectares]) for temporary effects compensation through adequate on-site restoration of California red-legged frog and Alameda whipsnake habitat. In such an event, Caltrans will seek the remaining 0.1:1 (0.21 acres [0.08 hectares]) compensation with the purchase of appropriate credits at the Ohlone Preserve Conservation Bank.

4. Compensation for the permanent and temporary effects to both species will be satisfied through the purchase of 4.07 acres (1.65 hectares) of occupied habitat shared for the California red-legged frog and the Alameda whipsnake at the Ohlone Preserve Conservation Bank. Documentation of this purchase will be submitted to the Service a minimum of 60 days prior to the onset of construction.

<u>California Red-Legged Frog</u>

1. Seasonal Avoidance. Construction will be limited to the dry season from June 15 to October 15.

2. Construction Fencing. Exclusion fencing will be installed for any work occurring before June 15 or after October 15. The fence will consist of a taut silk fabric and will be a minimum of 24 inches (0.6 meters) tall, staked at ten-foot (3 meter) intervals, and buried 6 inches (15 centimeters) below grade, or sealed in a like manner to prevent incursion under the fence. The exclusion fence will be placed immediately outside the ESA fencing, and will be installed at an angle of 15 to 20 degrees away from the interior work areas.

3. Pre-construction Survey. A pre-construction survey will be conducted by a qualified biologist in the immediate area of construction and where equipment and construction activities will be located. The survey will consist of two consecutive day and two consecutive night surveys with the last survey occurring the night before the start of construction. Any encountered frogs will be moved outside the exclusion fencing and will be reported to the Service.

4. On-site Meeting with Construction Crew. Prior to construction, a biologist will educate construction workers about the California red-legged frog and how to avoid them. If a frog is detected during construction, work will halt and a qualified biologist will be called to identify the frog. If the frog is determined to be a California red-legged frog, the frog will be allowed to leave the site passively or the Service will be contacted to consult regarding take of the individual to remove it from the project area.

5. Construction Area Delineation and ESA Fencing. The boundaries of the project area will be clearly identified with ESA fencing to prevent workers or equipment from straying outside the project area. All construction personnel, equipment, and activities will be confined to designated construction and staging areas.

6. Location of Refueling and Staging Areas. All refueling, maintenance, and staging of equipment and vehicles will occur at least 60 feet (18.3 meters) from riverine habitat.

7. On-site Monitor. A qualified biologist will be present during initial ground disturbance within the riparian and riverine habitat of Alameda Creek and Stonybrook Creek. Construction activity will halt if a California red-legged frog is detected. The frog will be allowed to leave the site passively or the Service will be contacted to consult regarding translocation outside the project area. After initial ground disturbance is completed, the Resident Engineer, or their designee, will monitor on-site compliance with all avoidance measures.

8. Dewatering of Workspace. As needed, workspaces within Alameda Creek and Stonybrook Creek will be dewatering using cofferdams. Water seeping into the workspaces will be pumped into Baker tanks located outside the ordinary high water level to allow sediment to settle out before the water is returned to the creek. Pump intakes will be fitted with 0.2 inch (0.5 centimeters) or less wire mesh screens to prevent California red-legged frogs from entering the pump system. A qualified biologist will monitor the initial dewatering of these areas. Dewatering activity will halt if a California red-legged frog is detected within the work area. Frogs will be allowed to leave the site passively or the Service will be contacted to consult regarding translocation outside the project area.

<u>Alameda Whipsnake</u>

1. Pre-construction Survey. A pre-construction survey will be conducted by a qualified biologist in the immediate area of construction and where equipment and construction activities will be located. Any encountered snakes will be allowed to leave the site passively or the Service will be contacted to consult regarding translocation outside the project area.

2. On-site Meeting with Construction Crew. Prior to construction, a biologist will educate construction workers about the Alameda whipsnake and how to avoid them. If a snake is detected during construction, work will halt and a qualified biologist will be called to identify the snake. If the snake is determined to be an Alameda whipsnake, the snake will be allowed to leave the site passively or the Service will be contacted to consult regarding translocation outside the project area.

3. Construction Area Delineation and Exclusion Fencing. The boundaries of the project area will be clearly delineated with ESA fencing to prevent workers or equipment from entering adjacent potential Alameda whipsnake habitat. All construction personnel, equipment, and activities will be confined to designated construction and staging areas. A qualified biologist will perform a clearance survey as vegetation is hand-cleared from the project area. The biologist will have the authority to halt all activities until an encountered snake is out of the area. Snake exclusionary fencing will be placed immediately outside the ESA fencing. The exclusionary fencing, consisting of 4 x 8 foot (1.2 x 2.4 meter) Stand Board or plywood panels set lengthwise, supported by metal fence posts, and buried 6 inches below grade, or sealed in a like manner to prevent incursion under the fence. This fencing will be installed at an angle of 15 to 20 degrees away from the interior work areas to prevent snakes from entering the construction area. Additional fencing may also be necessary along the creek side of the construction zone, but the decision by a qualified biologist as to the exact positioning of the fence can only be made once the contractor is on site and all work spaces are defined within the described action area.

STATUS OF SPECIES/ENVIRONMENTAL BASELINE

California Red-Legged Frog

The red-legged frog was listed as a threatened species on May 23, 1996 (Service 1996). Please refer to the final rule and the *Recovery Plan for the California Red-Legged Frog (Rana aurora draytonii)* (Service 2002b) for additional information on this species.

This species is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches (3.81 to 12.95 centimeters) in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background. The California red-legged frog has dorsal spots that usually have lighter centers (Stebbins 2003) and they also have distinctive dorsolateral folds that start near the eye and run the length of their body. Larvae (tadpoles) range from 0.6 to 3.1 inches (1.52 to 7.87 centimeters) in length, with a dark brown body with yellow with darker spots (Storer 1925). Red-legged frogs have paired vocal sacs and vocalize in air (Hayes and Krempels 1986).

Red-legged frogs typically breed from November through March, although there are earlier breeding records reported for the southern localities (Storer 1925). Individuals occurring in coastal drainages are active year-round (Jennings *et al.* 1992), whereas those found in interior sites are normally less active during the cold season. Female frogs deposit egg masses on emergent vegetation, allowing the eggs to float on the surface of the water (Hayes and Miyamoto 1984).

The historic range of the red-legged frog once extended coastally from the vicinity of Elk Creek in Mendocino County, California, and inland from the vicinity of Redding, Shasta County, California, southward to northwestern Baja California, Mexico (Fellers 2005; Jennings and Hayes 1985; Hayes and Krempels 1986). The red-legged frog was historically documented in 46 counties but the taxa is now thought to remain in 238 streams or drainages within 23 counties. This represents a loss of approximately 70 percent of its former range (Service 2002b). Red-legged frogs are still locally, and relatively, abundant within portions of the San Francisco Bay area and the Central Coast. Within the remaining distribution of the species, only isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse ranges. The species is believed to be extirpated from the southern Transverse and Peninsular ranges, but is still present in Baja California, Mexico (CDFG 2004).

Adult red-legged frogs prefer dense, shrubby or emergent riparian vegetation, closely associated with deep (>2.3 feet [0.7 meters]), still, or slow-moving water (Hayes and Jennings 1988). However, this species also have been found in ephemeral creeks and drainages and in ponds that may or may not have associated riparian vegetation. The largest densities of red-legged frogs are currently associated with deep pools with dense stands of overhanging willows (*Salix* species) and an intermixed fringe of cattails (*Typha latifolia*) (Jennings 1988). Red-legged frogs disperse upstream and downstream of their breeding habitat to forage and seek sheltering habitat.

During other parts of the year, California red-legged frog habitat includes nearly any area that stays moist and cool through the summer within 1-2 miles (1.6-3.2 kilometers) of a breeding site (Fellers 2005). According to Fellers (2005), this can include vegetated areas with coyote bush (*Baccharis pilularis*), California blackberry thickets (*Rubus ursinus*), and root masses associated with willow (*Salix* species) and California bay trees (*Umbellularis californica*). Sometimes the non-breeding habitat used by red-legged frogs is extremely limited in size. For example, non-breeding red-legged frogs have been found in a 6-foot (1.8-meter) wide coyote bush thicket growing along a tiny intermittent creek surrounded by heavily grazed grassland (Fellers 2005). Sheltering habitat for red-legged frogs is potentially all aquatic, riparian, and upland areas within the range of the species. This includes any landscape features that provide cover, such as existing animal burrows, boulders or rocks, organic debris such as downed trees or logs, and industrial debris. Sheltering red-legged frogs have also been found in agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or hay stacks. Incised stream channels sections narrower and deeper than 18 inches (45.7 centimeters) also may provide important summer sheltering habitat. Accessibility to sheltering habitat is essential for the

survival of red-legged frogs within a watershed, and can be a factor limiting frog population numbers and survival.

Red-legged frogs do not have a distinct breeding migration (Fellers 2005). Adult frogs are often associated with permanent bodies of water. Some frogs remain at breeding sites all year while others disperse. Dispersal distances are typically less than 0.5 mile (0.8 kilometers), however some individuals have been known to move up to 2 miles (3.2 kilometers) (Fellers 2005). Movements are typically along riparian corridors, but some individuals, especially on rainy nights, move directly from one site to another through normally inhospitable habitats, such as heavily grazed pastures or oak-grassland savannas (Fellers 2005). In one study, dispersing frogs in northern Santa Cruz County were found to travel distances from 0.25 miles (0.4 kilometers) to more than 2 miles (3.2 kilometers) without apparent regard to topography, vegetation type, or riparian corridors (Bulger *et al.* 2003).

Egg masses typically consist of 2,000 to 5,000 moderate sized (0.08 to 0.11 inches [0.2 to 0.3 centimeters] in diameter), dark reddish-brown eggs and are typically attached to vertical emergent vegetation, such as bulrushes (*Scirpus* species) or cattails (Jennings *et al.* 1992). Red-legged frogs are often prolific breeders, and typically lay their eggs during or shortly after large rainfall events in late winter and early spring (Hayes and Miyamoto 1984). Eggs typically hatch in 6 to 14 days (Jennings 1988). In coastal lagoons, the most significant mortality factor in the pre-hatching stage is water salinity (Jennings *et al.* 1992). Exposure to salinity levels greater than 4.5 parts per thousand results in 100 percent egg mortality (Jennings and Hayes 1990). Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae undergo metamorphosis 3.5 to 7 months after hatching (Storer 1925; Wright and Wright 1949; Jennings and Hayes 1990). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings *et al.* 1992). Sexual maturity normally is reached at 3 to 4 years of age (Storer 1925; Jennings and Hayes 1985). Red-legged frogs may live 8 to 10 years (Jennings *et al.* 1992). Populations of red-legged frogs fluctuate from year to year. When conditions are favorable red-legged frogs can experience extremely high rates of reproduction and thus produce large numbers of dispersing young, as well as a concomitant increase in the number of occupied sites. In contrast, red-legged frogs may temporarily disappear from an area when conditions are stressful (*e.g.*, drought).

The diet of red-legged frogs is highly variable. Hayes and Tennant (1985) found invertebrates to be the most common food items. According to their data, vertebrates, such as Pacific tree frogs (*Pseudacris regilla*) and California mice (*Peromyscus californicus*), represented over half the prey mass eaten by larger frogs (Hayes and Tennant 1985). Hayes and Tennant (1985) found juvenile frogs to be active diurnally and nocturnally, whereas adult frogs were largely nocturnal. Feeding activity probably occurs primarily along the shoreline and on the surface of the water (Hayes and Tennant 1985). The diet of red-legged frogs is not well studied, but their diet is likely similar to other ranid frogs that feed on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005; Kupferberg 1996a, 1996b).

Several researchers in central California have noted the decline and eventual disappearance of red-legged frog populations once bullfrogs (*Rana catesbeiana*) became established at the same site (L. Hunt, in litt. 1993; S. Barry, in litt. 1992; S. Sweet, in litt. 1993). This has been attributed to predation, competition, and reproduction interference. Twedt (1993) documented bullfrog predation of juvenile northern red-legged frogs (*Rana aurora aurora*), and suggested that bullfrogs could prey on subadult northern red-legged frogs as well. Bullfrogs may also have a competitive advantage over red-legged frogs. For instance, bullfrogs are larger and possess more generalized food habits (Bury and Whelan 1984). In addition, bullfrogs have an extended breeding season (Storer 1933) during which an individual female can produce as many as 20,000 eggs (Emlen 1977). Further more, bullfrog larvae are unpalatable to predatory fish (Kruse and Francis 1977). Bullfrogs also interfere with red-legged frog reproduction. Both California and northern red-legged frogs have been observed in amplexus (mounted on) with both male and female bullfrogs (Jennings and Hayes 1990; Twedt 1993; M. Jennings, in litt.1993; R. Stebbins in litt. 1993). Thus bullfrogs are able to prey upon and out-compete red-legged frogs, especially in sub-optimal habitat. Other species such as red swamp crayfish (*Procambarus clarkii*), signal crayfish (*Pacifastacus leniusculus*), and several species of warm water fish including sunfish (*Lepomis* species), goldfish (*Carassius auratus*), common carp (*Cyprinus carpio*), and mosquitofish may also contribute to the decline of red-legged frog populations (L. Hunt, in litt. 1993; S. Barry, in litt. 1992; S. Sweet, in litt. 1993).

The urbanization of land within and adjacent to red-legged frog habitat has also adversely affected red-legged frogs. These declines are attributed to channelization of riparian areas, enclosure of the channels by urban development that blocks red-legged frog dispersal, conversion and isolation of perennial pool habitats, and the introduction of predatory fishes and bullfrogs. The California red-legged frog may be susceptible to many of the same pathogens, fungi, water mold, bacteria, and viruses have been known to adversely other amphibian species. Chytridiomycosis and ranaviruses may be a particular developing concern for California red-legged frog populations. Mao *et al.* (1999 cited in Fellers 2005) reported northern red-legged frogs infected with an iridovirus, which was also present in sympatric three-spined sticklebacks (*Gasterosteus aculeatus*) in northwestern California. Ingles (1932a, 1932b, and 1933 cited in Fellers 2005) reported four species of trematodes from red-legged frogs, but he later synonymized two of them (found them to be the same as the other two). Nonnative species, such as bullfrogs, are located within the range of the California red-legged frog and have been identified as potential carriers of these diseases. Human activities can facilitate the spread of disease by encouraging the further introduction of non-native carriers and by acting as carriers themselves (i.e. contaminated boots or fishing equipment). Human activities can also introduce stress by other means, such as habitat fragmentation, that results in red-legged frogs being more susceptible to the effects of disease. Disease will likely become a growing threat because of the relatively small, fragmented remaining California red-legged frog breeding sites; the many stresses on these sites due to habitat losses and alterations; and the many other potential disease-enhancing anthropogenic changes which have occurred both inside and outside the species' range.

The recovery plan for red-legged frogs identifies eight Recovery Units (Service 2002b). The establishment of these Recovery Units is based on the Recovery Team's determination that various regional areas of the species' range are essential to its survival and recovery. The status of the red-legged frog will be considered within the smaller scale of Recovery Units as opposed to the overall range. These Recovery Units are delineated by major watershed boundaries as defined by U.S. Geological Survey hydrologic units and the limits of the range of the California red-legged frog. The goal of the draft recovery plan is to protect the long-term viability of all extant populations within each Recovery Unit. Within each Recovery Unit, core areas have been delineated and represent contiguous areas of moderate to high red-legged frog densities that are relatively free of exotic species such as bullfrogs. The goal of designating core areas is to protect metapopulations that, combined with suitable dispersal habitat, will allow for the long term viability within existing populations. This management strategy will allow for the recolonization of habitat within and adjacent to core areas that are naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of red-legged frogs.

The State Route 84, Niles Canyon Project is located within the East San Francisco Bay Recovery Unit, which extends from the northernmost portion of Contra Costa County, and includes a portion of San Joaquin County south to Santa Clara County, the eastern portion of San Mateo County, and all of San Francisco County (Service 2002b). This recovery unit is essential to the survival and recovery of the California red-legged frog, as it contains the largest number of occupied drainages in the northern portion of its range. Within this recovery unit, the frog appears to have been nearly eliminated from the western lowland areas near urbanization. However, they still occur in isolated populations in the East Bay Foothills (between Interstate 580 and Interstate 680), and are abundant in several areas in the eastern portions of Alameda and Contra Costa counties. Contra Costa and Alameda counties contain the majority of known California red-legged frog localities within the eastern San Francisco Bay area. The eastern and western edges of this area are heavily urbanized and the northern and southern edges are bounded by major highways. However, the Niles Canyon portion of State Route 84, between Sunol and Niles Junction, is largely undeveloped and parallels Alameda Creek. Alameda Creek is one of the defining hydrologic basins in the recovery unit and provides connectivity between several documented red-legged frog populations. Overall, there is a connection between red-legged frog populations in the foothills of central Alameda and Contra Costa Counties and the populations found in eastern Alameda County. Current survey data is inadequate in determining red-legged frog activity in the State Route 84, Niles Canyon Project vicinity however the species historically bred in several ponds and drainages within Garin/Dry Creek Regional Park, Pleasanton Ridge Regional Park, and Sinbad Creek.

There are several documented California red-legged frog observations within 5 miles (8 kilometers) of the action area and areas that are hydrologically connected to the aquatic habitat within the action area (CDFG 2005; Caltrans 2005). California red-legged frogs were not observed during 2002 protocol surveys conducted for the State Route 84, Niles Canyon Project (Caltrans 2004). However, Alameda Creek, Stonybrook Creek, and the associated riparian habitat within and adjacent to the action area was identified as likely California red-legged frog

dispersal and foraging habitat in a June 2005 technical memorandum (Caltrans 2005) and during an August 11, 2005 field visit with the Service (personal communication from J. Wilkenson, H.T. Harvey and Associates to J. Cleckler, Service). Habitat for this listed species occurs along the entire State Route 84, Niles Canyon Project corridor. The presence of predators such as bullfrogs and largemouth bass (*Micropterus salmoides*) does not necessarily preclude California red-legged frog from the local areas of Alameda Creek, Stonybrook Creek, or the associated riparian and adjacent upland habitat. Adult California red-legged frogs are highly mobile and may move considerable distances from their breeding ponds. California red-legged frogs have been documented to move more than 2 miles (3.2 kilometers). Areas containing aquatic and upland habitat exist within and adjacent to the action area (Caltrans 2005; Cleckler personal observation, August 2005). The action area contains components that can be used by the California red-legged frog for feeding, resting, mating, movement corridors, and other essential behaviors. Therefore, the Service believes that the California red-legged frog is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the action area, as well as local observations of this listed species.

Alameda Whipsnake

The Alameda whipsnake was federally listed as threatened on December 5, 1997, (Service 1997). Approximately 406,598 acres (164,545 hectares) of critical habitat was designated for the Alameda whipsnake within Contra Costa, Alameda, Santa Clara, and San Joaquin counties on October 3, 2000 (Service 2000). The critical habitat was vacated and remanded on May 9, 2003. Critical habitat was proposed again for the Alameda whipsnake on October 18, 2005, (Service 2005a). A draft Alameda whipsnake recovery plan was included in the *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California*, issued in November 2002 (Service 2002a).

The Alameda whipsnake is a slender, fast-moving, diurnal snake with a narrow neck and a relatively broad head with large eyes. The snake's dorsal surface is sooty black with distinct yellow-orange stripes along each side. The coloration of the snake's ventral surface varies along its length: the anterior portion is orange-rufous; the midsection is cream colored; and the posterior and tail are pinkish. Adults range in length from 3 to 4 feet (0.9 to 1.2 meters) (Service 1997).

The Alameda whipsnake is one of two subspecies of California whipsnake (*Masticophis lateralis*). The Alameda whipsnake is distinguished from the other subspecies, the chaparral whipsnake (*M. l. lateralis*), by its sooty black dorsum; wider lateral yellow-orange stripes; the lack of a dark line across the rostral; an uninterrupted light stripe between the rostral and eye; and the virtual absence of spotting on the venter of the head and neck.

The Alameda whipsnake inhabits the inner Coast Ranges in western and central Contra Costa and Alameda counties (Jennings 1983; McGinnis 1992; Swaim 1994) where it is found in a

variety of vegetation communities including chamise-redshank chaparral, mixed chaparral, coastal scrub, annual grassland, blue oak-foothill pine, blue oak woodland, coastal oak woodland, valley oak woodland, eucalyptus, redwood, and riparian (CDFG 1988).

Scrub and chaparral communities are the primary habitat types essential for providing space, food, and cover necessary to sustain all life stages of the Alameda whipsnake. Associated scrub habitat typically consists of Diablan sage scrub, coyote bush scrub, and chamise chaparral (Swaim 1994), and is also classified as coastal scrub, mixed chaparral, and chamise-redshank chaparral (CDFG 1988). Swaim (1994) found that core scrub habitat areas (areas of concentrated use by Alameda whipsnakes, based on telemetry and trapping data) tended to occur on east, southeast, south or southwest facing slopes and were within 500 feet (152.4 meters) of open or partially-open canopy or grassland habitat. Alameda whipsnakes have also been found in open chaparral stands with a northern exposure (K. Swaim, Swaim Biological Consulting, personal communication with the Service 2004). As a result of incidental observations and trapping surveys, Alameda whipsnakes have been discovered greater than 600 feet (182.9 meters) and as much as 21,600 feet (6.6 kilometers) from primary scrub and chaparral habitat (K. Swaim, Swaim Biological Consulting, personal communication with the Service 2004).

Alameda whipsnakes are also known to use other habitat types adjacent to their primary scrub and chaparral habitat. McGinnis (1992) has documented Alameda whipsnakes using oak woodland/grassland habitat as a corridor between stands of northern coastal scrub. Grassland habitats appear to be used extensively by male Alameda whipsnakes during the spring mating season (Swaim 1994). Females appear to use these grassland areas more extensively after mating (Swaim 1994), possibly looking for suitable egg-laying sites or for dispersing to other scrub habitat (K. Swaim, Swaim Biological Consulting, personal communication with the Service, 2002). Egg-laying sites have been found close to scrub communities in grasslands with scattered shrubs (Swaim 1994) and in true scrub communities (K. Swaim, Swaim Biological Consulting, personal communication with the Service, 2002). These other habitat areas may be important in the early life history stages of hatchling whipsnakes (Swaim 1994). Rock outcrops, talus, and burrows (mating habitats) need to be within dispersal range of scrub and grassland habitat (egg-laying habitats). Swaim (1994) also observed Alameda whipsnakes mating in rock outcrops.

Alameda whipsnakes require plant canopy covers that supply a suitable range of temperatures, corridors of plant cover and retreats (including rock outcrops) sufficient to provide dispersal pathways between areas of habitat, and plant community patches of sufficient size to prevent the deleterious effects of isolation, such as inbreeding or the loss of a subpopulation due to a catastrophic event. Specific habitat features used by Alameda whipsnakes include, but are not limited to, small mammal burrows, rock outcrops, talus, soil crevices, debris piles, and other forms of cover to provide temperature regulation, shelter from predators, egg-laying sites, and winter hibernaculum (Swaim 1994). Adequate insect populations are also necessary to sustain their primary lizard prey populations.

Survey data suggests that the Alameda whipsnake exhibits a bimodal season activity pattern with peak activity in the spring and late summer/early fall (Swaim 1994). Male Alameda whipsnakes appear to be more active than females in the spring, which is likely attributed to breeding season behavior (Swaim 1994). The breeding season is thought to be between March and June, and mating appears to typically occur near the female's hibernacula (Swaim 1994). During the mating season, females likely remain near their retreat sites while males disperse throughout their home ranges. In one study, Swaim (1994) estimated a mean individual home range size for four males was 13.6 acres (5.5 hectares), and 8.4 acres (3.4 hectares) for two females. Gravid female Alameda whipsnakes likely lay eggs between May and July (Stebbins 2003). Clutch sizes are typically between 6 to 11 eggs and the young hatch and emerge in the late-summer to early-fall (Swaim 1994). Male and female snakes appear to exhibit similar movement and activity patterns following the breeding season (Swaim 1994). Increases in late summer/early fall activity may be attributed to emergence of hatchling whipsnakes and the increased availability of hatchling lizard prey (Swaim 1994). Alameda whipsnakes typically retreat into winter hibernacula in November and emerge in March.

Alameda whipsnake above-ground activity cycles appear to be highly temperature dependent. Alameda whipsnakes have the highest documented mean active body temperature (92.1 degrees Fahrenheit [33.4 degrees centigrade]) and degree of body temperature stability (stenothermy) than other snake species under natural conditions (Swaim 1994). Maintenance of such a high body temperature likely enables the snake to capture its characteristically fast-moving prey (Swaim 1994). Open and partially open and/or low growing shrub communities provide a mosaic of sunny and shady areas that apparently allow the snake to effectively maintain sufficient body temperature while providing cover from potential predators (Swaim 1994).

The Alameda whipsnake is an active diurnal predator and hunts by holding its head high off the ground to peer over vegetation or rocks for potential prey. This foraging strategy corresponds with the open habitat with which this species is typically associated with (Swaim 1994). Its diet includes lizards, skinks, frogs, small mammals, snakes, nesting birds, and insects. Features such as small mammal burrows, rock outcrops, and talus provide important habitat components such as shelter from predators, egg-laying sites, over-night retreats, and winter hibernacula (Swaim 1994). Their lizard prey is often abundant in these areas as well. Lizards, especially the western fence lizard (*Sceloporus occidentalis*), appear to be the Alameda whipsnake's primary prey item (Stebbins 2003; Swaim 1994).

Urban development has fragmented the once contiguous range of the Alameda whipsnake into the following five population centers: (1) the Tilden-Briones population (Sobrante Ridge, Tilden/Wildcat Regional Parks to the Briones Hills, in Contra Costa County); (2) the Oakland-Las Trampas population (Oakland Hills, Anthony Chabot area to Las Trampas Ridge, in Contra Costa County); (3) the Hayward-Pleasanton Ridge population (Hayward Hills, Palomares area to Pleasanton Ridge, in Alameda County); (4) the Mount Diablo-Black Hills population (Mount Diablo vicinity and the Black Hills, in Contra Costa County); and (5) the Sunol-Cedar Mountain population, (Wauhab Ridge, Del Valle area to the Cedar Mountain Ridge) (Service 1997).

Habitat fragmentation appears to have resulted in little to no gene flow or interchange between the five populations. Interchange between the Tilden-Briones, Oakland-Las Trampas, and Hayward-Pleasanton Ridge populations appears to depend on dispersal over the Caldecott Tunnel in Contra Costa County; under State Route 580 in Alameda County (at the Eden Canyon interchange); under the Dublin Boulevard undercrossing; or where San Lorenzo Creek passes under the highway (Service 1997). Interchange between the Hayward-Pleasanton Ridge and Sunol-Cedar Mountain populations depends on dispersal along Alameda Creek in Alameda County; crossing under I-680 (where the creek passes under the highway); or crossing under the highway at Scott's Corner along Vallecitos Creek, or where two unnamed tributaries to Arroyo de la Laguna cross under I-680 north of Scott's Corner (Service 1997). The Mount Diablo-Black Hills population appears to be completely isolated from the other populations (Service 1997).

Habitat fragmentation makes some Alameda whipsnake populations more vulnerable to extinction. Habitat patches with high edge to interior ratios are known to provide less value for some species than round or square patches (Jimerson and Hoover 1991; Saunders *et al.* 1991). In general, the species most prone to extinction in fragmented habitats are those that depend on native vegetation; require combinations of different habitat types; require large territories; and exist at low densities (Saunders *et al.* 1991). Alameda whipsnakes have been associated with a variety of habitats for different natural history functions. They are primarily associated with native Diablan sage scrub, but are known to forage in adjacent grasslands, and migrate along riparian corridors. Consistent low trap success and high recapture rates suggests Alameda whipsnakes may be sparse, even in suitable habitat (Swaim 1994). The combination of these factors may cause the Alameda whipsnake to be more vulnerable to extinction in small habitat patches resulting from habitat fragmentation.

Small populations with limited breeding partners are prone to inbreeding which often results in problems associated with the lack of genetic diversity (Frankham 1998). Populations with less genetic variability or more deleterious genetic material are typically less able to successfully respond to environmental stresses or adapt to even relatively minor changes in environmental conditions. These factors influence the survivability of smaller, genetically isolated populations.

The Alameda whipsnake has a variety of potential native and exotic predators including California kingsnake (*Lampropeltis getula californiae*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis virginianus*), coyote (*Canis latrans*), gray fox (*Vulpes cinereoargenteus*), red fox (*V. vulpes*), and red-tailed hawk (*Buteo jamaicensis*). Urbanization often facilitates the introduction or spread of non-native predators (Goodrich and Buskirk 1995). Increased predatory pressure may become excessive in situations where Alameda whipsnake habitat is fragmented, isolated, and otherwise degraded by human activities. This may be especially true where alien species, such as rats, feral pigs (*Sus scrofa*), and feral and domestic cats (*Felis domesticus*) and dogs (*Canis familiaris*) are present. These additional threats become particularly acute where urban development immediately adjacent to Alameda whipsnake habitat. A growing movement to maintain feral cats in parklands, such as those managed by East Bay Regional Park District, is a potential threat to a variety of wildlife species (Coleman *et al.* in litt.

1997; Roberto 1995; DelVecchio 1997). Little is known about the predation of Alameda whipsnakes, but feral cats are known to prey on reptiles, including the yellow racer (*Coluber mormon*), a fast, diurnal snake similar to the Alameda whipsnake (Hubbs 1951; Stebbins 2003). The threat of predation and harassment from domestic and feral cats and other non-native species increases as human disturbance from recreational use on regional and state parks, and urban development encroaches into the current open space buffers between existing developments and Alameda whipsnake habitat on public lands (Coleman *et al.* in litt. 1997).

McGinnis (1992) has suggested that grazing has impacted Alameda whipsnake habitat in many areas east of the Coast Range. Livestock grazing that significantly reduces or eliminates shrub and grass cover can be detrimental to this snake. Many snake species, including the Alameda whipsnake, likely avoid such open areas due to increased danger from predators and lack of prey (McGinnis 1992). Removed native vegetation is often replaced by non-native plant species that significantly degrade habitat values or even replace entire plant communities such that it no longer provides appropriate habitat for the Alameda whipsnake. For instance, radio telemetry data indicates that Alameda whipsnakes tend to avoid dense stands of eucalyptus (Swaim 1994).

The Alameda whipsnake is directly and indirectly threatened by the effects of fire suppression. Fire suppression results in a buildup of fuel (underbrush, thatch, and woody debris). This exacerbates the effects of wildfires by creating conditions for hot, slow-moving fires. The development of a closed scrub canopy also results in a buildup of flammable fuels over time (Parker 1987; Rundel *et al.* 1987). Fire suppression can also result in the spread and proliferation of non-native vegetation, further increasing flammable fuel loads in and around Alameda whipsnake habitat. The threat of wildfire is typically highest in the summer and early fall when accumulated fuel is abundant and dry. This "fire season" coincides with the primary above-ground activity period for hatchling and adult Alameda whipsnakes (Swaim 1994). Therefore, populations are likely to sustain heavy losses from fires during this period.

Changes in the vegetation structure typically results in changes to the micro-climate temperature regime important in maintaining the Alameda whipsnake's high optimal body temperature. For instance, fire suppression may result in increased canopy closure and shading (Parker 1987) from plant species such as poison oak (*Toxicodendron diversilobum*) and coyote brush (*Baccharis pilularis*). Increased vegetative cover can result in ground temperatures that are less than optimal for the Alameda whipsnake. Survey data suggests that Alameda whipsnakes are less likely to be found in areas of scrub habitat with a closed canopy (Swaim 1994).

Encroaching urban development has lead to the implementation of rigorous fire suppression practices in and around adjacent suitable Alameda whipsnake habitat. Frequent fire events are important in maintaining the scrub habitat associated with the Alameda whipsnake. Many native coastal scrub and chaparral plant species require periodic fires to stimulate new sprouting, seedling recruitment, and seed dispersal (Parker 1987; Keeley 1987; Keeley 1992). The optimal frequency of fire events is often disputed but likely ranges from every 10 to 30 years (Keeley 1987; Rundel *et al.* 1987). Depending on the rate of fuel accumulation, any prescribed burn

program should take place every 10 to 30 years (J. Ferreira, California Department of Parks and Recreation, personal communication with the Service 1996).

All five remaining populations of the Alameda whipsnake are threatened by a variety of factors. Each of these populations consists of several to numerous subpopulations with varying degrees of connectivity between them. In the western portion of the species' range, the Tilden-Briones population is threatened by a high potential for catastrophic wildfire and urban development. However, the remaining habitat, regional parklands, and municipal watersheds within this area overlap to the extent that a regional preserve may be possible. The Oakland-Las Trampas population is threatened by a high potential for catastrophic wildfire and the negative effects associated with habitat fragmentation and urban development. The Hayward-Pleasanton Ridge population, who's distribution includes the State Route 84, Niles Canyon Project action area, may be the most susceptible to extirpation. This population is scattered in distribution and is, therefore, more vulnerable to the effects of development and subsequent habitat fragmentation. The Mount Diablo-Black Hills population, in the eastern portion of the species' range, is threatened by a high potential for catastrophic wildfire, development and its associated impacts, and inappropriate grazing practices. If threats associated with urbanization can be controlled, this population is a good candidate for recovery, due to the inclusion of public lands and the potential for improved fire and grazing management on parklands. The Sunol-Cedar Mountain population is threatened by development and inappropriate grazing practices. Overall, the Oakland-Las Trampas and Hayward-Pleasanton Ridge populations are the most immediately imperiled with habitat fragmentation becoming prevalent enough to compromise its long-term viability.

Seven recovery units have been identified for the Alameda whipsnake (Service 2002a). The State Route 84, Niles Canyon Project is located within the Niles Canyon-Sunol Corridor Unit (Unit 7). The unit's northern boundary is defined by State Route 84 and Alameda Creek. The Hayward-Pleasanton Ridge Unit (Unit 3) is located immediately north of the project action area and State Route 84. The Niles Canyon-Sunol Corridor Unit connects the Hayward-Pleasanton Ridge and the Sunol-Cedar Mountain populations. This corridor is completely within Alameda County on land predominately owned by East Bay Regional Park District (Vargas Plateau) and San Francisco Public Utility watershed lands (Alameda Watershed). The Alameda whipsnake recovery plan encourages the development of safe passage across Niles Canyon Road/ State Route 84 by removing barriers and constructing "snake friendly" undercrossings.

Focused Alameda whipsnake surveys and trapping efforts were not completed for the State Route 84, Niles Canyon Project. McGinnis (2002) conducted a site assessment of the project area and concluded that the Alameda whipsnake is likely to occur in the action area based on presence of suitable coastal scrub habitat and abundance of prey items (northern fence lizards). Therefore, the Service believes that the Alameda whipsnake is reasonably certain to occur in the action area because of the known distribution of the animal, its biology and ecology, and the presence of suitable habitat in and adjacent to the action area.

Alameda Whipsnake Proposed Critical Habitat

On October 18, 2005, the final rule determining proposed critical habitat for the Alameda whipsnake was published in the Federal Register (Service 2005a). The proposed rule identifies approximately 203,342 acres (82,290 hectares) within six critical habitat units based on three primary constituent elements: (1) scrub/shrub communities with a mosaic of open and closed canopy; (2) woodland or annual grassland plant communities contiguous to lands containing primary constituent element 1; and (3) lands containing rock outcrops, talus, and small mammal burrows.

Section 7 requires Federal agencies to confer with the Service on any action that is likely to result in destruction or adverse modification of proposed critical habitat. Therefore, this opinion includes a formal conference opinion for proposed Alameda whipsnake critical habitat within the State Route 84, Niles Canyon Project action area. The conference opinion is prepared according to 50 CFR 402.14, as if critical habitat was designated and provides conservation recommendations to assist Federal Highways and Caltrans in eliminating conflicts that may be caused by the proposed action. The conservation recommendations included in this conference opinion are advisory. The Service may adopt the formal conference report as part of the biological opinion when critical habitat is designated, as long as no substantial new information or changes in the action alter the content of the opinion (see 50 CFR 402.10(d)).

When designating critical habitat, the Service is required to list the known primary constituent elements together with the critical habitat description. Such physical and biological features include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing (or development) of offspring; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species (Service 2005a).

The primary constituent elements for the Alameda whipsnake are based on the current knowledge of the life history, biology, and ecology of the species and the requirements of the habitat necessary to sustain the essential life history functions of the subspecies. The three identified primary constituent elements are defined as: (1) scrub/shrub communities with a mosaic of open and closed canopy; (2) woodland or annual grassland plant communities contiguous to lands containing primary constituent element 1; and (3) lands containing rock outcrops, talus, and small mammal burrows. These three elements are further described as follows.

<u>Scrub/shrub communities with a mosaic of open and closed canopy</u>

This element is defined by scrub/shrub vegetation dominated by low to medium-stature woody shrubs with a mosaic of open and closed canopy as characterized by the chamise, chamise-eastwood manzanita, chaparral whitethorn, and interior live oak shrub vegetation series as

identified in the Manual of California Vegetation (Sawyer and Keeler-Wolf 1995), A Guide to Wildlife Habitats of California (Mayer and Laudenslayer 1988), and California Wildlife Habitat Relationship System (CDFG 1998), occurring at elevations from sea level to approximately 3,850 feet (1,170 meters). Such scrub/shrub vegetation within these series form a pattern of open and closed canopy which is used by the Alameda whipsnake to provide shelter from predators, temperature regulation by providing sunny and shady locations, prey-viewing opportunities, and nesting habitat and substrate. These features contribute to support a prey base consisting of western fence lizards and other prey species such as skinks, frogs, snakes, and birds.

Woodland or annual grassland plant communities contiguous to lands containing primary constituent element 1

The vegetation series of this element are comprised of one or more of the following: blue oak, coast live oak (*Quercus* species), California bay (*Umbellularia californica*), California buckeye, and California annual grassland vegetation series (as identified in the Manual of California Vegetation (Sawyer and Keeler-Wolf 1995), A Guide to Wildlife Habitats of California (Mayer and Laudenslayer 1988), and California Wildlife Habitat Relationship System (CDFG 1998). This mosaic of vegetation supports a prey base consisting of western fence lizards and other prey species such as skinks, frogs, snakes, and birds and provides opportunities for: (1) Foraging by allowing snakes to come in contact with and visualize, track, and capture prey (especially western fence lizards along with other prey such as skinks, frogs, birds); (2) short and long distance dispersal within, between, or to adjacent to areas containing essential features (i.e., primary constituent elements 1 or 3); and (3) contact with other Alameda whipsnakes for mating and reproduction.

Lands containing rock outcrops, talus, and small mammal burrows

The areas within this element are used for retreats (shelter), hibernacula, foraging, dispersal, and provide additional prey population support functions.

There is no firm information on the actual population of Alameda whipsnake within its range. In addition, there has been no analysis of the minimum viable population size necessary to maintain a stable or increasing population of Alameda whipsnake. However, expert opinion is that the subspecies persists in relatively low numbers throughout its range (McGinnis 1992). Moreover, irretrievable loss of occupied Alameda whipsnake habitat due to recent urban development is significant in areas adjacent to several of the proposed critical habitat units. This development has likely resulted in a commensurate reduction in population size for the Alameda whipsnake. Accordingly, the general pattern of habitat loss and fragmentation was taken into consideration in the designation of critical habitat.

Connectivity has been applied as a criterion to those areas where designation would result in a relatively high potential for dispersal between and within units of critical habitat. The need for

special management considerations was applied where such management may be essential to enhance the connectivity or the integrity of high quality habitat within a unit of critical habitat. The designated critical habitat is being proposed on lands that were determined to be occupied at the time of listing and contain the features, or primary constituent elements, found to be essential to the conservation of the Alameda whipsnake. Within the boundaries of critical habitat, land that contains developed areas such as buildings, paved areas, and other structures has been excluded from this designation.

The action area is within proposed Critical Habitat Unit 3 (otherwise know as the Hayward–Pleasanton Ridge Unit). This unit comprises 34,119 acres (13807 hectares) within Alameda County of which approximately 404 acres (164 hectares) are within East Bay Regional Park lands and the remainder is privately owned.

The Hayward–Pleasanton Ridge Unit contains the mosaic of scrub and chaparral vegetation and rocky outcrops considered as essential features (primary constituent element 1) for Alameda whipsnake critical habitat. The unit also includes a variation in vegetation patch size, an abundant edge between grassland and woodland, and a minimal amount of development or planned development. The soils present are considered supportive of the scrub and rock outcrop features essential for Alameda whipsnake. The Alameda whipsnake records within this unit are associated with Gaviota rocky sandy loams in particular, which likely provide talus (primary constituent element 3) and appear to coincide in aerial imagery to scrub or chaparral vegetation preferred by Alameda whipsnake. The primary habitat type within the unit is largely characterized by a woodland vegetation type of variable densities (primary constituent element 2) and statures (trees, shrubs) interspersed with grassland.

Some peripheral portions of habitat around this unit were not included as proposed critical habitat due to the high degree of development-related disturbance and fragmentation of the habitat. The Hayward–Pleasanton Ridge Unit is included in proposed critical habitat because it contains features essential to the conservation of the Alameda whipsnake, it is occupied by the subspecies, and it represents the southwestern portion of the subspecies' range and one of the five population centers.

The special management which may be required throughout this unit includes management of controlled burns and grazing, trespass, unauthorized trail and road construction, dumping, feral animal control, and other activities associated with urban or recreational interface.

The action area vicinity is relatively undeveloped, but includes State Route 84, Palomares Road, the Central Pacific Railway, vineyard developments, ranches, and other widely-spaced private holdings. The surrounding habitat includes several vegetation communities, including coast oak woodland, coastal scrub, and annual non-native grassland, as well as rocky outcrops. All undeveloped lands on and adjacent to the action area contain one or more of the constituent elements of proposed Alameda whipsnake critical habitat, including essential scrub/shrub communities with a mosaic of open and closed canopy; woodland or annual grassland plant

communities contiguous to lands containing scrub/shrub habitat; and lands containing rock outcrops, talus, and small mammal burrows.

Effects of the Proposed Action

The proposed State Route 84, Niles Canyon Project likely will result in a number of adverse effects to the California red-legged frog and the Alameda whipsnake. There is a likelihood that the animals may be affected by being crushed; entombed in their burrows or cover sites; hit and injured or killed by vehicle strikes; shot; chased and injured or killed by domestic animals; poisoned by chemical agents; trapped in erosion control netting; or harassed by noise and vibration. The proposed project may also adversely affect the California red-legged frog and Alameda whipsnake by blocking movement corridors; interfering with foraging, mating, and/or movement; or by subjecting them to predation that otherwise would not occur. It is highly likely these two listed animals inhabit the action area and surrounding vicinity (for purposes of this biological opinion the surrounding vicinity is described as 1,000 feet [304.8 meters] outside and adjacent to the project footprint), and that they are likely to be subject to indirect effects including loss of habitat, pesticide or chemical poisoning, an influx of exotic predators, increased competition, the intrusion of non-native plants, disease, and a reduction in natural food sources as a result of habitat disturbance and loss.

According to the calculations provided by Caltrans on February 14, 2006, the proposed project will result in the following loss of various habitats other than pre-existing hardscape features, as shown in Table 1.

Table 1. Temporary and permanent effects to non-hardscape habitat types within the proposed action area. (Some of the totals do not appear accurate due to rounding values to the nearest hundredth.)

Habitat Type	**Temporary** acres (hectares)	**Permanent** acres (hectares)	**Total** acres (hectares)
Wetland	0.0 (0)	0.02 (0.01)	0.02 (0.01)
Riparian	1.90 (0.77)	1.01 (0.41)	2.91 (1.18)
Riverine	0.14 (0.06)	0.02 (0.01)	0.16 (0.07)
Oak Woodland	0.03 (0.01)	0.24 (0.10)	0.27 (0.11)
Scrub	0.0 (0)	0.05 (0.02)	0.05 (0.02)
Total	**2.07 (0.84)**	**1.34 (0.54)**	**3.41 (1.39)**

The California red-legged frog would be affected by temporary and permanent loss of wetland, riparian, riverine, and oak woodland habitats within the action area. The Alameda whipsnake would be affected by the loss of oak woodland and scrub habitat within the action area. However, given the proximity of the five habitat types within the action area, it is likely that either species could occur anywhere within the action area. There are no physical barriers that would exclude either species from any of the five habitat types. Both species may use a wide variety of habitat types for activities such as foraging and dispersal. Furthermore, either species may seek retreat in other areas when displaced by activity or disturbance within their more traditionally associated habitat. Therefore, the proposed action could affect the California red-legged frog and the Alameda whipsnake throughout the action area.

Temporary effects are project activities that temporarily remove one or more essential components of a listed species habitat, but can be restored to pre-project conditions of equal or greater habitat value. In order for the effects to be considered temporary, the affected habitat of the listed species must be totally restored within one season. Ground disturbance resulting from the proposed State Route 84, Niles Canyon Project includes substantial grading, excavating, and fill. Caltrans is considering the adverse effects of a significant amount of cut and fill of earth, a maximum of approximately 2.07 acres (0.84 hectares), to be of a temporary nature. This cut and fill has potential to cause injury and mortality to individual California red-legged frogs and Alameda whipsnakes occupying the action area, and these areas likely will not be suitable for use as habitat for foraging, breeding, resting and other essential behaviors by these animals for a significant period of time, almost certainly longer than one season after the construction of the project is completed. Additional harm could be sustained by entanglement with erosion control features, capture or intentional harm by project personnel, or falling or entrapment in trenches or other project-related excavations. As part of the project description, Caltrans has stated upon completion of the project, they will re-contour temporally affected habitat areas if necessary, and revegetate them to promote restoration of the area to pre-project conditions. The temporary effects will result in the permanent loss of the habitat utilized by these listed animal species unless the restoration implemented by Caltrans is adequately planned, utilizes native California plant species collected in the immediate area of the proposed project, and meets specific success criteria.

The proposed project will result in permanent loss of approximately 1.34 acres (0.55 hectares) of habitat that is not occupied by pre-existing hardscape features, such as asphalt and retaining walls. This area of effect will result in the permanent loss of foraging, breeding, resting, or other fundamental habitat for the California red-legged frog and/or the Alameda whipsnake.

The proposed State Route 84, Niles Canyon Project involves the replacement of existing culverts. Project-related improvement of the Stonybrook Creek crossing is designed to enhance fish passage and may improve general wildlife movement under State Route 84. Replacement of existing drainage culverts with larger diameter units may provide additional passage under State Route 84 for small- to medium-sized wildlife species, including California red-legged frog and Alameda whipsnake.

California Red-legged Frog

Individual red-legged frogs may be directly injured, killed, harmed, and harassed by activities that disturb breeding, dispersal, and aestivation habitat. The proposed project will result in the temporary loss of 2.07 acres (0.84 hectares) and the permanent loss of approximately 1.34 acres (0.55 hectares) of habitat for this listed species. The proposed project could (1) result in the death of an unknown number of red-legged frogs; (2) result in construction related harassment, including effects from lights used during nighttime activities, to the surviving red-legged frogs on the site; (3) impede the dispersal of red-legged frogs through the site while the action is in progress; (4) increase the likelihood of predation and the introduction of amphibian disease; and (5) fragment and reduce the amount of red-legged frog habitat in Alameda County.

Changes in light level may disrupt orientation in nocturnal animals. The range of anatomical adaptations to allow night vision is broad (Park 1940), and rapid increases in light can blind animals. For frogs, a quick increase in illumination causes a reduction in visual capability from which the recovery time may be minutes to hours (Buchanan 1993). After becoming adjusted to a light, frogs may be attracted to it as well (Jaeger and Hailman 1973). Laboratory experiments have demonstrated that dark-adapted frog species exposed to rapid increases in illumination may be temporarily "blinded" and unable to gather visual information on prey, predators, or conspecifics until their eyes adapt to the new illumination. Foraging may be facilitated in frog species that hunt around lights because the ambient illumination is increased to a level that allows the frogs to see prey or because lights attract relatively larger numbers of insects and other invertebrate prey. Experiments and anecdotal evidence indicates that both temporary and permanent changes to the night time illumination of an area may affect the reproduction, foraging, predator avoidance, and social interactions of frog species (Buchanan 2002). Artificial lighting may alter reproductive behaviors by inhibiting frog species that normally only reproduce at very low illuminations. For instance, female Tungara frogs (*Physalaemus pustulosus*) are less selective about mate choice when light levels are increased, evidently preferring to mate quickly and avoid the increased predation risk of mating activity (Rand *et al.* 1997). Longcore and Rich (2004) reported that frogs in an experimental enclosure stopped mating activity during night football games, when lights from a nearby stadium increased sky glow. Mating choruses only resumes when the enclosure was covered to shield the frogs from light. Increased illumination may allow predators to see frogs they otherwise would be unable to detect. Circadian rhythms, activity patterns, and intra-specific visual communication also may be affected by increased illuminations.

Summer cover and foraging habitat along Alameda Creek and Stonybrook Creek will be temporarily and permanently eliminated by the proposed project. Individual frogs occupying the affected habitat run the risk of being crushed or buried by earth moving activities. Those that do survive will suffer permanent and temporary loss of habitat, and harassment from increased human activity. Construction of an unspecified duration and location will occur at night and the associated lighting may increase predation because frogs will lose the cover of darkness. Construction activities will likely impede the movement of adult frogs from unspecified breeding

habitat to summer habitat within the action area, and visa versa. Temporary loss of dispersal habitat for the project duration increases intra-and inter-specific competition for food and living space for red-legged frogs in the action area vicinity.

The proposed action is likely to result in indirect effects to the red-legged frog that will extend beyond the completion of the proposed action. The action would (1) result in permanent and temporal loss of aestivation habitat; (2) reduce water quality in the action area; (3) result in higher mortality of red-legged frogs in the action area; and (4) increase fragmentation of remaining red-legged frog habitat over the longer term.

Removal of vegetation will likely increase exposure to introduced non-native and/or urban-adapted predators due to the permanent and temporary loss of cover for dispersing red-legged frogs.

Roads have been documented as barriers to movements by a diversity of species, and this effect varies with road size and traffic volume. Most of the available data is associated with large mammals such as mountain lions (*Felis concolor*) (Van Dyke *et al.* 1986) and black bears (*Ursus americanus*) (Brody and Pelton 1989). Amphibians, such as the California red-legged frog likely process and relate to their environment and perception of potential threats in much different ways than large mammals and other more well-studied taxa. Therefore, although red-legged frogs may exhibit less reluctance to cross a road than a lynx (*Lynx lynx*) (Barnum 1999), roads pose an increased risk of mortality for any species. Furthermore, traffic frequency and road expansion likely corresponds with increased mortality, decreased gene flow, and increased fragmentation of habitats and populations (Joly and Morand 1997).

Roads were found to be significant barriers to gene flow among common frogs (*Rana temporaria*) in Germany and have resulted in genetic differentiation among populations separated by roads (Reh and Seitz 1990). Similarly, significant genetic subdivision was detected in bank voles (*Clethrionomys glarelous*) populations separated by a 164 foot (50-meter) wide highway in Germany (Gerlach and Musolf 2000). In California, local extirpations of mountain lions has occurred when roads and other development fragmented habitat into small patches and blocked movement corridors, thereby isolating the patches and preventing recolonization (Beier 1993). Adequately sized culverts or undercrossings, with suitable habitat at each side of the passage, significantly increases the ability of animals to cross highways (Ng *et al.* 2003).

California red-legged frog mortality and injury occurs when the animals attempt to cross roads and are hit by cars, trucks, or motorcycles. The majority of strikes likely occur on rainy nights when the animals are most active. Driver visibility is also lower at night and in inclement weather, increasing the potential for strikes. Such strikes are usually fatal for an animal the size of a red-legged frog. Thus, vehicle strikes are a direct source of mortality for this listed amphibian. If vehicle strikes are sufficiently frequent in a given locality, they could result in reduced California red-legged frog abundance. The death of animals during the breeding season could result in reduced reproductive success.

The local and range-wide effects of vehicle strikes on California red-legged frogs have not been adequately assessed. Vehicle strikes appear to occur most frequently where roads transverse areas where the animals are abundant. However, the linear quantity of roads in a given area may not be directly related to the number of associated vehicle strikes, as has been shown in San Joaquin kit fox (*Vulpes macrotis mutica*) studies (Cypher *et al.* 2000; U.S. Department of Energy 1993; Spiegel and Disney 1996; Ralls and White 1995). The type of road (*e.g.*, number of lanes), traffic volume, and average speed of vehicles likely all influence the number of California red-legged frog/vehicle strikes. The number of strikes likely increases with road size, traffic volume, and average speed (Clevenger and Waltho 1999). Another factor influencing the number of vehicles striking this threatened amphibian, but for which little data is available, is the frequency with which the animals cross roads and are therefore at risk. The proportion of successful road crossings by these animals likely declines with increasing road size, traffic volume and density, and vehicle speeds. It is unlikely that California red-legged frogs are able to become more successful in crossing roads with increased experience.

Vehicle-related mortality has significantly affected other listed or rare species. Vehicles caused 49 percent of the mortality documented among endangered Florida panthers (*Felis concolor coryi*) (Maehr *et al.* 1991). With a small remaining population, the loss of any individuals to vehicles could constitute a significant population effect. Similarly, at least 15 percent of the remaining 250-300 key deer (*Odocileus virginianus clavium*) are killed annually by vehicles (Tubak 1999), and this mortality is considered to be a limiting factor in the recovery of this endangered species (Service 1985). Mortality from vehicles was the primary source of mortality for endangered ocelots (*Felis pardalis*) in Texas (Tubak 1999), and also contributed to the failure of a lynx reintroduction project in New York (Aubrey *et al.* 1999). Rudolph *et al.* (1999) estimated that road-associated mortality may have depressed populations of Louisiana pine snakes (*Pituophis ruthveni*) and timber rattlesnakes (*Crotalus horridus*) by over 50 percent in eastern Texas, and this mortality may be a primary factor in local extirpations of timber rattlesnakes (Rudolph *et al.* 1998). Mortality from vehicles is also contributing to the reduction in the status of the prairie garter snake (*Thamnophis radix radix*) in Ohio (Dalrymple and Reichenbach 1984), and was a limiting factor in the recovery of the endangered American crocodile (*Crocodylus acutus*) in Florida (Kushland 1988). In Florida, threatened Florida scrub-jays (*Aphelocoma coerulescens*) suffered higher mortality in territories near roads, as well as reduced productivity due to vehicle strikes of both young and breeding adults (Mumme *et al.* 1999).

The presence of roads in an area could result in the local introduction of chemical contaminants. Contaminants could be introduced in several ways. Substances used in road building materials or to recondition roads can leach out or wash off roads into adjacent habitat. Vehicle exhaust emissions include hazardous substances which may become concentrated in road-side soils. Heavy metals such as lead, aluminum, iron, cadmium, copper, manganese, titanium, nickel, zinc, and boron are all emitted in vehicle exhaust (Trombulak and Frissell 2000). Concentrations of organic pollutants (e.g., dioxins, polychlorinated biphenyls) are higher in soils along roads (Benfenati *et al.* 1992) and ozone levels are higher in the air near roads (Trombulak and Frissell

2000). Vehicles may leak hazardous substances such as motor oil and antifreeze. Although the quantity leaked by a given vehicle may be minute, these substances can accumulate on roads and then get washed into the adjacent environment by storm water runoff. An immense variety of substances could be introduced during accidental materials spills. Such spills can result from small containers falling off passing vehicles to large material spills from traffic accidents. Depending on the substance, large spills may be partially or completely mitigated with clean-up efforts.

California red-legged frogs could be exposed to contaminants if using habitat adjacent to roads or downstream of associated stormwater runoff. Exposure pathways could include inhalation, dermal contact, direct ingestion, ingestion of contaminated soil or plants, or consumption of contaminated prey. Exposure to contaminants could cause short- or long-term morbidity, possibly resulting in reduced productivity or mortality. Carcinogenic substances could cause genetic damage resulting in sterility, reduced productivity, or reduced fitness among progeny. Contaminants may also have a negative effect on red-legged frog prey species. This could result in reduced prey abundance and diminished local carrying capacity for the red-legged frog.

Construction of roads can facilitate the invasion and establishment of non-native species. Disturbance and alteration of habitat adjacent to roads may create favorable conditions for non-native plants and animals. These exotic species can spread along roadsides and then into adjacent habitat. Modified road-side habitat may be more conducive to the dispersal of non-native species into red-legged frog habitat. Non-native wildlife could compete with red-legged frogs for resources such as food, or cause direct injury or frog mortality. Non-native plants and animals may also reduce habitat quality for the listed amphibian or their prey, and reduce the productivity or the local carrying capacity for the threatened species. As has been shown for San Joaquin kit foxes, introductions of non-native species could cause California red-legged frogs to alter behavioral patterns by avoiding or abandoning areas near roads (Cypher 2000).

Negative effects to wildlife populations from roads may extend some distance from the actual road. The phenomenon can result from any of the effects already described in this biological opinion (*e.g.*, vehicle-related mortality, habitat degradation, invasive exotic species, *etc.*). Forman and Alexander (1998) described the area affected as the "road effect" zone. Along a 4-lane road in Massachusetts, they determined that this zone extend for an average of approximately 980 feet (298.7 meters) to either side of the road for an average total zone width of approximately 1970 feet (600.5 meters). However, in places they detected an effect greater than 0.6 mile (1.0 kilometers) from the road. Rudolph *et al.* (1999) detected reduced snake abundance up to 2790 feet (850.4 meters) from roads in Texas. Extrapolating to a landscape scale, they concluded that roads likely have a significant effect on Texas snake populations, given that approximately 79 percent of the state is within 1640 feet (499.9 meters) of a road "road-zone" effects can be subtle. Van der Zandt *et al.* (1980) reported that lapwings (*Vanellus vanellus*) and black-tailed godwits (*Limosa limosa*) feeding at 1575-6560 feet (480-2000 meters) from roads were disturbed by passing vehicles. The heart rate, metabolic rate and energy expenditure of female bighorn sheep (*Ovis canadensis*) increases near roads (MacArthur *et al.* 1979).

Trombulak and Frossell (2000) described another type of "road-zone' effect. Heavy metal concentrations from vehicle exhaust were greatest within 66 feet (20 meters) of roads, and elevated levels of metals in both soil and plants were found at least 660 feet (201 meters) of roads. The "road-zone" apparently varies with habitat type and traffic volume. Based on bird responses, Forman *et al.* (2000) estimated primary road zones of 1,000 feet (305 meters) in woodlands, 1,197 feet (365 meters) in grasslands, and 2657 feet (810 meters) in natural lands near urban areas. The effect zone was 656 feet (200 meters) along secondary roads with lower traffic volumes.

Various other work activities associated with the proposed project also may adversely affect California red-legged frogs. Trash left during or after project activities could attract predators to work sites, which could subsequently harass or prey on the animals. For example, raccoons, crows, and ravens are attracted to trash and also prey opportunistically on amphibians. Construction equipment that has been used in different areas and with different species of amphibians, including the California red-legged frog, may transmit diseases by introducing contaminated soil and other foreign material brought in by equipment. There is also a possibility that people working on the site, particularly the onsite biologists could introduce amphibian disease to habitat used by California red-legged frogs. Recently, the probability of encountering and spreading a disease to previously unaffected amphibian populations has dramatically increased throughout the United States. It is possible that chytrid fungus may exacerbate the effects of other diseases on amphibians or increase the sensitivity of the amphibian to environmental changes (*e.g.*, water pH) that reduce normal immune response capabilities (Bosch *et al.* 2000).

Alameda Whipsnake

Individual Alameda whipsnakes may be directly injured or killed by activities that disturb feeding, sheltering, and dispersal habitat. The proposed project will result in the temporary loss of 2.07 acres (0.84 hectares) and the permanent loss of approximately 1.34 acres (0.55 hectares) of habitat for this listed species. The proposed project could (1) result in the injury and death of an unknown number of Alameda whipsnakes; (2) result in construction-related harassment to the surviving Alameda whipsnakes in the area; (3) partially impede the dispersal of Alameda whipsnakes through the area while the action is in progress; (4) increase the likelihood of predation on Alameda whipsnakes; and (5) fragment and reduce the amount of Alameda whipsnake habitat.

Construction related activities may cause disruption of foraging, harassment from increased human activity, and permanent and temporary loss of shelter. Because Alameda whipsnakes are diurnal, they will be active while construction is performed. Individuals that avoid construction activities may become displaced into adjacent areas where they may be vulnerable to increased predation, exposure, starvation, or stress through disorientation, loss of shelter, and intraspecific and inter-specific aggression (Grigione 2002).

The proposed construction may temporarily affect Alameda whipsnake dispersal due to activities that produce high levels of noise and vibration. State Route 84 road widening and realignment of the Palomares Road intersection includes activities that cause barriers or deterrents to dispersal activities.

The addition of impermeable surfaces resulting from the widened roadway and realignment will likely be accompanied by an increase in chemical runoff, higher road-kill, and the introduced of non-native and/or introduction of non-native species. These factors may affect the Alameda whipsnake in ways similar to those discussed for the California red-legged frog.

Alameda Whipsnake Proposed Critical Habitat

This conference opinion on the proposed critical habitat for the Alameda whipsnake does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR § 402.02. Instead, we have relied upon the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service* (No. 03-35279) to complete the following analysis with respect to the proposed critical habitat.

The proposed action is not expected to appreciably diminish the value of the proposed critical habitat for the Alameda whipsnake, or prevent proposed critical habitat from sustaining its role in the conservation and recovery of the species. Caltrans is proposing to implement measures to restore areas of temporary effects subject to a significant amount of cut and fill to pre-project conditions. Currently, there is an existing highway within the action area, and, due to the proposed restoration activities, widening a section of that highway will not significantly interfere with the current capability of the proposed critical habitat unit to satisfy essential requirements of the species. Constituent elements for the Alameda whipsnake will remain intact during and after project completion, or will be restored, and will continue to provide habitat essential for species recovery.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

From 1995 to 2020, the human population is projected to increase by 18 percent for the San Francisco Bay hydrologic region; while at the same time agricultural crop land use in the region is projected to remain around 65,000 acres (California Department of Water Resources 1998). According to the California Department of Forestry, from 2000 to 2020, the human population in the Bay Area region is expected to grow by 29 percent (5.3 million people to 6.8 million people), and by 60 percent from 2000 to 2040 (5.3 million people to 8.4 million people) (California Department of Forestry 1998). There will likely be many other development projects that occur

during this timeframe due to increases in human population growth that will continue to imperil the California red-legged frog and the Alameda whipsnake.

Within this region of Alameda County, there is a continued demand for new housing, vineyards, and recreation opportunities. Considering this, the remaining open space adjacent to the State Route 84, Niles Canyon Project is likely threatened by increased activity and habitat loss due to road, residential, and commercial development. The development of adjacent wildlife habitat will continue to result in the loss of not only breeding, resting, and foraging habitat, but the loss of dispersal corridors between breeding populations, thereby further isolating and fragmenting wildlife populations. Additionally, potential development of small reservoirs or water bodies, such as golf course hazards, and water diversions may pose further threats such as disruption of dispersal corridors for terrestrial species, and competition or predation from non-native species such as bullfrogs for aquatic species.

CONCLUSION

After reviewing the current status of the California red-legged frog and the Alameda whipsnake; the environmental baseline for the action area; the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the State Route 84, Niles Canyon Project is not likely to jeopardize the continued existence of these two listed species. Critical habitat was proposed for the Alameda whipsnake in the action area in October 2005 and will be adversely modified and destroyed as a result of the Niles Canyon Project. The Service reached the conclusion on the effects on the proposed critical habitat of the Alameda whipsnake because the effects of the project will be offset by the conservation measures in the project description, including the successful restoration of areas subject to the temporary effects of cut and fill to pre-project conditions.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral 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 that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not

intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this incidental take statement.

The measures described below are non-discretionary, and FHWA must ensure Caltrans requires that they become binding conditions of project authorization for the exemption under 7(o)(2) to apply. FHWA through Caltrans has a continuing duty to regulate the activity that is covered by this incidental take statement. If FHWA through Caltrans (1) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of 7(o)(2) may lapse.

Amount or Extent of Take

The Service anticipates that incidental take of the California red-legged frog will be difficult to detect because when this amphibian is not in their breeding ponds, it inhabits rodent burrows or inconspicuous cover sites, or may be difficult to locate due to their cryptic appearance and behavior; the sub-adult and adult animals may be located a distance from the breeding ponds; the migrations occur on a limited period during rainy nights in the fall, winter, or spring; and the finding of an injured or dead individual is unlikely because of their relatively small body size. Losses of this species may also be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in water regime at their breeding ponds, or additional environmental disturbances. Therefore, the Service is estimating that all California red-legged frogs inhabiting 3.41 acres (1.39 hectares) (2.07 acres [0.84 hectares] of temporary habitat effects and 1.34 acres [0.55 hectares] of permanent effects to the habitat for this species) will be subject to incidental take. Upon implementation of the Reasonable and Prudent Measures, incidental take associated with the State Route 84, Niles Canyon Project in the form of harm, harassment, capture, injury, and death of the California red-legged frog caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

The Service expects that incidental take of the Alameda whipsnake will be difficult to detect or quantify because this animal may range over a large territory and the finding of an injured or dead individual is unlikely because of their relatively small body size and conspicuous coloration. Therefore, the Service is estimating that all of the Alameda whipsnakes inhabiting 3.41 acres (1.39 hectares) (2.07 acres [0.84 hectares] of temporary habitat effects and 1.34 acres [0.55 hectares] of permanent effects to the habitat for this species) may be subject to incidental take. Upon implementation of the Reasonable and Prudent Measures, incidental take associated with the State Route 84, Niles Canyon Project in the form of harm, harassment, capture, injury, and death of the Alameda whipsnake caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

As stated in the California Department of Fish and Game Code Section 2080.1, FHWA is advised to submit this incidental take statement for the Alameda whipsnake to the Director of

Fish and Game for a consistency determination. FHWA may be required to apply for a State Incidental Take Permit for the Alameda whipsnake under section 2081(b) of the Fish and Game Code if the California Department of Fish and Game determines that this Federal document is not consistent with the California Endangered Species Act.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the California red-legged frog or the Alameda whipsnake. Critical habitat has been proposed for the Alameda whipsnake and is located within the action area. However only a small amount will be adversely modified or destroyed based on the proposed restoration of the areas subject to temporary disturbance.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize the effects of the State Route 84, Niles Canyon Project on the California red-legged frog and the Alameda whipsnake:

1. Caltrans will implement the project as described in the June 2005 Technical Memorandum and this biological opinion.

2. Reduce effects to the California red-legged frog and the Alameda whipsnake.

3. Caltrans shall ensure their compliance with this biological opinion.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, FHWA shall ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following Terms and Conditions implement Reasonable and Prudent Measure one (1):

    a. Caltrans shall minimize the potential for harm, harassment, or killing of federally listed wildlife species resulting from project related activities by implementation of the conservation measures as described in the June 2005 Technical Memorandum, and appearing in the Project Description of this biological opinion.

    b. Caltrans shall make the terms and conditions in this biological opinion a required term in all contracts for the project that are issued by them to all contractors.

2. The following Terms and Conditions implement Reasonable and Prudent Measure two (2):

   a. The Resident Engineer or their designee shall be responsible for implementing the conservation measures and Terms and Conditions of this biological opinion and shall be the point of contact for the project. The Resident Engineer or their designee shall maintain a copy of this biological opinion onsite whenever construction is taking place. Their name and telephone number shall be provided to the Service at least thirty (30) calendar days prior to groundbreaking at the project. Prior to ground breaking, the Resident Engineer must submit a letter to the Service verifying that they posses a copy of this biological opinion and have read the Terms and Conditions.

   b. A qualified biologist(s) shall be onsite during all activities that may result in the take of the California red-legged frog and/or the Alameda whipsnake. The qualifications of the biologist(s) must be presented to the Service for review and written approval prior to ground-breaking at the project site. Prior to approval, the biologist(s) must submit a letter to the Service verifying that they posses a copy of this biological opinion and understand its Terms and Conditions.

   c. The Caltrans biologist shall have oversight over implementation of all the Terms and Conditions in this biological opinion, and shall have the authority to stop project activities, through communication with the Resident Engineer or their designee, if any of the requirements associated with these Terms and Conditions are not being fulfilled. If biologist/construction liaison has requested a stop work due to take of any of the listed species the Service and the California Department of Fish and Game will be notified within one (1) working day via email or telephone. The Service contact is Chris Nagano, Deputy Assistant Field Supervisor, Endangered Species Program at the Sacramento Fish and Wildlife Office at telephone (916) 414-6600.

   d. Prior to any ground disturbance, pre-construction surveys shall be conducted by a Service-approved biologist for the California red-legged frog and the Alameda whipsnake. These surveys shall consist of walking surveys of the project limits and adjacent areas accessible to the public to determine presence of the species.

   e. Only Service-approved biologist(s) who are familiar with the biology and ecology of the California red-legged frog and the Alameda whipsnake shall capture or handle theses listed species.

   f. Biologists shall take precautions to prevent introduction of amphibian diseases to the action area by disinfecting equipment and clothing as directed in the recommended equipment decontamination procedures within the Service's California Red-Legged Frog Survey Guidance. This document is available at the Service's Sacramento office

website (http://www.fws.gov/sacramento/es/protocol.htm). Disinfecting equipment and clothing is especially important when biologists are coming to the action area to handle frogs after working in other aquatic habitats.

g. An employee education program covering the California red-legged frog and the Alameda whipsnake must be conducted before groundbreaking for the State Route 84, Niles Canyon Safety Widening Project. The program should consist of a brief presentation by the on-site biologist to explain listed species concerns to all contractors, their employees, and agency personnel involved in the project. The program should include a description of the California red-legged frog and the Alameda whipsnake and their habitat needs; an explanation of the status of these species and their protection under the Endangered Species Act; associated consequences of noncompliance with this opinion; and a description of the measures being taken to reduce effects to these species during project construction and implementation. An outline of the training program shall be submitted to the Deputy Assistant Field Supervisor for the Endangered Species Program at the Sacramento Fish and Wildlife Office at least twenty (20) working days prior to the start of construction. Documentation of the training, including individual signed affidavits, will be kept of file and available on request.

h. Project employees shall be provided with written guidance governing vehicle use, speed limits on unpaved roads, fire prevention, and other hazards.

i. Permanent and temporary disturbances and other types of project-related disturbance to the habitats of the California red-legged frog and the Alameda whipsnake shall be minimized to the maximum extent practicable by Caltrans. To minimize temporary disturbances, all project-related vehicle traffic shall be restricted to established roads, construction areas, and other designated areas. These areas also should be included in pre-construction surveys and, to the maximum extent possible, should be established in locations disturbed by previous activities to prevent further adverse effects.

j. The construction area shall be delineated with high visibility temporary fencing at least 4 feet (1.2 meters) in height, flagging, or other barrier to prevent encroachment of construction personnel and equipment onto any sensitive areas during project work activities. Such fencing shall be inspected and maintained daily until completion of the project. The fencing will be removed only when all construction equipment is removed from the site. Actions within the project area shall be limited to vehicle and equipment operation on existing roads. No project activities will occur outside the delineated project construction area.

k. To prevent inadvertent entrapment of California red-legged frogs and Alameda whipsnakes during construction, all excavated, steep-walled holes or trenches more than 2 feet (0.61 meters) deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed

of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, the on-site biologist should immediately place escape ramps or other appropriate structures to allow the animal to escape, or the Service and/or California Department of Fish and Game shall be contacted by telephone for guidance. The Service shall be notified of the incident by telephone and electronic mail within one working day.

l. Project-related vehicles shall observe a 20-mile (32-kilometer) per hour speed limit within construction areas, except on County roads, and State and Federal highways; this is particularly important at night when the California red-legged frog is most active. To the maximum extent possible, night-time construction should be minimized. Off-road traffic outside of designated project areas shall be prohibited.

m. Except when necessary for construction, driver or pedestrian safety, lighting of the State Route 84, Niles Canyon Project site by artificial lighting during night time hours should be minimized to the maximum extent practicable.

n. All grindings and asphaltic-concrete waste shall be stored within previously disturbed areas absent of habitat and at a minimum of 150 feet (45.7 meters) from any culvert, or drainage feature.

o. To eliminate an attraction to predators of the California red-legged frog and/or Alameda whipsnake all food-related trash items such as wrappers, cans, bottles, and food scraps must be disposed of in closed containers and removed at least once every day from the entire project site.

p. To avoid injury or death of the California red-legged frog and/or Alameda whipsnake, no firearms shall be allowed on the project site except for those carried by authorized security personnel, or local, State, or Federal law enforcement officials.

q. To prevent harassment, injury or mortality of California red-legged frog and/or Alameda whipsnake or destruction of their refugia by dogs or cats, no canine or feline pets shall be permitted in the action area.

r. Use of rodenticides and herbicides on the State Route 84, Niles Canyon Project shall be utilized in such a manner to prevent primary or secondary poisoning of listed species, and depletion of prey populations on which they depend. All uses of such compounds shall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Pesticide Regulation, and other appropriate State and Federal regulations, as well as additional project-related restrictions deemed necessary by the Service or the California Department of Fish and Game.

s. Plastic mono-filament netting (erosion control matting) or similar material shall not be used at the project site because California red-legged frogs may become entangled or trapped in it. Acceptable substitutes include coconut coir matting or tackified hydro-seeding compounds.

t. The following Term and Condition shall be implemented for borrow sites associated with the State Route 84, Niles Canyon Project:

1. As part of the construction contract, Caltrans shall require that all contractors comply with the Act in the performance of work necessary for project completion inside and outside the project right-of-way.

2. Caltrans shall require documentation from the contractor ensuring that aggregate, fill, or borrow material provided for the project was obtained in compliance with the Act. Evidence of compliance with the Act shall be demonstrated by providing the Resident Engineer any one of the following:

   i. a letter from the Service stating use of the borrow pit area will not result in the incidental take of listed species;

   ii. an incidental take permit for contractor-related activities issued by the Service pursuant to section 10(a)(1)(B) of the Act;

   iii. a biological opinion or a letter concurring with a "not likely to adversely affect" determination issued by the Service to the Federal agency having jurisdiction over contractor-related activities;

   iv. letter from the Service concurring with the "no effect" determination for contractor-related activities; or

   v. Contractor submittal of information to the Caltrans Resident Engineer indicating compliance with the State Mining and Reclamation Act (SMARA) and provide the County land use permits and California Quality Act (CEQA) clearance.

3. If a borrow site that is in compliance with the Act is not available, Caltrans shall either:

   i. identify/select a site that the Service has concurred with the "no effect" determination, or;

   ii. request reinitiation of formal consultation on the action considered herein based on new information.

u. Upon completion of the proposed action, all California red-legged frog and Alameda whipsnake habitat subject to temporary ground disturbances, including storage and staging areas, temporary roads, *etc.* must be re-contoured, if appropriate, and revegetated with seeds and/or cuttings of appropriate plant species to promote restoration of the area to pre-project conditions. Areas of temporary disturbance are expected to be returned to pre-project conditions within one season following construction. An area subject to "temporary" disturbance means any area that is disturbed during the project, but that after project completion will not be subject to further disturbance and has the potential to be revegetated. Caltrans shall submit to the Service their draft proposal for the restoration and revegetation plan at least sixty (60) calendar days prior to the date of initial ground breaking; the final plan shall be submitted for approval by the Service prior to ground breaking at the proposed project. To the maximum extent practicable (*i.e.*, presence of natural lands), topsoil shall be removed, cached, and returned to the site according to successful restoration protocols. Loss of soil from run-off or erosion shall be prevented with straw bales, straw wattles, or similar means provided they do not entangle, block escape or dispersal routes of listed animal species. The draft and final plan shall contain specific quantifiable criteria to evaluate the success of the restoration. A biologist shall ensure that areas subject to temporary disturbance have been adequately restored, and this information is included under the final reports described in the Reporting Requirements of this biological opinion.

v. As described in the May 16, 2006, electronic mail from Caltrans, the permanent effects to 1.34 acres (0.55 hectares) of California red-legged frog habitat shall be compensated at 3:1 (3.99 acres [1.61 hectares]) with occupied California red-legged frog habitat. The permanent effects to 1.34 acres (0.55 hectares) of Alameda whipsnake habitat shall be compensated at 3:1 (3.99 acres [1.61 hectares]) with occupied Alameda whipsnake habitat. As described in the May 16, 2006, email from Caltrans to the Service, this compensation will be satisfied through the purchase of 3.99 acres (1.61 hectares) of occupied habitat shared by the California red-legged frog and the Alameda whipsnake at the Ohlone Preserve Conservation Bank.

w. Documentation of this purchase must be submitted to the Service a minimum of 60 calendar days prior to the date if initial ground breaking at the project site.

x. As described in the May 16, 2006, electronic mail from Caltrans, the temporary effects to 2.07 acres (0.84 hectares) of California red-legged frog habitat shall be compensated at 1.1:1 (2.28 acres [0.92 hectares]) with occupied California red-legged frog habitat. The temporary effects to 2.07 acres (0.84 hectares) of Alameda whipsnake habitat shall be compensated at 1.1:1 (2.28 acres [0.92 hectares]) with occupied Alameda whipsnake habitat. Caltrans will receive a 1:1 credit (2.07 acres [0.84 hectares]) for temporary effects compensation through adequate on-site restoration of California red-legged frog and Alameda whipsnake habitat. In such an

event, Caltrans will need to satisfy the remaining 0.1:1 (0.21 acres [0.08 hectares]) compensation with the purchase of appropriate credits at the Ohlone Preserve Conservation Bank. Documentation of this purchase must be submitted to the Service a minimum of 60 calendar days prior to the date of initial ground breaking at the project site.

B. The following Terms and Conditions implement Reasonable and Prudent Measure two (2):

1. If requested, during or upon completion of construction activities, the on-site biologist, and/or a representative from Caltrans shall accompany Service or California Department of Fish and Game personnel on an on-site inspection of the site to review project effects to the California red-legged frog, the Alameda whipsnake, and their habitats.

2 The Federal Highway Administration shall ensure Caltrans complies with the Reporting Requirements of this biological opinion.

3. If requested, before, during, or upon completion of ground breaking and construction activities, Caltrans shall allow access by Service and California Department of Fish and Game personnel to the project site to inspect project effects to the California red-legged frog and the Alameda whipsnake, and their habitats.

Reporting Requirements

Injured California red-legged frogs and Alameda whipsnakes must be cared for by a licensed veterinarian or other qualified person such as the on-site biologist; dead individuals of any of these listed species must be preserved according to standard museum techniques and held in a secure location. The Service and the California Department of Fish and Game must be notified within one (1) working day of the discovery of death or injury to a California red-legged frog or an Alameda whipsnake that occurs due to project related activities or is observed at the project site. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal clearly indicated on a USGS 7.5 minute quadrangle and other maps at a finer scale, as requested by the Service, and any other pertinent information. The Service contacts are Chris Nagano, Deputy Assistant Field Supervisor, Endangered Species Program at the Sacramento Fish and Wildlife Office (916)414-6600), and Scott Heard, Resident Agent-in-Charge of the Service's Law Enforcement Division at (916)414-6660. The California Department of Fish and Game contact is Mr. Ron Schlorff at 1416 9th Street, Sacramento, California 95814, (916) 654-4262.

Caltrans shall submit a post-construction compliance report prepared by the on-site biologist to the Sacramento Fish and Wildlife Office within sixty (60) calendar days after the date of the completion of construction activity. This report shall detail (i) dates that construction occurred;

(ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the California red-legged frog and the Alameda whipsnake, if any; (v) occurrences of incidental take of any of these listed species, if any; (vi) documentation of employee environmental education; and (vii) other pertinent information.

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 to implement recovery actions, to help implement recovery plans, to develop information, or otherwise further the purposes of the Act.
The Service requests notification of the implementation of any conservation recommendations in order to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats. We propose the following conservation recommendations:

1. Caltrans should assist the Service in implementing recovery actions identified in the *Recovery Plan for the California red-legged Frog* (Service 2002b).

2. Caltrans should assist the Service in developing and implementing recovery actions identified in the *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California* (Service 2002a).

3. Caltrans should incorporate culverts, tunnels, or bridges on highways and other roadways that allow safe passage for the California red-legged frogs, Alameda whipsnake, other listed animals, and native wildlife. Caltrans should include photographs, plans, and other information in their biological assessments if they incorporate "wildlife friendly" crossings into their projects.

4. FHWA and Caltrans should consider participating in the planning for a regional habitat conservation plan for the California red-legged frog, Alameda whipsnake, and other listed or otherwise special-status species.

5. Caltrans should consider establishing functioning preservation and creation conservation banking systems to further the conservation of the California red-legged frog, Alameda whipsnake, and other appropriate species. Such banking systems also could be utilized for other required mitigation (*i.e.*, seasonal wetlands, riparian habitats, *etc.*) where appropriate.

6. Sightings of any listed or sensitive animal species should be reported to the California Natural Diversity Database of the California Department of Fish and Game. A copy of

the reporting form and a topographic map, clearly marked with the location the animals were observed, should also be provided to the Service.

7. Caltrans should provide habitat for bats, including surfaces for bat roosts on the underside of bridges and other structures whenever possible.

REINITIATION - CLOSING STATEMENT

This concludes the conference for effects of the proposed Niles Canyon Project in Alameda County, California, on the critical habitat for the Alameda whipsnake. You may ask the Service to confirm the conference opinion as a biological opinion issued through formal consultation if this critical habitat is designated. The request must be in writing. If the Service reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, the Service will confirm the conference opinion as the biological opinion on the project and no further section 7 consultation will be necessary.

This concludes formal consultation on the proposed State Route 84, Niles Canyon Project, in Alameda County, California. As provided in 50 CFR §402.16 and in the terms and conditions of this biological opinion, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding this biological opinion on the State Route 94, Niles Canyon Project, please contact John Cleckler or Chris Nagano at the letterhead address or at telephone (916) 414-6625.

Sincerely,

Chris Nagano

for Cay C. Goude
Acting Field Supervisor

cc:
Jim Richards, California Department of Transportation, Oakland, California
Jeff Jensen, California Department of Transportation, Oakland, California
Margaret Gabil, California Department of Transportation, Oakland, California
Amy Fowler, California Department of Transportation, Oakland, California
Marcia Grefsrud, California Department of Fish and Game, Yountville, California
Janice Gan, California Department of Fish and Game, Yountville, California
Carl Wilcox, California Department of Fish and Game, Yountville, California
Gary Stern, National Oceanic and Air Administration, Santa Rosa, California
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UNITED STATES NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
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April 18, 2006

In response refer to:
151422SWR2006SR00229:WSL

Jeffrey G. Jensen
District 4 Office Chief
Office of Biological Science and Permits
Department of Transportation
111 Grand Avenue
P.O. Box 23660
Oakland, California 94623-0660

Dear Mr. Jensen:

This responds to your letter of March 23, 2006, initiating informal Section 7 Endangered Species Act (ESA) consultation on the threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*). This consultation applies to the California Department of Transportation (Caltrans) Niles Canyon roadway improvement project (your file number 04-ALA-84 PM 12.1-13.3 04-174400). The proposed project is on State Route (SR) 84 between the Rosewarnes Underpass and the Farwell Underpass, in Alameda County. This section of SR 84 is an undivided, two-lane rural highway with narrow shoulders on a winding horizontal alignment which roughly parallels Alameda Creek through Niles Canyon.

The proposed project would replace an existing 17.5 meter long reinforced box culvert on Stonybrook Creek immediately upstream of the confluence with Alameda Creek with a clear span bridge. The bridge would provide increased hydraulic capacity and allow passage of juvenile and adult fish. In addition, three structures downstream of the culvert would be removed. They are: (1) an old grade control structure (rock weir) on Stonybrook Creek, (2) remnants of an old road, and (3) a bridge abutment at the confluence of Stonybrook and Alameda Creeks. Caltrans also proposes to realign the northbound lane around the existing underpass support column, broaden the shoulders of the highway, and build retaining walls into the hillside for a distance of about 45 meters.

In November 2003, Maura E. Moody of NOAA's National Marine Fisheries Service (NMFS) advised Caltrans that currently there were no steelhead in Alameda Creek at the project area due to an impassable fish barrier at the BART weir approximately 3.4 miles downstream. However, various agencies and groups are working to remove this barrier at the BART weir and other barriers to upstream migration in Alameda Creek to enable CCC steelhead to reach the upper Alameda Creek watershed. As noted in your above-referenced letter, if these efforts are successful before the project is constructed, CCC steelhead probably would be present in the project area. At present CCC

steelhead are not present in the project area and, thus, the analysis performed by NMFS was limited to determining the ability of the completed project to provide for the upstream and downstream passage of steelhead. However, if the downstream fish passage barriers are removed prior to project construction, this consultation should be re-initiated with NMFS to address potential construction-related impacts on steelhead.

The project includes the following measures to minimize impacts to resident rainbow trout: fencing of environmentally sensitive areas; a work window of June 15 to October 15; use of cofferdams to dry out work areas but enable the continued flow of Alameda Creek; an onsite biological monitor; employee orientation; adherence to Caltrans Best Management Practices; and post construction re-vegetation.

Although there currently are no CCC steelhead in the project area, it appears very likely that proposed downstream barrier removals unrelated to the project will permit them to migrate through the project area in the future. The proposed clear span bridge and the other design modifications discussed above are expected to create suitable conditions for migrating CCC steelhead by removing an existing barrier. Accordingly NMFS concurs with Caltrans' determination that this project may affect, but will not likely adversely affect threatened CCC steelhead.

This concludes consultation in accordance with 50 CFR §402.13(a) for the proposed Caltrans SR 84 Niles Canyon Safety Widening Project. However, further consultation may be required if: (1) new information becomes available indicating that listed species or critical habitat may be adversely affected by the project in a manner not previously considered, (2) current project plans change in a manner that affects listed species or critical habitat in a manner not previously considered, or (3) a new species is listed or critical habitat designated that may be affected by the action.

Any questions regarding this consultation should be directed to William Leet of my Santa Rosa staff at (707) 575-6016.

Sincerely,

Rodney McInnis
Regional Administrator

cc: Russ Strach, NMFS
Amy Fowler, Caltrans, Oakland
Eric Shott, NMFS

FOUNDATION REPORT FOR STONYBROOK CREEK BRIDGE DATED 09-25-2009

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. SAMAD HAMOUD
Senior Bridge Engineer
Structures Design West
Office of Bridge Design-West

Date: September 25, 2009

Attention: SON LY

File: 04-ALA-84 (KP 19.13/21.16)
04-174401
Stonybrook Creek Bridge

From: SUNNY YANG
Transportation Engineer
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

HOOSHMAND NIKOUI
Chief, Branch A
Office of Geotechnical Design-West
Geotechnical Services
Division of Engineering Services

Subject: Foundation Report for Stonybrook Creek Bridge

You have requested a foundation report for the bottomless box culvert structure overpassing the Stonybrook Creek that would replace the existing single box culvert and will become part of the traffic safety improvement on Route 84 in Alameda County, within the cities of Fremont and Union City.

This foundation report is an update of a previous version submitted to your office by Panchanatham N. Sundaram and Hooshmand Nikoui (August 5, 2008). The previous report was prepared for the design of a double bottomless box culvert for the Stonybrook Creek overpass structure. The current report reflects changes in our geotechnical recommendations due to modifications of structure plans since the issuance of the last report.

1. PERTINENT REPORTS AND INVESTIGATIONS

The following reports may be consulted for project details:

- "Stonybrook Creek Fish Passage Assessment" prepared for Alameda County, Public Works Agency" by Michael Lowe, April 6, 2001.
- "Geology and Seismology Information for Geotechnical Report" prepared by Grant Wilcox, August 13, 2001.

- "Modifications to the Preliminary Geotechnical Report (2001)" prepared by Panchanatham N. Sundaram and Steven Kakihara, August 3, 2004.
- "Final Seismic Design Recommendations," by Hossain Salimi, June 2, 2006.
- "Project Report" prepared by J. Scott Patterson, June 30, 2006.
- "Retaining Wall Type Selections" prepared by Hooshmand Nikoui, April 24, 2007.
- "Foundation Report for Wing Walls at Stonybrook Creek Bridge" prepared by Hooshmand Nikoui, July 30, 2008.

2. EXISTING CULVERT AND CONCERNS

The existing 17.5 m (57 ft) long reinforced box culvert drains the Stonybrook Creek into the Alameda Creek (average slope through the culvert is 4%). The creek's lower 600 m (2000 ft) length consists of large cobbles, with some gravels.

The present culvert's internal dimensions are 3 m wide by 2.1 m high, and is considered inadequate to pass the current standard design discharges and allow passage of fish migrating upstream. As per hydraulic capacity calculations, the traveled way of SR 84 is overtopped every 9.2 years. There is also an erosion concern at the location where the creek turns at 90 degrees to flow under SR 84. According to Project Report (June 30, 2006), a single span bridge was recommended that would meet the Federal Fish and Wildlife Service (FWS) as well as the National Oceanic and Atmospheric Administration (NOAA) requirements with regards to fish passage in the Stonybrook Creek.

3. TOPOGRAPHY AND DRAINAGE

The project site is in a mountainous area with deep cuts in soil and rock on the left side. Alameda Creek that is strewn with cobbles, boulders and sand bars of various dimensions exist on the right side.

4. GEOLOGY

4.1 Regional

Located within the Coast range geomorphic province of California, the geology of the region consists of northwest-trending ridges, gently sloping hills, intermontane valleys, and large elongated depressions. Cretaceous and Tertiary sedimentary rocks of the Great Valley Sequence, and Mesozoic and Early Cenozoic sedimentary rocks of the Franciscan

Group dominate the region. These rocks are generally mélange material created by the subduction of the Pacific Plate beneath the North American Plate.

4.2 Soil and Rock Conditions at the Bridge Site

4.2.1 Rock Conditions

The project is located in Niles Canyon, a narrow, steep-walled gap in the East Bay hills that connect Sunol Valley within the San Francisco Bay depression. Canyon walls consist of steeply dipping Cretaceous and Tertiary sedimentary rocks. The canyon floor consists of alluvial terrace deposits of Alameda Creek as well as large boulders (1 to 2 m in size) of locally derived sandstone.

The project area consists of two sedimentary units, both Cretaceous in age. The oldest unit, as yet unnamed, contains distinctly bedded sandstone and shale and underlies the western and eastern portions of the project area. The younger Oakland Sandstone underlies the central portion of the project area. Generally, rocks through the project area are hard and, thus, hard rock conditions should be expected.

A total of six boreholes were drilled around the existing culvert boundaries. Two of the boreholes (SB-1 and SB-5) were drilled in June 2006 while three holes (SB-4, SB-6 and SB-7 were drilled in April 2007. Bore hole SB-2 was not considered for interpretation of the soil/rock conditions, since it was somewhat far from the new bridge location. See Appendix A for relative locations of the boreholes. Appendix A includes the LOTBs for the five holes, SB-1, SB-4, SB-5, SB-6 and SB-7. Only hole SB-1 was drilled to a depth of nearly 30 m. All the remaining holes were drilled only to a depth of 13 m, since only sandstone rock was encountered in all the boreholes and the soil overburden was negligible. These sandstone rocks were essentially slightly weathered, medium hard to very hard. The RQD varied between 0% and 50%.

4.2.2 Soil Conditions

As revealed in the borings, there is not much soil overburden of significant depth within the bridge footprint in the traveled area. The soil overburden in the Alameda Creek area could not be ascertained because of restrictions to drilling in the creek bed location. Depending on the flood conditions in the creek, it is anticipated that the soil overburden thickness could vary.

4.3 Groundwater

Depth to groundwater could not be measured because of the nature of drilling. In general, subsurface water levels are subject to fluctuations controlled by the season. Due to the presence of jointed and fractured rock, the water level is considered to be controlled by the water level in the Alameda Creek.

5. SCOUR EVALUATION

Based on the information provided by Structure Design (E-Mail from M. Omran dated July 15, 2008), the design scour depth at the bridge location is zero.

6. CORROSION EVALUATION

Corrosion evaluation could not be performed since practically no soil overburden was encountered in the boreholes SB-1,SB-4,SB-5,SB-6 and SB-7. However, evaluation of corrosion potential of soil samples in other holes within the overall project area showed that it was nil.

7. SEISMIC STUDIES

Please refer to the Memo from Hossain Salimi to Mr. Gary Joe, dated June 2, 2006 for the final seismic design recommendations for the bridge. The following is a brief summary of the proposed preliminary seismic parameters.

Soil (Caltrans Seismic Design Criteria type) = C Soil
Controlling Fault = Hayward Fault (2 km from project site)
Maximum Moment Magnitude, Mw = 7.5
Peak Bedrock Acceleration at the site = 0.6 g
Surface Rupture at the Bridge site = Minimal
Potential for Liquefaction = Minimal
Surface Settlement due to Shaking = Minimal

For clarification or additional information on seismic design aspects of the project, please consult Hossain Salimi at (916) 227–7147.

8. AS-BUILT FOUNDATION DATA

Currently, we do not have any information on the type of foundation support for the existing culvert and wing walls. However, it is reasonable to believe the existing structures are founded on spread/strip footings on rock surface.

9. FOUNDATION RECOMMENDATIONS

Since the subsurface material is essentially sandstone rock for a depth of at least 15 m (50 ft), the appropriate foundation type is spread footing. The Structure Design has developed footing dimensions as shown in Table 1 below. The Structure Design has also provided structure loads in Tables 1 through 4 (dated August 11, 2009). Please refer to P & Q plans for details of the bridge structure. According to current Caltrans design practice, the WSD method is applicable to both abutments. The LRFD Strength and Extreme Event Limit States are not applicable for this bridge (Table 4).

Table 1. Foundation Data

Support No.	Design Method	Finish Grade Elevation (m)	BOF Elevation (m)	Footing Size (m)		Permissible Settlement under Service Load (mm)*
				B	L	
Abut 1	WSD	40.5	37.29	2.43	18.34	25
Abut 2	WSD	40.5	37.29	2.43	18.34	25

* Based on CALTRANS' current practice, the total permissible settlement for a shallow footing is one inch for multi-span structures with continuous spans or multi-column bents, one inch for single span structures with diaphragm abutments, and two inches for single span structures with seat abutments. Different permissible settlement under service loads may be allowed if a structural analysis verifies that required level of serviceability is met.

Table 2. Scour Data

Support No.	Long Term (Degradation and Contraction) Scour Elevation (m)	Short Term (Local) Scour Depth (m)
Abut 1	1	1
Abut 2	1	1

Table 3. LRFD Service Limit State I

Support No.	Total Load				Permanent Load*		
	Vertical Load (kN)	Effective Dimensions (m)		Horizontal Load in transverse Direction (kN)	Vertical Load (kN)	Effective Dimensions (m)	
		B'	L'			B'	L'
Abut 1	7000	2.43	18.34	-	5000	2.43	18.34
Abut 2	7000	2.43	18.34	-	5000	2.43	18.34

*See Table 3.4.1-2 in the AASHTO LRFD Bridge Design Specifications for components of permanent load. Total and Permanent Loads are NET for Bents and GROSS for Abutments.

Table 4. LRFD Strength and Extreme Event Limit States

Support No.	Strength Limit State (Controlling Group)			Extreme Event Limit State (Controlling Group)		
	Vertical Load (kN)	Effective Dimensions (m)		Vertical Load (kN)	Effective Dimensions (m)	
		B'	L'		B'	L'
Abut 1, 2	N/A	N/A	N/A	N/A	N/A	N/A

The foundation design analysis was performed in general using the methods outlined in AASHTO LRFD Bridge Design Specifications (2007); however, the reduction factor for geotechnical strength parameters was based on Caltrans/DES/Geotechnical Services. Based on LOTBs, an internal friction angle of 40 degree was conservatively assumed for the sandstone rock foundation.

Tables 5 and 6 provide a summary of foundation recommendations for the proposed spread footings. Based on the results of the analyses, the dimensions of the footings recommended by Structure Design are more than adequate for the Service Limit State.

Table 5. Foundation Design Recommendations for Spread Footings

Support Location	Footing Size (m)		Bottom of Footing Elevation (m)	Minimum Footing Embedment Depth (m)	Total Permissible Support Settlement (mm)	WSD (LRFD Service-I Limit State Load Combination)		LRFD		
	B	L						Service	Strength $\varphi_b = X$	Extreme Event $\varphi_b = 1.0$
						Permissible Gross Contact Stress (kPa)	Allowable Gross Bearing Capacity (kPa)	Permissible Net Contact Stress (kPa)	Factored Gross Nominal Bearing Resistance (kPa)	Factored Gross Nominal Bearing Resistance (kPa)
Abut 1	2.43	18.34	37.29	1.3	< 25	588	196	-	-	-
Abut 2	2.43	18.34	37.29	1.3	<25	588	196	-	-	-

Notes: 1) Recommendations are based on the foundation geometry and the loads provided by Structure Design in the Foundation Design Data Sheet. The footing contact area is taken as equal to the effective footing area, where applicable.
2) See MTD 4-1 for definitions and applications of the recommended design parameters.

Table 6: Spread Footing Data Table (for Contract Plans)

	Working Stress Design (WSD)		Load and Resistance Factor Design (LRFD)		
	Permissible Gross Contact Stress (Settlement) (kPa)	Allowable Gross Bearing Capacity (kPa)	**Service** Permissible Net Contact Stress (Settlement) (kPa)	**Strength** Factored Gross Nominal Bearing Resistance $\varphi_b = X$ (kPa)	**Extreme Event** Factored Gross Nominal Bearing Resistance $\varphi_b = 1.00$ (kPa)
Abut 1	588	196	-	-	-
Abut 2	588	196	-	-	-

10. CONSTRUCTION CONSIDERATIONS

We recommend construction of the foundations in the summer season when the water level in the Alameda Creek and Stonybrook Creek is expected to be low, thus minimizing the need for dewatering and diversion of creek water during foundation construction.

The recommendations for foundation construction are outlined in the memo from H. Nikoui to Mr. Samad Hamound (Memo dated April 24, 2007). We will consult Caltrans Construction regarding viable construction methods for excavation of spread footings. The contractor may have to employ special methods to perform excavations in sandstone rock.

11. DISCLAIMER AND CONTACT INFORMATION

The recommendations contained in this report are based on specific project information regarding structure type, location, and design loads that have been provided by the Office of Design West. If any conceptual changes are made during final project design, the Office of Geotechnical Design West, Design Branch A should review those changes to determine if these foundation recommendations are still applicable. Any questions regarding the above recommendations should be directed to the attention of Hooshmand Nikoui at (510) 286-4811, at the Office of Geotechnical Design-West, Branch A.

Attachments:

c: TPokrywka, HNikoui, RKiaaina, TLy, SHamoud, SLy, Daily File, Route File, Translab File

SYang

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 12-11-07

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Panch Sundaram NO. C57665 EXP. 12-30-07 CIVIL STATE OF CALIFORNIA

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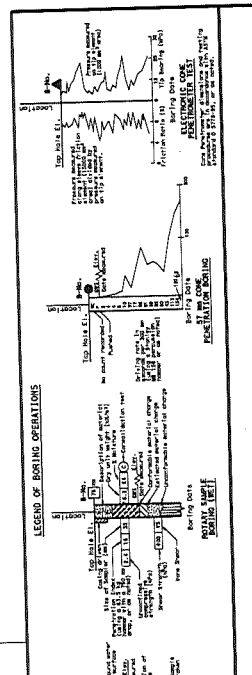
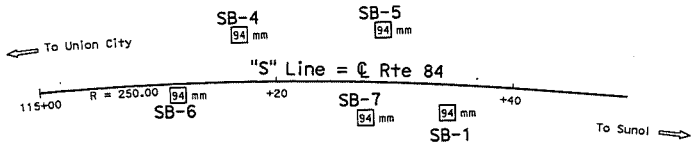


OGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)



BENCH MARK

SURVEY CONTROL

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E 1872274.909
Elev = 50.059

FD681
Fnd 25 mm IP /CT pp & Tack
08.016 m Lt ℄ "S" Line Rte 84
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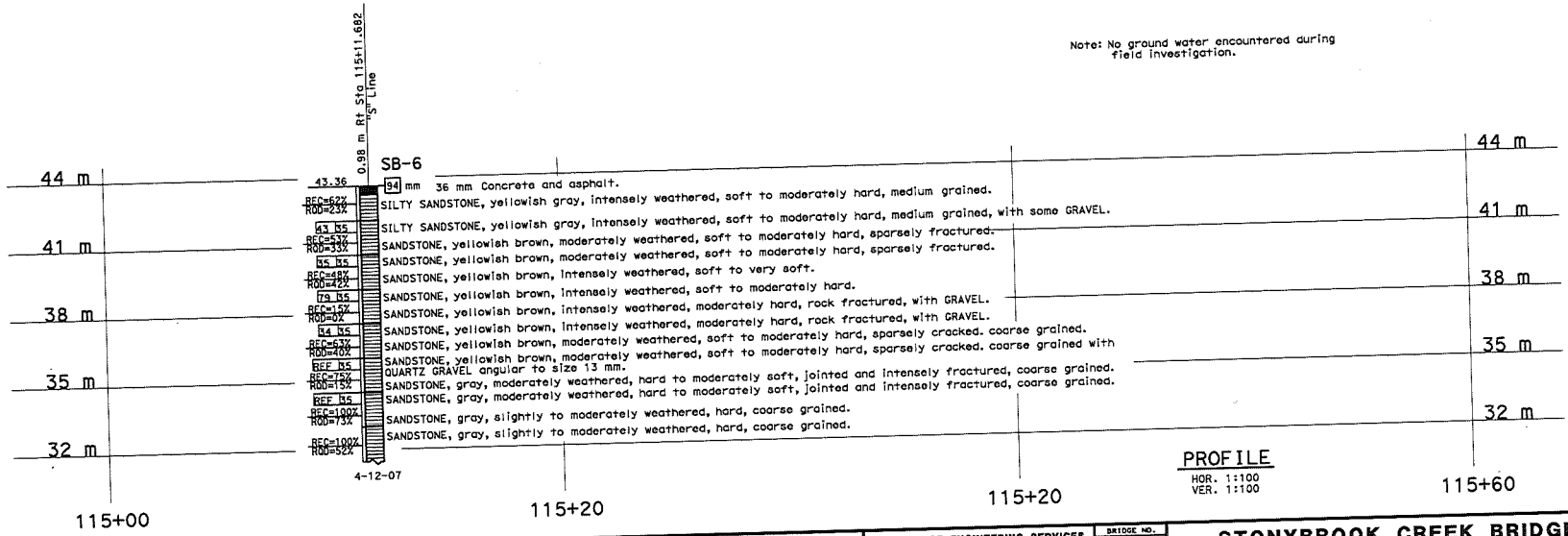
Elev = 43.565

PLAN

1:200

Note: No ground water encountered during field investigation.



PROFILE

HOR. 1:100
VER. 1:100

Caltrans Metric	ENGINEERING SERVICES	GEOTECHNICAL SERVICES	FIELD INVESTIGATION BY: R. Nashed	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH	BRIDGE NO. 33-0731	STONYBROOK CREEK BRIDGE
	DRAWN BY F. Nguyen 11/07					KILOMETER POST 20.85	LOG OF TEST BORINGS 1 OF 4
	CHECKED BY P. Sundaram				CU 04 EA 174401	DISREGARD PRINTS BEARING EARLIER REVISION DATES 12-11-07	SHEET OF
	ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN		ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100		FILE => stonybrk1of4.dgn	REVISION DATES (PRELIMINARY STAGE ONLY) 12-11-07	

USERNAME => s128198 DATE PLOTTED => 25-SEP-2009 TIME PLOTTED => 10:59

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 12-11-07

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Panch Sundaram No. C57665 Exp. 12-30-07 CIVIL STATE OF CALIFORNIA

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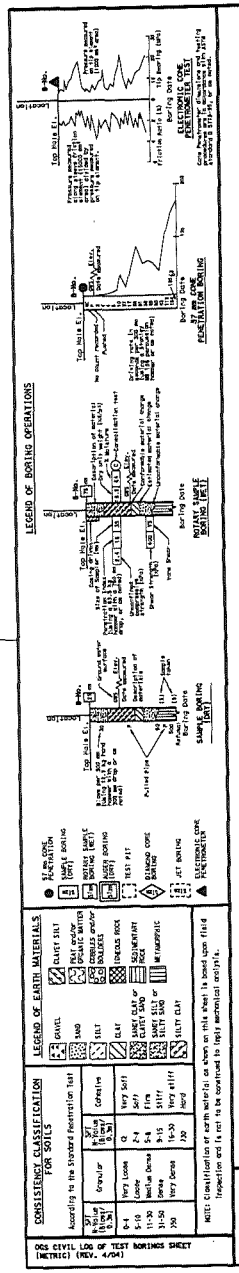
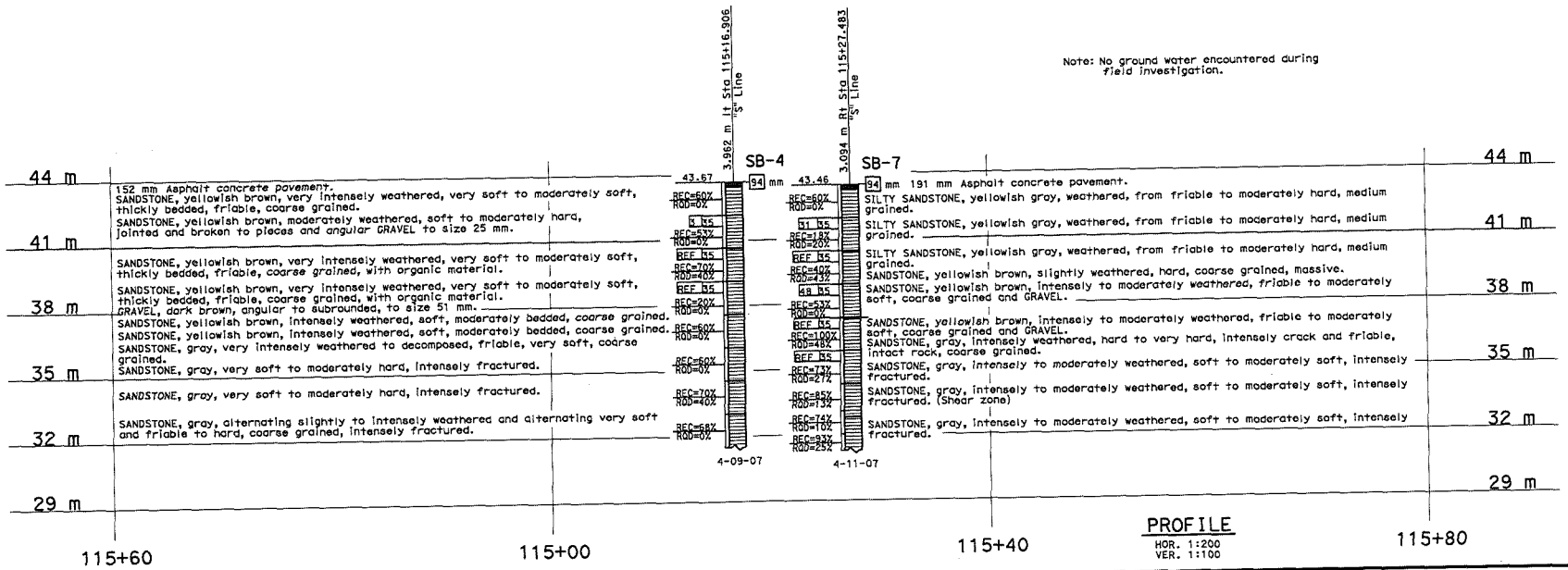


FOR PLAN VIEW, SEE
"LOG OF TEST BORINGS" 1 OF 4

Note: No ground water encountered during field investigation.



PROFILE
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ENGINEERING SERVICES	GEOTECHNICAL SERVICES	FIELD INVESTIGATION BY:
DRAWN BY F. Nguyen 11/07		R. Nashed
CHECKED BY P. Sundaram		

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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 ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH

CU 04
EA 174401

FILE => stonybrk2of4.dgn

BRIDGE NO. 33-0731
KILOMETER POST 20.85

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 12-11-07

SHEET OF

STONYBROOK CREEK BRIDGE
LOG OF TEST BORINGS 2 OF 4

USERNAME => s128198 DATE PLOTTED => 25-SEP-2009 TIME PLOTTED => 10:59

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	84			

REGISTERED CIVIL ENGINEER 12-11-07

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Panch Sundaram No. C57665 Exp. 12-30-07 CIVIL STATE OF CALIFORNIA

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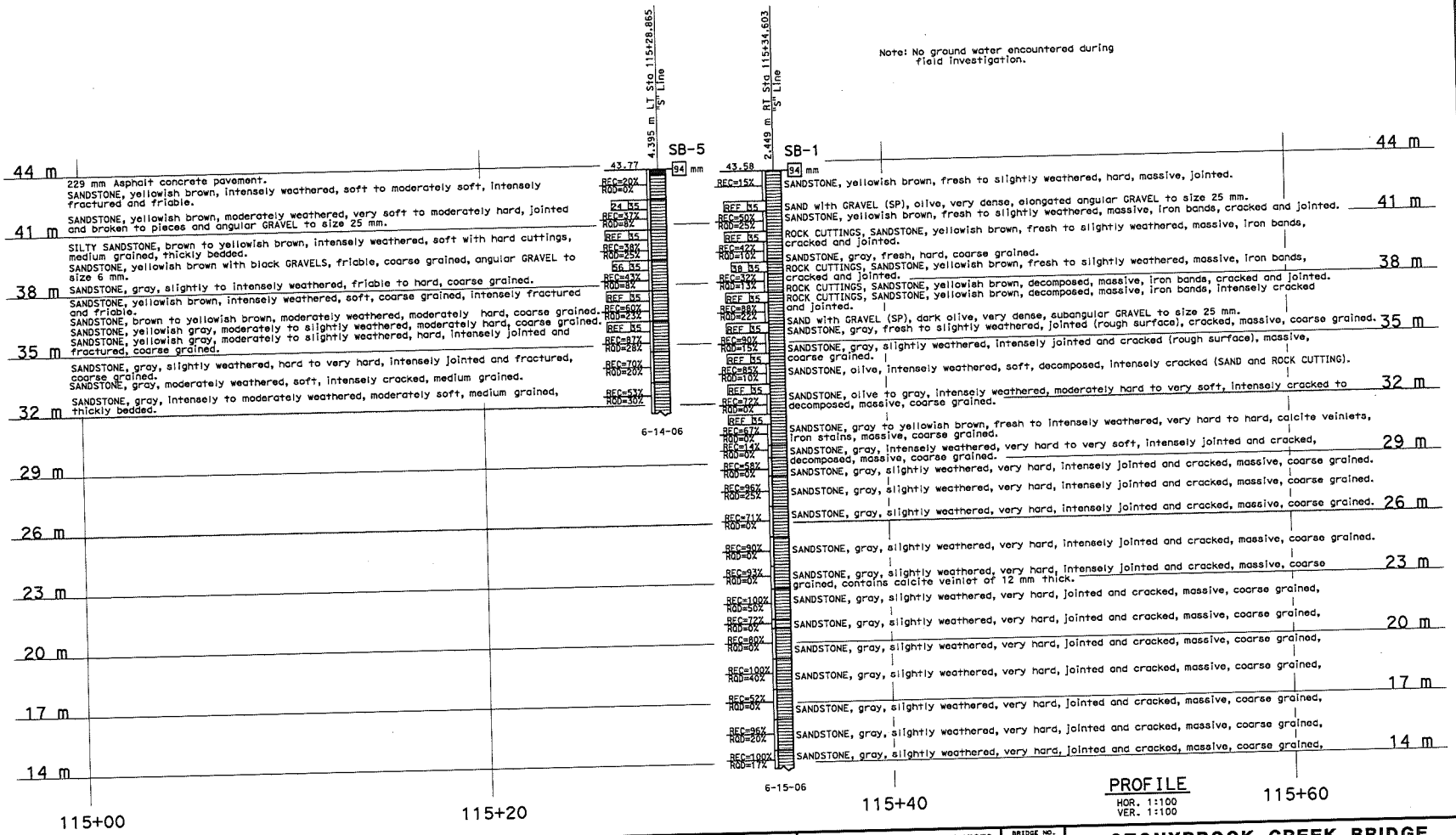
FOR PLAN VIEW, SEE
"LOG OF TEST BORINGS" 1 OF 4

Note: No ground water encountered during field investigation.



PROFILE
HOR. 1:100
VER. 1:100

LEGEND OF BORING OPERATIONS

LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration Test

Note: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

OCS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY F. Nguyen 11/07	
CHECKED BY	

FIELD INVESTIGATION BY: R. Nashed

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN
DESIGN BRANCH

BRIDGE NO. 33-0731
KILOMETER POST 20.85

STONYBROOK CREEK BRIDGE
LOG OF TEST BORINGS 3 OF 4

CU 04
EA 174401

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 11-29-07 12-11-07

SHEET OF

FILE => stonybrk3of4.dgn

USERNAME => s128198 DATE PLOTTED => 25-SEP-2009 TIME PLOTTED => 11:00

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04	Ala	84			

REGISTERED CIVIL ENGINEER 12-11-07

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Panch Sundaram No. C57665 Exp. 12-30-07 CIVIL STATE OF CALIFORNIA

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WEATHERING DESCRIPTORS

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

Descriptors		Diagnostic features					General characteristics 5 (strength, excavation, etc.)
		Chemical weathering-Discoloration and/or oxidation		Mechanical weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Texture and solutioning		
Alphanumeric descriptor	Descriptive term	Body of rock	Fracture surfaces +		Texture	Solutioning	
W1	Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck. Almost always rock excavation except for naturally weak or weakly cemented rocks such as siltstones or shales.
W2	Slightly weathered to fresh*						
W3	Slightly weathered	Discoloration or oxidation is limited to surfaces of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved.	Minor leaching of some soluble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened. With few exceptions, such as siltstones or shales, classified as rock excavation.
W4	Moderately to slightly weathered*						
W5	Moderately weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved.	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened. Depending on fracturing, usually is rock excavation except in naturally weak rocks such as siltstones or shales.
W6	Intensely to moderately weathered*						
W7	Intensely weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semiarid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened. Usually common excavation.
W8	Very intensely weathered						
W9	Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Always common excavation. Resistant minerals such as quartz may be present as "stringers" or "dikes."

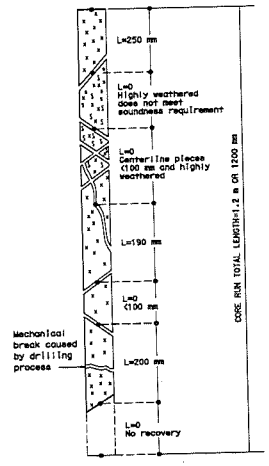
Note: This chart and its horizontal categories are more readily applied to rocks with feldspars and mafic minerals. Weathering in various sedimentary rocks, particularly limestones and poorly indurated sediments, will not always fit the categories established. This chart and weathering categories may have to be modified for particular site conditions or alteration such as hydrothermal effects; however, the basic framework and similar descriptors are to be used.

* Combination descriptors are permissible where equal distribution of both weathering characteristics are present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, dual descriptors should not be used where significant, identifiable zones can be delineated. When given as a range only two adjacent terms may be combined. "Decomposed to slightly weathered," or "moderately weathered to fresh" are not acceptable.

\+ Does not include directional weathering along shears or faults and their associated features. For example, a shear zone that carried weathering to great depths into a fresh rock mass would not require the rock mass to be classified as weathered.

5 These are generalizations and should not be used as diagnostic features for weathering or excavation classification. These characteristics vary to a large extent based on naturally weak materials or cementation and type of excavation

ROCK QUALITY DESIGNATION (RQD) & PERCENT RECOVERY (REC) LOGGING



RQD (ROCK QUALITY DESIGNATION)	DESCRIPTION OF ROCK QUALITY
0 - 25%	VERY POOR
25 - 50%	POOR
50 - 75%	FAIR
75 - 90%	GOOD
90 - 100%	EXCELLENT

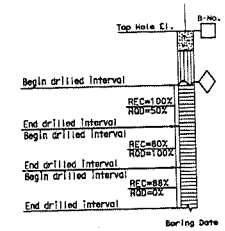
REC = Percent Core Recovery

$$REC = \frac{\sum \text{Length of all core pieces}}{\text{Total core run length}}$$

$$RQD = \frac{\sum \text{Length of sound core pieces} \geq 100\ mm}{\text{Total core run length}}$$

$$RQD = \frac{250+190+200}{1200} \times 100\%$$

RQD = 53% (fair)



(No Scale)
After Deere & Deere, 1989

FRACTURE DENSITY

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

FRACTURE DENSITY- Based on the spacing of all natural fractures in an exposure or core recovery lengths in boreholes; excludes mechanical breaks, shears, and shear zones; however, shear-disturbed zones (fracturing outside the shear) are included. Descriptors for fracture density apply to all rock exposures such as tunnel walls, dozer trenches, outcrops, or foundation cut slopes and inverts, as well as boreholes. Descriptive criteria presented below are based on borehole cores where lengths are measured along the core axis, for other exposures the criteria is distance measured between fractures (size of blocks).

UNFRACTURED (FD0): No fractures.

VERY SLIGHTLY FRACTURED (FD1): Core recovered mostly in lengths greater than 1 m.

SLIGHTLY TO VERY SLIGHTLY FRACTURED (FD2)*

SLIGHTLY FRACTURED (FD3): Core recovered mostly in lengths from 300 to 1000 mm, with few scattered lengths less than 300 mm or greater than 1000 mm.

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* Combinations of fracture densities (e.g. very intensely to intensely fractured, or moderately to slightly fractured) are used where equal distribution of both fracture density characteristics are present over a significant interval or exposure, or where characteristics are "in between" the descriptor definitions.

ROCK HARDNESS DESCRIPTORS

Alphanumeric Descriptor	Descriptor	Criteria
H1	Extremely hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows.
H2	Very hard	Cannot be scratched with knife or sharp pick. Core or fragment breaks with repeated heavy hammer blows.
H3	Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
H4	Moderately hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
H5	Moderately soft	Can be grooved 2 mm deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
H6	Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
H7	Very soft	Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.

Any bedrock unit softer than H7, very soft, is to be described using ASTM D-2488 consistency descriptors.

Note: Although "sharp pick" is included in these definitions, descriptions of ability to be scratched, grooved or gouged by a knife is the preferred criteria.

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Descriptors	Thickness / Spacing
Massive	Greater than 3 m
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Thickly	300 mm to 1 m
Moderately	100 to 300 mm
Thinly	30 to 100 mm
Very thinly	10 to 30 mm
Laminated (intensely foliated or banded)	Less than 10 mm

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

Caltrans Metric

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
PREPARED BY	F. Nguyen 11/07
CHECKED BY	

OGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 8/03)

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 ENGINEERING SERVICES STRUCTURE DESIGN

DESIGN BRANCH

CU 04
EA 174401

FILE => stonybrk4of4.dgn

BRIDGE NO. 33-0731
KILOMETER POST 20.85

DISREGARD PRINTS BEARING EARLIER REVISION DATES 12-11-07

REVISION DATES | SHEET | OF

STONYBROOK CREEK BRIDGE

LOG OF TEST BORINGS 4 OF 4

USERNAME => s128198 DATE PLOTTED => 25-SEP-2009 TIME PLOTTED => 11:00

FOUNDATION REPORT FOR NILES CANYON ROUTE 84 RETAINING WALL N1-CATCHER SYSTEM DATED 01-06-2010

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. SAMAD HAMOUD
Senior Bridge Engineer
Office of Bridge Design-West

Date: January 6, 2010

Attention: SON LY

File: 04-ALA-84 (KP 19.48)
04-174411
Catcher System

From: S. YANG / V. KHATA-O-KHOTAN
Transportation Engineer
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

HOOSHMAND NIKOUI
Chief, Branch A
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject: Foundation Report (FR) for Niles Canyon Route 84 Retaining Wall N1 - Catcher System

1. PROJECT DESCRIPTION

This memo provides foundation recommendations for the proposed catcher system on Route 84 (KP 19.48) at Niles Canyon in the City of Fremont. The purpose of the catcher system is to support the railroad bridge superstructure overcrossing Route 84, in the event of bridge collapsing due to seismic loading. The catcher structure is to be constructed at the eastbound side of the roadway, on the creek bed of Alameda Creek. The catcher system is part of a bigger project to improve traffic safety on Route 84 in Alameda County, within the cities of Fremont and Union City (KP 19.13/21.16).

2. SCOPE OF WORK

The following tasks were performed for the preparation of this Foundation Report:

1. Field geotechnical exploration, including drilling two exploratory borings at the location of the proposed catcher system, performing Standard Penetration Test (SPT), measuring groundwater infiltration rate, collecting soil and rock samples;
2. Laboratory testing, including Unconfined Compression Tests on rock samples;
3. Foundation Design Analysis; and
4. Preparation of this Foundation Report.

3. TOPOGRAPHY AND DRAINAGE

The project site is in a mountainous area with deep cuts in soil and rock on the westbound side. Alameda Creek, which is strewn with cobbles, boulders and sand bars of various dimensions, exists on the eastbound side.

4. GEOLOGY

4.1. Regional Geology

Located within the coast range geomorphic province of California, the geology of the region consists of northwest-trending ridges, gently sloping hills, intermountain valleys, and large elongated depressions. Cretaceous and Tertiary sedimentary rocks of the Great Valley Sequence, and Mesozoic and Early Cenozoic sedimentary rocks of the Franciscan Group dominate the region. These rocks are generally mélange material created by the subduction of the Pacific Plate beneath the North American Plate.

4.2. Rock Conditions at the Catcher System Site

The project is located in Niles Canyon, a narrow, steep-walled gap in the East Bay hills that connects Sunol Valley within the San Francisco Bay depression. Canyon walls consist of steeply dipping Cretaceous and Tertiary sedimentary rocks. The canyon floor consists of alluvial terrace deposit of Alameda Creek as well as large boulders (1 to 2 m in size) of locally derived sandstones.

The project area consists of two sedimentary units, both Cretaceous in age. The oldest unit, as yet unnamed, contains distinctly bedded sandstone and shale and underlies the western and eastern portions of the project area. The younger Oakland Sandstone underlies the central portion of the project area.

Two boreholes (B-1 and B-2) were drilled in June 2009 on the creek bed of Alameda Creek, one on either side of the railroad bridge. Based on Log of Test Borings of these holes (see attachment), bedrock was encountered in both holes at 2 m depth. The bedrock is composed primarily of intense weathered, soft to medium hard sandstone and shale. Average RQD is 0% at B-1 and approximately 40% at B-2.

4.3. Soil Conditions at the Catcher System Site

According to the LOTBs, the surface soil layer is only 2 m thick, consisting of medium dense to dense sandy gravels and cobbles.

4.4. Groundwater

Groundwater was measured to be at 1.7 m depth (elevation 28.7 m) in borehole B-1, which is similar to the stream water level in Alameda Creek. In general, groundwater level is subject to seasonal fluctuations.

5. SCOUR EVALUATION

The depth of scour has been estimated by Mr. Tony Nedwick of Structure Hydraulics to be approximately 1.0 m below the original ground surface.

6. CORROSION EVALUATION

Based on laboratory investigations of the soil samples from a nearby borehole (N1-1), the site soil is deemed to be non-corrosive.

7. SEISMIC STUDY

Please refer to the Memo from Hossain Salimi to Mr. Gary Joe, dated June 2, 2006 for the preliminary seismic design recommendations. The following is a brief summary of the proposed preliminary seismic design parameters:

Soil Type = Type C (per Caltrans Seismic Design Criteria 2004)
Controlling Fault = Hayward Fault (2 km from project site)
Maximum Moment Magnitude, Mw = 7.5
Peak Bedrock Acceleration = 0.6 g
Surface Rupture Potential = Minimum
Liquefaction Potential = Minimum
Surface Settlement due to Shaking = Minimum

For clarification or additional information on seismic design aspects of the project, please consult Hossain Salimi at (916) 227-7147.

8. FOUNDATION RECOMMENDATIONS

The LRFD Strength and Extreme Event Limit States are used for this design. Considering the significant overturning moment under seismic loading (Extreme Event), the Structure Design has recommended a group of 22 (2 rows of 11 each) 600 mm, 900 kN CIDH piles as the foundation support. The Structure Design has also provided structure loads in Tables 1 through 4 (dated September 9, 2009).

Table 1. Preliminary Foundation Design Data Sheet

Support No.	Foundation Type(s) Considered	Estimate of Maximum Factored Compression Loads (kN)
1	600mm CIDH 900kN Pile	450

Table 2. Scour Data

Support No.	Long Term (Degradation and Contraction) Scour Elevation (m)	Short Term (Local) Scour Depth (m)
1	1	1

Table 3. Foundation Design Data Sheet

Support No.	Design Method	Pile Type	Finished Grade Elevation (m)	Cut-off Elevation (m)	Pile Cap Size (m)		Permissible Settlement under Service Load (mm) *	Number of Piles per Support
					B	L		
1	LRFD	600mm CIDH	29.0	27.35	3.7	16.77	25	2rows @ 11 each = 22 Total

* Based on CALTRANS' current practice, the total permissible settlement for a shallow footing is one inch for multi-span structures with continuous spans or multi-column bents, one inch for single span structures with diaphragm abutments, and two inches for single span structures with seat abutments. Different permissible settlement under service loads may be allowed if a structural analysis verifies that required level of serviceability is met.

Table 4. Foundation Design Loads

Support No.	Service Limit State (kN)			Strength Limit State (Controlling Group, kN)				Extreme Event Limit State (Controlling Group, kN)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
1	7800	360	6000	9700	450	-	-	7800	1800	-	900

The foundation design analysis was performed in general using the methods outlined in AASHTO LRFD Bridge Design Specifications (2007); however, the reduction factor for geotechnical strength parameters was based on Caltrans/DES/Geotechnical Services. Only skin friction was considered in pile resistance calculations. Based on LOTBs (see attachment) and unconfined compression tests on collected samples, the shale materials were assigned a cohesion of 10 psi, and the sandstone was assigned a shear strength of 43 psi and an internal friction angle of 30 degrees.

Table 5 provides a summary of design tip elevations and specified tip elevation for the proposed CIDH piles. Based on the results of the analyses, the pile length is controlled by compression load in the Extreme Event to be 19 m.

Table 5. Foundation Design Recommendations

Support Location	Pile Type	Cut-off Elevation (m)	Service-I Limit State Load per Support (kN)	Total Permissible Support Settlement (mm)	Required Factored Nominal Resistance (kN)				Design Tip Elevation (m)	Specified Tip Elevation (m)
					Strength Limit		Extreme Event			
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1)	Tension (φ=1)		
1	600mm CIDH	27.35	7800	< 25	643	-	1800	900	19.35 (a) 8.35 (b) 17.55 (c)	8.35

Notes: 1) Design tip elevations are controlled by: (a) Compression (Strength Limit), (b-I) Compression (Extreme Event Limit), and (c) Tension (Extreme Event Limit), respectively.
2) The drilled shaft specified tip elevation shall not be raised.

9. CONSTRUCTION CONSIDERATIONS

We recommend construction of the foundation in the summer season when the water level in Alameda Creek is expected to be low, thus minimizing the need for dewatering and diversion of creek water during construction.

All CIDH piles shall be constructed under "Guidelines for CIDH Piles Cast in Wet Conditions." Drilling of the CIDH piles, placement of rebar cage, and concrete pour shall be completed in a continuous operation.

Difficult pile installation is anticipated due to the presence of sandstone rock and ground water. The contractor shall submit the drilling logs for CIDH piles for review after the completion of drilling. The drilling log shall include penetration rate, material descriptions, estimated volume of cuttings (poor, good, excessive) and other information pertaining to the drilling process (loss of circulation, zones of caving, down pressure, etc.) Excavated materials and drilling fluid shall be handled and disposed of in accordance with the contract plan.

Temporary casing may be needed. The contractor has the option of using full-length temporary casing. The use of temporary casing will require that it be removed while the concrete is being placed in order to develop the expected pile capacity and to facilitate the casing removal. Prior to placement of concrete, the interior surface of the shaft including the bottom should be cleaned of residue from drilling operations.

10. DISCLAIMER AND CONTACT INFORMATION

The recommendations contained in this report are based on specific project information regarding structure type, location, and design loads that have been provided by the Office of Structure Design West. If any conceptual changes are made during final project design, the Office of Geotechnical Design West, Design Branch A should review those changes to determine if these foundation recommendations are still applicable. Any questions regarding the above recommendations should be directed to the attention of Hooshmand Nikoui at (510) 286-4811.

Attachments: LOTBs

c: TJPokrywka, HNikoui, RKiaaina, SHamoud, SLy, VKhata-O-Khotan, Daily File, Route File, Translab File

SYang/mm

REGISTERED PROFESSIONAL ENGINEER
HOOSHMAND NIKOUI-G
No. 42698
Exp. 3/31/10
CIVIL
STATE OF CALIFORNIA

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	84	19.48		

REGISTERED CIVIL ENGINEER — DATE 12/29/09

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Zhaohui Yang — No. 75801 — Exp. 12-31-09 — 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.

Notes:
1. The indicated numbers for Standard Penetration Tests (SPT) are the uncorrected field values obtained during drilling.
2. SPT boring was performed using an "Automatic Hammer".
3. qu (lab): Indicates unconfined compressive strength determined in the soil lab on soil samples collected in the field.
4. Ground water was encountered in all of the borings during the field investigation.

BENCH MARK

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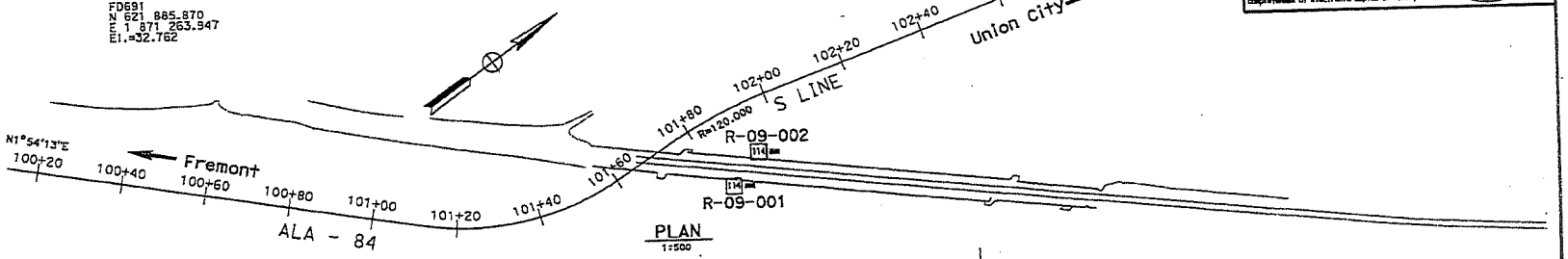
N 621 885.870
E 1 871 263.947
El.=32.762



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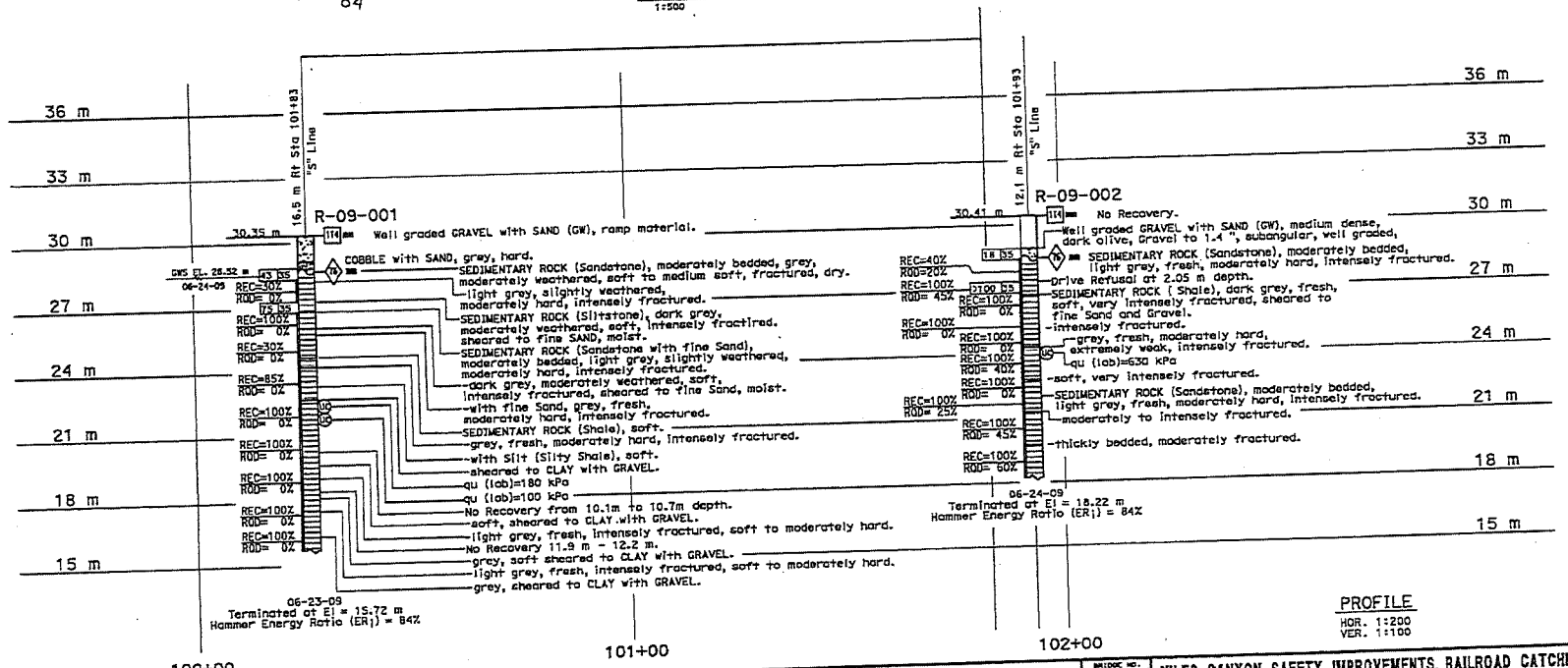

PROFILE
HOR. 1:200
VER. 1:100

LEGEND OF BORING OPERATIONS

LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS

SEE CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/01)

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY M. Reynolds 01/10	
CHECKED BY B. Price	

FIELD INVESTIGATION BY: S. Yang
FUNCTIONAL SUPERVISOR: H. Nikoui

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL
DESIGN - WEST

CU 04
EA 174401

BRIDGE NO. 33E0063
KILOMETER POST 19.48

NILES CANYON SAFETY IMPROVEMENTS, RAILROAD CATCHER

LOG OF TEST BORINGS 1 of 2

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS

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USERNAME => A174401E2 DATE PLOTTED => 05-JAN-2010 TIME PLOTTED => 15:50

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	84	19.48		

12/29/09
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

Zhaohui Yang
No. 71801
Exp. 12-31-09
CIVIL
REGISTERED PROFESSIONAL ENGINEER · STATE OF CALIFORNIA

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WEATHERING DESCRIPTORS

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

Descriptors		Diagnostic features: Chemical weathering-Discoloration and/or oxidation		Diagnostic features: Mechanical weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Diagnostic features: Texture and solutioning		General characteristics § (strength, excavation, etc.)
Alphanumeric descriptor	Descriptive term	Body of rock	Fracture surfaces †		Texture	Solutioning	
W1	Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck. Almost always rock excavation except for naturally weak or weakly cemented rocks such as siltstones or shales.
W2	Slightly weathered to fresh*						
W3	Slightly weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved.	Minor leaching of some soluble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened. With few exceptions, such as siltstones or shales, classified as rock excavation.
W4	Moderately to slightly weathered*						
W5	Moderately weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved.	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened. Depending on fracturing, usually is rock excavation except in naturally weak rocks such as siltstones or shales.
W6	Intensely to moderately weathered*						
W7	Intensely weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semiarid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened. Usually common excavation.
W8	Very intensely weathered						
W9	Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Always common excavation. Resistant minerals such as quartz may be present as "stringers" or "dikes."

Note: This chart and its horizontal categories are more readily applied to rocks with feldspars and mafic minerals. Weathering in various sedimentary rocks, particularly limestones and poorly indurated sediments, will not always fit the categories established. This chart and weathering categories may have to be modified for particular site conditions or alteration such as hydrothermal effects; however, the basic framework and similar descriptors are to be used.

* Combination descriptors are permissible where equal distribution of both weathering characteristics are present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, dual descriptors should not be used where significant, identifiable zones can be delineated. When given as a range only two adjacent terms may be combined. "Decomposed to slightly weathered," or "moderately weathered to fresh" are not acceptable.

† Does not include directional weathering along shears or faults and their associated features. For example, a shear zone that carried weathering to great depths into a fresh rock mass would not require the rock mass to be classified as weathered.

§ These are generalizations and should not be used as diagnostic features for weathering or excavation classification. These characteristics vary to a large extent based on naturally weak materials or cementation and type of excavation

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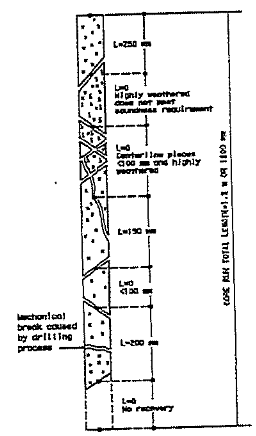

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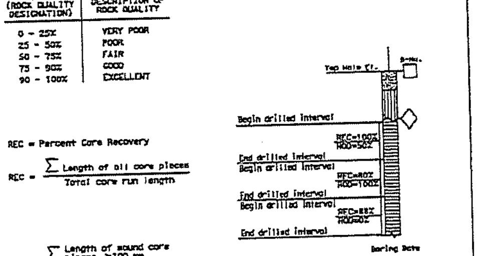

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Very thinly	10 to 30 mm
Laminated (intensely foliated or banded)	Less than 10 mm

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

Caltrans Metric

ENGINEERING SERVICES

GEOTECHNICAL SERVICES

PREPARED BY: M. Reynolds 01/10

CHECKED BY: B. Price

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL
DESIGN - WEST

BRIDGE NO. 33E0063
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NILES CANYON SAFETY IMPROVEMENTS, RAILROAD CATCHER

LOG OF TEST BORINGS 2 of 2

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EA 174401

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

GEN CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 8/06)

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USERNAME => s110322 DATE PLOTTED => 05-JAN-2010 TIME PLOTTED => 15:51

REVISED UPDATED FINAL FOUNDATION REPORT FOR RETAINING WALLS DATED 10-13-2009

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. SAMAD HAMOUD
Senior Bridge Engineer
Structures Design West

Date: October 13, 2009

Attention: Son Ly

File: 4-Ala 84- KP 19.13/21.16
04-174401
Niles Canyon Safety
Improvement Project

H. Nikoui

From: HOOSHMAND NIKOUI
Chief, Branch A
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject: Revised Updated Final Foundation Report (FR) for Retaining Walls

Per your request, we are submitting, herewith, the final updated Foundation Report (FR) for four Standard Type Retaining Walls for the proposed widening of Route 84 in Alameda County, within the Cities of Fremont and Union City. These walls are proposed to contain the roadway embankments within the State Right-of-Way and minimize encroachment into the existing Alameda Creek. The following sections summarize our findings and foundation recommendations. Please note that this updated FR (replacing our FR dated June 11, 2008) is based on the latest information we received from your office.

I. INTRODUCTION

It is proposed to improve traffic safety on Route 84 in Alameda County, within the City of Fremont and City of Union City, from KP 19.13 to 21.16.

According to the Project Report dated June 3, 2006, there is only one Build Alternative under consideration. As a safety improvement project, this alternative proposes to widen the existing shoulders to current standard, to improve sight distance and vertical clearances at Rosewarnes Underpass (Bridge No. 33-0034) and Farwell Underpass (Bridge No. 33-0035), to replace Route 84/Palomares Road Intersection approximately 19 m to the south and to provide a northbound left-turn lane on Route 84 at Palomares Road. In addition, a median soft barrier will be installed between the two mentioned underpasses. To widen the shoulders and construct the northbound left-turn lane entering

Palomares Road from Route 84, the existing box culvert in Stonybrook Creek will be removed and replaced with a single span bridge. Separate Foundation Reports will be prepared for the proposed Stonybrook Creek Bridge a its associated wing walls.

II. PROJECT DESCRIPTION

The existing Route 84 within the project limits is a two-lane conventional highway and is flanked by steep cuts in rock on the left side (looking east) and by Alameda Creek on the right. The Niles Canyon Railway passes over Route 84 at two locations (**Figure 1**) within the project boundaries, between Rosewarnes Underpass at KP 19.48 (PM 12.1) and Farewell Underpass at KP 21.49 (PM 13.3).

Due to the construction costs as well as biological and archeological impacts, the project proposes to widen the Route 84 only towards the Alameda Creek side with a minor widening (less than 50 meter long at one location) into the hillside. New right of way as well as both temporary and permanent easements will be required to construct this project.

Due to these proposed improvements, four retaining walls will need to be constructed to accommodate the proposed widening and roadway realignments at the locations listed in Table 1.

TABLE 1- Locations and Limits of the Proposed Retaining Walls

Wall ID #	Limits Sta. To Sta.	Approx. Length, m	Approx. Max. Height, m	Remarks
1	LOL N1 10+00.00 to 12+48.20	248.2	3.6	Build along Alameda Creek bed. **Type 1**
2	LOL N2 20+00.00 to 23+55.00	355	4.8	Immediately after the demolished Alameda Creek Dam on the east side of Rte. 84. Build on Alameda Creek bed. **Type 1**
3	P5 5+00 to 5+27.80	27.8	4.2	On the north side of Palomares Road. **Type 7 Mod.**
4	LOL N4 4+00 to 4+26.318	26.3	4.2	Across from the Palomares Road intersection with Rte 84 in the Alameda Creek bed. **Type 1**

Please note that originally proposed soil nail wall on the hillside has been replaced with rock bolts and rock netting and is covered under a separate report.

III. TOPOGRAPHY AND DRAINAGE

The project site is in a mountainous area with deep cuts in soil and rock on the left side. Alameda Creek, which is strewn with cobbles, boulders and sand bars of various dimensions, exists on the right side. The elevation of the traveled way generally increases towards the north.

The cuts in jointed sandstone and shale rock stand nearly vertical, albeit with occasional rock fall. However, in 1983, a failure occurred above the Rosewarnes Underpass at KP 19.47 that closed the highway for a short period of time. The geotechnical investigation that followed showed that no adverse bedding existed although several adverse joint sets are present. A recommendation was made at that time to dewater the slopes using horizontal drains. Since the installation of these drains in 1985, no further slide had occurred. However, future localized slides could still occur.

IV. GEOLOGY

A. Regional Geology and Seismicity

Located within the Coast range geomorphic province of California, the geology of the region consists of northwest-trending ridges, gently sloping hills, intermountain valleys, and large elonged depressions. Cretaceous and Tertiary sedimentary rocks of the Great Valley Sequence and Mesozoic and Early Cenozoic sedimentary rocks of the Franciscan Group dominate the region. These rocks are generally mélange material created by the subduction of the Pacific Plate beneath the North American Plate.

Table 2 summarizes the distance to nearby faults, maximum credible earthquake (MCE) on each fault, and the expected peak ground acceleration (PGA) from each fault. The site-to-source distance was measured from the nearest end of the project to the fault. The MCEs and PGAs (in g) are taken from Mualchin, 1996[1]. As can be seen, the hazard is controlled by the Hayward fault.

[1] Mualchin, L., 1996, A technical report to accompany the Caltrans California seismic hazard map, Caltrans, 64 p.

TABLE 2 – Nearby Faults and Characteristics

Fault	Distance (km)	MCE	PGA (g)
Hayward	3.5	7 ½	0.63
Calaveras	5.5	7 ½	0.58
San Andreas	34	8	0.3

B. Site Geology

The project is located in Niles Canyon, a narrow, steep-walled gap in the East Bay hills that connects Sunol Valley within the San Francisco Bay depression. The canyon walls consist of steeply dipping Cretaceous and Tertiary sedimentary rocks. The canyon floor consists of alluvial terrace deposits of Alameda Creek as well as large boulders (1 to 2 m in size) of locally derived sandstone **(Figure 2).**

The project area consists of two sedimentary units, both of Cretaceous in age. The oldest unit, as yet unnamed, contains distinctly bedded sandstone and shale and underlies the western and eastern portions of the project area. The younger Oakland Sandstone underlies the central portion of the project area. Very hard rock conditions should be expected during foundation excavation throughout the project.

Borings drilled on Route 84 within the limits of the project, showed that the bedrock elevations are approximately between 29 m and 40 m.

The soil overburden in the Alameda Creek area could not be ascertained because of restrictions to drilling in the creek bed location. Depending on the flood conditions in the creek, it is anticipated that the soil overburden thickness could vary with respect to time. The boring drilled throughout the project site revealed similar soil/rock conditions. The borings describe the foundation soil/rock as combinations of clay, sand, silt and gravel (2 to 4 meters thick) over intensely weathered to fresh and very hard shale and sandstone rocks. The SPT blow counts for the top soil-like materials ranged from 11 to 41. The SPT blow counts for shale and sandstone rocks ranged from 26 to refusal (>50). It appears that the bottom of all footings will be founded on shale or sandstone rocks.

C. Groundwater

Depth to groundwater could not be measured because of the nature of drilling. In general, subsurface water levels are subject to fluctuations controlled by the season. Due to the

presence of jointed and fractured rock and generally permeable soil, the water level considered to be controlled by the water level in the Alameda Creek.

V. SCOUR EVALUATION

The depth of scour has been estimated by Mr. Tony Nedwic of Structure Hydraulics to be about 1.0 meter below the original ground surface.

VI. WALL TYPE SELECTION

Based on our recent limited foundation investigations of the site, we have determined that Caltrans Standard Type Retaining Walls are the most economical type earth retaining system for all walls (Wall #1, 2, 3 and 4) for this project.

VII. SUBSURFACE SOIL/ROCK CONDITIONS

To investigate the foundation conditions for the proposed retaining walls 1 and 2, a total of seven (7) boreholes (N1-1, N1-2, and N2-1 through N2-5) were drilled in 2005 on or slightly outside the Route 84 northbound shoulders. Two borings (P5-1 and P5-2) were drilled along the north side of Palomares Road in the open areas for retaining wall #3. No borings have been drilled for the proposed retaining wall #4 due to dense vegetation and insufficient shoulder. No borings were drilled in the Alameda Creek bed for retaining walls 1, 2, and 4 due to Fish and Game restrictions. The Logs of Test Borings are attached to this report.

Boring N1-1 drilled on the roadway near Station 102 + 3 (within the limits of Wall #1) indicated that the subsurface soil and rock below the roadway structural section consists of 2-m thick soft to medium stiff lean clay over a layer of dense gravel 0.5 m thick (fill). This fill material is underlain by hard, weathered Shale rock to the bottom of the bore hole nearly 7-m thick with blow counts ranging from 47 at the top of shale to more than 50 at the bottom of shale.

Boring N1-2 drilled on the roadway near Station 102 + 55 (within the limits of Wall #1) indicated that the subsurface soil and rock below the roadway structural section consists of 4-m thick silty sand to sandy silt (ML) with gravel (fill) over 2-m thick claystone and clayey sandstone, moderately weathered, moderately hard to very hard. Below this layer, there is a layer of very hard, massive shale, to the bottom of the hole, 2.5 m thick having blow counts greater than 50 to a depth of 5-m.

Boring N2 – 1 drilled on the roadway near Station 111 + 16 (within the limits of Wall #2) indicated that the subsurface soil and rock below the roadway structural section consists of 1 m thick layer of soft to hard non- plastic silt (fill) over mostly soft to hard, massive sandstone to the bottom of the hole, 8 m thick having blow counts of over 50.

Boring N2 – 2 drilled on the roadway near Station 111 + 76 (within the limits of Wall #2) indicated that the subsurface soil and rock below the roadway structural section consists of 1.25 m thick gravel with sand (GP), followed by weathered to fresh, hard, massive sandstone to the bottom of the hole, 8.75 m in thickness. Blow counts in the upper 4 m is generally 25, while below it indicated refusal (> 50).

Boring N2 – 3 drilled on the roadway near Station 112 + 17 (within the limits of Wall #2) indicated that the subsurface soil and rock below the roadway structural section consists of 2-m thick rounded Gravel with varying amounts of sand and broken concrete (fill) followed by slightly weathered to moderately hard sandstone to the bottom of the hole with blow counts greater than 50, 7.6-m thick.

Boring N2 – 4 drilled on the roadway near Station 113 + 95 (within the limits of Wall #2) indicated that the subsurface soil and rock below the roadway structural section consists of 1.5-m thick loose, non-plastic silty sand (fill), followed by weathered, moderately hard to hard sandstone with blow counts greater than 50, 8.1-m-thick.

Boring N2 – 5 drilled on the roadway near Station 114 + 82 (near the end of Wall #2) indicated that the subsurface soil and rock below the roadway structural section consists of 2-m thick dense sand, (SW-SC) over 1-m thick clayey sand and 0.5-m thick gravel (fill). This fill material is underlain by weathered, moderately hard to hard sandstone with a thin layer of intensely weathered shale to the bottom of the hole with blow counts greater than 50, 5.9 m thick

Borings P5-1 and P5-2 drilled within the limits of Wall #3 indicated that the foundation soil and rock consists of 6-m thick combinations of silty sand and sandy silt (with blow counts ranging from 20 to 50 blows/0.3 m) over weathered to intensely weathered, soft to hard sandstone having blow counts ranging from 26 to over 50.

VIII. CONCLUSIONS AND RECOMMENDATIONS

A. Retaining Walls #1

Retaining Wall #1 will be constructed between Stations N1 10+00 and N1 12+48.2, approximately 248 m in length and its maximum height is about 3.6 m.

We recommend Standard Plans Type 1 Retaining Wall for Retaining Wall #1.

Assuming about 1 m for scour, the top of the Retaining Wall #1 footings should be embedded at least 1 meter below the original ground surface elevation. According to the borings, Retaining Wall #1 footings will be constructed on bedrock. The allowable bearing capacity of the foundation rock is estimated to be more than 500 kPa using a factor of safety of 3 which is much higher than the toe pressure of 135 kPa specified for a Standard Plans Type 1 Retaining Wall with a maximum height of 3.6 m. Since, we were not able to drill any borings on the creek bed along the retaining wall footing, there is a possibility that some portion of the wall foundation would be on materials other than bedrock. In this case, we recommend the following foundation preparation:

Excavate a minimum of 0.6 meter (in addition to the 1 m for scouring) below the footing and 0.6 meter to each side of the footing. Backfill the over excavated area with structural backfill or Class 3 Aggregate Base and compact to 95% relative compaction.

A contingency fund ($15,000) should be made available, if such situation arises during construction.

For Retaining Wall #1, we recommend the following:

Excavate and remove the existing rock block wall where it conflicts with the construction of footing of the proposed Type 1 retaining walls. Otherwise, leave the block wall in place and backfill between the two walls. Remove the existing sack concrete and all debris between the existing retaining wall and the proposed wall to a depth of 1.5 m below the creek bed elevation. In order to properly remove the above, shoring maybe necessary at some locations. If shoring would be required, a temporary soil nail wall is a feasible shoring system. Sheet piling would not work due to the existence of hard rock.

Soldier pile wall, as temporary shoring is feasible but would be time consuming, costly and required drilling into hard rock.

The excavation for the footing foundation shall be in a relatively dry condition; therefore ground and surface water control will likely be necessary at all locations. Diverting the water from Alameda Creek away from excavation may be required at some locations. During our field reconnaissance of the project site we have noticed debris, silt, cobbles, RSP, and very large boulders (1 m to larger than 2.5 m in diameter) at the base of the existing retaining walls within the limits of the new retaining walls footing.

After the Type 1 wall is constructed, backfill between the existing and the new walls with structure backfill material. If a temporary soil nail wall was used as shoring, it should be left buried within the backfill materials. The top of the temporary soil nail wall should be removed to a depth of 1 meter below the pavement surface elevation.

B. Retaining Wall #2

Retaining Wall #2 will be constructed between Stations N2 20+00 and N2 23+55, approximately 355 m in length and its maximum height is about 4.8 m.

We recommend Standard Plans Type 1 Retaining Wall for Retaining Wall #2.

Assuming about 1 meter for scouring, the top of the Retaining Wall #2 footing should be embedded at least 1 meter below the original ground surface elevation. According to the borings, Retaining Wall #2 footing will be constructed on bedrock. The allowable bearing capacity of the foundation rock is estimated to be more than 500 kPa, which is much higher than the toe pressure of 170 kPa specified for the Standard Plans Type 1 Retaining Wall with a maximum height of 4.8 m. Since, we were not able to drill any borings on the creek bed along the retaining wall footing, there is a possibility that some portion of the wall foundation would be on materials other than bedrock. In this case, we recommend the following foundation preparation:

Excavate a minimum of 0.6 meter (in addition to the 1 m for scouring) below the footing and 0.6 meter to each side of the footing. Backfill the over excavated area with structural backfill or Class 3 Aggregate Base and compact to 95% relative compaction.

A contingency fund ($25,000) should be made available, if such situation arises during construction.

There are two different types of existing retaining walls exist along the northbound edge of Route 84 within the limits of the proposed Wall #2; a rock block wall and a concrete cantilever wall. We have not been able to find any information in Caltrans files regarding the foundation type and details of these existing walls.

For construction of the portions of the proposed Wall #2, which will be along the existing rock block wall, we have the same recommendations as Wall #1 with minor modifications. If the rock block wall is to remain, then after the proposed wall is constructed, remove the top 1-meter of the block wall below the pavement surface elevation.

Where Wall #2 coincides with the existing concrete cantilever wall, no shoring will be required. We have the following recommendations:

Excavate and remove all materials between the existing retaining wall and the proposed wall to a depth of 1 meter below the creek bed elevation. If shoring is required, a temporary soil nail wall is the most feasible. Sheet piling will not work due to the existence of hard rock. Soldier pile wall is feasible as temporary shoring but would be time consuming, costly and require drilling into hard rock.

The excavation for the footing foundation shall be in a relatively dry condition; therefore ground and surface water control will likely be necessary at all locations. Diverting the water from Alameda Creek away from excavation may be required at some locations. During our field reconnaissance of the project site, we have noticed debris, silt, cobbles, RSP, and very large boulders (1 m to larger than 2.5 m in diameter) at the base of the existing retaining walls within the limits of the new retaining walls footing.

After the Type 1 wall is constructed, backfill between the existing and the new walls with structural backfill material. The existing concrete wall should be buried within the backfill materials. The top of the existing concrete wall should be excavated to a depth of 1 meter below the pavement surface elevation.

C. Retaining Wall #3

Retaining Wall #3 will be constructed between Stations P5 5+00 and P5 5+27.8, approximately 28 m in length and its maximum height is about 4.2 m.

In order to reduce the amount of excavation into the hillside, a Standard Drawing Type 7 Retaining wall is recommended for this wall. Temporary excavation of the existing hill for the construction of Wall #3 should not be steeper than 1V: ¾H. Special design, modified Type 7 Wall will be required, if the wall height exceeds 4 m.

There will be no scour issue for this retaining wall; the top of the Retaining Wall #3 footing should be embedded below the original ground surface elevation per Standard Drawing. According to the borings, Retaining Wall #3 footing will be constructed either on bedrock or competent sand and gravely native soils. The allowable bearing capacity of the foundation soil/rock is estimated to be about 300 kPa, which is more than adequate for Standard Drawing Type 7 Retaining Wall with the maximum height of 4.2 m.

D. Retaining Walls #4

There is no existing wall within the limits of Wall #4. There is concrete slope paving within a portion of Wall #4. Retaining Wall #4 will be constructed between Stations N4 4+00 (S116+13) to N4 4+26.318, approximately 26.3 m in length and its maximum height is about 4.2 m.

Standard Plans Type 1 Retaining wall is recommended for Retaining Wall #4. Same recommendations for Wall #1 also apply to this wall. Although there is no existing wall, temporary shoring may be needed to excavate for the new wall. Temporary slope should not be steeper than 1:1.

Assuming about 1m for scour (per Structure Hydraulics), the top of the Retaining Walls N4 footings should be embedded at least 1 meter below the original ground surface elevation. Retaining Wall #4 footing will be constructed most likely on bedrock. The allowable bearing capacity of the foundation rock is estimated to be more than 500 kPa, which is much higher the toe pressure of 160 KPa specified for Type 1 Retaining Wall with the maximum height of 4.2 m for Wall #4.

IX. CORROSION INVESTIGATION

Bulk samples were taken from the boring drilled for the retaining walls for corrosion study. The corrosion test results are presented in Table 3 below. The test results indicate the pH values range from 6.6 to 10.06 and resistively values range from 1300 to 6200 ohm-cm. These results are the indicative of non-corrosive environment and thus, no additional corrosion protection will be necessary.

TABLE 3 – Corrosion Test Results

SIC Number (IT101)	Boring No.	Sample Type	Sample Depth, ft	Resistively Ohm-Cm 1	pH
C633780	N1-1	SOIL	15	1300	8.21
C633778	N2-4	SOIL	0-5	4300	8.10
C633779	N2-5	SOIL	10	3400	8.33
C633781	N2-1	SOIL	0-5	5100	8.31
C633777	P5-1	SOIL	5	4900	8.01
C633782	N2-2	SOIL	0-5	4200	10.06
C633784	N1-2	SOIL	10	2900	8.29
C633783	N2-3	SOIL	0-5	4700	9.99
C633776	P5-2	SOIL	10	6200	6.60

X. SPECIFICATIONS

We recommend the following statements (or similar) provided in the contract SSP in order to protect Caltrans from any possible claims by the contractor for differing site conditions:

Rock Condition: Very hard rocks will be encountered during excavation. The contractor should utilized appropriate excavating equipment for excavating very hard rock.

Debris, cobbles, RSP, and very large boulders: Debris, cobbles, RSP, and very large boulders (1 m to larger than 2.5 m in diameter) exist at the base of the existing retaining walls within the limits of the new retaining walls footing. The SSP should provide language to let the bidders be aware of such conditions and let the bidders know that very hard rocks and boulders exist where excavations are necessary for the proposed retaining wall foundations.

* * * * *

If you have any questions, please call me at (510) 286-4811.

Attachments: LOTBs, Geology Map

c: RKiaaina/TLy (Design Shopp), TPokrywka, Daily File, Project File, Translab File

HNikoui/mm

REGISTERED PROFESSIONAL ENGINEER
HOOSHMAND NIKOUI-G
No. 42698
Exp. 3/31/10
CIVIL
STATE OF CALIFORNIA

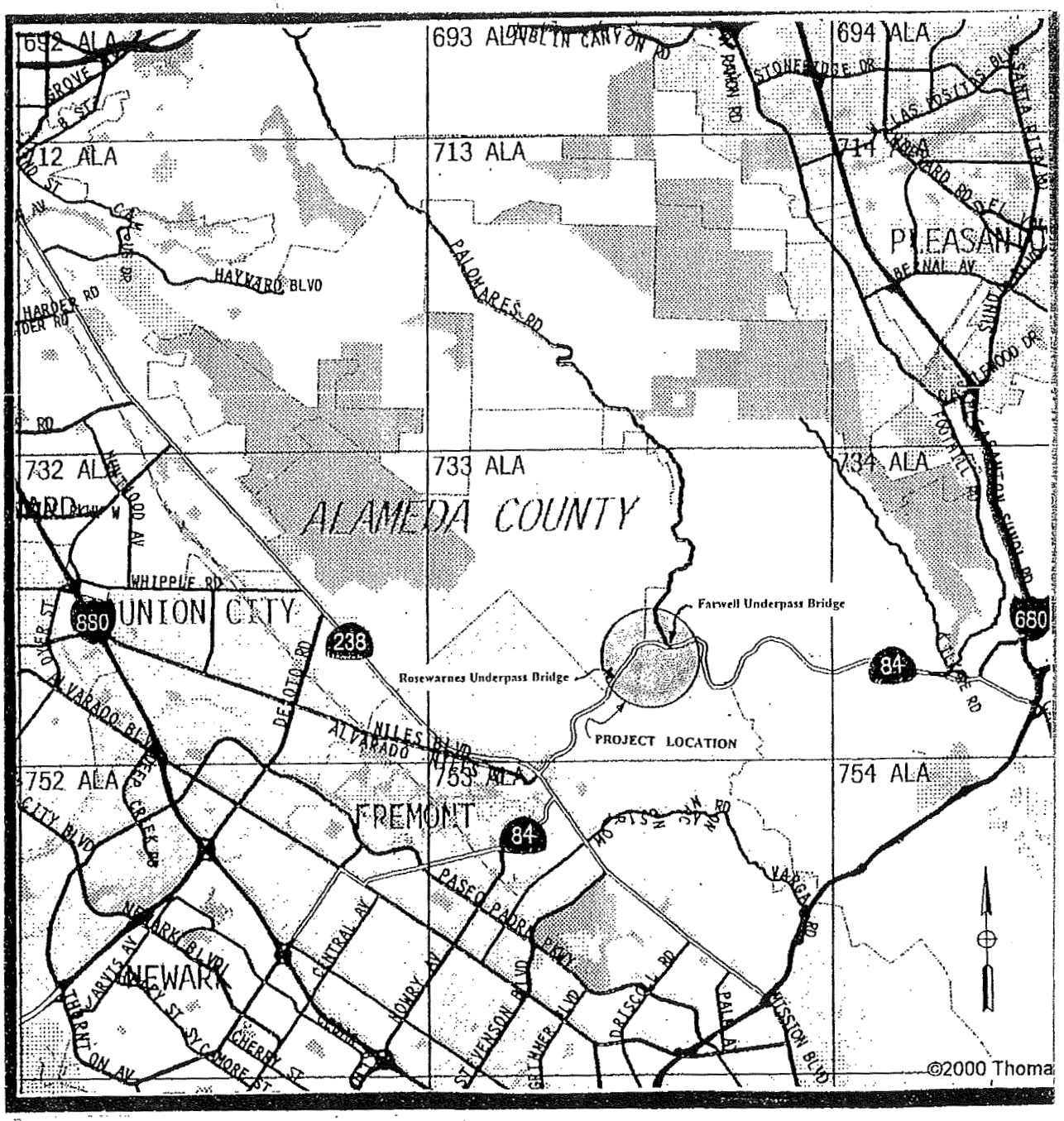
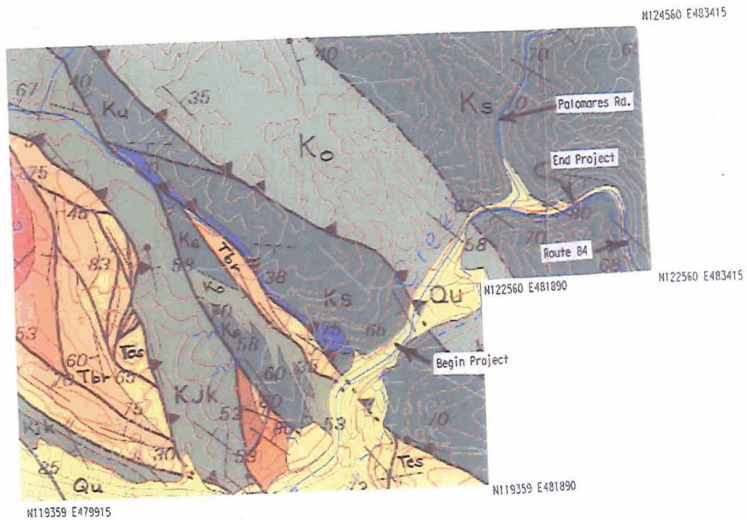


Figure 1: Vicinity Map – Improvement of Traffic Safety on Route 84 – 04 174 401
04 – Ala – 84 – kP 19.48 – 21.40 (PM 12.1 – 13.3) (Not to Scale)

Geology Map Route 84 and the Niles Canyon Area, Alameda County
Route 84 Widening



Units

	Qu	Undivided surficial deposits
	Tbr	Briones Formation, Undivided - sandstone, locally divided into:
	Tbi	Briones Formation, I member-
	Tbg	Briones Formation, G member - sandstone and shell breccia
	Tbge	conglomerate beds
	Tcs	Claremont Formation - shale and chert
	Ks	Unnamed sandstone and shale
	Ku	Unnamed shale
	Ko	Oakland Formation - conglomerate and sandstone

Map Symbols

- Oblique fault with thrust or reverse component
- Oblique fault with thrust or reverse component, approximately located
- Oblique fault with thrust or reverse component, concealed
- Strike and dip of bedding, top direction known

Reference: Graymer, R.W., Jones, D.L., and Brabb, E.E., 1996. Preliminary geologic map emphasizing bedrock formations in Alameda County, California: A digital database.

0 500 1000 m

Caltrans
Engineering Service Center
Division of Engineering Services
Office of Geotechnical Services
Geotechnical Design Branch (West)

04-ALA-84 KP 19.3/20.9
EA - 174401

FIGURE 2: GEOLOGIC MAP

DIST.	COUNTY	ROUTE	KILOMETER POSTS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	ALA.	84	19.47/21.40		

02-07-06

REGISTERED ENGINEER - CIVIL

P.N. Sundaram No. 57665 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

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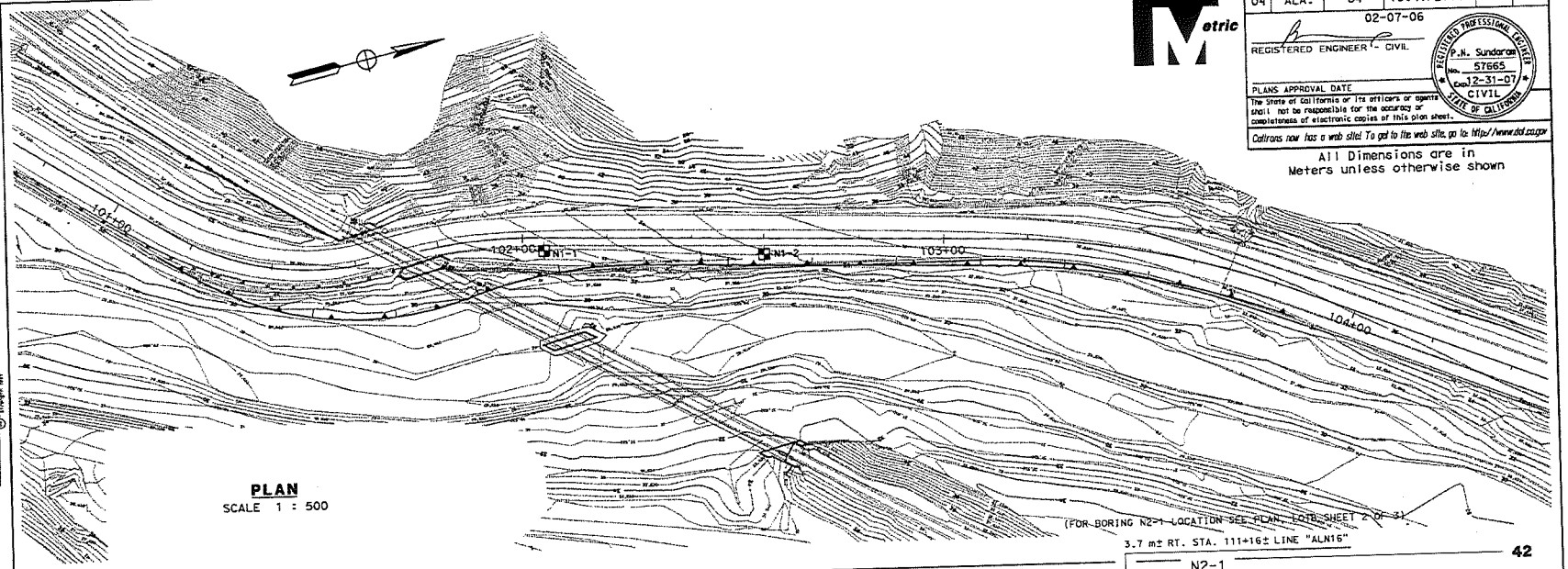

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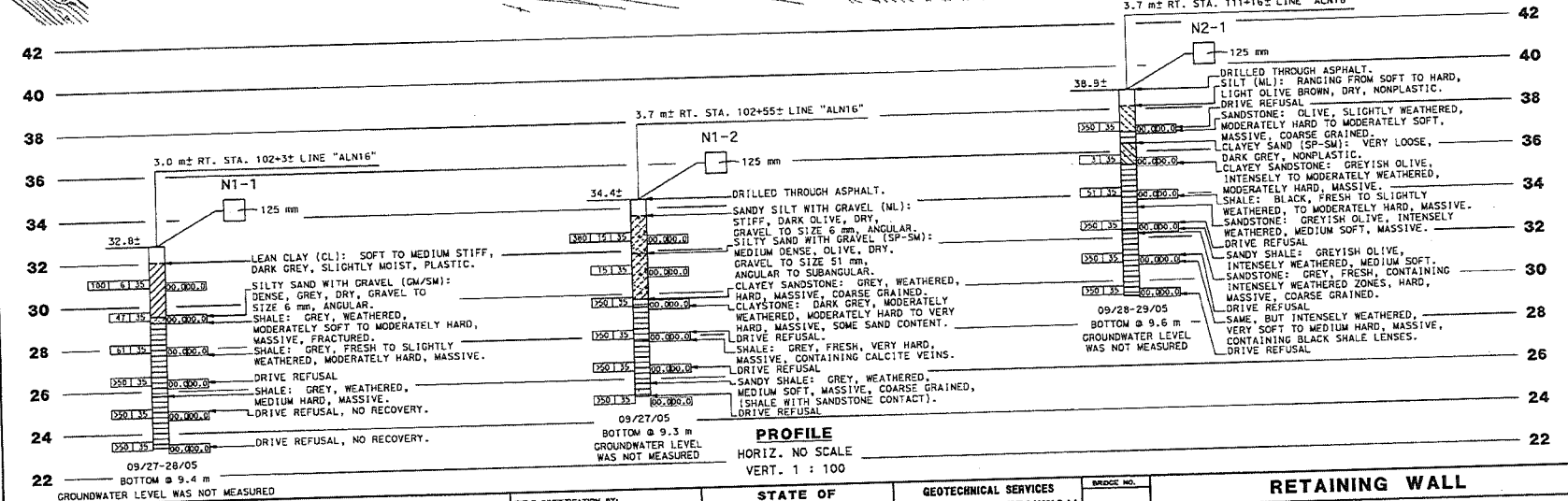

PROFILE
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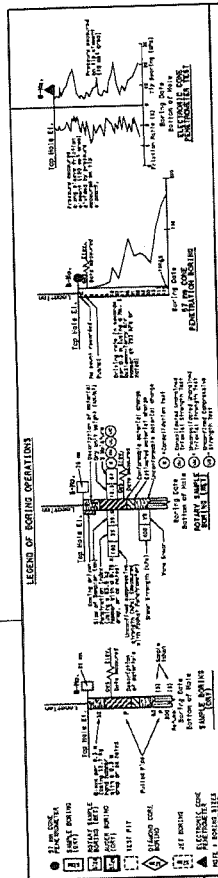

DIVISION OF ENGINEERING SERVICES	FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL SERVICES OFFICE OF GEOTECHNICAL DESIGN - WEST	BRIDGE NO. / KILOMETER POST	RETAINING WALL LOG OF TEST BORINGS
DRAWN BY: M. REYNOLDS 11/05	R. NASHED		CU EA 174400	DISREGARD PRINTS BEARING EARLIER REVISION DATES	SHEET 1 OF 3
CHECKED BY: P. SUNDARAM				REVISION DATES (PRELIMINARY STAGE ONLY)	

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

USERNAME => s110822
DGN FILE => 417440a01.dgn

DATE PLOTTED => 14-OCT-2009
TIME PLOTTED => 14:23

(Rev 01/02)

DIST.	COUNTY	ROUTE	KILOMETER POSTS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	ALA.	84	19.47/21.40		

02-07-06

REGISTERED ENGINEER - CIVIL

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER P.N. Sundaram No. 57665 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

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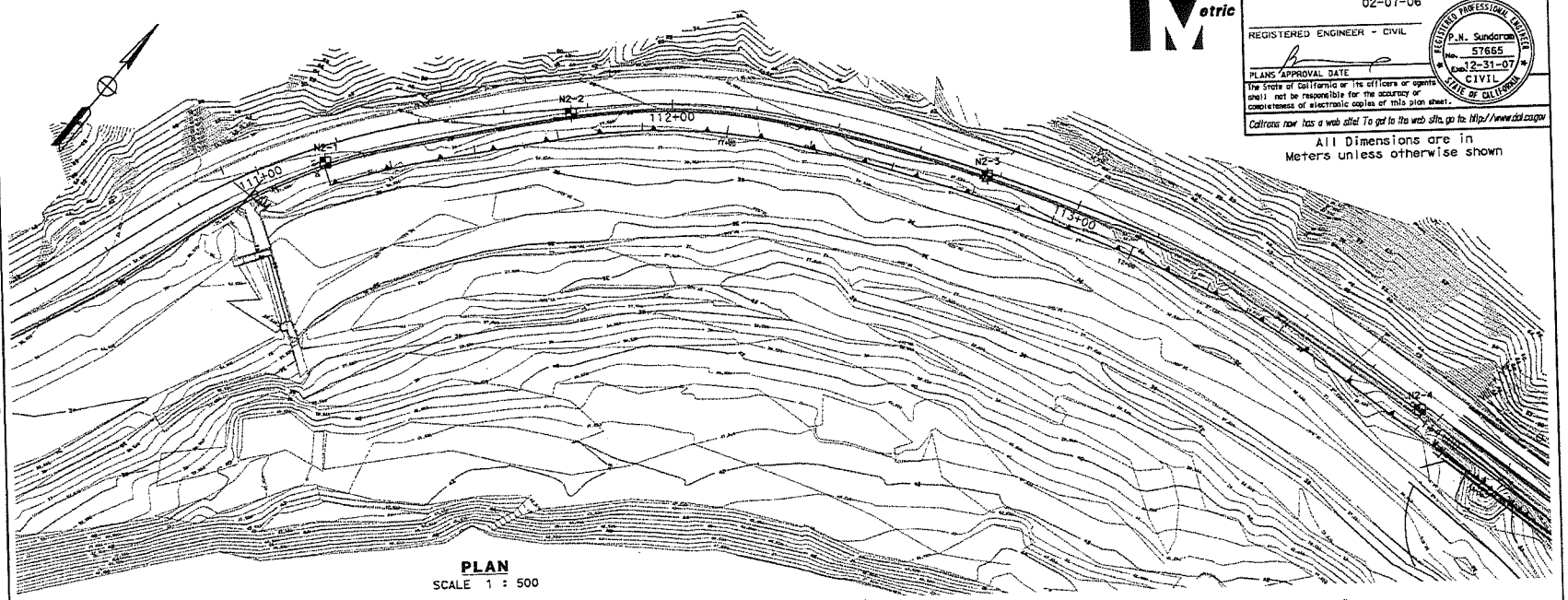

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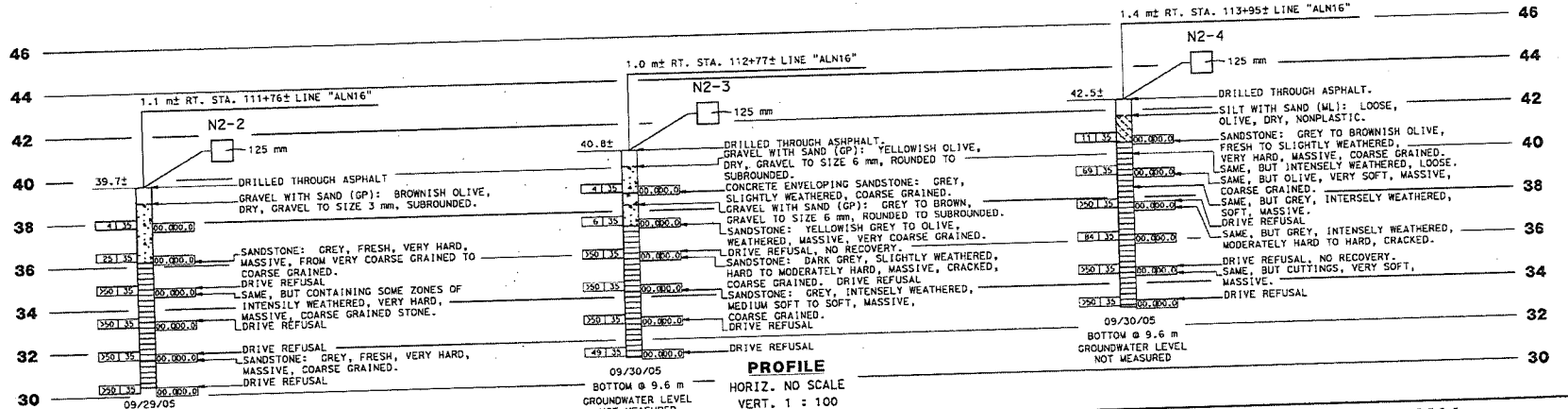

PROFILE
HORIZ. NO SCALE
VERT. 1 : 100

LEGEND OF BORING OPERATIONS

LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS

NOTE: Classification of earth material as shown on this sheet is based upon field observations and will be confirmed by laboratory analysis.

DIVISION OF ENGINEERING SERVICES	FIELD INVESTIGATION BY: R. NASHED
DRAWN BY: M. REYNOLDS 11/05	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
CHECKED BY: P. SUNDARAM	GEOTECHNICAL SERVICES OFFICE OF GEOTECHNICAL DESIGN - WEST
ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100	CU EA 174400

BRIDGE NO. / KILOMETER POST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

RETAINING WALL
LOG OF TEST BORINGS

SHEET 2 OF 3

USERNAME => s110822
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DIST.	COUNTY	ROUTE	KILOMETER POSTS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	ALA.	84	19.47/21.40		

02-07-06

REGISTERED ENGINEER - CIVIL

PLANS APPROVAL DATE

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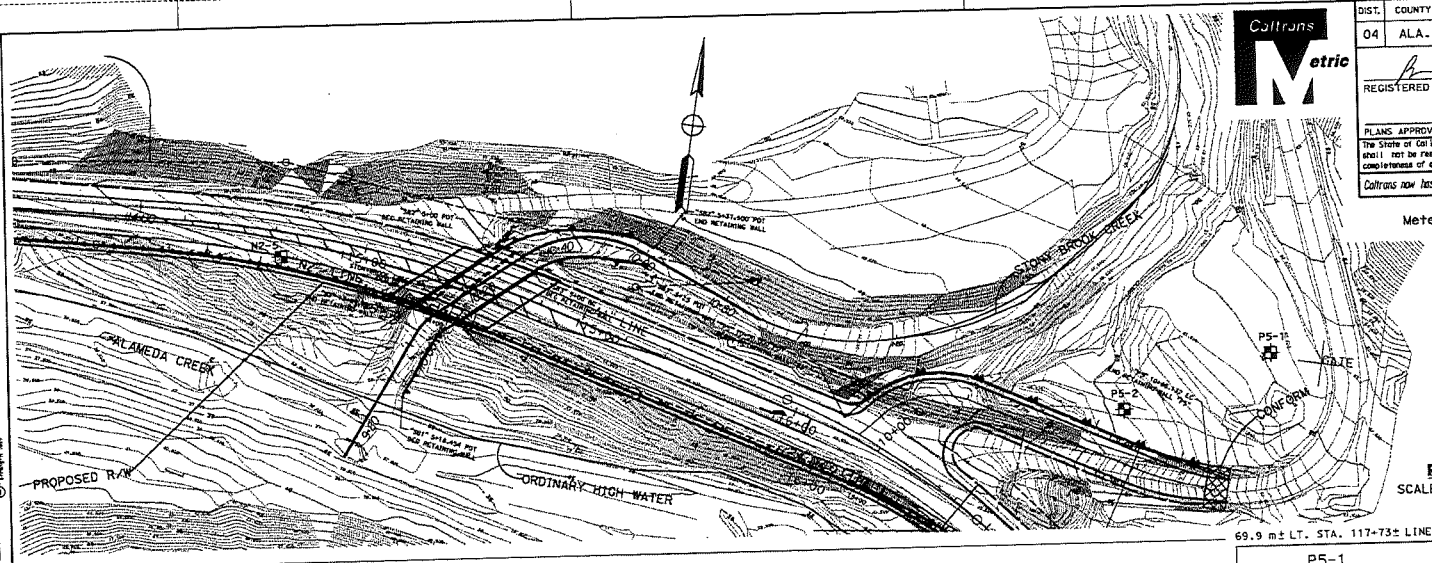
REGISTERED PROFESSIONAL ENGINEER P.N. Sundaram No. 57665 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

Caltrans Metric

All Dimensions are in Meters unless otherwise shown



PLAN
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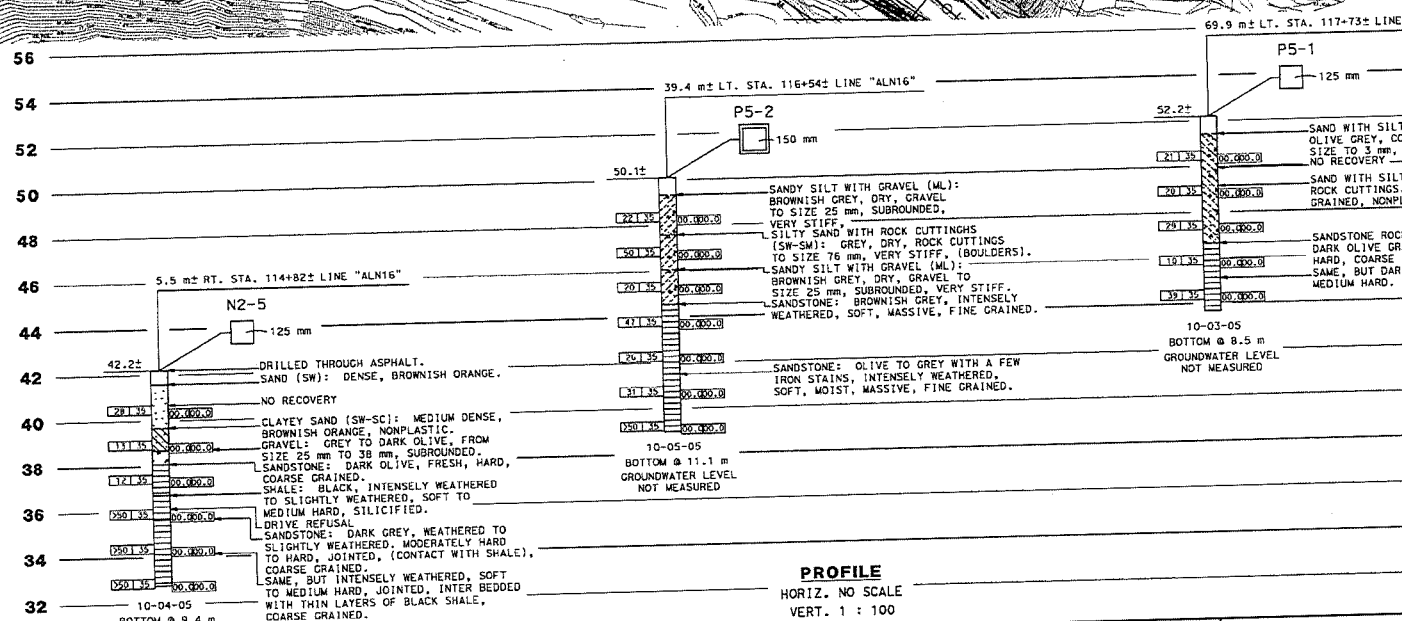

PROFILE
HORIZ. NO SCALE
VERT. 1 : 100

LEGEND OF BORING OPERATIONS

LEGEND OF EARTH MATERIALS: CLAYEY SILT; CLAY; GRAVEL; SAND; SILT; CLAY; SANDY CLAY or CLAYEY SAND; SANDY SILT or SILTY SAND; SILTY CLAY; FILL MATERIAL; TOPSOIL; RESIDUALLY WEATHERED; METAMORPHIC

CONSISTENCY CLASSIFICATION FOR SOILS (according to the Standard Penetration Test)

SPT N-Value (Blows/ 30 cm)	Granular	SPT N-Value (Blows/ 30 cm)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very Stiff
		>31	Hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply material strength.

(Rev 01/02)

DIVISION OF ENGINEERING SERVICES		FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL SERVICES OFFICE OF GEOTECHNICAL DESIGN - WEST	BRIDGE NO. / KILOMETER POST	RETAINING WALL LOG OF TEST BORINGS
DRAWN BY	M. REYNOLDS 11/05	R. NASHED A. KADDOURA		CU EA 174400	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES (NON-LIBRARY STAGE ONLY)
CHECKED BY	P. SUNDARAM					SHEET 3 OF 3

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

USERNAME => s110822
DGN FILE => 417440q03.dgn

DATE PLOTTED => 14-OCT-2009
TIME PLOTTED => 14:26

FOUNDATION REVIEW
DATED 12-28-2009

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

To: **Structure Design**
1. Preliminary Report
2. R.E. Pending File
3. Specifications & Estimates
4. File

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development
District Project Engineer

Date: 12/28/09

Niles Canyon Railroad Catcher
Structure Name

04	ALA	84	19.4
District	County	Route	Post Mile

04-174401	33E0063
E.A. Number	Structure Number

Foundation Report By: Sunny Yang / Hooshmand Nikoui Dated:

Reviewed By: SON LY (SD) Sunny Yang (GS)

General Plan Dated: 12/14/09 Foundation Plan Dated: 12/12/09

☐ No changes. ☒ The following changes are necessary.

On Retaining Wall #1, Sheet 3 of 16, Pile Data Table, change the last two columns to:

DESIGN TIP ELEVATION (m)	SPECIFIED TIP ELEVATION (m)
19.35 (a) 8.35 (b) 17.55 (c)	8.35

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- ✓ Pile Lengths
- Predrilling
- Pile Load Test
- Substitution of H Piles For Concrete Piles ☐ Yes ☐ No
- ✓ Footing Elevations, Design Loads, and Locations
- ✓ Seismic Data
- Location of Adjacent Structures and Utilities
- Stability of Cuts or Fills
- Fill Time Delay
- Effect of Fills on Abutments and Bents
- LOTB's
- Fill Surcharge
- Approach Paving Slabs
- Scour
- Ground Water
- Tremie Seals/Type D Excavation

Structure Design

16
Branch No.

Sunny Yang
Geotechnical Services

Rev. 11/04

FINAL HYDRAULIC REPORT
DATED 09-17-2009

State of California Department of Transportation

Structure Hydraulics

DIVISION OF STRUCTURES FINAL HYDRAULIC REPORT

Stonybrook Creek

Located in Alameda County on State Route 84 in Niles canyon, between the Niles District of Fremont and Sunol.

JOB:
Stonybrook Creek — Bridge Number: 33-0731

LOCATION:
04-ALA-84-KP 19.5/20.9

WRITTEN BY: Tony Nedwick — DATE: September 17, 2009

Stonybrook Creek
04-ALA-84-KP 19.5/20.9
EA 04-174401
September 17, 2009

Hydrology/Hydraulics Report

General:

It is proposed to replace the existing single box culvert at Stonybrook Creek with a single span bridge. According to information provided by Samad Hamoud and Son Ly of Bridge Design Branch 16 in the Office of Structures Design-West, this report assumes that there are no channel improvements planned upstream of the structure, which would increase the channel flow that ultimately reaches the proposed structure. Site visits were made on April 1, 2009 and again on June 9, 2009 with the Preliminary Investigations survey crew. At flows greater than the 10-year flow, the stream begins to overflow the southern bank upstream of the structure. It is estimated that during a 100-year event, stream flow reaching the structure will be approximately equivalent to a 25-year event. Therefore, the proposed bridge should be designed to pass the 25-year discharge. Along the upstream reach, the channel runs roughly parallel to the roadway, and takes an abrupt turn to enter the existing culvert. This bend is estimated to cause the flow to impact the north abutment wall at approximately 35°-45°. Currently, there are no signs of significant scour or erosion at this location, but the concrete invert appears to be acting as a grade control structure, trapping a mix of well-graded material that may be armoring the channel at this location. For hydraulic purposes, this bend should be minimized. However, channel constraints limit the realignment of the structure to reduce the hydraulic skew. Structure Design inquired about reducing the bridge skew, but this would not be recommended from a hydraulic standpoint, as it would increase the bend, potentially causing more erosion and scour concerns.

For this analysis, channel invert elevations were altered to match those proposed by District 4, and based off the 07/25/08 P-5 Profile provided by Son Ly. Using this profile, the invert elevations of the channel were 39.256 meters at Station 10+09.429,the downstream end of the structure, and 40.028 meters at Station 10+28.740, the downstream end of the structure. The model ties into the existing channel grade at Station 10+60.000 with an elevation of 42.915 meteres. This profile provides a 4.0% slopethrought the site, and a 9.24% slope immediately upstream. Of the proposed structure.

Based on environmental and fish passage concerns, the design uses a 6.40-meter clear span, taken normal to the channel flow line. The results are provided in the tables at the end of this report.

Basin:

At the location of the structure, Stonybrook Creek drains approximately 17.9 km^2 of watershed area. The majority of the watershed is comprised of undeveloped land with moderate to dense cover consisting of trees and shrubs. The watershed is in the moderate

coastal climate zone of California with elevations varying from approximately 668 m at the highest elevations to 41 m at the bridge site. Immediately upstream of the structure, the channel has an extremely steep average slope of about 7.0%. The channel slope through the culvert is approximately 4%.

During lower flows, Stonybrook Creek converges with Alameda Creek approximately 45 meters down stream of the existing culvert. Higher flows on Alameda Creek can potentially cause some backwater effects at Stonybrook Creek. The magnitude of these effects will depend on the discharge of both streams. However, due to differences in size and geographical location between the two watersheds, simultaneous occurrence of 100-year events on both streams is improbable. The Stonybrook Creek channel was modeled assuming the water surface elevations for a 25-year Alameda Creek event occurring simultaneously to the 100-year event on Stonybrook Creek.

In 2006, the Niles Diversion Dam was removed. This structure was located downstream of the convergence of Alameda and Stonybrook creeks. It is not yet know what affect the removal of this structure will have on sediment transport throughout the watershed, including Stonybrook Creek. The removal of the culvert and the increased capacity of the proposed structure can also affect the sediment transport characteristics of Stonybrook Creek.

Discharge:

The 25-year, 50-year and 100-year discharges for Stonybrook Creek were estimated from an analysis of several sources of data, including USGS Regional Regression equations, WMS computer software, Basin Transfer for nearby watersheds of similar size and characteristics, and previous reports.

For Stonybrook Creek, the 25-year flow is estimated as 40.7 m^3/s, the 50-year flow as 58.7 m^3/s and the 100-year flow as 76.7 m^3/s. The structure should provide a minimum waterway area of 14.4 m^2. It is recommended to provide a minimum 0.6 meters of freeboard between the 50-year water surface elevation and the soffit for debris passage.

Velocity:

The current channel has an average slope of approximately 7.0 % immediately upstream of the proposed structure. The slope of the existing culvert is approximately 4%. The 25-year discharge was modeled along the reach using HEC-RAS version 3.1. Manning's roughness coefficient was estimated as 0.050 through the bridge reach.

Average velocity was derived from the HEC-RAS results and ranges from 5.3 m/s to 6.0 m/s at the site for the discharge modeled.

Streambed:

The channel bed consists of sand, gravel, small cobbles and larger boulders. The channel banks are steeply cut on the northern embankment upstream of the structure. According to previous reports, the channel immediately upstream of the culvert has seen a significant accumulation of medium to large rocks and boulders as a result of the backwater condition caused by the existing culvert.

At the downstream end, the existing culvert invert is perched approximately 1.4 meters above the channel bed. There is a shallow pool at the culvert outfall caused by the flows exiting the culvert. However, the culvert is estimated to be perched approximately 0.3 meters above the natural channel bed due to degradation and sediment transport, in absence of the pool.

Scour:

At the upstream end of the structure, the flow does not run parallel to the Abutment 1 wall, but rather is being directed toward the wall at approximately 35°-45° degrees. Further compounding this problem is the current culvert, which may have acted as an unnatural barrier to sediment transport and channel degradation, especially the movement of larger material. This larger material, which has been armoring the channel from scour and erosion, may initially wash out once the concrete invert of the existing culvert is removed.

It is recommended to place the top of footings approximately 1.5 meters below the proposed channel invert at the upstream end of the structure. At the downstream end of the structure, the top of footings should be at least 0.6 meters below the proposed channel invert. If the footings are to be founded on scour resistant bedrock, then the top of footing elevations may be raised. Scour resistance of the bedrock is to be determined by the Office of Geotechnical Design-North and a representative of Structures Hydraulics and Hydrology. At the time of this report, there was no foundation data available. The footing excavations should be backfilled with a well-graded mixture of native, course-grained material from the footing excavations and not roadway fill.

It is recommended that wingwalls be used to tie the proposed structure in to the existing wingwalls or surrounding embankment material. The wingwall located at the upstream end of Abutment 1 (north-western quadrant of the structure) should be realigned so as to direct the flow into the bridge opening, and away from a direct impingement of the Abutment 1 wall and protect the upstream end of Abutment 1 from scour and erosion.

Stonybrook Creek
04-ALA-84-KP 19.5/20.9
EA 04-174401
September 17, 2009

Summary Information for Bridge Designer:

Below is a summary of key design parameters based on the hydrology and hydraulic analysis performed for this structure.

The minimum soffit elevation for the structure was determined by using the water surface elevation at Design Flood Flow Rate of 58.7 m^3/s. It is recommended that the proposed structure follow the alignment of the existing culvert. Wingwalls should be included in the design and the wingwall at the upstream end of Abutment 1 should be aligned so that it guides the flow into the structure and helps prevent direct impingement of flow onto the Abutment 1 wall.

Hydrologic Summary **Stonybrook Creek, 33-0731**		
Drainage Area: 17.9 km^2		
	Design Flood	**Base Flood**
Frequency	50-year	100-year
Discharge	58.7 m^3/s	76.7 m^3/s
Water Surface Elevation at Bridge-Upstream	41.6 m	42.0 m
Water Surface Elevation at Bridge-Downstream	41.2 m	41.5 m
Flood plain data are based upon information available when the plans were prepared and are shown to meet federal requirements. The accuracy of said information is not warranted by the State and interested or affected parties should make their own investigation.		
Minimum Soffit Elevation	42.2 m	
Scour Depth, upstream	1.5 m below proposed channel invert	
Scour Depth, downstream	0.6 m below proposed channel invert	

* Flows greater than a 10-year frequency, 24.0 m^3/s, will begin to exceed channel capacity upstream from the structure. During 50-year and 100-year watershed events, it is estimated that only 40.7 m^3/s will reach the structure.

All elevations given are referenced to the data provided by Structures Design and Preliminary Investigations-North, using the NAVD 88 vertical datum.

This report has been prepared under my direction as the professional engineer in responsible charge of the work, in accordance with the provisions of the Professional Engineers Act of the State of California.

REGISTERED PROFESSIONAL ENGINEER
ANTHONY NEDWICK
No. C60368
EXP. 06-30-10
CIVIL
STATE OF CALIFORNIA

Engineer – report prepared by (Signature) Anthony Nedwick	
Registration Number: C60368	Date: September 17, 2009

LEAD INVESTIGATION REPORT

Site Investigation Report
State Route 84
Alameda County, California

PREPARED FOR:
CALIFORNIA DEPARTMENT OF TRANSPORTATION
DISTRICT 4
OFFICE OF ENVIRONMENTAL ENGINEERING, HAZARDOUS WASTE BRANCH
111 W. GRAND AVE
OAKLAND, CALIFORNIA

Shaw Environmental, Inc.

PREPARED BY:
SHAW ENVIRONMENTAL, INC.
1326 NORTH MARKET BOULEVARD
SACRAMENTO, CALIFORNIA

CONTRACT NO.: 43A0078
TASK ORDER NO.: 04-174400-5B

SITE INVESTIGATION REPORT
AERIALLY DEPOSITED LEAD INVESTIGATION
STATE ROUTE 84
KILO POST 19.5 TO 21.4
ALAMEDA COUNTY, CALIFORNIA

January 13, 2004

Prepared for:

California Department of Transportation
District 4
Office of Environmental Engineering, Hazardous Waste Branch
111 W. Grand Avenue
Oakland, California

Prepared by:

Shaw™ Shaw Environmental, Inc.
1326 North Market Boulevard
Sacramento, California 95834-1912

Task Order No.: 04-174400-5B
Caltrans Contract No.: 43A0078

Project No.: 101252.0101

Shaw Environmental, Inc.

Martha Adams

Martha Adams, P.E.
Project Manager

REGISTERED PROFESSIONAL ENGINEER
MARTHA J. ADAMS
No. 58782
Exp. 6.30.07
CIVIL
STATE OF CALIFORNIA

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 Shaw Environmental, 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.

SHAW ENVIRONMENTAL, INC.

Martha Adams

Martha Adams, P.E.
Project Manager

CALIFORNIA DEPARTMENT OF TRANSPORTATION
OFFICE OF ENVIRONMENTAL ENGINEERING - HAZARDOUS WASTE BRANCH

Reviewed by:	Recommended by:	Approved by:
Naveen Aachi Task Order Manager	Christopher Wilson, PE District Branch Chief	Allen Baradar, PE, REA District Office Chief

Project Team

Contact	Affiliation	Responsibility
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Naveen Aachi (510) 286-4914		Task Order Manager
Martha Adams (916) 565-4183 (916) 565-4356 fax	Shaw Environmental, Inc. 1326 North Market Boulevard Sacramento, California 95834 *(Department Contractor)*	Project Planning and Coordination of Fieldwork and Sample Collection, Laboratory Assignments, Site Investigation Report
Cary Bean (510) 237-4575 (510) 237-4574 fax	Precision Sampling, Inc. 1400 S. 50th Street Richmond, California 94804 *(Shaw Subcontractor)*	Drilling Services
Ray James (916) 362-8947 (916) 362-0947 fax	Sparger Technology, Inc. 3050 Fite Circle, Suite 112 Sacramento, California 95827 *(Shaw Subcontractor)*	Sample Holding Laboratory Preparation Laboratory Analysis Laboratory QA/QC

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Executive Summary

This report presents the results of the soil investigation that was conducted by Shaw Environmental, Inc. along State Route (SR) 84 in Alameda County, California (Figure 1). The investigation was performed within State right-of-way along SR 84 from Kilo Post 19.5 to 21.4.

This investigation was conducted at the request and authorization of Mr. Naveen Aachi of the California Department of Transportation (Caltrans) and in general accordance with Caltrans Contract 43A0078, Task Order Number 04-174400-5B.

The purpose of the investigation was to evaluate the presence and concentration of aerially deposited lead (ADL) in soil prior to improvement activities proposed for SR 84. The results from the ADL investigation will be used to assess worker health and safety issues, soil handling and disposal procedures, and determine the applicability of the California Environmental Protection Agency, Department of Toxics Substance Control (DTSC) variance for re-use of lead contaminated soil.

The site investigation included the advancement of 18 soil borings using direct-push sampling equipment along the northbound and southbound shoulder areas of SR 84. Eight borings were located on the eastbound shoulder and eleven borings were located on the westbound shoulder of Route 84 (Figures 2 through 7). Due to subsurface soil conditions, 11 borings could not be advanced to the proposed depths. At these locations, the soil borings were advanced until refusal occurred. A total of 35 soil samples were collected and submitted for analysis.

Lead was reported in soil samples collected from the site. Total lead concentrations ranged from 4.17 to 161 milligrams per kilogram (mg/kg) in 35 soil samples analyzed. Lead concentrations were compared to the Total Threshold Limit Concentration (TTLC) of 1,000 mg/kg, and Soluble Threshold Limit Concentration (STLC) of 5 milligrams per liter (mg/l) to evaluate whether the soil would be considered a California hazardous waste, should it become a waste. Soil samples reported to contain total lead exceeding the TTLC or soluble lead exceeding the STLC would be considered a California hazardous waste, should the soil become a waste.

No soil samples were reported to contain total lead at a concentration in excess of the TTLC of 1,000 mg/kg. The maximum reported total lead concentration was 161 mg/kg collected at the surface at boring location 16. A total of two soil samples had soluble lead concentrations in excess of the STLC of 5.0 mg/l by Waste Extraction Test (WET) analysis. Soil at boring

locations 7 and 16 would be considered a California hazardous waste, should the soil become a waste based on the soluble lead results.

Soil at specific sample points may be classified as a California hazardous waste, however, the data from all intervals were combined into one data set for analysis. Evaluation of the soil data for the entire sample population resulted in an arithmetic mean (average) concentration of total lead of 24.97 mg/kg. The statistical analysis for the total lead data was conducted using the Bootstrap method (Efron, 1982) to estimate the 95 percent Upper Confidence Level (UCL) for the mean of the total lead data. The results of the statistical evaluation are summarized below.

Area	Total Lead Mean (mg/kg)	Total Lead 90% UCL (mg/kg)	Total Lead 95% UCL (mg/kg)	Predicted WET Lead Concentration 95% UCL (mg/l)	Predicted DI WET Lead Concentration 95% UCL (mg/l)
SR 84	24.97	33.74	36.67	1.94	0.64

The excavated soil, if treated as a whole and sampled on a composite basis from stockpiles generated during construction activities, would not likely require soluble lead analysis by the WET as the mean and 95 percent UCL were less than 50 mg/kg, a level that generally triggers WET analysis. If WET analyses are conducted, it is not likely that composite soil samples would contain soluble lead at concentrations greater than the STLC as the predicted soluble lead concentration is less than 5 mg/l.

Based on the statistical analysis conducted, the waste soil, if treated as a whole and sampled on a composite basis from stockpiles generated during construction activities, would not be considered a California hazardous waste and would not require invoking the DTSC variance. As the soil would not be considered a hazardous waste, special handling and disposal procedures are not required, except as needed to protect worker health and safety.

1.0 Introduction

This report has been prepared by Shaw Environmental Inc. (Shaw) to present the results of the aerially deposited lead (ADL) soil investigation that was conducted along State Route (SR) 84 in Alameda County, California (Figure 1).

This investigation was conducted at the request and authorization of Mr. Naveen Aachi of the California Department of Transportation (Caltrans) and in general accordance with Caltrans Contract 43A0078, Task Order Number 04-174400-5B.

1.1 Project Description

Caltrans proposes to widen existing shoulders to meet current standards, improve sight distance, increase overhead vertical clearances to meet current standards, and to provide a northbound left turn pocket at Palomares Road. The investigation was performed along SR 84, within Caltrans right-of-way (R/W), between Kilo Post (KP) 19.5 and KP 21.4 in Alameda County, California. All work was conducted within Caltrans R/W.

Shaw is not aware of any previous site investigative work in the project area.

1.2 Project Objective

The objective of this investigation was to determine the presence or absence of ADL in soil within the project limits along SR 84. The purpose of this site investigation was to screen soil that will be excavated from the site during the construction activities proposed for SR 84. The investigation will provide data for systematic evaluation of subsurface conditions along the project limits between KP 19.5 to 21.4.

The results from the ADL investigation will be used to assess worker health and safety issues, soil handling and disposal procedures, and determine the applicability of the California Environmental Protection Agency, Department of Toxics Substance Control (DTSC) variance for re-use of lead contaminated soil.

2.0 Scope of Work

The scope of work for the investigation was presented in Shaw's workplan dated November 17, 2003, which was approved for implementation by Caltrans. The following scope of work was conducted:

1. Planning and Permitting
2. Field Investigation
3. Laboratory Analyses
4. Site Investigation Report

2.1 Planning and Permitting

Planning and permitting included a pre-work site visit, preparation of a work plan and health and safety plan, and acquisition of boring permits.

A site-specific workplan (Shaw, 2003a) was prepared presenting the scope of work and the procedures to be implemented during the investigation. The workplan also provided information regarding laboratory analyses, investigation-derived waste, and report preparation.

A site-specific health and safety plan (Shaw, 2003b) was prepared in general accordance with 29 CFR 1910.120. The health and safety plan included safety procedures for work performed at the site, chemical hazard information, site safety officers, and preferred medical emergency locations (Shaw, 2003b).

Mr. Benjamin Chevlen and Mr. David Foley of Shaw, and Mr. Naveen Aachi and Mr. Abdullah Akram of Caltrans attended a pre-work site visit on October 30, 2003. Items discussed and reviewed during the meeting included the scope of work, the site visit checklist, and the project schedule. A field reconnaissance of the project area was conducted and Shaw personnel marked the boring locations. Underground Service Alert (USA) was notified of the subsurface investigation at least 48 hours prior to initiation of the fieldwork. Shaw notified USA of the subsurface investigation on November 10, 2003 (USA Ticket No. 413431).

A boring permit was not required from the Alameda County Public Works Agency for the direct-push soil borings as the maximum proposed boring depth was 0.9 meters (3.0 feet) below ground surface (bgs). A copy of the fully executed Caltrans task order constituted the encroachment permit for all work performed within Caltrans R/W during this investigation. A Caltrans Lane

Closure Request Form was submitted for the work along the shoulder areas. The Caltrans District 4 Communication Center (CDC) was notified at the time of traffic control implementation. Caltrans provided the appropriate traffic control measures including shoulder closure between the hours of 9:00 A.M. and 3:00 P.M. for work along the shoulder areas.

3.0 Field Investigation

The field investigation was conducted on November 17, 2003. Precision Sampling, Inc. (Precision), of San Rafael, California provided the direct-push drilling and sampling services. The site investigation included the advancement of 18 soil borings to facilitate the collection of soil samples in order to screen soil that may be excavated during the proposed construction activities. The project limits extended from KP 19.5 to KP 21.4 along SR 84 in Alameda County, California. The soil boring locations were selected according to Caltrans' Task Order No. 04-174400-5B (Figures 2-7).

Eighteen soil borings were attempted using direct-push drill methods (Geoprobe™). Due to subsurface soil conditions, 11 borings could not be advanced to the proposed depths. At these locations, the soil borings were advanced until refusal occurred. A soil boring could not be performed at Boring location #3 due to the drill rig's inability to access the location.

Eight borings were located on the eastbound shoulder and eleven borings were located on the westbound shoulder of Route 1 (Figures 2 through 7). Work was conducted in the unpaved portion of the shoulder area where the shoulder was wide enough to allow for safe stopping of sampling vehicles.

The soil borings were advanced using direct-push drilling and sampling equipment to a maximum depth of 0.9 meters (3.0 feet) bgs, where possible. The soil borings were located in the unpaved shoulder approximately 0.45 meters (1.5 feet) from the edge of pavement. Soil samples were collected, where possible, at the following depths:

- 0.0 - 0.3 meters (0.0 – 1.0 feet) bgs.
- 0.3 - 0.6 meters (1.0 - 2.0 feet) bgs.
- 0.6 – 0.9 meters (2.0 – 3.0 feet) bgs.

Soil samples were labeled with the boring number and the sample collection depth. For example, "B-1-1" represents the first boring collected at a depth of 0.0 to 0.3 meters (0 to1.0 foot) bgs. A total of 35 soil samples were collected during this investigation. Soil samples were collected using a Geoprobe™ rig equipped with an approximate 5-centimeter (2-inch) diameter, 1.2-meter (4 foot) long sampler lined with an acetate sleeve. Soil samples were retained, by cutting an approximately 0.15-meter (6-inch) section of the acetate sleeve for

each sample depth interval. The acetate sleeve was immediately capped and labeled. Following soil sample collection, the borings were backfilled with the excess borehole cuttings.

The ADL soil samples were labeled, packaged and stored on ice in an insulated chest for transport under chain-of-custody manifest to a California-certified analytical laboratory. Drilling and sampling procedures are presented in Appendix A.

All drilling and sampling equipment was washed prior to use. In addition, to minimize cross-contamination, all appropriate downhole drilling and sampling equipment was washed between borings. Wash water generated during the field investigation was poured onto the ground, avoiding storm drains or conduits to surface water bodies, and was allowed to soak into the soil. Solutions were poured onto the ground in such a way as to avoid runoff.

The horizontal and vertical locations of the borings were established using a Trimble GPS Pathfinder™ Pro XRS global positioning system (GPS). The GPS utilized a GPS receiver and MSK radio beacon differential receiver. The GPS is reported to have sub-meter accuracy for horizontal location of the borings. The vertical accuracy is reported to be two to five times that of the horizontal precision. The GPS data was downloaded in the office and Trimble software was utilized to provide differential corrections to the coordinates. The horizontal and vertical datums used for this investigation were the California Coordinate System of 1983 (CCS83), Zone 2, and the North American Vertical Datum of 1988 (NAVD88), respectively. The standard unit of measurement for both of these datums was the meter. The GPS data for each boring location is presented on Table 1.

3.1 Laboratory Analyses

The ADL soil samples collected and retained for analysis were submitted to Sparger Technology, Inc. (Sparger), of Sacramento, California, a California-certified analytical laboratory (ELAP #1614). Chain-of-custody procedures, including the use of chain-of-custody forms, were used to document sample handling and transport from the time of collection to delivery to the laboratory for analysis. The chain-of-custody forms and laboratory analytical reports are included in Appendix B.

A total of 35 soil samples were submitted for laboratory analysis. The analyses were conducted on a 48-hour turn-around basis. The analyses were performed in general accordance with the following Environmental Protection Agency (EPA) methods.

Matrix	Analyses
Soil	ICAP EPA 6010: lead only (all soil samples)
Soil	Waste Extraction Test (WET) 22CCR 667000 Extraction and 6010 Analysis (selected samples)
Soil	pH EPA 9045 (selected samples)

A total of 35 soil samples were analyzed for total lead in general accordance with EPA Method 6010. Soil samples reported to contain total lead concentrations in excess of 50 milligrams per kilogram (mg/kg) and less than 1,000 mg/kg were further analyzed for soluble lead using the WET. The total lead concentration of 50 mg/kg was selected because it is 10 times the Soluble Threshold Limit Concentration (STLC) of 5.0 milligrams per liter (mg/l). A total of 3 soil samples were analyzed for soluble lead by the WET.

Samples with soluble lead concentrations greater than or equal to 5.0 mg/l (STLC) were further analyzed for soluble lead by the WET using a deionized water extraction solution test (DIWET). A total of 2 soil samples exceeded the STLC of 5.0 mg/l and were analyzed for soluble lead by the DIWET. No soil samples analyzed during this investigation exceeded the Total Threshold Limit Concentration (TTLC) of 1,000 mg/kg.

A total of five soil samples, chosen at random by Caltrans, were tested for pH. Analytical results are presented on Table 1. Certified analytical reports and chain-of-custody forms are included in Appendix B.

4.0 Site Investigation Results

4.1 Lead Investigation Results

Lead analyses were conducted on 35 soil samples from the project limits. A summary of lead results compared to 10 times STLC and TTLC values are presented below. Results are presented on Table 1, and certified analytical reports and chain-of-custody forms are included in Appendix B.

Heavy Metal	10 Times STLC (mg/kg)	No. Samples Exceeding 10 Times STLC	TTLC (mg/kg)	No. Samples Exceeding TTLC	Total Lead Concentration Range (mg/kg)
Lead	50	3	1,000	0	4.17 to 161

Selected soil samples were further analyzed for soluble lead concentrations by the WET and DI WET. A summary of soluble lead results is presented below.

Heavy Metal	STLC (mg/kg)	No. Samples Exceeding STLC	WET Concentration Range (mg/l)	DIWET Concentration Range (mg/l)
Lead	5.0	2	4.6 to 10.3	1.51 and 3.55

In the five soil samples tested, pH ranged from 7.5 to 8.7 (Table 1). The mean pH for the samples tested was 7.5 standard units.

5.0 Data Evaluation

5.1 Lead Concentrations and Distribution

Soil samples collected from the site were reported to contain lead (Table 1). The source for the lead is not known. However, studies along the transportation corridors have attributed elevated lead concentrations within soil to accumulation of dust and debris-containing lead from leaded gasoline emissions (Coltrin, et al., 1993).

The majority of the soil samples containing elevated lead concentrations were collected from the surface to 0.3-meter (1 foot) depth interval. A summary of the distribution of the elevated lead concentrations is presented below. The data set is restricted to those samples reported to contain greater than or equal to 50 mg/kg total lead, a level selected because it is 10 times the STLC.

		Distribution of Samples from Total Sample Population with Greater Than 50 mg/kg Lead		Distribution of Samples from Interval with Greater Than 50 mg/kg Lead		Distribution of Samples from All Samples with Greater Than 50 mg/kg Lead	
Sample Area	Sample Interval	Number	Percentage	Number	Percentage	Number	Percentage
SR 84	0.0-0.30 m	3 of 35	8.6	3 of 18	16.7	3 of 3	100
SR 84	0.30-0.60 m	0	-	0	-	0	-
SR 84	0.60–0.90 m	0	-	0	-	0	-

As shown above, the number of samples containing elevated lead concentrations decreased with depth. This is typical of accumulations of ADL, as reported by Coltrin and others (1993), where lead concentrations were observed to decrease with depth.

Lead concentrations were compared to TTLC (1,000 mg/kg) and STLC (5.0 mg/l) values to evaluate whether the soil would be considered a California hazardous waste, should it become a waste. Soil samples reported to contain total lead exceeding the TTLC or soluble lead exceeding the STLC would be considered a California hazardous waste, should the soil become a waste.

No soil samples were reported to contain total lead at a concentration in excess of the TTLC of 1,000 mg/kg. The maximum total lead concentration was 161 mg/kg reported in soil sample B-16-1 collected at the surface at boring location 16.

A total of two soil samples had soluble lead concentrations in excess of the STLC of 5.0 mg/l by WET analysis. Soil at boring locations 7 and 16 would be considered a California hazardous waste, should the soil become a waste based on the soluble lead results.

The DTSC granted Caltrans a variance for soil considered hazardous due to the presence of elevated lead concentrations (DTSC, 2000). The variance allows Caltrans to reuse lead-contaminated soil within Caltrans right-of-way in the roadway corridor boundaries under certain conditions if the soil is considered a non-Resource Conservation and Recovery Act (RCRA) waste. Assembly Bill 414 allows Caltrans to reuse soil with total lead concentrations of up to 1,496 mg/kg. However, within the jurisdiction of the Regional Water Quality Control Board, San Francisco Bay Region, Caltrans is restricted to total lead concentrations of less than 350 mg/kg, in accordance with HSC 25157.8. Therefore, in accordance with the variance and HSC 25157.8, the following conditions apply to Caltrans' re-use and management of soil impacted by ADL as fill material for construction and maintenance operations (DTSC, 2000):

1. As fill beneath at least one foot of clean (non-hazardous) soil and a minimum five feet above the maximum water table elevation if the soluble lead concentration reported by the DIWET analysis is less than 0.5 mg/l and the total lead concentration is less than 350 mg/kg. This condition applies only if the soil is not a RCRA waste.

2. As fill beneath a pavement structure designated to protect the soil from water infiltration and five feet above the water table if the soluble lead concentration reported by DIWET analysis is greater than 0.5 mg/l but less than 50 mg/l, and the total lead concentration is less than 750 mg/kg. This condition applies only if the soil is not a RCRA waste.

3. Lead-contaminated soil with a pH below 5 shall only be used as fill beneath the paved portion of the roadway. This condition applies only if the soil is not a RCRA waste.

5.2 Lead Data Statistical Analysis

To further evaluate the applicability of the DTSC variance (DTSC, 2000), Shaw conducted a statistical evaluation of lead analytical data for this project at the request of Caltrans. The statistical evaluation was conducted in general accordance with the procedures discussed in EPA Technology Support Center Issue (EPA, December 1997). A statistical evaluation was conducted to further evaluate the concentration of lead within soil at the site. The statistical evaluation addressed the following items:

- Calculation of mean;
- Determination of the distribution of the sample data; and
- Calculation of the 90 percent Confidence Intervals (CI) which provides the corresponding 95 percent Upper Confidence Level (UCL), interpreted as a 0.95 probability that the true mean for a given sample is no higher than the calculated UCL.

The data from all sample intervals were combined into one data set for analysis. Evaluation of the soil data for the entire sample population resulted in an arithmetic mean (average) concentration of total lead of 24.97 mg/kg (Appendix C).

A histogram of the total lead results for the entire data set was constructed to evaluate the distribution of the total lead concentrations within the data set. The data was heavily skewed to lower concentrations (Appendix C). Statistical analysis was conducted using non-parametric techniques, which do not require that the data be drawn from a specific distribution (Gilbert, 1987). There are several variations on the nonparametric Bootstrap. Efron's empirical quantile method (Efron, 1982) applied to the mean was used to estimate the 95 percent UCL for the mean for this data set. The 95 percent UCL calculated for total lead data was 36.67 mg/kg.

Pearson (product moment) correlation coefficients (Pearson values) were obtained from regression analysis for regression lines fit to the data (Appendix C). Prior to calculation of the correlation coefficients, the total/soluble lead bivariate data were visually inspected for outliers. A scatter plot was generated for the total/soluble lead data set. As discussed in Gilbert (1987), data points outside the main "data cloud" were considered outliers, as they may not be from the same bivariate distribution as the remaining data points. No outliers were considered present.

The correlation coefficient for the total/WET was 0.97. There was too few DIWET data for a correlation coefficient to be calculated. The correlation coefficient for total/WET was above the acceptable correlation coefficient value of 0.8, per Caltrans Contract No. 43A0078. The correlation coefficient for the WET data indicates that acceptable correlation between total and soluble lead data exists.

An expected soluble (WET) lead concentration was obtained from regression analysis (model fit to the data) developed from the total and soluble lead data. The coefficient for the dependant variables (slope of regression line) used in the regression analysis, and the total lead versus soluble lead concentration plots are presented in Appendix E. The predicted soluble lead concentration for WET data corresponding to the total lead 95 percent UCL is 1.94 mg/l. A summary of the statistical data is outlined below.

Area	Total Lead Mean (mg/kg)	Total Lead 90% UCL (mg/kg)	Total Lead 95% UCL (mg/kg)	Predicted WET Lead Concentration 95% UCL (mg/l)	Predicted DI WET Lead Concentration 95% UCL (mg/l)
SR 84	24.97	33.74	36.67	1.94	0.64

5.2.1 *Summary*

Soil at specific boring locations may be considered a California hazardous waste based on the soluble (WET) concentrations of lead reported in individual surface soil samples from the project limits. Surface soil at boring locations 7 and 16 would be considered a California hazardous waste, should the soil become a waste, based on the soluble lead results.

Shaw conducted statistical analyses on the total and soluble lead data. The statistical analysis assumes that the soil will be handled as one waste stream. However, if the construction work is staged in a manner that segregates the excavated soil, waste soil from some areas, specifically boring locations 7 and 16, may be considered a California hazardous waste.

The excavated soil, if treated as a whole and sampled on a composite basis from stockpiles generated during construction activities, would not likely require soluble lead analysis by the WET as the mean and 95% UCL were less than 50 mg/kg, a level that generally triggers WET analysis. If WET analyses are conducted, it is not likely that composite soil samples would contain soluble lead at concentrations greater than the STLC as the predicted soluble lead concentration is less than 5 mg/l. The composite soil profile for the project would likely have soluble lead concentrations less than the STLC of 5.0 mg/l.

The waste soil, if treated as a whole and sampled on a composite basis from stockpiles generated during construction activities, would not be considered a California hazardous waste based on the statistical analysis conducted. As the soil would not be considered a hazardous waste, special handling and disposal procedures are not required, except as needed to protect worker health and safety.

6.0 Conclusions and Recommendations

Based on the laboratory results, current regulatory guidelines, and the judgment of Shaw, the following conclusions and recommendations are offered:

- Total lead concentrations ranged from 4.17 to 161 mg/kg in 35 soil samples analyzed. The source for the lead is not known. However, studies along the transportation corridors have attributed elevated lead concentrations within soil to accumulation of dust and debris-containing lead from leaded gasoline emissions (Coltrin, et al., 1993).

- Lead concentrations were compared to TTLC and STLC values to evaluate whether the soil would be considered a hazardous waste should it become a waste. No soil sample was reported to contain total lead concentrations that exceeded the TTLC value of 1,000 mg/kg. Two soil samples contained soluble lead at concentrations in excess of the STLC of 5.0 mg/l by WET analysis.

- Surface soil at boring locations 7 and 16 would be considered a California hazardous waste, should the soil become a waste, based on the soluble lead results.

- The mean pH for the seven samples tested was 7.5 standard units.

- The statistical evaluation resulted in the following data:

Area	Total Lead Mean (mg/kg)	Total Lead 90% UCL (mg/kg)	Total Lead 95% UCL (mg/kg)	Predicted WET Lead Concentration 95% UCL (mg/l)	Predicted DI WET Lead Concentration 95% UCL (mg/l)
SR 84	24.97	33.74	36.67	1.94	0.64

- The excavated soil from SR 84 will not likely require soluble lead analysis by the WET as the mean and 95 percent UCL for total lead are less than 50 mg/kg, a level that triggers WET analysis when considering soil disposal options. If WET analyses are conducted, it is likely that composite soil samples would contain soluble lead at concentrations less than the STLC, as the predicted value for soluble lead by the WET corresponding to the total lead 95 percent UCL is less than 5.0 mg/l.

- Based on the statistical analysis conducted, it is likely that the waste soil, if treated as a whole and sampled on a composite basis from stockpiles generated during the construction activities, would not be considered a California hazardous waste and would not require invoking the DTSC variance.

7.0 References

Caltrans (California Department of Transportation, District 4), 2003, Caltrans Contract Number 43A0078, Task Order Number 04-174400-5B, Union City and Fremont, Alameda KP 19.5/21.4: dated October 14, 2003.

Coltrin, D., Teichman, J., and Prouty, K., 1993, A survey of lead contamination in soil along Interstate-880, Alameda County, California: *Applied Occupational and Environmental Hygiene,* Tharr, D., ed., vol. 8, no. 4, April 1993, p. 217-220.

DTSC (California Environmental Protection Agency, Department of Toxic Substances Control), Variance for lead contaminated waste: dated September 22, 2000, 8 p.

EPA (U.S. Environmental Protection Agency), 1986, Test Methods for Evaluating Solid Waste, Volume II: Field Manual, Physical/Chemical Methods, SW-846, Third Edition: dated November 1986.

Gilbert, R. O., *Statistical Methods for Environmental Pollution Monitoring*: Van Nostrand Reinhold, New York, New York, 1987.

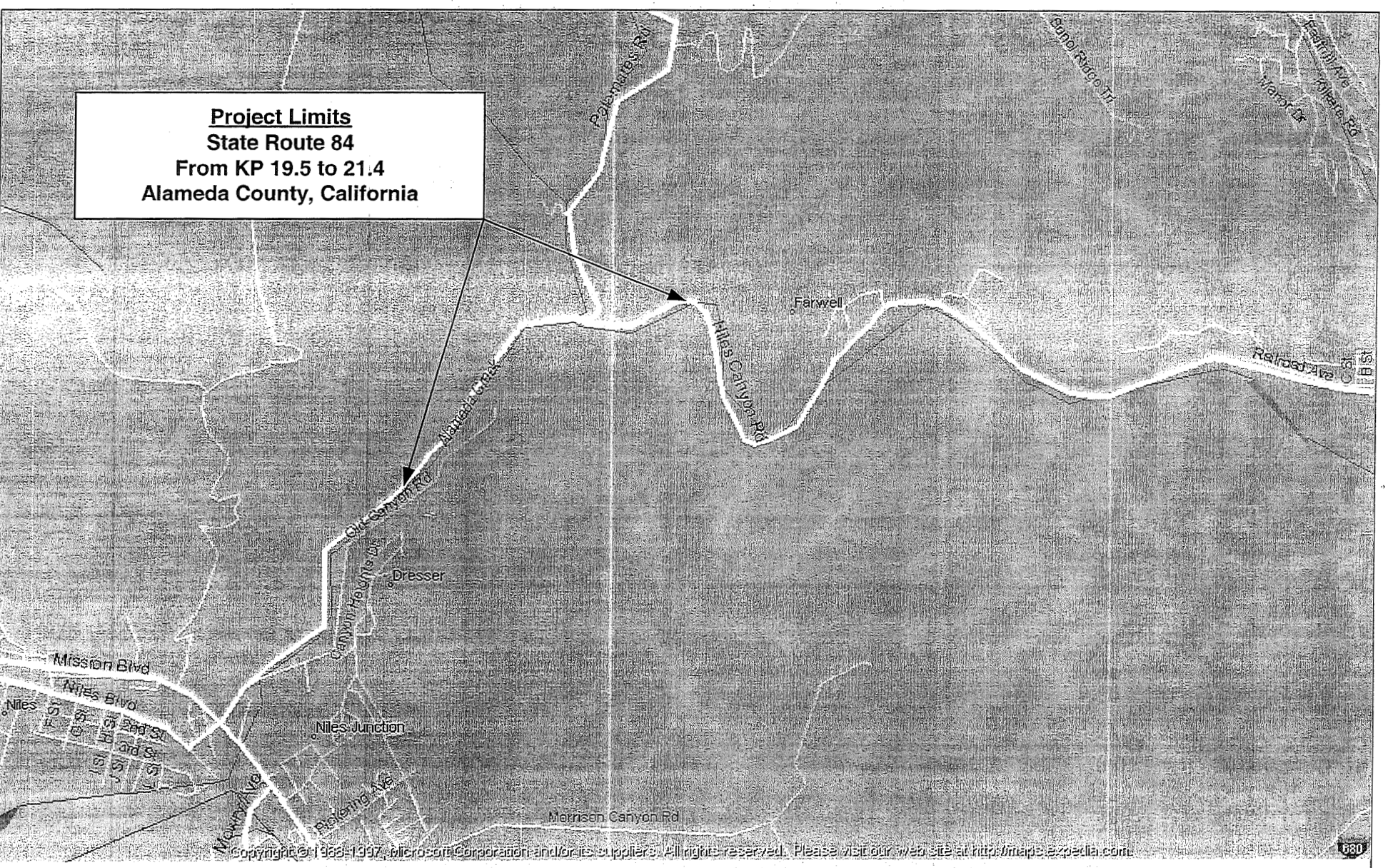
Shaw Environmental, Inc. (Shaw), 2003a, Workplan, Aerially Lead Investigation, State Route 84, Alameda County, California: dated October 3, 2003.

Shaw, 2003b, Health and Safety Plan, Aerially Lead Investigation, State Route 84, Alameda County, California: dated October 3, 2003.

TABLE 1
LEAD ANALYTICAL DATA AND GPS LOCATIONS
Caltrans - State Route 84
Alameda County, California
Task Order No. 04-174400-5B
Contract No. 43A0078

Boring	Sample Designation (boring # - depth)	Latitude	Longitude	MSL (meters)	Sample Depth (m)	Sample Depth (ft)	Lead Total	Lead WET	Lead DI WET	pH
1	B - 01 - 1	37.58874455	-121.95833646	30.64	0.0 - 0.3	0 - 1.0	32.8			
	B - 01 - 2				0.3 - 0.6	1.0 - 2.0	42.6			
	B - 01 - 3				0.6 - 0.9	2.0 - 3.0	14			
2	B - 02 - 1	37.59008767	-121.95748346	32.49	0.0 - 0.3	0 - 1.0	41.7			
	B - 02 - 2				0.3 - 0.6	1.0 - 2.0	-			
	B - 02 - 3				0.6 - 0.9	2.0 - 3.0	-			
3	B - 03 - 1		No GPS Data		0.0 - 0.3	0 - 1.0	-	Could not access		
	B - 03 - 2				0.3 - 0.6	1.0 - 2.0	-			
	B - 03 - 3				0.6 - 0.9	2.0 - 3.0	-			
4	B - 04 - 1	37.59809873	-121.94880630	40.56	0.0 - 0.3	0 - 1.0	27.5			
	B - 04 - 2				0.3 - 0.6	1.0 - 2.0	-			
	B - 04 - 3				0.6 - 0.9	2.0 - 3.0	-			
5	B - 05 - 1	37.59789977	-121.94728811	42.82	0.0 - 0.3	0 - 1.0	6.31			
	B - 05 - 2				0.3 - 0.6	1.0 - 2.0	8.71			
	B - 05 - 3				0.6 - 0.9	2.0 - 3.0	10.8			8.0
6	B - 06 - 1	37.59789591	-121.94246014	47.43	0.0 - 0.3	0 - 1.0	31.5			
	B - 06 - 2				0.3 - 0.6	1.0 - 2.0	14.4			
	B - 06 - 3				0.6 - 0.9	2.0 - 3.0	17.9			
7	B - 07 - 1	37.59861283	-121.94084724	49.59	0.0 - 0.3	0 - 1.0	**136**	**8.18**	1.51	
	B - 07 - 2				0.3 - 0.6	1.0 - 2.0	9.82			
	B - 07 - 3				0.6 - 0.9	2.0 - 3.0	-			
8	B - 08 - 1	37.59862221	-121.94113374	48.24	0.0 - 0.3	0 - 1.0	**143**	4.60		8.2
	B - 08 - 2				0.3 - 0.6	1.0 - 2.0	16.2			7.5
	B - 08 - 3				0.6 - 0.9	2.0 - 3.0	9.47			
9	B - 09 - 1	37.59786014	-121.94300479	44.47	0.0 - 0.3	0 - 1.0	11.2			
	B - 09 - 2				0.3 - 0.6	1.0 - 2.0	-			
	B - 09 - 3				0.6 - 0.9	2.0 - 3.0	-			
10	B - 10 - 1	37.59756405	-121.94471609	45.36	0.0 - 0.3	0 - 1.0	6.56			
	B - 10 - 2				0.3 - 0.6	1.0 - 2.0	-			
	B - 10 - 3				0.6 - 0.9	2.0 - 3.0	-			
11	B - 11 - 1	37.59793264	-121.94699217	46.11	0.0 - 0.3	0 - 1.0	14.9			
	B - 11 - 2				0.3 - 0.6	1.0 - 2.0	-			
	B - 11 - 3				0.6 - 0.9	2.0 - 3.0	-			
12	B - 12 - 1	37.59819823	-121.94835683	41.45	0.0 - 0.3	0 - 1.0	7.26			
	B 12 2				0.3 - 0.6	1.0 - 2.0	6.14			
	B - 12 - 3				0.6 - 0.9	2.0 - 3.0	8.77			
13	B - 13 - 1	37.59685673	-121.95242873	32.17	0.0 - 0.3	0 - 1.0	4.62			
	B 13 2				0.3 - 0.6	1.0 - 2.0	-			
	B - 13 - 3				0.6 - 0.9	2.0 - 3.0	-			
14	B - 14 - 1	37.59576792	-121.95306271	38.07	0.0 - 0.3	0 - 1.0	10			
	B - 14 - 2				0.3 - 0.6	1.0 - 2.0	9.99			
	B - 14 - 3				0.6 - 0.9	2.0 - 3.0	7.97			
15	B - 15 - 1	37.59431113	-121.95459375	35.59	0.0 - 0.3	0 - 1.0	4.17			8.4
	B 15 2				0.3 - 0.6	1.0 - 2.0	7.94			
	B - 15 - 3				0.6 - 0.9	2.0 - 3.0	-			
16	B - 16 - 1	37.59245382	-121.95624608	36.92	0.0 - 0.3	0 - 1.0	**161**	**10.3**	3.55	
	B 16 2				0.3 - 0.6	1.0 - 2.0	6.56			8.7
	B - 16 - 3				0.6 - 0.9	2.0 - 3.0	-			
17	B - 17 - 1		No GPS Data		0.0 - 0.3	0 - 1.0	7.36			
	B 17 2				0.3 - 0.6	1.0 - 2.0	9.45			
	B - 17 - 3				0.6 - 0.9	2.0 - 3.0	-			
18	B - 18 - 1	37.58939537	-121.95779459	29.26	0.0 - 0.3	0 - 1.0	8.08			
	B 18 2				0.3 - 0.6	1.0 - 2.0	9.24			
	B - 18 - 3				0.6 - 0.9	2.0 - 3.0	10.2			
TTLC							1,000	-	-	-
STLC							-	5.0	5.0	-
Reporting Limits							1.0	0.05	0.10	-

Notes:
1. Lead analysis conducted in general accordance with U.S. Environmental Protection Agency (EPA) Method 6010. pH analysis conducted in general accordance with EPA Method 9045.
2. Sample depths reported in approximate meters (m) / feet (ft) below the ground surface.
3. TTLC = total threshold limit concentration. STLC = soluble threshold limit concentration. WET = waste extraction test. DI WET = WET with deionized water extraction solution.
4. WET conducted in general accordance with California Title 22 procedures.
5. Total metal results reported in milligrams per kilogram. WET and DI WET results reported in milligrams per liter. pH results reported in standard units.
6. Soil samples labeled as follows: boring no.-depth. Ex.: B-1-1, boring 1, 0.3-meter depth.
7. For total results, bold results exceed 10 times the STLC.
8. For WET results, bold results exceed the STLC.
9. - = No sample collected, drill rig refusal.
9. Latitude and longitude converted to decimal format.



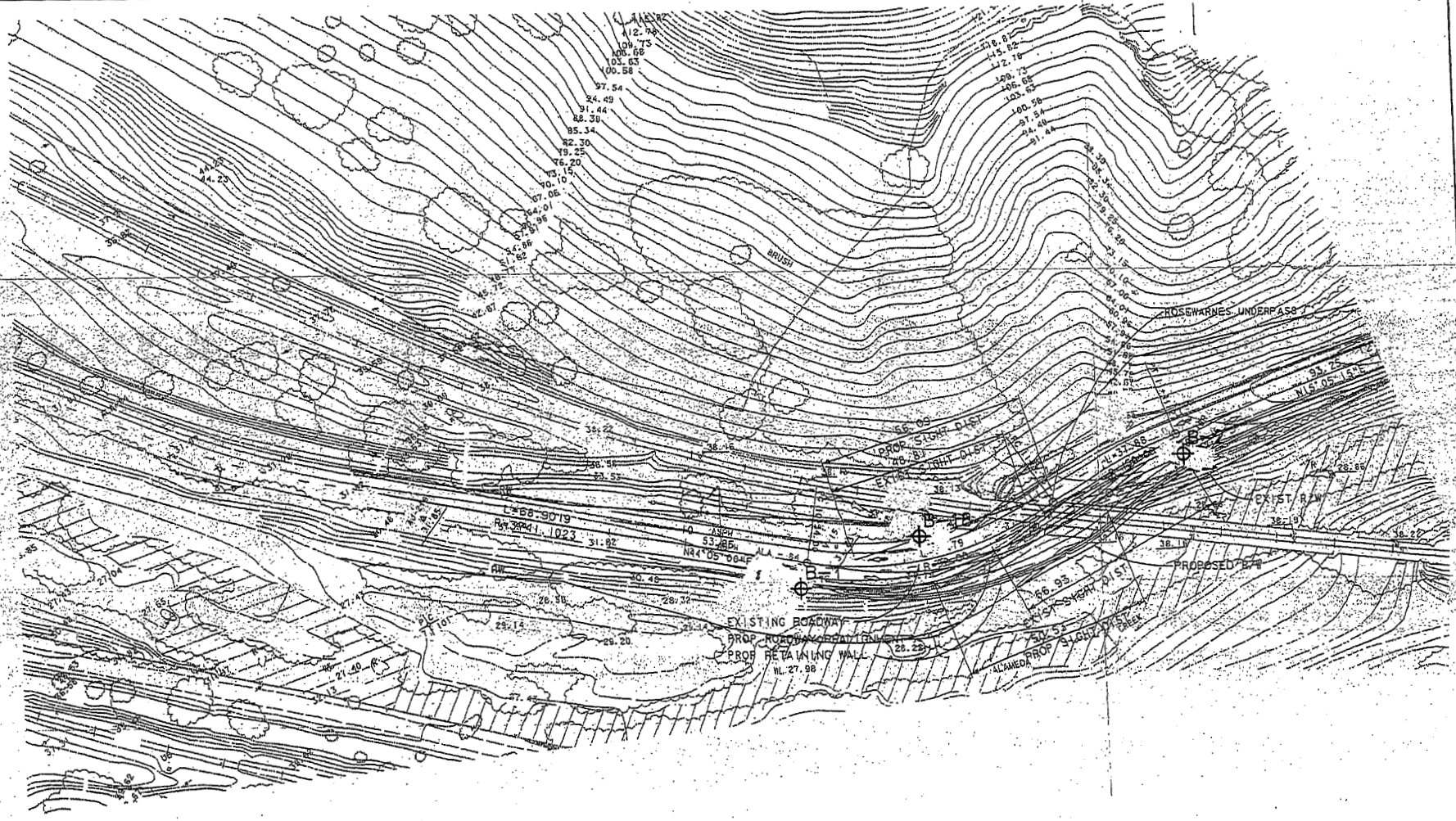
Reference:
Microsoft Expedia, Streets 98

Not to Scale

Figure 1

Site Location Map
State Route 84
Alameda County, CA

Shaw™ Shaw Environmental, Inc.



LEGEND

B-18 ⊕ SOIL BORING LOCATION

SCALE 1:1000

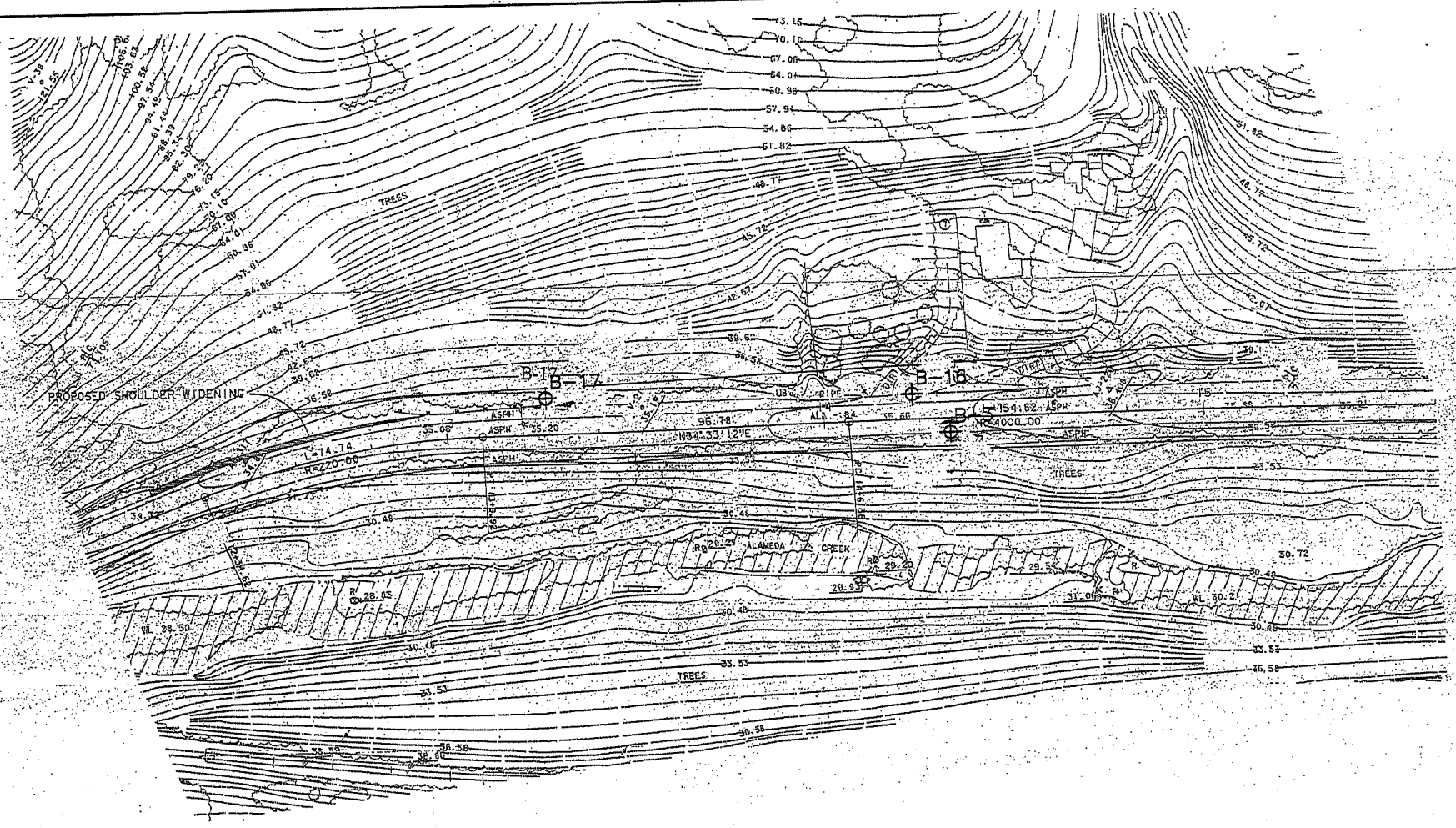
Shaw™
Shaw E&I, Inc.

STATE ROUTE 84
KP 19.5 TO 25.4
ALAMEDA COUNTY, CALIFORNIA

FIGURE 2

SOIL BORING LOCATIONS

DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
J.C. Douglas	7-5-04		101252



DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
D. Douglas 1-5-04			101252

LEGEND

B-17 ⊕ SOIL BORING LOCATION

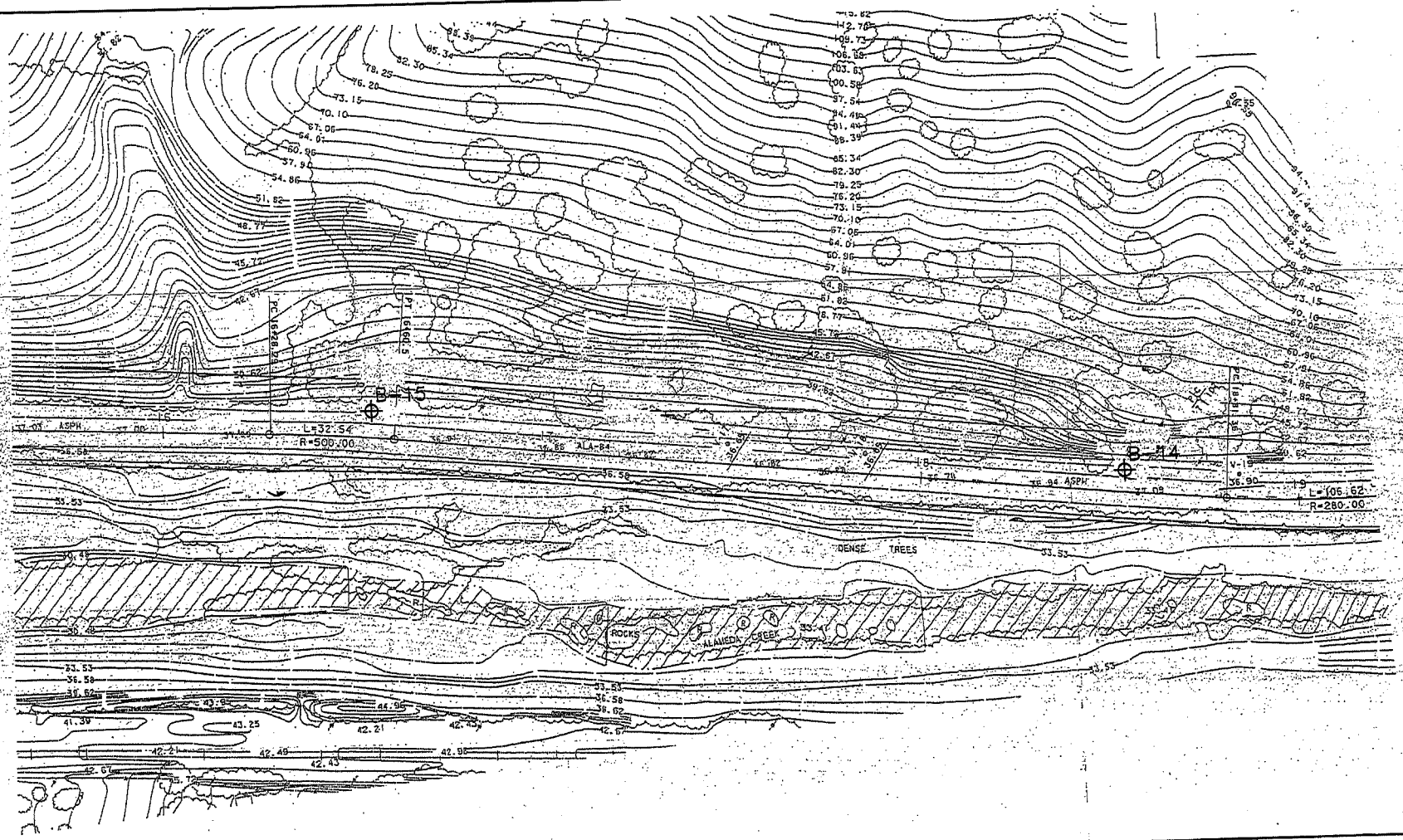
SCALE 1:1000

Shaw™
Shaw E & I, Inc.

STATE ROUTE 84
KP 19.5 TO 25.4
ALAMEDA COUNTY, CALIFORNIA

FIGURE 3

SOIL BORING LOCATIONS



LEGEND

B-15 ⊕ SOIL BORING LOCATION

SCALE 1:1000

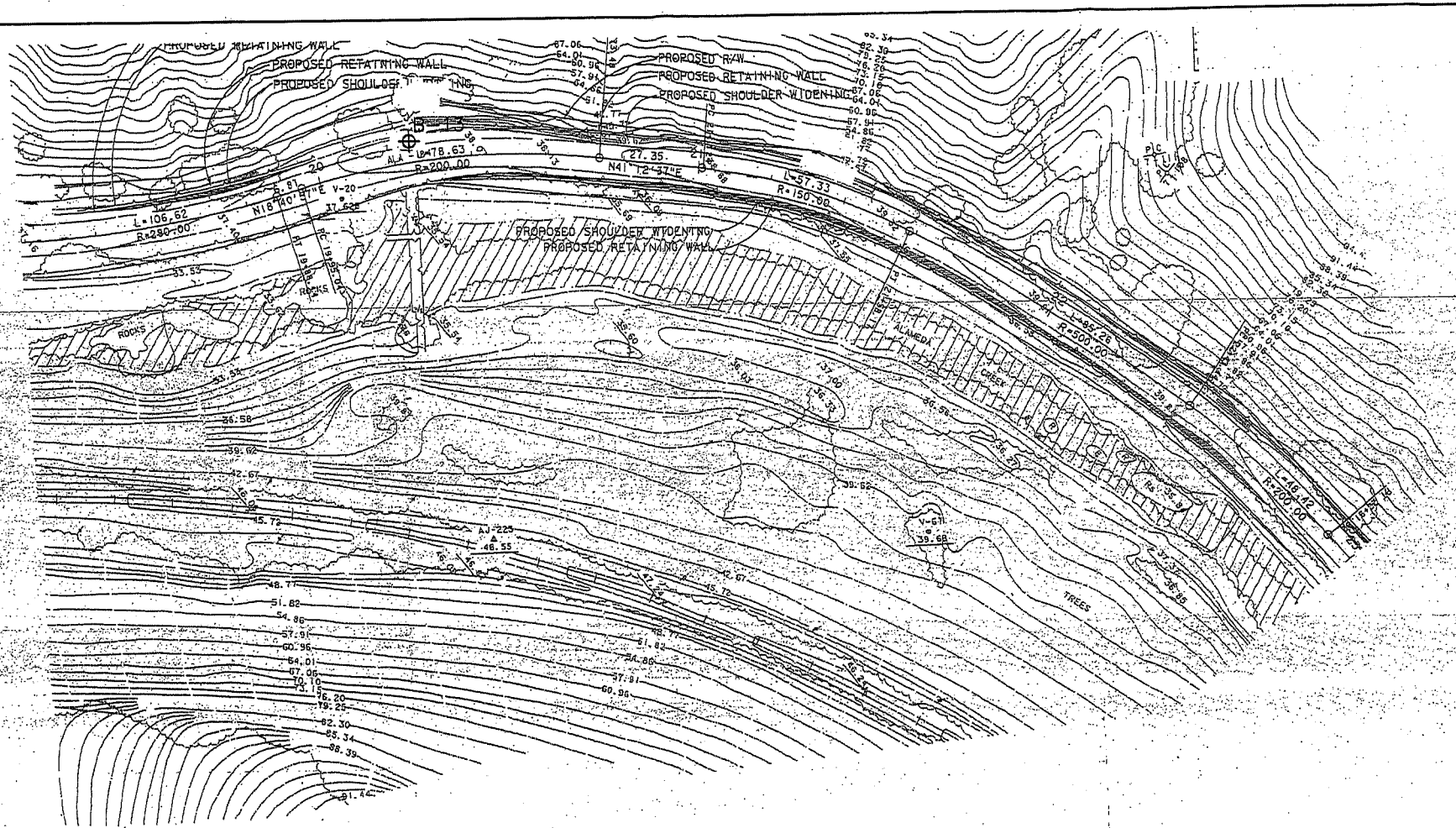
Shaw
Shaw E&I, Inc.

STATE ROUTE 84
KP 19.5 TO 25.4
ALAMEDA COUNTY, CALIFORNIA

FIGURE 4

SOIL BORING LOCATIONS

DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
C. Douglas 7-5-04			101252



DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
C. Douglas	11-5-04		101252

LEGEND

B-13 ⊕ SOIL BORING LOCATION

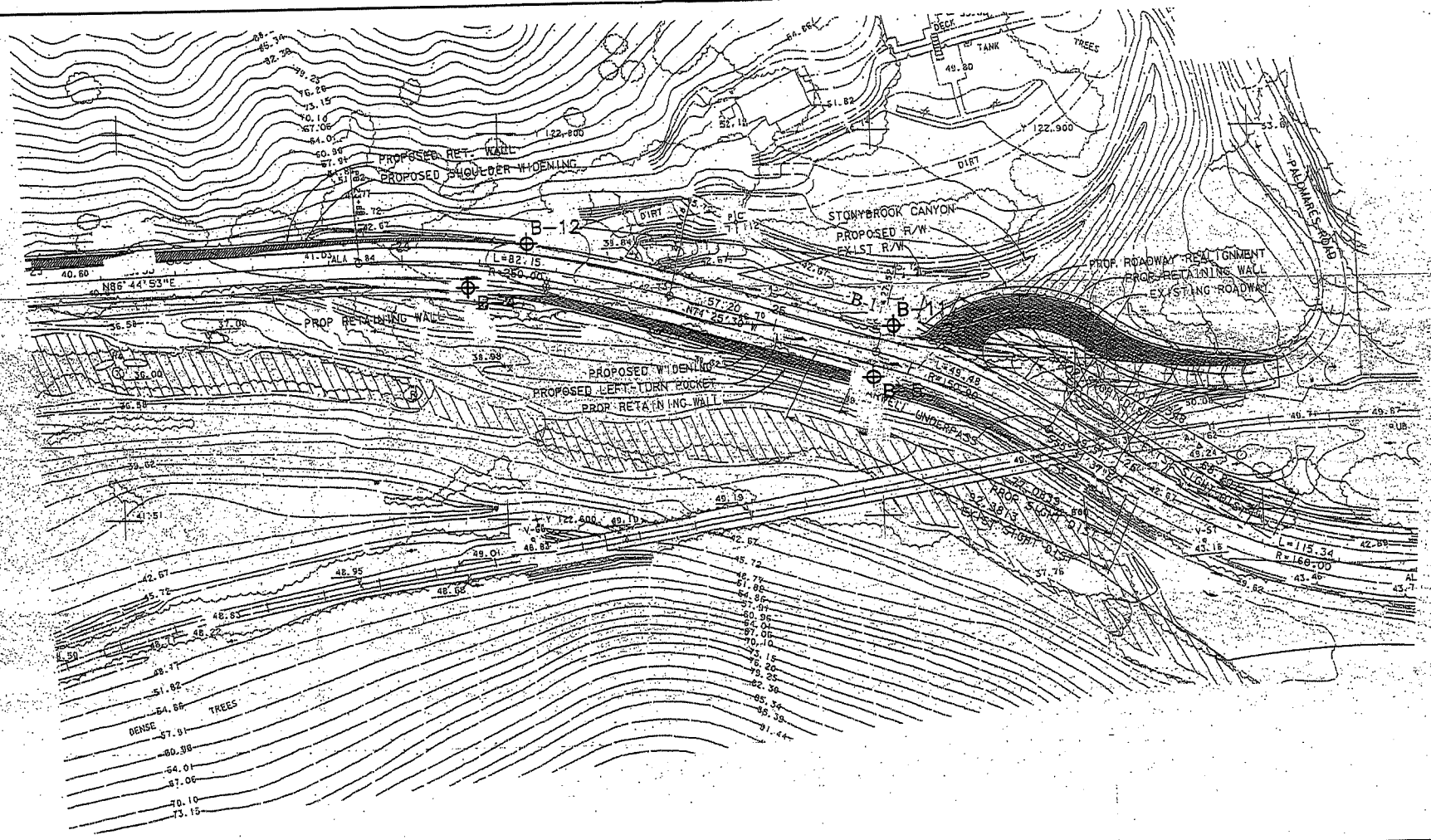
SCALE 1:1000

Shaw™
Shaw E&I, Inc.

STATE ROUTE 84
KP 19.5 TO 25.4
ALAMEDA COUNTY, CALIFORNIA

FIGURE 5

SOIL BORING LOCATIONS



LEGEND

B-12 ⊕ SOIL BORING LOCATION

SCALE 1:1000

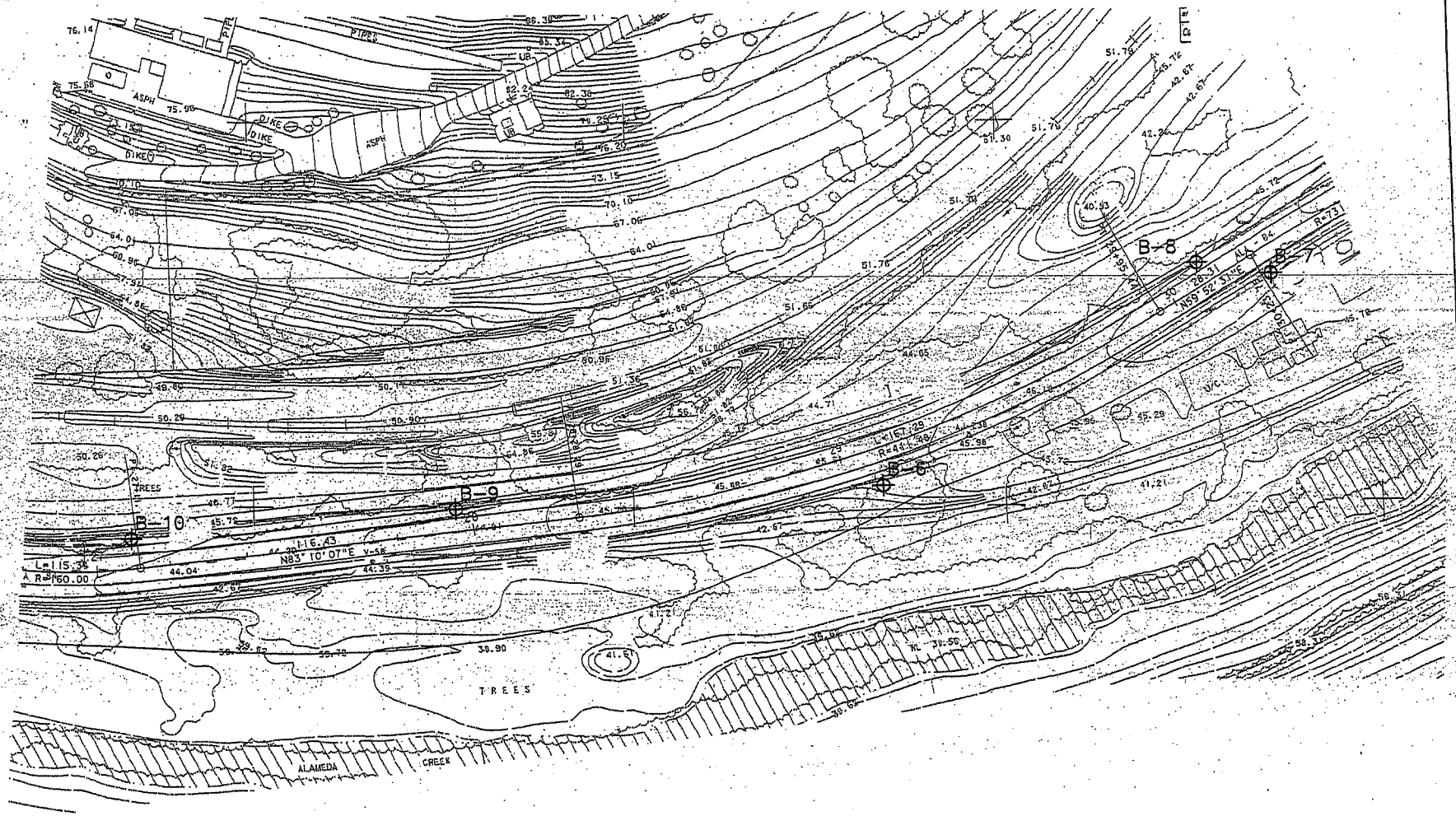
Shaw
Shaw E&I, Inc.

STATE ROUTE 84
KP 19.5 TO 25.4
ALAMEDA COUNTY, CALIFORNIA

FIGURE 6

SOIL BORING LOCATIONS

DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
C. Douglas 1-5-04			101252



LEGEND

B-10 ⊕ SOIL BORING LOCATION

SCALE 1:1000

Shaw™
Shaw E&I, Inc.

STATE ROUTE 84
KP 19.5 TO 25.4
ALAMEDA COUNTY, CALIFORNIA

FIGURE 7

SOIL BORING LOCATIONS

DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
C. Douglas 1-5-04			101252

APPENDIX A
DRILLING AND SAMPLING PROCEDURES

Appendix A
Drilling and Sampling Procedures

The procedures that were used for drilling the borings, collecting soil samples, and collecting groundwater grab samples are presented below.

- A boring permit was not required from the Alameda County Public Works Agency as the borings were only advanced to a maximum depth of 0.9 meters (3.0 feet) bgs.

Drilling and Soil Sample Collection

- Work was conducted in the unpaved portion of the shoulder areas of northbound and southbound SR 84.
- Eighteen soil borings were advanced using Geoprobe™, direct-push, sampling equipment to a maximum depth of approximately 0.9 meters (3.0 feet) bgs for soil sample collection. Due to subsurface soil conditions, 11 borings could not be advanced to the proposed depths. At these locations, the soil borings were advanced until refusal occurred.
- The direct push samples were collected directly from a 2.5-centimeter (1-inch) diameter direct-push rod containing an acetate sleeve. The sleeve was cut into discreet sample intervals and immediately capped and labeled.
- Soil samples were labeled with the boring number, and approximate sample collection depth. For example, B-16-1, where, 16 is the boring number, and 1 is the sample collection depth from the surface to 0.30 meters (0 to 1 foot) bgs.
- Following soil sample collection, the borings were backfilled with the excess soil cuttings.
- The drilling and sampling equipment was washed in a detergent rinse, two clear water rinses, and a final deionized/distilled water rinse prior to drilling each boring. Wash water generated during the field investigation was poured onto the ground, avoiding storm drains or conduits to surface water bodies, and was allowed to soak into the soil. Solutions were poured onto the ground in such a way as to avoid runoff.

Sample Retention and Analysis

- Chain-of-custody procedures, including the use of chain-of-custody forms, were used to document sample handling and transport from collection to delivery to the laboratory for analysis.

- The samples were retained in insulated chests preserved with ice and delivered to the laboratory within 24 hours of the date of sampling. A total of 35 soil samples were submitted for laboratory analysis. The analyses were conducted on a 48-hour turn-around basis.
- Laboratory quality assurance/quality control procedures are summarized below:
  - Method Blank Frequency = one per 10 samples
  - Matrix Spike/Matrix Spike Duplicate = one per 10 samples
  - Laboratory Control Sample/Laboratory Control Sample Duplicate = one per 10 samples

APPENDIX B
LABORATORY ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY FORMS

Sparger Technology, Inc.
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Analytical Laboratory Division
Mobile Laboratory Division
Scientific Division

Martha Adams
Shaw Environmental & Infrastructure
1326 N. Market Blvd.
Sacramento, CA 95834

Client	Shaw Environmental & Infrastructure
Workorder	15881 101252 RTE 84 San Mateo
Received	11/14/03

The samples were received in EPA specified containers. The samples were transported and received under documented chain of custody and stored at four (4) degrees C until analysis was performed.

Sparger Technology, Inc. ID Suffix Keys - These descriptors will follow the Sparger Technology, Inc. ID numbers and help identify the specific sample and clarify the report.

DUP - Matrix Duplicate
MS - Matrix Spike
MSD - Matrix Spike Duplicate
LCS - Lab Control Sample
LCSD - Lab Control Sample Duplicate
RPD - Relative Percent Difference
QC - Additional Quality Control
DIL - Results from a diluted sample
ND - None Detected
RL - Reporting Limit

Note: In an effort to conserve paper, the results are printed on both sides of the paper.

Ray James
Laboratory Director

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Test Certificate of Analysis

Client ID Shaw Environmental & Infrastructure
Workorder # 15881 **Workorder ID** 101252 RTE 84 San Mateo

Parameter Lead
Method 6010B

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
15881001	B-12-1	7.26	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881002	B-12-2	6.14	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881003	B-12-3	8.77	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881004	B-13-1	4.62	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881005	B-15-1	4.17	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881006	B-15-2	7.94	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881007	B-14-1	10.0	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881008	B-14-2	9.99	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881009	B-14-3	7.97	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881010	B-16-1	161	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881011	B-16-2	6.56	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881012	B-17-1	7.36	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881013	B-17-2	9.45	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881014	B-18-1	8.08	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881015	B-18-2	9.24	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881016	B-18-3	10.2	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881017	B-1-1	32.8	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881018	B-1-2	42.6	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881019	B-1-3	14.0	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881020	B-2-1	41.7	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881021	B-4-1	27.5	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881022	B-5-1	6.31	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881023	B-5-2	8.71	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881024	B-5-3	10.8	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881025	B-6-1	31.5	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881026	B-6-2	14.4	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881027	B-6-3	17.9	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881028	B-7-1	136	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881029	B-7-2	9.82	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881030	B-8-1	143	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881031	B-8-2	16.2	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881032	B-8-3	9.47	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881033	B-9-1	11.2	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1
15881034	B-10-1	6.56	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1

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Test Certificate of Analysis

Client ID Shaw Environmental & Infrastructure
Workorder # 15881
Workorder ID 101252 RTE 84 San Mateo

Parameter Lead (continued)
Method 6010B

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
15881035	B-11-1	14.9	1.0	mg/Kg	11/17/03	11/20/03	Soil	1:1

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Test Certificate of Analysis

Client ID Shaw Environmental & Infrastructure
Workorder # 15881 **Workorder ID** 101252 RTE 84 San Mateo

Parameter pH
Method 9045 PH

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
15881005	B-15-1	8.4	0.10	SU	11/17/03	11/20/03	Soil	1:1
15881011	B-16-2	8.7	0.10	SU	11/17/03	11/20/03	Soil	1:1
15881024	B-5-3	8.0	0.10	SU	11/17/03	11/20/03	Soil	1:1
15881030	B-8-1	8.2	0.10	SU	11/17/03	11/20/03	Soil	1:1
15881031	B-8-2	7.5	0.10	SU	11/17/03	11/20/03	Soil	1:1

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Method Blank Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	58984
Sample ID	MB for HBN 205386 [ICPV/4638]
Matrix	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	ND	1.0	mg/Kg	1:1

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Lab Control Sample Report

Client ID Shaw Environmental & Infrastructure
Workorder ID 101252 RTE 84 San Mateo
Laboratory ID 58985
Sample ID LCS for HBN 205386 [ICPV/4638]
Matrix Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	46.1	1.0	mg/Kg	1:1

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Lab Control Sample Duplicate Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	58986
Sample ID	LCSD for HBN 205386 [ICPV/4638
Matrix	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	45.9	1.0	mg/Kg	1:1

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Duplicate Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	58987
Sample ID	DUP for HBN 205386 [ICPV/4638]
Matrix	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	7.26	1.0	mg/Kg	1:1

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Matrix Spike Report

Client ID Shaw Environmental & Infrastructure
Workorder ID 101252 RTE 84 San Mateo
Laboratory ID 58988
Sample ID MS for HBN 205386 [ICPV/4638]
Matrix Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	52.2	1.0	mg/Kg	1:1

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Matrix Spike Duplicate Report

Client ID Shaw Environmental & Infrastructure
Workorder ID 101252 RTE 84 San Mateo
Laboratory ID 58989
Sample ID MSD for HBN 205386 [ICPV/4638]
Matrix Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	51.9	1.0	mg/Kg	1:1

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Method Blank Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	58990
Sample ID	MB for HBN 205388 [ICPV/4639]
Matrix	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	ND	1.0	mg/Kg	1:1

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Lab Control Sample Report

Client ID Shaw Environmental & Infrastructure
Workorder ID 101252 RTE 84 San Mateo
Laboratory ID 58991
Sample ID LCS for HBN 205388 [ICPV/4639]
Matrix Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	46.1	1.0	mg/Kg	1:1

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Lab Control Sample Duplicate Report

Client ID Shaw Environmental & Infrastructure
Workorder ID 101252 RTE 84 San Mateo
Laboratory ID 58992
Sample ID LCSD for HBN 205388 [ICPV/4639
Matrix Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	45.9	1.0	mg/Kg	1:1

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Duplicate Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	58993
Sample ID	DUP for HBN 205388 [ICPV/4639]
Matrix	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	30.8	1.0	mg/Kg	1:1

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Matrix Spike Report

Client ID Shaw Environmental & Infrastructure
Workorder ID 101252 RTE 84 San Mateo
Laboratory ID 58994
Sample ID MS for HBN 205388 [ICPV/4639]
Matrix Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	76.6	1.0	mg/Kg	1:1

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Matrix Spike Duplicate Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	58995
Sample ID	MSD for HBN 205388 [ICPV/4639]
Matrix	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	11/19/03	11/20/03	73.4	1.0	mg/Kg	1:1

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Duplicate Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	58996
Sample ID	DUP for HBN 205484 [PHV/1502]
Matrix	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
pH	9045 PH	11/20/03	11/20/03	8.4	0.10	SU	1:1

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QC SUMMARY

Client ID	Shaw Environmental & Infrastructure		
Workorder ID	101252 RTE 84 San Mateo		
QC Batch	ICPP 4667	**Original**	15881001
Matrix	Soil	**Sample**	Duplicate [58987]

Parameter	RPD	RPD Limits
Lead	0000	(35)

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QC SUMMARY

Client ID	Shaw Environmental & Infrastructure		
Workorder ID	101252 RTE 84 San Mateo		
QC Batch	ICPP 4668	**Original**	15881021
Matrix	Soil	**Sample**	Duplicate [58993]

Parameter	RPD	RPD Limits
Lead	11.3	(35)

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QC SUMMARY

Client ID	Shaw Environmental & Infrastructure		
Workorder ID	101252 RTE 84 San Mateo		
QC Batch	PHX 1455	**Original**	15881005
Matrix	Soil	**Sample**	Duplicate [58996]

Parameter	RPD	RPD Limits
pH	000	(35)

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QC SUMMARY

Client ID	Shaw Environmental & Infrastructure		
Workorder ID	101252 RTE 84 San Mateo		
QC Batch	ICPP 4667	**Original**	15881001
Matrix	Soil	**Samples**	Matrix Spike [58988] Matrix Spike Duplicate [58989]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	89.9	89.3	(75-125)	0.6700	(35 MAX)

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QC SUMMARY

Client ID	Shaw Environmental & Infrastructure		
Workorder ID	101252 RTE 84 San Mateo		
QC Batch	ICPP 4668	**Original**	15881021
Matrix	Soil	**Samples**	Matrix Spike [58994] Matrix Spike Duplicate [58995]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	98.2	91.8	(75-125)	6.74	(35 MAX)

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QC SUMMARY

Client ID Shaw Environmental & Infrastructure
Workorder ID 101252 RTE 84 San Mateo
QC Batch ICPP 4667
Matrix Soil

Samples Lab Control Sample [58985]
Lab Control Sample Duplicate [58986]

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	92.2	91.8	(80-120)	0.4350	(20 MAX)

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QC SUMMARY

Client ID Shaw Environmental & Infrastructure
Workorder ID 101252 RTE 84 San Mateo
QC Batch ICPP 4668
Matrix Soil

Samples Lab Control Sample [58991]
Lab Control Sample Duplicate [58992]

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	92.2	91.8	(80-120)	0.4350	(20 MAX)

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Martha Adams
Shaw Environmental & Infrastructure
1326 N. Market Blvd.
Sacramento, CA 95834

Client	Shaw Environmental & Infrastructure
Workorder	15891 101252 RTE 84 San Mateo
Received	11/24/03

The samples were received in EPA specified containers. The samples were transported and received under documented chain of custody and stored at four (4) degrees C until analysis was performed.

Sparger Technology, Inc. ID Suffix Keys - These descriptors will follow the Sparger Technology, Inc. ID numbers and help identify the specific sample and clarify the report.

- DUP - Matrix Duplicate
- MS - Matrix Spike
- MSD - Matrix Spike Duplicate
- LCS - Lab Control Sample
- LCSD - Lab Control Sample Duplicate
- RPD - Relative Percent Difference
- QC - Additional Quality Control
- DIL - Results from a diluted sample
- ND - None Detected
- RL - Reporting Limit

Note: In an effort to conserve paper, the results are printed on both sides of the paper.

Ray James
Laboratory Director

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Test Certificate of Analysis

Client ID Shaw Environmental & Infrastructure
Workorder # 15891 **Workorder ID** 101252 RTE 84 San Mateo

Parameter Lead
Method 6010B STLC Pb

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
15891001	B-16-1	10.3	0.050	mg/L	11/17/03	11/25/03	Soil	1:1
15891002	B-7-1	8.18	0.050	mg/L	11/17/03	11/25/03	Soil	1:1
15891003	B-8-1	4.60	0.050	mg/L	11/17/03	11/25/03	Soil	1:1

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Method Blank Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	59027
Sample ID	MB for HBN 205607 [ICPV/4640]
Matrix	STLC Leachate

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	11/21/03	11/25/03	ND	0.050	mg/L	1:1

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Lab Control Sample Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	59028
Sample ID	LCS for HBN 205607 [ICPV/4640]
Matrix	STLC Leachate

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	11/21/03	11/25/03	2.40	0.050	mg/L	1:1

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Lab Control Sample Duplicate Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	59029
Sample ID	LCSD for HBN 205607 [ICPV/4640
Matrix	STLC Leachate

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	11/21/03	11/25/03	2.41	0.050	mg/L	1:1

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Duplicate Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	59030
Sample ID	DUP for HBN 205607 [ICPV/4640]
Matrix	STLC Leachate

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	11/21/03	11/25/03	9.93	0.050	mg/L	1:1

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Matrix Spike Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	59031
Sample ID	MS for HBN 205607 [ICPV/4640]
Matrix	STLC Leachate

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	11/21/03	11/25/03	12.7	0.050	mg/L	1:1

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Matrix Spike Duplicate Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	59032
Sample ID	MSD for HBN 205607 [ICPV/4640]
Matrix	STLC Leachate

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	11/21/03	11/25/03	12.5	0.050	mg/L	1:1

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QC SUMMARY

Client ID	Shaw Environmental & Infrastructure		
Workorder ID	101252 RTE 84 San Mateo		
QC Batch	ICPP 4669	**Original**	15891001
Matrix	STLC Leachate	**Sample**	Duplicate [59030]

Parameter	RPD	RPD Limits
Lead	3.7	(35)

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Environmental Laboratories

Analytical Laboratory Division
Mobile Laboratory Division
Scientific Division

QC SUMMARY

Client ID	Shaw Environmental & Infrastructure		
Workorder ID	101252 RTE 84 San Mateo		
QC Batch	ICPP 4669	**Original**	15891001
Matrix	STLC Leachate	**Samples**	Matrix Spike [59031] Matrix Spike Duplicate [59032]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	96	88	(60-125)	8.7	(35 MAX)

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Sparger Technology, Inc.
Environmental Laboratories

Analytical Laboratory Division
Mobile Laboratory Division
Scientific Division

QC SUMMARY

Client ID Shaw Environmental & Infrastructure
Workorder ID 101252 RTE 84 San Mateo
QC Batch ICPP 4669
Matrix STLC Leachate

Samples Lab Control Sample [59028]
Lab Control Sample Duplicate [59029]

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	96	96	(80-120)	00	(20 MAX)

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Sparger Technology, Inc.
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Martha Adams
Shaw Environmental & Infrastructure
1326 N. Market Blvd.
Sacramento, CA 95834

Client	Shaw Environmental & Infrastructure
Workorder	15894 101252 RTE 84 San Mateo
Received	11/25/03

The samples were received in EPA specified containers. The samples were transported and received under documented chain of custody and stored at four (4) degrees C until analysis was performed.

Sparger Technology, Inc. ID Suffix Keys - These descriptors will follow the Sparger Technology, Inc. ID numbers and help identify the specific sample and clarify the report.

DUP - Matrix Duplicate
MS - Matrix Spike
MSD - Matrix Spike Duplicate
LCS - Lab Control Sample
LCSD - Lab Control Sample Duplicate
RPD - Relative Percent Difference
QC - Additional Quality Control
DIL - Results from a diluted sample
ND - None Detected
RL - Reporting Limit

Note: In an effort to conserve paper, the results are printed on both sides of the paper.

Ray James
Laboratory Director

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Sparger Technology, Inc.
Environmental Laboratories

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Test Certificate of Analysis

Client ID Shaw Environmental & Infrastructure
Workorder # 15894 **Workorder ID** 101252 RTE 84 San Mateo

Parameter Lead
Method 6010B STLC-DI

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
15894001	B-16-1	3.55	0.010	mg/L	11/17/03	12/01/03	Soil	1:1
15894002	B-7-1	1.51	0.010	mg/L	11/17/03	12/01/03	Soil	1:1

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Method Blank Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	59141
Sample ID	MB for HBN 206137 [ICPV/4645]
Matrix	STLC-DI Leachate

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	11/26/03	12/01/03	ND	0.010	mg/L	1:1

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Lab Control Sample Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	59142
Sample ID	LCS for HBN 206137 [ICPV/4645]
Matrix	STLC-DI Leachate

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	11/26/03	12/01/03	0.497	0.010	mg/L	1:1

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Lab Control Sample Duplicate Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	59143
Sample ID	LCSD for HBN 206137 [ICPV/4645
Matrix	STLC-DI Leachate

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	11/26/03	12/01/03	0.501	0.010	mg/L	1:1

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Sparger Technology, Inc.
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Duplicate Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	59144
Sample ID	DUP for HBN 206137 [ICPV/4645]
Matrix	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	11/26/03	12/01/03	1.36	0.010	mg/L	1:1

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Sparger Technology, Inc.
Environmental Laboratories

Analytical Laboratory Division
Mobile Laboratory Division
Scientific Division

Matrix Spike Report

Client ID Shaw Environmental & Infrastructure
Workorder ID 101252 RTE 84 San Mateo
Laboratory ID 59145
Sample ID MS for HBN 206137 [ICPV/4645]
Matrix Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	11/26/03	12/01/03	1.86	0.010	mg/L	1:1

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Sparger Technology, Inc.
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Analytical Laboratory Division
Mobile Laboratory Division
Scientific Division

Matrix Spike Duplicate Report

Client ID	Shaw Environmental & Infrastructure
Workorder ID	101252 RTE 84 San Mateo
Laboratory ID	59146
Sample ID	MSD for HBN 206137 [ICPV/4645]
Matrix	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	11/26/03	12/01/03	2.09	0.010	mg/L	1:1

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Sparger Technology, Inc.
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QC SUMMARY

Client ID	Shaw Environmental & Infrastructure		
Workorder ID	101252 RTE 84 San Mateo		
QC Batch	ICPP 4674	**Original**	15894002
Matrix	Soil	**Sample**	Duplicate [59144]

Parameter	RPD	RPD Limits
Lead	10	(35)

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Sparger Technology, Inc.
Environmental Laboratories

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Scientific Division

QC SUMMARY

Client ID	Shaw Environmental & Infrastructure		
Workorder ID	101252 RTE 84 San Mateo		
QC Batch	ICPP 4674	**Original**	15894002
Matrix	Soil	**Samples**	Matrix Spike [59145] Matrix Spike Duplicate [59146]

	Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
*	Lead	70	116	(75-125)	49	(35 MAX)

*Poor MS Spike recovery and high RPD due to sample matrix effect.

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Sparger Technology, Inc.
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QC SUMMARY

Client ID Shaw Environmental & Infrastructure
Workorder ID 101252 RTE 84 San Mateo
QC Batch ICPP 4674
Matrix STLC-DI Leachate

Samples Lab Control Sample [59142]
Lab Control Sample Duplicate [59143]

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	99	100	(80-120)	1.0	(20 MAX)

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84

15881

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CHAIN OF CUSTODY
and Analysis Request Form

Company:
Shaw Environmental
1326 North Market Boulevard
Sacramento, CA 95834
Phone: (916) 928-3300 Fax: (916) 928-3341

Laboratory:
Sparger Technology, Inc.
3050 Fite Circle, Suite 112, Sacramento, CA 95827
Phone: (916) 362-8947
Fax: (916) 362-0947

Send Results To:
Martha Adams (Direct Ph. 565-4183)
Shaw Environmental
1326 North Market Boulevard
Sacramento, CA 95834

Project:
RTE 84
Location: San Mateo County
Project #:101252/01010000
Contract: 43A0078

No.	Sample ID:	Depth (ft)	Date	Time	Container	Preservative Used	Matrix	Test: 6010: Lead Only	Test: 9450: Soil pH	Total	TAT
1	B-12-1	1	11/17/2003	1000	Acetate Sleeve	None	Soil	X		1	48 hour
2	B-12-2	2	11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
3	B-12-3	2.9	11/17/2003	↓	Acetate Sleeve	None	Soil	X		1	48 hour
4	B-13-1	1	11/17/2003	1030	Acetate Sleeve	None	Soil	X		1	48 hour
5	B-15-1	1	11/17/2003	1040	Acetate Sleeve	None	Soil	X	X	1	48 hour
6	B-15-2	2	11/17/2003	↓	Acetate Sleeve	None	Soil	X		1	48 hour
7	B-14-1	1	11/17/2003	1050	Acetate Sleeve	None	Soil	X		1	48 hour
8	B-14-2	2	11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
9	B-14-3	2.9	11/17/2003	↓	Acetate Sleeve	None	Soil	X		1	48 hour
10	B-16-1	1	11/17/2003	1110	Acetate Sleeve	None	Soil	X		1	48 hour
11	B-16-2	2	11/17/2003	↓	Acetate Sleeve	None	Soil	X	X	1	48 hour
12	B-17-1	1	11/17/2003	1120	Acetate Sleeve	None	Soil	X		1	48 hour
13	B-17-2	2	11/17/2003	↓	Acetate Sleeve	None	Soil	X		1	48 hour
14	B-18-1	1	11/17/2003	1135	Acetate Sleeve	None	Soil	X		1	48 hour
15	B-18-2	2	11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
16	B-18-3	2.9	11/17/2003	↓	Acetate Sleeve	None	Soil	X		1	48 hour
17	B-1-1	1	11/17/2003	1145	Acetate Sleeve	None	Soil	X		1	48 hour
18	B-1-2	2	11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
19	B-1-3	2.9	11/17/2003	↓	Acetate Sleeve	None	Soil	X		1	48 hour
20	B-2-1	1	11/17/2003	1210	Acetate Sleeve	None	Soil	X		1	48 hour
21	B-4-1	1	11/17/2003	1225	Acetate Sleeve	None	Soil	X		1	48 hour
22	B-5-1	1	11/17/2003	1235	Acetate Sleeve	None	Soil	X		1	48 hour
23	B-5-2	2	11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
24	B-5-3	2.9	11/17/2003	↓	Acetate Sleeve	None	Soil	X	X	1	48 hour
25	B-6-1	1	11/17/2003	1250	Acetate Sleeve	None	Soil	X		1	48 hour
26	B-6-2	2	11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
27	B-6-3	2.9	11/17/2003	↓	Acetate Sleeve	None	Soil	X		1	48 hour

BEN CHOVER 11/18/03 08 12
SHAW
Date / Time

Received: [illegible]
Sparger Tech
Date / Time 11/18/03 - 8:12

5881

page 2-2

CHAIN OF CUSTODY
and Analysis Request Form

Company:
Shaw Environmental
1326 North Market Boulevard
Sacramento, CA 95834
Phone: (916) 928-3300 Fax: (916) 928-3341

Laboratory:
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3050 Fite Circle, Suite 112, Sacramento, CA 95827
Phone: (916) 362-8947
Fax: (916) 362-0947

Send Results To:
Martha Adams (Direct Ph. 565-4183)
Shaw Environmental
1326 North Market Boulevard
Sacramento, CA 95834

Project:
RTE 84
Location: San Mateo County
Project #:101252.01010000
Contract: 43A0078

No.	Sample ID:	Depth	Date	Time	Container	Prese-rvative Used	Matrix	Test: 6010: Lead Only	Test: 9450: Soil pH	Total	TAT
28	B-7-1	1	11/17/2003	1305	Acetate Sleeve	None	Soil	X		1	48 hour
29	B-7-2	2	11/17/2003	↓	Acetate Sleeve	None	Soil	X		1	48 hour
30	B-8-1	1	11/17/2003	1320	Acetate Sleeve	None	Soil	X	X	1	48 hour
31	B-8-2	2	11/17/2003		Acetate Sleeve	None	Soil	X	X	1	48 hour
32	B-8-3	2.9	11/17/2003	↓	Acetate Sleeve	None	Soil	X		1	48 hour
33	B-9-1	1	11/17/2003	1335	Acetate Sleeve	None	Soil	X		1	48 hour
34	B-10-1	1	11/17/2003	1340	Acetate Sleeve	None	Soil	X		1	48 hour
35	B-11-1	1	11/17/2003	1355	Acetate Sleeve	None	Soil	X		1	48 hour
36			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
37			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
38			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
39			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
40			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
41			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
42			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
43			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
44			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
45			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
46			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
47			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
48			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
49			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
50			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
51			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
52			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
53			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour
54			11/17/2003		Acetate Sleeve	None	Soil	X		1	48 hour

BEN CHEVLEN

11/19/03 0812
SHAW ENVIRONMENTAL

Rec'd 3rd Floor
Sparger Tech
date 11/19/03 — 8:12

APPENDIX C
LEAD STATISTICAL ANALYSIS SPREADSHEETS

BOOTSTRAP
STATE ROUTE 84
Alameda County, CA

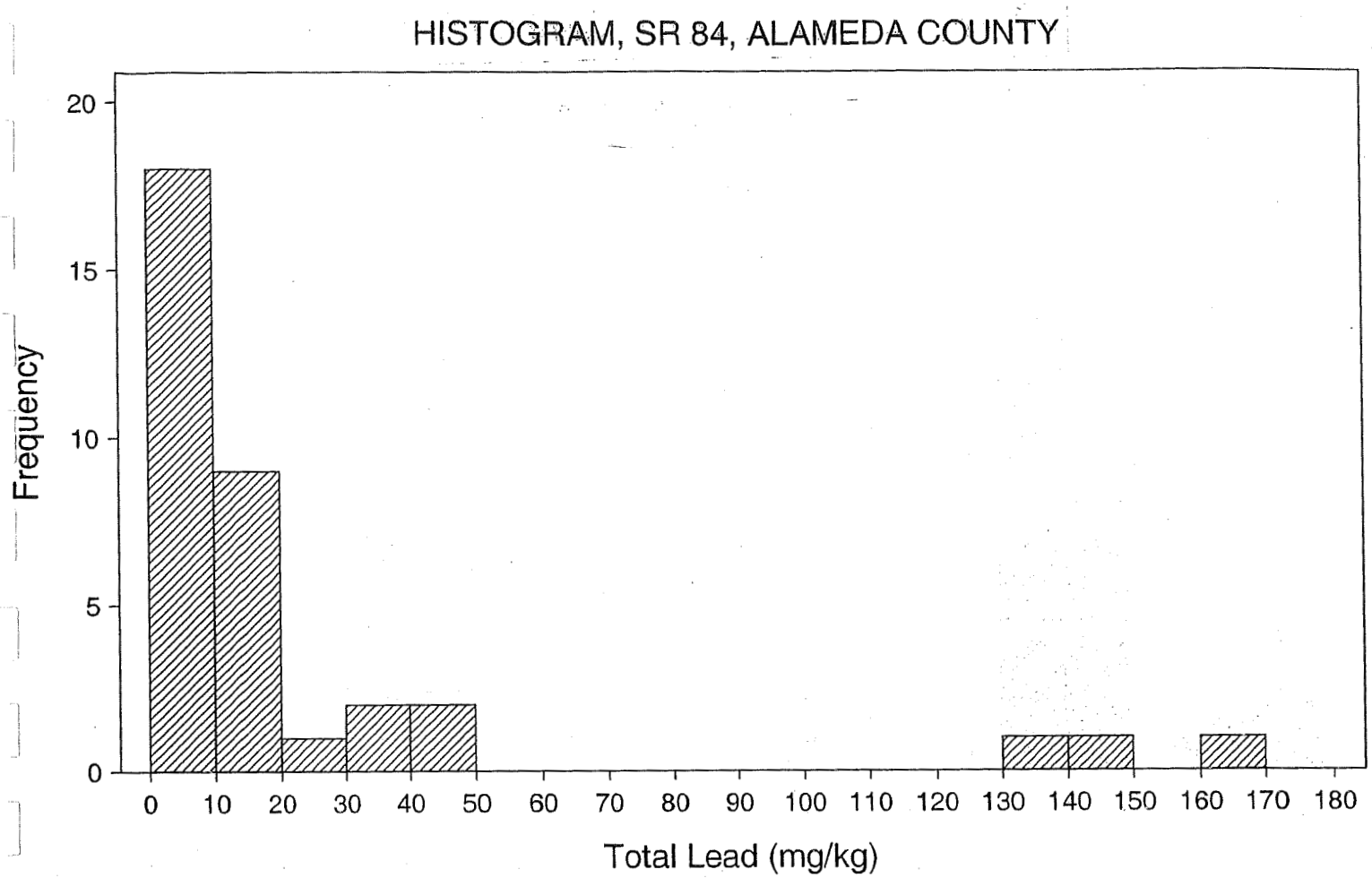
SR 84, Alameda County, CA

Analyte	LOD	Concentration	Sample Designation (boring # - depth)	Depth (meters)	Result	Qualifier	Weight
Lead (mg/kg)	1	32.80	B - 01 - 1	0.30	32.80	=	1
Lead (mg/kg)	1	42.60	B - 01 - 2	0.60	42.60	=	1
Lead (mg/kg)	1	14.00	B - 01 - 3	0.90	14.00	=	1
Lead (mg/kg)	1	41.70	B - 02 - 1	0.30	41.70	=	1
Lead (mg/kg)	1	27.50	B - 04 - 1	0.30	27.50	=	1
Lead (mg/kg)	1	6.31	B - 05 - 1	0.30	6.31	=	1
Lead (mg/kg)	1	8.71	B - 05 - 2	0.60	8.71	=	1
Lead (mg/kg)	1	10.80	B - 05 - 3	0.90	10.80	=	1
Lead (mg/kg)	1	31.50	B - 06 - 1	0.30	31.50	=	1
Lead (mg/kg)	1	14.40	B - 06 - 2	0.60	14.40	=	1
Lead (mg/kg)	1	17.90	B - 06 - 3	0.90	17.90	=	1
Lead (mg/kg)	1	136.00	B - 07 - 1	0.30	136.00	=	1
Lead (mg/kg)	1	9.82	B - 07 - 2	0.60	9.82	=	1
Lead (mg/kg)	1	143.00	B - 08 - 1	0.30	143.00	=	1
Lead (mg/kg)	1	16.20	B - 08 - 2	0.60	16.20	=	1
Lead (mg/kg)	1	9.47	B - 08 - 3	0.90	9.47	=	1
Lead (mg/kg)	1	11.20	B - 09 - 1	0.30	11.20	=	1
Lead (mg/kg)	1	6.56	B - 10 - 1	0.30	6.56	=	1
Lead (mg/kg)	1	14.90	B - 11 - 1	0.30	14.90	=	1
Lead (mg/kg)	1	7.26	B - 12 - 1	0.30	7.26	=	1
Lead (mg/kg)	1	6.14	B - 12 - 2	0.60	6.14	=	1
Lead (mg/kg)	1	8.77	B - 12 - 3	0.90	8.77	=	1
Lead (mg/kg)	1	4.62	B - 13 - 1	0.30	4.62	=	1
Lead (mg/kg)	1	10.00	B - 14 - 1	0.30	10.00	=	1
Lead (mg/kg)	1	9.99	B - 14 - 2	0.60	9.99	=	1
Lead (mg/kg)	1	7.97	B - 14 - 3	0.90	7.97	=	1
Lead (mg/kg)	1	4.17	B - 15 - 1	0.30	4.17	=	1
Lead (mg/kg)	1	7.94	B - 15 - 2	0.60	7.94	=	1
Lead (mg/kg)	1	161.00	B - 16 - 1	0.30	161.00	=	1
Lead (mg/kg)	1	6.56	B - 16 - 2	0.60	6.56	=	1
Lead (mg/kg)	1	7.36	B - 17 - 1	0.30	7.36	=	1
Lead (mg/kg)	1	9.45	B - 17 - 2	0.60	9.45	=	1
Lead (mg/kg)	1	8.08	B - 18 - 1	0.30	8.08	=	1
Lead (mg/kg)	1	9.24	B - 18 - 2	0.60	9.24	=	1
Lead (mg/kg)	1	10.20	B - 18 - 3	0.90	10.20	=	1

Mean Average
24.97

NP Bootstrap
90% UCLs
Site Mean
33.74

NP Bootstrap
95% UCLs
Site Mean
36.67


HISTOGRAM, SR 84, ALAMEDA COUNTY
Frequency
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
Total Lead (mg/kg)

STATISTICS
STATE ROUTE 84
ALAMEDA COUNTY, CALIFORNIA

DESCRIPTIVE STATISTICS

	TOTAL	WET	DIWET	PH
N	35	3	2	5
LO 90% CI	13.778	2.8345	M	7.7304
MEAN	24.975	7.6900	2.5300	8.1600
UP 90% CI	36.172	12.546	M	8.5896
MINIMUM	4.1700	4.6000	1.5100	7.5000
MAXIMUM	161.00	10.300	3.5500	8.7000

CORRELATIONS (PEARSON)
ZERO INTERCEPT OPTION SELECTED: CORRELATIONS = COSINES

	TOTAL
WET	0.97

CASES INCLUDED 3 MISSING CASES 32

UNWEIGHTED LEAST SQUARES LINEAR REGRESSION OF WET

NOTE: MODEL FORCED THROUGH ORIGIN

PREDICTOR VARIABLES	COEFFICIENT	STD ERROR	STUDENT'S T	P
TOTAL	0.05284	0.00998	5.29	0.0339

R-SQUARED	0.9334	RESID. MEAN SQUARE (MSE)	6.46021
ADJUSTED R-SQUARED	0.9001	STANDARD DEVIATION	2.54169

SOURCE	DF	SS	MS	F	P
REGRESSION	1	181.078	181.078	28.03	0.0339
RESIDUAL	2	12.9204	6.46021		
TOTAL	3	193.999			

PREDICTED/FITTED VALUES OF WET (95% UCL)

LOWER PREDICTED BOUND	-9.1113	LOWER FITTED BOUND	0.3629
PREDICTED VALUE	**1.9375**	FITTED VALUE	1.9375
UPPER PREDICTED BOUND	12.986	UPPER FITTED BOUND	3.5120
SE (PREDICTED VALUE)	2.5679	SE (FITTED VALUE)	0.3660

UNUSUALNESS (LEVERAGE)	0.0207
PERCENT COVERAGE	95.0
CORRESPONDING T	4.30

PREDICTOR VALUES: TOTAL = 36.670

UNWEIGHTED LEAST SQUARES LINEAR REGRESSION OF DIWET

NOTE: MODEL FORCED THROUGH ORIGIN

PREDICTOR VARIABLES	COEFFICIENT	STD ERROR	STUDENT'S T	P
TOTAL	0.01749	0.00540	3.24	0.1905

R-SQUARED	0.9131	RESID. MEAN SQUARE (MSE)	1.29345
ADJUSTED R-SQUARED	0.8262	STANDARD DEVIATION	1.13730

SOURCE	DF	SS	MS	F	P
REGRESSION	1	13.5891	13.5891	10.51	0.1905
RESIDUAL	1	1.29345	1.29345		
TOTAL	2	14.8826			

CASES INCLUDED 2 MISSING CASES 33

PREDICTED/FITTED VALUES OF DIWET (95% UCL)

LOWER PREDICTED BOUND	-6.6471	LOWER FITTED BOUND	-0.6080
PREDICTED VALUE	**0.6414**	FITTED VALUE	0.6414
UPPER PREDICTED BOUND	7.9299	UPPER FITTED BOUND	1.8908
SE (PREDICTED VALUE)	1.1544	SE (FITTED VALUE)	0.1979

UNUSUALNESS (LEVERAGE)	0.0303
PERCENT COVERAGE	90.0
CORRESPONDING T	6.31

PREDICTOR VALUES: TOTAL = 36.670

RETAINING WALL - LOG OF TEST BORINGS (TOTAL 3 SHEETS)

DIST.	COUNTY	ROUTE	KILOMETER POSTS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	ALA.	84	19.47/21.40		

02-07-06

REGISTERED ENGINEER - CIVIL

REGISTERED PROFESSIONAL ENGINEER P.N. Sundaram No. 57665 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

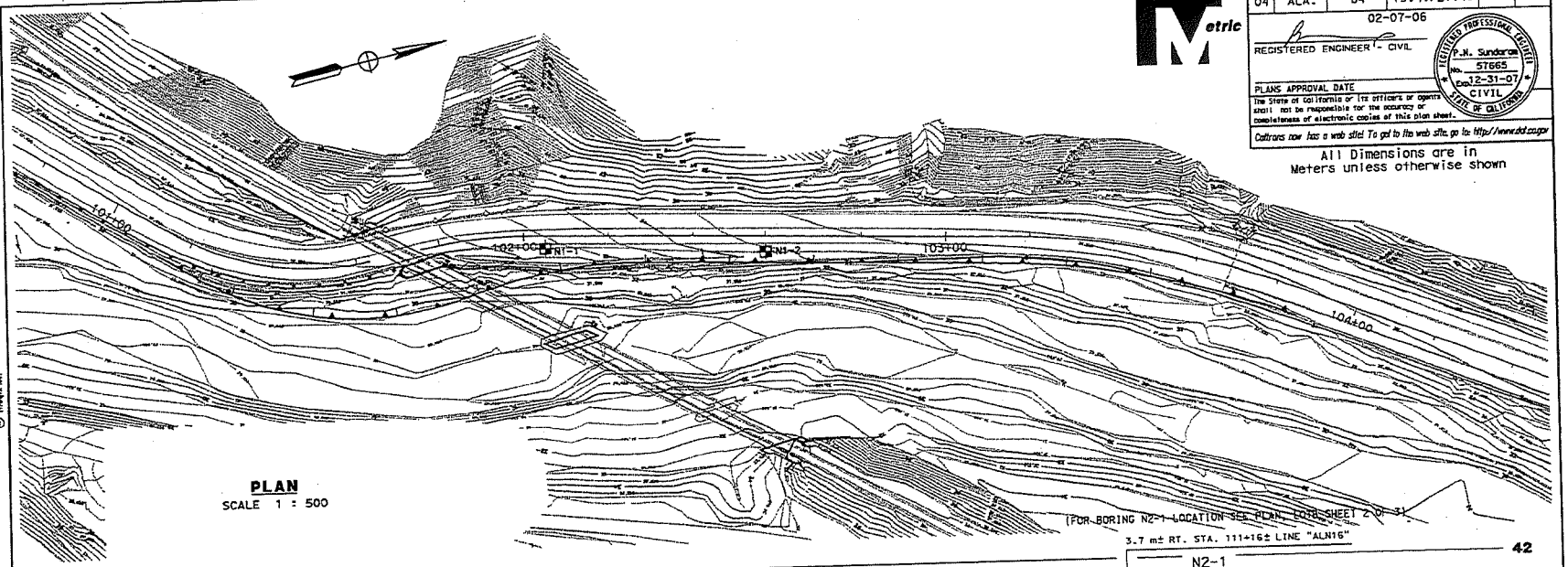
PLANS APPROVAL DATE

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.

Caltrans now has a web site! To get to its web site, go to: http://www.dot.ca.gov

Caltrans Metric

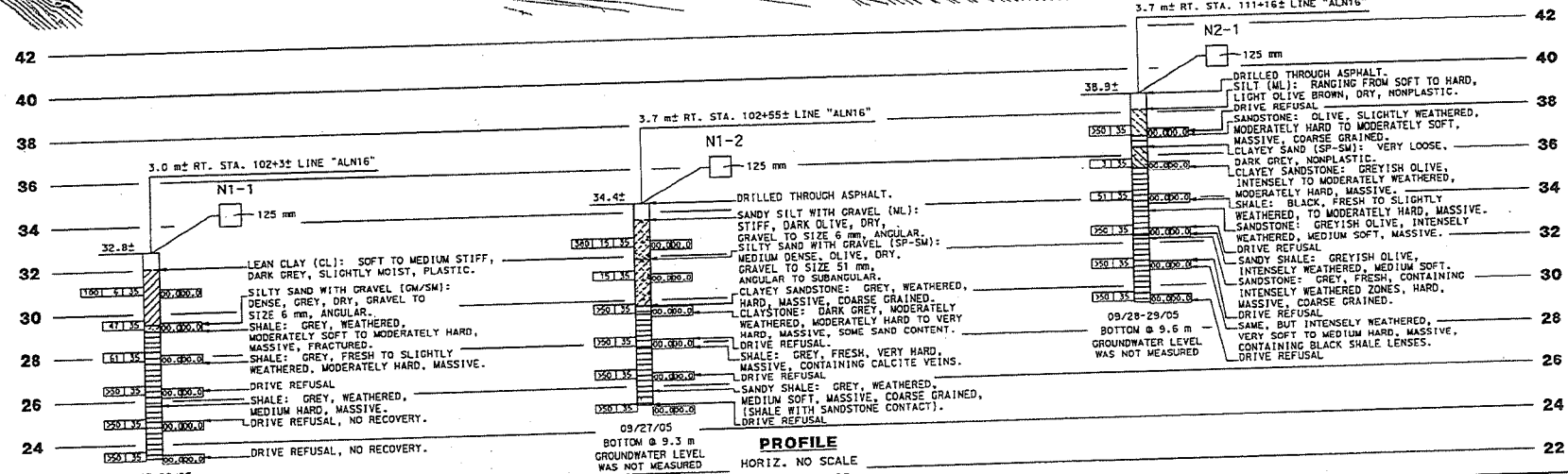
All Dimensions are in Meters unless otherwise shown



PLAN

SCALE 1 : 500

(FOR BORING N2-1 LOCATION SEE PLAN, LOG SHEET 2 OF 3)



PROFILE

HORIZ. NO SCALE

VERT. 1 : 100

LEGEND OF BORING OPERATIONS

LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS

(Rev 01/02)

DIVISION OF ENGINEERING SERVICES

DRAWN BY: M. REYNOLDS 11/05

CHECKED BY: P. SUNDARAM

FIELD INVESTIGATION BY: R. NASHED

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL SERVICES OFFICE OF GEOTECHNICAL DESIGN - WEST

CU EA 174400

USERNAME => s110822

DGN FILE => 4174400g01.dgn

BRIDGE NO.

KILOMETER POST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

RETAINING WALL

LOG OF TEST BORINGS

SHEET 1 OF 3

DATE PLOTTED => 14-OCT-2009

TIME PLOTTED => 1412:3

DIST.	COUNTY	ROUTE	KILOMETER POSTS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	ALA.	84	19.47/21.40		

02-07-06

REGISTERED ENGINEER - CIVIL

P.N. Sundaram 57665 12-31-07 CIVIL STATE OF CALIFORNIA

PLANS APPROVAL DATE

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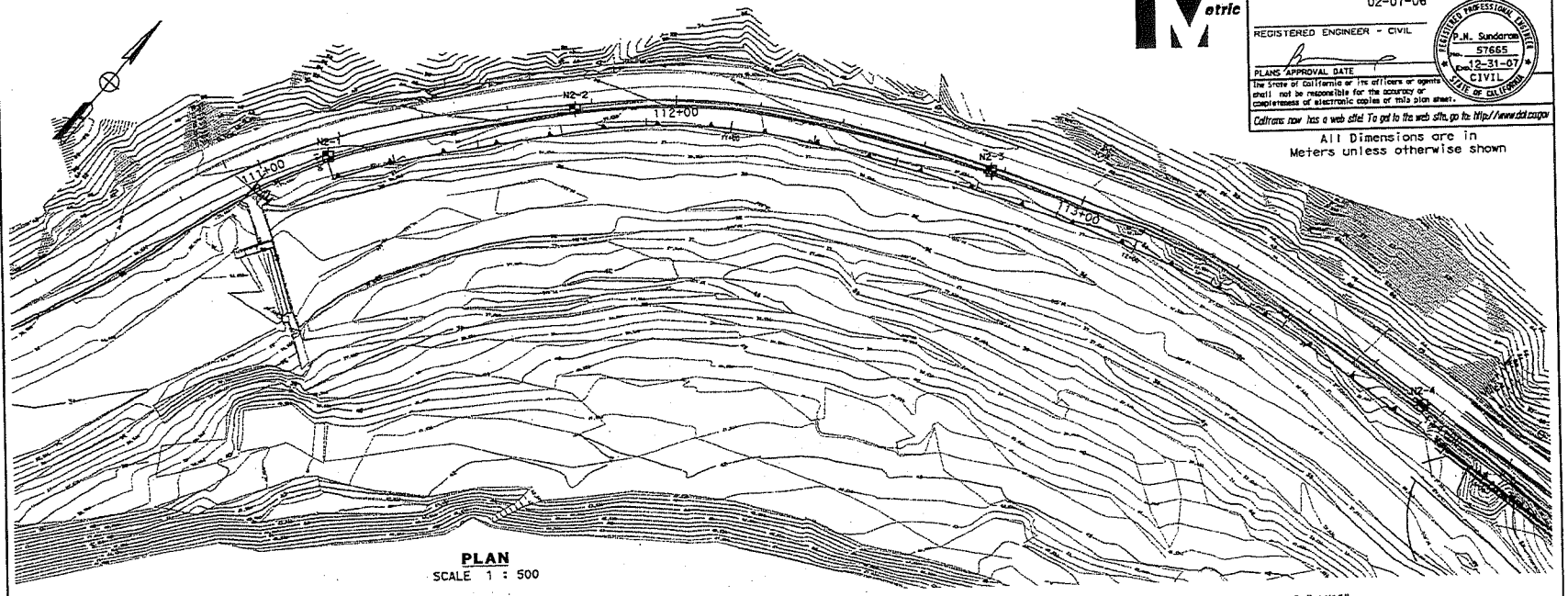
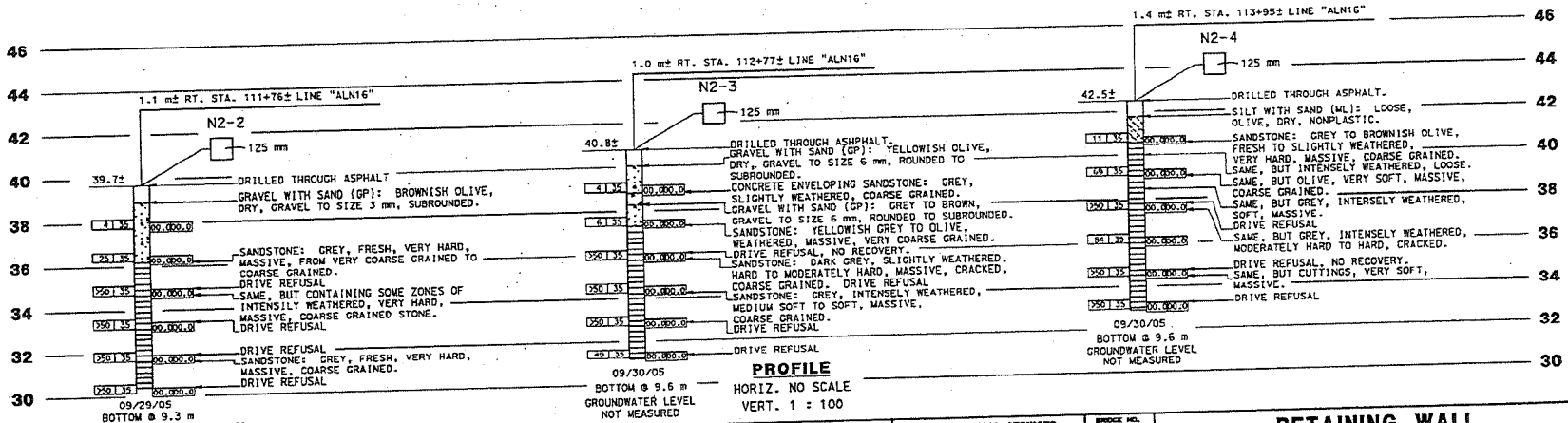
Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov

All Dimensions are in Meters unless otherwise shown



PLAN
SCALE 1 : 500



PROFILE
HORIZ. NO SCALE
VERT. 1 : 100

DIVISION OF ENGINEERING SERVICES

DRAWN BY: M. REYNOLDS 11/05

CHECKED BY: P. SUNDARAM

FIELD INVESTIGATION BY: R. NASHED

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN - WEST

CU
EA 174400

USERNAME => s110822
DGN FILE => 417440q02.dgn

BRIDGE NO.

KILOMETER POST

RETAINING WALL
LOG OF TEST BORINGS

REVISION DATES PRELIMINARY STAGE ONLY

SHEET 2 OF 3

DATE PLOTTED => 14-OCT-2009
TIME PLOTTED => 14:54

LEGEND OF BORING OPERATIONS

LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS

NOTES: Classification of earth materials as shown on this sheet is based upon field inspection and is not to be construed to imply anything about stability.

(Rev 01/02)

DIST.	COUNTY	ROUTE	KILOMETER POSTS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	ALA.	84	19.47/21.40		

02-07-06
REGISTERED ENGINEER - CIVIL

REGISTERED PROFESSIONAL ENGINEER
P.N. Sundaram
No. 57665
Exp. 12-31-07
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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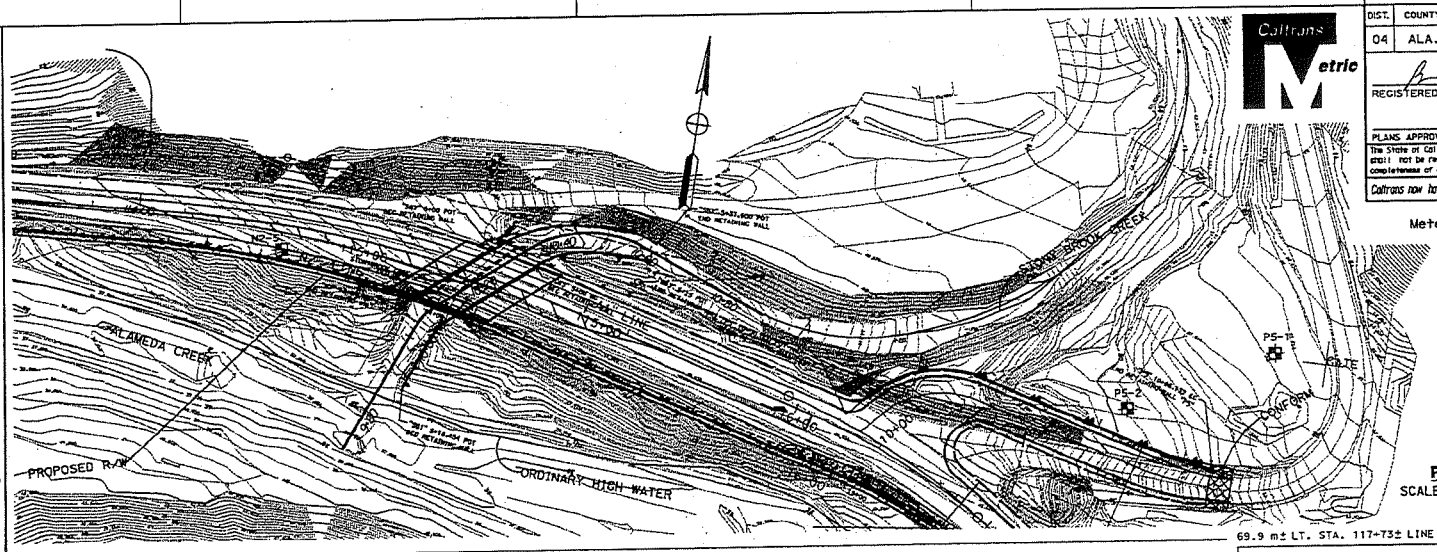
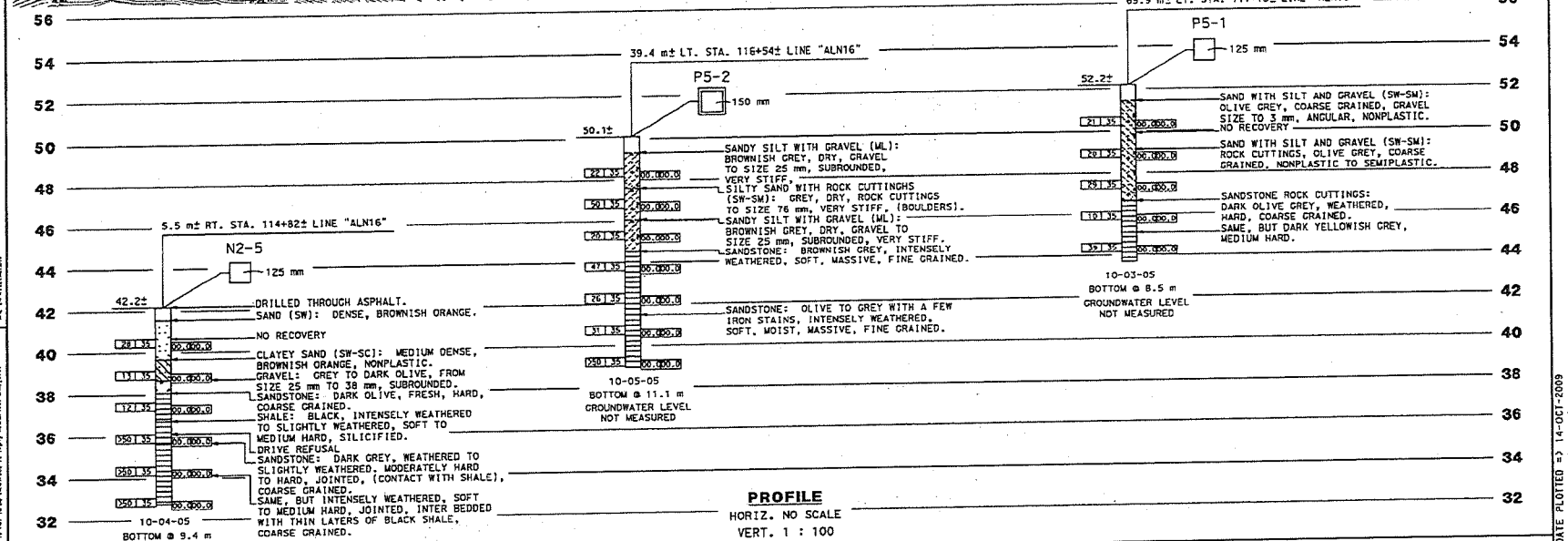
Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov

Caltrans Metric

All Dimensions are in Meters unless otherwise shown



PLAN
SCALE 1 : 500



PROFILE
HORIZ. NO SCALE
VERT. 1 : 100

LEGEND OF BORING OPERATIONS

LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS

DIVISION OF ENGINEERING SERVICES		FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL SERVICES OFFICE OF GEOTECHNICAL DESIGN - WEST	BRIDGE NO. / KILOMETER POST	RETAINING WALL LOG OF TEST BORINGS
DRAWN BY	M. REYNOLDS 11/05	R. NASHED A. KADDOURA		CU EA 174400		SHEET 3 OF 3
CHECKED BY	P. SUNDARAM					

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

USERNAME => s110822
DGN FILE => 417440q03.dgn

DATE PLOTTED => 14-OCT-2009
TIME PLOTTED => 14:26