FOR CONTRACT NO.: 01-476604

INFORMATION HANDOUT

PLACS

WATER QUALITY

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION

WDID NO.: 1B12174WNME

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND WILDLIFE

NOTIFICATION NO. 1600-2012-0242-R1

UNITED STATES ARMY CORPS OF ENGINEERS
REPORTING NATIONWIDE 404 PERMIT

UNITED STATES FISH AND WILDLIFE SERVICE
LETTER OF CONCURRENCE

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
LETTER OF CONCURRENCE

PLAC CONDITION RESPONSIBILITY (PCR) SUMMARY

MATERIALS INFORMATION

FOUNDATION REPORT

ROUTE: 01-MEN-128-35.0/35.3

PLACS

WATER QUALITY

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION

WDID NO.:1B12174WNME

CALIFORNIA Water Boards

EDMUND G. BROWN JR. GOVERNOR

MATTHEW RODRIQUEZ SECRETARY FOR ENVIRONMENTAL PROTECTION

North Coast Regional Water Quality Control Board

June 26, 2013

In the Matter of

Water Quality Certification

for the

California Department of Transportation
Highway 128 Smoot Sink Storm Damage Repair Project
WDID No. 1B12174WNME
Caltrans EA No.: 01-47660

APPLICANT:	California Department of Transportation
RECEIVING WATERS:	Rancheria Creek
HYDROLOGIC UNIT:	Mendocino Coast Hydrologic Area, Navarro River Hydrologic Sub-Area
COUNTY:	Mendocino
FILE NAME:	Caltrans Hwy 128 Smoot Sink Storm Damage Repair Project

BY THE EXECUTIVE OFFICER:

1. On September 7, 2012, the North Coast Regional Water Quality Control Board (Regional Water Board) received an application from the California Department of Transportation (Caltrans) requesting Federal Clean Water Act (CWA) section 401, Water Quality Certification (certification) for activities related to the California Department of Transportation (Caltrans) State Route (SR) 128 Smoot Sink Drainage Repair Project, (Project). Additional information was submitted by Caltrans on May 13, 2013, as requested by the Regional Water Board.

2. **Hydrologic Units:** The proposed project would cause disturbances to waters of the United States (U.S.) and waters of the State associated with the Mendocino Coast Hydrologic Unit (No. 113.00) The affected hydrologic sub-area is the Navarro River (Hydrologic Sub-Area No. 113.50).

3. **Public Notice:** The Regional Water Board provided public notice of the application pursuant to title 23, California Code of Regulations, section 3858 on May 28, 2013, and posted information describing the project on the Regional Water Board's website. No comments were received.

4. **Project Purpose:** The purpose of the Project is to protect State Route 128 at post-mile 35.5 by stabilizing the existing hillside below the roadway and improving drainage.

5. **Project Description:** Proposed slide stabilization activities include construction of five soil-stressing anchor walls along different contours downslope of SR 128 as well as construction of a 30-foot-high, 15-foot-deep, 180-foot-long rock buttress at the toe of the slide above Rancheria Creek. After the anchor walls are installed and loaded, the rock buttress will be constructed along and above the ordinary high water mark (OHWM) of Rancheria Creek.

   Vertical and horizontal roadway alignments will be reconstructed to improve geometrics.

   There are three intermittent channels that cross the Project area before draining to Rancheria Creek. For purposes of this certification, they are herein referred to channels "A," "B," and "C," from north to south, respectively. 18-inch culverts will be replaced with 24-inch culverts and inlet and outlet drainage improvements will be performed within all three channels where they cross beneath SR 128.

6. **Construction Schedule:** Project implementation is expected to last two construction seasons and commence in 2014. Slide stabilization will occur during the first construction season and roadway realignment will occur during the second construction season. On-site mitigation shall commence in fall 2015.

7. **Permanent Impacts:** The following permanent impacts will occur as a result of Project implementation:

Impacted Feature	Reason for Permanent Impact	Approximate Dimensions of Permanent Impact
State water "A"	Energy-dissipating riprap at outlet	0.012 acres (59 linear feet)
State water "C"	Culvert extension at outlet	0.0006 acres (24 ft^2) (6 linear feet)
Two riparian trees and potential riparian area above Rancheria Creek OHWM	Construction of rock buttress	0.22 acres (180 linear feet)

8. **Temporary Impacts:** The following temporary impacts will occur as a result of Project implementation:

Impacted Feature	Reason for Temporary Impact	Approximate Dimensions of Temporary Impact
State water "A"	Placement of energy-dissipating biodegradable coconut fiber blanket and minor channel re-grading	0.019 acres (132 linear feet)
State water "B"		0.004 acres (44 linear feet)
State water "C"		0.005 acres (36 linear feet)
Rancheria Creek	Placement of sump pump at OHWM	0.003 acres

9. **Mitigation for Temporary and Permanent Impacts:** To mitigate for temporary and permanent impacts to jurisdictional waters, Caltrans shall restore 0.33 acres (440 linear feet) of State waters on-site as well as establish approximately 180 linear feet (0.07 acres) or riparian vegetation along the upper length of the new rock buttress. 0.05 and 0.28 acres of restoration shall occur at channels A and B, respectively.

   All restoration work involves planting of tree and shrub species native to the Project area. Restoration at channel B includes headcut abatement and pulling back the southern creek bank within an incised portion of the channel above the existing headcut.

10. **Avoidance and Minimization:** Caltrans is avoiding and minimizing potential impacts to jurisdictional waters by:
    a. Using biodegradable coconut fiber mats in-lieu of rock-energy dissipation within the three intermittent channels;
    b. Restricting grading and in-water activities to between June 1 and October 15; and
    c. Trimming and not removing vegetation wherever possible.

11. **Post-Construction Stormwater Treatment**: Caltrans shall provide an approximately 1,000 foot-long by 15-feet-wide biofiltration strip alongside the eastbound lane to treat impervious surface from no less than 0.72 acres.

12. **Utility Relocations:** Utility relocations are not needed for this project.

13. **Other Agency Actions:** Caltrans applied to the U.S. Army Corps of Engineers for coverage under Nationwide Permit No. 14 (*linear transportation projects*), pursuant to Clean Water Act, section 404. Caltrans received a 1602 Streambed Alteration

Agreement from the California Department of Fish and Wildlife on January 31, 2013. Caltrans received an informal consultation letter (2011/03132) from the National Marine Fisheries Service dated July 19, 2011, concurring that Project implementation would be unlikely to adversely affect threatened Northern California steelhead and California Central Coast coho salmon.

14. **CEQA Compliance:** On June September 16, 2011, Caltrans certified a Mitigated Negative Declaration (State Clearinghouse No. 2011042011) for the Project to comply with the California Environmental Quality Act (CEQA). The Regional Water Board has considered the environmental documentation, including any proposed changes, and has incorporated avoidance, minimization, and mitigation measures into the certification to avoid significant effects to State waters.

15. **TMDL:** The Project area drains to Rancheria Creek, a tributary of the Navarro River. The Navarro River watershed is listed on the Clean Water Act Section 303(d) list as impaired for sediment and temperature. In December 2000, the U.S. EPA established sediment and temperature Total Maximum Daily Loads (TMDLs) for the Navarro River watershed.

    Roads are a significant source of sediment in watersheds (directly, from surface erosion, or indirectly by destabilizing hillsides). Activities that impact stream beds, banks, floodplains, and riparian vegetation contribute to increased stream temperatures and have the potential to increase sediment loads. Measures to reduce sediment discharges from roads to surface waters as well as measures to avoid, minimize, and mitigate impacts on riparian zones is essential for achieving TMDL compliance. Accordingly, this Order is consistent with, and implements portions of the Navarro River TMDL.

16. Pursuant to Regional Water Board Resolution R1-2004-0087, *Total Maximum Daily Load Implementation Policy Statement for Sediment-Impaired Receiving Waters within the North Coast Region* (Sediment TMDL Implementation Policy), the Executive Officer is directed to "rely on the use of all available authorities, including existing regulatory standards, and permitting and enforcement tools to more effectively and efficaciously pursue compliance with sediment-related standards by all dischargers of sediment waste."

17. Pursuant to Regional Water Board Resolution R1-2012-0013, *Implementation of the Water Quality Objective for Temperature in the North Coast Region* (Temperature Implementation Policy), Regional Water Board staff is directed to address factors that contribute to elevated water temperatures when issuing 401 certifications or WDRs (permits) for individual projects. Any permit should be consistent with the assumptions and requirements of temperature shade load allocations in areas subject to existing temperature TMDLs, including EPA- established temperature TMDLs, as appropriate. If applicable, any permit or order should implement similar shade controls in areas listed as impaired for temperature but lacking a TMDL and region-

wide as appropriate and necessary to prevent future impairments and to comply with the intrastate temperature objective.

18. **Antidegradation Policy:** The federal antidegradation policy requires that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. This certification is consistent with applicable federal and State antidegradation policies, as it does not authorize the discharge of increased concentrations of pollutants or increased volumes of treated wastewater, and does not otherwise authorize degradation of the waters affected by this Project.

19. 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 certification.

Receiving Waters:	Rancheria Creek and intermittent tributaries thereof Navarro River Hydrologic Area 113.50	
Filled and/or Excavated Areas:	Permanent – State waters	65 linear feet (0.013 acres)
	Temporary – State waters	212 linear feet (0.031 acres)
	Permanent – State riparian	0.22 acres (180 linear feet)
Dredge Volume:	none	
Fill Volume:	Permanent – 53 cubic yards to State waters Permanent – 2,800 cubic yards to State riparian	
Mitigation proposed:	On-site: - 180 linear feet (0.07 acres) riparian vegetation establishment - 0.33 acres (440 linear feet) of riparian restoration	
Latitude/Longitude:	~ 38.93462 / -123.30854	

Accordingly, based on its independent review of the record, the Regional Water Board certifies that the Highway 128 Smoot Sink Storm Damage Repair Project, as described in the application received September 7, 2012, and as revised May 10, 2013, will comply with sections 301, 302, 303, 306 and 307 of the Clean Water Act, and with applicable provisions of state law, provided that the Caltrans complies with the following terms and conditions:

All conditions of this certification apply to Caltrans (and all its employees) and all contractors (and their employees), sub-contractors (and their employees), and any

other entity or agency that performs activities or work on the project (including the off-site mitigation lands) as related to this Water Quality Certification.

Project-Specific Conditions Requiring Reports (continued)

1. Project construction shall be prohibited until an on-site Mitigation and Monitoring Plan (MMP) has been submitted to and found acceptable by the Executive Officer. The MMP shall include:
    - i) A proposal to restore 0.33 acres of jurisdictional waters along channels A and B. Caltrans shall restore 0.05 acres (100 linear feet) of channel A and 0.27 acres (340 linear feet) of channel B;
    - ii) A proposal to establish 180 linear feet of riparian vegetation along the upper length of the rock buttress;
    - iii) A proposal to stabilize the longitudinal profile of channel B using biotechnical stabilization techniques. The proposal shall include at least 95% ready plans. The proposal shall incorporate use of appropriately-sized rootwad or tree trunk revetments obtained from trees removed during Project construction. The proposal shall also include a longitudinal profile of the channel pre-restoration and proposed post-restoration;
    - iv) A discussion, justification, and project plans for any proposed change in grade or channel morphology within the mitigation areas;
    - v) A proposal to pull-back the existing vertical slopes between the existing head-cut and the existing culvert outlet;
    - vi) An implementation schedule;
    - vii) An invasive species control plan;
    - viii) Planting plans for all proposed plantings;
    - ix) A proposal to monitor morphological creek stability and vegetation success for no less than 10 years;
    - x) An adaptive management plan;
    - xi) A proposal to submit years 1-5, 7, 9, and 10 annual reports no later than January 31 following the respective monitoring year.

2. The Regional Water Board shall be notified in writing (e-mail is acceptable) at least five working days prior to commencement of:
    - i) Ground disturbing activities for each construction season; and
    - ii) Water diversion installations.

3. If an unauthorized discharge to surface waters (including wetlands, rivers or streams) occurs, or any other threat to water quality arises as a result of Project implementation, the associated Project activities shall cease immediately until the threat to water quality is otherwise abated. If there is a discharge to State waters, the

Project-Specific Conditions Requiring Reports (continued)

Regional Water Board shall be notified no more than 24 hours after the discharge occurs. This 24-hour reporting requirement is more stringent than, and supersedes the notification requirements of both the Caltrans statewide stormwater permit (99-06-DWQ) and the statewide Construction General Permit (CGP) (SWRCB Order 2009-009 DWQ).

4. Work within State waters and grading activities shall be prohibited between October 15 and June 1;

5. The Project area is geologically unstable and is situated directly above Rancheria Creek, which is tributary to the Navarro River, both sediment-impaired water bodies. Because of this, Caltrans shall prepare a Wet Season Construction Site Stabilization Plan (Stabilization Plan). The Stabilization Plan shall be submitted to the Regional Water Board no later than September 1st, 2014, and shall be subject to the acceptance of Regional Water Board staff. The Stabilization Plan shall include:
   - i) A work schedule for all remaining 2014 construction activities including Best Management Practices (BMP) implementation. The schedule shall include a commitment to have the site fully stabilized no later than October 15;
   - ii) A narrative describing Caltrans's approach to site stabilization that considers the unique site conditions. Provide specific erosion, sediment, and pollution prevention control BMPs and strategies that shall be implemented; and
   - iii) A summary of the qualifications and experience of the person, or persons who prepared the Stabilization Plan.

   The above required information is information required in the contents of a project Storm Water Pollution Prevention Plan (SWPPP). This condition requires a level of Regional Water Board staff review that is typically absent during the SWPPP development process.

Project-Specific Conditions

6. Caltrans shall install an approximately 1,000-foot-long, 15,000 ft^2 biofiltration strip between post-miles 34.99 and 35.18 (stations 16+75 to 26+75), to treat no less than 0.72 acres of impervious area. The biofiltration strip shall be maintained to retain treatment efficacy for the life of the BMP.

7. Heavy equipment shall not be operated below the OHWM of Rancheria Creek. Excavation, rock placement, keying-in, and all other rock buttress construction activities requiring equipment use shall be staged above the OHWM during construction.

8. Except for non-ground disturbing temporary pollution prevention BMPs, fill shall not

Project-Specific Conditions (continued)

be placed below the Rancheria Creek OHWM.

9. Asphalt-concrete grindings shall not be placed in any location where it may, at any time, be directly exposed to storm or ground waters, except asphalt-concrete grinding may be re-used and incorporated into impervious asphalt mixes.

10. On-site restoration shall commence no later than Fall 2015.

Standard Conditions

11. Herbicides and pesticides shall not be used within the Project limits. If Caltrans has a compelling case as to why herbicides and pesticides should be used, then a request along with a BMP plan may be submitted to the Regional Water Board Executive Officer for review and consideration of acceptance.

12. All activities and BMPs shall be implemented according to the submitted application materials (as revised May, 2013) and the findings and conditions of this certification.

13. All conditions required by this Order shall be included in the Contract Documents prepared by Caltrans for the contractor. In addition, Caltrans shall require compliance with all conditions included in this Order in the bid contract for this Project.

14. This Order does not authorize drafting of surface waters.

15. Caltrans shall provide access to the Project construction site upon request by Regional Water Board staff.

16. Construction Best Management Practices (BMPs) shall be implemented in accordance with the Caltrans Construction Site Best Management Practice Manual (CCSBMPM) and all contractors and subcontractors shall comply with the CCSBMPM. All BMPs shall be installed and used in accordance with the manufacturer's specifications. If Caltrans elects to install alternative BMPs for use on the Project, Caltrans shall first submit a proposal to Regional Water Board staff for review and acceptance.

17. Caltrans is prohibited from discharging waste to waters of the State, unless explicitly authorized by this certification. No debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete or concrete washings, welding slag, oil or petroleum products, or other organic or earthen material from any construction or associated activity of whatever nature, shall be allowed to enter into waters of the State.

    Except for temporary stockpiling of waste generated during demolition operations ("temporary" in this instance means generated and removed during the same working day), waste materials shall not be placed within 150 linear feet of waters of

Standard Conditions (continued)

the State or where the materials may be washed by rainfall into waters of the State. Exceptions to the 150-foot limit may be granted on a case-by-case basis provided Caltrans first submits a proposal in writing that is found acceptable by Regional Water Board staff.

18. All Project-generated waste shall be handled, transported, and disposed in strict compliance with all applicable State and Federal laws and regulations. When operations are complete, any excess material or debris shall be removed from the work area and disposed of properly and in accordance with the Special Provisions for the Project and/or the 2006 Standard Specification 7-1.13, *Disposal of Material Outside the Highway Right of Way*. Within 30 days of disposing of materials off-site Caltrans shall submit to the Regional Water Board the satisfactory evidence provided to the Caltrans Engineer by the Contractor referenced in Standard Specification 7-1.13. In accordance with State and Federal laws and regulations, Caltrans is liable and responsible for the proper disposal of waste generated by their Project.

19. Gravel bags used within State waters shall meet the gravel specifications described below in condition number20. Gravel bag fabric shall be non-woven polypropylene geotextile (or comparable polymer) and shall conform to the following requirements:
    - i) Mass per unit area, grams per square meter, min ASTM Designation: D 5261 — 270;
    - ii) Grab tensile strength (25-mm grip), kilonewtons, min. ASTM Designation: D4632* 0.89;
    - iii) Ultraviolet stability, percent tensile strength retained after 500 hours, ASTM designation: D4355, xenon arc lamp method 70 or appropriate test method for specific polymer;
    - iv) Gravel bags shall be between 600 mm and 800 mm in length and between 400 mm and 500 mm in width; and
    - v) 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. 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.

    Caltrans shall first request approval from the Regional Water Board if an exception from this requirement is needed for a specific location.

20. Gravel used in State waters shall:
    - i) Consist of mechanically-rounded and washed, and/or river run gravel obtained from a river or creek bed;
    - ii) Be clean, hard, sound, durable, uniform in quality, and free of disintegrated material, organic matter, and deleterious substances;
    - iii) Be composed entirely of particles that have no more than one fractured face;

Standard Conditions (continued)

iv) Have a cleanliness value of at least 85, using the Cleanness Value Test Method for California Test No. 227; and

v) Have a diameter no less than 0.75 inches in diameter, and no greater than four inches in diameter.

Exceptions to these criteria are subject to the review and acceptance of Regional Water Board staff.

21. Fueling, lubrication, maintenance, storage and staging of vehicles and equipment shall not result in a discharge or a threatened discharge to any waters of the State or the U.S. At no time shall Caltrans use any vehicle or equipment which leaks any substance that may impact water quality.

22. Caltrans shall prioritize the use of wildlife-friendly biodegradable (not photo-degradable) erosion control products wherever feasible. Caltrans shall not use or allow the use of erosion control products that contain synthetic netting for permanent erosion control (i.e. erosion control materials to be left in place for two years or after the completion date of the Project). If Caltrans finds that erosion control netting or products have entrapped or harmed wildlife, personnel shall remove the netting or product and replace it with wildlife-friendly biodegradable products.

    Caltrans shall not use or allow the use of erosion control products that contain synthetic materials within waters of the United States or waters of the State at any time, with the exception of plastic sheeting. Caltrans shall first request approval from the Regional Water Board if an exception from this requirement is needed for a specific location.

23. Work in flowing or standing surface waters, unless otherwise proposed in the Project description and approved by the Regional Water Board, is prohibited.

24. Caltrans shall implement appropriate BMPs to prevent the discharge of equipment fluids to the stream channel. The minimum requirements shall include: storing hazardous materials at least 150 linear feet outside of the stream banks; checking equipment for leaks and not using equipment with leaks; and pressure washing or steam cleaning equipment to remove fluid residue on any of its surfaces prior to its entering any stream channel. Fluids and waste by-products generated by equipment washing and cleaning shall not enter State waters.

25. Non-stormwater discharges are prohibited unless the discharge is approved by the Regional Water Board and in compliance with the Basin Plan. If construction dewatering of groundwater is necessary, then Caltrans shall use a method of water disposal other than disposal to surface waters, such as land disposal. Groundwater disposed of to land shall not enter State waters. Alternatively, Caltrans may apply for

Standard Conditions (continued)

coverage under the Low Threat Discharge Permit or an individual National Pollutant Discharge Elimination System (NPDES) Permit. If Caltrans applies for coverage under either of these permits, then discharge is prohibited until Caltrans has received notification of coverage under the respective permit.

26. Fueling, lubrication, maintenance, storage and staging of vehicles and equipment shall be prohibited within waters of the State. Fueling of individual equipment types within waters of the State may be authorized if Caltrans first prepares a fueling plan that:
    - i) Identifies the specific piece of machinery that may require fueling within waters of the State;
    - ii) Provides justification for the need to refuel within State waters. The justification shall describe why fueling outside of jurisdictional waters is infeasible; and
    - iii) Includes a narrative of specific BMPs that shall be employed to prevent and capture fuel releases.

    Fueling of equipment within waters of the State shall be prohibited until the above mentioned plan has been approved by Regional Water Board staff. The fueling plan may be submitted individually, included in the Project SWPPP, or submitted as a SWPPP amendment. If the fueling plan is included in the Notice of Intent package for coverage under the statewide construction general stormwater permit, then acceptance of the NOI does not constitute Regional Water Board staff acceptance of the fueling plan.

27. The Resident Engineer (or appropriately authorized agent) shall hold water quality permit compliance meetings (similar to tailgate safety meetings) to discuss permit compliance, including instructions on violation avoidance and violation reporting procedures. The meetings shall be held at least every other week, before forecasted storm events, and when a new contractor or subcontractor arrives to begin work at the site. The contractors, subcontractors and their employees, and inspectors or monitors assigned to work on the Project within the next week, shall be present at the meetings. Individuals that cannot attend the meeting shall have an alternative meeting briefing. Caltrans shall maintain dated sign-in sheets for attendees at these meetings, and shall make them available to the Regional Water Board on request.

28. Caltrans and their contractor are not authorized to discharge wastewater (e.g., water that has contacted uncured concrete or cement, or asphalt) to surface waters, ground waters, or land. Wastewater may only be disposed of to a sanitary waste water collection system/facility (with authorization from the facility's owner or operator) or a properly-licensed disposal or reuse facility. If Caltrans or their contractor proposes an alternate disposal method, then Caltrans or their contractor shall first request authorization from the Regional Water Board. Plans to reuse or recycle wastewater require written approval from Regional Water Board staff.

Standard Conditions (continued)

29. Concrete shall be excluded from surface water for a period of 30-days after it is poured/sprayed. During that time the concrete shall be kept moist and runoff from the concrete shall not be allowed to enter any water body. Commercial sealants may be applied to the concrete surface where difficulty in excluding flow for a long period may occur. If sealant is used, water shall be excluded from the site until the sealant is cured. If groundwater comes into contact with fresh concrete, it shall be prevented from flowing towards surface water.

30. All imported fill material shall be clean and free of pollutants. All fill material shall be imported from a source that has the appropriate environmental clearances and permits. The reuse of low-level contaminated solids as fill on-site shall be performed in accordance with all State and Federal policies and established guidelines and must be submitted to the Regional Water Board for review and concurrence.

31. Caltrans shall provide a copy of this certification and State Water Resources Control Board (SWRCB) Order No. 2003-0017-DWQ (web link referenced below) to the contractor and all subcontractors conducting the work, and require that copies remain in their possession at the work site. Caltrans shall be responsible for work conducted by its contractor or subcontractors.

32. The validity this certification is conditioned upon total payment of any fee required under title 23, California Code of Regulations, section 3833, and owed by the applicant. The Regional Water Board received $3,502 from Caltrans on September 7, 2012.

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

34. In the event of any violation or threatened violation of the conditions of this certification, the violation or threatened violation shall be subject to any remedies, penalties, process or sanctions as provided for under applicable state or federal law. For the purposes of section 401(d) of the Clean Water Act, the applicability of any state law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water quality standards and other pertinent requirements incorporated into this certification. In response to a suspected violation of any condition of this certification, the State Water Board may require the holder of any federal permit or

Standard Conditions (continued)

license subject to this certification to furnish, under penalty of perjury, any technical or monitoring reports the State Water Board deems appropriate, provided that the burden, including costs, of the reports shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In response to any violation of the conditions of this certification, the Regional Water Board may add to or modify the conditions of this certification as appropriate to ensure compliance.

35. This certification action is subject to modification or revocation upon administrative or judicial review; including review and amendment pursuant to Water Code section 13330 and title 23, California Code of Regulations, section 3867.

36. This certification is not transferable. In the event of any change in control of ownership of land presently owned or controlled by the Applicant, the Applicant shall notify the successor-in-interest of the existence of this certification by letter and shall forward a copy of the letter to the Regional Water Board. The successor-in-interest must send to the Regional Water Board Executive Officer a written request for transfer of this certification to discharge dredged or fill material under this Order. The request must contain the following:
    i) Requesting entity's full legal name;
    ii) The state of incorporation, if a corporation;
    iii) Address and phone number of contact person; and
    iv) A description of any changes to the project or confirmation that the successor-in-interest intends to implement the project as described in this Order.

37. Except as may be modified by any preceding conditions, all certification actions are contingent on: a) the discharge being limited, and all proposed revegetation, avoidance, minimization, and mitigation measures being completed, in compliance with Caltrans' project description and CEQA documentation, as approved herein, b) Caltrans shall construct the project in accordance with the project described in the application and the findings above, and c) compliance with all applicable water quality requirements and water quality control plans including the requirements of the Water Quality Control Plan for the North Coast Region (Basin Plan), and amendments thereto. Any change in the design or implementation of the project that would have a significant or material effect on the findings, conclusions, or conditions of this Order must be submitted to the Executive Officer of the Regional Water Board for prior review, consideration, and written concurrence. If the Regional Water Board is not notified of a significant alteration to the project, it will be considered a violation of this Order, and Caltrans may be subject to Regional Water Board enforcement actions.

38. The authorization of this certification for any dredge and fill activities expires on

Standard Conditions (continued)

June 26, 2018. Conditions and monitoring requirements outlined in this Order are not subject to the expiration date outlined above, and remain in full effect and are enforceable.

Conditions 1–3 and 5 of this certification include requirements for information and 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 California Water Code, Section 13268.

The Regional Water Board may add to or modify the conditions of this Order, as appropriate, to implement any new or revised water quality standards and implementation plans adopted or approved pursuant to the Porter-Cologne Water Quality Control Act or section 303 of the Clean Water Act.

Please contact our staff Environmental Specialist / Caltrans Liaison, Brendan Thompson at (707) 576-2699, or via e-mail, at Brendan.Thompson@waterboards.ca.gov, if you have any questions.

Original Signed By David Leland For

_____

Matthias St. John
Executive Officer

130626_BJT_dp_CDOT_Hwy128_SmootSink_401Cert

Web link: 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 can be found at: http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2003/wqo/wqo2003-0017.pdf

Original to: Mr. Sebastian Cohen, Caltrans, District 1, 1656 Union St., Eureka, CA 95501

Copy to: Mr. Al Kannely, Caltrans, District 3 Env. Division, P.O. Box 911, Marysville, CA 95901-0911

Electronic Copies to: U.S. Army Corps of Engineers, Regulatory Functions - San Francisco District
California Department of Fish and Wildlife, Bay Delta Region
State Water Resources Control Board
Environmental Protection Agency, Region IX

PLACS

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND WILDLIFE

NOTIFICATION NO. 1600-2012-0242-R1

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
NORTHERN REGION
601 LOCUST STREET
REDDING, CALIFORNIA 96001

RECEIVED
JAN 31 2013
D. F. G. – EUREKA

LAKE OR STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2012-0242-R1
Rancheria Creek and 3 Unnamed Tributaries

4 Encroachments

Mr. Sebastian Cohen Representing the Department of Transportation
ROAD DRAINAGE WORK AND SLIDE STABILIZATION
RANCHERIA CREEK AND 3 UNNAMED TRIBUTARIES, MENDOCINO COUNTY

This Lake or Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Wildlife (DFW) and Mr. Sebastian Cohen (Permittee) representing the California Department of Transportation (Caltrans).

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, Permittee notified DFW on September 17, 2012 that Permittee intends to complete the project described herein.

WHEREAS, pursuant to FGC section 1602, DFW has determined that the project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, Permittee has reviewed the Agreement and accepts its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, Permittee agrees to complete the project in accordance with the Agreement.

PROJECT LOCATION

The project is located on Rancheria Creek and three Unnamed Tributaries in the County of Mendocino, State of California; Sections 4 and 32, Township 13N, Range 13W; Mt. Diablo Base and Meridian, in the Ornbaun Valley, Calif. 7.5-minute quadrangle; U.S. Geological Survey (USGS) map (38.93462N/123.30854W, NAD 83).

PROJECT DESCRIPTION

The project involves four encroachments: a) install rock slope protection (RSP) buttresses adjacent to the eastern bank of Rancheria Creek between Drainages 1 and 2, b) Drainage 1 (PM 35.07); add RSP at outlet and install erosion control and complete other work at inlet structure, c) Drainage 2 (PM 35.17); replace existing culvert and install erosion control at the inlet/outlet and d) Drainage 3 (PM 35.22); replace existing culvert and install erosion control at the inlet/outlet.

PROJECT IMPACTS

Existing fish or wildlife resources the project could substantially adversely affect include: populations of steelhead (*Oncorhynchus mykiss*), northern red-legged frog (*Rana aurora*) and other aquatic and riparian species.

The adverse effects the project could have on the fish or wildlife resources identified above include: direct and/or incidental take, impede up- and/or down-stream migration, damage to spawning and/or rearing habitat and potential cumulative impacts.

MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES

1. Administrative Measures

Permittee shall meet each administrative requirement described below.

1.1 Documentation at Project Site. Permittee shall make the Agreement, any extensions and amendments to the Agreement, and all related notification materials and California Environmental Quality Act (CEQA) documents, readily available at the project site at all times and shall be presented to DFW personnel, or personnel from another state, federal, or local agency upon request.

1.2 Providing Agreement to Persons at Project Site. Permittee shall provide copies of the Agreement and any extensions and amendments to the Agreement to all persons who will be working on the project at the project site on behalf of Permittee, including but not limited to contractors, subcontractors, inspectors, and monitors.

1.3 Notification of Conflicting Provisions. Permittee shall notify DFW if Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the project by another local, state, or federal agency. In that event, DFW shall contact Permittee to resolve any conflict.

1.4 Project Site Entry. Permittee agrees that DFW personnel may enter the project site to verify compliance with the Agreement.

2. Avoidance and Minimization Measures

To avoid or minimize adverse impacts to fish and wildlife resources identified above, Permittee shall implement each measure listed below.

2.1 Except where otherwise stipulated in this Agreement, all work shall be conducted in accordance with the forms, work plans and maps and drawings submitted with Notification No. 1600-2012-0242, as modified or amended on September 7, 2012.

2.2 This Agreement pertains to four encroachments affecting Rancheria Creek and three Unnamed Tributaries.

2.3 All work within the bed, bank and channel shall be confined to the period June 15 through October 15 of each year. Work may be conducted in or near the stream during the late season work period October 15 through November 1, provided adherence to all conditions in this Agreement and a) – c) below:

a) The Permittee shall complete any unfinished encroachment work, including erosion control measures, within 24 hours of DFG directing the Permittee to do so.

b) Prior to any work at a site, the Permittee shall stock-pile erosion control materials at the site. All bare mineral soil exposed in conjunction with crossing construction, deconstruction, maintenance or repair or removal shall be treated for erosion immediately upon completion of work on the crossing, and prior to the onset of precipitation capable of generating runoff.

c) When a 7-day National Weather Service forecast of rain includes a minimum of 5 consecutive days with any chance of precipitation, 3 consecutive days with a 30% or greater chance of precipitation, or 2 consecutive days of 50% or greater chance of precipitation, the Permittee shall finish work underway at encroachment and refrain from starting any new work at encroachment prior to the rain event.

2.4 All bare mineral soil exposed in conjunction with this project shall be treated for erosion prior to the onset of precipitation capable of generating run-off or the end of the yearly work period, whichever comes first. Restoration shall include using prescribed erosion control on all bare mineral soil exposed in conjunction with encroachment work. No annual (Italian) ryegrass (*Lolium multiflorum*) shall be used.

2.5 The Permittee shall provide site maintenance including, but not limited to, re-applying erosion control to minimize surface erosion and ensuring drainage structures, streambeds and banks remain sufficiently armored and/or stable.

2.6 Structures and associated materials not designed to withstand high seasonal flows shall be removed to areas above the ordinary high water mark before such flows occur or the end of the yearly work period, whichever comes first.

2.7 Refueling of equipment and vehicles and storing, adding or draining lubricants, coolants or hydraulic fluids shall not take place within or adjacent to any stream. All such fluids and containers shall be disposed of properly. Heavy equipment parked within or adjacent to the stream shall use drip pans or other devices (e.g., absorbent blankets, sheet barriers or other materials) as needed to prevent soil and water contamination.

2.8 All activities performed in the field which involve the use of petroleum or oil based substances shall employ absorbent material designated for spill containment and clean up activity on site for use in case of accidental spill. Clean-up of all spills shall begin immediately. The Permittee shall immediately notify the State Office of Emergency Services at 1-800-852-7550. DFW shall be notified by the Permittee and consulted regarding clean-up procedures.

2.9 No debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete washings, oil or petroleum products, or other organic or earthen material from construction work, or associated activity of whatever nature shall be allowed to enter into, or be placed where it may be washed by rainfall or runoff into Waters of the State. When operations are completed, any excess materials or debris shall be removed from the work area. (Not applicable to material installed pernanently or temporarily as part of the project activities).

2.10 Upon DFW determination that turbidity/siltation levels resulting from project related activities constitute a threat to aquatic life, activities associated with the turbidity/siltation, shall be halted until effective DFW approved control devices are installed, or abatement procedures are initiated.

SITE-SPECIFIC CONDITONS:

2.11 Unless otherwise authorized by DFG staff, work at Drainages 1, 2 and 3 will occur during periods when project sites are void of surface water.

2.12 If white alder (Alnus rhombifolia) or other trees larger than 3 inches in diameter are removed or significantly damaged as a result of this project, new trees of the same species shall be planted at a minimum 3:1 ratio in the affected area. Planted trees shall be monitored post-project for a minimum of three years to ensure rooting and long term success. Dead and/or dying replacement trees shall be replaced.

2.13 If concrete or another high pH medium will be used in conjunction with proposed anchor wall sites or other near-stream locations, a monitoring plan shall be developed to ensure that un-cured concrete or other toxic material does not

contact surface flow of Rancheria Creek or the three affected Unnamed Tributaries.

2.14 At Drainage 1 (PM 35.07), install sufficient RSP immediately adjacent to the culvert outlet to fully abate on-going erosion. Beginning at the wire fence that exists upstream of the culvert inlet and extending a minimum of 150 feet upstream of this point, pull-back and stabilize the existing eroding vertical stream banks.

2.15 At Drainage 2 (PM 35.17), stabilize the existing four-foot vertical head-cut that exists approximately 300 feet upstream of this drainage's confluence with Rancheria Creek. Acceptable stabilization methods shall result in abating on-going erosion and up-stream migration of the head-cut. In addition, pull back existing vertical slopes from the head-cut upstream to the existing culvert outlet.

2.16 At Drainage 3 (PM 35.22), request access from the landowner for purposes of pulling back vertical, eroding banks upstream of the culvert inlet. This condition may be disregarding if landowner access is not approved upon request.

3. Reporting Measures

Permittee shall meet each reporting requirement described below.

3.1 Permittee shall notify the Department, in writing, at least five (5) days prior to initiation of construction (project) activities and at least five (5) days prior to completion of construction (project) activities. Notification shall be faxed to the Department at (707) 441-2021, Attn: Rick Macedo, Staff Environmental Scientist, or via e-mail at richard.macedo@wildlife.ca.gov.

CONTACT INFORMATION

Any communication that Permittee or DFW submits to the other shall be in writing and any communication or documentation shall be delivered to the address below by U.S. mail, fax, or email, or to such other address as Permittee or DFW specifies by written notice to the other.

To Permittee:

Mr. Sebastian Cohen
California Department of Transportation
1656 Union Street
Eureka, CA 95501
E-Mail: Sebastian_Cohen@dot.ca.gov

To DFW:

Department of Fish and Wildlife
Region 1
619 Second Street, Eureka, California 95501
Attn: Lake and Streambed Alteration Program – Laurie Harnsberger
Notification #1600-2012-0242-R1
Fax: 707-441-2021
E-mail: laurie.harnsberger@wildlife.ca.gov

LIABILITY

Permittee shall be solely liable for any violations of the Agreement, whether committed by Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents or contractors and subcontractors, to complete the project or any activity related to it that the Agreement authorizes.

This Agreement does not constitute DFW's endorsement of, or require Permittee to proceed with the project. The decision to proceed with the project is Permittee's alone.

SUSPENSION AND REVOCATION

DFW may suspend or revoke in its entirety the Agreement if it determines that Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, is not in compliance with the Agreement.

Before DFW suspends or revokes the Agreement, it shall provide Permittee written notice by certified or registered mail that it intends to suspend or revoke. The notice shall state the reason(s) for the proposed suspension or revocation, provide Permittee an opportunity to correct any deficiency before DFW suspends or revokes the Agreement, and include instructions to Permittee, if necessary, including but not limited to a directive to immediately cease the specific activity or activities that caused DFW to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes DFW from pursuing an enforcement action against Permittee instead of, or in addition to, suspending or revoking the Agreement.

Nothing in the Agreement limits or otherwise affects DFW's enforcement authority or that of its enforcement personnel.

OTHER LEGAL OBLIGATIONS

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from obtaining any other permits or authorizations that might be required under other federal, state, or local laws or regulations before beginning the project or an activity related to it.

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with other applicable statutes in the FGC including, but not limited to, FGC §§ 2050 et seq. (threatened and endangered species), 3503 (bird nests and eggs), 3503.5 (birds of prey), 5650 (water pollution), 5652 (refuse disposal into water), 5901 (fish passage), 5937 (sufficient water for fish), and 5948 (obstruction of stream).

Nothing in the Agreement authorizes Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, to trespass.

AMENDMENT

DFW may amend the Agreement at any time during its term if DFW determines the amendment is necessary to protect an existing fish or wildlife resource.

Permittee may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by DFW and Permittee. To request an amendment, Permittee shall submit to DFW a completed DFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in DFW's current fee schedule (see Cal. Code Regs., title 14, § 699.5).

TRANSFER AND ASSIGNMENT

This Agreement may not be transferred or assigned to another entity, and any purported transfer or assignment of the Agreement to another entity shall not be valid or effective, unless the transfer or assignment is requested by Permittee in writing, as specified below, and thereafter DFW approves the transfer or assignment in writing.

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, Permittee shall submit to DFW a completed DFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in DFW's current fee schedule (see Cal. Code Regs., title 14, § 699.5).

EXTENSIONS

In accordance with FGC § 1605(b), Permittee may request one extension of the Agreement, provided the request is made prior to the expiration of the Agreement's term. To request an extension, Permittee shall submit to DFW a completed DFW "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in DFW's current fee schedule (see Cal. Code Regs., title 14, § 699.5). DFW shall process the extension request in accordance with FGC 1605(b) through (e).

If Permittee fails to submit a request to extend the Agreement prior to its expiration, Permittee must submit a new notification and notification fee before beginning or continuing the project the Agreement covers (FGC § 1605, subd. (f)).

EFFECTIVE DATE

The Agreement becomes effective on the date of DFW's signature, which shall be: 1) after Permittee's signature; 2) after DFW complies with all applicable requirements under the California Environmental Quality Act (CEQA); and 3) after payment of the applicable FGC § 711.4 filing fee listed at http://www.wildlife.ca.gov/habcon/ceqa/ceqa_changes.html.

TERM

This Agreement shall expire five years after the date the Agreement is fully executed, unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605(a)(2) requires.

EXHIBITS

None.

AUTHORITY

If the person signing the Agreement (signatory) is doing so as a representative of Permittee, the signatory hereby acknowledges that he or she is doing so on Permittee's behalf and represents and warrants that he or she has the authority to legally bind Permittee to the provisions herein.

AUTHORIZATION

This Agreement authorizes only the project described herein. If Permittee begins or completes a project different from the project the Agreement authorizes, Permittee may be subject to civil or criminal prosecution for failing to notify DFW in accordance with FGC section 1602.

CONCURRENCE

The undersigned accepts and agrees to comply with all provisions contained herein.

SEBASTIAN COHEN

Sebastian Cohen — 1/30/13

Name: — Date

Title Project Manager

FOR DEPARTMENT OF FISH AND WILDLIFE

T. LABANCA — 1/31/13

For Name Curt Babcock — Date

Environmental Program Manager

Prepared by: Rick Macedo
Staff Environmental Scientist
1-10-13 and revised on 1-24-13

PLACS

UNITED STATES ARMY CORPS OF ENGINEERS
REPORTING 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
ATTENTION OF

JUN 27 2013

Regulatory Division

SUBJECT: File Number 2013-00022N

Mr. Sebastian Cohen
California Department of Transportation
1656 Union Street
Eureka, California 95501

Dear Mr. Cohen:

This correspondence is in reference to your submittal of September 6, 2012, revised on June 6, 2013 concerning Department of the Army (DA) authorization to repair a hillslope failure (Smoot Sink) located along State Route (SR) 128 at post mile 35.5, approximately 6 miles south of Booneville, in Mendocino County, California (38.93462, -123.30854).

The purpose of the project is to repair a portion of the bank between SR 128 and Rancheria Creek that is subject to frequent hillside failure resulting in damage to SR 128. Work in the first construction season will include installation of five individual anchor walls and installation of a fabric-lined rock buttress, 30 feet high, 15 feet deep, and 180 feet long, constructed at the toe of the failing slope and adjacent to Rancheria Creek (above the ordinary high water mark). Ground water that is encountered during excavation will be removed and disposed of offsite. In the second construction season, the roadway will be reconstructed and returned to 1989 dimensions. Additionally two of the drainage systems will be improved, including installation of additional erosion protection. Inlets of intermittent streams A and B and the outlet of stream B will be re-graded and stabilized. The large headcut on intermittent stream B will also be stabilized. All temporarily impacted areas will be restored to pre-construction conditions and a re-vegetation plan will be implemented. Anchor walls will be constructed between June 15 and October 30, and the rock buttress will be constructed when the water table is at its lowest (e.g., early August). Road reconstruction, drainage system improvements, and restoration will occur after September 15 of the second year of construction. Work will require permanent placement of fill within 0.012 acre (59 linear feet) and temporary placement of 0.029 acre (212 linear feet) of tributaries to Rancheria Creek. All work shall be completed in accordance with the plans and drawings titled "*USACE File #2013-00022N, Smoot Sink Men 128 PM 35.5, June 17, 2013, Figures 1 to 8*", enclosure 1. All plantings to restore temporarily impacted areas and to enhance the riparian corridor will occur as outlined in the "*Smoot Sink Storm Damage Repair Project, Mitigation and Monitoring Proposal, Revised June 2013*".

Section 404 of the Clean Water Act (CWA) generally regulates the discharge of dredged or fill material below the plane of ordinary high water in non-tidal waters of the United States, below the high tide line in tidal waters of the United States, and within the lateral extent of wetlands adjacent to these waters. Section 10 of the Rivers and Harbors Act generally regulates construction of structures and work, including excavation, dredging, and discharges of dredged or fill material, occurring below the plane of mean high water in tidal waters of the United States; in former diked baylands currently below mean high water; outside the limits of mean high water but affecting the navigable capacity of tidal waters; or below the plane of ordinary high water in non-tidal waters designated as navigable waters of the United States. Navigable waters of the United States generally include all waters subject to the ebb and flow of the tide; and/or all waters presently used, or have been used in the past, or may be susceptible for future use to transport interstate or foreign commerce. An authorized jurisdictional determination was completed and dated certified June 27, 2013 (enclosure 2).

You are advised that the approved jurisdictional determination may be appealed through the U.S. Army Corps of Engineers' *Administrative Appeal Process*, as described in 33 C.F.R. Part 331 (65 Fed. Reg. 16,486; Mar. 28, 2000), and outlined in the enclosed flowchart and *Notification of Administrative Appeal Options, Process, and Request for Appeal* (NAO-RFA) Form. If you do not intend to accept the approved jurisdictional determination, you may elect to provide new information to this office for reconsideration of this decision. If you do not provide new information to this office, you may elect to submit a completed NAO-RFA Form to the Division Engineer to initiate the appeal process; the completed NAO-RFA Form must be submitted directly to the Appeal Review Officer at the address specified on the NAO-RFA Form. You will relinquish all rights to a review or an appeal, unless this office or the Division Engineer receives new information or a completed NAO-RFA Form within 60 days of the date on the NAO-RFA Form. If you intend to accept the approved jurisdictional determination, you do not need to take any further action associated with the Administrative Appeal Process.

Based on a review of the information in your submittal and the current condition of the site, as verified during a field investigation on January 17, 2013, the project qualifies for authorization under Department of the Army Nationwide Permits (NWPs) 13 for Bank Stabilization and 14 for Linear Transportation, 77 Fed. Reg. 10,184, February 21, 2012, pursuant to Section 404 of the CWA of 1972, as amended (33 U.S.C. § 1344 *et seq.*). The project must be in compliance with the terms of the NWP, the general conditions of the Nationwide Permit Program, and the San Francisco District regional conditions cited in enclosure 3. You must also be in compliance with any special conditions specified in this letter for the NWP authorization to remain valid. Non-compliance with any term or condition could result in the revocation of the NWP authorization for your project, thereby requiring you to obtain an Individual Permit from the Corps. This NWP authorization does not obviate the need to obtain other State or local approvals required by law.

This verification will remain valid until March 18, 2017, unless the NWP authorization is modified, suspended, or revoked. Activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon a NWP will remain authorized provided the activity is completed within 12 months of the date of a NWP's expiration, modification, or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 C.F.R. § 330.4(e) and 33 C.F.R. §§ 330.5 (c) or (d). This verification will remain valid if, during the time period between now and March 18, 2017, the activity complies with any subsequent modification of the NWP authorization. The Chief of Engineers will periodically review NWPs and their conditions and will decide to either modify, reissue, or revoke the permits. If a NWP is not modified or reissued within five years of its effective date, it automatically expires and becomes null and void. It is incumbent upon you to remain informed of any changes to the NWPs. Changes to the NWPs would be announced by Public Notice posted on our website (http://www.spn.usace.army.mil/Missions/Regulatory.aspx). Upon completion of the project and all associated mitigation requirements, you shall sign and return the Certification of Compliance, enclosure 4, verifying that you have complied with the terms and conditions of the permit.

You shall comply with all terms and conditions set forth by the "*California Department of Transportation, Highway 128 Smoot Sink Storm Damage Repair Project, WDID No. 1B12174WNME, Caltrans EA No.: 01-47660*" issued by the North Coast, Regional Water Quality Control Board on June 26, 2013 (enclosure 5). You shall consider such conditions to be an integral part of the NWP authorization for your project.

General Condition 18 stipulates that project authorization under a NWP does not allow for the incidental take of any federally-listed species in the absence of a biological opinion (BO) with incidental take provisions. As the principal federal lead agency for this project, Caltrans initiated consultation with the United States Fish and Wildlife Service (USFWS) and /or National Marine Fisheries Service (NMFS) to address project related impacts to list species, pursuant to Section 7(a) of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 *et seq.*). Please see special conditions below outlining requirements pursuant to these consultations.

In order to ensure compliance with this NWP authorization, the following special conditions shall be implemented:

1. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, if temporary structures, work, and discharges, including cofferdams, are required.

2. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flow.

3. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations.

4. No fill, with the exception of BMPs for water quality protection, shall be placed below the Ordinary High Water Mark of Rancheria Creek.

5. All best management practices outlined in enclosure 6 shall be followed.

6. The NMFS concurred with the determination that the project was not likely to adversely affect Northern California steelhead and Central California Coast coho Salmon and designated critical habitat for this species. This concurrence was premised, in part, on project work restrictions outlined in enclosure 7. These work restrictions are incorporated as special conditions to the NWP authorization for your project to ensure unauthorized incidental take of species and loss of critical habitat does not occur.

7. The USFWS concurred with the determination that the project was not likely to adversely affect northern spotted owl. This concurrence was premised, in part, on project work restrictions outlined in enclosure 8. These work restrictions are incorporated as special conditions to the NWP authorization for your project to ensure unauthorized incidental take of species and loss of critical habitat does not occur.

8. A Biological Monitor shall be present during all construction to ensure adequate protection against degradation of water quality including sedimentation or creek bank erosion. If increased turbidity is observed in Rancheria Creek construction shall stop until the source of the turbidity can be addressed and remediated.

9. Prior to 1) re-grading and stabilization of the inlets of intermittent streams A and B and the outlet of stream B and 2) stabilization of the large headcut on intermittent stream B, final plans shall be submitted to the Corps for approval.

10. On-site mitigation will be achieved through re-vegetation, invasive species control, and monitoring of 0.33 acre of intermittent stream and 180 linear feet of riparian area as outlined in the "*Smoot Sink Storm Damage Repair Project, Mitigation and Monitoring Proposal*" revised June 2013. A management and monitoring program will be implemented as outlined in the plan. The monitoring program shall occur for minimum of 5 years. If at 5 years the success criteria have not been attained, then monitoring shall continue until success criteria are met for two consecutive years. Reports shall be submitted to the Corps by December 31 of each year.

11. In the event that you are unable to implement the plan described in special condition 10 within 1-year of completion of the project, or if you are unable to meet outlined success criteria by year 10, you must purchase credits at a Corps approved mitigation bank to compensate for the temporary and permanent impacts at a 3:1 ratio. If no approved bank or in-lieu fee is available, you shall propose an alternative mitigation plan to be reviewed and approved by the Corps.

12. Mitigation will be deemed successful when performance criteria outlined in table 6-1 are attained after a 5-year monitoring period.

13. Any changes to the "*Smoot Sink Storm Damage Repair Project, Mitigation and Monitoring Proposal*" revised June 2013, as a result of requests made by the Regional Water Quality Control Board, including changes to the performance standards and any proposed adaptive management actions, shall be submitted in writing to the Corps at least 60 days prior to proposed implementation. Caltrans shall not implement the proposed changes prior to receiving written approval from the Corps.

You may refer any questions on this matter to Paula Gill of my Regulatory staff by telephone at 415-503-6776 or by e-mail at Paula.C. Gill@usace.army.mil. All correspondence should be addressed to the Regulatory Division, North Branch, referencing the file number at the head of this letter.

The San Francisco District is committed to improving service to our customers. My Regulatory staff seeks to achieve the goals of the Regulatory Program in an efficient and cooperative manner, while preserving and protecting our nation's aquatic resources. If you would like to provide comments on our Regulatory Program, please complete the Customer Service Survey Form available on our website: http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

Jane M. Hicks
Chief, Regulatory Division

Enclosures

Copy Furnished (w/ encl 1 only):

CA RWQCB, Santa Rosa, CA

Copies Furnished (w/o encls):

U.S. EPA, San Francisco, CA
CA SWRCB, Sacramento, CA
USFWS, Arcata, CA
NMFS, Santa Rosa, CA
CDFW, Yountville, CA

Enclosure 3:

Nationwide Permit 13 - *Bank Stabilization*

Bank stabilization activities necessary for erosion prevention, provided the activity meets all of the following criteria: (a) No material is placed in excess of the minimum needed for erosion protection; (b) The activity is no more than 500 feet in length along the bank, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects; (c) The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark or the high tide line, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects; (d) The activity does not involve discharges of dredged or fill material into special aquatic sites, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects; (e) No material is of a type, or is placed in any location, or in any manner, that will impair surface water flow into or out of any waters of the United States; (f) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas); and, (g) The activity is not a stream channelization activity.

This NWP also authorizes temporary structures, fills, and work necessary to construct the bank stabilization activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate. *Invasive plant species shall not be used for bioengineering or vegetative bank stabilization.*

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if the bank stabilization activity: (1) involves discharges into special aquatic sites; or (2) is in excess of 500 feet in length; or (3) will involve the discharge of greater than an average of one cubic yard per running foot along the bank below the plane of the ordinary high water mark or the high tide line. (See general condition 31.) (Sections 10 and 404)

Nationwide Permit 14 - *Linear Transportation Projects*

Activities required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project. This NWP also authorizes temporary structures, fills, and work necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must

consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate. This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10-acre; or (2) there is a discharge in a special aquatic site, including wetlands. (See general condition 31.) (Sections 10 and 404)

Note: Some discharges for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4).

Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR §§ 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR § 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation. (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States. (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which “may affect” a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed. (b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary. (c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity “may affect” or will have “no effect” to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps’ determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have “no effect” on listed species or critical habitat, or until Section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps. (d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.
(e) Authorization of an activity by a NWP does not authorize the “take” of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with “incidental take” provisions, etc.) from the U.S. FWS or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word “harm” in the definition of “take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. (f) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.noaa.gov/fisheries.html respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for obtaining any “take” permits required under the U.S. Fish and Wildlife Service’s regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the

appropriate local office of the U.S. Fish and Wildlife Service to determine if such “take” permits are required for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied. (b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address section 106 compliance for the NWP activity, or whether additional section 106 consultation is necessary. (c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed. (d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps. (e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic

properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment. (a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters. (b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332. (1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects

on the aquatic environment. (2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered. (3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). (4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided. (5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee programs, or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the

nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:
"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____
(Transferee)

_____
(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

31. Pre-Construction Notification.

(a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either: (1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any

special conditions imposed by the district or division engineer; or (2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information: (1) Name, address and telephone numbers of the prospective permittee; (2) Location of the proposed project; (3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans); (4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate; (5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan. (6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical

habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and (7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level. (2) For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of intermittent and ephemeral stream bed, and for all NWP 48 activities that require pre-construction notification, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5. (3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act. (4) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

Enclosure 1: San Francisco District Regional Conditions

A. General Regional Conditions that apply to all NWPs in the Sacramento, San Francisco, and Los Angeles Districts:

1. When pre-construction notification (PCN) is required, the permittee shall notify the U.S. Army Corps of Engineers, San Francisco District (Corps) in accordance with General Condition 31 using either the South Pacific Division Preconstruction Notification (PCN) Checklist or a signed application form (ENG Form 4345) with an attachment providing information on compliance with all of the General and Regional Conditions. In addition, the PCN shall include:

A written statement describing how the activity has been designed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States;

Drawings, including plan and cross-section views, clearly depicting the location, size and dimensions of the proposed activity, as well as the location of delineated waters of the U.S. on the site. The drawings shall contain a title block, legend and scale, amount (in cubic yards) and area (in acres) of fill in Corps jurisdiction, including both permanent and temporary fills/structures. The ordinary high water mark or, if tidal waters, the mean high water mark and high tide line, should be shown (in feet), based on National Geodetic Vertical Datum (NGVD) or other appropriate referenced elevation. All drawings for activities located within the boundaries of the Los Angeles District shall comply with the September 15, 2010 Special Public Notice: *Map and Drawing Standards for the Los Angeles District Regulatory Division*, (available on the Los Angeles District Regulatory Division website at: www.spl.usace.army.mil/regulatory/); and

Numbered and dated pre-project color photographs showing a representative sample of waters proposed to be impacted on the site, and all waters of the U.S. proposed to be avoided on and immediately adjacent to the activities site. The compass angle and position of each photograph shall be identified on the plan-view drawing(s) required in subpart b of this Regional Condition.

2. The permittee shall submit a PCN, in accordance with General Condition 31, For all activities located in areas designated as Essential Fish Habitat (EFH) by the Pacific Fishery Management Council (i.e., all tidally influenced areas - Federal Register dated March 12, 2007, 72 C.F.R. 11,092, in which case the PCN shall include an EFH assessment and extent of proposed impacts to EFH. Examples of EFH habitat assessments can be found at: http://www.swr.noaa.gov/efh.htm.

3. For activities in which the Corps designates another Federal agency as the lead for compliance with Section 7 of the Endangered Species Act (ESA) of 1973 as amended, 16 U.S.C. §§ 1531-1544, Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act (EFH), 16 U.S.C. § 1855(b)(4)(B) and/or Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended , 16 U.S.C. §§ 470-470h, the lead Federal agency shall provide all relevant documentation to the appropriate Corps demonstrating any previous consultation efforts, as it pertains to the Corps Regulatory permit area (for Section 7 and EFH compliance) and the Corps Regulatory area of potential effect (APE) (for Section 106 compliance). For activities requiring a PCN, this information shall be submitted with the PCN. If the Corps does not designate another Federal agency as the lead for ESA, EFH and/or NHPA, the Corps will initiate consultation for compliance, as appropriate.

4. For all activities in waters of the U.S. that are suitable habitat for Federally-listed fish species, the permittee shall design all road crossings to ensure that the passage and/or spawning of fish is not hindered. In these areas, the permittee shall employ bridge designs that span the stream or river, including pier- or pile-supported spans, or designs that use a bottomless arch culvert with a natural stream bed unless determined to be impracticable by the Corps.

5. The permittee shall complete the construction of any compensatory mitigation required by special condition(s) of the NWP verification before or concurrent with commencement of construction of the authorized activity, except when specifically determined to be impracticable by the Corps. When mitigation involves use of a mitigation bank or in-lieu fee program, the permittee shall submit proof of payment to the Corps prior to commencement of construction of the authorized activity.

6. Any requests to waive the 300 linear foot limitation for intermittent and ephemeral streams for NWPs 21, 29, 39, 40, 42, 43, 44, 50, 51 and 52, or to waive the 500 linear foot limitation along the bank for NWP 13, must include the following:

    a. A narrative description of the stream. This should include known information on: volume and duration of flow; the approximate length, width, and depth of the waterbody and characteristics observed associated with an Ordinary High Water Mark (e.g. bed and bank, wrack line or scour marks); a description of the adjacent vegetation community and a statement regarding the wetland status of the adjacent areas (i.e. wetland, non-wetland); surrounding land use; water quality; issues related to cumulative impacts in the watershed, and; any other relevant information;

    b. An analysis of the proposed impacts to the waterbody, in accordance with General Condition 31;

    c. Measures taken to avoid and minimize losses to waters of the U.S., including other methods of constructing the proposed activity(s); and

    d. A compensatory mitigation plan describing how the unavoidable losses are proposed to be offset, in accordance with 33 CFR 332.

B. General Regional Conditions that apply to all NWPs in the San Francisco District:

1. Notification to the Corps (in accordance with General Condition No. 31) is required for any activity permitted by NWP if it will take place in waters or wetlands of the U.S. that are within the **San Francisco Bay diked baylands** (see figure 1) (undeveloped areas currently behind levees that are within the historic margin of the Bay. Diked historic baylands are those areas on the Nichols and Wright map below the 5-foot contour line, National Geodetic Vertical Datum (NGVD) (see Nichols, D.R., and N. A. Wright. 1971. Preliminary map of historic margins of marshland, San Francisco Bay, California. U.S. Geological Survey Open File Map)). The notification shall explain how avoidance and minimization of losses of waters or wetlands are taken into consideration to the maximum extent practicable (see General Condition 23).

2. Notification to the Corps (in accordance with General Condition No. 31) is required for any activity permitted by NWP if it will take place in waters or wetlands of the U.S. that are within the **Santa Rosa Plain** (see figure 2). The notification will explain how avoidance and minimization of losses of waters or wetlands are taken into consideration to the maximum extent practicable in accordance with General Condition No. 23.

3. Notification to the Corps (in accordance with General Condition No. 31), including a compensatory mitigation plan, habitat assessment, and extent of proposed-project impacts to Eelgrass Beds are required for any activity permitted by NWP if it will take place within or adjacent to **Eelgrass Beds**.

C. Regional Conditions that apply to specific NWPs in the San Francisco District:
13. BANK STABILIZATION:

1. Notification to the Corps (in accordance with General Condition No. 31) is required for all activities stabilizing greater than 300 linear feet of channel. Where the removal of wetland vegetation (including riparian wetland trees, shrubs and other plants) or submerged, rooted, aquatic plants over a cumulative area greater than 1/10 acre or 300 linear feet is proposed, the Corps shall be notified (in accordance with General Condition No. 31). The notification shall include the type of

vegetation and extent (e.g., areal dimension or number of trees) of the proposed removal. The notification shall also address the effect of the bank stabilization on the stability of the opposite side of the streambank (if it is not part of the stabilization activity), and on adjacent property upstream and downstream of the activity.

2. This permit allows excavating a toe trench in waters of the U.S., and, if necessary, to use the material for backfill behind the stabilizing structure. Excess material is to be disposed of in a manner that will have only minimal impacts to the aquatic environment. The notification to the Corps (in accordance with General Condition No. 31) shall include location of the disposal site.

3. For man-made banks, roads, or levees damaged by storms or high flows, the one cubic yard per running foot limit is counted only for that additional fill which encroaches (extends) beyond the pre-flood or pre-storm shoreline condition of the waterway. It is not counted for the fill that would be placed to reconstruct the original dimensions of the eroded, man-made shoreline.

4. For natural berms and banks, the one cubic yard per running foot limit applies to any added armoring.

5. To the maximum extent practicable, any new or additional bank stabilization must incorporate structures or modifications beneficial to fish and wildlife (e.g., soil bioengineering or biotechnical design, root wads, large woody debris, etc.). Where these structures or modifications are not used, the applicant shall demonstrate why they were not considered practicable.

14. LINEAR TRANSPORATION PROJECTS:

1. Notification to the Corps (in accordance with General Condition No. 31) is required for all projects filling greater than 300 linear feet of channel. For projects involving greater than 300 linear feet of bank stabilization, the project proponent shall address the effect of the bank stabilization on the stability of the opposite side of the streambank (if it is not part of the stabilization activity), and on adjacent property upstream and downstream of the activity.

2. This permit does not authorize construction of new airport runways and taxiways.

3. If this NWP has been used to authorize previous project segments within the same linear transportation project, justification must be provided demonstrating that the cumulative impacts of the proposed and previously authorized project segments do not result in more than minimal impacts to the aquatic system.

4. To the maximum extent practicable, any new or additional bank stabilization required for the crossing must incorporate structures or modifications beneficial to fish and wildlife (e.g., soil bioengineering or biotechnical design, root wads, large woody debris, etc.). Where these structures or modifications are not used, the applicant shall demonstrate why they were not considered practicable. Bottomless and embedded culverts are encouraged over traditional culvert stream crossings.

Enclosure 6:

Avoidance of Indirect Impacts:

1. All construction-related materials will be stored in designated staging areas at least 100 feet from perennial waterways and drainages.

2. Refueling and vehicle maintenance will be performed at least 100 feet from creeks and other water bodies.

3. Temporary sedimentation barriers, such as sandbags or siltation fencing, will be installed to minimize the amount of silt entering the creeks and any ephemeral/intermittent drainages with water present in the channel. The locations of these barriers will be determined by the resident engineer and environmental monitor, and will be clearly marked in the field before construction activities begin.

4. Additional BMPs will be implemented to prevent runoff from adjacent lands from flowing across construction areas, slow down the runoff traveling across construction sites, remove sediment from on-site runoff before it leaves the site, and provide soil stabilization.

5. To address potential water quality impacts during construction, Caltrans will require the contractor to use a combination of BMPs to control potential erosion and sedimentation from the project site. Caltrans has developed a suite of construction site BMPs that will be implemented on the proposed project. The construction site BMP manual can be downloaded at: http://www.dot.ca.gov/hq/construc/stormwater/CSBMPM_303_Final.pdf

6. Caltrans will prohibit the contractor from discharging oils, greases, chemicals, or spillage of concrete and grout into receiving waters. For example, on this project, equipment operating in water bodies will be required to be steam cleaned prior to arrival onsite, and be maintained in a clean condition during the length of activities.

7. Following the construction process, the contractor will stabilize disturbed soil areas through permanent revegetation or other means. An appropriate design will be used that will allow all finished slopes to achieve stabilization, even under severe conditions, and also provide erosion control BMPs at all point source discharges of stormwater runoff. Treatment BMPs, such as biofiltration, will be incorporated where feasible.

8. As part of standard operation and maintenance procedures, Caltrans has developed a standard Hazardous Waste and Spill Response Plan, which Caltrans will ensure is implemented during the project. These BMPs address water quality issues associated with accidental spills.

9. The project's contractor will be required to implement appropriate BMPs to prevent the discharge of equipment fluids to the stream channel; the minimum requirements will include:

- storing hazardous materials outside of the stream banks;
- checking equipment for leaks and preventing equipment with leaks from accessing any areas below the top of banks;
- maintaining spill response material and suitably trained personnel at the project site;
- responding immediately to any fluid releases and applying containment booms and absorbent materials as appropriate; and
- notifying the RWQCB of releases and discharges; or minor accidental releases of equipment fluid to the dewatered channel, the contractor will be required to remove and properly dispose of contaminated material.

10. Equipment will not be stored in the channel when not in use; all equipment will be removed from the channel at the end of each work day; all equipment will be fueled, maintained, and repaired at sites well away from the streambanks.

11. Erosion control measures will be implemented at the end of each work window or completion of project activities to prevent material from entering watercourses.

Minimum Erosion Control and Post-Construction Stormwater Treatment, Measures, and Construction/Post-Construction Pollutant Source Controls

1. To avoid or minimize potential short-term or long-term impacts on water quality and aquatic habitat in Rancheria Creek, Caltrans proposes to implement all applicable construction, treatment, maintenance, and pollution prevention BMPs in accordance with Caltrans' *Storm Water Quality Handbook* (California Department of Transportation 2007) and NPDES General Construction Activity Storm Water Permit. Approved construction and post-construction water quality control measures will be fully described in the SWPPP for the proposed project, which will include the measures that follow.

2. Schedule all ground-disturbing activities during the dry season and limit the amount and duration of soil exposure to the minimum needed to perform construction.

3. Minimize the loss of native vegetation and clearly mark the boundaries of all protected vegetation in the plans and in the field (install high-visibility fencing).

4. Apply approved sediment control and soil stabilization techniques (e.g., silt fences, fiber rolls, hydroseeding) to all disturbed soils, and ensure that all erosion control measures are in place by October 15 of each construction season.

5. Locate stockpiles away from the stream channel, and implement sediment and wind control measures.

6. Maintain silt fences or other approved sediment barriers in all drainage channels leading to the creek, and remove and haul accumulated sediment to an approved disposal site.

7. Maintain fuel storage and refueling sites away from the stream channel, and ensure that all vehicles and construction equipment are free of leaking fuel, oil, or hydraulic fluids

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UNITED STATES FISH AND WILDLIFE SERVICE
LETTER OF CONCURRENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, California 95521
Phone: (707) 822-7201 FAX: (707) 822-8411

In Reply Refer To:
AFWO-11B0055-11I0049

MAR 2 2 2011

Sandra E. Rosas, Chief
Environmental Management, M2 Branch, District 3
California Department of Transportation
703 B Street
P.O. Box 911
Marysville, California 95901–0911

Subject: Informal Consultation for the Smoot Sink Storm Damage Project, Mendocino County, California

Dear Ms. Rosas:

We have reviewed your request, dated January 28, 2011 and received February 07, 2011, for informal consultation with the Fish and Wildlife Service (Service) for the Smoot Sink Storm Damage Project at Post Mile (PM) 34.9 to 35.3 on State Route 128, Mendocino County, California. This response is prepared in accordance with the Endangered Species Act of 1973, as amended (16 U.S.C. 153 1 et seq.) (Act), and its implementing regulations (50 CFR § 402). The California Department of Transportation (Caltrans) is seeking concurrence that the proposed project may affect, but is not likely to adversely affect the federally listed as threatened northern spotted owl (*Strix occidentalis caurina*) and will have no effect on the federally listed as threatened marbled murrelet (*Brachyramphus marmoratus*). This letter transmits the Service's concurrence on the may affect, not likely to adversely affect determination made by Caltrans for the northern spotted owl and the no effect determination for the marbled murrelet.

Caltrans proposes to stabilize a slide on State Route 128, by constructing a rock buttress and anchor walls during the first construction season of June 15 to October 30, 2012. This will be followed by reconstruction of the vertical and horizontal alignments of the roadway, improvements to the drainage systems for three intermittent streams, road delineation, paving, and shoulder backing during the second construction season of September 15 to October 14, 2013. Restoration of temporarily disturbed areas and installation of permanent erosion control measures would also occur during the second construction season. Construction of the anchor

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walls and rock buttress will require approximately 84 days. Road reconstruction, drainage system improvements, and restoration will require approximately 21 days.

The nearest spotted owl activity center (CDFG MEN 0290) is approximately 0.30 mile to the south of the southern end of the project area; however, the activity center is approximately 0.50 mile from the portion of the project area that will generate noise above ambient levels. The MEN 0216 and MEN 0300 spotted owl activity centers are approximately 1.1 and 1.4 miles from the project area, respectively. The nearest spotted owl critical habitat unit to the project area is 9.8 miles to the north.

The nearest marbled murrelet detection location is over 16 miles southwest of the project area and the closest known nest is located over 120 miles to the northwest. A small (240 acre) marbled murrelet critical habitat polygon is located approximately 2 miles to the southwest of the project area.

Using 2006 Service guidance on estimating the effects of auditory disturbance to the northern spotted owl and marbled murrelet you estimated the harassment distance due to elevated project generated sound levels (81–90 decibels) at 165 feet from the project area. Suitable nesting habitat for either species does not occur within 165 feet of the project area.

Concurrence

The Service concurs with your determination that the proposed activities of anchor wall and rock buttress construction, roadway alignment, paving, shoulder backing, delineation, and drainage system improvements and restoration, may affect, but are not likely to adversely affect the northern spotted owl and will have no effect on the marbled murrelet, based on the following factors:

1. No construction activities will occur within designated northern spotted owl or marbled murrelet critical habitat.

2. No suitable northern spotted owl or marbled murrelet nesting habitat is present within the action area and no suitable nest trees will be removed. Replanting of affected areas with native plant species will minimize the impacts to spotted owl foraging and dispersal habitat.

3. Noise levels during construction are unlikely to affect the MEN 0290 northern spotted owl pair due to the low level of anticipated noise and the distance between the construction activities and the known spotted owl activity center. Although noise above ambient levels is expected to penetrate the forest to the west of the project area, the sound will likely be attenuated to ambient levels or lower by the time it reaches suitable northern spotted owl nesting habitat that occurs farther to the west; upslope from the project area.

Conclusion

This concludes informal consultation on the proposed Smoot Sink Storm Damage Project on State Route 128, Mendocino County, California. However, obligations under section 7 of the Act, as amended, should be reconsidered if: (1) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (2) this action is subsequently modified in a manner that was not considered; (3) a new species is listed or critical habitat designated that may be affected by the action; or (4) you are unable to implement all of the measures described above.

Thank you for your coordination on this project. Please contact staff biologist Gregory Schmidt at (707) 825-5103 should you have further questions regarding this consultation.

Sincerely,

Acting

Nancy J. Finley
Field Supervisor

cc:
CDFG, Eureka, CA (Attn: M. van Hattem)

Jones, Linda S@DOT

From: Walker, Liza M@DOT
Sent: Monday, June 24, 2013 4:04 PM
To: Jones, Linda S@DOT
Subject: FW: Concurrence to Change in Work Window

Liza Walker
Associate Environmental Planner
California Department of Transportation
District 3
703 B Street
Marysville CA 95901
(530) 741-4139

From: Brown, Carolyn L@DOT
Sent: Monday, June 17, 2013 1:30 PM
To: Walker, Liza M@DOT; Kannely, Alfred S@DOT
Subject: FW: Concurrence to Change in Work Window

For your records/file.

CB

From: Schmidt, Gregory [mailto:gregory_schmidt@fws.gov]
Sent: Monday, June 17, 2013 10:03 AM
To: Brown, Carolyn L@DOT
Subject: Re: Concurrence to Change in Work Window

Hi Carolyn,

Re: Changing the seasonal work window for Year 2 of the project to match the June 15 to October 30 Year 1 work window.

I see no reason why a seasonal work window change for construction Year 2 from 15 September to 30 October to a June 15 start date would alter the Service's original NLAA determination as presented in the original letter of concurrence for this consultation. I base this on the fact that no suitable northern spotted owl nesting\roosting habitat occurs within the portion of the action area where construction sound above ambient sound levels will be generated. Please save this email as part of the record for this consultation. I will place a copy of this email in my decision record for the project as well. Thanks.

Greg

****
Gregory Schmidt
Fish & Wildlife Biologist, Endangered Species Program
US Fish and Wildlife Service

Arcata Fish and Wildlife Office
1655 Heindon Road, Arcata CA 95521-4573
Phone: (707) 825-5103; Fax: (707) 822-8411
E-mail: Gregory_Schmidt@fws.gov
****

On Thu, Jun 13, 2013 at 4:42 PM, Brown, Carolyn L@DOT <carolyn.brown@dot.ca.gov> wrote:

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Regarding Informal Consultation AFWO-11B0055-1110049

Hello Gregory,

As a follow up to my phone message earlier today, this email is to request U.S. Fish and Wildlife Service (Service) concurrence to a modification in the work windows for Caltrans's Smoot Sink Storm Damage Project, located on State Route 128 in Mendocino County, CA.

On March 22, 2013, the Service concurred with our determination that our Smoot Sink project may affect but is not likely to adversely affect northern spotted owl and will have no effect on marbled murrelet. The Service concurred with our determination based on three factors:

1. No construction activities will occur within designated northern spotted owl or marbled murrelet critical habitat.

2. No suitable northern spotted owl or marbled murrelet nesting habitat is present within the action area and no suitable nest trees will be removed. Replanting of affected areas with native plan species will minimize the impacts to spotted owl foraging and dispersal habitat.

3. Noise levels during construction are unlikely to affect the MEN 0290 northern spotted owl pair due to the low level of anticipated noise and the distance between the construction activities and the known spotted owl activity center. Although noise above the ambient levels is expected to penetrate the forest to the west of the project area, the sound will likely be attenuated to ambient levels or lower by the time it reaches suitable nor then spotted owl nesting habitat that occurs farther to the west; upslope from the project area.

The construction scenario that was presented in our pervious coordination described a two-year scenario and proposed a work window of June 15 to October 30 for the first year of construction and a September 15 to October 30 work window for year two.

In preparing the project specifications it has become apparent that the second season work window will be very difficult for a contractor to bid and, at best, is expected to increase the cost of the project. We would like to modify the second season work window such that it matches the first season work window – change the window for the second construction season to June 15 to October 30. This shift in dates is not expected to result in any new affects on northern spotted owl or marbled murrelet or any other sensitive/protected species.

I've attached a copy of your March 22, 2011 consultation response letter for your convenience. Please let me know if you require any additional information. If a letter is needed from us, we will follow this email up with one documenting the change. However, due to the critical timeline we are under for ensuring the project meets the delivery and funding schedule, we respectfully request your response to this email as soon as possible.

Thank you for your assistance with this.

Carolyn Brown
Branch Chief
Office of Environmental Stewardship
Caltrans
703 B Street
Marysville, CA 95901
(530) 741-4133
carolyn.brown@dot.ca.gov

Carolyn Brown

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UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
LETTER OF CONCURRENCE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

July 19, 2011

In response, refer to:
2011/03132

Sandra Rosas, Office Chief
Department of Transportation - Caltrans District 3
Office of Environmental Management
703 B Street
Post Office Box 911
Marysville, California 95901-0911

Dear Ms. Rosas:

Thank you for your letter of February 8, 2011, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Effective July 1, 2007, the Federal Highway Administration assigned, and the California Department of Transportation (Caltrans) has assumed all responsibilities for consultation and approval on most highway projects in California. Therefore, Caltrans is now considered the Federal action agency for ESA consultations with NMFS for Federally funded projects. This letter also serves as consultation under the authority of, and in accordance with, the Essential Fish Habitat (EFH) provisions of the Magnuson Stevens Fishery Conservation and Management Act (MSA), and the provisions of the Fish and Wildlife Coordination Act of 1934 (FWCA), as amended. These consultations pertain to Caltrans' proposed Mendocino Route 128/Smoot Sink Storm Damage Project in Mendocino County, California.

The Mendocino Route 128/Smoot Sink Storm Damage Project site is located at milepost 35.5 on State Route (SR) 128 along Rancheria Creek in Mendocino County, California. Proposed construction involves permanent road repairs and slope stabilization along approximately 2,500 feet (ft) of roadway on SR 128. Rancheria Creek and three ephemeral drainages are included in the action area. Rancheria Creek originates in the foothills south of Yorkville, California and flows approximately 35 miles northwest along SR 128 to its confluence with the Navarro River. The reach of Rancheria Creek included in the project site is approximately 700 ft long; the channel is predominated by pocket water and riffle habitat and is less than 50 ft wide during the summer dry season.

Proposed slope stabilization and roadway construction at Smoot Sink will require two seasons. Slope stabilization activities will be completed in one construction season between June 15th and October 30th; and construction will occur in locations where no surface water is present (*i.e.*, only groundwater will be encountered during construction). A series of five anchor walls will be constructed downslope of the failing portion of SR 128 to stabilize the roadway and slope. Additionally, a rock slope protection buttress will be constructed at the base of the slope along Rancheria Creek to achieve an acceptable factor of safety. The buttress will be 170 ft long and 15 ft wide, and will be constructed with a two to five-foot off-set from the ordinary high water alignment. The rock buttress will be constructed at or below the existing grade with a 1.75:1.0 slope; buttress construction will involve excavation of approximately 2600 cubic yards of material and impact 0.23 acres of riparian habitat. Construction of the rock buttress will occur in a three to five day time period between mid-September and mid-October to minimize contact with groundwater during excavation. Groundwater that is encountered during excavation will be removed and disposed of offsite and water elevations in Rancheria Creek are not anticipated to drop as a result of construction activities.

Roadway realignment and roadway drainage modification is proposed to occur after September 15th in the second season of construction, and require approximately three weeks for completion. Proposed roadway realignment and drainage modifications are not anticipated to increase the discharge of stormwater or roadway runoff to Rancheria Creek.

Standard best management practices for construction site and sediment and stormwater runoff control will be utilized on this project. Biofiltration swales and biostrips will be used when possible to control runoff. Deviations to the toe of the rock buttress alignment will be made to protect existing riparian vegetation, and environmental sensitive areas will be demarcated with fencing to ensure riparian vegetation is preserved during construction. Vegetation will be trimmed rather than removed when possible, and temporarily disturbed riparian areas will be replanted with native species prior to October 30th to minimize erosion and creek sedimentation. Revegetation will be monitored annually for a minimum of 3 years.

Endangered Species Act

In its February 8, 2011, letter Caltrans asked for concurrence with a finding that the project is not likely to adversely affect Northern California (NC) steelhead (*Oncorhynchus mykiss*) and California Central Coast (CCC) coho salmon (*O. kisutch*). Available information indicates the following listed species (Distinct Population Segments [DPS] or Evolutionarily Significant Units [ESU]) or designated critical habitat may occur in the project area.

Northern California steelhead (*O. mykiss*) **DPS**
Threatened (71 FR 834; January 5, 2006)
Critical Habitat (70 FR 52488; September 2, 2005)

Central California Coast coho salmon (*O. kisutch*) **ESU**
Endangered (70 FR 37160; June 28, 2005)
Critical Habitat (64 FR 24049; May 5, 1999)

The life history of steelhead is summarized in Busby *et al.* (1996) and the life history of CCC coho is summarized by Shapavalov and Taft (1954) and Hassler (1987). Recent surveys indicate NC steelhead and CCC coho are present in Rancheria Creek. One observation of juvenile coho was made in 1996 in Minnie Creek, a tributary to Rancheria Creek that connects to the creek several miles downstream of the project site (KrisWeb). Historical records, however, indicate coho salmon were present near the project site; these records include 28 juveniles captured by fyke net approximately 1 mile upstream of the project area (0.5-mile downstream of Fish Rock Road) in April 1972 (Brown 1972). Recent snorkel surveys of Rancheria Creek (2000-2001) indicate that juvenile steelhead were present within a few miles of the project site during summer months (KrisWeb, Johnson *et al.* 2002). Therefore, listed salmonids are likely to be present in the waters of Rancheria Creek adjacent to the project site during construction activities. It is unlikely, however, that listed salmonids will be significantly affected by construction activities. No in-water construction activities are proposed, and excavation and groundwater pumping will be sufficiently minimized to avoid affecting creek water levels or quality.

Rancheria Creek is designated critical habitat for both NC steelhead and CCC coho salmon. Aquatic habitat adjacent to the project site can provide year-round rearing habitat, and migration habitat for juvenile and adult salmonids. Predominant substrate in this reach of Rancheria Creek is large boulders and bedrock; suitable spawning substrate and habitat is only present in small pockets. Proposed slope stabilization activities include removal of riparian vegetation. This reach of Rancheria Creek, however, offers limited riparian canopy on the east (roadway) bank due to regular slope failures and the majority of the existing riparian vegetation will fall outside of the buttress footprint.

Based on the best available information, NMFS concurs with Caltran's determination that threatened NC steelhead and endangered CCC coho salmon are not likely to be adversely affected by the Mendocino Route 128/Smoot Sink Storm Damage Project. This concludes informal consultation in accordance with 50 CFR 402.13(a) for the proposed Mendocino Route 128/Smoot Sink Storm Damage Project Mendocino County, California. However, further consultation may be required if: (1) new information becomes available indicating that listed species or critical habitat may be affected by the project in a manner or to an extent not previously considered; (2) current project plans change in a manner that causes an effect to 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.

Magnuson-Stevens Fishery Conservation and Management Act

The project area is located within an area identified as EFH for CCC coho salmon, managed with the Pacific Coast Salmon Fishery Management Plan under the MSA. As discussed in the above ESA section, no in-water construction will take place. However, adverse effects to EFH could occur from disruption and removal of riparian vegetation and temporary increases in turbidity following construction. While these impacts are considered minor and temporary, NMFS has made the determination that the proposed action would adversely affect EFH for this species. However, the proposed action contains adequate measures to avoid, minimize, mitigate, or otherwise offset any adverse effects to EFH. Therefore, NMFS has no additional EFH Conservation Recommendations to provide.

This concludes EFH consultation for Caltrans' proposed Mendocino Route 128/Smoot Sink Storm Damage Project in Mendocino County, California. Pursuant to 50 CFR 600.920(l) of the EFH regulations, Caltrans must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations.

Fish and Wildlife Coordination Act

The purpose of the FWCA is to ensure that wildlife conservation receives equal consideration, and is coordinated with other aspects of water resources development [16 U.S.C. 661]. The FWCA establishes a consultation requirement for Federal departments and agencies that undertake any action that proposes to modify any stream or other body of water for any purpose, including navigation and drainage [16 U.S.C 662(a)]. Consistent with this consultation requirement, NMFS provides recommendations and comments to Federal action agencies for the purpose of conserving fish and wildlife resources. The FWCA allows the opportunity to offer recommendations for the conservation of species and habitats beyond those currently managed under the ESA.

Please contact Mr. Joseph Heublein at (707) 575-1251, or via e-mail at joe.heublein@noaa.gov should you have any questions.

Sincerely,

for Rodney R. McInnis
Regional Administrator

cc: Al Kannely, Caltrans District 3
Grace Kim Tell, Caltrans District 1
Jeremiah Puget, RWQCB
Rick Macedo, CDFG
Scott Bauer, CDFG
Copy to File ARN: 151422-SWR-2011-SR00370

Literature Cited

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Jones, Linda S@DOT

From: Walker, Liza M@DOT
Sent: Monday, June 24, 2013 4:07 PM
To: Jones, Linda S@DOT
Subject: FW: NOAA Response to Change in Work Window

Liza Walker
Associate Environmental Planner
California Department of Transportation
District 3
703 B Street
Marysville CA 95901
(530) 741-4139

From: Brown, Carolyn L@DOT
Sent: Friday, June 14, 2013 9:50 AM
To: Anderson, Lynne E@DOT; Cohen, Sebastian H@DOT; Pommerenck, Adele@DOT
Cc: Jones, Linda S@DOT; Walker, Liza M@DOT; Kannely, Alfred S@DOT; Zdenek, Mike J@DOT
Subject: NOAA Response to Change in Work Window

Good News for Friday –

I just got off the phone with Joe Heublein at NOAA. He has no concerns with the change in the year 2 work window, moving the work window to June 15 (from September 15), so that the work windows are the same for both seasons. No additional consultation is required, since our original consultation was informal (Not Likely to Adversely Affect).

He did want confirmation that we were preparing a SWPPP (or equivalent) – to which I responded yes.

I have not heard back from FWS.

Thanks,

CB

Carolyn Brown

Branch Chief
Office of Environmental Stewardship
703 B Street
Marysville, CA 95901
(530) 741-4133

PLACS
PLAC CONDITION RESPONSIBILITY (PCR) SUMMARY

PLAC CONDITION RESPONSIBILITY (PCR) SUMMARY

General:
This PCR Summary clarifies various PLAC requirements. Perform all work described in the PLACs on behalf of Caltrans unless otherwise stated below in Table 2. If a discrepancy exists between the PCR Summary and the PLAC, the PCR Summary governs.

Definitions:
Agency: A board, agency, or other entity that issues a PLAC
Activity: A task, event or other project element
PLAC Condition: a work activity and/or submittal required by a PLAC

Table 1 - Clarification of PLAC Requirements

PLAC Name	Section of the PLAC	PLAC Requirement
All PLACs	Applicable PLAC sections	**Submittals:** Submit to the Engineer when PLAC conditions require: 1. Communications. The Engineer will contact the agencies. 2. Records to be maintained, within 5 working days after the activity. 3. Submittals 5 days before the agencies require them. The Engineer will review and submit to the agencies.
Department of the Army Requirements: Letter Dated June 27, 2013 - File Number 2013-00022N	Second Paragraph on Page 1	Revise Sentence 10 "Road reconstruction, drainage system improvements, and restoration will occur during the second season."
	Special Conditions (beginning on page 3)	Condition 5. Best management practices are covered in contract documents.
North Coast Regional Water Quality Control Board General 401 Water Quality Certification WDID No. 1B12174WNME	Project-Specific Conditions	Condition 6. Biofiltration strip is incorporated into the project plans.
	Standard Conditions	Condition 12-13. Conditions not in permit have been incorporated into contract documents.
		Condition 14. Do not draft surface waters.
		Condition 27. Meetings are required during active construction season. Individuals who attend alternative meeting briefings must also sign sign-in sheet.
		Condition 37 Necessary conditions, not in the permits, have been incorporated into the contract documents.

California Department of Fish and Wildlife Lake or Streambed Alteration Agreement Notification No: 1600-2012-0242-R1	2.Avoidance and Minimization Measures	Measure2.1 Conditions not listed in permit have been incorporated into contract documents.

Table 2 - Work to be Performed by the Department

PLAC Name	Section of the PLAC	PLAC Requirement
Department of the Army Requirements: Letter Dated June 27, 2013 - File Number 2013-00022N	Conditions (beginning on page 3)	Conditions 9, 10, 11, 12 and 13. Revegetation, invasive species control, monitoring and reports
North Coast Regional Water Quality Control Board General 401 Water Quality Certification WDID No. 1B12174WNME	Project Specific Conditions Requiring Reports	Condition 1. MMP and implementation
		Condition 10. On-site restoration
	Standard Conditions	Condition 31. The Department provides in the contract documents and the Contractor ensures they have copies on worksite.
		Conditions 32, 33, 35, 36 and 38.
California Department of Fish and Wildlife Lake or Streambed Alteration Agreement Notification No: 1600-2012-0242-R1	2.Avoidance and Minimization Measures Site-Specific Conditions	Measure 2.12 Revegetation

MATERIALS INFORMATION

FOUNDATION REPORT

M e m o r a n d u m

Flex your power!
Be energy efficient!

To: MR. JOE DOWNING
Chief
Division of Engineering Services
Structure Design
Office of Bridge Design North
Bridge Design Branch 3

Date: May 11, 2011

File: 01-MEN-128 PM 34.5/35.5
01-476601
0100000351
Smoot Sink Anchor Walls

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: **Foundation Report for Smoot Sink Anchor Walls**

INTRODUCTION

As requested, the Office of Geotechnical Design - North (GDN) of Geotechnical Services is providing a Foundation Report (FR) for the anchor walls proposed for the subject project. The subject project proposes to mitigate the landslide and roadway sink occurring on Route 128 between approximately PM 35.0 and 35.2 in Mendocino County (see Plate No. A-6). According to the Caltrans Digital Photolog Viewer, Roadview Explorer 2.0 (http://onramp.dot.ca.gov/photolog/roadview_index.htm), the subject site is located at latitude and longitude coordinates of 38.9363028^{o} North and 123.3090932^{o} West; These coordinates are the basis for obtaining data in this report available through GIS related information sources.

Background

The earliest known documented distress on the subject segment of highway occurred in February of 1986 when a "slipout" of the road was reported per the Site (storm) Damage Report No. 23-9. In 1986 "Foundation Recommendations" for the site were prepared by the D1 District Material Engineer (see Reference No. 4). A remedial attempt by Caltrans in 1989 consisting of placing a groundwater interceptor trench ("I-trench") on the left side of the highway to a depth of 30 to 50 feet, but was unsuccessful at stabilizing the landslide. Maintenance records indicate that between February 21, 1991 and October 2, 1996, 4,529 tons of asphaltic concrete was placed in over one hundred applications (utilizing over 5,400 man-hours) to maintain the road. Photos of the site taken by Maintenance forces are presented in Appendix E. In April of 2000, preliminary recommendations for mitigation of the subject

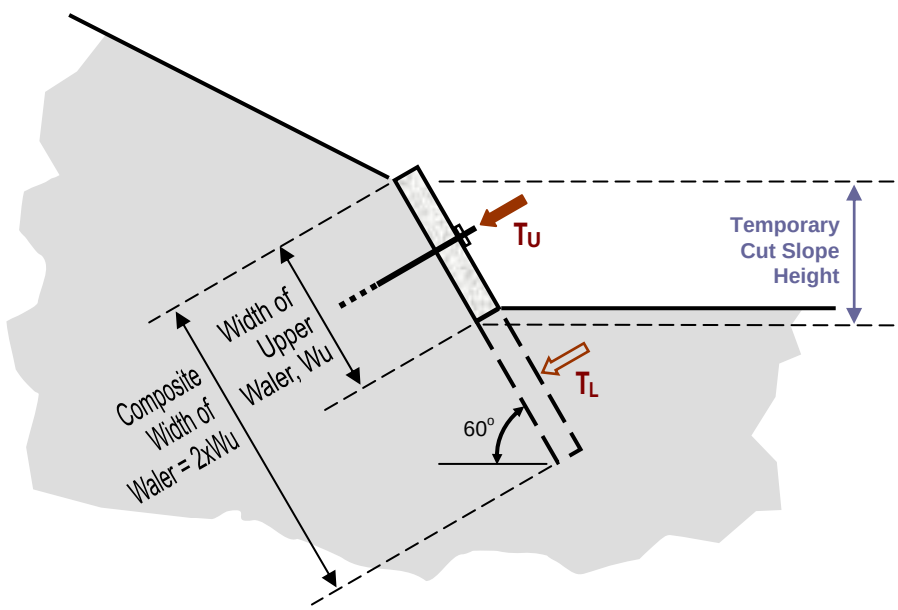
landslide were provided by GDN to District 1 in a Preliminary Geotechnical Design Report (2000 PGR, Reference No. 8); Details on the I-trench construction are also included as part of the 2000 PGR.

As a result of the winter 2006/2006 storm events, a Damage Assessment Form (DAF, see Reference No. 11) was developed for the subject site, which was later followed up by a DAF Amendment Update (Reference No. 17) in December of 2008, which provided preliminary plans and estimates for a anchor wall system presented as the preferred alternative.

Proposed Structures

Based on the provided General Plan (GP dated 5-21-10, Reference No. 21), the proposed anchor wall system will consist of five anchor walls ("AWW1" thru "AWW5") placed westerly (downhill) of the roadway. The anchor wall layout and configuration presented in the General Plan was utilized to develop the plan and analysis diagrams of Plate Nos. A-1 thru A-5, Appendix A. Each anchor wall is to consist of a 10 foot wide rigid waler inclined at 30° from the vertical with two rows of anchors spaced at 7 feet horizontally. Top-down construction of each waler is anticipated, where each waler will be temporarily bifurcated and "stacked", with the upper waler portion (or "lift") constructed, and anchors installed and stressed, prior to excavation for the lower waler construction (see Figure No. 1, below).

Figure No. 1. Diagram of Stacked Waler Construction (no scale)



Scope of work

The scope of our work included performing a literature and document review (including a review of Caltrans records of previous project construction performed at the site) to obtain geological and geotechnical data pertaining to the project site and the subject landslide, with the purpose of providing insight into the design and construction of the proposed wall facilities. A site investigation program was performed which included intermittent visits to the site between March 3, 1999 and April 11, 2011 for landslide mapping and data collection. The program also included two phases of subsurface exploration: an initial Phase 1 study in 1999 and 2000, and a final Phase 2 study in 2009 (see below for details). The studies consisted of the drilling of exploratory borings, installing and monitoring of slope inclinometers/piezometers, and laboratory testing of selected samples to assist in characterization of the subsurface conditions. This was followed by engineering analysis and preparation of this report summarizing our findings, conclusions and recommendations.

Phase 1 Subsurface Exploration Study

The initial, Phase 1 subsurface exploration study was performed on an intermittent basis between August 3 and November 19, 1999 utilizing an Acker AD2 truck-mounted drilling rig. Nine borings were performed at the locations shown on Plate No. A-1. The bore holes were accomplished utilizing hollow-stem auguring, and relatively undisturbed samples were collected at various depths by advancing “Standard Penetration Test” (2.0 inch O.D.) and “California Modified” (2.5 inch O.D.) samplers under a standard striking force weight of 140 lb dropped 30 inches. Selected “relatively undisturbed” samples were moisture sealed and returned to our laboratory for testing. Selected bulk samples collected from bore hole cuttings were bagged and also returned to our lab for testing. As of the date of this FR the Phase 1 samples have been discarded. Ground water observations were made in the borings during and after completion. Slope inclinometer (SI) piping was installed in all borings (except those in the roadway) for monitoring of slope movement. The SI pipe was partially perforated with 3/16-inch diameter holes and No. 8 well sand was placed in the annulus to allow for the SI installations to function as a groundwater piezometer. Manual surveying of SI/piezometers was performed on an intermittent basis to collect ground displacement and groundwater level data.

Phase 2 Subsurface Exploration Study

Drilling, logging and slope inclinometer installation for the final, Phase 2 subsurface exploration study was performed on April 21, 22, and 28 of 2009 utilizing an Acker AD2 truck-mounted drilling rig. Three borings were performed at the locations shown on Plate No. A-1. The borings were accomplished utilizing mud rotary drilling advanced with a self-casing wire-line drill system. Soil samples were collected in the Phase 2 borings using HX continuous "punch" and diamond bit coring (2.4 inch I.D.), and was interrupted by drive sampling. Drive sampling for the project was accomplished by advancing "Standard Penetration Test" (SPT; 2.0 in. O.D.) sampler under a standard striking force derived from an 140 lb weight dropped 30 in; Caltrans has assigned a Hammer Efficiency of 83% (Reference No. 20) to the driving system utilized. Core samples were stored in core boxes and returned to the Transportation Laboratory for reference, testing and storage. SI piping was installed in the boreholes as in Phase 1. Manual surveying of SI/piezometers was performed on an intermittent basis to collect ground displacement and groundwater level data.

Laboratory Testing

The laboratory testing included moisture (ASTM D 2216), unit weight (ASTM D 4767), particle-size analysis (ASTM 422), Atterberg Limits (AASHTO T 89 and T 90), strength testing of soils (ASTM D2850), soil maximum density (CTM 216), and corrosion (CTM 417, 422, 532 and 643). Strength testing of rock samples included Unconfined Compression (ASTM D7012) and Point Load (ASTM D5731) tests. The results of laboratory testing are presented in Appendix D, attached.

FINDINGS

Geology

The project site is located within the Coast Ranges geomorphic province, but more specifically the site is situated within the westerly portion of the Central and Eastern Belts of the Franciscan Complex. These belts make up the vast, diverse assemblage of eugeosynclinal rocks with unsystematic structure and without regional metamorphism. As described by the California Division of Mines and Geology (CDMG, Reference No. 1), the Franciscan belts "should not be visualized as a formation or sequence with ordinary physical, spatial, and temporal coherence, but rather as a disorderly assemblage of various characteristic rocks that have undergone unsystematic disturbance. The rocks include deep-water sediments and mafic marine volcanic material, all of which are locally accompanied by masses of serpentine." The

CDMG Regional Geologic Map (RGM) No. 2A describes the Franciscan Complex as a "tectonically disruptive subduction complex composed of diverse rock types including sandstone, shale, conglomerate, greenstone (altered basalt), chert, limestone, metagraywacke (semischist), schist, blueschist, gabbro, and serpentinized peridotite.

According to the CDMG RGM No. 2A (see Plate No. A-7), the vicinity of the site is underlain by materials of the Mesozoic Franciscan complex mélange terrane (KJf{mel}). KJf{mel} is described by CDMG RGM No. 2A as "chaotic mixtures of fragmented rock masses in a sheared shaly matrix." Geologists have often termed the fragmented rock masses as "blocks"; Hence, the Fransican mélange is characterized as having "block-in-matrix" (or "bimrock" per Medley, see Reference Nos. 7 and 16) characteristics. Medley defines bimrocks as "a mixture of rocks, composed of geotechnically significant blocks within a bonded matrix of finer texture", and states that this definition "practically and purposefully avoids rock petrology, genesis, and other geological connotations associated with rock names and fabrics." Medley further states "the spatial, lithological and mechanical heterogeneity hinders conventional geotechnical soil and rock mass characterization" when analyzing bimrock formations. It is noted by Medley that "large blocks in mélanges tend to be ellipsoidal to irregular in shape" and "block/core intersections (chords) do not generally indicate true block sizes".

Seismicity/Faulting

According to the 2007 Caltrans Deterministic PGA Map (Reference No. 14), a peak ground acceleration (PGA) of 0.20g for the site would be applicable for a Vs_{30}=2,500 ft/sec. This map notes "PGA contours do not incorporate any site correction factors (e.g. soil amplification, near fault factor, etc) and is not to be used for final seismic analysis or design."

Based on subsurface conditions encountered and the methods presented in the Geotechnical Services Design Manual (Reference No. 18), a Vs_{30} of 1,250 ft/sec is applicable to the site. The Caltrans ARS Online web tool (http://10.160.173.178/shake2/shake_index2.php) indicates that the closest "active" fault (ruptured within past 700,000 years and meeting Caltrans criteria for inclusion per Reference No. 19) to the site is the San Andreas fault zone (North Coast section). The web tool indicates the closest surface projection of the top of rupture plane of this fault to be a distance of approximately 14.6 miles (23.5 km) westerly of the project site (see Plate No. A-7a), and that this fault is a "right-lateral strike-slip" fault type capable of generating a Maximum Movement Magnitude (M_{max}) of 7.9. Table No. 1 below summarizes the PGAs applicable for the site based on the deterministic spectral acceleration (near a period of T= 0 seconds) and probabilistic PGA for a time interval of 50 years.

According to AASHTO LRFD Bridge Design Specifications (Section C3.10.2) "It can also be shown that if the time interval is lengthened to, say, 75 years, the probability of exceeding an earthquake with a return period of 475 years increases to about 15 percent."

Table No. 1. Peak Ground Acceleration (PGA)

PGA (%g) for Vs_{30} = 2,500 feet/sec	**PGA (%g)** for Vs_{30} = 1,250 feet/sec	**Probability of Exceedance in 50 years (75 years)**	**Return Period**
54.6 [1]	59.4 [2]	2 %	2,475 years
40.9 [1]	44.4 [2]	5 %	975 years
31.4 [1]	34.1 [2]	10 % (~15 %)	475 years
19.6 min. [3]	22.4 min. [3]	DNA	DNA
18.6 [3]	21.4 [3]	DNA	DNA

Notes:
[1] Probabilistic PGA for Vs_{30}=2,500 ft./sec obtained from the 2008 USGS National Seismic Hazard Maps (at http://gldims.cr.usgs.gov/nshmp2008/viewer.htm) and the Caltrans ARS Online Probabilistic Response Spread Sheet.
[2] Based on soil amplification factor of 1.087 (at a period, T=0 seconds) obtained from the Caltrans ARS Online Probabilistic Response Spread Sheet.
[3] Deterministic Spectral Acceleration obtained from the Caltrans ARS Online web tool (http://10.160.173.178/shake2/shake_index2.php) for a period near T~ 0 seconds; "min" = minimum deterministic spectral acceleration.
DNA = Does not apply.

Alquist-Priolo Earthquake Fault Zone Maps available through the California Geologic Survey (Reference No. 23), indicate the site is not within an Alquist-Priolo Earthquake Fault Zone. No faults are known to extend close to or on the project site.

Surface Morphology

The "historic" head scarp of the subject landslide is defined by a depleted area at the toe of a stable, relatively steep slope uphill of the main body; however, the active head scarp has been documented primarily within, and immediately adjacent to, the roadway (see Plate No. A-1). Within the roadway, the active head scarp is continually being masked by maintenance paving operations. Hence, this documentation has partially been based on photos (see Appendix E) provided by Maintenance forces. In the roadway, larger magnitudes of ground surface sinking has been noted between roughly STA "M1" 21+00 and 22+50 as can be seen in Photo Nos. 1 and 3 (Appendix E). As of the latest site visit by GDN (4-11-11) no significant cracking has been observed on the ground surface easterly (upslope) of the active head scarp as defined on Plate No. A-1. The historic flanks of the landslide are generally

defined by the drainages related to the culverts at PM 35.07 and 35.17, which encompass hummocky terrain within. Rancheria Creek bounds the toe of the landslide to the west.

Subsurface Soil and Rock Conditions

It should be noted that borings performed for the Phase 1 study utilized hollow stem auguring and intermittent SPT sampling which hinders the identification fracturing and other properties of rock materials. Logging of the Phase 1 borings was generally in conformance with the 1996 edition "Soil & Rock logging Classification Manual" (see Reference No. 6), which indicates "friable" rock to be classified as soil, followed by the parent rock name in parentheses. The Phase 2 borings were logged in accordance with the 2007 edition "Soil and Rock Logging, Classification, and Presentation Manual" (Reference No. 12), which indicates "friable" rock to be described as rock, followed by the soil identification in parentheses.

Borings performed within the active landslide area during Phases 1 and 2 generally revealed medium dense, clayey gravel (GP-GC, GW-GC) and clayey sand (SC) colluvial-like materials overlying rock materials of the Franciscan Complex. Westerly of the roadway, the colluvial materials extended to depths ranging between roughly 10 and 30 feet below the ground surface (BGS). Beneath the roadway, the colluvium is extending to depths ranging between roughly 40 and 45 feet BGS, and was overlain by asphalt concrete fill (up to 26 feet thickness) and silty and sandy gravel (GM and GP) roadway fill (up to 10 feet thickness).

The Franciscan Complex rock materials (descriptive components primarily identified from Phase 2 borings) encountered underlying the colluvial and fill materials consisted of harder rock blocks of graywacke sandstone, serpentinite, and greenstone within a matrix of pervasively sheared, soft, dark gray shale, which was friable to a clayey sand with gravel soil (SC-CL). Serpentinite and graywacke rock blocks were intersected in lengths ranging between approximately 1.5 and 6.5 feet, and noted to predominantly be from slightly weathered to fresh, from moderately hard to very hard, and from intensely to moderately fractured. Blocks of greenstone rock were intersected in lengths of 11 and 12 feet and noted to be from moderately weathered to fresh, from hard to very hard, and from intensely to slightly fractured.

In situ and laboratory testing of the dark gray shale rock matrix materials revealed the shale rock materials exhibited strengths predominately lower than the lower boundary strength (unconfined compressive strength = 10 KSF) for a cohesive Intermediate Geomaterial (IGM) per the IGM strength criteria presented by the FHWA (see Reference No. 22). Based on these criteria, the FHWA guidance indicates that the geomaterial properties of the shale rock

materials would more appropriately mimic a "cohesive soil" material. Unconfined compression testing (ASTM D7012-07) of a core specimen from the greenstone block encountered in Boring RC-09-001 yielded a compressive strength of 21,577 PSI. Point Load testing of core specimens from serpentinite, greenstone and graywacke blocks yielded Uniaxial Compressive Strengths (UCS) of 2,898 to 5,058 PSI. All Point Load tests were noted to have been performed parallel to a "plane of weakness" (i.e. considered to measure the least strength). Point Load strength indices were correlated to UCS utilizing conversions offered in ASTM D5731-08.

Mud rotary drilling on the Phase 2 field study utilized a wireline, self-casing system; thus, the caving potential of site materials could not be accessed by borehole sidewall collapse. Hollow stem auger drilling on the Phase 1 study also limited the ability to assess borehole sidewall stability. Loss of drilling fluids occurred intermittently while placing mud-rotary borings at the site and was likely due to the presence of cracks and voids in the subsurface materials. The utilization of high viscosity mud mix (bentonite) typically was not successful in regaining circulation, and hence, relative large quantities of drilling fluid were needed to accomplish the borings.

Boring locations for both study phases are presented on Plate No. A-1. A more detailed description of the subsurface conditions encountered during our field exploration, along with laboratory testing results, is presented graphically on the Boring Records of Appendix B, attached. The results of laboratory testing are also presented in Appendix D.

Slope Inclinometers

Table No. 1 below summarizes the findings of SI instrumentation data collected at the site with respect to the location of the basal shear of the landslide. The graphical results of slope inclinometer ground movement surveys are presented on Plate Nos. C-1 through C-10, Appendix C (attached). Follow-up monitoring of SIs installed as part of the Phase 1 study was attempted in October of 2008. As would be expected, all SIs right (westerly) of the roadway were significantly distorted at shallow depth and SI surveying was not performed. As recomended in the 2000 PGR, surveying of the SIs uphill (easterly) of the roadway (SI Nos. A-99-001and A-99-009) was attempted to verify that the ground uphill of the active head scarp was not undergoing movement; however, the casing openings for SI Nos. A-99-001 and A-99-009 could not be located. Comparisons between the unobstructed depth to the bottom of casing and the reported installed depth of casing for piezometers uphill of the active head scarp (A-89-001 thru A-89-003) suggest some ground movement could be occurring (see Table No. 3a).

Table No. 2. Summary of Location of Basal Movement from SIs

SI I.D. (2000 PGR I.D.)	RC-09-001	RC-09-002	RC-09-003	A-99-001 (SI-1)	A-99-002 (SI-2)	A-99-003 (SI-3)	A-99-006 (SI-6)	A-99-007 (SI-7)	A-99-008 (SI-8)	A-99-009 (SI-9)
Top Elev. (feet)	784.0	775.0	796.4	780.5	777.6	744.1	731.0	736.2	757.9	766.4
Depth to Basal Movement (feet)	23	61	45	NC	19	43	33	33	17	NC
Elevation of Basal Movement (feet)	746.5	714.0	724.4	NC	758.6	701.1	698.0	703.2	740.9	NC

NOTES: NC = Not Conclusive based on available SI survey data

Groundwater

Groundwater measurements taken from piezometers from investigations are summarized in Table Nos. 3a and 3b below. It should be noted than when performing dry-method borings for the Phase 1 study, seepage and perched groundwater conditions were encountered between zones of non-saturated subsurface materials.

Table No. 3a. Summary of Piezometer Measurements; Phase 1 and Previous Work Borings; (all values in feet)

Date	Depth to Water from Ground Surface									
	A-99-001	A-99-002	A-99-003	A-99-006	A-99-007	A-99-008	A-99-009	A-89-001	A-89-002	A-89-003
5/10/99	-	-	-	-	-	-	-	7.4	14.6	21.8
8/12/99	Dry	40.5	24.0	-	-	-	-	-	-	-
11/4/99	Dry	40.0	26.0	-	-	-	-	20.4	22.4	29.4
11/19/99	24.3	39.0	25.5	28.3	27.6	-	-	0.4	18.1	-
12/10/99	30.0	38.7	22.6	28.8	21.8	7.6	18.7	-	-	-
1/21/00	26.2	34.6	19.8	26.8	19.9	10.2	8.7	-	-	-
3/21/00	26.5	37.5	21.5	27.5	27.0	10.8	12.8	8.2	14.6	21.4
10/20/08	NL	AB	AB	AB	AB	AB	NL	21.5	23.7	30.9
4/11/11	NL	AB	AB	AB	AB	AB	NL	6.5	16.4	21.9
	Bottom of Piezometer Pipe, depth [elevation]									
Installed	61.5 [719.0]	61.5 [716.1]	51.5 [692.6]	49.0 [682.0]	45.0 [691.2]	28.5 [729.4]	50.0 [716.4]	36.0 [729.0]	45.0 [721.4]	49.0 [724.9]
Monitoring Period								26.4 [738.6]	41.1 [725.3]	47.1 [726.8]

Notes: dry = no free ground water measured.
AB = Abandoned due to significant deformation
NL = Not able to locate

Table No. 3b. Summary of Piezometer Measurements; Phase 2 Borings
(all values in feet)

Date	Depth to Water from Ground Surface		
	RC-09-001	RC-09-002	RC-09-003
5/12/09	36.7	37.8	45.1
6/2/09	40.2	52.1	49.6
7/8/09	39.4	48.8	54.3
8/11/09	39.5	49.8	56.8
9/30/09	38.6	49.6	58.6

Characterization & Analyses

Static Slope Stability

Stability analyses were performed with Slope/W software (Reference No. 15) which utilizes a limit equilibrium method (LEM) of analysis. Plate Nos. A-2 through A-5 (Appendix A) present the results of a slope stability analysis of the landslide for three x-sections (A-A', B-B' and C-C') oriented as shown on Plate No. A-1. Strength parameters of the materials primarily comprising the basal shear zone were derived by "back-analysis" to a Factor of Safety (FS) of 0.99 based on the "pre-roadway" model (see Table No. 4); the pre-roadway failure plane is considered the historic failure plane.

Present conditions were analyzed and included the addition of the roadway fill and I-trench to the pre-roadway conditions. Based on surface mapping and SI data, no definitive conclusion was drawn on whether the I-trench portion of the historic landslide is undergoing movement. Nevertheless, both the documented active landslide (defined by "Failure Surface No. 2") and the inferred historic landslide (defined by "Failure Surface No. 1") are included in our stability analysis. It can be seen in the results of Table No. 4 that the addition of roadway fill material within the historic landslide has increased instability in the interior of the historic landslide.

In accordance with Bridge Design Specifications (BDS) 5.2.2.3 (Reference No. 10), overall stability of the landslide was evaluated using LEM to a minimum FS of 1.3. To achieve a minimum FS of 1.3, a minimum effective anchor force of 270 kips (oriented at 30 degrees from the horizontal and at 7 feet spacing) is required at each proposed anchor wall location.

Table No. 4. Results of Static Slope Stability Analyses

Failure Surface No.	Static Factor of Safety				Explanation
	Cross-Section			Average (evenly weighted)	
	C-C' (STA "A1" 21+53, skewed 5° RT)	A-A' (STA "A1" 22+56, skewed 10° RT)	B-B' (STA "A1" 25+18, skewed 33° RT)		
1	0.99	0.99	0.99	0.99	Pre-Roadway
2	1.14	1.12		1.08	
1	0.98	1.03	0.97	0.99	Present
2	0.87	0.95		0.93	
1	1.43	1.30	1.27	1.33	Proposed Anchor Walls (two 270 kips forces @ 7 feet spacing); RSP Toe Buttress
2	1.47	1.30		1.35	
(see Plate No.; Appendix A)	A-5	A-2 A-3	A-4		

Seismic Slope Stability

BDS 5.2.2.3 indicates that "Seismic forces applied to the mass of slope shall be based on a horizontal seismic acceleration coefficient, k_h, equal to one-third of, A, the expected peak acceleration produced by the Maximum Credible Earthquake on bedrock at the site as defined in the Caltrans Seismic Hazard Map. Generally the vertical seismic coefficient, k_v, is considered to equal zero." BDS 5.2.2.3 refers to the 1996 Caltrans Seismic Hazard Map (Reference No. 5) which is based on the deterministic approach. As presented in Table No. 1 of the "Seismicity/Faulting" section of this report, the minimum deterministic PGA for a soft rock site condition is 0.196g; correspondingly, k_h would be 0.065. Table No. 5 below presents the results of LEM analysis based on the application of k_h to the landslide mass. Applying the stabilization forces of F=270 kips from the static LEM analysis yields a seismic FS of less than 1.0. It is anticipated that proof and performance testing of anchors will be performed on each anchor during construction to a least 130% of the design force (270 kips); hence, the effective passive capacity force to pull-out would be as high as Fe = 350 kips. The proposed waler would have the passive bearing capacity to carry Fe = 350 kips (see Figure No. 2, "Conclusions & Recommendations"). Based on the criteria of BDS Section 5, a FS of greater than 1.0 for Fe = 350 kips (see Table No. 5) suggests that the anchor wall system

should have the passive capacity to resist failure (or at least limit ground deformation) during the relatively short duration loading events associated with earthquake related ground shaking at the site. A detailed analysis of anticipated slope related, earthquake induced deformations is not included in the GDN scope of work. The potential for liquefaction related ground failure at the site as a result of earthquake induced ground motions is null.

Table No. 5. Results of Seismic Slope Stability Analyses

Failure Surface No.	Seismic Factor of Safety (k_h = 0.065)				Explanation
	Cross-Section			Average (evenly weighted)	
	C-C' (STA "A1" 21+53, skewed 5° RT)	A-A' (STA "A1" 22+56, skewed 10° RT)	B-B' (STA "A1" 25+18, skewed 33° RT)		
1	0.98	0.93	0.97	0.96	Two 270 kips Forces @ 7 feet spacing; RSP Toe Buttress
2	1.09	0.97		1.01	
1	1.05	0.98	1.05	1.03	Two 350 kips Forces @ 7 feet spacing; RSP Toe Buttress
2	1.15	1.04		1.08	

Toe Slope Stability

Per Caltrans Bridge Design Specification 4.4.9 (2003) footings (not including bridge abutments) located near a slope should be evaluated by LEM analysis to a minimum FS of 1.3. The toe slope (at Rancheria Creek) below the proposed anchor walls was analyzed based on the presumption that it has naturally reposed to a FS$\simeq$1.0 (based on an assigned high water elevation in the creek of 705 feet). The installation of a properly keyed, 15 feet wide rock slope protection (RSP) buttress would stabilize the toe slope to a FS of 1.3. This stability analysis is based on a maximum elevation of 695 feet at the base of the key and a minimum elevation of 725 feet for the top of the buttress.

In an attempt to limit work in the Rancheria Creek area, the RSP buttress could be reduced to 12 feet width and still maintain an acceptable FS of 1.23 (see Plate No. A-3). This acceptability is based on the consideration that if toe slope failure did occur, the probability is low that the integrity of the anchor wall would be significantly compromised. Based on the presence of relatively intact rock exposures present at the toe, the RSP buttress can be further reduced in size towards the south as diagramed on Plate No. A-4. In addition to stabilizing the toe slope, the proposed RSP toe buttress will serve to protect the toe slope from scour by

hydraulic forces of the creek. Hence, the District Hydraulics Engineer should be provided an opportunity to review the proposed RSP buttress to assess adequacy for scour protection.

CONCLUSIONS & RECOMMENDATIONS

Waler Bearing Capacity

Based on an analysis utilizing available passive earth pressure, a minimum FS of 2.0 against bearing failure is maintained for the proposed long-term loading of anchor wall walers. This analysis was performed with a net anchor force (F) of 270 kips (spaced on 7 feet centers) and a net waler width (W) of 10 feet (see Figure No. 2. below). The available passive earth pressure was derived from log-spiral coefficients with increases based on available cohesion (see Reference No. 3). During construction of the upper lift of the anchor walls, it is expected that the available passive earth pressure could be reduced as a result of the temporary absence of overburden materials uphill of the wall (defined by the uphill ground slope angle (β) for a minimum distance of 20 feet from the top of the waler). Analyzing the waler bearing pressure for the upper lift based on an upper waler width (W_U) of 5 feet and an upper anchor force (T_U) of 135 kips ($T_U = 0.5xF$), a β of at least 18° would have to be maintained for a FS $\geq$ 2.0. GDN proposes to reduce T_U to allow for greater variance of β during construction. Accordingly, based on a T_U of 100 kips, a minimum FS of 2.0 is maintained for $\beta \geq 10^o$. Counterbalancing of the lower anchor force (T_L) to 170 kips was implemented such that the net anchor force is maintained ($F=T_U+T_L$). Based on approximations for the anticipated anchor bond zone materials (see Figure No. 4 of "Construction" section), T_L = 170 kips generally appears to be within the working range for achieving adequate bond stress development during anchor stressing.

Enhancement of passive bearing resistance is desired by limiting waler segment lengths to no less than 50 feet (i.e. L>5W for continuous footing per BDS 4.4.7.1). Walers should be cast in place to develop the desired minimum interface friction (δ) of 0.7ϕ. Hence pre-casting of waler panels shall not be allowed. A stress-strain modulus, E_s (or Modulus of Elasticity) of 350 ksf is applicable to the anticipated materials supporting the walers.

Figure No. 2a. Waler Bearing Factor of Safety vs. Ground Slope; ϕ = 32 degrees; c = 50 psf; δ/ϕ = 0.7; Ca/C=0.6

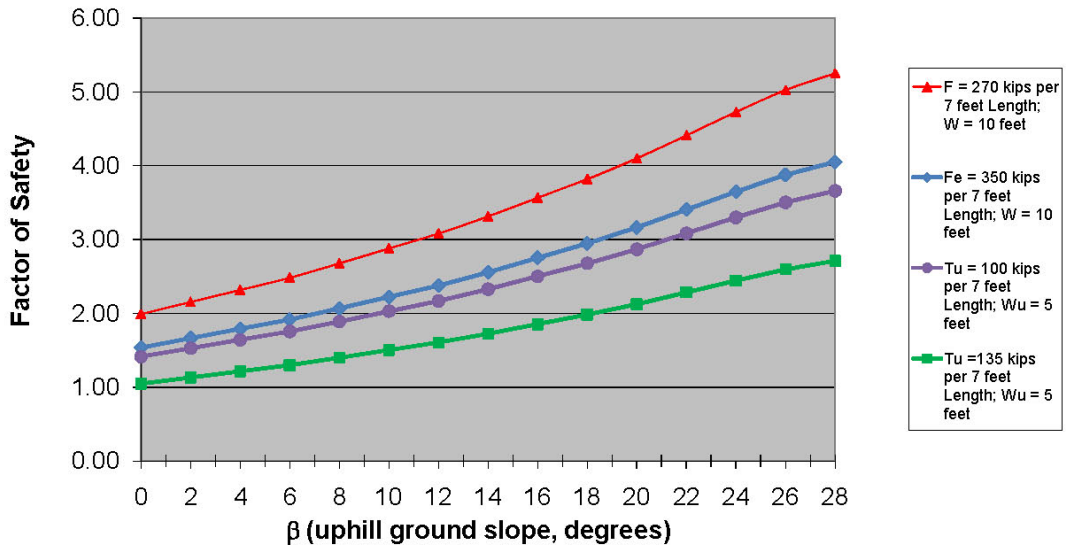
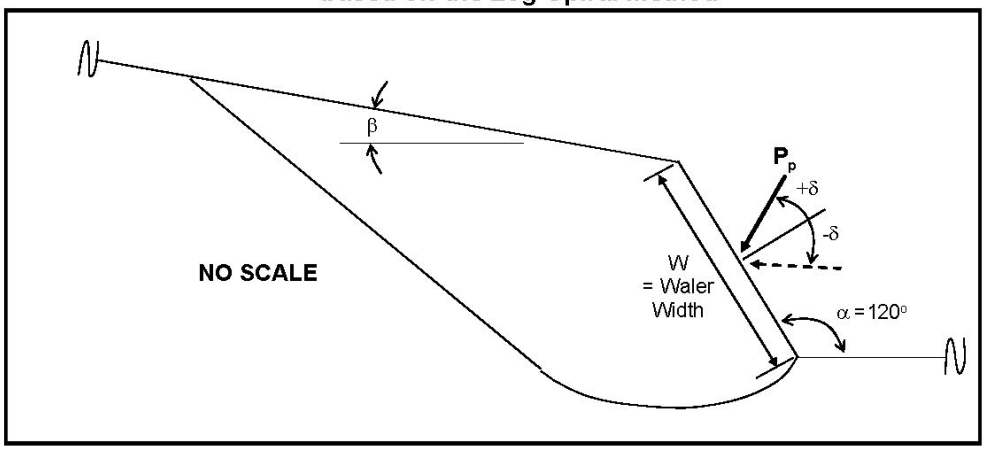


Figure No. 2b. Parameters for Passive Resistance based on the Log-Spiral Method



Anchor Unbonded Length

Table No. 6, below, provides recommended minimum unbonded lengths approximated based on the depth of basal landslide movement from SI data.

Table No. 6. Minimum Anchor Unbonded Length
(Stationing based on wall stationing on 2010 GP, Reference No. 21)

WALL	**AWW1**			
STATION	10+00		11+40	
UNBONDED LENGTH (feet)	50			
WALL	**AWW2**			
STATION	20+00		22+10	
UNBONDED LENGTH (feet)	60			
WALL	**AWW3**			
STATION	30+00	30+75	30+75	31+05
UNBONDED LENGTH (feet)	70		60	
WALL	**AWW4**			
STATION	40+00	40+55	40+55	41+05
UNBONDED LENGTH (feet)	50		40	
WALL	**AWW5**			
STATION	50+00	50+55	50+55	51+05
UNBONDED LENGTH (feet)	50		30	

Corrosion Potential of Foundation Elements

In accordance with 2003 Caltrans Corrosion Guidelines (Reference No. 9), the Department considers a site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil and/or water samples taken at the site:

1) Chloride concentration is greater than or equal to 500 ppm,
2) sulfate concentration is greater than or equal to 2000 ppm,
3) or the pH is 5.5 or less.

Four soil samples were obtained for corrosion analyses at the following locations:

Boring ID. A-99-001;10.0 to15.0 feet BGS (Bulk A),
Boring ID: A-99-001;50.0 to55.0 feet BGS (Bulk B),
Boring ID: A-99-002;20.0 to25.0 feet BGS (Bulk C),and
Boring ID: A-99-007;36.0 to39.0 feet BGS (Bulk H).

Based on the results of the corrosion testing (see Table No. D-1, Appendix D), the site is considered "non-corrosive" per the 2003 Caltrans Corrosion Guidelines. The site of the proposed structure does not appear to be located within 1000 feet of salt or brackish water.

Subsurface Drainage

The stability analysis for the anchor wall system did not include lowering of the water table utilizing sub-drainage facilities. Nevertheless, added benefit to landslide stability could be provided by re-establishing outflow drainage to the I-trench. In an effort to not conflict with the proposed anchor wall facilities, it would be possible to install a subsurface, rigid drain pipe along the northerly perimeter of the landslide that would intersect the base of the I-trench and daylight at the outflow location of the culvert at PM 35.07 (see Plate No. A-1). The installation would be composed of Horizontal Directional Drilling (HDD) utilizing "blind" techniques that incorporate a high accuracy magnetic steering system to assure proper connection to the target at the base of the I-trench. The estimated cost of the HDD pipe would be roughly $50,000. A sample non-Standard Special Provision for HDD pipe installations can be provided by GDN on request.

Construction

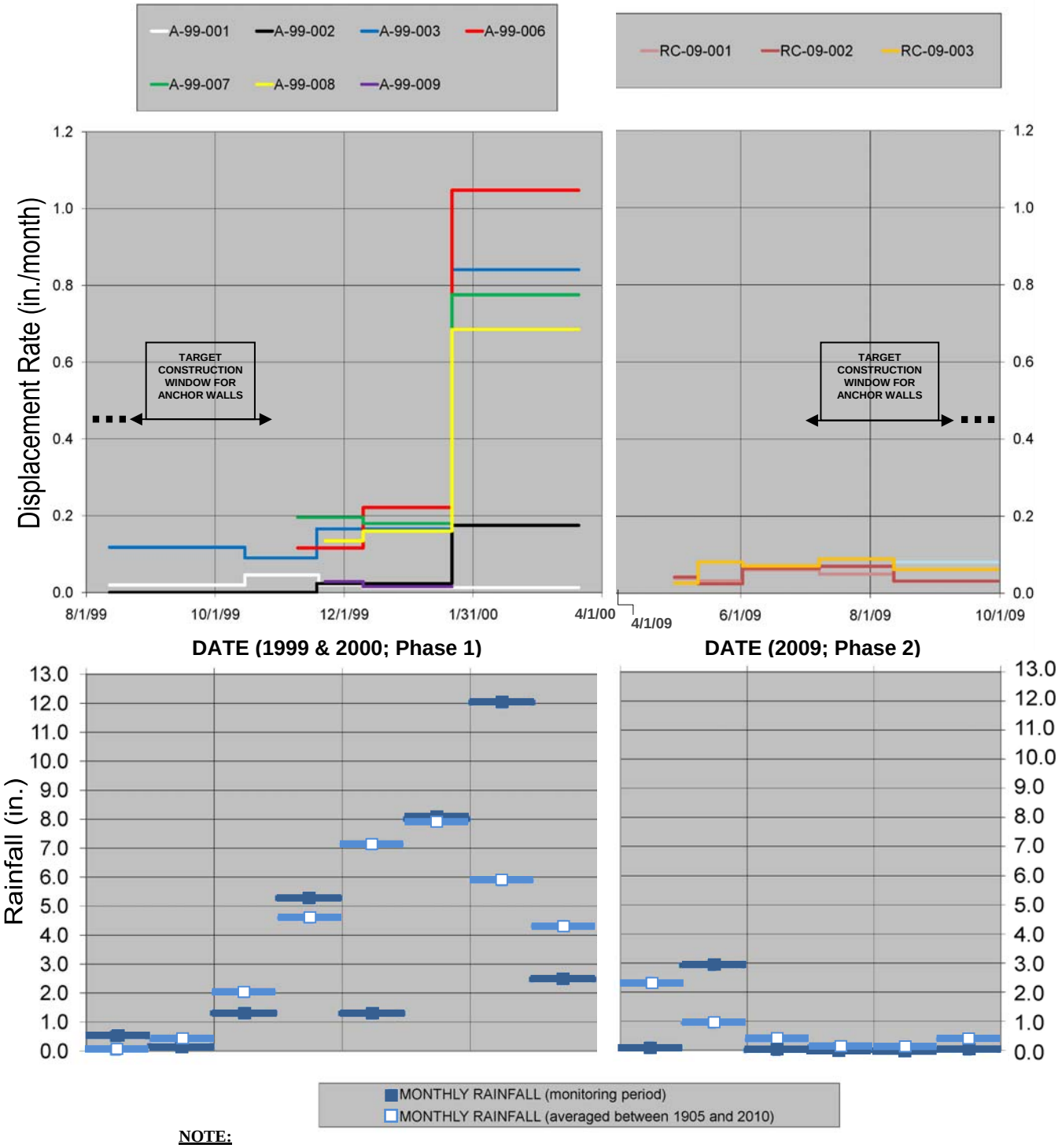
Schedule

Ground displacement rates within the subject landslide are expected to have increases directly correlating with periods of significant rainfall in the project area, as can be seen in Figure No. 3, below. Ground displacement rates in the landslide were measured as high as approximately 1 inch per month in the winter time. Premature loading of a partially completed anchor wall system could have detrimental effects on the system as excessive stress and deformation to the structural elements could occur. As can be seen in Table No. 7 (below), a target milestone would be achieved at the completion of the first anchor wall as stabilization to a FS greater than 1.0 would occur. It is strongly recommended that construction of the anchor wall facilities be initiated at a time following at least a month of dry weather (say in July/August) and be at or near completion prior to the occurrence of significant rainfall (say October).

Table No. 7. Results of Construction Period Slope Stability Analyses

Failure Surface No.	Factor of Safety				Explanation
	Cross-Section			Average (evenly weighted)	
	C-C' (STA "A1" 21+53, skewed 5° RT)	A-A' (STA "A1" 22+56, skewed 10° RT)	B-B' (STA "A1" 25+18, skewed 33° RT)		
1	1.11	1.14	1.13	1.23	One 270 kips Force @ 7 feet spacing; No RSP Toe Buttress
2	1.02	1.07		1.07	

Figure No. 3. SI Average Incremental Displacement Rates & Monthly Rainfall



NOTE:
Rainfall data obtained from the California Data Exchange Center (CDEC) website at http://cdec.water.ca.gov/; Ukiah Station (I.D. UKH) located at 39.1500°N, 123.2000°W, approximately 15.8 miles northeasterly of the project site; Operated by the National Weather Service.

Anchor Wall Sequencing & Temporary Cutslopes

Based on the anchor wall layout provided in the GP, it is recommended that the anchors walls furthest up slope (AWW3, AWW5, and a portion of AWW2) be constructed, stressed, and backfilled first such to maintain the minimum required over-burden for the waler passive bearing resistance for anchor walls constructed downslope. The minimum required over-burden is defined by β not less than 10° for a distance of at least 20 feet as discussed in the "Waler Bearing Capacity" section of this report. Upper limits to β should be considered when assessing temporary cutslope stability for the waler construction.

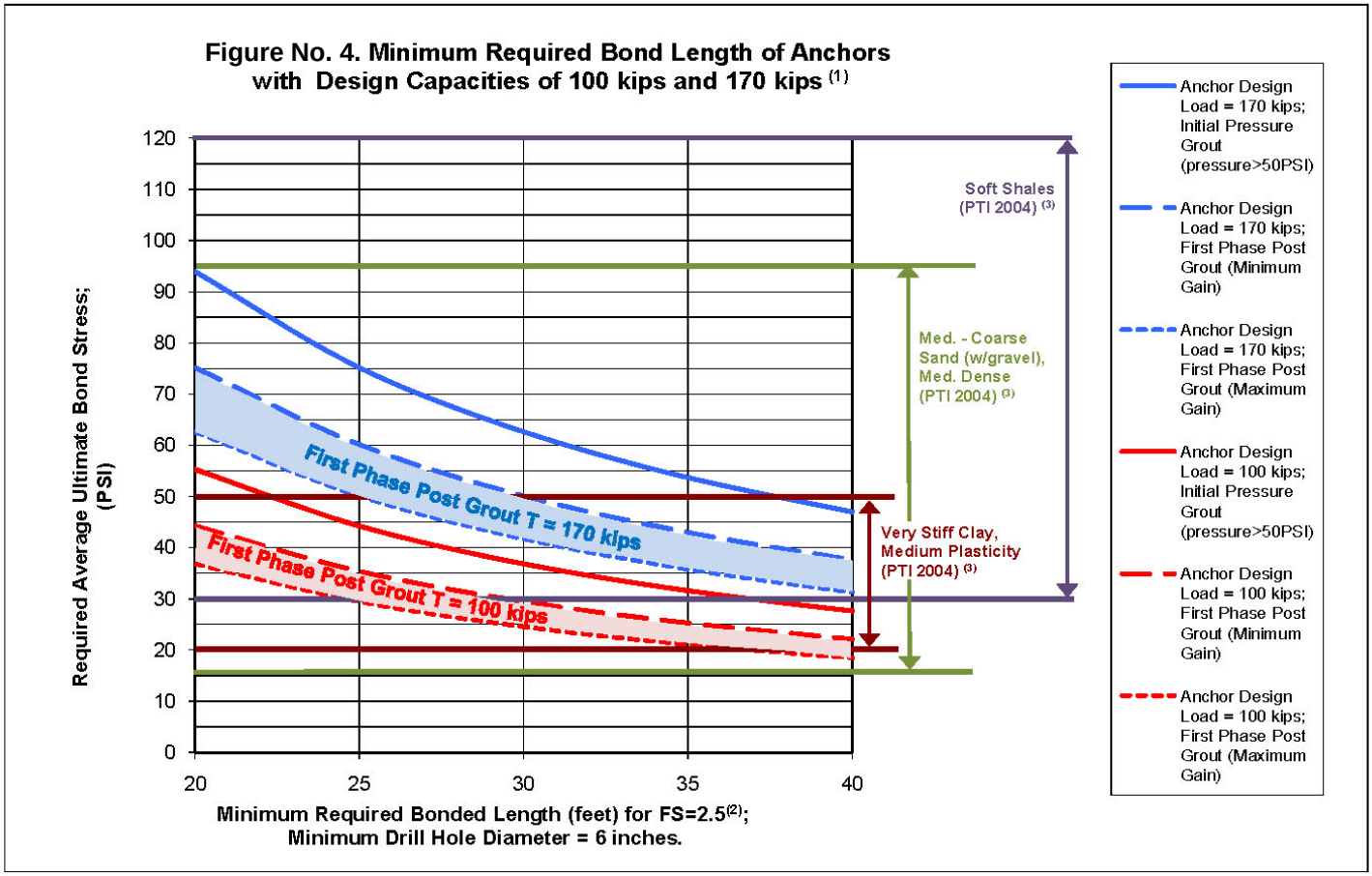
Anchor Installation

The contractor should expect to encounter soil-like materials beneath the site of significant plasticity. Furthermore, we anticipate that the impact and water from drilling equipment will pulverize shale and weathered serpentine rock materials present on the site, and hence, at times will generate spoils composed of plastic materials even when drilling through rock-like materials. The contractor should be prepared to deal with any construction difficulty related with the presence of plastic (i.e. clayey) materials, such as the frequent clogging of drill bit waterway ports and drill spoils return pipes.

The contractor may encounter difficulties during drilling for anchors due to the presence of very hard and very strong (compressive strength as high as 21,577 PSI) gravel, cobble, boulder and rock materials as indicated by our subsurface exploration and lab testing. These materials will likely necessitate relatively slow rock drilling. Rock blocks encountered within the shale formation included slightly fractured, very hard greenstone up to 12 feet in dimension, and massive, very hard graywacke (sandstone) to 5 feet dimension. The chaotic nature of the subsurface conditions leaves the likelihood of an unsystematic presence of hard, intact rock blocks beneath the site. GDN anticipates that lineal drilling through intact, hard rock blocks at the site could be as high as 30 percent of the overall lineage

As can be interpreted in Figure No. 4 (below), it should be expected by the contractor that at least one phase of bond zone post-grouting could be required for anchor installation to achieve the allowable pull-out resistance of anchors. The cohesive soil-like, shale rock matrix materials (see "Subsurface Soil and Rock Conditions" section) should be anticipated to contribute significantly to the geotechnical component (and engineering response) of anchor pullout resistance. The information of Figure No. 4 is preliminary in nature, and, as per BDS 5.8.6.3, "the final design of the bonded length is generally the responsibility of the

contractor and is verified by load testing each ground anchor." GDN recommends that the contractor present calculations (as part of the anchor working drawing submittal) showing the derivation of the bonded length for anchors and the assumed average ultimate bond stress utilized.



Notes:
(1) Figure provided for general feasibility conderations only; not ment for bond length design.
(2) BDS 5.8.6.3 (page 5-75): *"Typical values for the factor of safety, FS, applied to ultimate anchor bond stress values are 2.0 to 2.5 for soil and 2.5 to 3.0 for rock. Final design of the bonded length is generally the responsibility of the contractor and is verified by load testing each ground anchor."*
(3) Brackets based on "Average Ultimate Bond Stress-Soil/Grout" values provided in PTI (2004); Values based on straight shaft bond zone grouted under a pressure higher than 50 PSI through a casing or hollow stemmed auger during withdrawal.
(4) Minimum and maximum gains per phase of post-grouting based on 25% and 50%, respectively, per PTI (2004).
(5) PTI (2004): "Recommendations for Prestressed Rock and Soil Anchors", Post-Tensioning Institute, fourth edition, 2004.

The self-casing wire-line drill system and hollow-stem drilling techniques utilized during the subsurface exploration studies make it difficult to directly assess borehole stability and the

potential for sidewall collapse. Nevertheless, significant sidewall instability and collapse in anchor boreholes should be expected due to the anticipated presence of sand, gravel, cobble, and boulders in colluvium-like materials, and cobble and boulder-sized rock blocks (both fractured and unfractured) in the weaker shale rock matrix. Thus, casing would likely be needed to maintain the integrity of the holes prior to placing grout.

All anchor installations are expected to extend into the static groundwater table beneath the site and will require drilling and the placement of concrete and grout in wet conditions. Construction methods should require the displacement of water via a closed system using a concrete pump or a tremie tube to place concrete at the base of the hole. The contractor may also encounter perched groundwater tables and confined (under pressure) groundwater aquifers while drilling even during the driest periods of the year. When anchor drilling contacts confined aquifers, the contractor should expect water seepage out of the anchor borehole at the ground surface for a significant period of time.

Significant loss of drilling fluids occurred while placing mud-rotary borings at the site and was likely due to the presence of cracks and voids associated with landslide related ground displacement. Cracks and voids associated with formational fracturing are also expected to contribute to fluid loss. The utilization of high-viscosity enhancing drill fluid additives (such as polymer and bentonite) typically was not successful in regaining drill fluid circulation. We expect a significant potential for grout loss at any horizontal depth during anchor construction. Controlling measures, such as the use of a “grout sock”, could potentially reduce grout loss. In the cases where pressurized/post-grouting is being utilized (i.e. to enhance soil/rock bond values), the potential for grout loss will be greater.

When placing grout for anchors, the contractor could expect premature filling of adjacent and nearby pre-drilled anchor holes prior to tendon placement of anchors. The result would be an obstructed hole for placement of the steel anchor tendon, and in cases where the anchor could still be fitted in the hole, the potential for inadequate bonding between grout and the anchor could result. This may be the case even if the contractor applies sensitive measures such as utilizing a "grout sock" or multi-phasing the grout process on each anchor with initial high viscosity/low pressure grout placement to seal fractures and voids. An additional measure may be desired which would consist of staging the anchor hole drilling and grout placement such that a buffer zone is provided for between nearby open pre-drilled holes. The buffer zone could significantly lower the potential for premature cross filling of anchor holes with grout prior to installation of the tendon. The implementation of staging of the drilling, tendon placement, and grouting could likely lead to greater construction costs as a result of additional equipment mobilization and significant modifications to the construction schedule.

Serpentine/Asbestos

Serpentinite rock was noted to be present on the cut exposure left of STA "M1" 20+00. Gravel and boulder-sized serpentinite rock were noted scattered throughout the toe area of the landslide were the RSP buttress is proposed. Serpentinite materials were also encountered in the borings for the 1989, 1999 and 2009 site investigations. The North Region Hazardous Material Officer should be contacted to determine if materials at the site meet the classification as Naturally Occurring Asbestos (NOA) materials and the need for Airborne Toxic Control Measures (ATCMs) during project construction.

Project Information

Standard Special Provisions S5-280, "Project Information," discloses to bidders and contractors a list of pertinent information available for their inspection prior to bid opening. The following is an excerpt from SSP S5-280 disclosing information originating from Geotechnical Services. Items listed to be included in the information Handout will be provided in Acrobat (.pdf) format to the addressee(s) of this report via electronic mail.

Data and information attached with the project plans are:

A. Log of Test Borings for the 2009 subsurface exploration.

Data and Information included in the Information Handout provided to the bidders and Contractors are:

A."Foundation Report for Smoot Sink Anchor Walls", dated May 11, 2011.

Data and Information available for inspection at the District Office:

A. None

Data and information available for inspection at the Transportation Laboratory:

A. Core samples collected from the 2009 subsurface exploration.

If any conceptual changes are made during final project design, the Office of Geotechnical Design North should review those changes to determine if these foundation recommendations are still applicable.

If there are any questions, please contact Mark Hagy at (916) 227-1077.

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Transportation Engineer – Civil
Geotechnical Design – North

c: Grace Tell – D1 Project Management
DougBrittsan – GDN
Struct. Const. RE Pending File
DES OE, Office of PS&E
Mark Melani - D1 Hazardous Waste
DME
GS Corporate
GDN File

Page 24: List of Attachments:
Page 25: References

LIST OF ATTACHMENTS

Appendix A: Plates
1) Plate No. A-1: Plans and Cross-Sections
2) Plate No. A-2: X-Section A-A'; STA 22+56, Slope Stability Analysis Results
3) Plate No. A-3: X-Section A-A'; STA 22+56, Slope Stability Analysis Results, with Slope Stressing and RSP
4) Plate No. A-4: X-Section B-B'; STA 25+18, Slope Stability Analysis Results
5) Plate No. A-5: X-Section C-C'; STA 21+53, Slope Stability Analysis Results
6) Plate No. A-6. Vicinity Map
7) Plate No. A-7. Geology Map (3 sheets)

Appendix B-1: Boring Logs (Phase 1 and Previous Work)
1) Plate Nos. B-1 thru B-3 Boring Log Legend (3 Sheets)
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3) Plate No. B-5. Log of Boring A-99-002 (2 sheets)
4) Plate No. B-6. Log of Boring A-99-003 (2 sheets)
5) Plate No. B-7. Log of Boring A-99-004 (1 sheet)
6) Plate No. B-8. Log of Boring A-99-005 (2 sheets)
7) Plate No. B-9 Log of Boring A-99-006 (2 sheets)
8) Plate No. B-10. Log of Boring A-99-007 (2 sheets)
9) Plate No. B-11. Log of Boring A-99-008 (1 sheet)
10) Plate No. B-12. Log of Boring A-99-009 (2 sheets)
11) Plate No. B-13. Log of Boring A-89-001 (1 sheet)
12) Plate No. B-14. Log of Boring A-89-002 (1 sheet)
13) Plate No. B-15. Log of Boring A-89-003 (1 sheet)
14) Plate No. B-16. Log of Boring R-89-004 (2 sheets)

Appendix B-2: Boring Logs (Phase 2)
1) Boring Record Legend (3 sheets)
2) Hole I.D. RC-09-001 (3 sheets)
3) Hole I.D. RC-09-002 (3 sheets)
4) Hole I.D. RC-09-003 (3 sheets)

Appendix C: Slope Inclinometer Data
1) Plate No. C-1: Slope Inclinometer Results for RC-09-001
2) Plate No. C-2: Slope Inclinometer Results for RC-09-002
3) Plate No. C-3: Slope Inclinometer Results for RC-09-003
4) Plate No. C-4: Slope Inclinometer Results for A-99-001
5) Plate No. C-5: Slope Inclinometer Results for A-99-002
6) Plate No. C-6: Slope Inclinometer Results for A-99-003
7) Plate No. C-7: Slope Inclinometer Results for A-99-006
8) Plate No. C-8: Slope Inclinometer Results for A-99-007
9) Plate No. C-9: Slope Inclinometer Results for A-99-008
10) Plate No. C-10: Slope Inclinometer Results for A-99-009

Appendix D: Laboratory Testing Results
1) Table Nos. D-1 & D-2. Summary of Laboratory Test Results
2) Plate Nos. D-1 & D-2: Atterberg Limits Test Results
3) Plate No. D-3 thru D-6: Particle-Size Analysis Test Results
4) Plate No. D-7 thru D-10: Triaxial Compression Test Results
5) Plate No. D-11: Unconfined Compression Test Results
6) Plate No. D-12: Point Load Strength Index of Rock Test Results

Appendix E: Photos (Plate Nos. E-1 thru E-4)

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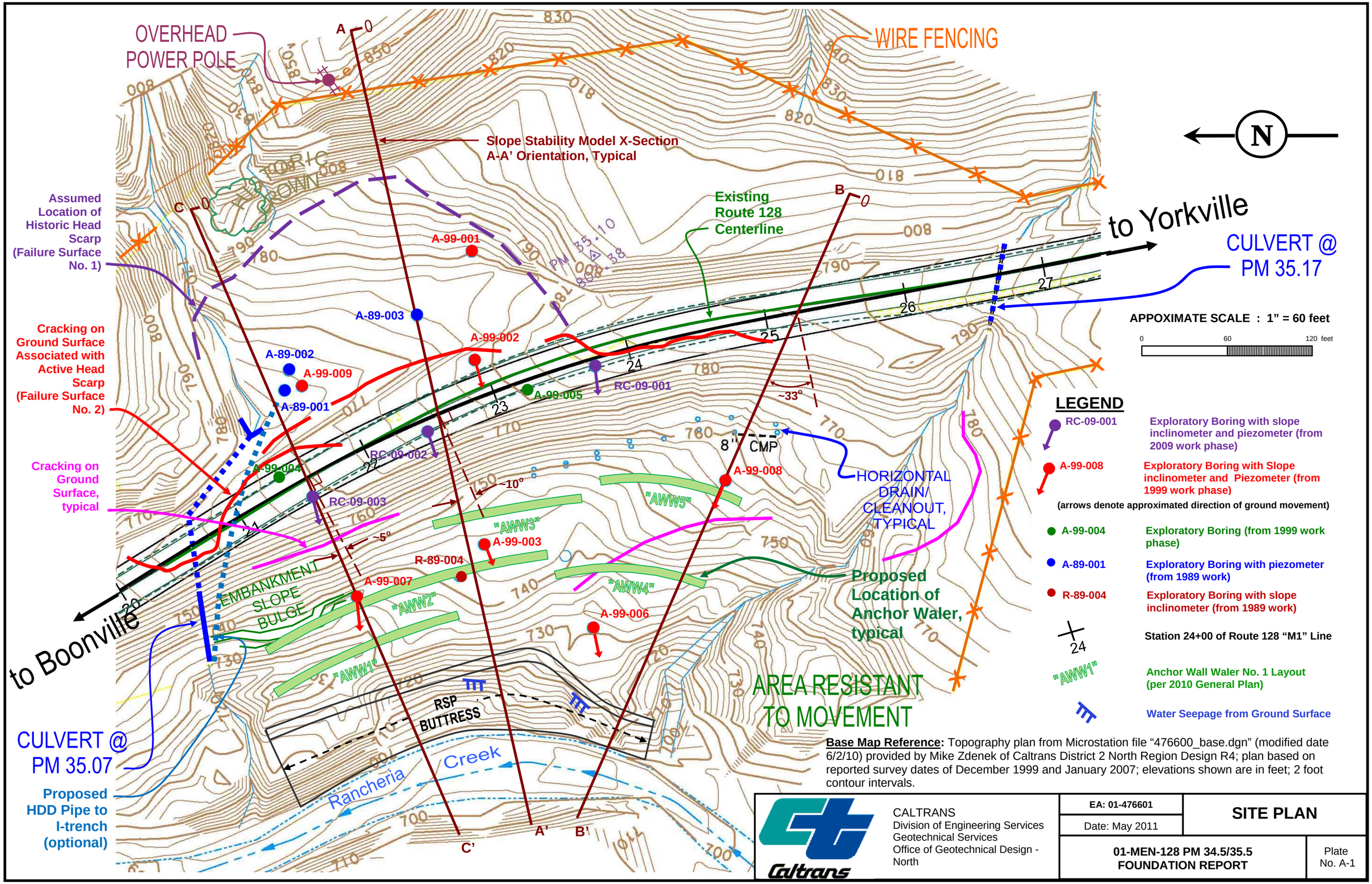
Appendix A

Plans and Cross-Sections



Base Map Reference: Topography plan from Microstation file "476600_base.dgn" (modified date 6/2/10) provided by Mike Zdenek of Caltrans District 2 North Region Design R4; plan based on reported survey dates of December 1999 and January 2007; elevations shown are in feet; 2 foot contour intervals.

Caltrans	CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**SITE PLAN**
		01-MEN-128 PM 34.5/35.5 FOUNDATION REPORT	Plate No. A-1

Idealized 2-D General Limit-Equilibrium Method Slope Stability Analyses

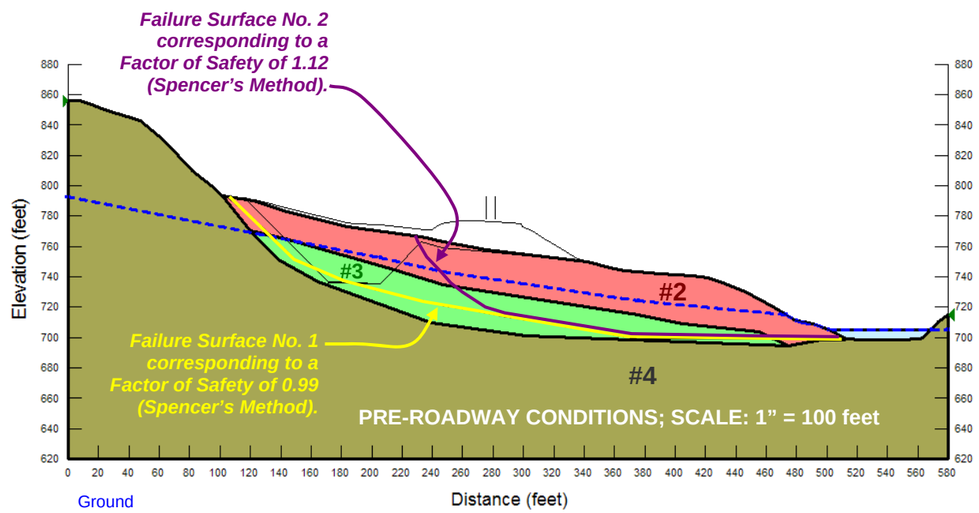
#1 - Embankment/I-Trench Materials:
$\gamma = 125$ pcf
$\varphi = 30^{o}$
c = 0 psf

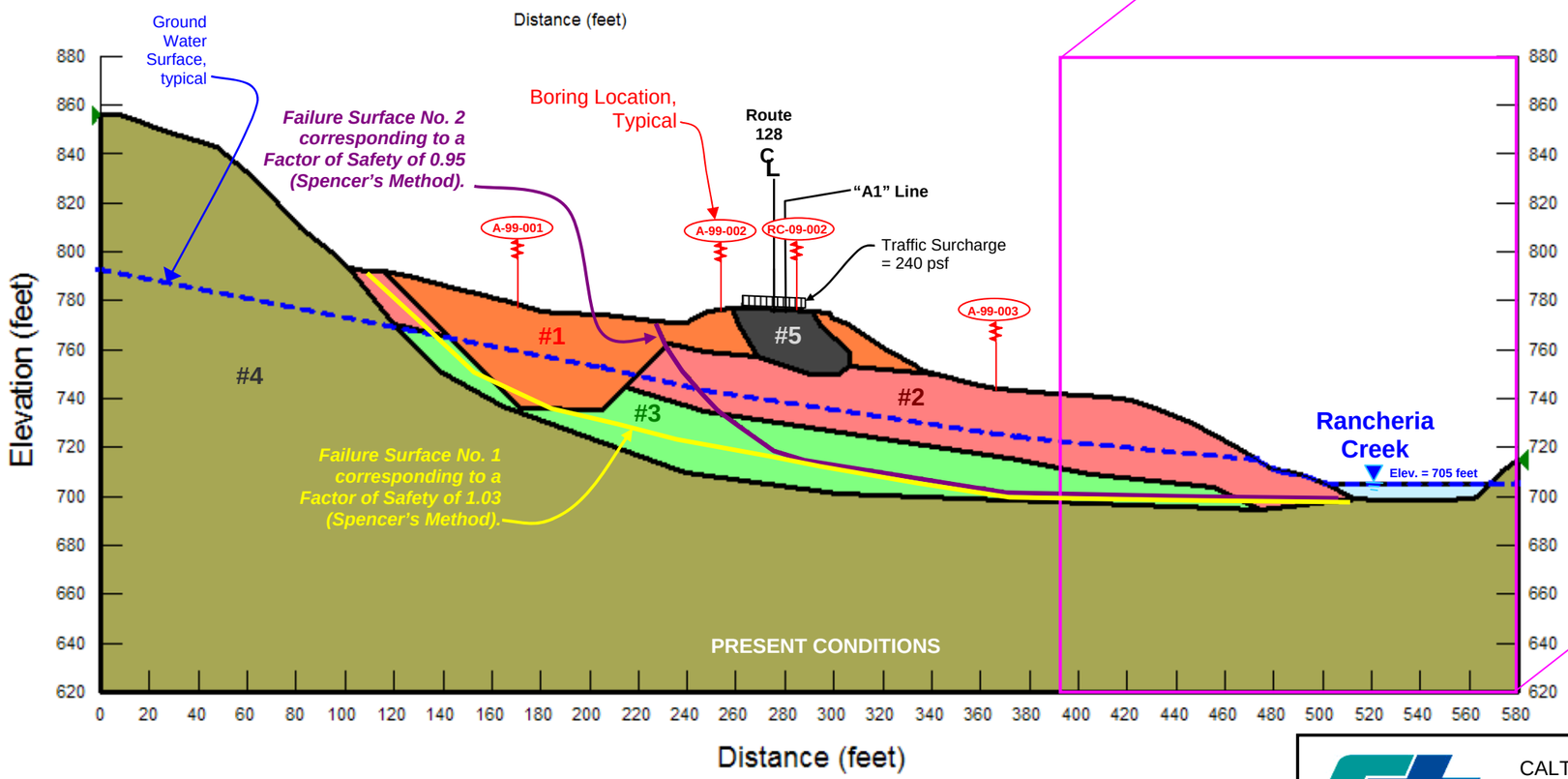
#2 – Colluvial-Like Materials:
$\gamma = 135$ pcf
$\varphi = 32^{o}$
c =0 psf

#3 - Franciscan Melange Materials:
$\gamma = 130$ pcf
$\varphi = 8^{o}$
c = 300 psf

#4 - Pseudo-Stable Zone:
C=∞

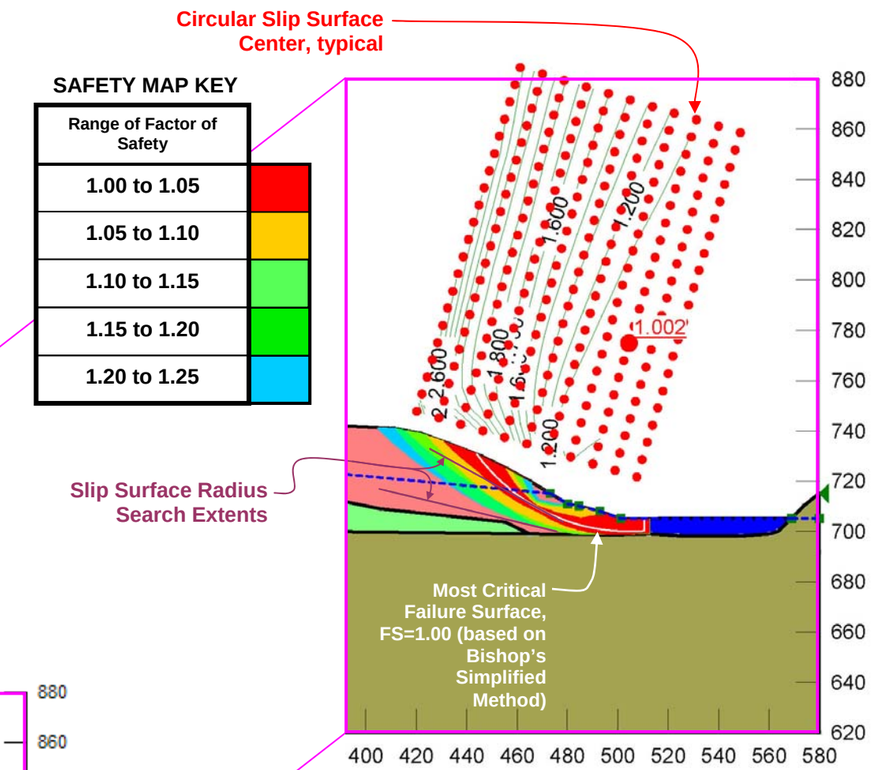
#5 – Asphalt Concrete Fill:
$\gamma = 145$ pcf
$\varphi = 0^{o}$
c = 4,000 psf





SAFETY MAP KEY

Range of Factor of Safety
1.00 to 1.05
1.05 to 1.10
1.10 to 1.15
1.15 to 1.20
1.20 to 1.25



APPROXIMATE SCALE : 1" = 60 feet (vertical = horizontal); unless otherwise noted

0 60 120 feet

Note: A-A' cross-section at Station 22+56 based on the "A1" Line (see Site Plan, Plate No. 1); Skewed approximately 10 degrees right.

CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**X-SECTION A-A'; STA 22+56** **Slope Stability Analysis Results**
	01-MEN-128 PM 34.5/35.5 **FOUNDATION REPORT**	Plate No. A-2

Idealized 2-D General Limit-Equilibrium Method Slope Stability Analyses

#1 - Embankment/I-Trench Materials:
$\gamma = 125$ pcf
$\varphi = 30^\circ$
c = 0 psf

#2 – Colluvial-Like Materials:
$\gamma = 135$ pcf
$\varphi = 32^\circ$
c =0 psf

#3 - Franciscan Melange Materials:
$\gamma = 130$ pcf
$\varphi = 8^\circ$
c = 300 psf

#4 - Pseudo-Stable Zone:
C=∞

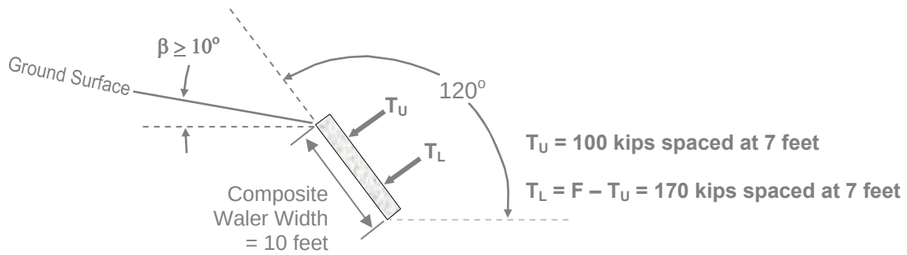
#5 – Asphalt Concrete Fill:
$\gamma = 145$ pcf
$\varphi = 0^\circ$
c = 4,000 psf

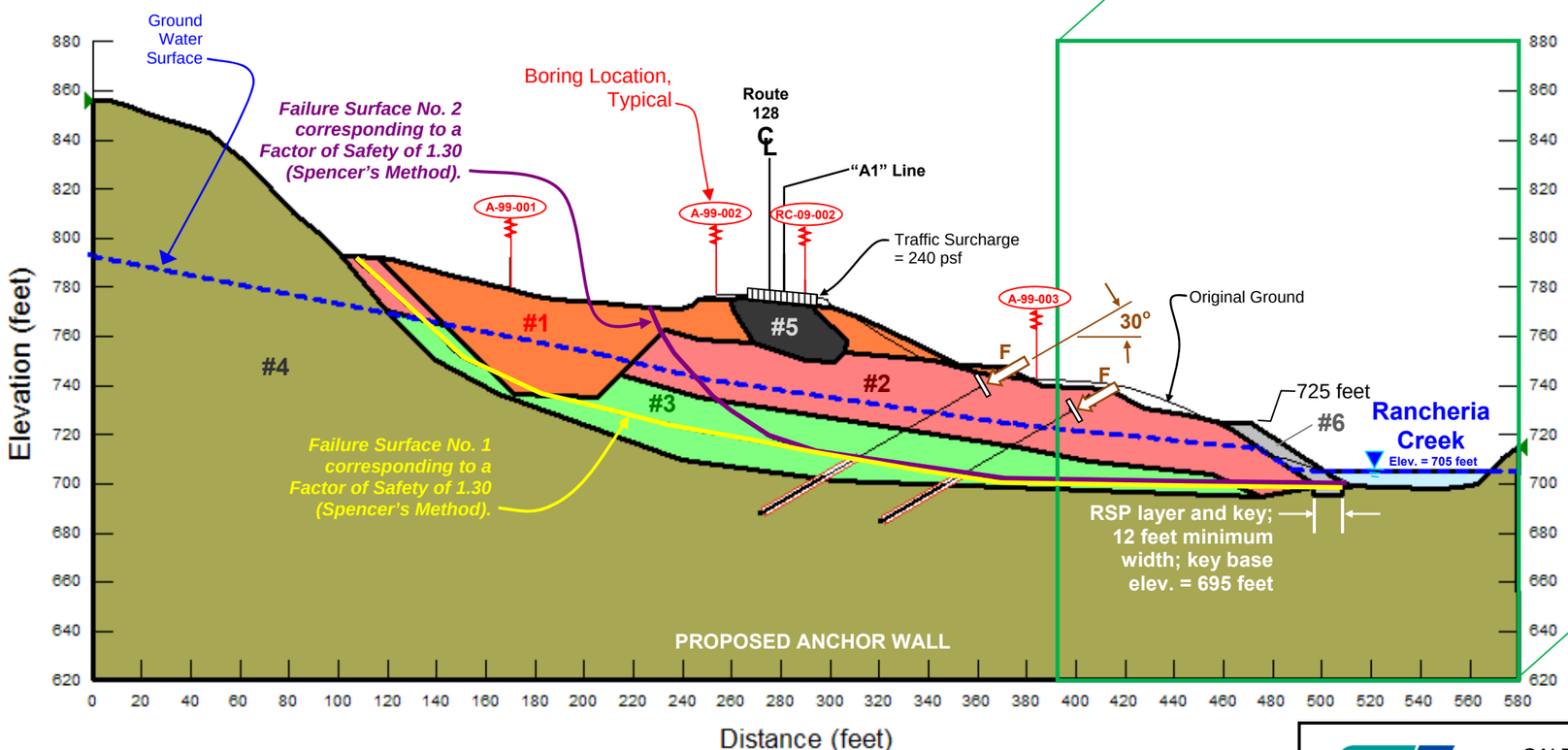
#6 –Rock Slope Protection (Method B Placement) Buttress:
$\gamma = 105$ pcf ($\gamma_{saturated} = 125$ pcf)
$\varphi = 45^\circ$
c = 0 psf

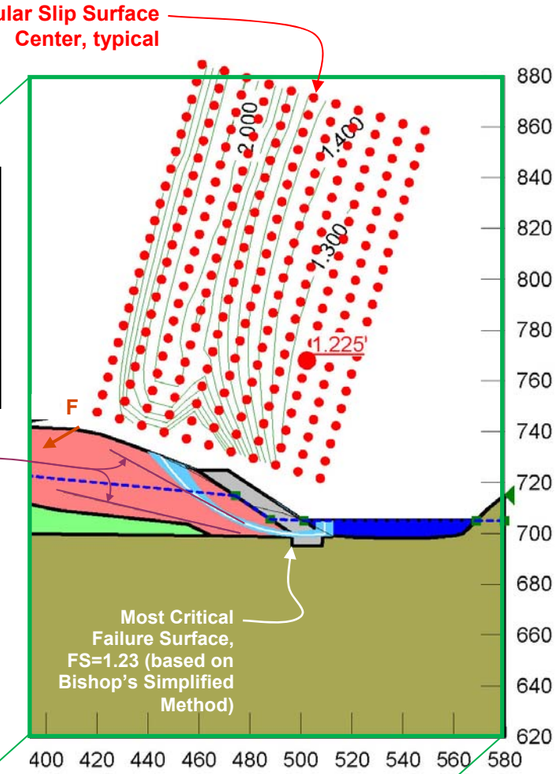
F – Effective Ground AnchorForce:
F=270 kips/7 feet spacing

SAFETY MAP KEY

Range of Factor of Safety	
1.00 to 1.05	NA
1.05 to 1.10	NA
1.10 to 1.15	NA
1.15 to 1.20	NA
1.20 to 1.25	







APPOXIMATE SCALE : 1" = 60 feet (vertical = horizontal)

0 60 120 feet

Note: A-A' cross-section at Station 22+56 based on the "A1" Line (see Site Plan, Plate No. 1); Skewed approximately 10 degrees right.

CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**X-SECTION A-A'; STA 22+56 Slope Stability Analysis Results With Slope Stressing and RSP**
	01-MEN-128 PM 34.5/35.5 FOUNDATION REPORT	Plate No. A-3

Idealized 2-D General Limit-Equilibrium Method Slope Stability Analyses

#1 - Embankment/I-Trench Materials:
$\gamma = 125$ pcf
$\varphi = 30^o$
c = 0 psf

#2 – Colluvial-Like Materials:
$\gamma = 135$ pcf
$\varphi = 32^o$
c =0 psf

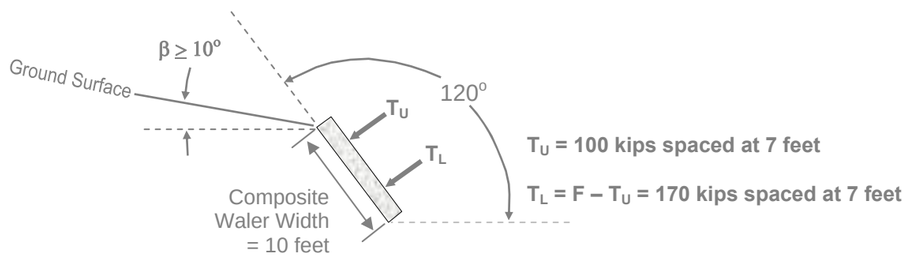
#3 - Franciscan Melange Materials:
$\gamma = 130$ pcf
$\varphi = 8^o$
c = 300 psf

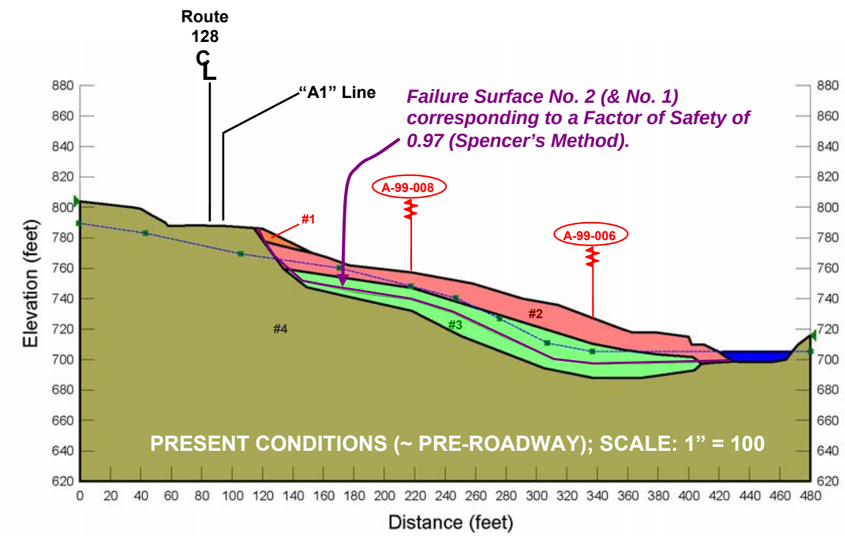
#4 - Pseudo-Stable Zone:
C=∞

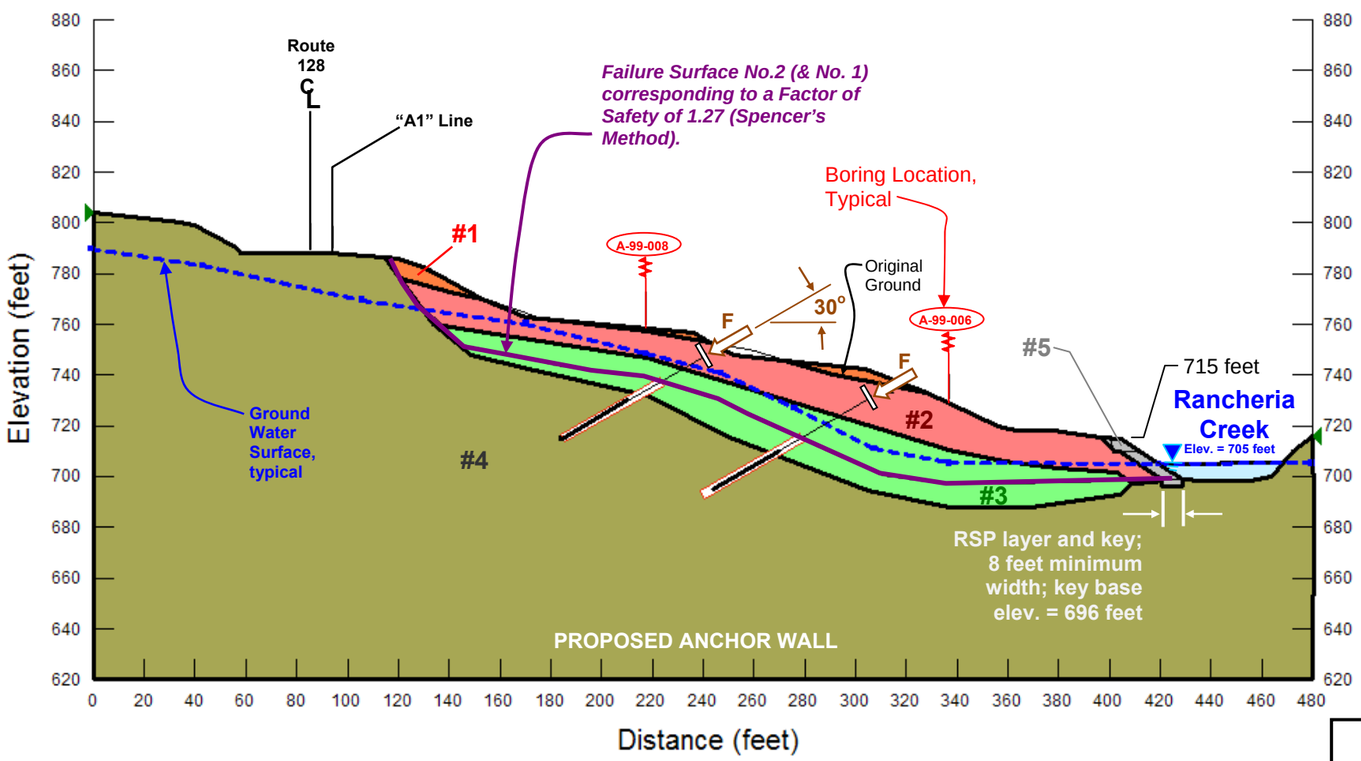
#5 – Asphalt Concrete Fill:
$\gamma = 145$ pcf
$\varphi = 0^o$
c = 4,000 psf

#5 –Rock Slope Protection (Method B Placement) Buttress:
$\gamma = 105$ pcf ($\gamma_{saturated} = 125$ pcf)
$\varphi = 45^o$
c = 0 psf

F – Effective Ground AnchorForce:
F=270 kips/7 feet spacing







APPROXIMATE SCALE : 1" = 60 feet (vertical = horizontal); unless otherwise noted

0 60 120 feet

Note: B-B' cross-section at Station 25+18 based on the "A1" Line (see Site Plan, Plate No. 1); Skewed approximately 33 degrees right.

Caltrans	CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**X-SECTION B-B'; STA 25+18** **Slope Stability Analysis Results**
		01-MEN-128 PM 34.5/35.5 **FOUNDATION REPORT**	Plate No. A-4

Idealized 2-D General Limit-Equilibrium Method Slope Stability Analyses

#1 - Embankment/I-Trench Materials:
$\gamma = 125$ pcf
$\varphi = 30^o$
c = 0 psf

#2 – Colluvial-Like Materials:
$\gamma = 135$ pcf
$\varphi = 32^o$
c =0 psf

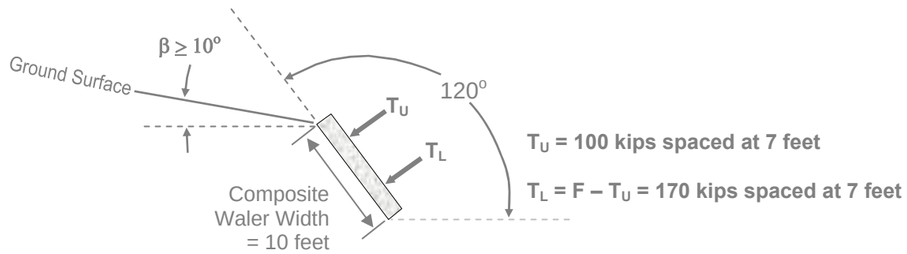
#3 - Franciscan Melange Materials:
$\gamma = 130$ pcf
$\varphi = 8^o$
c = 300 psf

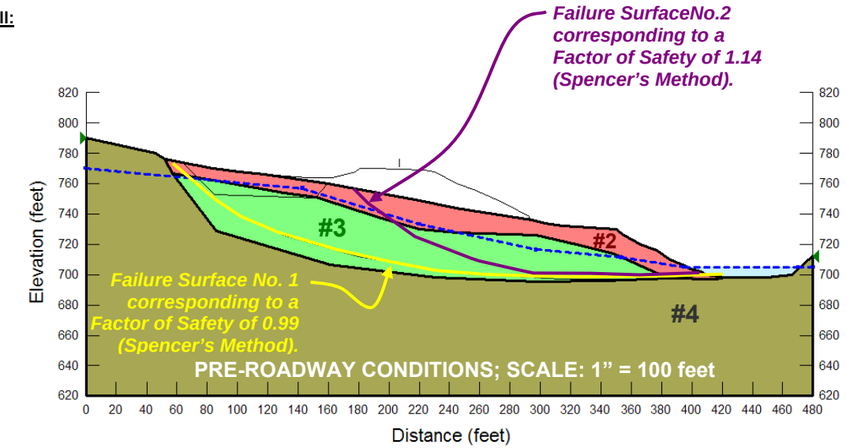
#4 - Pseudo-Stable Zone:
C=∞

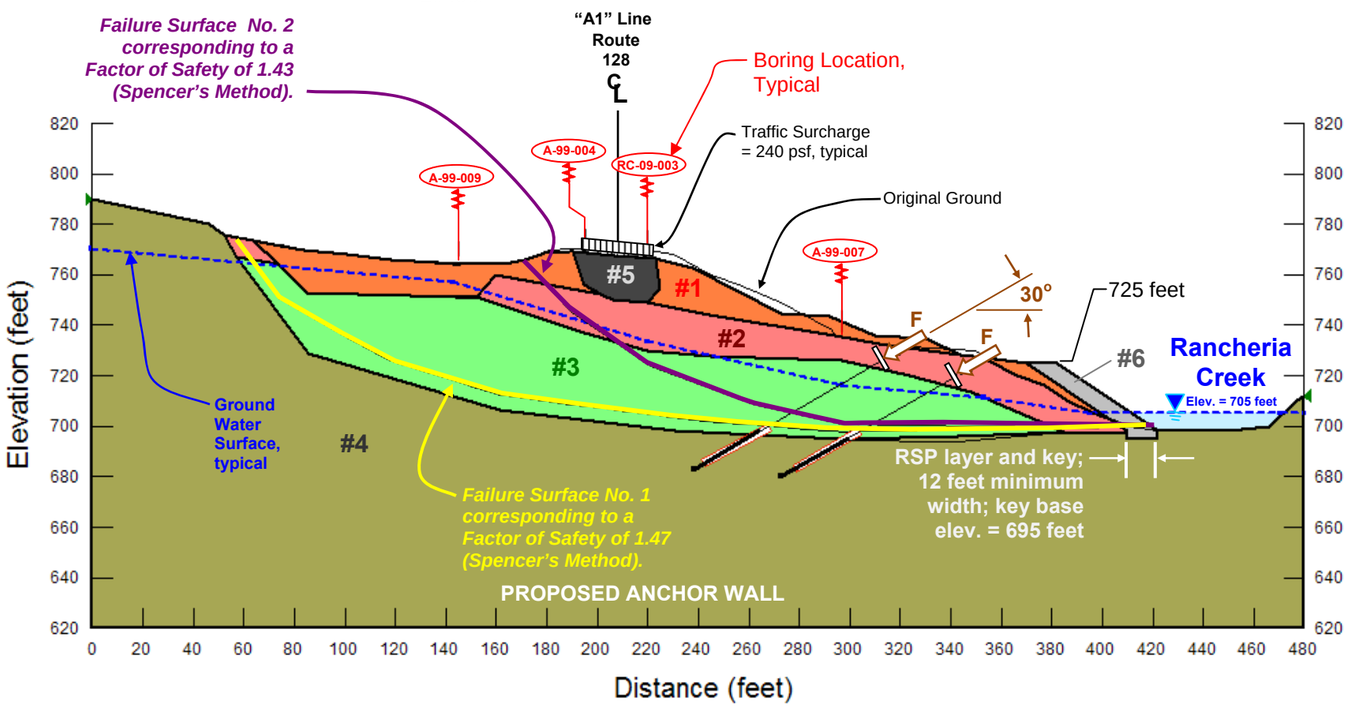
#5 – Asphalt Concrete Fill:
$\gamma = 145$ pcf
$\varphi = 0^o$
c = 4,000 psf

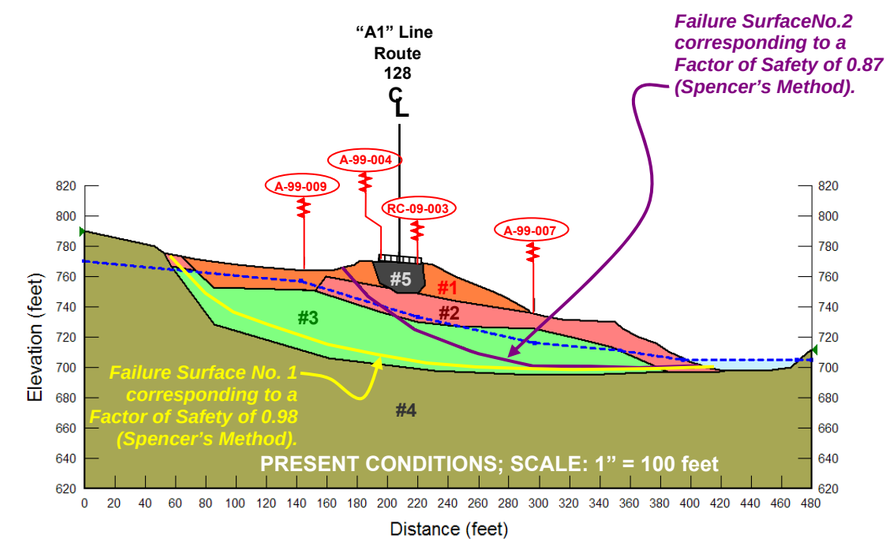
#6 –Rock Slope Protection (Method B Placement) Buttress:
$\gamma = 105$ pcf ($\gamma_{saturated} = 125$ pcf)
$\varphi = 45^o$
c = 0 psf

F – Effective Ground Anchor Force:
F=270 kips/7 feet spacing







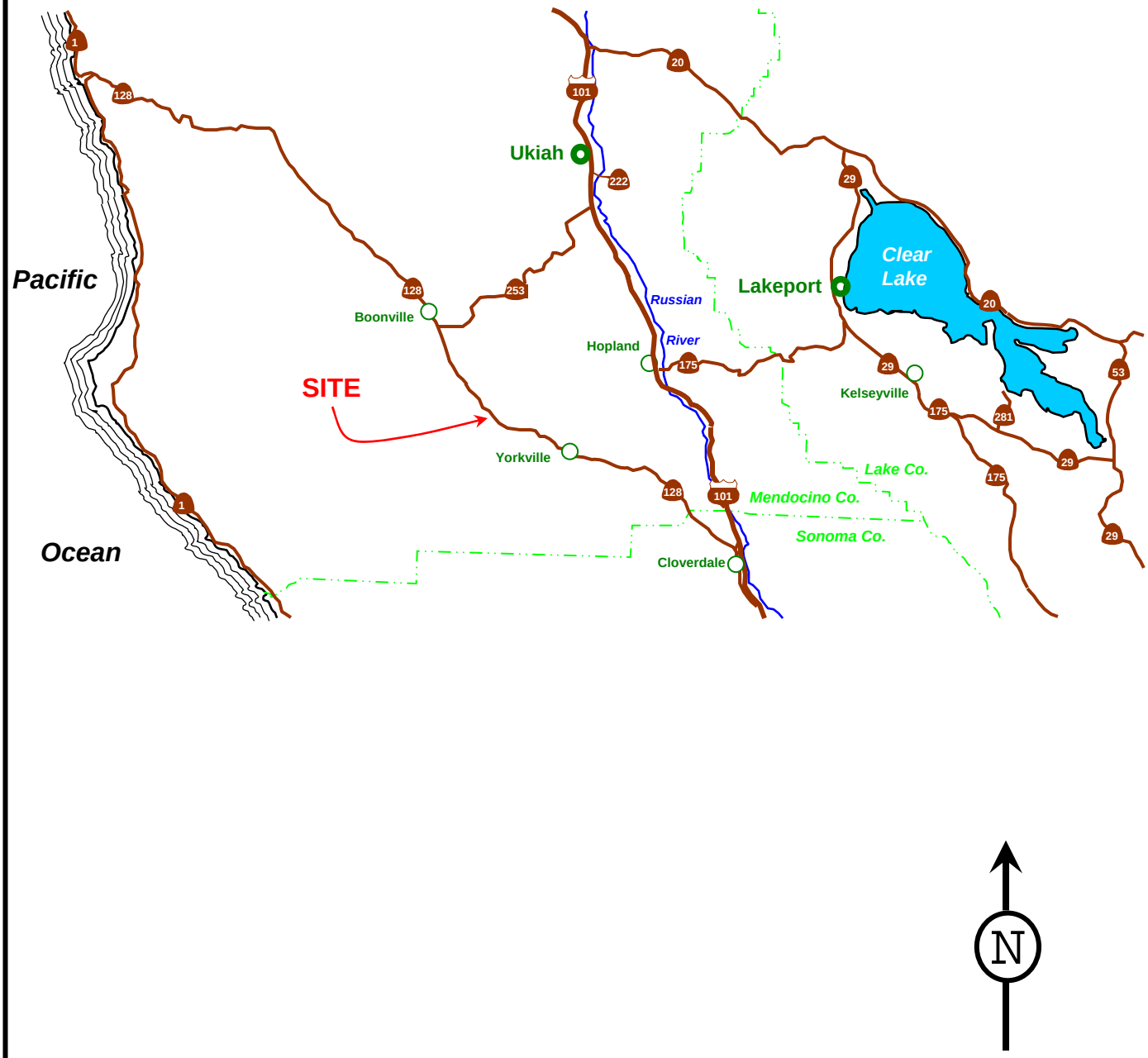


APPROXIMATE SCALE : 1" = 60 feet (vertical = horizontal); unless otherwise noted

0 60 120 feet

Note: C-C' cross-section at Station 21+53 based on the "A1" Line (see Site Plan, Plate No. 1); Skewed approximately 5 degrees right.

Caltrans	CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**X-SECTION C-C'; STA 21+53** **Slope Stability Analysis Results**
		01-MEN-128 PM 34.5/35.5 **FOUNDATION REPORT**	Plate No. A-5



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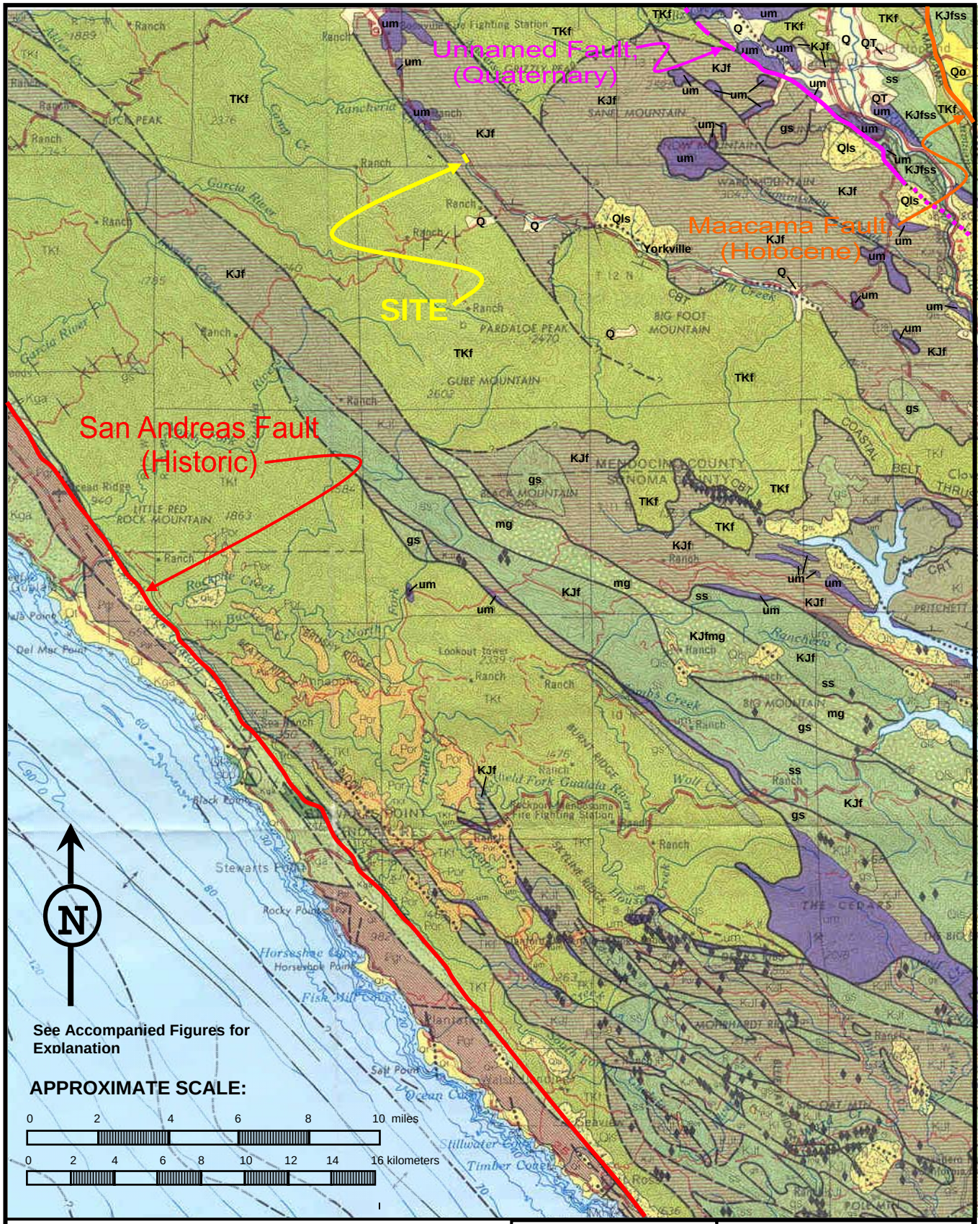
EA: 01-476601

Date: May 2011

VICINITY MAP

01-MEN-128 PM 34.5-35.5
FOUNDATION REPORT

Plate No. A-6



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EA: 01-476601	**GEOLOGY MAP**
Date: May 2011	
01-MEN-128 PM 34.5-35.5 FOUNDATION REPORT	Plate No. A-7a

ABBREVIATED EXPLANATION

Approximate stratigraphic relationships only; see referenced publication for more accurate stratigraphic relationships and unit descriptions.

CENOZOIC

QUATERNARY

Holocene

- Q — Alluvium
- Qa — Natural levee and channel deposits
- Qb — Basin deposits *(Alluvium)*
- Qls — Landslide deposits
- Qs — Dune and beach sand
- Ql — Intertidal deposits *(Peaty-mud)*

Pleistocene

- Qo — Older alluvium
- Qmr — Modesto-Riverbank Formations *(Arkosic alluvium)*
- Qt — Terrace deposits
- Qm — Millerton Formation *(Marine and nonmarine clay, silt, sand and conglomerate)*
- Qrb — Red Bluff Formation *(Gravel in reddish silty or sandy matrix)*
- QT — Huichica and Glen Ellen Formations; Includes undifferentiated continental deposits. *(Fluvial gravel, silt, sand, and clay)*
- QTc — "Cache Formation" *(Pebbly sandstone, conglomerate, siltstone and tuff)*

TERTIARY

Pliocene

- Pt — Tehama Formation *(Sand, silt, and volcaniclastic rocks)*; Putah Tuff Member *(Ppt)*
- Por — Ohlson Ranch Formation *(Marine sandstone, siltstone, and conglomerate)*
- Pwg — Wilson Grove Formation *(Marine sandstone, conglomerate, and tuff)*
- Pun — Unnamed continental deposits *(Poorly sorted sandstone and conglomerate)*
- Pp — Petaluma Formation *(Claystone, siltstone, mudstone; mostly nonmarine)*

Miocene

- Mo? — Orinda (?) Formation *(Pebbly sandstone and conglomerate)*
- Mdb — Drakes Bay Formation *Marine siltstone and mudstone)*
- Msp — San Pablo Group *(Marine sandstone and shale)*
- Mmy — Monterey Group *(Marine sandstone and shale)*
- Mgs — Gallaway - Skooner Gulch Formations *(Marine sandstone and mudstone)*
- Ml — Laird Sandstone *(Marine quartzose feldspathic sandstone)*

Eocene

- Emk — Markley Sandstone *(Marine)*
- En — Nortonville Shale *(Marine)*
- Ed — Domengine Sandstone *(Marine)*
- Ec — Capay Formation *(Marine sandstone)*
- Eum — Unnamed Eocene marine rocks

Paleocene

- Pgr — German Rancho Formation *(Marine sandstone and mudstone)*
- Pmz — Martinez Formation *(Marine quartzose sandstone)*
- Ppr — Point Reyes Formation *(Marine conglomerate and sandstone)*
- TKf — Coastal Belt Franciscan *(Marine sandstone, shale, and conglomerate)*

MESOZOIC

CRETACEOUS

- Kga — Gualala Formation *(Marine sandstone, mudstone, and conglomerate)*
- Ku — Upper Cretaceous *(Undifferentiated marine rocks)*
- Kfo — Forbes Formation *(Marine shale and siltstone)*
- Kg — Guinda Formation *(Marine sandstone and mudstone)*
- Kf — Funks Formation *(Marine shale and sandstone)*
- Ks — Sites Formation *(Marine sandstone)*
- Ky — Yolo Formation *(Marine shale and sandstone)*
- Kv — Venado Formation *(Marine sandstone and conglomerate)*

(Upper Cretaceous Great Valley Sequence)

- Kl, Klsp — Lower Cretaceous Great Valley Sequence *(Marine mudstone, sandstone, and conglomerate) (Klsp - detrital serpentine)*
- KJu, KJusp — Lower Cretaceous-Upper Jurassic Great Valley Sequence *(Marine mudstone, siltstone, sandstone, and conglomerate) (KJsp - detrital serpentine)*

JURASSIC

- KJf, ss, ch, gs, mg — Franciscan Complex * *(ss-sandstone, shale, conglomerate; ch-chert; gs-greenstone; mg-metagraywacke)*
  - um — Serpentinized ultramafic rocks *

PALEOZOIC

- PzMz, ls — Metamorphic rocks of uncertain age. ls - limestone and marble *(Biotite schist and quartzite)*

- QTcv — Clear Lake Volcanics *(d-dacite; a-andesite to basaltic rock; b-basalt; r-rhyolite; t-tuff and other pyroclastic rocks)* ✺ *Quaternary cinder cone or volcano.*
- Psv — Sonoma Volcanics *(b-basalt; a-andesite; r-rhyolite; t-tuff and other pyroclastic rocks)*
- Mpt — Pinole Tuff
- Mbm — Volcanic rocks of Burdell Mtn. *(Andesitic mudflow breccias and flows)*
- Mpp — Putnam Peak Basalt
- Mib — Iversen Basalt
- Kgr — Granitic rocks
- sbp — Spilite near Black Point

Coast Range Ophiolite

- Jv — Volcanic rocks, mainly basalt
- Jgd — Gabbro and diabase
- um — Ultramafic rocks (Peridotite)-partly to completely serpentinized

* Horizontal pattern denotes melange terrane

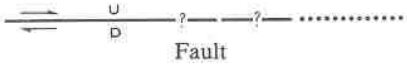
Reference: Wagner, D.L. & Bortugno, E.J. (1982) "Geologic Map of the Santa Rosa Quadrangle", scale 1:250,000, California Department of Conservation - Division of Mines and Geology, RGM 2A. Division of Mines and Geology, Geologic Data Map No. 6.

Caltrans	CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**GEOLOGY MAP LEGEND**
		01-MEN-128 PM 34.5-35.5 FOUNDATION REPORT	Plate No. A-7b

MAP SYMBOLS

Contact

Observed or approximately located; queried where gradational or inferred.

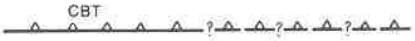


Fault

Solid where well located; dashed where approximately located or inferred and in the offshore area; queried where continuation or existence is uncertain; except for the offshore area, faults are dotted where concealed by younger rocks or water. Arrows show relative or apparent direction of movement. U, upthrown side and D, downthrown side (relative or apparent).

Thrust fault—barbs on the upper plate. Generally dips less than 45°, but locally may have been subsequently steepened. Dashed where approximately located or inferred; dotted where concealed by younger rocks or water; queried where continuation or existence is uncertain.

Coast Range thrust (CRT)—the upper boundary of a long inactive, late Mesozoic subduction zone (barbs on upper plate); has discontinuous outcrop owing to modification by younger faults and concealment by overlying deposits; locally the Coast Range thrust is very steep.



Coastal belt thrust (CBT)—an inferred boundary between the Coastal Belt Franciscan and older parts of the Franciscan Complex (barbs on upper plate); has discontinuous outcrop owing to younger faulting; locally the Coastal Belt thrust is very steep.

Anticlinal fold

Dashed where inferred; dotted where concealed by younger rocks, lakes or bays.

Synclinal fold

Dashed where inferred; dotted where concealed by younger rocks, lakes or bays.

Strike and dip of beds

General strike and dip of stratified rocks.

Blueschist blocks

CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**GEOLOGY MAP LEGEND (Cont'd.)**
	01-MEN-128 PM 34.5-35.5 FOUNDATION REPORT	Plate No. A-7c

<u>Appendix B-1</u>

Boring Logs

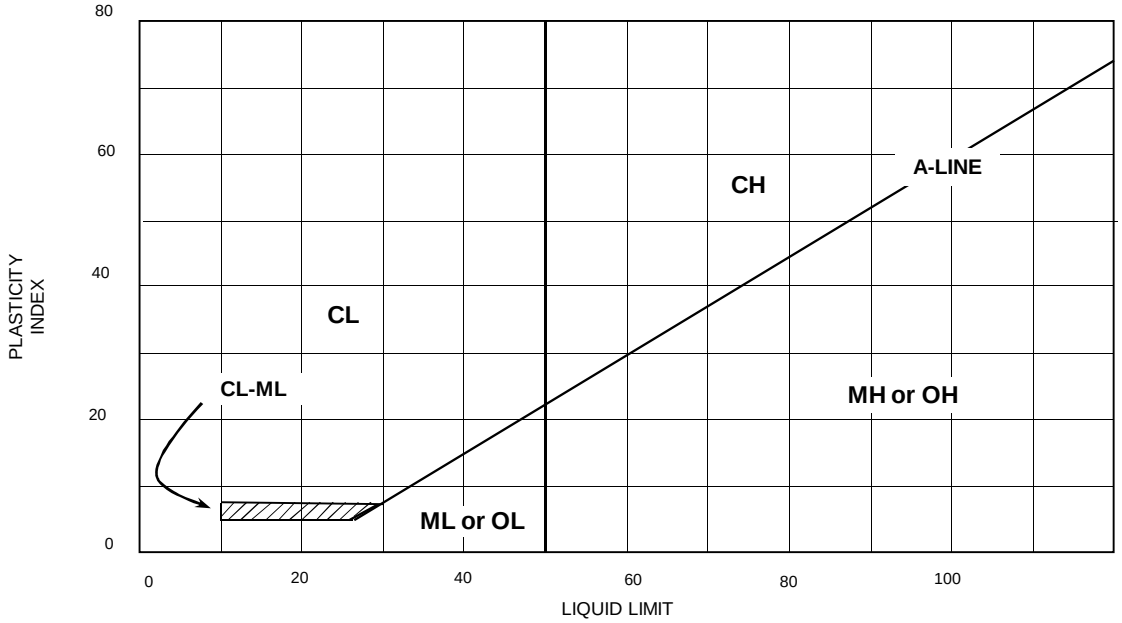
(Phase 1 and Previous work)

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISION			SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS Over 50% > #200 sieve	GRAVELS Over 50% > #4 sieve	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS Over 50% < #4 sieve	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE-GRAINED SOILS Over 50% < #200	SILTS AND CLAYS Liquid limit < 50		ML	INORGANIC SILTS, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY,
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS Liquid limit > 50		MH	INORGANIC SILTS , MICACEOUS OR DIATOMACIOUS FINE SANDY OR
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

PLASTICITY CHART

(USED FOR CLASSIFICATION OF FINE-GRAINED SOILS)



SOIL GRAIN SIZE

U.S. STANDARD SIEVE	12"	3"	3/4"	4	10	40	200	
BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		
SOIL GRAIN SIZE	300	75	19	4.75	2.0	0.425	0.075	0.005

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EA: 01-476601	**SOIL CLASSIFICATION SYSTEM**
Date: May-2011	
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FOUNDATION REPORT	**B-1**

SYMBOLS

SANDSTONE	ULTRAMAFIC	VOLCANIC
CLAYSTONE	SCHIST	TUFF
SILTSTONE	GRAYWACKE	CONGLOMERATE
MUDSTONE	GREENSTONE	BRECCIA
SHALE	GRANITIC	ROCK (general)

DESCRIPTIVE TERMINOLOGY

DEGREE OF WEATHERING

Descriptor	Criteria
Fresh	Crystals are bright. Discontinuities may show some minor surface staining. No discoloration in rock fabric.
Slightly weathered	Rock mass is generally fresh. Discontinuities are stained and may contain clay. Some discoloration in rock fabric. Decomposition extends up to 25.4 mm into rock.
Moderately weathered	Rock mass is decomposed 50% or less. Significant portions of rock show discoloration and weathering effects. Crystals are dull and show visible chemical alteration. Discontinuities are stained and may contain secondary mineral deposits.
Intensely weathered	Rock mass is more than 50% decomposed. Rock can de excavated with geologist's pick. All discontinuities exhibit secondary mineralization. Complete discoloration of rock fabric. Surface of core is friable and usually pitted due to washing out of highly altered minerals by drilling water.
Decomposed	Rock mass is completely decomposed. Original rock "fabric" may be evident. May be reduced to soil with hand pressure.

FRACTURING & FOLIATION(BEDDING)

Fracturing Descriptor*	Foliation (Bedding) Descriptor	Thickness/Spacing Criteria
Unfractured	Massive	None observed
Very slightly fractured		Greater than 3m
	Very thickly foliated	Between 1m and 3m
Slightly fractured	Thickly foliated	Between 300mm and 1m
Moderately fractured	Moderately foliated	Between 100mm and 300mm
Intensely fractured	Thinly foliated	Between 30mm to 100 mm
Very intensely fractured	Very thinly foliated	Between 10mm to 30 mm
	Laminated (or intensely foliated)	Less than 10mm (3/8")

***Note:** Spacing criteria for fracturing can refer to general or average recovery length of core measured along core axis; For other exposures, the criteria is distance measured between fracture (size of blocks).

RELATIVE HARDNESS

Descriptor	Criteria
Extremely hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows
Very hard	Cannot be scratched with knife or sharp pick. Core or fragment breaks with repeated heavy hammer blows.
Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
Moderately Hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
Moderately Soft	Can be grooved 2 mm (1/16") deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
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.
Very soft	Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.

SAMPLING DATA

TYPE

1" O.D. Caltrans One Inch Sampler (NT)	1" O.D. Caltrans One Inch Sampler (LT)
2" O.D. Standard Penetration Test Sampler(NT)	2" O.D. Standard Penetration Test Sampler (LT)
2.5" O.D. Modified California Sampler (NT)	2.5" O.D. Modified California Sampler (LT)
3" O.D. California Sampler (NT)	3" O.D. California Sampler (LT)
Shelby Tube (NT)	Shelby Tube (LT)
NX Size (~2.0" I.D.) Core Barrel (NT)	NX Size (~2.0" I.D.) Core Barrel (LT)
HX Size (~2.5" I.D.) Core Barrel (NT)	HX Size (~2.5" I.D.) Core Barrel (LT)
Bulk Sample Collected from Cuttings (NT)	Bulk Sample Collected from Cuttings (LT)

Note: LT=lab testing performed on sample; NT= no lab testing performed on sample

DRIVING DATA

23	23 blows drove sampler 12", after initial 6" of seating
68/203{8}	68 blows drove sampler 8", after initial 6"of seating
*50/3	50 blows drove sampler 3" during seating interval
	(Note: To avoid damage to sampling tools, driving is limited to 50 blows per 6" interval)
REF	Practical refusal, i.e. no drive length under numerous blows; NR will apply (see below)
PUSH	Sampler pushed under static load
20@150	20 seconds time @ an average pressure of 150 psi to descend depth interval of 1 ft
	(Note: ## indicates no reading obtained)
NR	Indicates no recovery of material in sampler for entire drive

OTHER SYMBOLS

Water level encountered while drilling (Time/Date)

Water level measured in hole after drilling (Time/Date)

_?_._._?_ Strata boundary inferred without visual confirmation (i.e. no sample or boring cuttings retreval)

Seepage condition prevelent; excessive free water noted in voids yet no static water table apparent

TESTING

CONS	Consolidation (Cal Test 219)	L_r	Recovery Ratio (rock cores only)
UU	Uncons. Undrained Triaxial (Cal Test 230)	RQD	Rock Quality Designation (%)
CU	Cons. Undrained Triaxial (Cal Test 230)	60°	Dip Angle
DS	Cons. Drained Direct Shear (ASTM D3080)	PERM	Permeability (Cal Test 220))
UCC	Unconfined Compression (Cal Test 221)	COR	Corrosivity Testing (Cal Test 532/643)
LL	Liquid Limit-% (Cal Test 204)	GRAD	Gradation Analysis (Cal Tests 202/203)
PI	Plasticity Index (Cal Test 204)		(%:G=gravel;S=sand;M=silt;C=clay-includes colloids)
PP	Pocket Penetrometer	TORV	Pocket Torvane Test
S_u	Undrained Shear Strength: From UU or one-half the unconfined compressive strength per UCC, PP; Intended as a guideline only and does not address clay content or draining charateristics of material. Taken as one-half of deviator stress for CU when no envelope established.	CP	Compaction Test (Cal Test 216)
		G_s	Specific Gravity (Cal Test 209-soils; Cal Test 206-aggregate/rock); SSD = saturated surface dry; ABS = % absorbtion

GENERAL NOTES

1. Logs represent general subsurface conditions observed at the point of exploration on the date indicated.
2. In general, USCS designations presented on logs were established by visual methods only; Therefore, actual designations (based on laboratory tests) may vary.
3. No warranty is provided as to the continuity of soil conditions between individual sample locations.
4. Lines separating strata on the logs represent approximate boundaries only; actual transitions may be gradual.

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **780.5 feet**	LOG I.D. **A-99-001**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **18 feet (seepage zone?)**	DATE PERFORMED: **3 August 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **C. Samuel**
BACKFILL NOTES: **Slope inclinometer pipe installed in annulus: lined full depth with sand; 3/16" dia. holes drilled for bottom 10 feet @ 3" o.c., staggared, for perforation.**	APPROXIMATE BORING LOCATION: **"M1" STA 23+18.56**	APPROX. DISTANCE FROM EXISTING CL: **approx. 99.6 ft. left**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
			Dark red-brown sandy GRAVEL with clay & silt	GC								
			damp, medium dense	GP								
776.5	1.22	4	gravels composed of hard to very hard mudstone									
772.5	2.44	8										
768.5	3.66	12	moist, very gravelly, gravel is up to 1" diameter, light yellow to red-purple in color, very hard, angular to very angular, intensely fractured (appears recently sheared			1-1	33					**Bulk A**: 10'-15' PI=19; LL=45 GRAD: G=20;S=49;M=13;C=18 COR: pH = 7.6 R = 1850 Ohm-cm Cl = NA SO_4 = NA
764.5	4.88	16										
760.5	6.10	20	becomes darker in color @ 18', slightly softer drilling, wet									
			free water in samples, rust staining of gravel (variegated), matrix materials are soft, pliable			1-2	10					
756.5	7.32	24	bit pulled @ 25' - no water noted									
752.5	8.53	28	silty cuttings									
748.5	9.75	32	moist, dense, red-brown angular gravels, clayey			1-3	85	10.1	19.41	123.6		
			Dark gray very clayey GRAVEL	CL								
			moist, medium dense **(FRANCISCAN COMPLEX)**	GC								
744.5	10.97	36	gravel composed of black shaly rock, generally subrounded to subangular, exhibits "slickenside" texture, possible serpentinized ultamafic rocks; matrix composed of gray clay with sheared appearance (melange "block & matrix" materials)			1-4	28	8.9				
740.5	12.19	40										

(Continued on next page)

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **780.5 feet**	LOG I.D. **A-99-001**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **18 feet (seepage zone?)**	DATE PERFORMED: **3 August 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **C. Samuel**
BACKFILL NOTES: **Slope inclinometer pipe installed in annulus: lined full depth with sand; 3/16" dia. holes drilled for bottom 10 feet @ 3" o.c., staggered, for perforation.**	APPROXIMATE BORING LOCATION: **"M1" STA 23+18.56**	APPROX. DISTANCE FROM EXISTING CL: **approx. 99.6 ft. left**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GEOTECHNICAL DESCRIPTION (continued from previous page)	SOIL TYPE	SAMPLER	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
			becomes damp, white veins (calcium carbonate?) matrix clay appears semi-indurated, hard consistency	CL GC		1-5	48				>2.2(PP)	
736.5	13.41	44										
			light to dark grey rock, dry, very hard rock, partially serpentized peridotite			1-6	*50/3	1.3				NOTE: PP applied to clayey matrix materials, typical.
732.5	14.63	48										
728.5	15.85	52	fissile serpentine gravels to 2" diameter, very hard matrix materials, talcish white veins			1-7	50/2	2.5			>2.2(PP)	**Bulk B**: 50'-55' PI=22; LL=38 GRAD: G=10;S=39;M=22;C=29 COR: pH = 9.2 R = 875 Ohm-cm Cl = < 25 SO_4 = 250 CP: 126 pcf @ 9.3 %
724.5	17.07	56	gray to black in color, damp, shale gravels with slickensided surface			1-8	62	5.5			>2.2(PP)	
720.5	18.29	60	gravels composed of black shale, serpentine to 1/8" diameter			1-9	76/9	6.3			>2.2(PP)	
716.5	19.51	64	**Boring terminated at 61.5';** **A free groundwater table was not encountered while drilling; Water seepage encountered between 18' and 23' depth, possible seepage zone.**									

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EA:	01-476601
Date:	May-2011

LOG OF BORING NO. A-99-001

01-MEN-128 PM 34.5/35.5

FOUNDATION REPORT

PLATE NO. **B-4b**

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **777.6 feet**	LOG I.D. **A-99-002**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **39.0 feet (perched?)**	DATE PERFORMED: **4 August 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **Slope inclinometer pipe installed in annulus: lined full depth with sand; 3/16" dia. holes drilled for bottom 20 feet @ 3" o.c., staggared, for perforation.**	APPROXIMATE BORING LOCATION: **"M1" STA 22+95.26**	APPROX. DISTANCE FROM EXISTING CL: **approx. 26.7 ft. left**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
				Dark brown clayey GRAVEL moist, medium dense (FILL?) angular gravels, 3/8" to 1" in diameter	GC								
773.6	1.22	4											
769.6	2.44	8											
765.6	3.66	12											
761.6	4.88	16											
				Brown to red-brown sandy GRAVEL with clay moist, medium dense gravels composed of hard to very hard mudstone	GC GP								
757.6	6.10	20											**Bulk C**: 20'-25' GRAD: PI=20; LL=39 G=54;S=31;M=8;C=7 COR: pH = 7.6 R = 2800 Ohm-cm Cl = NA SO_4 = NA
753.6	7.32	24											
				angular gravels ½" to 1 ½"' diameter									
749.6	8.53	28											
				variegated red-brown(rust) to dark brown much coarse sands			2-1	80	4.5				
745.6	9.75	32											
741.6	10.97	36		much rust oxidation on gravels			2-2	62					
737.6	12.19	40		free water in cuttings from 39 feet									

(Continued on next page)

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **777.6 feet**	LOG I.D. **A-99-002**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **39.0 feet (perched?)**	DATE PERFORMED: **4 August 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **Slope inclinometer pipe installed in annulus: lined full depth with sand; 3/16" dia. holes drilled for bottom 20 feet @ 3" o.c., staggered, for perforation.**	APPROXIMATE BORING LOCATION: **"M1" STA 22+95.26**	APPROX. DISTANCE FROM EXISTING CL: **approx. 26.7 ft. left**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GEOTECHNICAL DESCRIPTION (continued from previous page)	SOIL TYPE	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²:tsf	ADDITIONAL COMMENTS AND TESTS
			yellow-red in color (15:00;8/4/99)	GC							
			very gravelly	GP	2-3	89	8.4				
			? ? ? ? ? ?								
733.6	13.41	44	*no soil cuttings returned at ground surface*	CL							
			Grey to red-brown very clayey GRAVEL	GC							
			dense **(FRANCISCAN COMPLEX)**			85/11				>2.2(PP)	
			damp, very hard clay matrix materials		2-4		6.6				
729.6	14.63	48	gravel composed of dark gray shale fragments (melange "block & matrix" materials)								NOTE: PP applied to clayey matrix materials, typical.
			light green to gray in color, very moist							1.0(PP)	
725.6	15.85	52	(intensely weathered serpentine?)		2-5	44	13.8				
			still no soil cuttings returned at ground surface								
721.6	17.07	56	dark gray to black in color								
			black, hard shale-like gravels		2-6	48	8.4				
			(moderately weathered serpentine?)								
			resume of soil cuttings return at ground surface								
717.6	18.29	60									
			dark grey to black hard rock								
			(slightly weathered serpentine)		2-7	*50/3	2.4				
713.6	19.51	64	**Boring terminated at 61.5';**								
			A free groundwater table encountered at 39' while drilling; Water level measured in boring anulus at 41' after completion of drilling.								

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LOG OF BORING NO. A-99-002

01-MEN-128 PM 34.5/35.5

FOUNDATION REPORT

PLATE NO. **B-5b**

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **744.1 feet**	LOG I.D. **A-99-003**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **24.0 feet (seepage zone)**	DATE PERFORMED: **5 August 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **C. Samuel**
BACKFILL NOTES: **Slope inclinometer pipe installed in annulus: lined full depth with sand; 3/16" dia. holes drilled for bottom 10 feet @ 3" o.c., staggared, for perforation.**	APPROXIMATE BORING LOCATION: **"M1" STA 22+51.2**	APPROX. DISTANCE FROM EXISTING CL: **approx. 96.9 ft. right**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
			Olive-grey sandy GRAVEL with some clay moist, medium dense	GC GP							
740.1	1.22	4									
			very dark gray, hard angular gravels with some reddish iron staining, 3/8" to 1" diameter								
736.1	2.44	8									
			dark brown in color, more clayey gravel appears to be igneous, possibly ultrabasic rock, dark red-grey in color w/ yellow-red iron staining on surfaces		3-1	10					**Bulk D**: 10'-15' PI=26; LL=46 GRAD: G=62;S=26;M=5;C=7
732.1	3.66	12									
728.1	4.88	16	variegated yellow to rust-red in color much coarse sand to pea-gravel size (3/8") particles		3-2	22	3.6				
724.1	6.10	20									
			gravels to 1½" diamater, very clayey		3-3	25	3.9				
720.1	7.32	24	bit pulled for sampling, water level noted @ 24' on rod	▽							
			very moist to wet, yellow-red to brown in color sands well-graded, gravels to ½" diamater, angular		3-4	23	11.9				**Bulk E**: 25'-30' PI=22; LL=41 GRAD: G=54;S=31;M=7;C=8
716.1	8.53	28									
			Dark gray very clayey GRAVEL moist, medium dense **(FRANCISCAN COMPLEX)**	CL GC							
712.1	9.75	32	gravels blue-gray to black in color, possible intensely weathered serpentinized ultamafic rocks		3-5	27	11.0			2.0(PP)	NOTE: PP applied to clayey matrix materials, typical.
708.1	10.97	36	black, moderately hard gravels, friable (shale?) gravels in semi-indurated (hard) soil matrix composed of gray clay (melange "block & matrix" materials)		3-6	27	10.3			>2.2(PP)	
704.1	12.19	40									

(Continued on next page)

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **744.1 feet**	LOG I.D. **A-99-003**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **24.0 feet (seepage zone)**	DATE PERFORMED: **5 August 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **C. Samuel**
BACKFILL NOTES: **Slope inclinometer pipe installed in annulus: lined full depth with sand; 3/16" dia. holes drilled for bottom 10 feet @ 3" o.c., staggered, for perforation.**	APPROXIMATE BORING LOCATION: **"M1" STA 22+51.2**	APPROX. DISTANCE FROM EXISTING CL: **approx. 96.9 ft. right**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION (continued from previous page)	SOIL TYPE	SAMPLER	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
				gray to black in color, damp, shale-like gravels with slickensided surface	CL GC		**3-7**	31	8.2			1.5(PP)	NOTE: PP applied to clayey matrix materials, typical.
700.1	13.41	44											
				some white talcish (soapy) veins, very clayey, some black gravels			**3-8**	36	11.6			1.7(PP)	
696.1	14.63	48											
692.1	15.85	52					**3-9**	52	7.1			>2.2(PP)	
				Boring terminated at 51.5';									
				A free groundwater table was encountered while drilling around 24 feet, possible perched condition above clayey materials around 29 feet depth.									
688.1	17.07	56											

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EA: 01-476601	**LOG OF BORING NO. A-99-003**	
Date: May-2011		
01-MEN-128 PM 34.5/35.5		PLATE NO.
FOUNDATION REPORT		**B-6b**

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **768.4 feet**	LOG I.D. **A-99-004**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **31.5 feet (pearched)**	DATE PERFORMED: **2 November 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **grout full depth**	APPROXIMATE BORING LOCATION: **"M1" STA 21+38.0**	APPROX. DISTANCE FROM EXISTING CL: **approx. 11.0 ft. left**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
			Asphalt Concrete (fill) compact	AC								
764.4	1.22	4										
760.4	2.44	8										
756.4	3.66	12	larger gravels, easier drilling effort @ 12.5'									
			Brown to black sandy GRAVEL with trace clay moist, medium dense **(fill)**	GP								
752.4	4.88	16	mixed asphalt concrete and clayey gravel soils gravel to 1" diameter			**4-1**	37	9.2				
748.4	6.10	20	becomes clayey at ~21 '									
			Brown sandy GRAVEL with some clay moist, medium dense	GC GP								
744.4	7.32	24										**Bulk F** 24'-28' PI=20; LL=40 GRAD: G=36;S=36;M=14;C=14
740.4	8.53	28	angular gravels to 3/8" diameter gravels appear igneous, likely basic (greenstone)			**4-2**	15					
			free water noted within sample below 31.5'									
736.4	9.75	32				**4-3**	10				0.7(PP)	
			Dark gray very clayey GRAVEL moist, medium dense **(FRANCISCAN COMPLEX)**	CL GC								NOTE: PP applied to clayey matrix materials, typical.
732.4	10.97	36	green gravels (serpentine?) in partial indurated clay matrix (melange)			**4-4**	30	16.6	18.92	120.5	1.08(UU) 1.2(PP)	
			Boring terminated at ~11.1m (36.5');									
728.4	12.19	40	**A free groundwater table was encountered while drilling around 9.3 m (30.5 feet), possible perched condition above clayey materials around 9.6 m (31.5 feet) depth.**									

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EA: 01-476601
Date: May-2011

LOG OF BORING NO. A-99-004

01-MEN-128 PM 34.5/35.5

FOUNDATION REPORT

PLATE NO. **B-7**

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **779.2 feet**	LOG I.D. **A-99-005**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **28.0 feet & 48.5 feet (seepage zones?)**	DATE PERFORMED: **2 November 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **grout full depth**	APPROXIMATE BORING LOCATION: **"M1" STA 23+22.0**	APPROX. DISTANCE FROM EXISTING CL: **approx. 7.0 ft. right**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
				Asphalt Concrete (fill) compact	AC								
775.2	1.22	4											
771.2	2.44	8											
				soil in cuttings, easier drilling effort @ 10.5'									
767.2	3.66	12		Brown to black sandy GRAVEL with trace clay moist, medium dense **(fill)** mixed asphalt concrete and clayey gravel soils	GP								
763.2	4.88	16		very gravelly at ~18' becomes clayey at ~19 '									
759.2	6.10	20		Brown very sandy GRAVEL with some clay moist, medium dense	GC GP								NOTE: PP applied to clayey matrix materials, typical.
755.2	7.32	24		orange to red-brown in color Fe oxidation, hard sub-angular gravels			**5-1**	17	13.5			>2.2(PP)	
751.2	8.53	28		very gravelly, some free water in voids ?			**5-2**	22					
				rocky drilling below 29.5'									**Bulk G** 30'-34' PI=19; LL=38 GRAD: G=35;S=40;M=15;C=10
747.2	9.75	32		gravels appear igneous of orgin, likely basic (greenstone and basalt?), possibly ultrabasic									
				less rocky drilling at 34'									
743.2	10.97	36		rocky drilling at 37'									
739.2	12.19	40		very gravelly, angular, igneous (basalt?, peridotite?)			**5-3**	29	8.6				

(Continued on next page)

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **779.2 feet**	LOG I.D. **A-99-005**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **28.0 feet & 48.5 feet (seepage zones?)**	DATE PERFORMED: **2 November 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **grout full depth**	APPROXIMATE BORING LOCATION: **"M1" STA 23+22.0**	APPROX. DISTANCE FROM EXISTING CL: **approx. 7.0 ft. right**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION (continued from previous page)	SOIL TYPE	SAMPLER	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
				continued rocky drilling	GC GP								
735.2	13.41	44											
				less rocky drilling at 47'									
731.2	14.63	48		very wet, free water in voids below 48.5'			5-4	47	12.9				
				Boring terminated at 49.5';									
727.2	15.85	52		**A free groundwater table was not encountered while drilling; Water seepage apparent between 28.0' and 29.5' depth, possible perched condition; Seepage also apparent below 48.5 feet.**									

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **731.0 feet**	LOG I.D. **A-99-006**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **15.0 feet (seepage zone)**	DATE PERFORMED: **3 November 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **see "NOTE" next page**	APPROXIMATE BORING LOCATION: **"M1" STA 23+7.1**	APPROX. DISTANCE FROM EXISTING CL: **approx. 184.1 ft. right**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
			Brown sandy GRAVEL with some clay damp, medium dense	GC GP							
727.0	1.22	4									
			very gravelly, hard sub-angular to angular gravels		6-1	18					
			gravel composed of ultramafic rock, dark red-grey in color w/ yellow-red iron staining on surfaces								
723.0	2.44	8									
			much black (magnesium?) staining on gravel surfaces		6-2	36					
719.0	3.66	12									
			rocky cuttings								
715.0	4.88	16	free water on sampler below 15'	▽	6-3	20	15.1				
711.0	6.10	20	very gravelly, ½" to 1" diameter		6-4	39					free water mark at 16' on drill bit rod (during extraction for 6-4 sampling)
			Dark gray very clayey GRAVEL moist, medium dense **(FRANCISCAN COMPLEX)**	CL GC							
707.0	7.32	24									
			black, sub-rounded, hard gravels, (serpentine?)							1.3(PP)	
			gravels in semi-indurated (hard) soil matrix composed of gray clay (melange "block & matrix" materials)		6-5	27	12.9	19.70	125.5	1.22(UU)	NOTE: PP applied to clayey matrix materials, typical.
703.0	8.53	28									
										0.9(PP)	
					6-6	29	18.4	17.93	114.2	0.38(UU)	
699.0	9.75	32									
695.0	10.97	36	3" sand lense at ~34.5'		6-7	32	15.0	18.60	118.5	2.0(PP)	
			? ? ? ? ? ?								
			Dark gray clayey fine SAND very wet, loose?**(FRANCISCAN COMPLEX)**	▽ SC SP							
691.0	12.19	40									

(Continued on next page)

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **731.0 feet**	LOG I.D. **A-99-006**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **15.0 feet (seepage zone)**	DATE PERFORMED: **3 November 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **see "NOTE" this page**	APPROXIMATE BORING LOCATION: **"M1" STA 23+7.1**	APPROX. DISTANCE FROM EXISTING CL: **approx. 184.1 ft. right**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION (continued from previous page)	SOIL TYPE	SAMPLER	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
					SC SP		6-8	11	14.2	19.88	126.6		6-8ii: G=9;S=62;M=19;C=10 excessive water in hole (aquifer?)
687.0	13.41	44		? ? ? ? ? ? Grey slightly sandy GRAVEL, very wet, dense **(FRANCISCAN COMPLEX)** rounded to sub-angular gravels composed of greywacky (sandstone), some chert, 3/8" to 1" diameters, trace clay	GP		6-9	*50/4					rocky drilling
683.0	14.63	48					6-10	*50/1					No Recovery
679.0	15.85	52		**Boring terminated at 49.0';** **A free groundwater table was encountered while drilling around 39 feet within possible permeable stratum below 38 feet. Free water also encountered around 15 feet depth which is possibly a perched condition above clayey materials around 20.5 feet depth.**									

NOTE: Slope inclinometer pipe installed in annulus: lined to ~23.5' depth with filter sand; betonite plug at 22.5' to 23.5' depth; Class 2 AB type materials place to ground surface; 4" bentonite plug placed at ground surface; 3/16" dia. holes drilled for bottom 25 feet @ 3" o.c., staggered, for perforation.

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EA: 01-476601	**LOG OF BORING NO. A-99-006**	
Date: May-2011		
01-MEN-128 PM 34.5/35.5		PLATE NO.
FOUNDATION REPORT		**B-9b**

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **736.2 feet**	LOG I.D. **A-99-007**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **38.0 feet (perched?)**	DATE PERFORMED: **4 November 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **see "NOTE" next page**	APPROXIMATE BORING LOCATION: **"M1" STA 21+44.4**	APPROX. DISTANCE FROM EXISTING CL: **approx. 90.3 ft. right**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
			Brown sandy GRAVEL with some clay damp, medium dense	GC GP							
732.2	1.22	4									
			rocky drilling at 4'		7-1	47					No Recovery: (possible rock obstruction at shoe)
			easy efffort drilling to 9.5', very clayey								
728.2	2.44	8									
			red-brown in color, moist		7-2	15	15.6				
724.2	3.66	12	Dark gray very clayey GRAVEL with sand moist, soft to firm clayey matrix materials **(FRANCISCAN COMPLEX)**	CL GC							
720.2	4.88	16	black, laminated angular gravels (splintery), with some green in color; clay matrix exhibits contorted texture		7-3	21	19.2	16.92	107.8		NOTE: PP applied to clayey matrix materials, typical.
716.2	6.10	20	less gravelly, sub-rounded gravels exhibit conchoidal fracturing and soapy feel (serpentine)		7-4	26	9.3			1.0(PP)	
712.2	7.32	24	gravels floating in stiff to v. stiff clay matirx (melange "block & matrix" materials)							1.0(PP)	
					7-5	27	14.8	18.32	116.7	0.77(UU)	
708.2	8.53	28									
704.2	9.75	32	some gravel, very clayey, very stiff white veins (caliche?)		7-6	25	14.6	19.33	123.1	1.0(PP)	**Bulk H:** 36'-39' PI=23; LL=40 GRAD: G=7;S=47;M=22;C=24
700.2	10.97	36	trace gravel, clay exhibits shiny surface when broken, moderate organic odor		7-7	61				1.2(PP)	COR: pH = 9.0 R = 1100 Ohm-cm Cl = < 25 SO_4 = < 25
696.2	12.19	40	bit pulled for sampling, water level noted @ 38' on rod								

(Continued on next page)

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **736.2 feet**	LOG I.D. **A-99-007**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **38.0 feet (perched?)**	DATE PERFORMED: **4 November 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **see "NOTE" this page**	APPROXIMATE BORING LOCATION: **"M1" STA 21+44.4**	APPROX. DISTANCE FROM EXISTING CL: **approx. 90.3 ft. right**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION (continued from previous page)	SOIL TYPE	SAMPLER	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
				modrerate organic odor	CL			79/11				1.7(PP)	
					GC		7-8		14.4	19.42	123.7		
				rocky, hard drilling at 42' and below									
692.2	13.41	44		very hard greenstone									
				(FRANCISCAN COMPLEX)			7-9	*50/0.5					No Recovery
688.2	14.63	48											

Boring terminated at 45' due to practical refusal in rock;

A free groundwater table was encountered around 38 feet, possibly a perched condition above rock at 42 feet.

NOTE: Slope inclinometer pipe installed in annulus: lined full depth with filter sand; 8" bentonite plug placed at ground surface; 3/16" dia. holes drilled bottom 20 feet @ 3" o.c., staggared, for perforation.

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **757.9 feet**	LOG I.D. **A-99-008**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **10 feet (perched?)**	DATE PERFORMED: **18 November 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **Slope inclinometer pipe installed in annulus: lined full depth with sand; 3/16" dia. holes drilled bottom 20 feet @ 3" o.c., staggered, for perforation.**	APPROXIMATE BORING LOCATION: **"M1" STA 24+44.8**	APPROX. DISTANCE FROM EXISTING CL: **approx. 109.8 ft. right**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
			Light brown sandy GRAVEL with some clay damp, medium dense	GC GP							
753.9	1.22	4			8-1	20					No Recovery
749.9	2.44	8	light to red-brown in color (Fe oxidation) rock fabric evident, moderately weathered								
			becomes gray in color at 11'		8-2	16	14.1	17.79	113.3		hole set open for 1 hour after 8-2 sampling; some free water measured
745.9	3.66	12	Dark gray very clayey GRAVEL with sand moist, firm clayey matrix materials **(FRANCISCAN COMPLEX)** (melange "block & matrix" materials)	CL GC	8-3	17	18.1	18.20	115.9	0.8(PP)	
741.9	4.88	16	black, sub-rounded gravels to 3/8" diameter exhibiting conchoidal fracturing and soapy feel (serpentine?)								NOTE: PP applied to clayey matrix materials, typical.
737.9	6.10	20	black sub-rounded gravels to 3/4" diameter with silky luster; some green gravel, white mottling (caliche)		8-4	28	9.8	19.64	125.1	1.7(PP)	
733.9	7.32	24	green and black gravel as above clay matrix exhibits contorted appearance		8-5	17	8.5	18.26	116.3	1.7(PP)	
729.9	8.53	28	rocky drilling below 26' hard greenstone **(FRANCISCAN COMPLEX)** very hard drilling at 28' and below		8-6	*50/0.5					No Recovery
725.9	9.75	32	**Boring terminated at 28.5' due to practical refusal in rock;** **A free groundwater table was measure in hole while drilling around 10 feet, possibly a perched condition above clayey materials at 11 feet.**								
721.9	10.97	36									
717.9	12.19	40									

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Office of Geotechnical Design - North

EA: 01-476601
Date: May-2011

LOG OF BORING NO. A-99-008

01-MEN-128 PM 34.5/35.5

FOUNDATION REPORT

PLATE NO. **B-11**

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **766.4 feet**	LOG I.D. **A-99-009**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **none noted**	DATE PERFORMED: **19 November 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **Slope inclinometer pipe installed in annulus: lined full depth with sand; 3/16" dia. holes drilled bottom 20 feet @ 3" o.c., staggered, for perforation.**	APPROXIMATE BORING LOCATION: **"M1" STA 21+80.6**	APPROX. DISTANCE FROM EXISTING CL: **approx. 59.7 ft. left**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
			Dark red-brown sandy GRAVEL with some clay moist, medium dense **(fill)**	GC GP								
762.4	1.22	4	very gravelly, hard sub-angular to angular gravels									
						9-1	18	17.8	18.46	117.6		
758.4	2.44	8										
754.4	3.66	12				**9-2**	26	12.2	22.03	140.3		
750.4	4.88	16	asphalt concrete particles			**9-3**	39	7.4	21.04	134.0		
746.4	6.10	20				**9-4**	21					
			rocky drilling at 23', cuttings become gray in color									
742.4	7.32	24	Dark gray very clayey GRAVEL moist medium dense (FRANCISCAN COMPLEX)	CL GC								
738.4	8.53	28	black and green, sub-rounded gravels exhibiting conchoidal fracturing (serpentine?) clay matrix exhibits contorted appearance, very stiff (melange "block & matrix" materials)			**9-5**	27	13.1	19.94	127.0	1.2 (PP)	NOTE: PP applied to clayey matrix materials, typical.
734.4	9.75	32				**9-6**	48	10.8	21.13	134.6	2.0 (PP)	
730.4	10.97	36										
726.4	12.19	40										

(Continued on next page)

DRILL RIG: **Acker AD2**	GROUND SURFACE ELEVATION: **766.4 feet**	LOG I.D. **A-99-009**
BORING DIAMETER: **8 inches**	DEPTH TO GROUND WATER DURING DRILLING: **none noted**	DATE PERFORMED: **19 November 1999**
DRILLING METHOD: **Hollow Stem Augering**	SAMPLING METHOD: **Auto-Hammer; 140# dropped 30"**	LOGGED BY: **M. Hagy**
BACKFILL NOTES: **Slope inclinometer pipe installed in annulus: lined full depth with sand; 3/16" dia. holes drilled bottom 20 feet @ 3" o.c., staggared, for perforation.**	APPROXIMATE BORING LOCATION: **"M1" STA 21+80.6**	APPROX. DISTANCE FROM EXISTING CL: **approx. 59.7 ft. left**

ELEVATION (feet)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION (continued from previous page)	SOIL TYPE	SAMPLER	SAMPLE NO.	DRIVING DATA	WATER CONTENT %	DRY DENSITY kN/m³	pcf	S_u (TEST TYPE) kg/cm²;tsf	ADDITIONAL COMMENTS AND TESTS
				black, sub-rounded gravels to 3/8" diameter exhibiting soapy feel (serpentine?)	CL GC		**9-7**	69	10.1	20.82	132.6	> 2.2 (PP)	
				hard, high plasticity clay matrix									
722.4	13.41	44											
718.4	14.63	48											
				very gravelly			**9-8**	84	11.5	20.08	127.9	1.5 (PP)	
				Boring terminated at 50';									
714.4	15.85	52		**A free groundwater table was not encountered.**									

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EA:	01-476601
Date:	May-2011

LOG OF BORING NO. A-99-009

01-MEN-128 PM 34.5/35.5

FOUNDATION REPORT

PLATE NO. **B-12b**

MEN-128-35.0/35.2

CALTRANS State of California

LOG OF EXPLORATORY BORING

E A No. 211403 DATE 11-28-89 BORING No. B-1

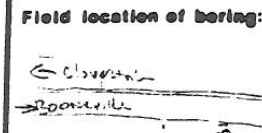
LOCATION 75' Lt STA 104 + 23 ± ℄ CONST

PROJECT Shearing Creek Landslide Study

LOGGED BY SSW DRILLER KB, SS

87-52 Sheet 1/1

Field location of boring:



Top of Pvc Elev 527.49
Ground Elev. 527.0

Survey notes on back of log
Surveyed By SSW
Datum Culvert Inlet FROM AS-Builts

Drilling method Hollow Stem Auger

Hole dia. 6"

Casing Installation date 36' of 1.5" Perforated PVC PIPE - Used 1 Bag of Monterey Sand at the Bottom of Hole - Filled Remaining Annules with Cuttings

Water level	35.5-36	Dry Cave at 27		
Time	During Drilling	Material in Pvc		
Date	11-28-89	12-5-89		

Type of Sample	Blows/ft. or Pressure PSI (140#)	REMARKS	Depth	Sample	Soil Group Symbol (U.S.C.S.)	DESCRIPTION
			2		FILL	BROWN, Silty AND Clayey, SAND AND FINE gravel FILL, Slightly moist to moist
			4			
			6			
			8			
			10			
			12			
			14			
			16			14-18': Permeable material, DRY
			18			
1.4 SS	9-11-15 (26)	BROWN Clayey and Silty Sandy Fine GRAVEL Sl. moist to moist	20			
			22			
			24		OG / FIG	
		Rock				
1.4 SS	12-10-7 (17)	GRAY Hor. laminated Sandstone And Shale moist	26			GRAY Laminated AND Sheared Shale with and minor sandstone Rounded Fine GRAVEL Clasts. Shistose texture Shale weathered to a Silty Clay, Slightly moist except FOR A 2" THICK Crushed Sandstone Layer where Free Water WAS present
		Gray cuttings	28			
		Depth of Form FROM As-Built				
1.4" SS	8-21-18 (39)	GRAY Laminated Shale (Clay) With Small to Sized Rounded Shale GRAVEL - moist	30			
			32			
			34			
1.4" SS	7-8-11 (19)		36			
			38			Bottom of Hole 36.5'
			40			

FIELD BORING LOG NO. A-89-001 Plate No. B-13

MEN-128-35.0/35.2

CALTRANS State of California

LOG OF EXPLORATORY BORING

E & A No. 211403 DATE 11-29-89

LOCATION 11' ft of STA 104+31 ℄ CONST

PROJECT SHOARING CREEK Landslide Study

LOGGED BY SSW DRILLER KB/SS

BORING No. B-2 89-53 Sheet 1/1

Field location of boring: PM 35.07

Boonville

TOP of PVC Elev 529.38 Ground Elev. 529.0

Surveyed By SSW

Datum See Survey notes on back of B-1 Log

Drilling method Hollow Stem Auger

Hole dia. 6"

Casing Installation data 45' of 1.5" perforated PVC Pipe - Perm will come around pipe thus no sand required - Backfilled remaining annules with cuttings

Water level	36.1	39.40		
Time	During Drilling	1000 HRS		
Date	11-29-89	12-5-89		

Type of Sample	Blows/ft. or Pressure PSI	REMARKS	Depth	Sample	Soil Group Symbol (U.S.C.S.)	DESCRIPTION
			2		FILL	Brown, Silty and Clayey Sand and Gravel FILL Slightly moist to moist
			4			
			6			
			8			
			10			
			12			
			14			
			16			
			18			
			20			
			22			
			24			
		End of Shift				
1.4"SS	9-9-14	Begin Drill 11-29-89	26			
	(23)	Rods wet - sample dry				
		FILL	28			
		Added water for drilling				
1.4"SS	5-5-4		30			
	(14)					
			32			
			34		Perm	Class 1 Permeable Material, wet 1" above base, filter fabric at contact
	4-3-6					
1.4"SS	(9)		36			
			38			Gray laminated and sheared shale with minor sandstone, shistose texture wet at contact
			40			
			42			
			44			Bottom of boring 45'

HEN-128-55.0/35.2

CALTRANS State of California

LOG OF EXPLORATORY BORING

E.A. No. 211403 DATE 11-29-89

LOCATION 100' LT STA 105+28 ℄ CONST ±

PROJECT Shearing Creek Landslide Study

LOGGED BY SSW DRILLER KB, SS

BORING No. B-3

8954

Sheet 1

Field location of boring: PM 35.07

Cloverdale ←

Bromeville →

B3 ← 100' → B-1 (B-2)

Ground Elev. 536.3 (Top of Pipe Elev 539.41)

Surveyed By SSW

Datum See Survey notes on back of Drill log

Drilling method Hollow Stem Augers

Hole dia. 6"

Casing installation date 49' of 1.5' Perforated PVC Pipe - Perm will come around pipe thus no sand required. Backfilled remaining annules with cuttings

Water level	DRY to 49'			
Time	1000 HRS			
Date	12-5-89			

Type of Sample	Blows/ft. or Pressure PSI	REMARKS	Depth	Sample	Soil Group Symbol (U.S.C.S.)	DESCRIPTION
			2		FILL	BROWN Silty and Clayey Sand and gravel fill slightly moist to moist
			4			
			6			
			8			
			10			
			12			
			14			
			16			
			18			
			20			
			22			
			24			
		Added water for drilling	26			
			28			
			30			
			32			
			34			
1.4"SS	S-3-6 (9)		36			
			38			
			40			CLASS I PERMEABLE MATERIAL
	11-13-21 (34)	Pen at Perm from 42' ↓	42			GRAY SHEARED SILTY CLAY WITH ALTERED SERPENTINE WITH LAMINATIONS - SLIGHTLY MOIST TO MOIST
		Added water for drilling	44			
			46			

FIELD BORING LOG NO. A-89-003 Plate No. B-15

MEN-128-35.0/35.2

CALTRANS State of California

LOG OF EXPLORATORY BORING

E A No. 211403 DATE 12-6-89

LOCATION 76 MI STA 104+30 ℄ CONST

PROJECT Shearing Creek Landslide Study

LOGGED BY SSW DRILLER EC, KB

BORING No. B-4 (SI-1) 89-55 Sheet 1/2

Field location of boring: Downhill → Slope down

[≈ 52' to River Elev]

Surveyed By SSW

Datum See Survey Notes on B-1 Log

Ground Elev. 307.4

Drilling method Mud Rotary

Hole dia. 4 1/2"

Casing installation date 60' of 2.75" Aluminum Slope Indicator Casing, Used 5 Bags of Aquarium Sand Backfill

Cool-Dry 93 Lm

Water level				
Time				
Date				

Type of Sample	Blows/ft. or Pressure PSI	REMARKS	Depth	Sample	Soil Group Symbol (U.S.C.S.)	DESCRIPTION
	140#	HD out 8'				
			2			Random Clayey and Silty, Sand and Gravel Moist
			4			
			6			
			8			
			10			
			12			
			14			
1.4"SS	10-8-13 (21)		16			
			18			
			20			
			22			
			24			
			26			
			28			
1.4"SS	24-46-32 (78)		30			
			32			Blue Green Sheared Shale which has altered to a Silty Clay with a Shiatsoe texture, scattered fine gravel clasts floating in the sheared matrix moist to very moist. Gravels are sheared and slickensided - thin Serpentine interbeds
			34			
			36			
			38			
			40			
			42			
2" Mod	500 9	8" Mandrel				
Undist	500 20	Send Line to Lab				
		500 of Shelby				
		Rock - [illegible]				

FIELD BORING LOG NO. R-89-004 Plate No. B-16a

MRN-128-35.0 /35.2

CALTRANS State of California

LOG OF EXPLORATORY BORING

E A No. 211403 DATE 12-6-89

LOCATION 76' Rt STA 104+30 ℄ CONST

PROJECT Shearing Creek Landslide Study

LOGGED BY SSW DRILLER EC/KB

BORING No. B-4(SI-1) 89-55

Sheet 2/2

Field location of boring:

Ground Elev. Surveyed By Datum

Drilling method Mud Rotary

Hole dia. 4 1/2

Casing installation date

Water level				
Time				
Date				

Type of Sample	Blows/ft. or Pressure PSI	REMARKS	Depth	Sample	Soil Group Symbol (U.S.C.S.)	DESCRIPTION
			46			
			48			
			50			
14"ss	10-14-22 (36)		52			
			54			
		DRILLING FIRMS	56			
		SANDSTONE cuttings	58			
		IN and out of Floaters	60			Bottom of Boring 60'
			62			
			64			
			66			
		~~Hard Crack at Bottom~~	68			
		~~TNO Sample~~	70			
			72			

FIELD BORING LOG NO. R-89-004 Plate No. B-16b

Appendix B-2

Boring Logs

(Phase 2)

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic / Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTS

C	Consolidation (ASTM D 2435-04)
CL	Collapse Potential (ASTM D 5333-03)
CP	Compaction Curve (CTM 216 - 06)
CR	Corrosion, Sulfates, Chlorides (CTM 643 - 99; CTM 417 - 06; CTM 422 - 06)
CU	Consolidated Undrained Triaxial (ASTM D 4767-02)
DS	Direct Shear (ASTM D 3080-04)
EI	Expansion Index (ASTM D 4829-03)
M	Moisture Content (ASTM D 2216-05)
OC	Organic Content (ASTM D 2974-07)
P	Permeability (CTM 220 - 05)
PA	Particle Size Analysis (ASTM D 422-63 [2002])
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00)
PL	Point Load Index (ASTM D 5731-05)
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value (CTM 301 - 00)
SE	Sand Equivalent (CTM 217 - 99)
SG	Specific Gravity (AASHTO T 100-06)
SL	Shrinkage Limit (ASTM D 427-04)
SW	Swell Potential (ASTM D 4546-03)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D 2166-06) Unconfined Compression - Rock (ASTM D 2938-95)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850-03)
UW	Unit Weight (ASTM D 4767-04)
VS	Vane Shear (AASHTO T 223-96 [2004])

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler
- Modified California Sampler
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (short-term)
- Static Water Level Reading (long-term)

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REPORT TITLE
BORING RECORD LEGEND

DIST.	COUNTY	ROUTE	POSTMILE	EA
01	Mendocino	128	D34.5/D35.5	01-476601

PROJECT OR BRIDGE NAME
Smoot Sink

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
			1 of 3

CONSISTENCY OF COHESIVE SOILS

Descriptor	Unconfined Compressive Strength (tsf)	Pocket Penetrometer (tsf)	Torvane (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 - 0.50	0.25 - 0.50	0.12 - 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 - 1.0	0.50 - 1.0	0.25 - 0.50	Can be penetrated several inches by thumb with moderate effort
Stiff	1.0 - 2.0	1.0 - 2.0	0.50 - 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2.0 - 4.0	2.0 - 4.0	1.0 - 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

APPARENT DENSITY OF COHESIONLESS SOILS

Descriptor	SPT N_{60} - Value (blows / foot)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Descriptor	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Descriptor	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

SOIL PARTICLE SIZE

Descriptor		Size
Boulder		> 12 inches
Cobble		3 to 12 inches
Gravel	Coarse	3/4 inch to 3 inches
	Fine	No. 4 Sieve to 3/4 inch
Sand	Coarse	No. 10 Sieve to No. 4 Sieve
	Medium	No. 40 Sieve to No. 10 Sieve
	Fine	No. 200 Sieve to No. 40 Sieve
Silt and Clay		Passing No. 200 Sieve

PLASTICITY OF FINE-GRAINED SOILS

Descriptor	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CEMENTATION

Descriptor	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

NOTE: This legend sheet provides descriptors and associated criteria for required soil description components only. Refer to Caltrans Soil and Rock Logging, Classification, and Presentation Manual (July 2007), Section 2, for tables of additional soil description components and discussion of soil description and identification.

ROCK GRAPHIC SYMBOLS

IGNEOUS ROCK

SEDIMENTARY ROCK

METAMORPHIC ROCK

BEDDING SPACING

Descriptor	Thickness or Spacing
Massive	> 10 ft
Very thickly bedded	3 to 10 ft
Thickly bedded	1 to 3 ft
Moderately bedded	3-5/8 inches to 1 ft
Thinly bedded	1-1/4 to 3-5/8 inches
Very thinly bedded	3/8 inch to 1-1/4 inches
Laminated	< 3/8 inch

WEATHERING DESCRIPTORS FOR INTACT ROCK

	Diagnostic Features					
	Chemical Weathering-Discoloration-Oxidation		Mechanical Weathering and Grain Boundary Conditions	Texture and Solutioning		
Descriptor	Body of Rock	Fracture Surfaces		Texture	Solutioning	General Characteristics
Fresh	No discoloration, not oxidized	No discoloration or oxidation	No separation, intact (tight)	No change	No solutioning	Hammer rings when crystalline rocks are struck.
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.
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.
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 (refer to grain boundary conditions)	All fracture surfaces are discolored or oxidized; surfaces are friable	Partial separation, rock is friable; in semi-arid conditions, granitics are disaggregated	Altered by chemical disintegration such as via hydration or 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.
Decomposed	Discolored of 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. Resistant minerals such as quartz may be present as "stringers" or "dikes".

Note: Combination descriptors (such as "slightly weathered to fresh") are used where equal distribution of both weathering characteristics is present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, combination descriptors should not be used where significant identifiable zones can be delineated. Only two adjacent descriptors shall be combined. "Very intensely weathered" is the combination descriptor for "decomposed to intensely weathered".

RELATIVE STRENGTH OF INTACT ROCK

Descriptor	Uniaxial Compressive Strength (psi)
Extremely Strong	> 30,000
Very Strong	14,500 - 30,000
Strong	7,000 - 14,500
Medium Strong	3,500 - 7,000
Weak	700 - 3,500
Very Weak	150 - 700
Extremely Weak	< 150

ROCK HARDNESS

Descriptor	Criteria
Extremely Hard	Specimen cannot be scratched with pocket knife or sharp pick; can only be chipped with repeated heavy hammer blows
Very hard	Specimen cannot be scratched with pocket knife or sharp pick; breaks with repeated heavy hammer blows
Hard	Specimen can be scratched with pocket knife or sharp pick with heavy pressure; heavy hammer blows required to break specimen
Moderately Hard	Specimen can be scratched with pocket knife or sharp pick with light or moderate pressure; breaks with moderate hammer blows
Moderately Soft	Specimen can be grooved 1/6 in. with pocket knife or sharp pick with moderate or heavy pressure; breaks with light hammer blow or heavy hand pressure
Soft	Specimen can be grooved or gouged with pocket knife or sharp pick with light pressure, breaks with light to moderate hand pressure
Very Soft	Specimen can be readily indented, grooved, or gouged with fingernail, or carved with pocket knife; breaks with light hand pressure

CORE RECOVERY CALCULATION (%)

$$\frac{\Sigma \text{ Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \times 100$$

RQD CALCULATION (%)

$$\frac{\Sigma \text{ Length of intact core pieces > 4 in.}}{\text{Total length of core run (in.)}} \times 100$$

FRACTURE DENSITY

Descriptor	Criteria
Unfractured	No fractures
Very Slightly Fractured	Lengths greater 3 ft
Slightly Fractured	Lengths from 1 to 3 ft, few lengths outside that range
Moderately Fractured	Lengths mostly in range of 4 in. to 1 ft, with most lengths about 8 in.
Intensely Fractured	Lengths average from 1 in. to 4 in. with scattered fragmented intervals with lengths less than 4 in.
Very Intensely Fractured	Mostly chips and fragments with few scattered short core lengths

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REPORT TITLE				
BORING RECORD LEGEND				
DIST. 01	COUNTY Mendocino	ROUTE 128	POSTMILE D34.5/D35.5	EA 01-476601
PROJECT OR BRIDGE NAME Smoot Sink				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET of

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
H. AkbarZadegan	4-21-09	4-21-09	NAD83	RC-09-001
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans			4.72' Rt Sta 23+74.11M1	784.0 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			Acker AD2	4.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT, Punch Core, Diamond Bit Core			Automatic (140#/30 in.)	83%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Perforated SI pipe with sanded annulus			36.7 ft on 5-12-09	80.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT CONCRETE (22 feet).		1			100							finger bit with "punch" core
	1														
782.00	2														
	3														
780.00	4														
	5				2			50							
778.00	6														
	7														
776.00	8														
	9														
774.00	10				3			50							
	11														
772.00	12														
	13														
770.00	14														
	15				4			30							
768.00	16														
	17														
766.00	18														
	19														
764.00	20				5			30							20 feet: Depth of movement
	21														
762.00	22		Well-graded GRAVEL with CLAY and SAND (GW-GC); medium dense; light brown and greenish gray; moist; some SAND, from coarse to fine; few fines.												lost drill fluid circulation at 22 feet depth
	23														
760.00	24														
	25				6	5 8 11	19								
758.00	26														
	27				7			43							25 to 30 feet depth: losing drill fluid into formation
756.00	28														
	29														
	30														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				RC-09-001
DIST. 01	COUNTY MEN	ROUTE 128	POSTMILE D34.5/D35.5	EA 01-476601
PROJECT OR BRIDGE NAME Smoot Sink				
BRIDGE NUMBER	PREPARED BY M. Hagy	DATE 4-6-11	SHEET 1 of 3	

5 BR - STANDARD MEN128PM35.GPJ CALTRANS_LIBRARY_DEC09.GLB 4/13/11

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Remarks
	30	Very dense; yellowish brown. Well-graded GRAVEL with CLAY and SAND (GW-GC) *(continued)*.	8	10 27 42	69			
752.00	32	Greenish gray.	9			71		
	33	Light brown.						
750.00	34							
	35	CLAYEY SAND with GRAVEL (SC); medium dense; light brown; moist; from fine to coarse SAND; some fine and coarse GRAVEL; little fines.	10			80		
748.00	36							
	37							
746.00	38							
	39							Sample 1-10; 39' to 40': PA
744.00	40		11	2 7 10	17			40 to 50 feet depth: losing drill fluid into formation, PP = 4.5 TSF
	41							
742.00	42		12			40		
	43							
740.00	44							
	45	SEDIMENTARY ROCK, (POORLY INDURATED SHALE); laminated; dark gray; fresh; soft; very intensely fractured; pervasively sheared; brecciated (CLAYEY SAND with GRAVEL (SC/CL); medium dense; moist; from coarse to fine SAND; from some to mostly fines; little fine GRAVEL). (FRANCISCAN COMPLEX).	13			33	0	
738.00	46							
	47							
736.00	48							PP = 4.5 TSF
	49							
734.00	50		14	6 8 11	19			
	51							
732.00	52		15			86	0	Sample 1-15; 52' to 53': PA & PI
	53							PP = 4.0 TSF
730.00	54							
	55		16			83	0	
728.00	56							
	57	METAMORPHIC ROCK, (GREENSTONE) greenish gray; fresh; very hard; slightly fractured. (FRANCISCAN COMPLEX).	17			70	70	57 feet depth: harder drilling resistance encountered; changing from finger bit to diamond bit; lost all drill fluid into formation
726.00	58							
	59							
724.00	60	Gray; very slightly fractured.	18			100	100	60 to 70 feet depth: lost all drill fluid into formation
	61							
722.00	62							
	63							
720.00	64							
	65	Light gray; from intensely to moderately fractured.	19			100	66	continued hard drilling resistance to 71.5 feet depth
	66							

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**RC-09-001**
DIST. **01**	COUNTY **MEN**	ROUTE **128**	POSTMILE **D34.5/D35.5**	EA **01-476601**
PROJECT OR BRIDGE NAME **Smoot Sink**				
BRIDGE NUMBER	PREPARED BY **M. Hagy**		DATE **4-6-11**	SHEET **2 of 3**

5 BR - STANDARD MEN128PM35.GPJ CALTRANS_LIBRARY_DEC09.GLB 4/13/11

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	66		METAMORPHIC ROCK *(continued)*.		19			100	66						Sample 1-19; 66.3' to 67.0': UC = 21,577 PSI
	67														
716.00	68														
	69		METAMORPHIC ROCK, (SERPENTINITE); greenish gray and black; fresh; hard; intensely fractured. (FRANCISCAN COMPLEX).												
714.00	70				20			67	0						
	71														
712.00	72		SEDIMENTARY ROCK, (POORLY INDURATED SHALE); laminated; dark gray; fresh; soft; very intensely fractured; pervasively sheared; brecciated (CLAYEY SAND with GRAVEL (SC/CL); medium dense; moist; from coarse to fine SAND; from some to mostly fines; little fine GRAVEL). (FRANCISCAN COMPLEX).												softer drilling below 71.5 feet depth; drilling fluid recirculating to ground surface
	73														
710.00	74														
	75				21			63	8						PP = 4.5 TSF
708.00	76														
	77		77 feet: SANDSTONE (GRAYWACKE) COBBLE, 5 inches.												77 feet depth: PP = 4.5 TSF
706.00	78														
	79														
704.00	80		Bottom of borehole at 80.0 ft bgs												
	81														
702.00	82														
	83														
700.00	84														
	85														
698.00	86														
	87														
696.00	88														
	89														
694.00	90														
	91														
692.00	92														
	93														
690.00	94														
	95														
688.00	96														
	97														
686.00	98														
	99														
684.00	100														
	101														
	102														

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REPORT TITLE				HOLE ID
BORING RECORD				RC-09-001
DIST. 01	COUNTY MEN	ROUTE 128	POSTMILE D34.5/D35.5	EA 01-476601
PROJECT OR BRIDGE NAME Smoot Sink				
BRIDGE NUMBER	PREPARED BY M. Hagy		DATE 4-6-11	SHEET 3 of 3

5 BR - STANDARD MEN128PM35.GPJ CALTRANS_LIBRARY_DEC09.GLB 4/13/11

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
H. AkbarZadegan	4-22-09	4-22-09	NAD83	RC-09-002
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans			7.63' Rt Sta 22+45.93M1	775.0 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			Acker AD2	4.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT, Punch Core, Diamond Bit Core			Automatic (140#/30 in.)	83%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Perforated SI pipe with sanded annulus			37.8 ft on 5-12-09	85.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT CONCRETE (26.5 feet).		1			60							finger bit with "punch" core
	1														
773.04	2														
	3														
771.04	4														
	5				2			85							
769.04	6														
	7														
767.04	8														
	9														
765.04	10				3			100							
	11														
763.04	12														
	13														
761.04	14														
	15				4			5							asphalt concrete blocking off at core bit
759.04	16														
	17														
757.04	18														
	19														
755.04	20				5			5							
	21														
753.04	22														
	23														
751.04	24														
	25				6			0							
749.04	26														
	27		Well-graded GRAVEL with CLAY and SAND (GW-GC); medium dense; light gray and reddish gray; moist; some SAND, from coarse to fine; few fines.												26.5 feet depth: Softer drilling resistance; fines washing out at return
747.04	28														
	29														
	30														

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REPORT TITLE				HOLE ID
BORING RECORD				RC-09-002
DIST.	COUNTY	ROUTE	POSTMILE	EA
01	MEN	128	D34.5/D35.5	01-476601
PROJECT OR BRIDGE NAME				
Smoot Sink				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	M. Hagy		4-6-11	1 of 3

5 BR - STANDARD MEN128PM35.GPJ CALTRANS_LIBRARY_DEC09.GLB 4/13/11

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	30	Well-graded GRAVEL with CLAY and SAND (GW-GC) *(continued)*.		7	6 13 12	25								
	31													
743.04	32			8										
	33	METAMORPHIC ROCK, (SERPENTINITE); greenish gray and light gray; fresh; hard; intensely and moderately fractured. (FRANCISCAN COMPLEX).		9			100	37						32.5 feet depth: change from finger bit to diamond bit
741.04	34													
	35			10			100	27						
739.04	36													
	37													Sample 2-10; 36.5' to 37.0': PL, UCS = 2,898 PSI
737.04	38													
	39	METAMORPHIC ROCK, (GREENSTONE); greenish gray; moderately and slightly weathered; hard; intensely and moderately fractured. (FRANCISCAN COMPLEX).												
735.04	40			11			86	42						
	41													
733.04	42													
	43													
731.04	44													
	45	Very hard, moderately fractured.		12			96	86						45 feet depth: very hard drilling resistance
729.04	46													Sample 2-12; 45.0' to 45.5': PL, UCS = 3,878 PSI
	47													
727.04	48													
	49													
725.04	50	SEDIMENTARY ROCK, (GRAYWACKE); fine-grained; massive; gray; slightly weathered and fresh; very hard; moderately fractured. (FRANCISCAN COMPLEX).		13			100	62						
	51													Sample 2-13; 50.5' to 51.0': PL, UCS = 3,312 PSI
723.04	52													
	53													
721.04	54													
	55	SEDIMENTARY ROCK, (POORLY INDURATED SHALE); laminated; dark gray; fresh; soft; very intensely fractured; pervasively sheared; brecciated (CLAYEY SAND with GRAVEL (SC/CL); medium dense; moist; from coarse to fine SAND; from some to mostly fines; little fine GRAVEL). (FRANCISCAN COMPLEX).		14			56	0						PP = 4.5 TSF
719.04	56													
	57													
717.04	58													
	59													
715.04	60			15			90	0						60 feet: Depth of movement
	61													
713.04	62													
	63	63 feet: SANDSTONE (GRAYWACKE) COBBLE, 5 inches.												
711.04	64													
	65			16			82	0						
	66													

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Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				RC-09-002
DIST. 01	COUNTY MEN	ROUTE 128	POSTMILE D34.5/D35.5	EA 01-476601
PROJECT OR BRIDGE NAME Smoot Sink				
BRIDGE NUMBER	PREPARED BY M. Hagy		DATE 4-6-11	SHEET 2 of 3

5 BR - STANDARD MEN128PM35.GPJ CALTRANS_LIBRARY_DEC09.GLB 4/13/11

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	66		SEDIMENTARY ROCK *(continued)*.		16			82	0						
	67														
707.04	68														
	69														
705.04	70				17			20	0						
	71														
703.04	72														
	73														
701.04	74														
	75				18			60	0						
699.04	76														
	77														PP = 4.0 TSF; TV = 3.0 TSF
697.04	78														
	79		Dark gray and very dark gray.												
695.04	80				19			40	0						
	81														
693.04	82														
	83														
691.04	84		SEDIMENTARY ROCK, (GRAYWACKE); fine-grained; massive; light gray; fresh; hard; moderately fractured. (FRANCISCAN COMPLEX).												
	85														
689.04	86		Bottom of borehole at 85.0 ft bgs												
	87														
687.04	88														
	89														
685.04	90														
	91														
683.04	92														
	93														
681.04	94														
	95														
679.04	96														
	97														
677.04	98														
	99														
675.04	100														
	101														
	102														

Department of Transportation
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Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				RC-09-002
DIST. 01	COUNTY MEN	ROUTE 128	POSTMILE D34.5/D35.5	EA 01-476601
PROJECT OR BRIDGE NAME Smoot Sink				
BRIDGE NUMBER	PREPARED BY M. Hagy		DATE 4-6-11	SHEET 3 of 3

5 BR - STANDARD MEN128PM35.GPJ CALTRANS_LIBRARY_DEC09.GLB 4/13/11

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
H. AkbarZadegan	4-28-09	4-28-09	NAD83	RC-09-003
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans			12.70' Rt Sta 21+51.85M1	769.4 ft NAVD88
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			Acker AD2	4.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT, Punch Core, Diamond Bit Core			Automatic (140#/30 in.)	83%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Perforated SI pipe with sanded annulus			45.1 ft on 5-12-09	80.0 ft

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0	ASPHALT CONCRETE (12.5 feet).		1			100							finger bit with "punch" core
767.35	2													
765.35	4													
	5			2			100							
763.35	6													
761.35	8													
759.35	10			3			80							
757.35	12													
	13	SILTY SAND (SM); brown; moist; from coarse to fine sand; some fines.												
755.35	14	ASPHALT CONCRETE (7 feet).												
	15			4			80							
753.35	16													
751.35	18													
749.35	20	SILTY GRAVEL with SAND (GM); medium dense; greenish gray; wet; coarse and fine GRAVEL; some from coarse to fine SAND; some fines (FILL).		5			40							Fines and sand washing out at return
747.35	22													
745.35	24													
	25			6	5 6 6	12								
743.35	26													
	27			7										
741.35	28													
	29													
	30													

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				RC-09-003
DIST. 01	COUNTY MEN	ROUTE 128	POSTMILE D34.5/D35.5	EA 01-476601
PROJECT OR BRIDGE NAME Smoot Sink				
BRIDGE NUMBER	PREPARED BY M. Hagy		DATE 4-6-11	SHEET 1 of 3

5 BR - STANDARD MEN128PM35.GPJ CALTRANS_LIBRARY_DEC09.GLB 4/13/11

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	30	CLAYEY SAND with GRAVEL (SC); medium dense, light reddish brown; moist; from fine to coarse SAND; some fines; little fine and coarse GRAVEL.		8			40						
	31												
737.35	32												PP = 4.0 TSF
	33												
735.35	34	34 feet: olive and dark olive gray.											
	35			9	8 5 6	11							
733.35	36												
	37			10			43						
731.35	38												
	39												
729.35	40	40 feet: Dark gray.		11			12	0					40 to 45 feet depth: Relatively easy drilling resistance encountered on core run
	41												
727.35	42												
	43												
725.35	44	SEDIMENTARY ROCK, (POORLY INDURATED SHALE); laminated; dark gray; fresh; soft; very intensely fractured; pervasively sheared; brecciated (CLAYEY SAND with GRAVEL (SC/CL); medium dense; moist; from coarse to fine SAND; from some to mostly fines; little fine GRAVEL). (FRANCISCAN COMPLEX).											44 feet: Depth of movement
	45			12	3 6 9	15							
723.35	46												
	47			13			31	0					
721.35	48												
	49												
719.35	50			14	7 12 20	32							
	51												
717.35	52			15			26	0					
	53												
715.35	54												
	55			16			100	0					
713.35	56												PP = 4.0 TSF
	57												
711.35	58	SEDIMENTARY ROCK, (GRAYWACKE); fine-grained; massive; gray; slightly weathered; moderately hard and hard; intensely and moderately fractured. (FRANCISCAN COMPLEX).		17			100	33					57.5 to 62.5? feet depth: Hard drilling resistance encountered; change from finger bit to diamond bit
	59												
709.35	60	SEDIMENTARY ROCK, (POORLY INDURATED SHALE); laminated; dark gray; fresh; soft; very intensely fractured; pervasively sheared; brecciated (CLAYEY SAND with GRAVEL (SC/CL); medium dense; moist; from coarse to fine SAND; from some to mostly fines; little fine GRAVEL). (FRANCISCAN COMPLEX).		18			54	0					Sample 3-17; 59.5' to 60.0': PL, UCS = 5,058 PSI
	61												
707.35	62												
	63												62.5 feet depth: Relatively easier drilling resistance
705.35	64	METAMORPHIC ROCK, (SERPENTINITE); greenish gray and dark gray; slightly weathered; moderately hard; intensely and moderately fractured. (FRANCISCAN COMPLEX).											
	65			19			54	0					65 to 70 feet depth: Relatively easy drilling resistance encountered
	66	SEDIMENTARY ROCK, (POORLY INDURATED											

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				RC-09-003
DIST. 01	COUNTY MEN	ROUTE 128	POSTMILE D34.5/D35.5	EA 01-476601
PROJECT OR BRIDGE NAME Smoot Sink				
BRIDGE NUMBER	PREPARED BY M. Hagy		DATE 4-6-11	SHEET 2 of 3

5 BR - STANDARD MEN128PM35.GPJ CALTRANS_LIBRARY_DEC09.GLB 4/13/11

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	66		SHALE); laminated; dark gray; fresh; soft; very intensely fractured; pervasively sheared; brecciated (CLAYEY SAND with GRAVEL (SC/CL); medium dense; moist; from coarse to fine SAND; from some to mostly fines; little fine GRAVEL). (FRANCISCAN COMPLEX). SEDIMENTARY ROCK *(continued)*.		19			54	0						partially on core run
	67														
701.35	68														
	69														
699.35	70				20			28	0						
	71														
697.35	72														
	73														72.5 to 75 feet depth: Relatively easy drilling resistance encountered
695.35	74														
	75		SEDIMENTARY ROCK, (GRAYWACKE); fine-grained; massive; gray; moderately and slightly weathered; from moderately soft to moderately hard; very intensely fractured. (FRANCISCAN COMPLEX).		21			62	0						
693.35	76														
	77														
691.35	78														
	79														
689.35	80		Bottom of borehole at 80.0 ft bgs												
	81														
687.35	82														
	83														
685.35	84														
	85														
683.35	86														
	87														
681.35	88														
	89														
679.35	90														
	91														
677.35	92														
	93														
675.35	94														
	95														
673.35	96														
	97														
671.35	98														
	99														
669.35	100														
	101														
	102														

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REPORT TITLE				HOLE ID
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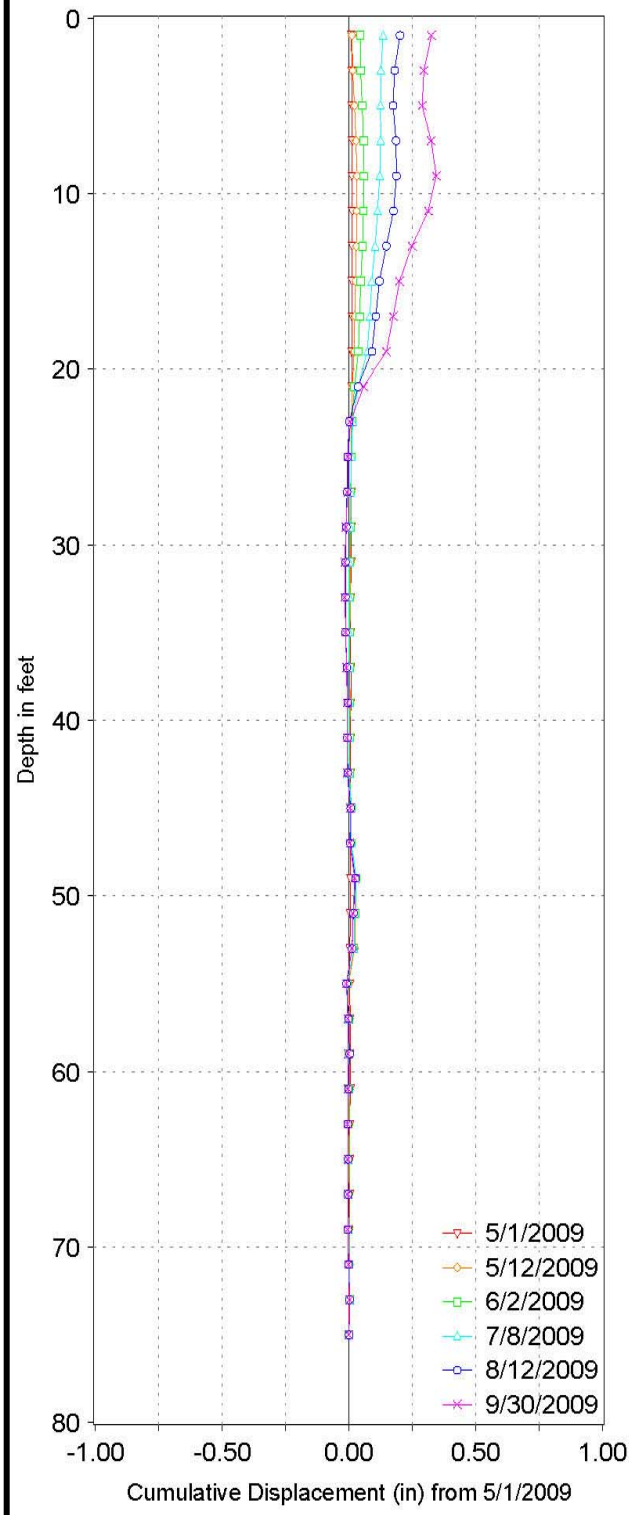
BRIDGE NUMBER	PREPARED BY M. Hagy		DATE 4-6-11	SHEET 3 of 3

5 BR - STANDARD MEN128PM35.GPJ CALTRANS_LIBRARY_DEC09.GLB 4/13/11

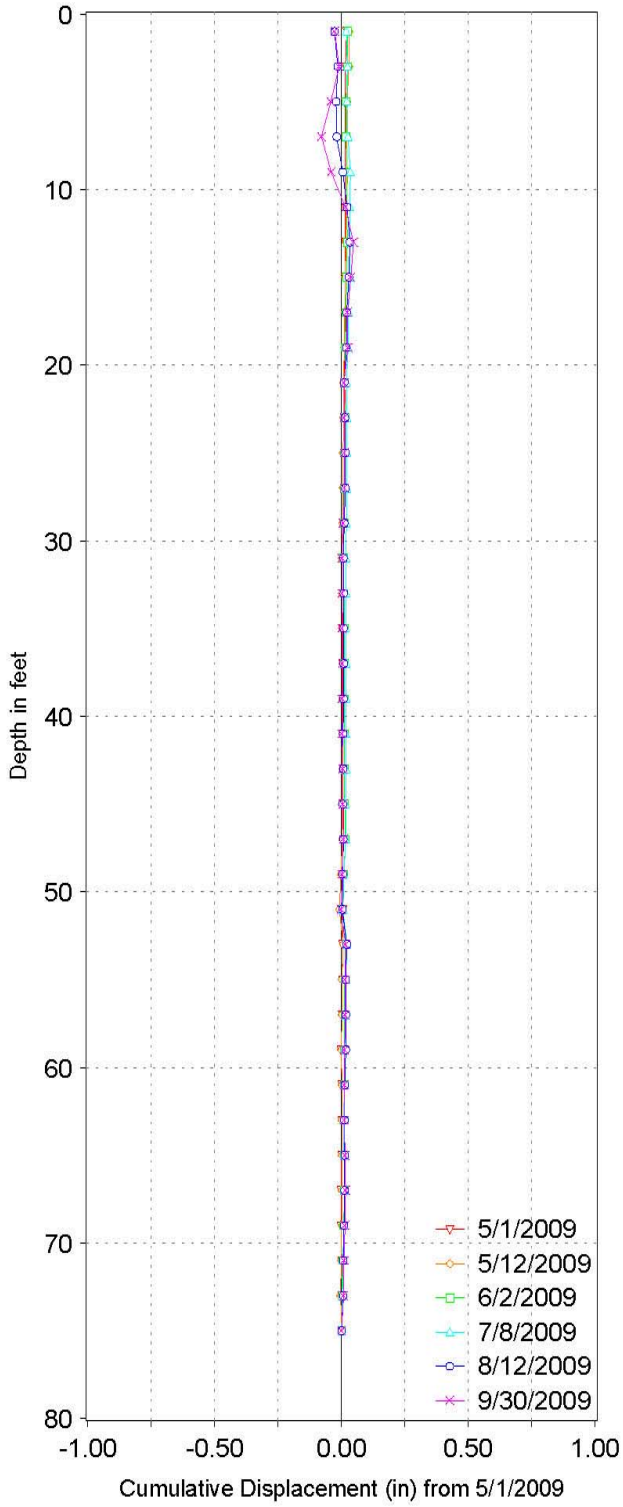
Appendix C

Slope Inclinometer Data

RC-09-001; A-Axis



RC-09-001; B-Axis



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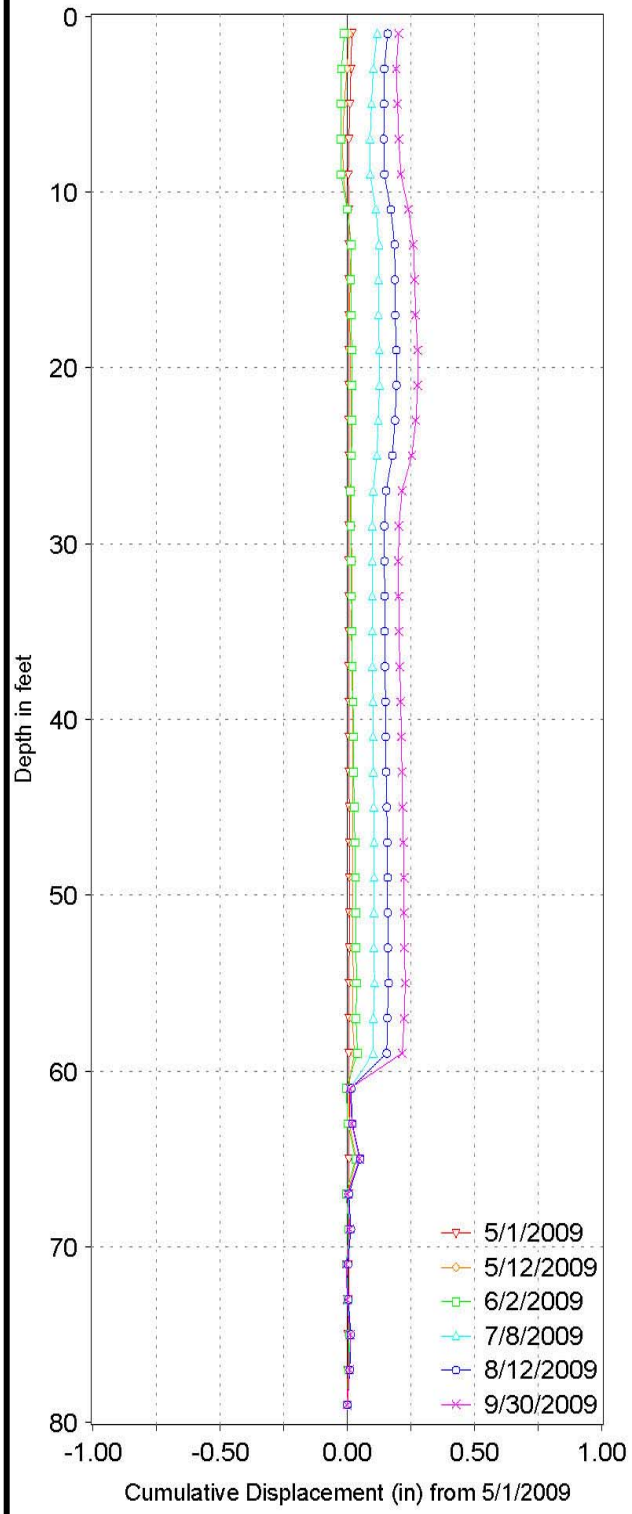
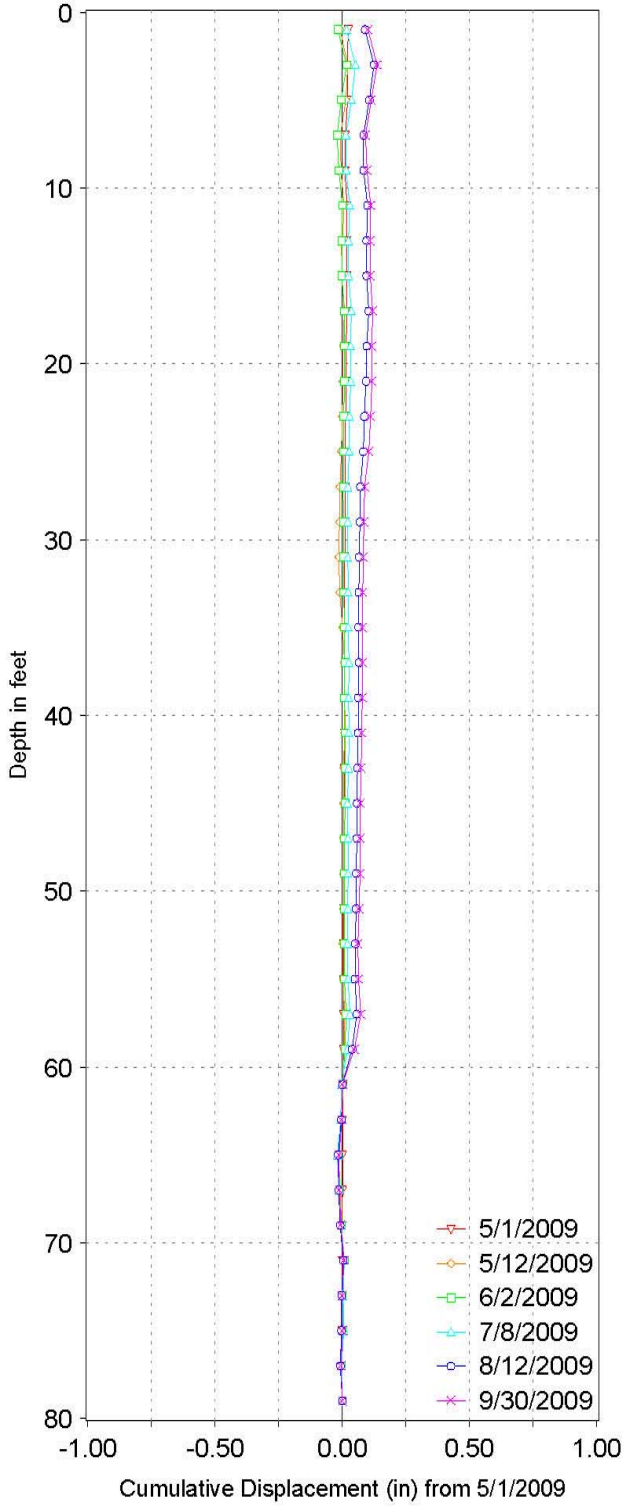
EA: 01-476601	**SLOPE INCLINOMETER RESULTS FOR RC-09-001**
Date: May 2011	
01-MEN-128; PM 34.5-35.5 FOUNDATION REPORT	Plate No. C-1

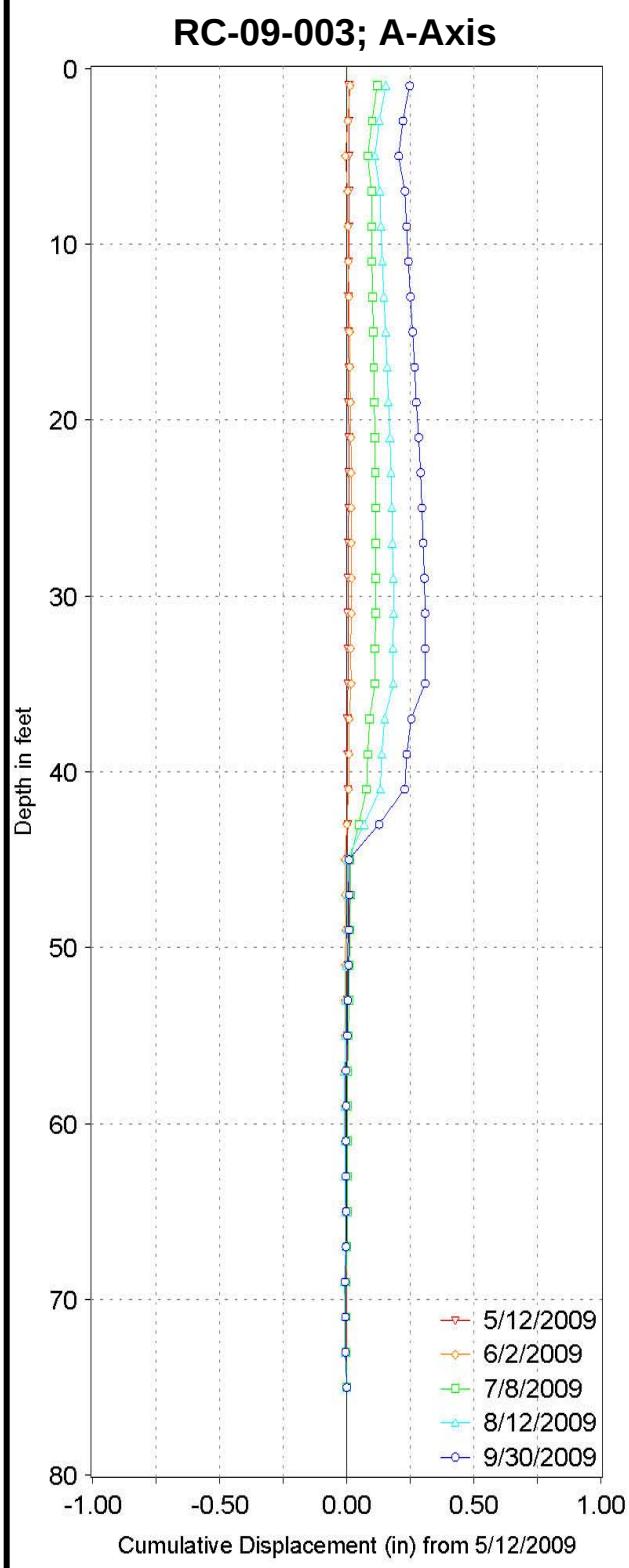
RC-09-002; A-Axis

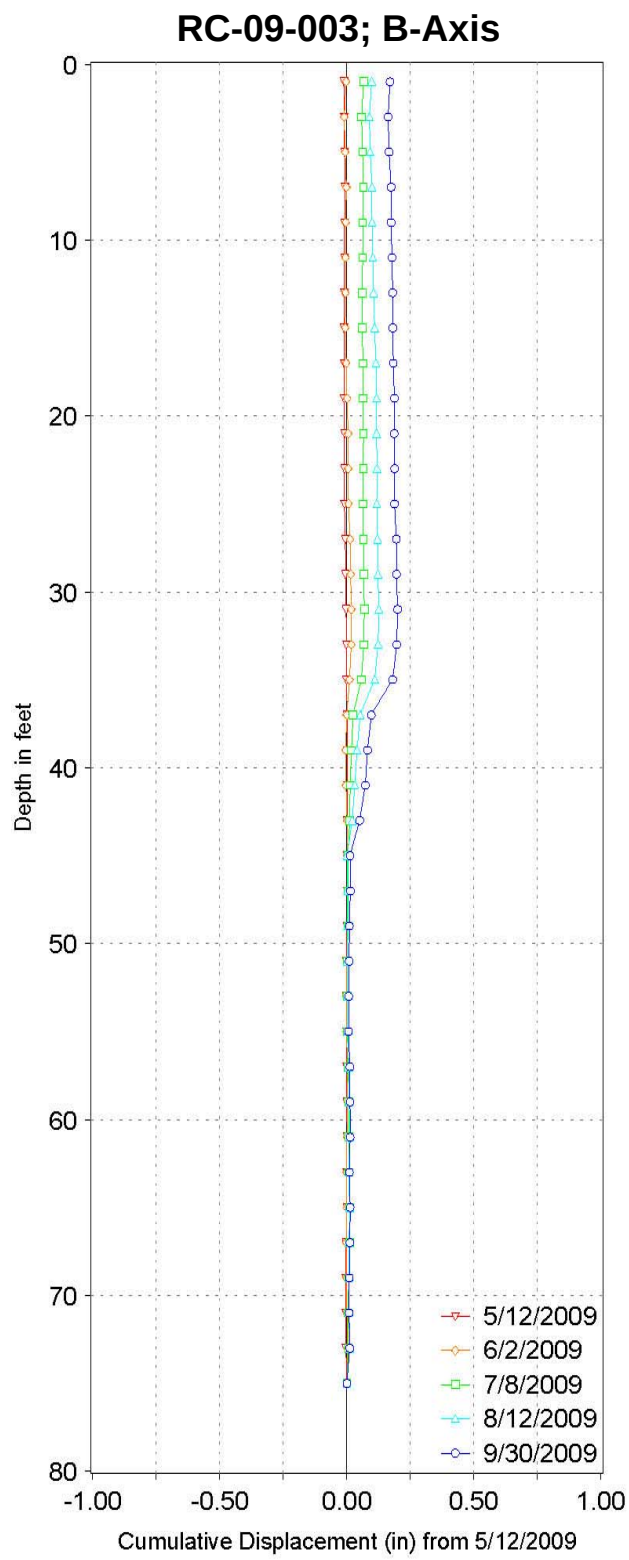


RC-09-002; B-Axis



CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**SLOPE INCLINOMETER RESULTS FOR RC-09-002**
	01-MEN-128; PM 34.5-35.5 FOUNDATION REPORT	Plate No. C-2





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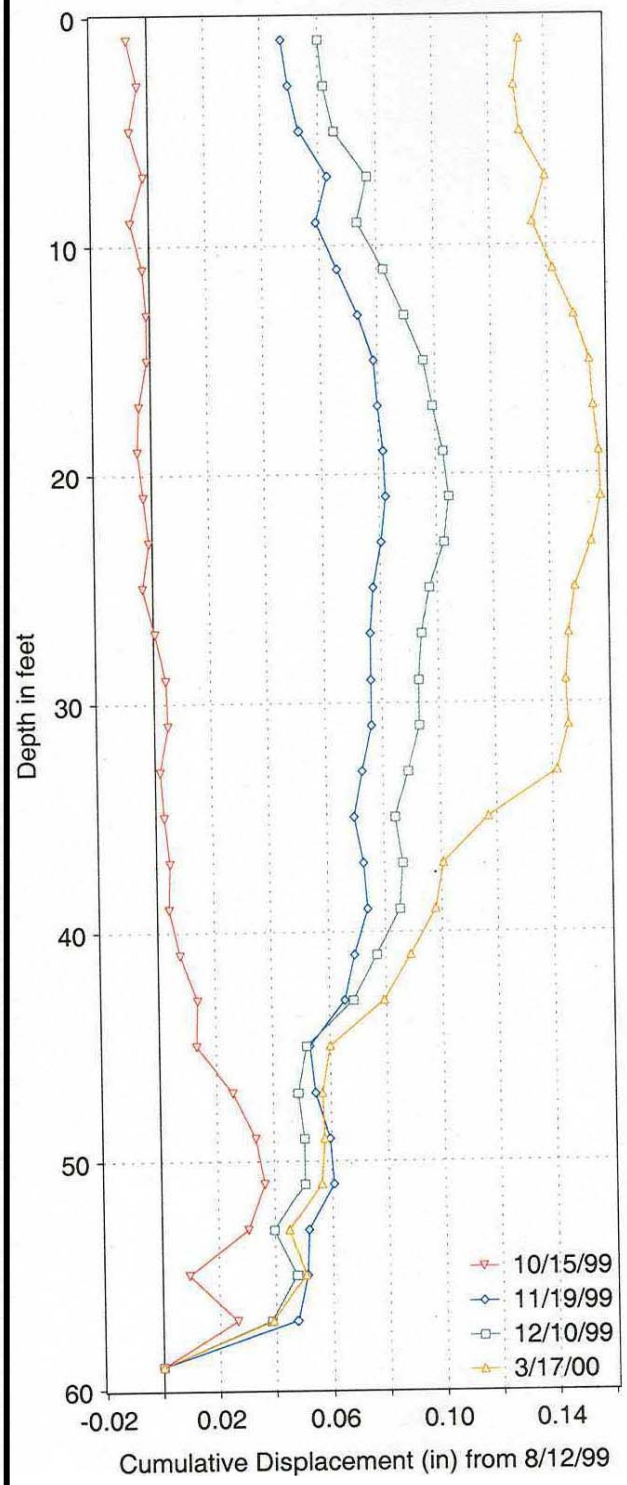
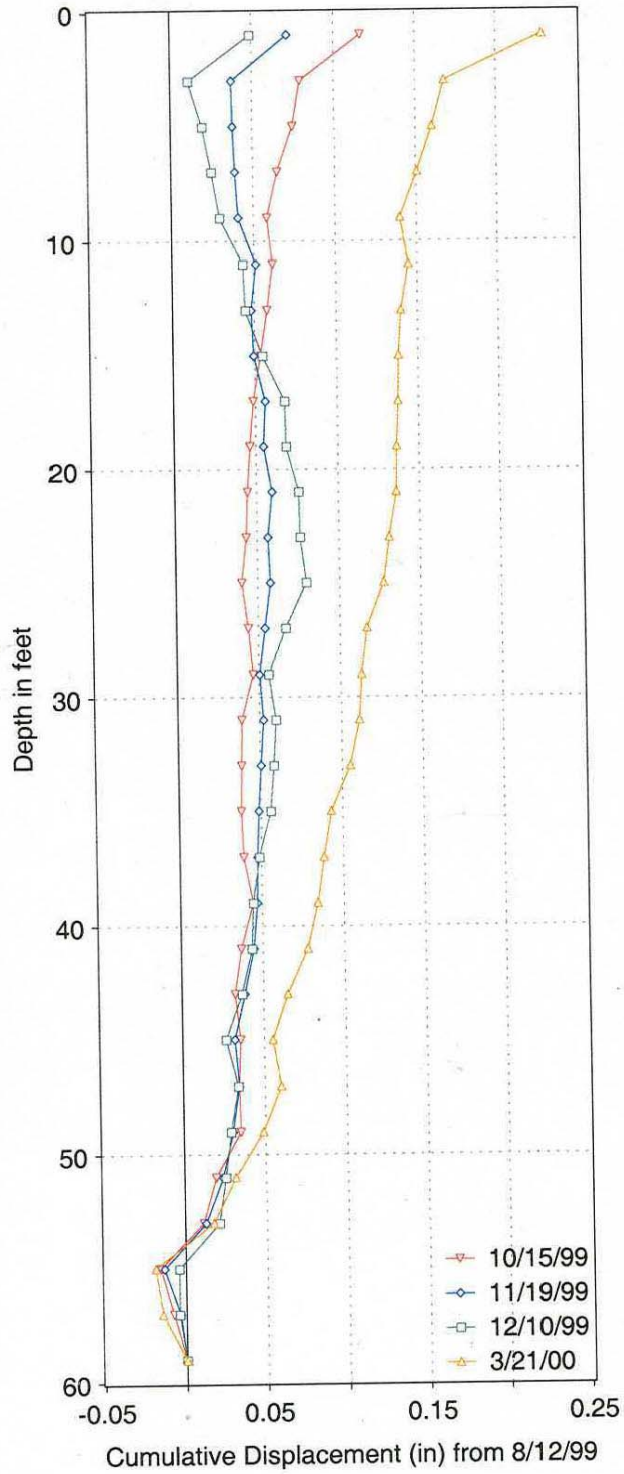
Office of Geotechnical Design - North

EA: 01-476601	**SLOPE INCLINOMETER RESULTS FOR RC-09-003**
Date: May 2011	
01-MEN-128; PM 34.5-35.5 FOUNDATION REPORT	Plate No. C-3

A-99-001; A-Axis

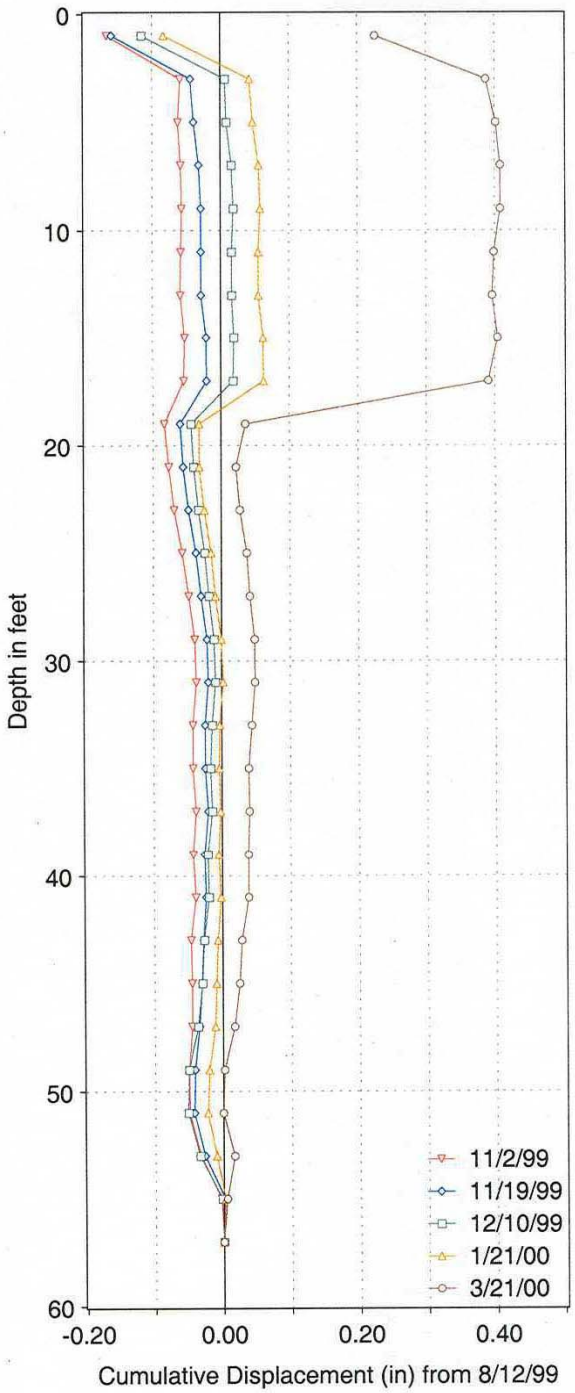


A-99-001; B-Axis

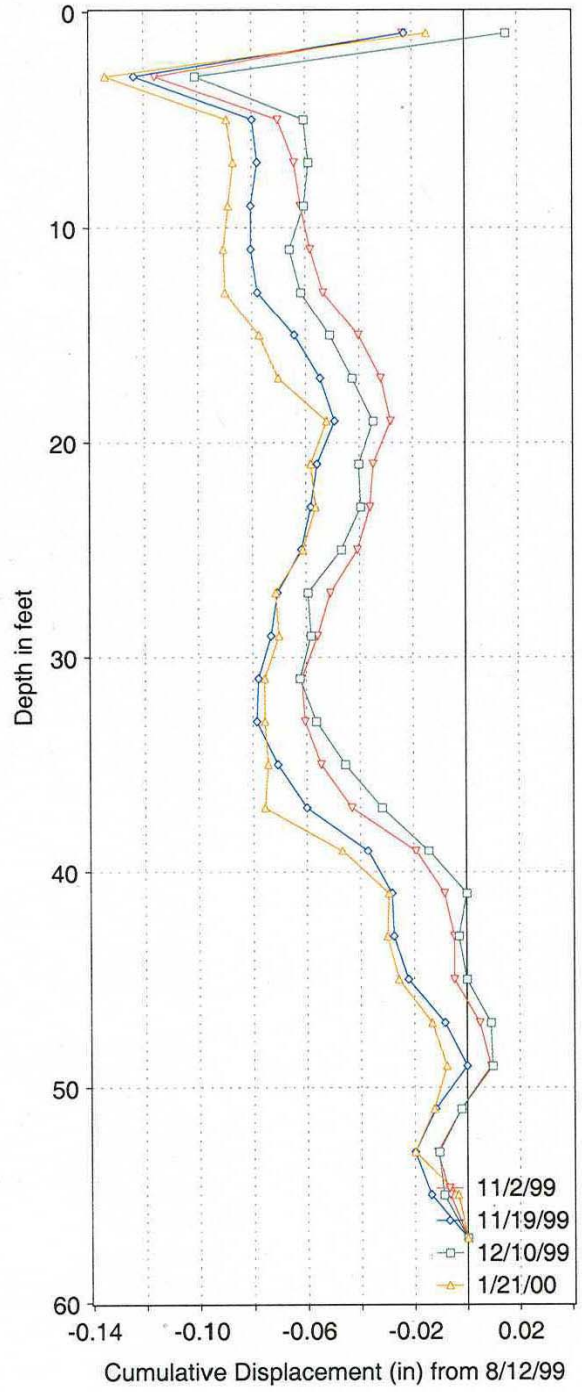


CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**SLOPE INCLINOMETER RESULTS FOR A-99-001**
	01-MEN-128; PM 34.5-35.5 FOUNDATION REPORT	Plate No. C-4

A-99-002; A-Axis

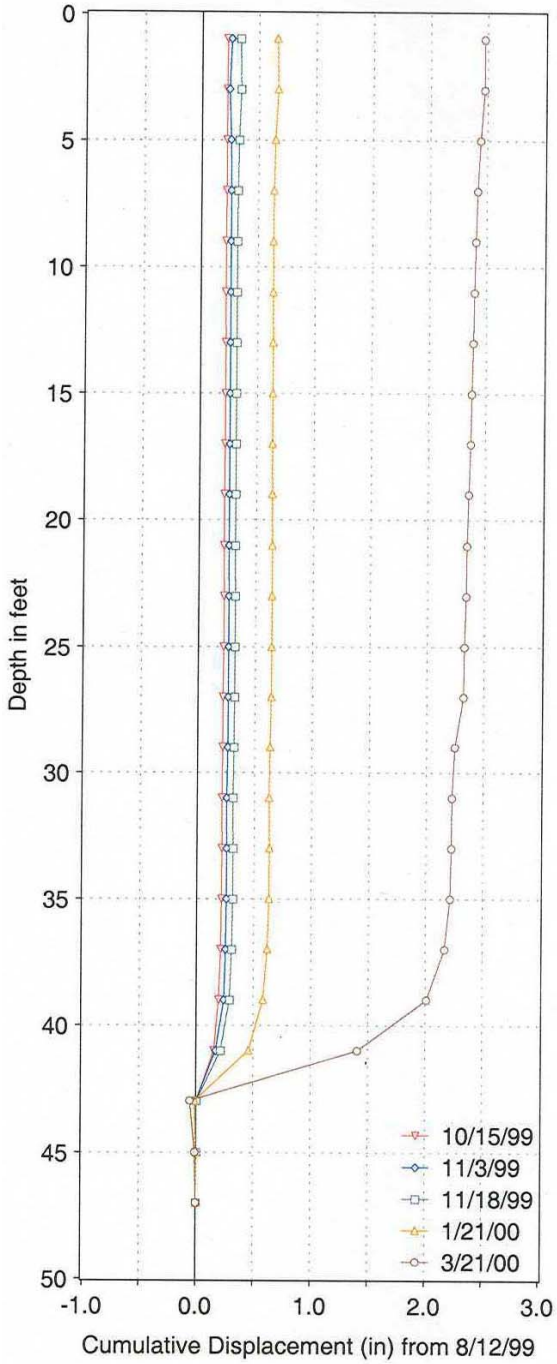


A-99-002; B-Axis

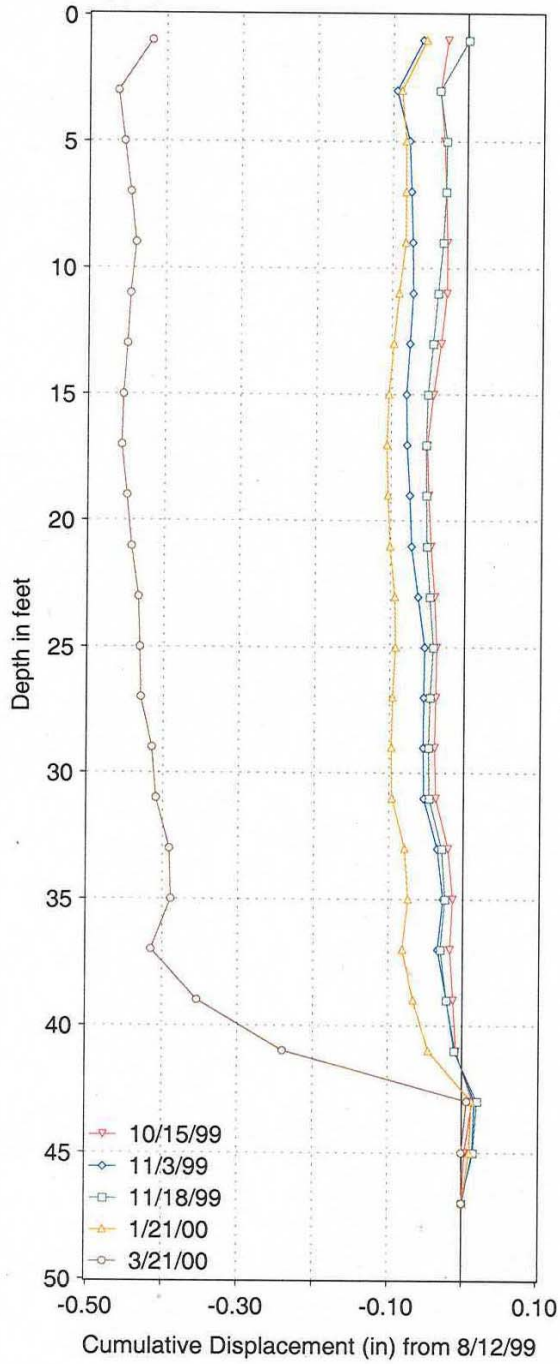


CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**SLOPE INCLINOMETER RESULTS FOR A-99-002**
	01-MEN-128; PM 34.5-35.5 FOUNDATION REPORT	Plate No. C-5

A-99-003; A-Axis

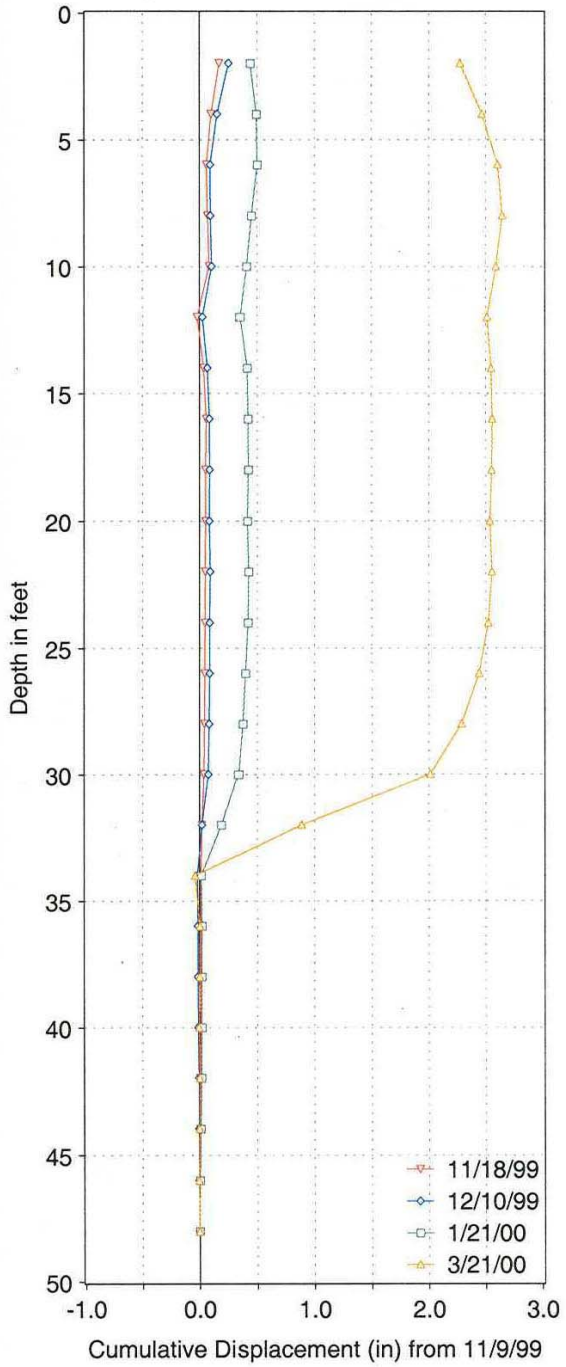


A-99-003; B-Axis

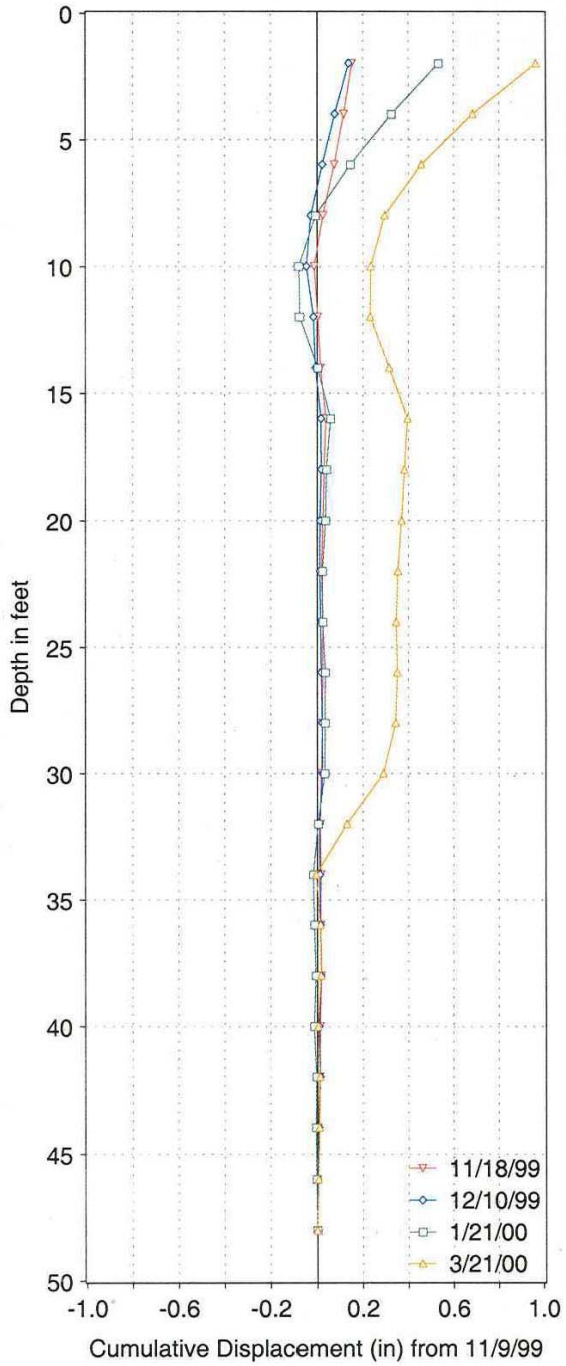


CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**SLOPE INCLINOMETER RESULTS FOR A-99-003**
	01-MEN-128; PM 34.5-35.5 FOUNDATION REPORT	Plate No. C-6

A-99-006; A-Axis



A-99-006; B-Axis



CALTRANS
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Office of Geotechnical Design - North

EA: 01-476601

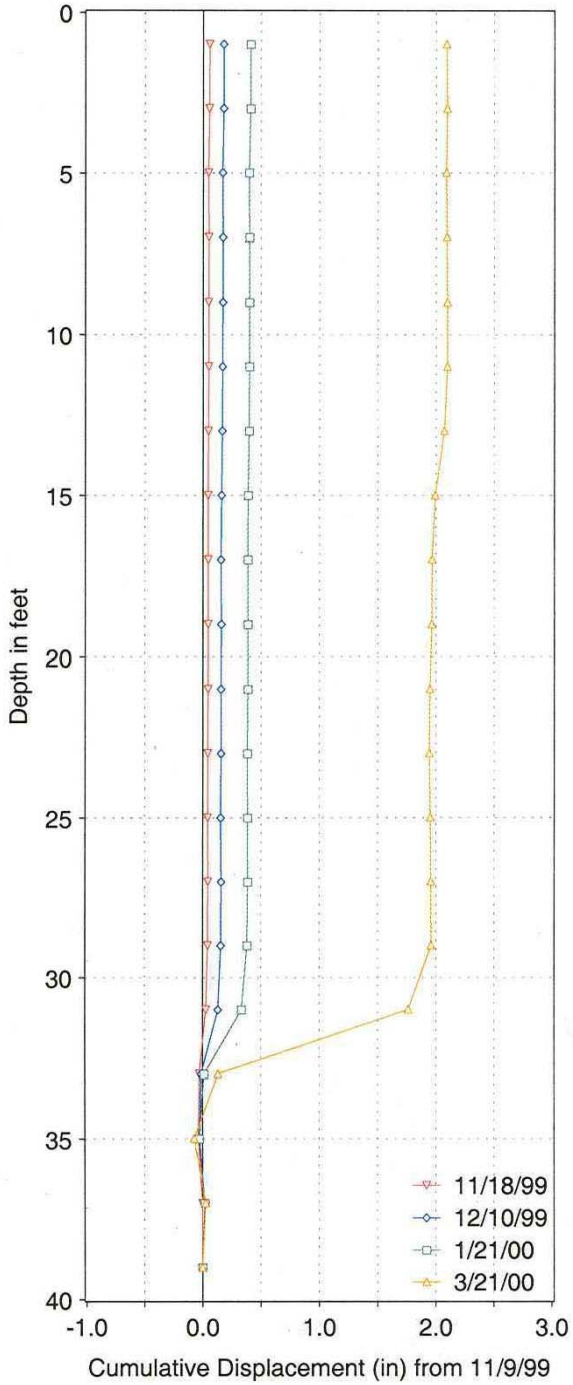
Date: May 2011

SLOPE INCLINOMETER RESULTS FOR A-99-006

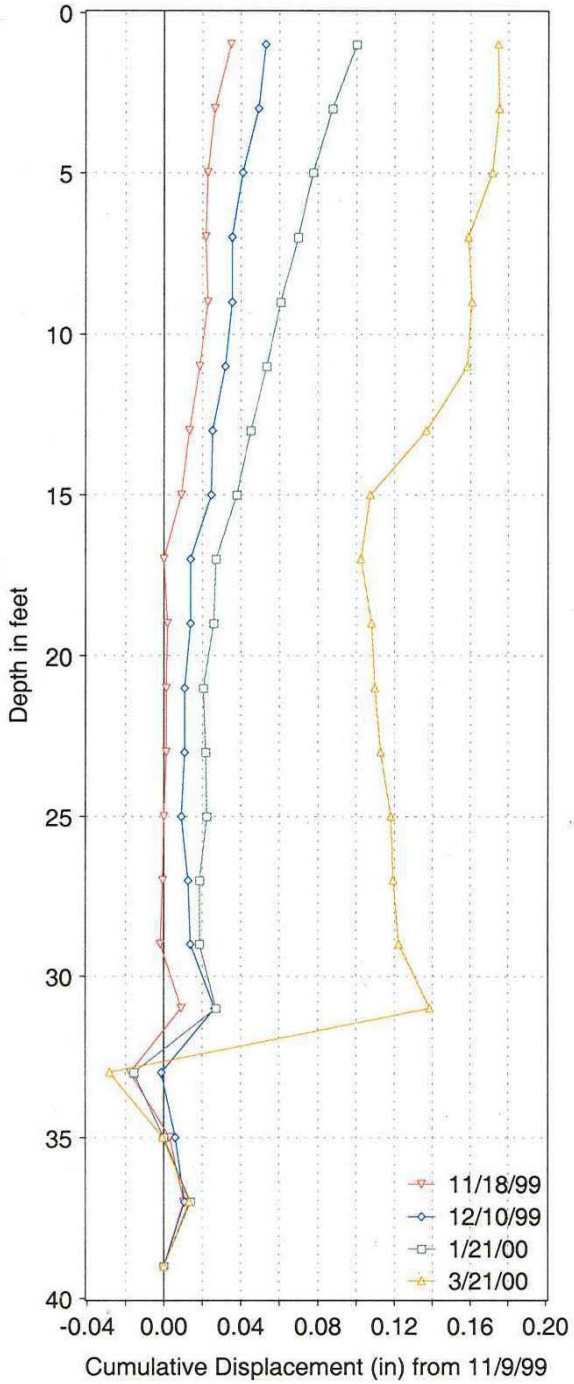
01-MEN-128; PM 34.5-35.5
FOUNDATION REPORT

Plate No.
C-7

A-99-007; A-Axis

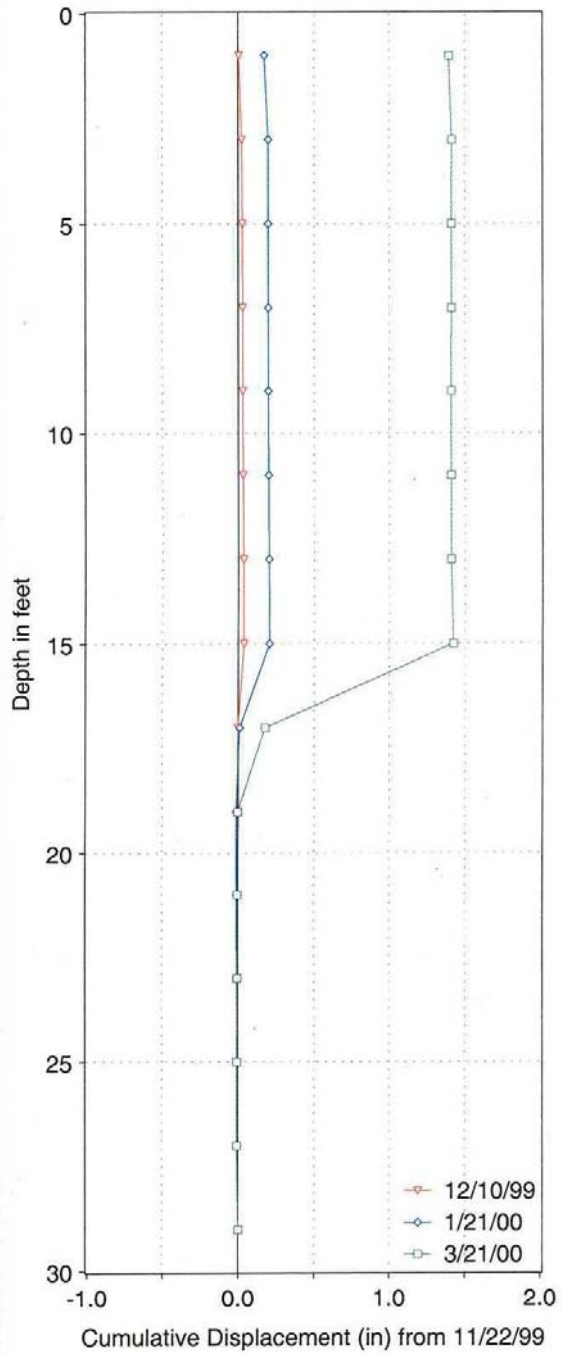


A-99-007; B-Axis

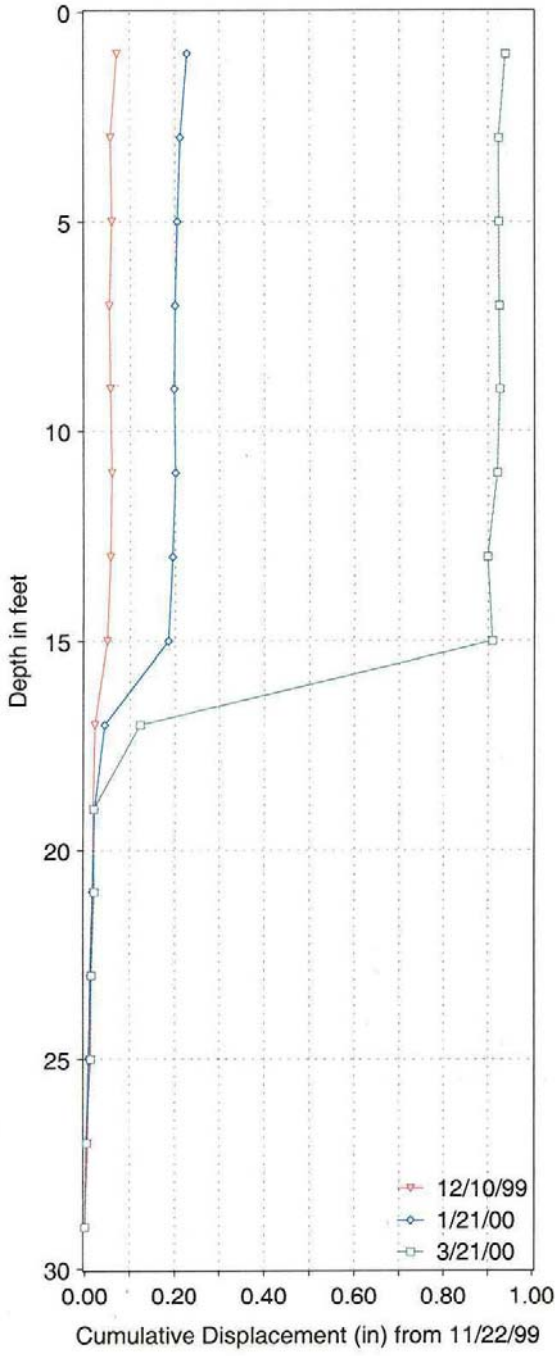


CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**SLOPE INCLINOMETER RESULTS FOR A-99-007**
	01-MEN-128; PM 34.5-35.5 FOUNDATION REPORT	Plate No. C-8

A-99-008; A-Axis

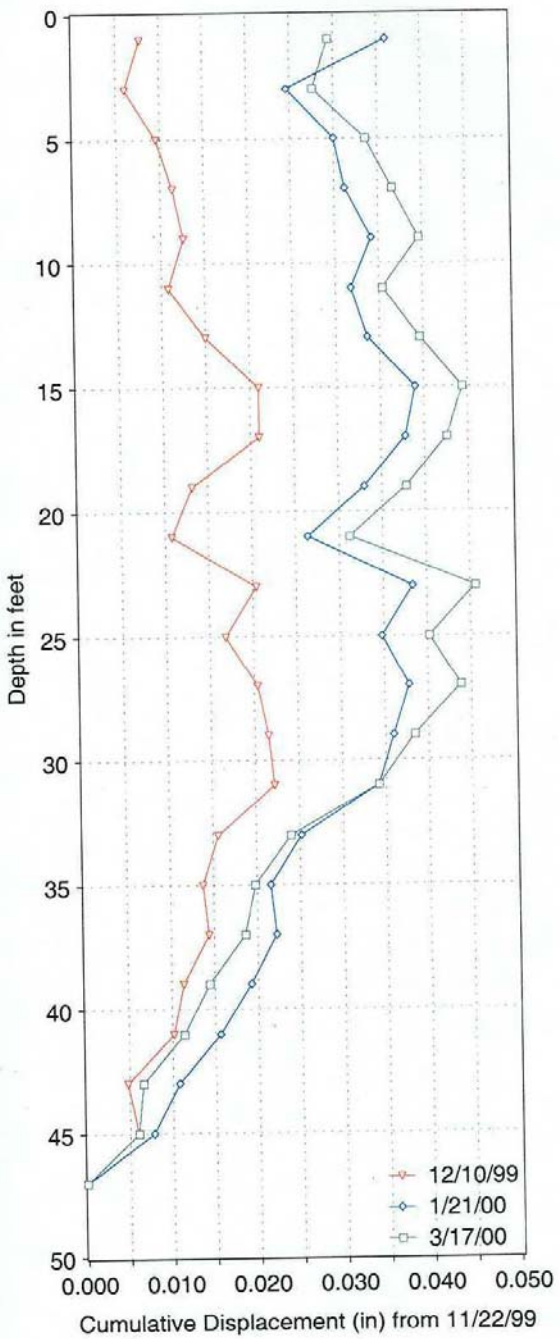


A-99-008; B-Axis

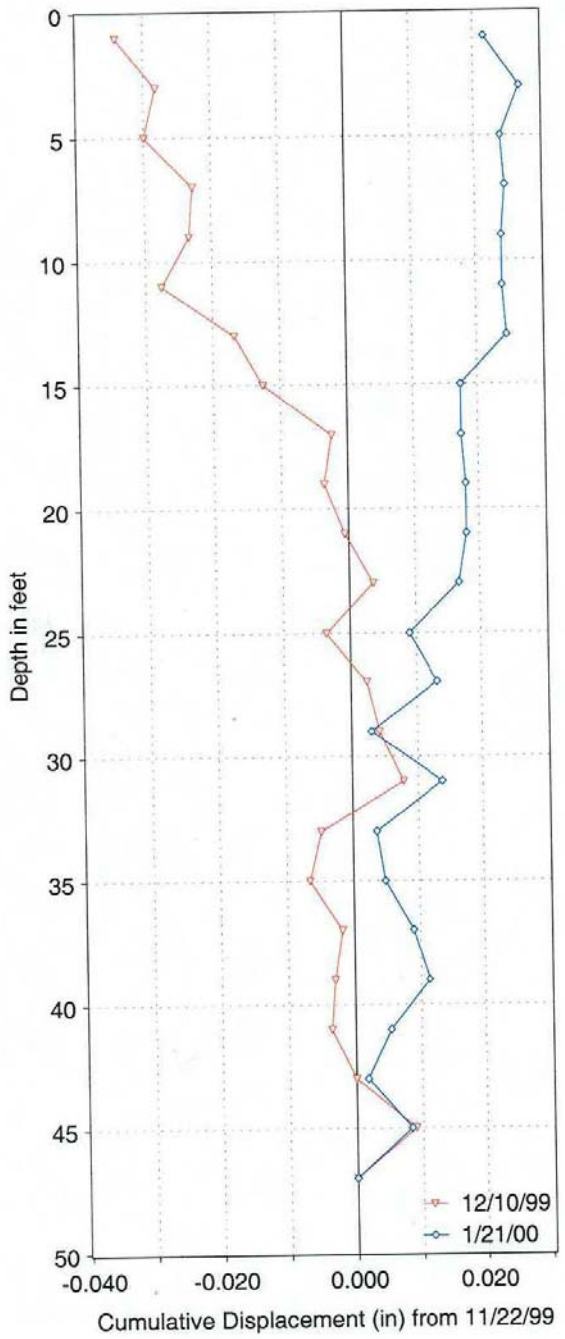


CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**SLOPE INCLINOMETER RESULTS FOR A-99-008**
	01-MEN-128; PM 34.5-35.5 FOUNDATION REPORT	Plate No. C-9

A-99-009; A-Axis



A-99-009; B-Axis



CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**SLOPE INCLINOMETER RESULTS FOR A-99-009**
	01-MEN-128; PM 34.5-35.5 FOUNDATION REPORT	Plate No. C-10

Appendix D

Laboratory Testing Results

TABLE NO. D-1. SUMMARY OF LABORATORY TEST RESULTS

Sample Location				Percentage Passing Through Sieve No. or Particle Size Finer Than														Strength Tests			Atterb. Limits		In-Situ		Max. Lab. Density (CTM 216)		Corrosion (CTM 417, 422, 532 and 643)	
Boring No.	I.D. No.	Depth (feet) top	Depth (feet) bottom	1 ½	1	3/4	1/2	3/8	4	8	16	30	50	100	200	5μ	1μ	UU (Su, tsf) ASTM (D2850-95)	UC (psi) (ASTM D7012-07C)	UCS (psi) (ASTM D5731-08)	LL	PI	γ_d (pcf)	wc (%)	γ_d (pcf)	% wc		
RC-09-001	1-10	39.0	40.0	100	98	97	91	86	70	57	46	37	30	25	21	12	8											
RC-09-001	1-15	52.0	53.0			100	94	91	79	72	67	62	57	52	48	25	12				43	24						
RC-09-001	1-19	66.3	67.0																21,577				180	NA				
RC-09-002	2-10	36.5	37.0																	2,898								
RC-09-002	2-12	45.0	45.5																	3,878								
RC-09-002	2-13	50.5	51.0																	3,312								
RC-09-003	3-17	59.5	60.0																	5,058								
A-99-001	A	10	15.0		100	99	98	96	80	59	48	43	39	35	31	18	13				45	19					pH	7.6
																											R (Ohm-cm)	1850
																											Cl (ppm)	NA
																											SO4 (ppm)	NA
A-99-001	3	31.5	32.0																				123.6	10.1				
A-99-001	4	36.0	36.5																					8.9				
A-99-001	6	45.0	45.5																					1.3				
A-99-001	B	50.0	55.0			100	98	97	90	83	75	68	62	56	51	29	15				38	22			126	9.3	pH	9.2
																											R (Ohm-cm)	875
																											Cl (ppm)	<25
																											SO4 (ppm)	250
A-99-001	7	51.0	51.5																					2.5				
A-99-001	8	56.0	56.5																					5.5				
A-99-001	9	61.0	61.5																					6.3				

TABLE NO. D-1. SUMMARY OF LABORATORY TEST RESULTS

Sample Location				Percentage Passing Through Sieve No. or Particle Size Finer Than														Strength Tests			Atterb. Limits		In-Situ		Max. Lab. Density (CTM 216)		Corrosion (CTM 417, 422, 532 and 643)	
Boring No.	I.D. No.	Depth (feet) top	Depth (feet) bottom	1 ½	1	3/4	1/2	3/8	4	8	16	30	50	100	200	5μ	1μ	UU (Su, tsf) ASTM (D2850-95)	UC (psi) (ASTM D7012-07C)	UCS (psi) (ASTM D5731-08)	LL	PI	γ_d (pcf)	wc (%)	γ_d (pcf)	% wc		
A-99-02	C	20.0	25.0		100	99	91	81	46	30	22	20	19	17	15	7	5				39	20					pH	7.6
																											R (Ohm-cm)	2800
																											Cl (ppm)	NA
																											SO4 (ppm)	NA
A-99-002	1	31.0	31.5																					4.5				
A-99-002	3	41.0	41.5																					8.4				
A-99-002	4	46.0	46.5																					6.6				
A-99-002	5	51.0	51.5																					13.8				
A-99-002	6	56.0	56.5																					8.4				
A-99-002	7	61.0	61.5																					2.4				
A-99-003	D	10.0	15.0		100	97	86	74	38	23	18	17	15	14	12	7	5				46	26						
A-99-003	2	16.0	16.5																					3.6				
A-99-003	3	21.0	21.5																					3.9				
A-99-003	E	25.0	30.0			100	94	84	46	31	25	22	19	17	15	8	5				41	22						
A-99-003	4	26.0	26.5																					11.9				
A-99-003	5	31.0	31.5																					11.0				
A-99-003	6	36.0	36.5																					10.3				
A-99-003	7	41.0	41.5																					8.2				
A-99-003	8	46.0	46.5																					11.6				
A-99-003	9	51.0	51.5																					7.1				
A-99-004	1	15.5	16.0																					9.2				

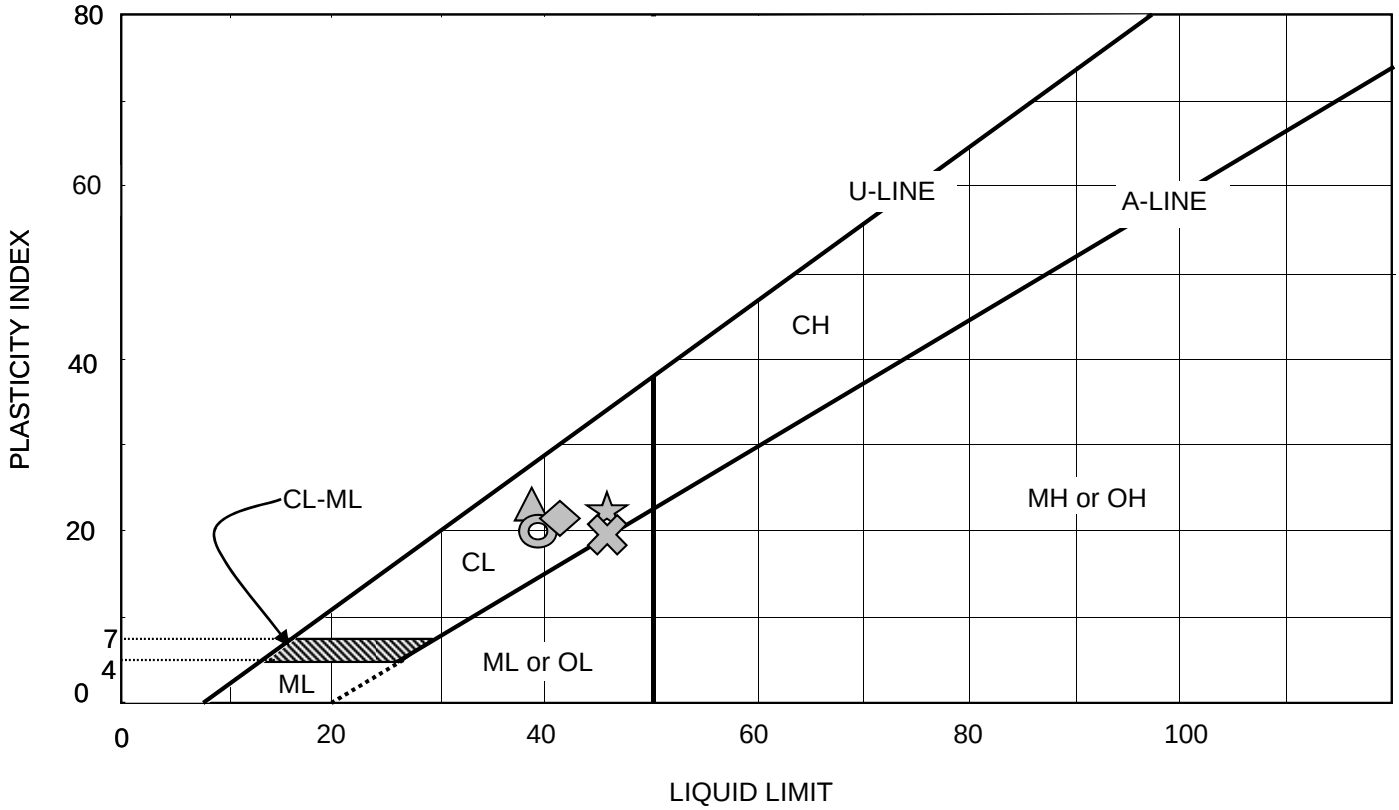
TABLE NO. D-1. SUMMARY OF LABORATORY TEST RESULTS

Sample Location				Percentage Passing Through Sieve No. or Particle Size Finer Than														Strength Tests			Atterb. Limits		In-Situ		Max. Lab. Density (CTM 216)		Corrosion (CTM 417, 422, 532 and 643)	
Boring No.	I.D. No.	Depth (feet) top	Depth (feet) bottom	1 ½	1	3/4	1/2	3/8	4	8	16	30	50	100	200	5μ	1μ	UU (Su, tsf) ASTM (D2850-95)	UC (psi) (ASTM D7012-07C)	UCS (psi) (ASTM D5731-08)	LL	PI	γ_d (pcf)	wc (%)	γ_d (pcf)	% wc		
A-99-004	4ii	35.5	36.0															1.08					120.5	16.6				
A-99-004	F	24.0	28.0		100	98	90	83	64	54	48	42	37	32	28	14	8				40	20						
A-99-005	1	24.0	24.5																					13.5				
A-99-005	G	30.0	34.0		100	97	89	82	65	52	41	36	33	29	25	10	4				38	19						
A-99-005	3	39.0	39.5																					8.6				
A-99-005	4	49.0	49.5																					12.9				
A-99-006	3	15.5	16.0																					15.1				
A-99-006	5	25.0	25.5															1.22					125.5	12.9				
A-99-006	6	30.5	31.0															0.38					114.2	18.4				
A-99-006	7ii	35.0	35.5																				118.5	15.0				
A-99-006	8ii	40.0	40.5					100	91	85	78	69	56	41	29	10	3							18.6				
A-99-006	8i	40.5	41.0																				126.6	14.2				
A-99-007	2ii	10.0	10.5																					15.6				
A-99-007	3	15.5	16.0																				107.8	19.2				
A-99-007	4ii	20.0	20.5																					9.3				
A-99-007	5ii	25.0	25.5															0.77					116.7	14.8				
A-99-007	6	30.5	31.0																				123.1	14.6				
A-99-007	H	36.0	11.0	100	99	99	98	97	93	85	76	67	60	53	46	24	8				40	23					pH R (Ohm-cm) Cl (ppm) SO4 (ppm)	9.0 1100 NA NA

TABLE NO. D-1. SUMMARY OF LABORATORY TEST RESULTS

Sample Location				Percentage Passing Through Sieve No. or Particle Size Finer Than														Strength Tests			Atterb. Limits		In-Situ		Max. Lab. Density (CTM 216)		Corrosion (CTM 417, 422, 532 and 643)	
Boring No.	I.D. No.	Depth (feet) top	Depth (feet) bottom	1 ½	1	3/4	1/2	3/8	4	8	16	30	50	100	200	5μ	1μ	UU (Su, tsf) ASTM (D2850-95)	UC (psi) (ASTM D7012-07C)	UCS (psi) (ASTM D5731-08)	LL	PI	γ_d (pcf)	wc (%)	γ_d (pcf)	% wc		
A-99-007	8	40.5	41.0																				123.7	14.4				
A-99-008	2	9.5	10.0																				113.3	14.1				
A-99-008	3	14.5	15.0																				115.9	18.1				
A-99-008	4	20.5	21.0																				125.1	9.8				
A-99-008	5ii	24.0	24.5																				116.3	8.5				
A-99-009	1	6.0	6.5																				117.6	17.8				
A-99-009	2	11.0	11.5																				140.3	12.2				
A-99-009	3	16.0	16.5																				134.0	7.4				
A-99-009	5	26.0	26.5																				127.0	13.1				
A-99-009	6	31.0	31.5																				134.6	10.8				
A-99-009	7	24.0	24.5																				132.6	10.1				
A-99-009	8	49.5	50.0																				127.9	11.5				

ATTERBERG LIMITS TEST (ASTM D4318/CAL TEST 204)



SYMBOL	SAMPLE ID	SAMPLE LOCATION	LIQUID LIMIT (%)	PLASTICITY INDEX	CLASSIFICATION
✖	Bulk A	Boring No. A-99-001: 10'-15'	45	19	CL
▲	Bulk B	Boring No. A-99-001: 50'-55'	38	22	CL
◎	Bulk C	Boring No. A-99-002: 20'-25'	39	20	CL
★	Bulk D	Boring No. A-99-003: 10'-15'	46	26	CL
◆	Bulk E	Boring No. A-99-003: 25'-30'	41	22	CL

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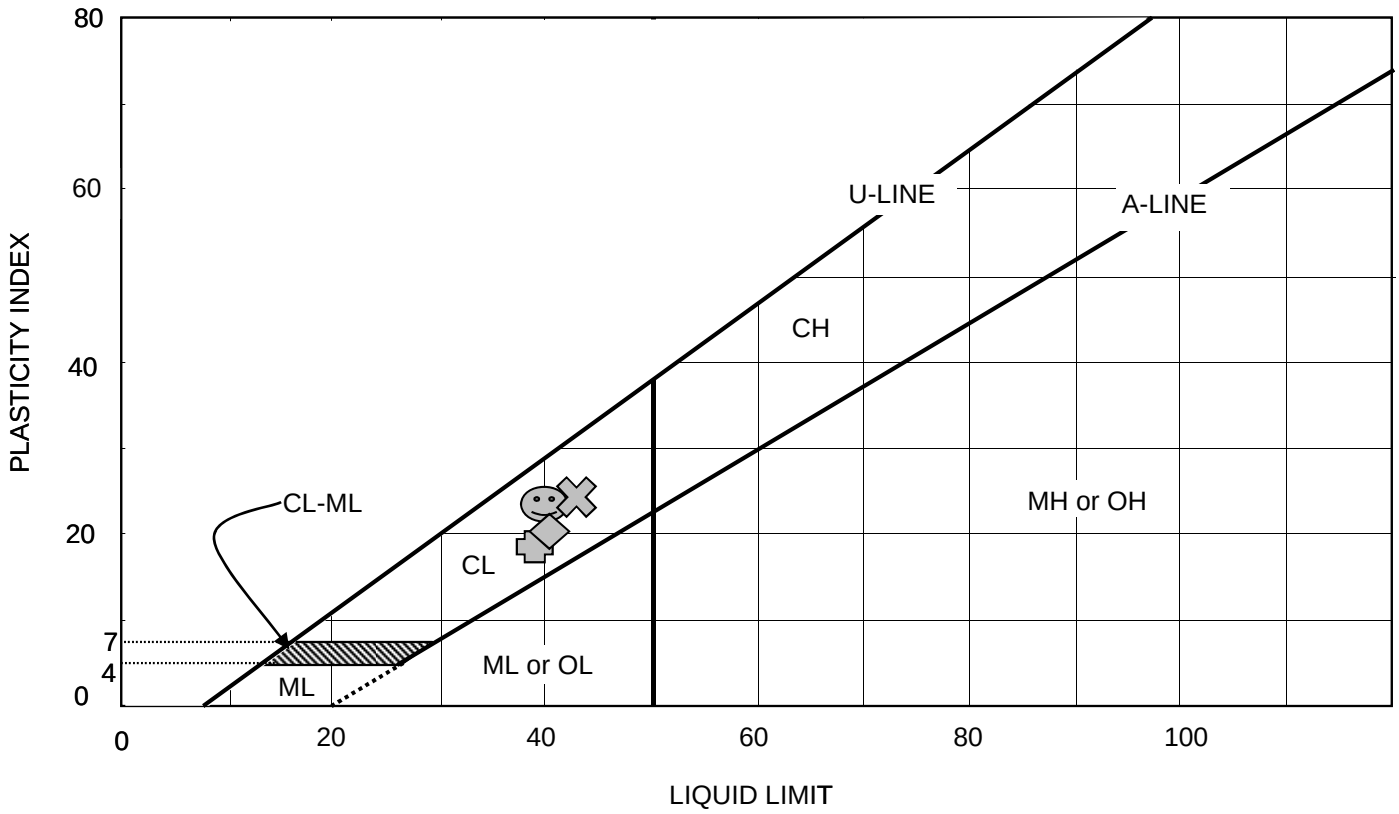
Geotechnical Services
Office of Geotechnical Design - North

Project Name:	SMOOT SINK
EA:	03-476601
D-Co-Rt-PM:	01-MEN-128-PM 34.5/35.5
Test Date:	May-2011

Plate No. D-1

ATTERBERG LIMITS TEST (ASTM D4318/CAL TEST 204)



SYMBOL	SAMPLE ID	SAMPLE LOCATION	LIQUID LIMIT (%)	PLASTICITY INDEX	CLASSIFICATION
◆	Bulk F	Boring No. A-99-004: 24'-28'	40	20	CL
✚	Bulk G	Boring No. A-99-005: 30'-34'	38	19	CL
☺	Bulk H	Boring No. A-99-007; 36'-39'	40	23	CL
✖	1-15	Boring No. RC-10-001: 52'-53'	43	24	CL

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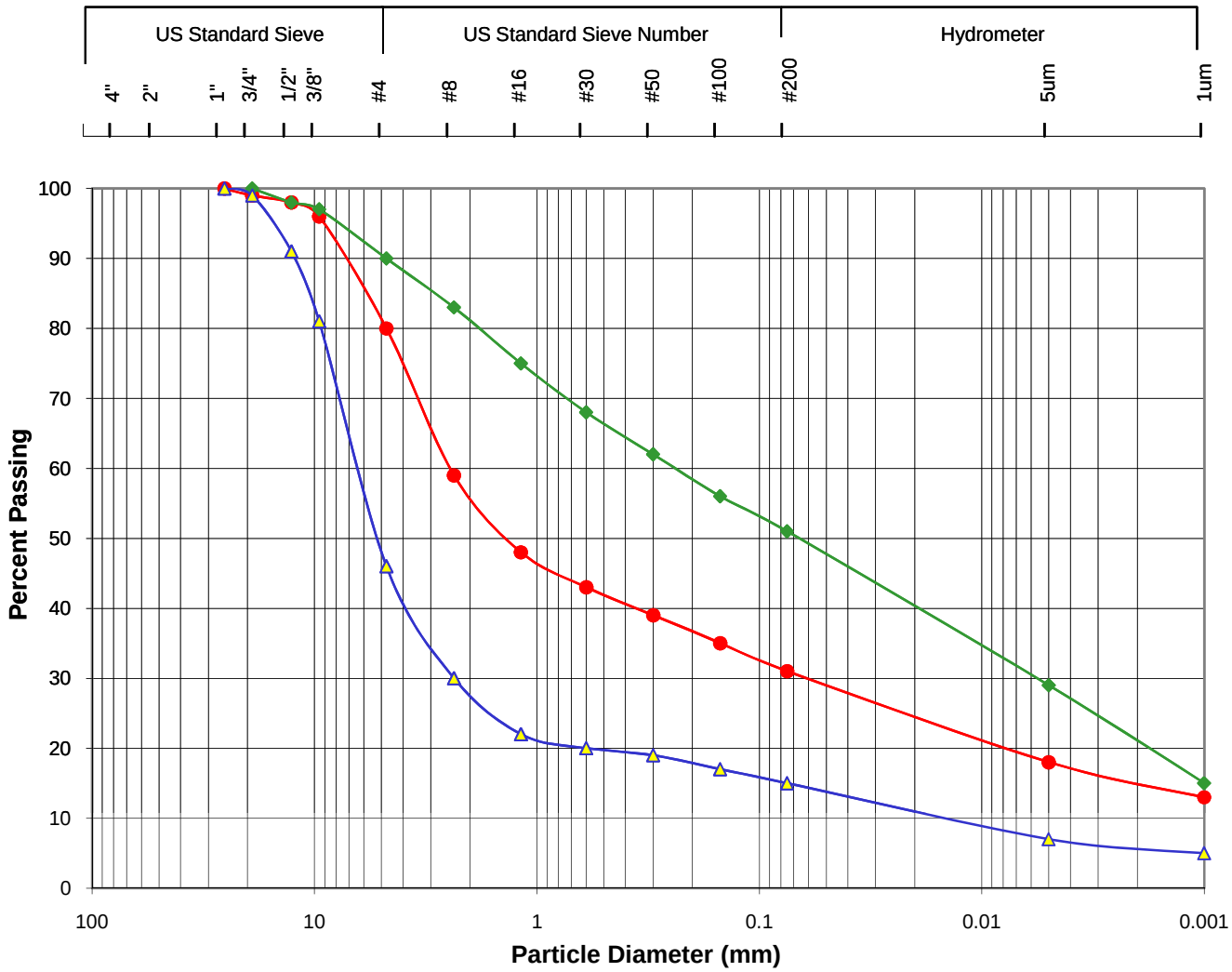
Office of Geotechnical Design - North

Project Name:	SMOOT SINK
EA:	03-476601
D-Co-Rt-PM:	01-MEN-128-PM 34.5/35.5
Test Date:	May-2011

Plate No. D-2

Gradation Analysis Test Results



GRAVELS		SANDS			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

Sample ID:
- Bulk A; Boring No. A-99-001: 10'-15'
- Bulk B; Boring No. A-99-001: 50'-55'
- Bulk C; Boring No. A-99-002: 20'-25'

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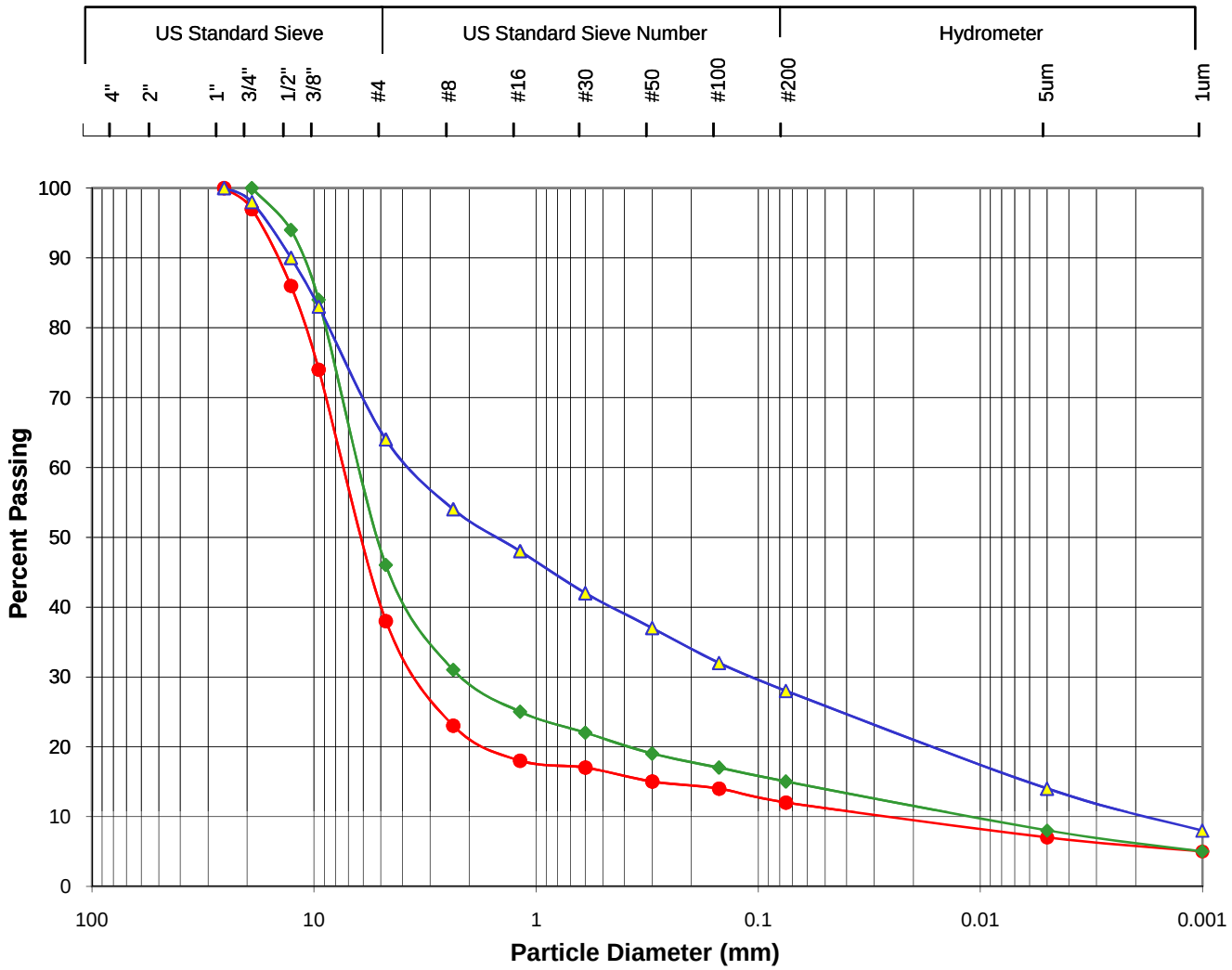
Project:	Smoot Sink
EA:	01-476601
D.-Co.-Rt.-:	01-MEN-128 PM 34.5/35.5
Test Date:	May-2011

Plate No. D-3

Gradation Analysis Test Results



GRAVELS		SANDS			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

Sample ID:
- Bulk D; Boring No. A-99-003: 10'-15'
- Bulk E; Boring No. A-99-003: 25'-30'
- Bulk F; Boring No. A-99-004: 24'-28'

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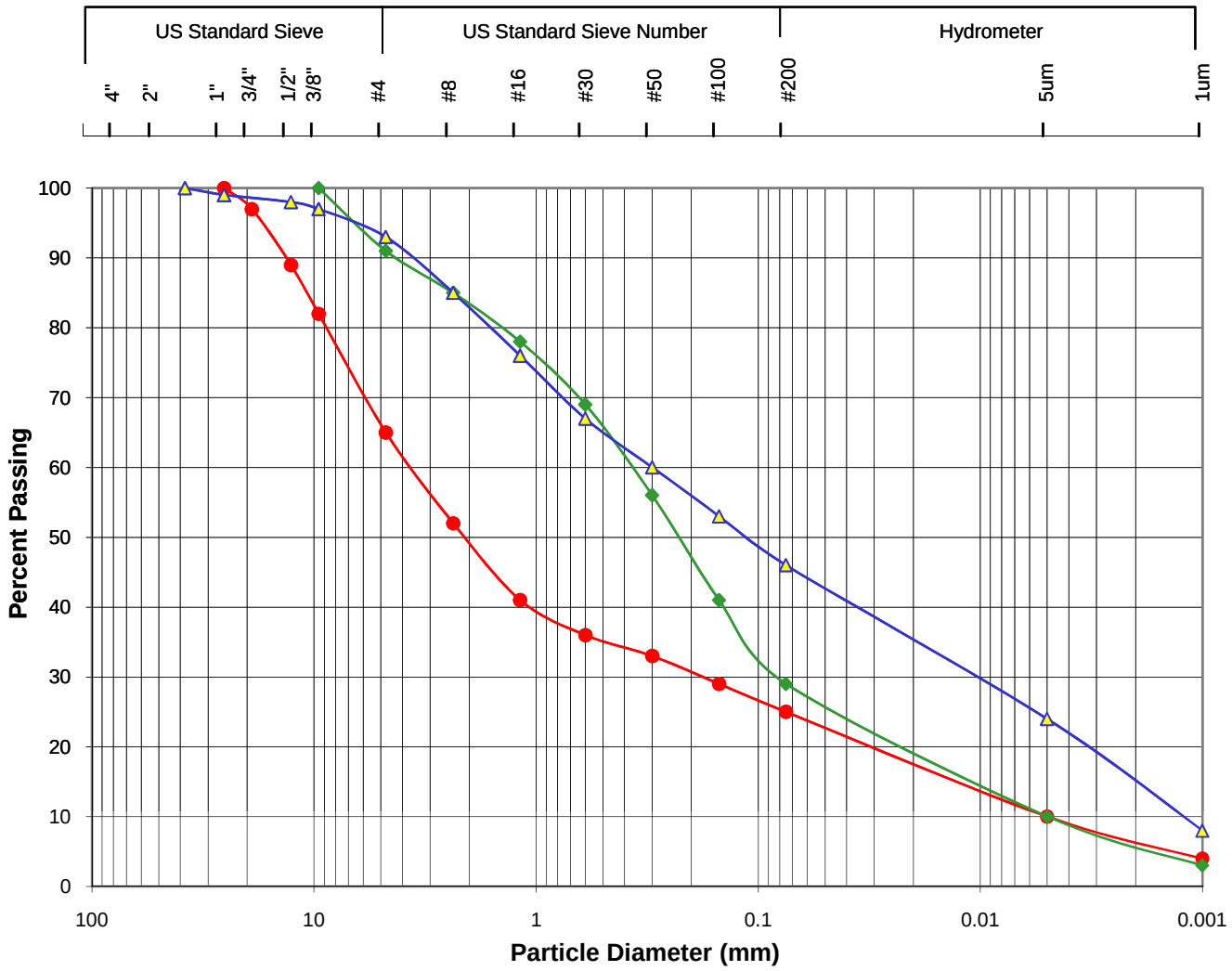
Office of Geotechnical Design - North

Project:	Smoot Sink
EA:	01-476601
D.-Co.-Rt.-:	01-MEN-128 PM 34.5/35.5
Test Date:	May-2011

Plate No. D-4

Gradation Analysis Test Results



GRAVELS		SANDS			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

Sample ID:
- Bulk G; Boring No. A-99-005: 30'-34'
- Sample 6-8II; Boring No. A-99-006: 40'-40.5'
- Bulk H; Boring No. A-99-007: 36'-39'

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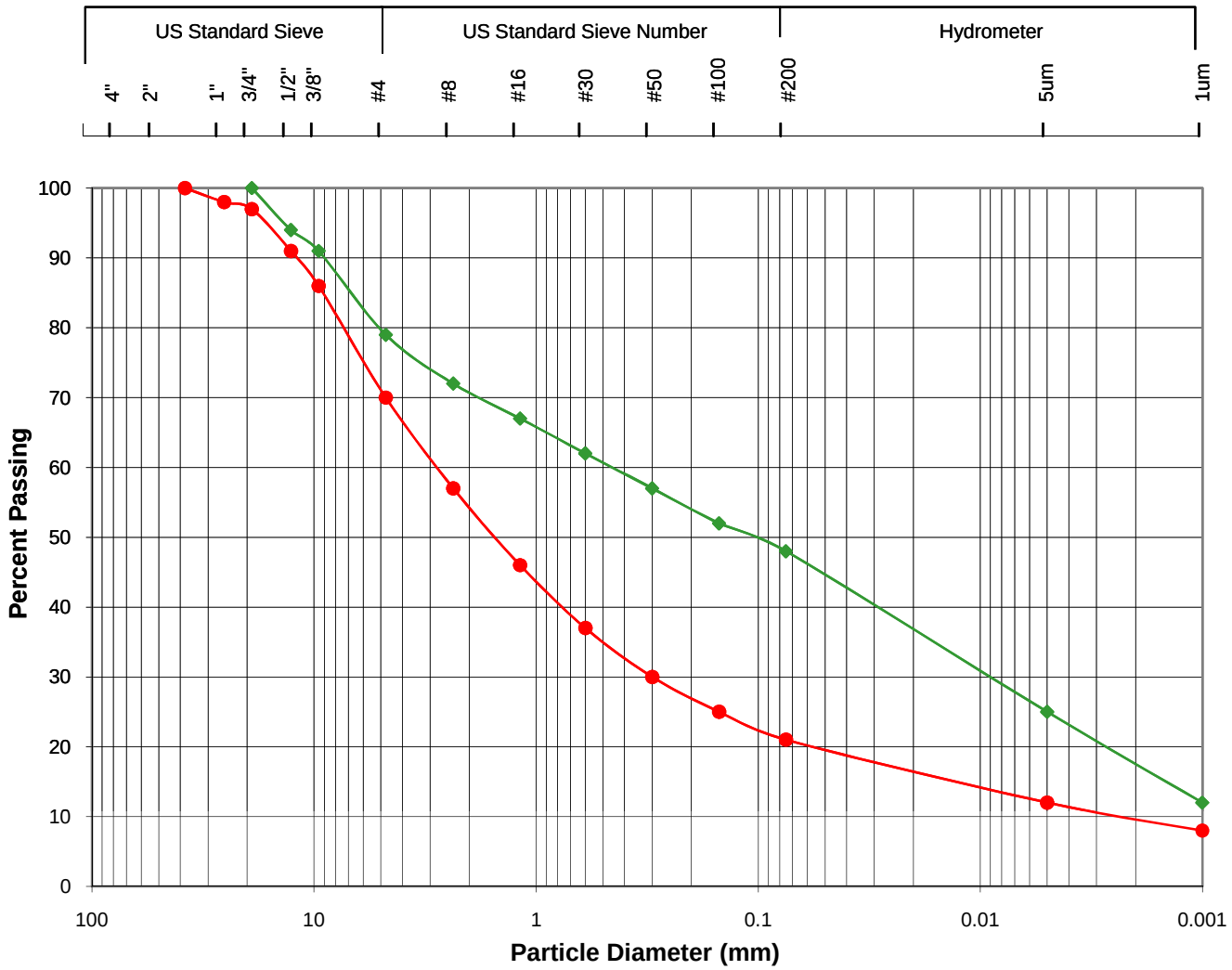
Project:	Smoot Sink
EA:	01-476601
D.-Co.-Rt.-:	01-MEN-128 PM 34.5/35.5
Test Date:	May-2011

Plate No. D-5

Gradation Analysis Test Results



GRAVELS		SANDS			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

Sample ID:
- 1-10: Boring No. RC-10-001, 39.0'-40.0'
- 1-15: Boring No. RC-10-001, 52.0'-53.0'

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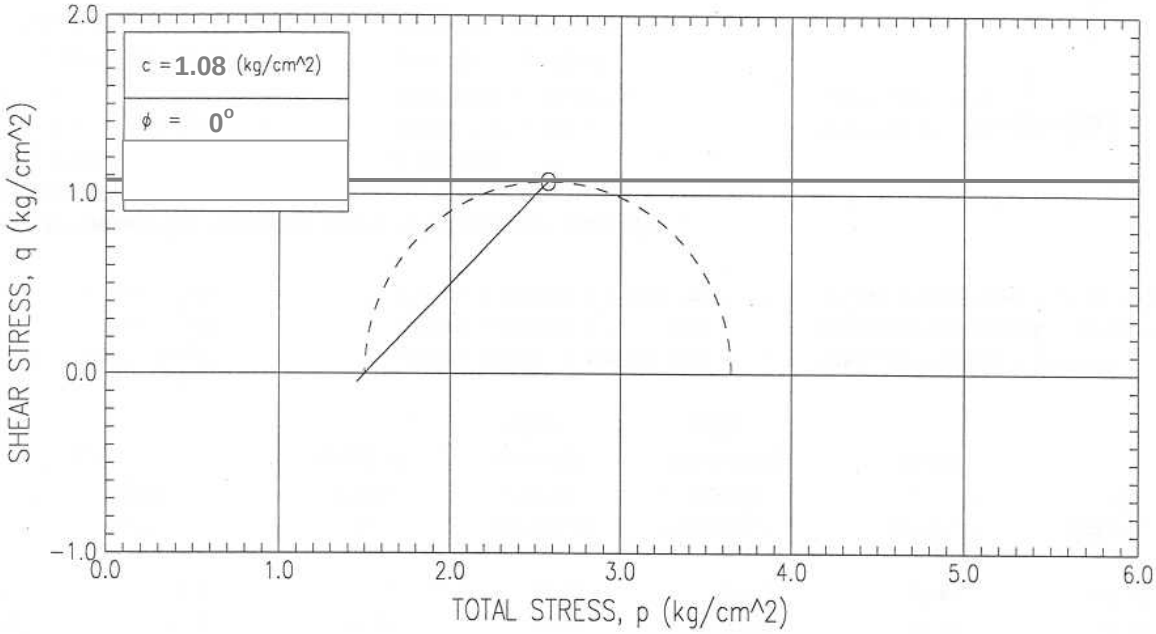
Office of Geotechnical Design - North

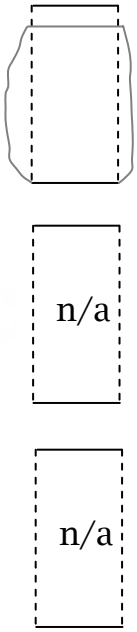
Project:	Smoot Sink
EA:	01-476601
D.-Co.-Rt.-:	01-MEN-128 PM 34.5/35.5
Test Date:	May-2011

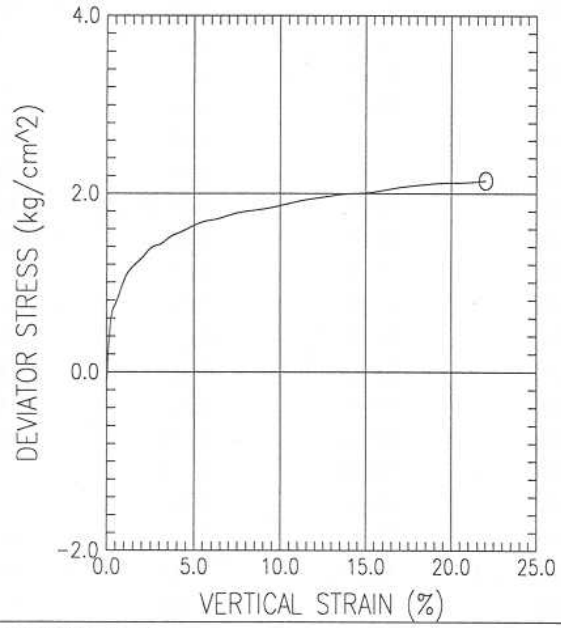
Plate No. D-6

UU TEST MAX SHEAR



FAILURE SKETCHES





SYMBOL		O			
TEST NO.		10167-6			
INITIAL	WATER CONTENT (%)	16.59			
	DRY DENSITY (gm/cm^3)	1.93			
	SATURATION (%)	0.00			
	VOID RATIO	0.000			
BEFORE SHEAR	WATER CONTENT (%)	16.59			
	DRY DENSITY (gm/cm^3)	1.93			
	SATURATION (%)	0.00			
	VOID RATIO	0.000			
	BACK PRESS. (kg/cm^2)	0.00			
MINOR PRIN. STRESS (kg/cm^2)		1.50			
MAX. DEV. STRESS (kg/cm^2)		2.15			
TIME TO FAILURE (min)		21			
RATE OF STRAIN INCR (%/min)		1.00			
INITIAL DIAMETER (cm)		4.67			
INITIAL HEIGHT (cm)		10.08			
B-VALUE		0.00			

STRAIN CONTROLLED

DESCRIPTION OF SPECIMENS:

1) LT GRAY&WHITE,MOIST,HETERO,STRAT,MOTT,STIFF>HARD

LL	PL	PI	GS	TYPE OF SPECIMEN 2X4LINER	TYPE OF TEST UU (Q)

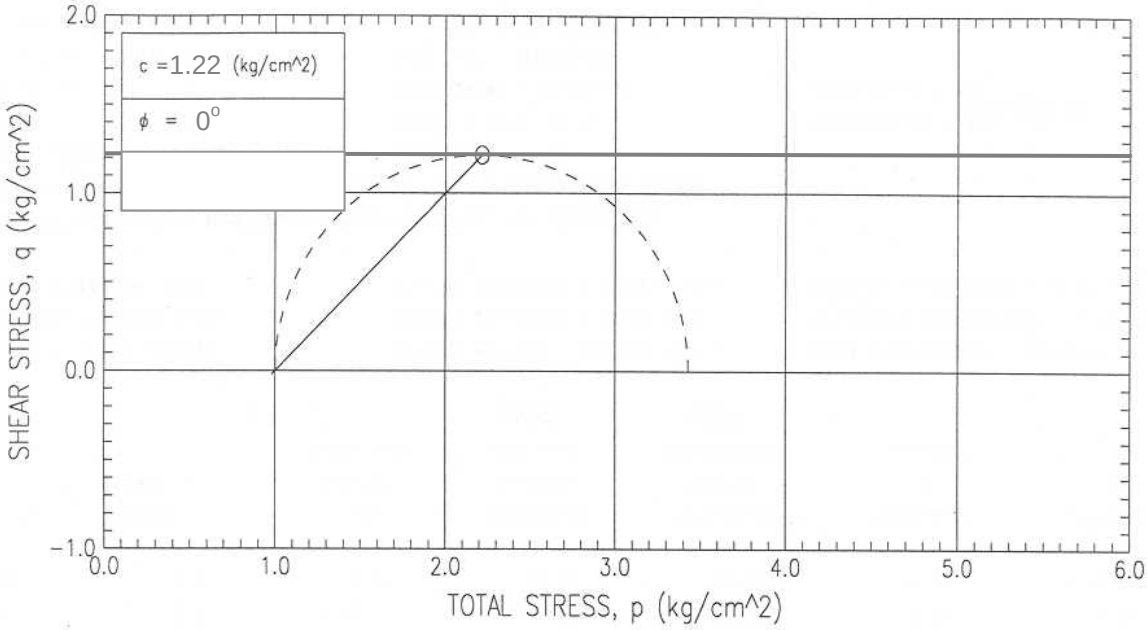
REMARKS:

1) MATRIX OF WEATHERED SHALE,CLAY&SILT,MED PLS,LOOSE

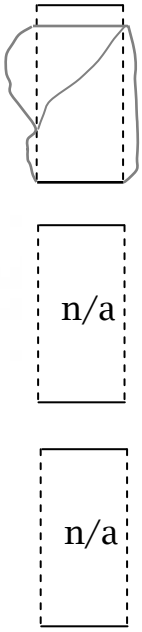
PROJECT 01-MEN-128			
PROJECT NO.01-35940K			
BORING NO. 4	SAMPLE NO.	4-4-4-II	
TECH. GR	DEPTH/ELEV	35.5-36.0	
LABORATORY	DATE	12/22/99	

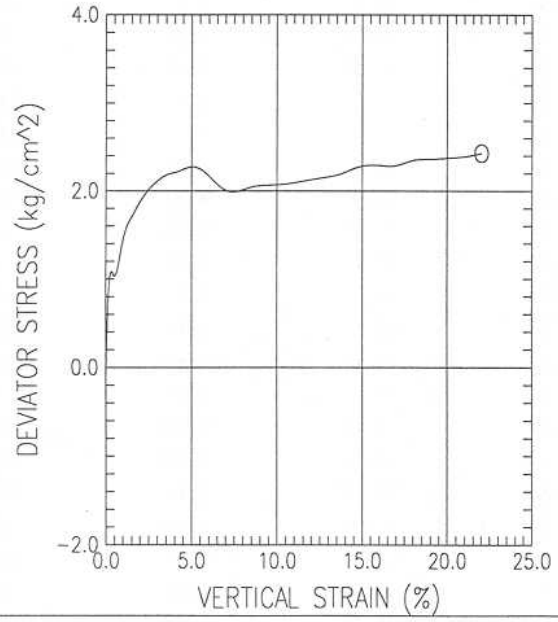
TRIAXIAL COMPRESSION TEST REPORT **Plate No. D-7**

UU TEST MAX SHEAR



FAILURE SKETCHES





SYMBOL		O			
TEST NO.		10168-6			
INITIAL	WATER CONTENT (%)	12.91			
	DRY DENSITY (gm/cm^3)	2.01			
	SATURATION (%)	0.00			
	VOID RATIO	0.000			
BEFORE SHEAR	WATER CONTENT (%)	12.91			
	DRY DENSITY (gm/cm^3)	2.01			
	SATURATION (%)	0.00			
	VOID RATIO	0.000			
	BACK PRESS. (kg/cm^2)	0.00			
MINOR PRIN. STRESS (kg/cm^2)		1.00			
MAX. DEV. STRESS (kg/cm^2)		2.43			
TIME TO FAILURE (min)		21			
RATE OF STRAIN INCR (%/min)		1.00			
INITIAL DIAMETER (cm)		4.90			
INITIAL HEIGHT (cm)		10.08			
B-VALUE		0.00			

STRAIN CONTROLLED

DESCRIPTION OF SPECIMENS:

1) LT GRAY&WHITE,MOIST,HETERO,STRAT,MOTT,STIFF

LL	PL	PI	GS	TYPE OF SPECIMEN 2X4LINER	TYPE OF TEST UU (Q)

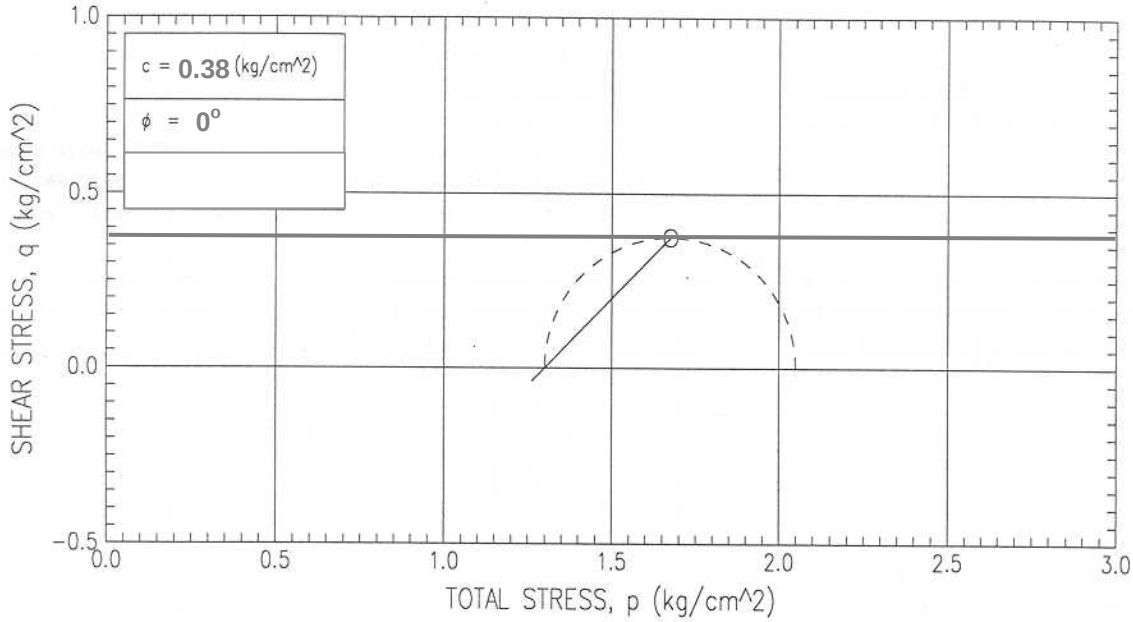
REMARKS:

1) MATRIX OF WEATHERED SHALE,CLAY&SILT,SL PLS*SAMPLE

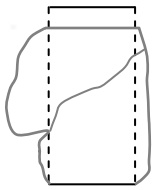
PROJECT 01-MEN-128			
PROJECT NO.01-35940K			
BORING NO. 6	SAMPLE NO.	6-6-5-I	
TECH. GR	DEPTH/ELEV	25.0-25.5	
LABORATORY	DATE	12/22/99	

TRIAXIAL COMPRESSION TEST REPORT **Plate No. D-8**

UU TEST MAX SHEAR



FAILURE SKETCHES



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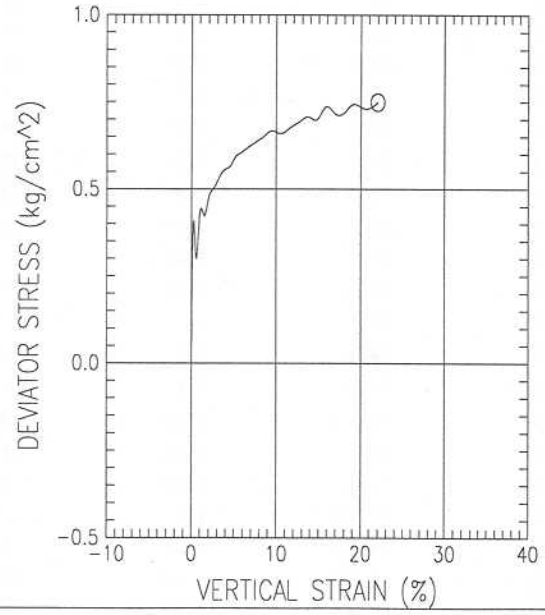


SYMBOL		O			
TEST NO.		10169-6			
INITIAL	WATER CONTENT (%)	18.39			
	DRY DENSITY (gm/cm^3)	1.83			
	SATURATION (%)	0.00			
	VOID RATIO	0.000			
BEFORE SHEAR	WATER CONTENT (%)	18.39			
	DRY DENSITY (gm/cm^3)	1.83			
	SATURATION (%)	0.00			
	VOID RATIO	0.000			
	BACK PRESS. (kg/cm^2)	0.00			
MINOR PRIN. STRESS (kg/cm^2)		1.30			
MAX. DEV. STRESS (kg/cm^2)		0.75			
TIME TO FAILURE (min)		21			
RATE OF STRAIN INCR (%/min)		1.00			
INITIAL DIAMETER (cm)		4.88			
INITIAL HEIGHT (cm)		10.16			
B-VALUE		0.00			

STRAIN CONTROLLED

DESCRIPTION OF SPECIMENS:

1) DRK GRAY&WHITE,WET,HETERO,MOTT,SOFT,FAT CLAY

LL	PL	PI	GS	TYPE OF SPECIMEN 2X4LINER	TYPE OF TEST UU (Q)

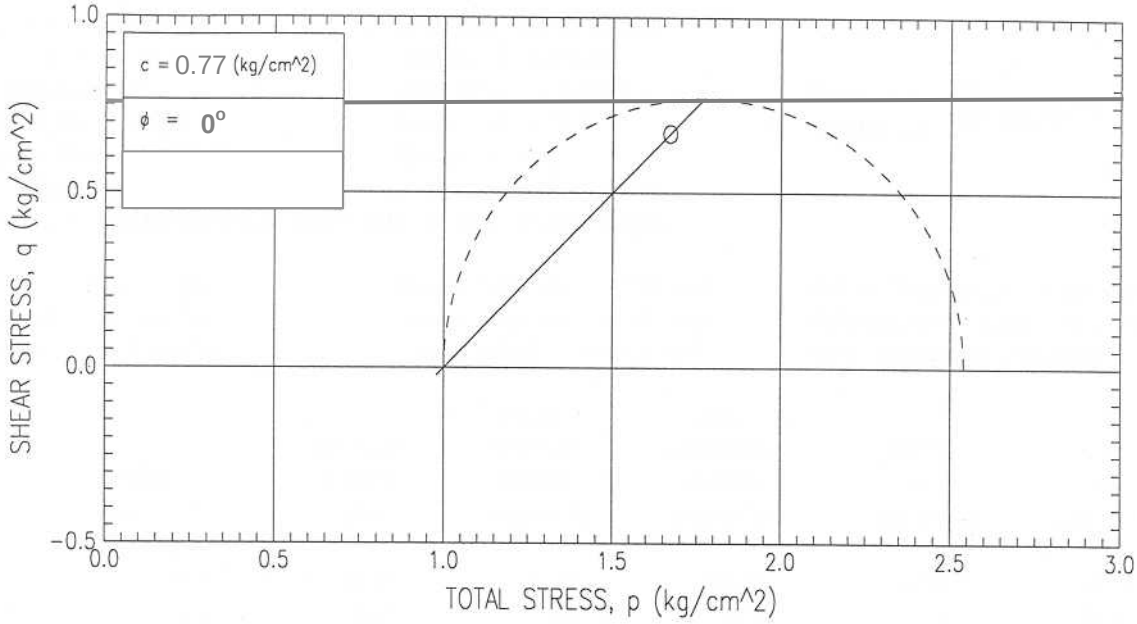
REMARKS:

1) SLICKEN SIDED MLT,HIGH,PLS*VOIDS ALONG THE SIDES

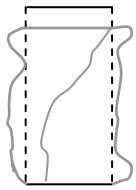
PROJECT 01-MEN-128			
PROJECT NO.01-35940K			
BORING NO. 6	SAMPLE NO.	6-6-6-I	
TECH. GR	DEPTH/ELEV	30.5-31.0	
LABORATORY	DATE	12/22/99	

TRIAXIAL COMPRESSION TEST REPORT **Plate No. D-9**

UU TEST MAX SHEAR



FAILURE SKETCHES



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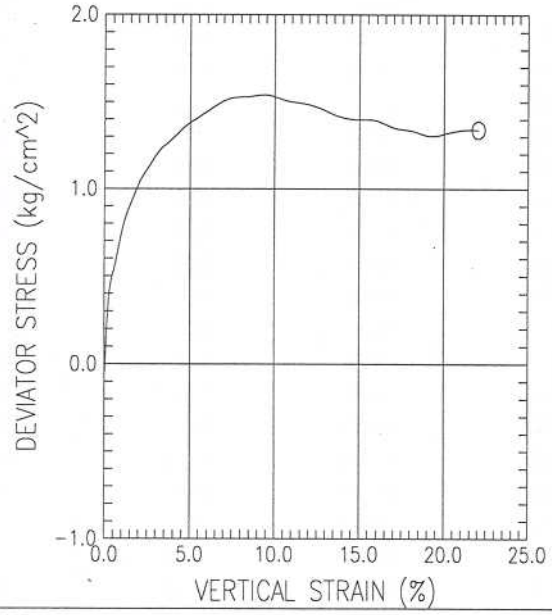


SYMBOL		O			
TEST NO.		10170-6			
INITIAL	WATER CONTENT (%)	14.82			
	DRY DENSITY (gm/cm^3)	1.87			
	SATURATION (%)	0.00			
	VOID RATIO	0.000			
BEFORE SHEAR	WATER CONTENT (%)	14.82			
	DRY DENSITY (gm/cm^3)	1.87			
	SATURATION (%)	0.00			
	VOID RATIO	0.000			
	BACK PRESS. (kg/cm^2)	0.00			
MINOR PRIN. STRESS (kg/cm^2)		1.00			
MAX. DEV. STRESS (kg/cm^2)		1.54			
TIME TO FAILURE (min)		9			
RATE OF STRAIN INCR (%/min)		1.00			
INITIAL DIAMETER (cm)		4.70			
INITIAL HEIGHT (cm)		10.16			
B-VALUE		0.00			

STRAIN CONTROLLED

DESCRIPTION OF SPECIMENS:

1) DRK GRAY&WHT,WET,HETERO,STRAT,MOTT,STIFF

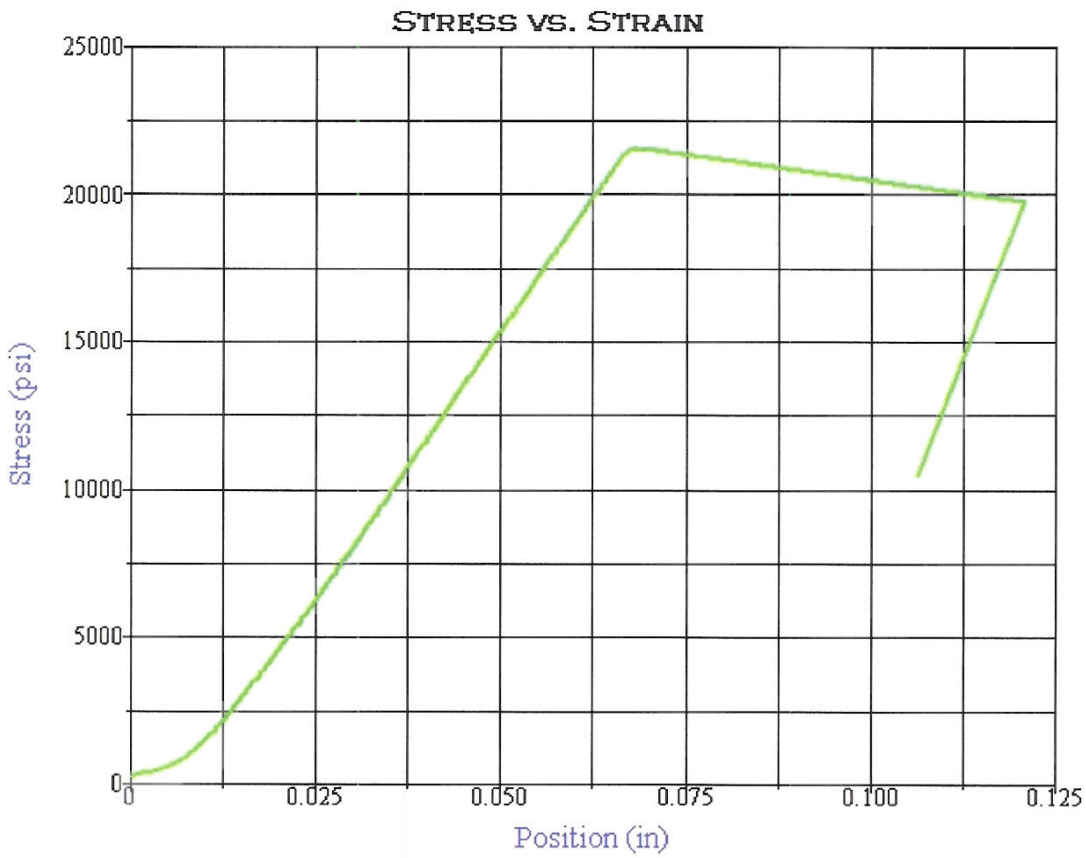
LL	PL	PI	GS	TYPE OF SPECIMEN 2X4LINER	TYPE OF TEST UU (Q)

REMARKS:

1) MATRIC WEATHERED SHALE&CLAY,-3/8MLT,*DISTURBED*QUE

PROJECT 01-MEN-128			
PROJECT NO.01-35940K			
BORING NO. 7	SAMPLE NO.	7-7-5-II	
TECH. GR	DEPTH/ELEV	25.0-25.5	
LABORATORY	DATE	12/22/99	

TRIAXIAL COMPRESSION TEST REPORT **Plate No. D-10**



Test Summary

Counter:	701
Elapsed Time:	00:10:09
Operator:	AZM
Sample NO.:	B1-19
Resident Engineer:	
Ticket:	GL# 10-051
E.A./CONTRACT NUMBER:	01-476600
Procedure Name:	Cores test
Start Date:	7/22/2010
Start Time:	12:35:00 PM
End Date:	7/22/2010
End Time:	12:45:09 PM
Workstation:	D1K00YB1
Tested By:	AZM
Lab:	Q10-119

Test Results

Specimen Gage Length:	5.8400 in
Diameter:	2.4000 in
Area:	4.5239 in²
Maximum Load:	97610 lbf
Compressive Strength:	21577 psi

Point Load Strength Index of Rock Test Results; ASTM D 5731 - 08

GL Tracking No.: 10-51

Report Date: July 29, 2010

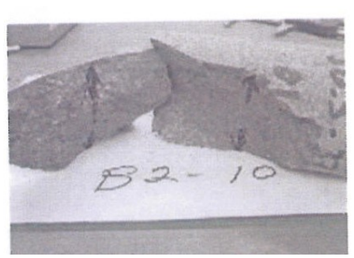
Boring I. D.	SAMPLE I.D.	Depth (feet)		Test Type	Initial Distance Between Contact Points, D (mm)	Final Distance Between Contact Points, D' (mm)	Equivalent Diameter, D_e (mm) per Section 10.1 of ASTM D 5731-08	Width, W (mm)	Length, L (mm)	Failure Load (lbs)	Uncorrected Point Load Strength Index, I_s; per EQ. #1 of ASTM D 5731-08		Size Correction Factor, F; per EQ. #4 of ASTM D 5731-08	Size Corrected Point Load Strength Index, $I_{s(50)}$; per EQ. #3 of ASTM D 5731-08		Generalized Index to Strength Conversion Factor, K, per Table 1 of ASTM D 5731-08 (approximated where appropriate)	Estimated Uniaxial Comp. Strength, s_c per EQ. #6 of ASTM D 5731-08		Remarks
		top	bot.								(MPa)	(PSI)		(MPa)	(PSI)		(MPa)	(PSI)	
RC-10-002	2-10	37	37	D-L	60.0	56.0	57.97	NA	NA	616.0	0.82	118.28	1.07	0.87	126	24.5	20	2,898	
RC-10-002	2-12	45	45.5	D-L	60.0	55.0	57.45	NA	NA	809.6	1.09	158.28	1.06	1.16	168	24.5	27	3,878	
RC-10-002	2-13	51	51	D-L	60.0	56.0	57.97	NA	NA	704.0	0.93	135.18	1.07	1.00	144	24.5	23	3,312	
RC-10-003	3-17	60	60	D-L	60.0	55.0	57.45	NA	NA	1,056.0	1.42	206.45	1.06	1.52	220	24.5	35	5,058	

NOTES:

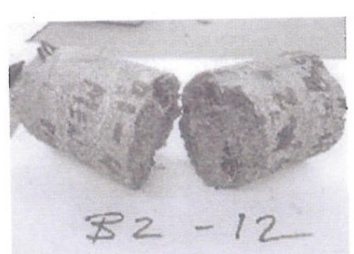
Test Type Abbreviations: D - Diametral, A -Axial, B - Block, I - Irregular Lump.

Orientation of Load (if anisotropic): P - Perpendicular to plane of weakness, L - Parallel to plane of weakness

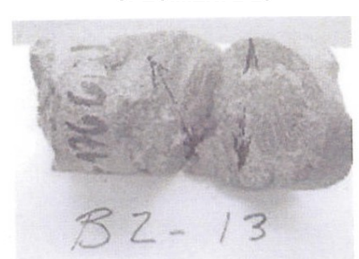
SPECIMEN: 2-10



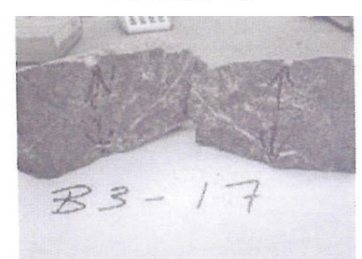
SPECIMEN: 2-12



SPECIMEN: 2-13



SPECIMEN: 3-17



CALTRANS
Division of Engineering Services
Geotechnical Services

Project Name:	Smoot Sink
EA:	01-476601
Dist-Co-Rt-PM:	01-MEN-128-PM 35.3
Date:	May-2011

Plate No. D-12

Appendix E

Photos

Photo No. 1. Google Earth 3D image viewing from southwest (dated 6-15-05).

Photo No. 2. Roadway crack viewing southwesterly at STA "M1" 24+00; photo date December 2005.

Photo No. 3. Roadway viewing westbound from STA "M1" 24+40; note sinking in roadway; photo date 4-11-11.

CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA: 01-476601 Date: May 2011	**PHOTOS**
	01-MEN-128; PM 34.5-35.5 **FOUNDATION REPORT**	Plate No. E-1

Photo No. 4. Roadway pavement distress around ~STA “M1” 21+50; note small sinkholes in westbound lane; viewing eastbound from left side of roadway (photo date 3-16-95, photo provided by Boonville Maintenance).

Photo No. 5. Patching of roadway scarp cracking around culvert at PM 35.07; viewing eastbound from right side of roadway (photo date 2-18-97, photo provided by Boonville Maintenance).

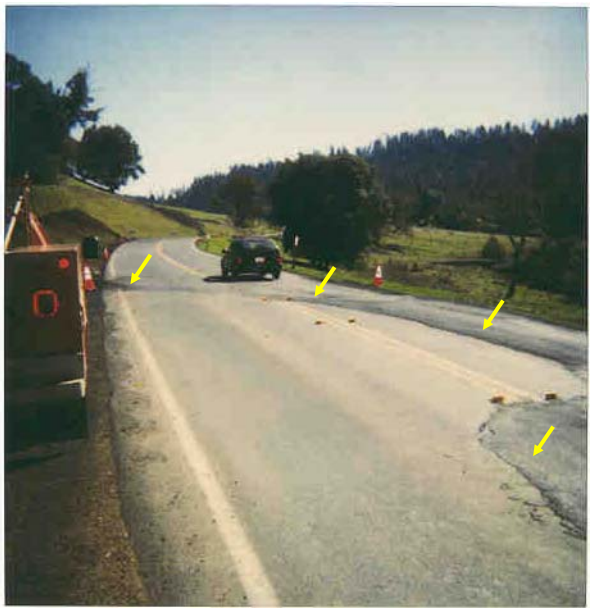


Photo No. 6. Patching of roadway scarp crack around culvert at PM 35.07; viewing eastbound from left side of roadway (photo date 2-18-97, photo provided by Boonville Maintenance).

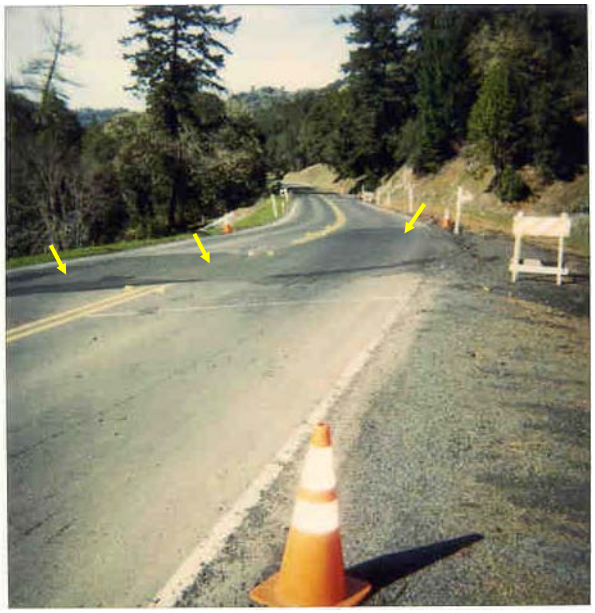


Photo No. 7. Patching of roadway scarp crack between ~STA “M1” 23+50 and 23+75; viewing westbound from left side of roadway (photo date 2-18-97, photo provided by Boonville Maintenance).

Photo No. 8. Patching of roadway scarp crack between ~STA "M1" 24+00 and 25+00; viewing westbound from left side of roadway (photo date 2-18-97, photo provided by Boonville Maintenance).

Photo No. 9. Placement of asphalt concrete fill to raise roadway grade; viewing eastbound around ~STA "M1" 21+30 at centerline; note fill depth (photo date 2-21-97, photo provided by Boonville Maintenance).

Photo No. 10. Slight depression from stress crack forming left of roadway between ~STA "M1" 21+25 and 21+75; viewing eastbound from left side of roadway (photo date 3-13-00, photo provided by Boonville Maintenance).

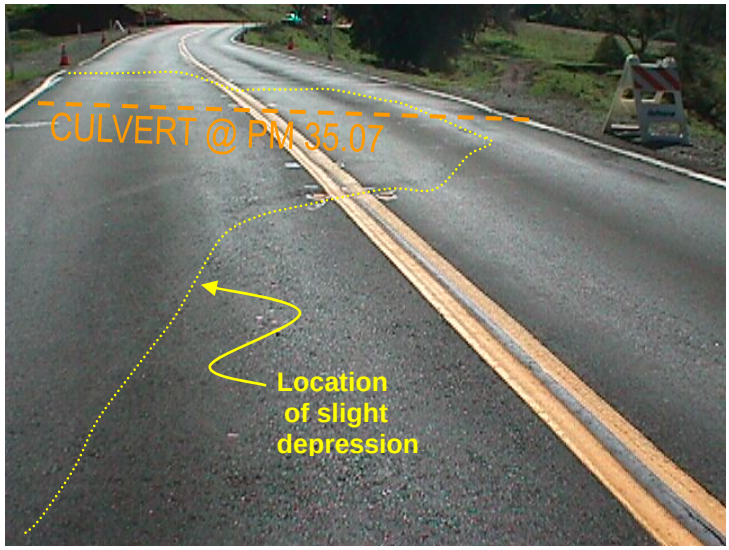


Photo No. 11. Slight depression from stress crack forming in roadway between ~STA "M1" 20+00 and 21+00; viewing eastbound (photo date 3-13-00, photo provided by Boonville Maintenance).

Photo No. 12. Patching of roadway scarp crack between ~STA “M1” 23+70 and 25+00; viewing westbound from right side of roadway (photo date 3-16-00).

Photo No. 13. Patching of roadway scarp crack between ~STA “M1” 23+70 and 24+80; viewing westbound from right side of roadway (photo date 3-16-00).

Photo No. 14. Patching of roadway scarp crack between ~STA “M1” 23+50 and 24+50; viewing westbound from right side of roadway (photo date 3-16-00).

Photo No. 15. Patching of roadway scarp crack between ~STA “M1” 23+50 and 25+00 (photo date 3-16-00).