INFORMATION HANDOUT

For Contract No. 01-0B5004
At 01-Men-101-3.8, 5.3

Identified by
Project ID 0112000133

PERMITS

United States Army Corps of Engineers

Non-Reporting Nationwide 404

WATER QUALITY

California Regional Water Quality Control Board

North Coast RegionWDID No. 1B15029WNME, ECM PIN CW-813833

AGREEMENTS

California Department of Fish and Wildlife

Notification No. 1600-2015-0396-R1

MATERIALS INFORMATION

Foundation Reports – Formoli Slide SPGA Retaining Wall

Foundation Reports – Peregrine Slide SPGA Retaining Wall

Water Source Information

Non-Reporting Nationwide Permit 14

U. S. Army Corps of Engineers

South Pacific Division

Nationwide Permit Pre-Construction Notification (PCN) Form

This form integrates requirements of the U. S. Army Corps of Engineers Nationwide Permit Program within the South Pacific Division (SPD), including General and Regional Conditions. You MUST fill out all boxes related to the work being done. Fillable boxes in this form expand if additional space is needed.

Box 1 Project Name Peregrine Slides Repair Project			
Applicant Name Steven Blair		**Applicant Title** Project Manager	
Applicant Company, Agency, etc. California Department of Transportation		**Applicant's internal tracking number** (if any) EA 01-0B500; EFIS Number 0112000133	
Mailing Address 1656 Union Street, Eureka, CA 95501			
Work Phone with area code (707) 441-5899	Mobile Phone with area code	Home Phone with area code	Fax # with area code (707) 445-5733
E-mail Address Steven.Blair@dot.ca.gov	Relationship of applicant to property: ☐ Owner ☐ Purchaser ☐ Lessee ☒ Other: Caltrans PM		
Application is hereby made for verification that subject regulated activities associated with subject project qualify for authorization under a U.S. Army Corps of Engineers Nationwide Permit or Permits as described herein. I certify that I am familiar with the information contained in this application and, that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities. I hereby grant to the agency to which this application is made the right to enter the above-described location to inspect the proposed, in-progress, or completed work. I agree to start work only after all necessary permits have been received and to comply with all terms and conditions of the authorization.			
Signature of applicant			Date (mm/dd/yyyy) 8/13/15

If anyone other than the person named as the Applicant will be in contact with the U. S. Army Corps of Engineers representing the Applicant regarding this project during the permit process, Box 2 MUST be filled out.

Box 2 Authorized Agent/Operator Name Allison Kunz		**Agent/Operator Title** Project Biologist	
Agent/Operator Company, Agency, etc. California Department of Transportation		E-mail Address Allison.Kunz@dot.ca.gov	
Mailing Address 703 B Street, Marysville, CA 95901			
Work Phone with area code (530) 741-4103	Mobile Phone with area code	Home Phone with area code	Fax # with area code (530) 741-4457
I hereby authorize the above named authorized agent to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application. I understand that I am bound by the actions of my agent and I understand that if a federal or state permit is issued, I, or my agent, must sign the permit.			
Signature of applicant			Date (mm/dd/yyyy) 8-13-15
I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief, such information is true, complete, and accurate.			
Signature of authorized agent Allison Kunz			Date (mm/dd/yyyy) 8/13/15

Revised April 12, 2012. For the most recent version of this form, visit your Corps District's Regulatory website.

Box 3 Name of property owners(s), if other than applicant: Construction of the proposed project will occur within Caltrans right-of-way.		
Owner Title	**Owner Company, Agency etc.**	
Mailing Address		
Work Phone with area code	Mobile Phone with area code	Home Phone with area code

Box 4 Name of contractor(s) (if known): The contractor is unknown at this time.		
Contractor Title	**Contractor Company, Agency, etc.**	
Mailing Address		
Work Phone with area code	Mobile Phone with area code	Home Phone with area code

Box 5 Site Number 1 of 1. Project location(s), including street address, city, county, state, zip code where proposed activity will occur: State Route 101 in Mendocino County, approximately 5 miles south of Hopland.	
Name of Waterbody(ies) (if known, otherwise enter "an unnamed tributary to"): an unnamed tributary to Tributary to what known, downstream waterbody: Russian River	
Latitude & Longitude (D/M/S, DD, or UTM with Zone): PM 3.75: 38.8966 & -123.05715 PM 5.30: 38.91608 & -123.05735	Section, Township, Range: Township 12N, Range 11W, Section 11 Township 12N, Range 11W, Section 2
County Assessor parcel number (include county name): Most work will be done within Caltrans right-of-way. Also on 050-280-08 and 050-250-14.	USGS Quadrangle map name: Hopland
Watershed (HUC and watershed name[1]): 1114310701/Russian River Hydrologic Unit [1]http://water.usgs.gov/GIS/regions.html	Size of permit area or project boundary: 4.5 acres linear feet
Directions to the project location and other location descriptions, if known: From Santa Rosa: travel north on SR 101 for approximately 40 miles. The project is located 5 miles south of the town of Hopland.	
Access limitations or restrictions (if any): None	

Box 6 Nature of Activity (Description of project, include all features):

Caltrans proposes to slow down or stop the slope movement of two (2) slide areas in Mendocino County near Hopland from 0.6 miles north of Commisky Station Road to 0.6 miles south of Pieta Creek Bridge (#10-083). The two slides areas are on the east side of State Route (SR) 101 at PM 3.75 and 5.3. The purpose of this project is to stabilize two active landslide areas on SR 101 and to restore the roadway to pre-damage conditions.

Formoli Slide

The proposed build alternative at Formoli Slide, PM 3.75, is a 20 foot high, 353 foot long soldier pile ground anchor wall (SPGA) with one or two levels of ground anchors and with tapering at both ends of the wall. The wall will be located approximately 35 feet right (east) of the edge of shoulder. Additional work includes:

- Construction of a ten foot deep underdrain at the front toe of the wall by placing an eight inch diameter perforated plastic pipe six inches above the base of the permeable material to collect and convey seepage water through outlet pipes to the drainage inlet (DI) of the drainage system (DS) 1 at PM 3.72.
- Grading of the slopes on the hill sides behind the wall to minimize surface ponding.
- Excavation of the front of the wall to create a bench and surfaced with aggregate base, at a 3% slope towards the wall to facilitate drainage and to provide Maintenance with an area for removing material that may overtop the wall in the event of possible future slope failures.
- Construction of new structural section where the roadway pavement has been damaged by the slide movement. The uplifted sections will be removed and the roadway surface returned to near its original elevation.

The hillside surface flow from above the wall would be directed along the sides of the wall to the swale along the wall (or alternatively along the edge of shoulder) and conveyed to the immediate culvert downstream (PM 3.72) where the underdrain also discharges. The existing pipe culvert at PM 3.72 will be replaced and installed at a lower elevation to match the elevation of the proposed underdrain.

Peregrine Slide

The proposed build alternative at Peregrine Slide, PM 5.3, is a 50 foot high, 419 foot long SPGA wall with five levels of ground anchors (tie backs) with tapering at both ends of the wall. The wall will be located approximately 100 feet right (east) of the edge of shoulder. Additional work includes:

- Excavation of the front of the wall to create a bench similar to Formoli. The back of the wall will be filled to the top with material excavated from the front bench.
- Construction of an underdrain at the front toe of the wall and also one 50 feet behind the wall.
- Installation of a level of horizontal drains through the wall face above the adjacent finished grade and placed inclined upward from the wall face at a grade of 10%. The horizontal drains will be connected to a collector system draining out to the drainage system at PM 5.17. The collector system will be buried within a toe berm constructed at the front toe of the wall. Discharge from the underdrain behind the wall will be conveyed to the DS at PM 5.11 along a hillside channel.
- Grading of the slopes on the hillside behind the wall to minimize surface ponding and infiltration.
- Construction of a 6' high earthen berm with 3:1 side slopes and an adjacent roadside swale. The roadside swale will be vegetated so as to serve as a "bio-swale" for water quality treatment of the storm water discharge from the roadway.
- Construction of new structural section where the roadway pavement has been damaged by the slide movement. The uplifted sections will be removed and the roadway surface returned to near its original elevation. At Peregrine, both ends of the newly placed structural sections will be overlaid with HMA-A to conform to the existing pavements.

The surface flow from the slide now flows into the cross culvert at PM 5.22. Because the proposed wall will intercept this flow, surface runoff from above the wall will be directed to the current culvert location at PM 5.11. This culvert will be up-sized to convey the additional flow. The abandoned culvert at PM 5.17 will be reconstructed at a lower elevation to take the flow from the underdrain at the bottom of the wall and horizontal drains. The last 40 feet of the existing culvert at PM 5.07 will be replaced with 24" corrugated steel pipe.

Korean War Veterans Viaduct

The cross drainage culvert at PM 4.95 that was also damaged will be replaced with an open channel. The pipe will be replaced with a rock-lined open channel approximately of 200 feet in length. Beginning to the east of the highway, the first 50 feet the channel, which will be steep, will have a layer of 1 Ton RSP. The rest of the channel is flatter and will be constructed with ¼ Ton (method B) RSP.

Construction will occur in the spring to early fall and have a duration of approximately two years. Construction is programmed for 2016. This project has both State and Federal funding.

Project Purpose (Description of the reason or purpose of the project):

The purpose of this project is to stabilize two active landslide areas on SR 101 and to restore the roadway to pre-damage conditions.

Reason(s) for discharge into Waters of the United States (Description of why dredged and/or fill material needs to be placed in Waters of the United States):

Replacement, repair, or maintenance of existing drainage facilities and roadway.

Proposed discharge of dredge and/or fill material. Indicate total surface area in **acres** and **linear feet** (where appropriate) of the proposed impacts to Waters of the United States, indicate water body type (tidal wetland, non-tidal wetland, riparian wetland, ephemeral stream/river, intermittent stream/river, perennial stream/river, pond/lake, vegetated shallows, bay/harbor, lagoon, ocean, etc.), and identify the impact(s) as permanent and/or temporary for each requested Nationwide Permit[1]:

[1]Enter the intended permit number(s). See Nationwide Permit regulations for permit numbers and qualification information: http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/NationwidePermits.aspx

Water Body Type	**Requested NWP Number: 14 (non-reporting)**				**Requested NWP Number:**				**Requested NWP Number:**			
	Permanent		Temporary		Permanent		Temporary		Permanent		Temporary	
	Area	Length	Area	Length	Area	Length	Area	Length	Area	Length	Area	Length
Other	0.037	546	0.010	56								
Total:	**0.037**	**452**	**0.010**	**56**								

Total volume (in cubic yards) and type(s) of material proposed to be dredged from or discharged into Waters of the United States:

Material Type	**Total Volume Dredged**	**Total Volume Discharged**
Rock Slope Protection (RSP)		31.5 cubic yards
Clean spawning gravel		
River rock		
Soil/Dirt/Silt/Sand/Mud		52.3 cubic yards
Concrete		
Structure		
Stumps/Root wads		
Other:		
Total:		83.8 cubic yards

Activity requires a written waiver to exceed specified limits of the Nationwide Permit? ☐ YES ☒ NO
If yes, provide Nationwide Permit number and name, limit to be exceeded, and rationale for each requested waiver:

Activity will result in the loss of greater than ½-acre of Waters of the United States? ☐ YES ☒ NO
If yes, provide an electronic copy (compact disc) or multiple hard copies (7) of the complete PCN for appropriate Federal and State Pre-discharge Notification (See General Condition #31, Pre-construction Notification, Agency Coordination, Section 2 and 4):

Describe direct and indirect effects caused by the activity and how the activity has been designed (or modified) to have minimal adverse effects on the aquatic environment (See General Condition #31, Pre-construction Notification, District Engineer's Decision, Section 1):
A potential indirect impact to waters of the U. S. associated with the project could include a temporary degradation of water quality. In order to avoid potential impacts to water quality, erosion control and soil stabilization measures will be implemented in accordance with Caltrans'

Best Management Practices (BMPs). These BMPs could include, but are not limited to, the use of silt fences, fiber rolls, and the application of fiber matrix on unfinished slopes. Disturbed soils will also be treated with an erosion control seed mixture. To protect water quality, in-water work (work below the ordinary high water mark of the unnamed seasonal tributary) will be restricted to the dry/low flow season (June 15 to October 15).
Potential cumulative impacts of proposed activity (if any): To avoid and/or minimize impacts to waters of the U. S. the following measures would be incorporated into the project: use of clean fill, Best Management Practices (BMPs) for slope stabilization and erosion control. These BMPs could include, but are not limited to, the use of silt fences, fiber rolls, and the application of fiber matrix on unfinished slopes. Disturbed soils will also be treated with an erosion control seed mixture. The majority of the work would be done during the dry/low flow season (June 15 to October 15). Any work conducted outside of that time period would be limited to when the channel is dry (no flowing water).

Drawings and figures (see each U. S. Army Corps of Engineers District's Minimum Standards Guidance):

Vicinity map: ☒ Attached (or mail copy separately if applying electronically)

To-scale Plan view drawing(s): ☒ Attached (or mail copy separately if applying electronically)

To-scale elevation and/or Cross Section Drawings(s): ☒ Attached (or mail copy separately if applying electronically)

Numbered and dated pre-project color photographs: ☒ Attached (or mail copy separately if applying electronically)

Sketch drawing(s) or map(s): ☒ Attached (or mail copy separately if applying electronically)

Has a wetland/waters of the U.S. delineation been completed?

☐ Yes, Attached[2] (or mail copy separately if applying electronically) ☒ No

If a delineation has been completed, has it been verified in writing by the Corps?

☐ Yes, Date of approved jurisdictional determination (m/d/yyyy): Corps file number: ☐ No

[2]If available, provide ESRI shapefiles (NAD83) for delineated waters

For proposed discharges of dredged material resulting from navigation dredging into inland or near-shore waters of the U.S. (including beach nourishment), please attach[3] a proposed Sampling and Analysis Plan (SAP) prepared according to Inland Testing Manual (ITM) guidelines (including Tier I information, if available), or if disposed offshore, a proposed SAP prepared according to the Ocean Disposal Manual.

[3]Or mail copy separately if applying electronically

Is any portion of the work already complete? ☐ YES ☒ NO

If yes, describe the work:

Box 7 Authority:

Is Section 10 of the Rivers and Harbors Act applicable?: ☐ YES ☒ NO

Is Section 404 of the Clean Water Act applicable?: ☒ YES ☐ NO

Is the project located in U. S. Army Corps of Engineers property or easement?: ☐ YES ☒ NO

If yes, has Section 408 process been initiated?: ☐ YES ☐ NO

Would the project affect a U. S. Army Corps of Engineers structure?: ☐ YES ☒ NO

If yes, has Section 408 process been initiated?: ☐ YES ☐ NO

Is the project located on other Federal Lands (USFS, BLM, etc.)?: ☐ YES ☒ NO

Is the project located on Tribal Lands?: ☐ YES ☒ NO

Box 8 Is the discharge of fill or dredged material for which Section 10/404 authorization is sought part of a larger plan of development?: ☐ YES ☒ NO

If discharge of fill or dredged material is part of development, name and proposed schedule for that larger development (start-up, duration, and completion dates):

Not applicable.

Location of larger development (if discharge of fill or dredged material is part of a plan of development, a map of suitable quality and detail of the entire project site should be included):

Not applicable.

Box 9 Measures taken to avoid and minimize impacts to waters of the United States:

To avoid and/or minimize impacts to waters of the U. S. the following measures would be incorporated into the project: use of clean fill, Best Management Practices (BMPs) for slope

stabilization and erosion control. These BMPs could include, but are not limited to, the use of silt fences, fiber rolls, and the application of fiber matrix on unfinished slopes. Disturbed soils will also be treated with an erosion control seed mixture. The majority of the work would be done during the dry/low flow season (May 15 to October 15). Any work conducted outside of that time period would be limited to when the channel is dry (no flowing water).

Box 10 Proposed Compensatory Mitigation related to fill/excavation and dredge activities. Indicate in **acres** and **linear feet** (where appropriate) the total quantity of Waters of the United States proposed to be created, restored, enhanced and/or preserved for purposes of providing compensatory mitigation. Indicate water body type (tidal wetland, non-tidal wetland, riparian wetland, ephemeral stream/river, intermittent stream/river, perennial stream/river, pond/lake, vegetated shallows, bay/harbor, lagoon, ocean, etc.) or non-jurisdictional (uplands[1]). Indicate mitigation type (permittee-responsible on-site/off-site, mitigation bank, or in-lieu fee program). If the mitigation is purchase of credits from a mitigation bank, indicate the bank to be used, if known:

[1] For uplands, please indicate if designed as an upland buffer.

Site Number	Water Body Type	Created		Restored		Enhanced		Preserved		Mitigation Type
		Area	Length	Area	Length	Area	Length	Area	Length	
1	Other	3,000 sq. ft.								On-site revegetation at 3:1 ratio
Total:		3,000 sq. ft.								

If no mitigation is proposed, provide detailed explanation of why no mitigation would be necessary: Not applicable.

If permittee-responsible mitigation is proposed, provide justification for not utilizing a Corps-approved mitigation bank or in-lieu fee program: Not applicable.

Has a draft/conceptual mitigation plan been prepared in accordance with the April 10, 2008 Final Mitigation Rule[2] and District Guidelines?

[2] http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/mitig_info.aspx

[3] **Sacramento and San Francisco Districts**-http://www.spk.usace.army.mil/organizations/cespk-co/regulatory/pdf/Mitigation_Monitoring_Guidelines.pdf

[4] **Los Angeles District**-http://www.spl.usace.army.mil/regulatory/mmg_2004.pdf

[5] **Albuquerque District**-http://www.spa.usace.army.mil/reg/mitigation/SPA%20Final%20Mitigation%20Guidelines_OLD.pdf

☐ Yes, Attached (or mail copy separately if applying electronically) ☒ No

If no, a mitigation plan must be prepared and submitted, if applicable.

Mitigation site(s) Latitude & Longitude (D/M/S, DD, or UTM with Zone):	USGS Quadrangle map name(s):
Assessor Parcel Number(s):	Section(s), Township(s), Range(s):

Other location descriptions, if known:

Directions to the mitigation location(s):

Box 11 Threatened or Endangered Species and Essential Fish Habitat

Please list any federally-listed (or proposed) threatened or endangered species or critical habitat (or proposed critical habitat) within the project area (include scientific names (e.g., Genus species), if known):

a. None. Please see the Natural Environment Study for information regarding species considered during studies for this project.

b.

c.

d.

e.

f.

Have surveys, using U.S. Fish and Wildlife Service/NOAA Fisheries protocols, been conducted?
☐ Yes, Report attached (or mail copy separately if applying electronically) ☒ No

Has a biological assessment or evaluation been completed for the proposed project?
☐ Yes, Report attached (or mail copy separately if applying electronically) ☒ Not attached

Has Section 7 consultation been initiated by another federal agency?
☐ Yes, Initiation letter attached (or mail copy separately if applying electronically) ☒ No

Has Section 10 consultation been initiated for the proposed project?
☐ Yes, Initiation letter attached (or mail copy separately if applying electronically) ☒ No

Has the USFWS/NOAA Fisheries issued a Biological Opinion?
☐ Yes, Attached (or mail copy separately if applying electronically) ☒ No
If yes, list date Opinion was issued (m/d/yyyy):

Is the project located within Essential Fish Habitat (EFH)? ☐ Yes ☒ No
[1] http://swr.nmfs.noaa.gov/hcd/HCD_webContent/EFH/index_EFH.htm

Box 12 Historic Properties and Cultural Resources

Are any cultural resources of any type known to exist on-site? ☐ YES ☒ NO

Please list any known historic properties listed, or eligible for listing, on the National Register of Historic Places:

a. None.

b.

c.

d.

e.

f.

Has a cultural resource records search been conducted?
☒ Yes, Report attached (or mail copy separately if applying electronically) ☐ No

Has a cultural resource pedestrian survey been conducted for the site?
☐ Yes, Report attached (or mail copy separately if applying electronically) ☒ No

Has another federal agency been designated the lead federal agency for Section 106 consultation?
☐ Yes, Designation letter/email attached (or mail copy separately if applying electronically) ☐ No

Has Section 106 consultation been initiated by another federal agency?
☐ Yes, Initiation letter attached (or mail copy separately if applying electronically) ☒ No

Has a Section 106 MOA or PA been signed by another federal agency and the SHPO?
☐ Yes, Attached (or mail copy separately if applying electronically) ☒ No
If yes, list date MOA or PA was signed (m/d/yyyy):

Box 13 Section 401 Water Quality Certification:
Applying for certification? ☒ Yes, Attached (or mail copy separately if applying electronically) ☐ No
☐ Not Applicable (projects proposed for authorization under RHA Section 10 only)

Certification issued? (including Programmatically)?
☐ Yes, Attached (or mail copy separately if applying electronically) ☒ No
Certification waived? ☐ Yes, Attached (or mail copy separately if applying electronically) ☐ No
Certification denied? ☐ Yes, Attached (or mail copy separately if applying electronically) ☐ No

Exempted Activity? ☐ Yes ☒ No
Agency concurrence? ☐ Yes, Attached ☐ No
If exempt, state why:

Box 14 Coastal Zone Management Act
Is the project located within the Coastal Zone? ☐ Yes ☒ No (If no, proceed to Box 15)

If yes, applying for a coastal commission-approved Coastal Development Permit?
☐ Yes, Attached (or mail copy separately if applying electronically) ☐ No
If no, applying for separate CZMA-consistency certification?
☐ Yes, Attached (or mail copy separately if applying electronically) ☐ No

Permit/Consistency issued? ☐ Yes, Attached (or mail copy separately if applying electronically) ☐ No

Exempt? ☐ Yes ☐ No
Agency concurrence? ☐ Yes, Attached ☐ No
If exempt, state why:

Box 15 List of other certification or approval/denials received from other federal, state, or local agencies for work described in this application:

Agency	Type Approval[4]	Identification Number	Date Applied	Dated Approved	Date Denied
NCRWQCB	401 Water Quality Cert	Pending	September 2015		
CDFW	1602 Agreement	Pending	September 2015		

[4]Would include but is not restricted to zoning, building, and flood plain permits

Nationwide Permit General Conditions (GC) checklist:

(http://www.gpo.gov/fdsys/pkg/FR-2012-02-21/pdf/2012-3687.pdf)

Check	General Condition	Rationale for compliance with General Condition
☒	1. Navigation	The proposed project will not have an adverse impact on navigation.
☒	2. Aquatic Life Movements	The proposed project will not disrupt the life cycle movements of aquatic life.
☒	3. Spawning Areas	This project will not affect spawning areas.
☒	4. Migratory Bird Breeding Areas	The project will not affect migratory breeding areas.
☒	5. Shellfish Beds	The project will not occur in areas of concentrated shellfish populations.
☒	6. Suitable Material	All materials used for the construction of the proposed project will comply with Caltrans materials standards.
☒	7. Water Supply Intakes	The proposed project will not occur in the proximity of a public water supply intake.
☒	8. Adverse Effects from Impoundments	The proposed project will not result in the impoundment of water.
☒	9. Management of Water Flows	The proposed project will maintain pre-construction flow conditions. The project will not permanently restrict or impede the passage of normal or expected high flows, and will withstand expected high flows.
☒	10. Fills Within 100-Year Floodplains	The proposed project is not within 100-Year Floodplain.
☒	11. Equipment	The contractor will take measures to minimize soil disturbance by heavy equipment during construction.
☒	12. Soil Erosion and Sediment Controls	Appropriate soil erosion and sediment controls will be used and maintained during construction. Exposed soils and areas of work below the ordinary high water mark will be stabilized at the earliest possible date.
☒	13. Removal of Temporary Fills	Temporary fills are not expected to be needed during the construction of this project, but if they become necessary they will be removed in their entirety upon project completion. The affected areas will be returned to their preexisting elevation and reseeded with native species as appropriate.
☒	14. Proper Maintenance	The project will be constructed in accordance with Caltrans codes and standards, and will be properly maintained by Caltrans Maintenance.
☒	15. Single and Complete Project	The proposed project is a single and complete project.
☒	16. Wild and Scenic Rivers	The proposed project will not take place in or near a river designated as a Wild and Scenic River.
☒	17. Tribal Rights	The construction of this project will not impair reserved tribal rights.
☒	18. Endangered Species	See Box 11 above
☒	19. Migratory Bird and Bald and Golden Eagle Permits	The proposed project will comply with this condition
☒	20. Historic Properties	See Box 12 above
☒	21. Discovery of Previously Unknown Remains and Artifacts	The proposed project will comply with this condition.
☒	22. Designated Critical Resource Waters	The proposed project will not take place in or near Designated Critical Resource Waters.
☒	23. Mitigation	See Box 10 above
☒	24. Safety of Impoundment Structures	The proposed project will comply with this condition.

☒	25. Water Quality	See Box 13 above
☒	26. Coastal Zone Management	See Box 14 above
☒	27. Regional and Case-by-Case Conditions	The proposed project will comply with any case-by-case conditions.
☒	28. Use of Multiple Nationwide Permits	The Applicant is aware that if total proposed acreage of impact exceeds acreage limit of NWP with highest specified acreage, no NWP can be issued.
☒	29. Transfer of Nationwide Permit Verifications	The Applicant is aware of this permit transfer requirement.
☒	30. Compliance Certification	The Applicant is aware of this compliance certification requirement.
☒	31. Pre-Construction Notification	The applicant is aware of the pre-construction notification requirements.

San Francisco District (SPN) in California:

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

1. Is pre-construction notification (PCN) required? ☒ Yes ☐ No

   If yes, then in accordance with General Condition 31, the appropriate U.S. Army Corps of Engineers (Corps) District shall be notified using either the South Pacific Division 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. The PCN Checklist and application form are available at: http://www.spn.usace.army.mil/regulatory/index.html. In addition, the PCN shall include:

   a. 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; and

   b. 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 projects located within the boundaries of the Los Angeles District shall comply with the most current version of the 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

   c. Numbered and dated pre-project color photographs showing a representative sample of waters proposed to be impacted on the project site, and all waters proposed to be avoided on and immediately adjacent to the project site. The compass angle and position of each photograph shall be documented on the plan-view drawing required in subpart b of this regional condition.

   If yes, is the PCN attached? ☒ Yes ☐ No ☐ Not Applicable

2. Is the activity located in an area 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 FR 11092)).
   ☐ Yes ☒ No

   If yes, notification pursuant to General Condition 31 is required. 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. Are any other Federal agencies involved? ☒ Yes ☐ No

   If yes, 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 (50 CFR Part 402.07), Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act (EFH) (50 CFR 600.920(b)) and/or Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (36 CFR 800.2(a)(2)), 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. Is the project located within a waterbody supporting any federally-listed threatened or endangered fish species?
☐ Yes ☒ No
If yes, unless determined to be impracticable by the Corps, 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 streambed.

5. Will the permittee 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?
☐ Yes ☒ No

If no, then the proposed activity may not be in compliance with Regional Condition 10, unless construction of compensatory mitigation prior to or concurrent with commencement of construction of the authorized activity is specifically determined impracticable by the Corps.

Will the mitigation involve use of a mitigation bank or in-lieu fee program? ☐ Yes ☒ No

If yes, then the permittee shall submit proof to the Corps of payment prior to commencement of construction of the authorized activity.

6. Will the activity result in the loss of greater than 300 linear feet of intermittent and/or ephemeral streams for NWPs 29, 39, 40, 42, 43, 44, 51, and 52 or result in the loss of greater than 500 linear feet along the bank for NWP 13? ☐ Yes ☒ No

If yes, is the applicant requesting a waiver of the linear foot limit? ☐ Yes ☐ No ☒ Not Applicable

If yes, then the request shall 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 water body and characters 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 associated vegetation community (i.e. wetland, non-wetland); surrounding land use; water quality; issues related to cumulative impacts in the watershed, and; any other relevant information; and

b. An analysis of the proposed impacts to the waterbody in accordance with General Condition 31 and Regional Condition 3; and

c. Measures taken to avoid and minimize losses, including other methods of constructing the proposed project; and

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

B. SPN Regional Conditions to be applied across **the entire San Francisco District:**

1. Is the project located within the **San Francisco Bay diked baylands** (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, Figure 1 on the Public Notice for Federal Register Notice Announcing the Reissuance of the Nationwide Permits and the San Francisco District Regional Conditions: http://www.spn.usace.army.mil/regulatory/nwp/2012/final%20NWPs.pdf)? ☒ Yes ☒ No

If yes, notification pursuant to General Condition 31 is required. The PCN must include an explanation of how avoidance and minimization of losses of waters or wetlands are taken into consideration to the maximum extent practicable (see General Condition 23(a)).

2. Is the project located within the **Santa Rosa Plain** (http://www.spn.usace.army.mil/regulatory/srp/srpmap.pdf)?
☐ Yes ☒ No

If yes, notification pursuant to General Condition 31 is required. The PCN must include an explanation of how avoidance and minimization of losses of waters or wetlands are taken into consideration to the maximum extent practicable (see General Condition 23(a)).

3. Will the proposed project impact **Eelgrass Beds**? ☐ Yes ☒ No

If yes, notification pursuant to General Condition 31 is required. The PCN must include a compensatory mitigation plan, habitat assessment, and extent of proposed-project impacts to Eelgrass Beds.

C. SPN Regional Conditions to be applied to specific Nationwide Permits (NWP):

NWP 3:

Will excavation equipment operate from an upland site? ☐ Yes ☐ No
If no, an explanation as to need to place equipment in waters of the U.S. must be included in the PCN.

Will work occur within a special aquatic site? ☐ Yes ☐ No
If yes, an explanation why the special aquatic site cannot be avoided, as well as impact minimization measures, must be included in the PCN.

NWP 11:

Are temporary structures proposed in wetlands or vegetated shallow water areas? ☐ Yes ☐ No
If yes, notification pursuant to General Condition 31 is required. The PCN shall include the type of habitat and aerial extent affected by the structure(s).

NWP 12:

Will excess material removed from any trenching that is not used for backfilling of the trench be disposed of at an upland site? ☐ Yes ☐ No

Does the proposed project include construction of substation facilities? ☐ Yes ☐ No
If yes, NWP 12 cannot be used to authorize this project.

NWP 13:

Will more than 300 linear feet of bank be stabilized? ☐ Yes ☐ No
If yes, notification pursuant to General Condition 31 is required. The PCN shall address the effect of the bank stabilization on the stability of the opposite side of the waterway's bank, and on the adjacent property upstream and downstream of the activity.

Will wetland vegetation or submerged, rooted, aquatic plants be removed from an area greater than 0.1 acre or 300 linear feet? ☐ Yes ☐ No
If yes, notification pursuant to General Condition 31 is required and shall include vegetation type and extent of removal.

Will excess material excavated from a toe trench be disposed of in an upland location? ☐ Yes ☐ No
If yes, the PCN shall include the location of the disposal site.

Will additional fill extend beyond the original shoreline in excess of one cubic yard per running foot?
☐ Yes ☐ No

Will bank stabilization incorporate structures or modifications beneficial to fish and wildlife? ☐ Yes ☐ No
If no, the applicant shall demonstrate why the structures or modifications were not considered practicable.

NWP 14:

Will the proposed project fill greater than 300 linear feet of a jurisdictional waterway? ☐ Yes ☒ No
If yes, notification pursuant to General Condition 31 is required. The PCN shall address the effect of the activity on the stability of the opposite side of the waterway's bank, and on the adjacent property upstream and downstream of the activity.

Is the proposed project to construct taxiways or runways? ☐ Yes ☒ No
If yes, NWP 14 cannot be used to authorize this project.

Has this NWP been used to authorize previous project segments within the same linear transportation project?
☐ Yes ☒ No
If yes, 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.

Has any new or additional bank stabilization required for the crossing incorporated structures or modifications beneficial to fish and wildlife? ☐ Yes ☒ No
If no, the applicant shall demonstrate why they were not considered practicable. Bottomless and embedded culverts are encouraged over traditional culvert stream crossings.

NWP 23:

Use of this NWP requires notification pursuant to General Condition 31. Please refer to Regional Conditions for additional information on PCN requirements.

NWP 27:

The PCN shall include documentation of a review of the project's impacts to demonstrate that at the conclusion of work the project would result in a net increase of aquatic function. The documentation must also include a review of the project's impacts on adjacent properties or structures and must also discuss cumulative impacts associated with the project.

NWP 29:

Will the activity result in the replacement of wetlands or waters of the U.S. with impervious surfaces?
☐ Yes ☐ No
If yes, the residential development shall incorporate low impact development concepts to the extent practicable, and a description of those concepts proposed shall be included with the PCN. Additional information on concepts and definitions are available at the following website: http://www.epa.gov/owow/NPS/lid

Is the proposed project located within the San Francisco Bay diked baylands (Figure 1 on the Public Notice for Federal Register Notice Announcing the Reissuance of the Nationwide Permits and the San Francisco District Regional Conditions: http://www.spn.usace.army.mil/regulatory/nwp/2012/final%20NWPs.pdf)?
☐ Yes ☐ No
If yes, NWP 29 cannot be used to authorize this project.

NWP 33:

Are access roads designed to be the minimum width necessary? ☐ Yes ☐ No ☐ Not Applicable (N/A)

Are access roads designed to minimize changes to the hydraulic flow characteristics of waterways and

degradation of water quality for project implementation? ☐ Yes ☐ No ☐ N/A

Will the road(s) be properly stabilized and maintained during and after construction? ☐ Yes ☐ No ☐ N/A

Will fill be placed to minimize encroachment of equipment within waters of the U.S.? ☐ Yes ☐ No ☐ N/A

Will vegetative disturbance be minimized? ☐ Yes ☐ No ☐ N/A

Will borrow material be taken from an upland source, where feasible? ☐ Yes ☐ No ☐ N/A

If no to any of the above, NWP 33 cannot be used to authorize the project.

Will the proposed project result in stream channelization? ☐ Yes ☐ No ☐ N/A
If yes, NWP 33 cannot be used to authorize the project.

NWP 35:

Use of this NWP requires notification pursuant to General Condition 31. Please refer to Regional Conditions for additional information on PCN requirements.

NWP 39

Will the activity result in the replacement of wetlands or waters of the U.S. with impervious surfaces?
☐ Yes ☐ No
If yes, the commercial or institutional development shall incorporate low impact development concepts to the extent practicable, and a description of those concepts proposed shall be included with the PCN. Additional information on concepts and definitions are available at the following website: http://www.epa.gov/owow/NPS/lid

Is the proposed project located within the San Francisco Bay diked baylands (Figure 1 on the Public Notice for Federal Register Notice Announcing the Reissuance of the Nationwide Permits and the San Francisco District Regional Conditions: http://www.spn.usace.army.mil/regulatory/nwp/2012/final%20NWPs.pdf)?
☐ Yes ☐ No
If yes, NWP 39 cannot be used to authorize the project.

NWP 40:

Will work impede flows during high volume events of a perennial or intermittent watercourse? ☐ Yes ☐ No
If yes, NWP 40 cannot be used to authorize the project.

NWP 41:

If the Corps determines that there will be a detrimental impact to aquatic habitat, compensatory mitigation may be required.

Will fill material be re-deposited, re-graded, and/or discharged, or will channel lining be installed?
☐ Yes ☐ No
If yes, notification pursuant to General Condition 31 is required. The PCN shall include a statement demonstrating the need for the project and an explanation of the project's benefit to water quality.

NWP 42:

Are buildings proposed in waters of the U.S.? ☐ Yes ☐ No
If yes, the applicant must demonstrate that there is no on-site practicable alternative less environmentally damaging as defined by the Section 404(b)(1) guidelines.

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. 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;

b. 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

c. 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:

3. MAINTENANCE:

1. To the extent practicable, excavation equipment shall work from an upland site (e.g., from the top of the bank, the road bed of the bridge, or culverted road crossing) to minimize adding fill into waters of the U.S. If it is not practicable to work from an upland site, or if working from the upland site would cause more environmental damage than working in the stream channel, the excavation equipment can be located within the stream channel but it must minimize disturbance to the channel (other than the removal of accumulated sediments or debris). As part of the notification to the Corps (in accordance with General Condition No. 31), an explanation as to the need to place excavation equipment in waters of the U.S. is required, as well as a statement of any additional necessary fill (e.g., cofferdams, access road, fill below the OHW mark for a staging area, etc.).

2. If the activity is proposed in a special aquatic site, the notification to the Corps (in accordance with General Condition No. 31) shall include an explanation of why the special aquatic site cannot be avoided, and the measures to be taken to minimize impacts to the special aquatic site.

11. TEMPORARY RECREATIONAL STRUCTURES:

1. Notification to the Corps (in accordance with General Condition No. 31) is required if any temporary structures are proposed in wetlands or vegetated shallow water areas (e.g. in eelgrass beds). The notification shall include the type of habitat and areal extent affected by the structures.

12. UTILITY LINE ACTIVITIES:

1. Excess material removed from a trench, associated with utility line construction, shall be disposed of at an upland site away from any wetlands or other waters of the U.S. so as to prevent this material from being washed into aquatic areas.

2. This NWP permit does not authorize the construction of substation facilities. Utility line substations can usually be constructed in uplands.

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.

23. APPROVED CATEGORICAL EXCLUSIONS:

1. Use of this NWP requires notification to the Corps (in accordance with General Condition No. 31). The notification shall include the following:

    a. A copy of the Federal Categorical Exclusion (Cat/Ex) document signed by the appropriate federal agency. If the Cat/Ex is signed by a state or local agency representative instead of by a federal agency representative, then copies of all documentation authorizing alternative agency signature shall be provided.

    b. Written description of Corps authority (e.g., Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act.);

    c. a list of conditions described in the Cat/Ex and/or attachments outlining measures that must be taken prior to, during, or after project construction to minimize impacts to the aquatic environment;

    d. a copy of the jurisdictional delineation performed by qualified specialists showing the project limits and the location (delineated boundaries) of Corps jurisdiction within the overall project limits;

    e. map(s) showing the locations of potentially permanent and temporary project impacts to areas within Corps jurisdiction;

f. a clear and concise description of all project impacts including, but not necessarily limited to:
   1. quantification and description of permanent project impacts to areas within Corps jurisdiction,
   2. quantification and description of temporary impacts to areas within Corps jurisdiction, and
   3. linear extent of Corps jurisdiction affected by the project;

g. a general description of activities covered by the Cat/Ex that do not require Corps authorization but are connected or related to the activities in Corps jurisdiction;

h. a complete description of any proposed mitigation and/or restoration including, but not necessarily limited to, locations of any proposed planting, short- and long-term maintenance, proposed monitoring, success criteria and contingency plans;

i. written justification of how the project complies with the Nationwide Permit Program including less than minimal impact to the aquatic environment and compliance with the General Conditions.

j. For Federal Highway Administration (FHWA) Cat/Ex projects, the notification should describe how activities described in the Cat/Ex meet the description of the Cat/Ex project published in the August 28,1987 Federal Register part 771.117 (a)(b)(c) and (d) (Volume 52, No. 167) or any updated version published in the Federal Register.

2. Only activities specifically described in the Cat/Ex project description will be covered by the NWP 23 authorization. If other activities not described in the Cat/Ex project description will be performed (e.g., dewatering, slope protection, etc.), these activities must receive separate NWP authorizations.

3. Notification to the Corps (in accordance with General Condition 31) must include a copy of the signed Cat/Ex document and final agency determinations regarding compliance with Section 7 of the Endangered Species Act (ESA), Essential Fish Habitat (EFH) under the Magnussen-Stevens Act, and Section 106 of the National Historic Preservation Act.

27. Aquatic Habitat Restoration, Establishment, and Enhancement Activities

1. Notification to the Corps (in accordance with General Condition 31) must include documentation of a review of project impacts to demonstrate that at the conclusion of the work that the project would result in a net increase in aquatic function. Additionally, the documentation must include a review of project impacts on adjacent properties or structures and must also discuss cumulative impacts associated with the project.

29. Residential Developments:

1. When discharge of fill results in the replacement of wetlands or waters of the U.S. with impervious surfaces, to ensure that the authorized activity does not result in more than minimal degradation of water quality (in accordance with General Condition 25), the residential development shall incorporate low impact development concepts (e.g. native landscaping, bioretention and infiltration techniques, and constructed green spaces) to the extent practicable. A description of the low impact development concepts proposed in the project shall be included with the permit application. More information including low impact development concepts and definitions is available at the following website: http://www.epa.gov/owow/NPS/lid/.

2. Use of this NWP is prohibited within the San Francisco Bay diked baylands (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 (see figure 1) 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)).

33. TEMPORARY CONSTRUCTION, ACCESS, AND DEWATERING:

1. Access roads shall be designed to be the minimum width necessary and shall be designed to minimize changes to the hydraulic flow characteristics of the stream and degradation of water quality (in accordance with General Conditions 9 and 25). The following Best Management Practices (BMPs) shall be followed to the maximum extent practicable to ensure that flow and circulation patterns of waters are not impaired and adverse effects on the aquatic environment will be kept to a minimum:

   a. The road shall be properly stabilized and maintained during and following construction to prevent erosion.

   b. Construction of the road fill shall occur in a manner that minimizes the encroachment of trucks, tractors, bulldozers, or other heavy equipment within waters of the United States (including adjacent wetlands) that lie outside the lateral boundaries of the fill itself.

2. Vegetative disturbance in the waters of the U.S. shall be kept to a minimum.

3. Borrow material shall be taken from upland sources whenever feasible.

4. Stream channelization is not authorized by this NWP.

35. MAINTENANCE DREDGING OF EXISTING BASINS:

1. Use of this NWP will require notification to the Corps (in accordance with General Condition No. 31). The notification information should be provided on the Consolidated Dredging-Dredged Material Reuse/Disposal Application. This application and instructions for its completion can be found on our web site at: http://www.spn.usace.army.mil/conops/applications.html. The information must include the location of the proposed upland disposal site. A jurisdictional delineation of the proposed upland disposal site prepared in accordance with the current method required by the Corps may also be required.

2. The U.S. Coast Guard will be notified by the permittee at least 14 days before dredging commences if the activity occurs in navigable waters of the U.S. (Section 10 waters).

3. The permittee will be required to provide the following information to the Corps:
   a. Dredge Operation Plan: Submit, for approval by this office, no earlier than 60 calendar days and no later than 20 calendar days before the proposed commencement of dredging, a plan which includes the following: **Corps file number,** a copy of the dredging contract or description of the work under which the contractor will do the permitted work; name and telephone numbers of the dredging contractor's representative on site; proposed dredging start and completion dates; quantity of material to be removed; dredging design depth and typical cross section including overdepth; and date of last dredging episode and design depth. The Dredge Operational Plan shall also provide the following information: The controls being established to insure that dredging operations occur within the limits defined by the basin or channel dimensions and typical channel section.

   b. Pre-Dredge Survey: Submit no earlier than 60 calendar days and no later than 20 calendar days before commencement of dredging, a survey with accuracy to one-tenth foot that delineates and labels the following: areas to be dredged with overdepth allowances; existing depths; estimated quantities to be dredged to the design depth; and

estimated quantities for overdepth dredging. **All surveys shall be signed by the permittee to certify their accuracy. Please include the Corps file number.**

c. Solid Debris Management Plan: Submit no earlier than 60 calendar days and no later than 20 calendar days before commencement of work, a plan which describes measures to ensure that solid debris generated during any dredging operation is retained and properly disposed in areas not under Corps jurisdiction. **At a minimum, the plan shall include the following: source and expected type of debris; debris retrieval method; Corps file number; disposal method and site; schedule of disposal operations; and debris containment method to be used, if floatable debris is involved. (Please note that failure to provide all of the information requested in a, b, and c above may result in delays to your project. When your Dredge Operation Plan has been approved, you will receive a written authorization to commence with your project.)**

d. Post-Dredge Survey: Submit, **within 30 days of the last disposal activity** ("last" is defined as that activity after which no further activity occurs for 15 calendar days), a survey with accuracy to one-tenth foot that delineates and labels the areas dredged and provides the dredged depths. **Also, include the Corps file number, actual dates of dredging commencement and completion, actual quantities dredged for the project to the design depth, and actual quantities of overdepth.** The permittee shall substantiate the total quantity dredged by including calculations used to determine the volume difference (in cubic yards) between the Pre- and Post-Dredge Surveys and **explain any variation in quantities greater than 15% beyond estimated quantities or dredging deeper than is permitted (design plus overdepth allowance)**. **All surveys shall be accomplished by a licensed surveyor and signed by the permittee to certify their accuracy.** A copy of the post dredge survey should be sent to the National Ocean Service for chart updating:

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

e. **The permittee or dredge contractor shall inform this office when: 1) a dredge episode actually commences, 2) when dredging is suspended (suspension is when the dredge contractor leaves the dredge site for more than 48 hours for reasons other than equipment maintenance), 3) when dredging is restarted, and 4) when dredging is complete. Each notification should include the Corps file number.** Details for submitting these notifications will be provided in the verification letter (to whom and how).

39. Commercial and Institutional Developments:

1. When discharge of fill results in the replacement of wetlands or waters of the U.S. with impervious surfaces, to ensure that the authorized activity does not result in more than minimal degradation of water quality (in accordance with General Condition 25), the commercial and institutional development shall incorporate low impact development concepts (e.g. native landscaping, bioretention and infiltration techniques, and constructed green spaces) to the extent practicable. A description of the low impact development concepts proposed in the project shall be included with the permit application. More information including low impact development concepts and definitions is available at the following website: http://www.epa.gov/owow/NPS/lid/.

2. Use of this NWP is prohibited within the San Francisco Bay diked baylands (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 (see figure 1) 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)).

40. AGRICULTURAL ACTIVITIES:

1. This NWP does not authorize discharge of fill into the channel of a perennial or intermittent watercourse that could impede high flows. This limitation does not apply to watercourses that flow only when there is an irregular, extraordinary flood event.

41. RESHAPING EXISTING DRAINAGE DITCHES:

1. Compensatory mitigation may be required if the Corps determines there will be a detrimental impact to aquatic habitat.

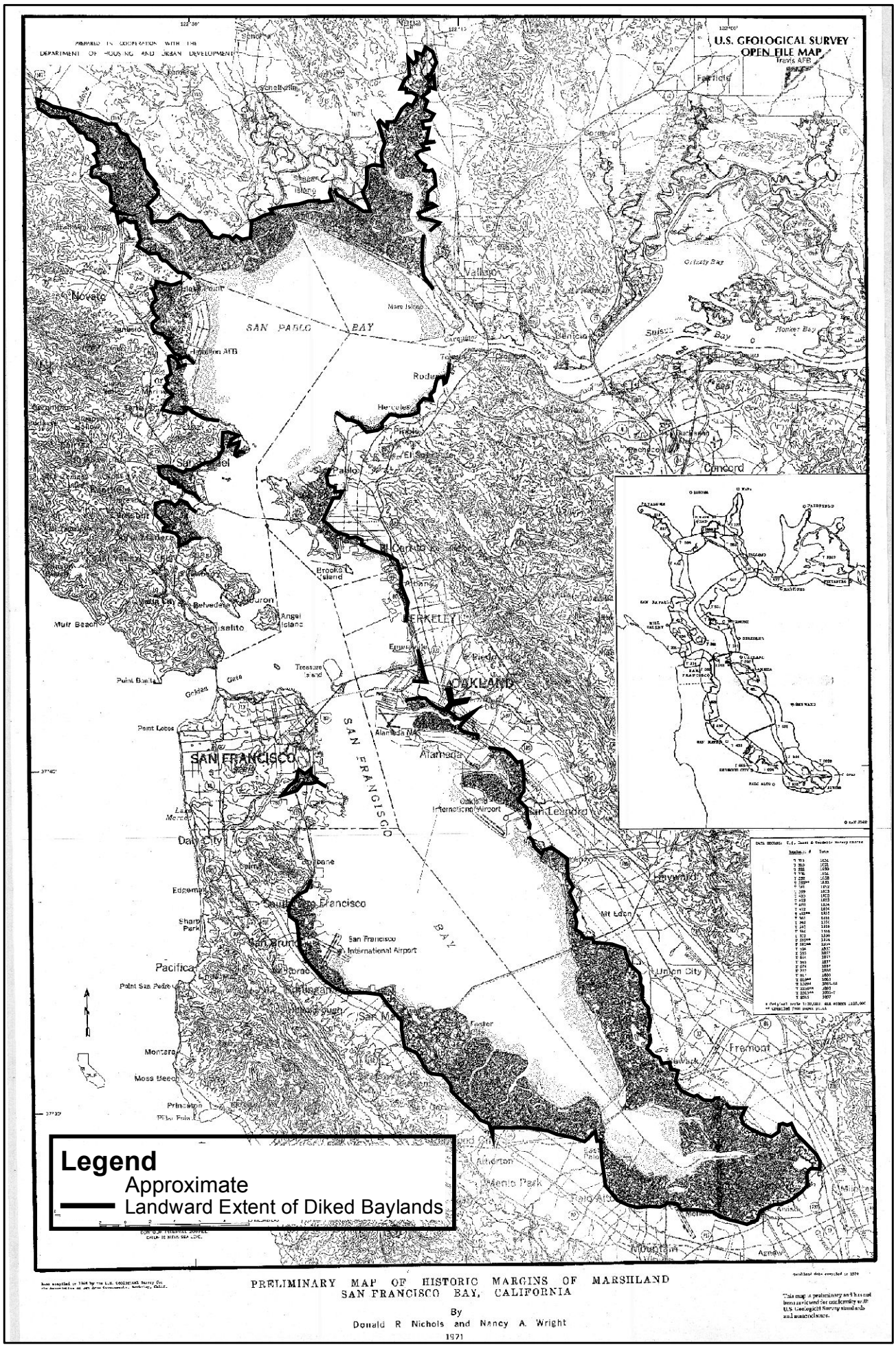
2. Notification to the Corps (in accordance with General Condition 31) is required if the applicant proposes to re-grade, discharge, install channel lining, or redeposit fill material.

3. The notification to the Corps (in accordance with General Condition 31) shall include an explanation of the project's benefit to water quality and a statement demonstrating the need for the project.

42. RECREATIONAL FACILITIES:

1. If buildings are proposed to be built in waters of the United States, including wetlands, the applicant must demonstrate that there is no on-site practicable alternative that is less environmentally damaging as defined by the Section 404(b)(1) guidelines.

Figure 1: Map of Diked Baylands



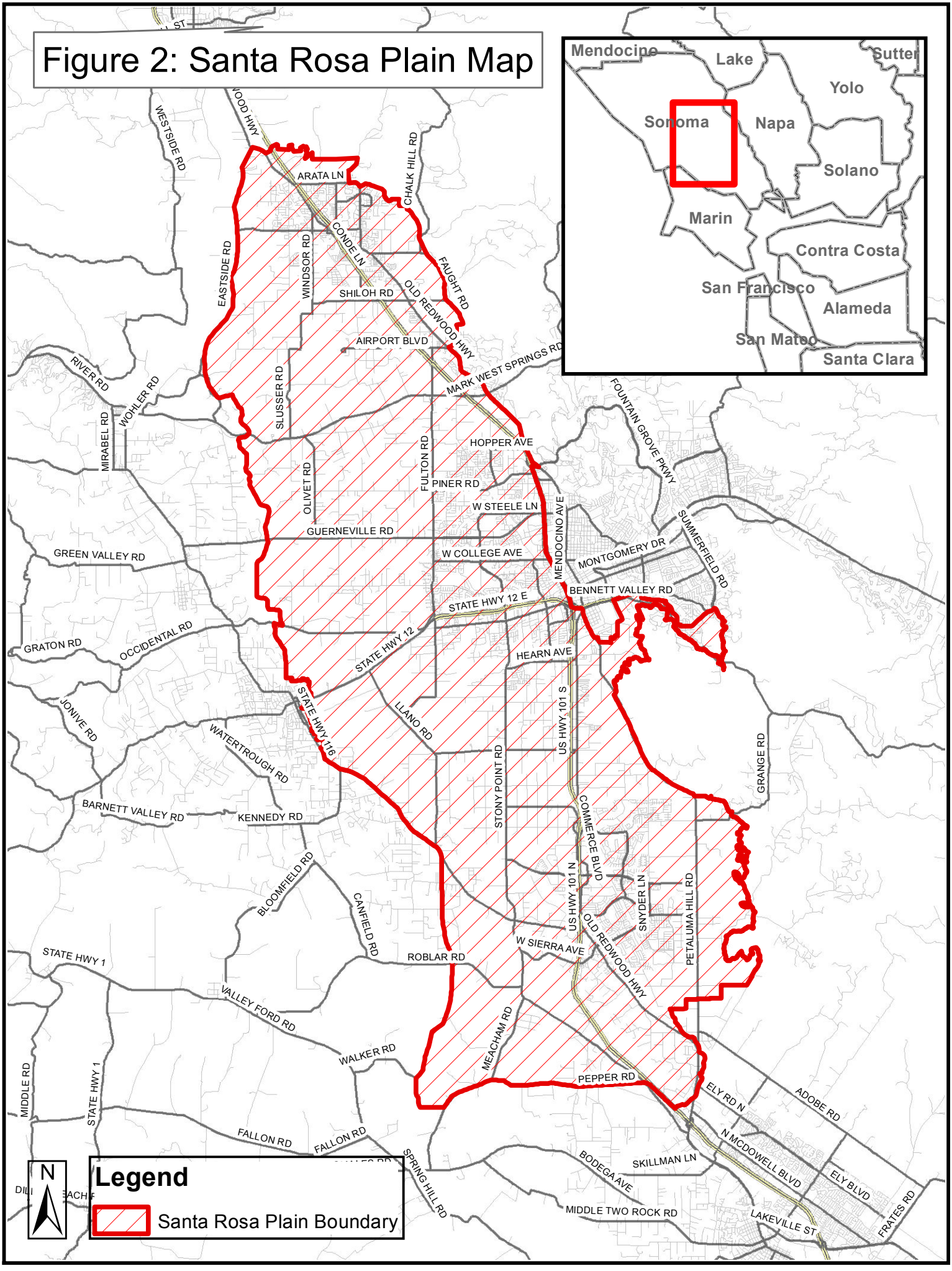


Figure 2: Santa Rosa Plain Map
Mendocino
Lake
Sutter
Yolo
Sonoma
Napa
Solano
Marin
Contra Costa
San Francisco
Alameda
San Mateo
Santa Clara
WESTSIDE RD
ARATA LN
CHALK HILL RD
EASTSIDE RD
WINDSOR RD
CONDE LN
FAUGHT RD
SHILOH RD
OLD REDWOOD HWY
AIRPORT BLVD
MARK WEST SPRINGS RD
RIVER RD
WOHLER RD
MIRABEL RD
SLUSSER RD
FOUNTAIN GROVE PKWY
HOPPER AVE
FULTON RD
PINER RD
OLIVET RD
W STEELE LN
GUERNEVILLE RD
MENDOCINO AVE
SUMMERFIELD RD
MONTGOMERY DR
GREEN VALLEY RD
W COLLEGE AVE
BENNETT VALLEY RD
STATE HWY 12 E
STATE HWY 12
GRATON RD
OCCIDENTAL RD
HEARN AVE
STATE HWY 116
LLANO RD
US HWY 101 S
JONIVE RD
WATERTROUGH RD
STONY POINT RD
GRANGE RD
BARNETT VALLEY RD
KENNEDY RD
COMMERCE BLVD
BLOOMFIELD RD
CANFIELD RD
US HWY 101 N
SNYDER LN
PETALUMA HILL RD
STATE HWY 1
ROBLAR RD
W SIERRA AVE
OLD REDWOOD HWY
VALLEY FORD RD
MEACHAM RD
WALKER RD
PEPPER RD
ELY RD N
ADOBE RD
MIDDLE RD
STATE HWY 1
FALLON RD
FALLON RD
N MCDOWELL BLVD
SKILLMAN LN
BODEGA AVE
ELY BLVD
SPRING HILL RD
MIDDLE TWO ROCK RD
LAKEVILLE ST
FRATES RD
N
Legend
Santa Rosa Plain Boundary

U S Army Corps of Engineers
Sacramento District

Nationwide Permit Summary

33 CFR Part 330; Issuance of Nationwide Permits – March 19, 2012

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).

A. **Regional Conditions**

1. **Regional Conditions for California, excluding the Tahoe Basin**

http://www.spk.usace.army.mil/Portals/12/documents/regulatory/nwp/2012_nwps/2012-NWP-RC-CA.pdf

2. **Regional Conditions for Nevada, including the Tahoe Basin**

http://www.spk.usace.army.mil/Portals/12/documents/regulatory/nwp/2012_nwps/2012-NWP-RC-NV.pdf

3. **Regional Conditions for Utah**

http://www.spk.usace.army.mil/Portals/12/documents/regulatory/nwp/2012_nwps/2012-NWP-RC-UT.pdf

4. **Regional Conditions for Colorado**.

http://www.spk.usace.army.mil/Portals/12/documents/regulatory/nwp/2012_nwps//2012-NWP-RC-CO.pdf

B. **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: he 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 email, 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.

C. District Engineer's Decision

☐ 1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. For a linear project, this determination will include an evaluation of the individual crossings to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to intermittent or ephemeral streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51 or 52, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in minimal adverse effects. When making minimal effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

☐ 2. If the proposed activity requires a PCN and will result in a loss of greater than 1/10- acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences 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. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

☐ 3. If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either: (a) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (c) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period, with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

D. **Further Information**

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project.

E. **Definitions**

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

I**ntermittent stream**: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities eligible for exemptions under Section 404(f) of the Clean Water Act are not considered when calculating the loss of waters of the United States.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of standing or flowing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas (see 33 CFR 328.3(e)).

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands adjacent to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a wetland (i.e., water of the United States) that is inundated by tidal waters. The definitions of a wetland and tidal waters can be found at 33 CFR 328.3(b) and 33 CFR 328.3(f), respectively. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line, which is defined at 33 CFR 328.3(d).

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States. If a jurisdictional wetland is adjacent – meaning bordering, contiguous, or neighboring – to a waterbody determined to be a water of the United States under 33 CFR 328.3(a)(1)-(6), that waterbody and its adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of "waterbodies" include streams, rivers, lakes, ponds, and wetlands.

February 10, 2016

In the Matter of
Water Quality Certification

for the

State Route 101 Peregrine Slides Repair Project
38.897, -123.057; 38.916, -123.057[1]
WDID No. 1B15029WNME, ECM PIN CW-813833
Caltrans EA No. 01-0B500, EFIS No. 01-1200-0133

APPLICANT:	California Department of Transportation
RECEIVING WATER:	Russian River
HYDROLOGIC AREA:	Ukiah Hydrologic Sub Area No. 114.31
COUNTY:	Mendocino
FILE NAME:	CDOT State Route 101 PM R 3.75/5.30 Peregrine Slides Repair Project

BY THE EXECUTIVE OFFICER:

1. On September 23, 2015, the North Coast Regional Water Quality Control Board (Regional Water Board) received an application (application) from the California Department of Transportation (Caltrans), requesting Federal Clean Water Act, section 401, Water Quality Certification (certification) for activities related to the proposed State Route 101 Peregrine Slides Repair Project (Project).

2. **Receiving Waters**: The proposed Project would cause disturbances to tributaries of Russian River (Basin Planning Area No. 114.31, Ukiah Hydrologic Sub Area).

[1] WGS84 datum

3. **Public Notice:** The Regional Water Board provided public notice of the application pursuant to title 23, California Code of Regulations, section 3858 on November 23, 2015, and posted information describing the Project on the Regional Water Board's website. No comments were received.

4. **Project Description:** The purpose of the Project is to control and stabilize two active slide areas up-gradient of State Route 101 (SR 101). The Project locations are approximately five miles south of Hopland, adjacent the Russian River in Mendocino County at post-miles (PM) 3.75 and 5.30, and at the Korean War Veteran's Viaduct.

   Project activities include the following:

   Formoli Slide—PM 3.75
   At this location, Caltrans intends to build a 20-foot-high, 353-foot-long soldier pile ground anchor wall approximately 35 feet to the east of northbound SR 101. Additional activities at this location would include:

   - Construction of a ten-foot-deep underdrain at the front toe of the wall. An eight-inch-diameter perforated plastic pipe would be placed six inches above the base of permeable material to collect and convey seepage water to the drainage inlet at PM 3.72;
   - Grading of slopes behind the anchor wall to minimize surface ponding and slope saturation;
   - Excavation of an inward-sloped, aggregate base-surfaced bench in front of the anchor wall to facilitate drainage, to provide maintenance access, and to provide a space to capture potential slide debris; and
   - Construction of a new structural section where the roadway pavement has been damaged by the slide movement. The uplifted sections would be removed and the roadway surface returned to near its original elevation.

   The hillside surface flow above the anchor wall would be directed along the sides of the wall to a swale and conveyed to the drainage inlet at PM 3.72. The existing pipe culvert at PM 3.72 would be replaced and installed at a lower elevation to match the elevation of the proposed underdrain.

   Peregrine Slides—PM 5.3
   At this location, Caltrans proposes to build a 50-foot-high, 419-foot-long soldier pile ground anchor wall approximately 100 feet to the east of northbound SR 101. Additional activities at this location would include:

- Excavation of an inward-sloped, aggregate base-surfaced bench in front of the anchor wall to facilitate drainage, to provide maintenance access, and to provide a space to capture potential slide debris;
- Construction of underdrains at the front toe of the wall and 50 feet behind the wall;
- Replacement of culvert at PM 5.17 with new culvert placed at a lower elevation;
- Replacement of the last 40 feet of the existing culvert at PM 5.07 with 24-inch corrugated steel pipe;
- Installation of horizontal drains in the slope above the anchor wall. The horizontal drains and front underdrain would discharge via a collector system to the drainage system at PM 5.17. Discharge from the underdrain behind the wall would be conveyed to the drainage system at PM 5.11 via a hillside channel;
- Grading of slopes behind the anchor wall to minimize surface ponding and slope saturation;
- Construction of a storm water treatment biofiltration swale; and
- Construction of a new structural section where the roadway pavement has been damaged by the slide movement. The uplifted sections would be removed and the roadway surface returned to near its original elevation.

Surface runoff from Peregrine Slide currently flows into a cross culvert at PM 5.22. Project construction will result in the redirection of surface runoff to the existing culvert at PM 5.11.

Korean War Veteran's Viaduct – PM 4.95
The damaged cross-drainage culvert at PM 4.95 shall be removed and replaced with an approximately 196-foot-long open channel. Caltrans shall install two sediment traps located at two weirs within the open channel.

5. **Construction Timing:** The Project is expected to require 190 days of construction. The Project is proposed to begin in the spring of 2017, and be completed in the fall of 2018. Construction shall occur during the dry season (June 15 to October 15) to minimize impacts to surface water.

6. **Project Impacts:** The Project will result in approximately 546 linear feet (0.037 acres) of permanent impacts to ephemeral tributaries of the Russian River as a result of drainage system modifications. The Project will result in approximately 56 linear feet (0.001 acres) of temporary impacts to ephemeral tributaries of the Russian River as a result of culvert modifications. This Project will also result in approximately 0.023 acres of permanent impacts to riparian vegetation.

7. **Mitigation for Project Impacts**: To compensate for 546 linear feet (0.037 acres) of permanent impacts to jurisdictional waters, Caltrans shall convert a culverted drainage to a rock-lined ditch which would result in approximately 192 feet (0.11 acres) of open channel.

To compensate for approximately 0.023 acres of permanent impacts to riparian vegetation, Caltrans shall plant approximately 0.069 acres of willow cuttings and valley oak trees along the ephemeral drainages behind the Formoli Wall (~PM 5.22), and at the culvert outlet of the drainage system located at PM 5.11.

8. **Post-Construction Storm Water Treatment**: Project implementation would result in approximately 0.79 acres of new impervious surface. To control roadway pollutants, post-construction, Caltrans shall install two bioswales in series with 8 to 12 inches of engineered soil media to treat no less than 0.79 acres of impervious surface. Caltrans shall install a sediment trap within the Project limits. The trap shall be made up of two weirs located on the rock lined ditch at PM 4.95, beneath the Korean War Veterans Viaduct.

9. **Disturbed Soil Area**: Project implementation will result in greater than one acre of disturbed soil area. Caltrans shall apply for coverage under the National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ) and prepare a Stormwater Pollution Prevention Plan detailing best management practices (BMPs) to control pollution from the Project area during construction. All temporarily disturbed areas within the Project area shall be appropriately stabilized and/or replanted with appropriate native vegetation.

10. **Utility Relocations:** Utility relocations affecting jurisdictional waters are not proposed for this Project.

11. **Other Agency Actions:** Caltrans has applied for coverage under a non-reporting U.S. Army Corps of Engineers Nationwide Permit No. 14, *Linear Transportation Projects*, pursuant to section 404 of the Clean Water Act. Caltrans has applied for a Section 1600 Streambed Alteration Agreement from the California Department of Fish and Wildlife.

12. **CEQA Compliance:** On April 2, 2015, Caltrans signed a Notice of Determination approving a Mitigated Negative Declaration for the Project (State Clearinghouse No. 2015021063) in order to comply with the California Environmental Quality Act.

13. **Total Maximum Daily Load:** The Russian River is identified as impaired for sediment and temperature under Clean Water Act Section 303(d). At present, Total Maximum Daily Loads (TMDLs) have not been established for this water body. Bank erosion is identified as a source contributing to the sediment impairment. Removal of riparian vegetation is identified as a source contributing to temperature impairment. Activities that would be authorized by the certification would be designed to reduce removal of riparian vegetation and reduce sediment discharges from bank erosion.

14. **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.

15. 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. A weblink to this Order is included at the end of this certification.

Receiving Water:	Russian River (Ukiah Hydrologic Sub Area No. 114.31)	
Filled and/or Excavated Areas:	Permanent – jurisdictional waters Temporary – jurisdictional waters	546 linear feet (0.037 acres) 56 linear feet (0.001 acres)
Dredge Volume:	none	
Latitude/Longitude:	38.897, -123.057; 38.916, -123.057	

Accordingly, based on its independent review of the record, the Regional Water Board certifies that the State Route 101 Peregrine Slides Repair Project (WDID No. 1B15029WNME), as described in the application will comply with sections 301, 302, 303, 306 and 307 of the Clean Water Act, and with applicable provisions of state law, provided that 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 as related to this Water Quality Certification.

Project-Specific Conditions Requiring Reports

1. To compensate for the removal of 0.023 acres of willow thicket along the ephemeral drainage at PM 5.22, Caltrans shall plant no less than 0.069 acres of willow and valley oak trees as described in the *Revegetation Plan, dated October, 2015*. Monitoring will be performed once each year between May 1 and September 30, for a period of five years by the Project Biologist, or Revegetation Specialist. Qualitative monitoring will include photo points. Quantitative monitoring will measure the area of willow and oak establishment and include survival counts of individual oak plantings. Results will be documented on aerial photos or project plans. Permanent photo points will be set up

Project-Specific Conditions Requiring Reports (continued)

to document the mitigation effort. Monitoring reports shall be submitted annually to the Regional Water Board for five years. The first monitoring report shall be submitted no later than January 31, 2019. The report shall include yearly performance criteria, progress towards final success criteria and include any adaptive management measures.

a. Performance criteria for Year 1 through Year 4 will be achieved if the following conditions are met:
    i. An annual increase of vegetative cover of willows and oaks in 1st – 4th years after willows are installed.
    OR
    ii. A minimum of 40 surviving oak trees, including volunteers, at the end of year 1 and a minimum of 30 surviving oak trees, including volunteers, at the end of year 4.
b. Success criteria for Year 5 will be achieved if the following conditions are met:
    i. A minimum of 50% of vegetative cover of willows and oaks by 5th year of monitoring.
    OR
    ii. At least 25 surviving oak trees, including volunteers, by 5th year of monitoring.

2. Caltrans shall install two bioswales to treat no less than 0.73 acres of impervious surface runoff. The bioswales shall be amended with 4 inches of compost incorporated to a depth of 12 inches. The bioswales shall be vegetated using native grass seed. Caltrans shall submit photographs of completed and fully vegetated bioswales no later than June 1, 2018.

3. Caltrans shall provide a sediment trap maintenance plan to the Regional Water Board for review and staff acceptance no later than October 15, 2018. The maintenance plan shall detail the inspection schedule, and criteria and timing for sediment removal. Two sediment trap monitoring reports shall be provided no later than January 15, 2019, and July 15, 2019, to document the trap's performance and maintenance. The monitoring reports shall include photos, maintenance dates, approximate volume of sediment removed from the basin and sediment disposal location.

Standard Conditions

4. Herbicides and other pesticides shall not be used within the Project limits. If Caltrans has a compelling case as to why pesticides should be used, then a request for pesticide use and a BMP plan may be submitted to the Regional Water Board staff for review and acceptance.

Standard Conditions (continued)

5. All Project activities and BMPs shall be implemented according to the submitted application package and the findings and conditions of this certification. Subsequent changes to the Project that could significantly impact water quality shall first be submitted to Regional Water Board staff for prior review, consideration, and written concurrence. If the Regional Water Board is not notified of an alteration to the Project that results in an impact to water quality, it will be considered a violation of this certification, and Caltrans may be subject to Regional Water Board enforcement actions.

6. All conditions required by this certification 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 certification in the bid contract for this Project.

7. Caltrans is prohibited from discharging waste to waters of the state, unless explicitly authorized by this certification. For example, 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 state waters.

8. 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 in a manner where the materials may be transported into waters of the state. Waste materials shall not be placed within 100 linear feet of state waters. Exceptions to the 100-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.

9. Caltrans is liable and responsible for the proper disposal, reuse, and/or recycling of all Project-generated waste in compliance with applicable state and federal laws and regulations, and as described in Caltrans 2010 Standard Specifications 13-4.03D, Waste Management. Additionally, when handling, transporting, disposing, reusing, and/or recycling Project-generated waste, Caltrans and their contractors shall:

    i) Provide the Regional Water Board with a copy of the Solid Waste Disposal and Recycling Report prepared for Caltrans by the contractor per Caltrans 2010 Standard Specification 14-10.02A(1), Submittals. These reports shall be provided not later than January 31 for each year work is performed during the previous calendar year. A copy of the final Solid Waste Disposal and Recycling Report shall be submitted to the Regional Water Board within 30 days after being received by Caltrans from the contractor.

    ii) For waste other than solid waste, obtain evidence that waste has been appropriately disposed, reused, and/or recycled. Evidence shall include type

Standard Conditions (continued)

and quantity of waste and may include, but not be limited to, property owner agreements, permits, licenses, and environmental clearances. Evidence shall be provided to the Regional Water Board upon request; and

iii) For waste other than solid waste, ensure the Resident Engineer has given written permission for disposal, reuse, and/or recycling, prior to the actual disposal, reuse, and/or recycling.

10. Asphalt-concrete grindings shall not be placed in any location where they may, at any time, be directly exposed to surface waters or seasonally high ground water, except asphalt-concrete grindings may be re-used and incorporated into hot mix asphalt products or encapsulated within the roadway structural section.

11. Caltrans and their contractors shall comply with the activity restrictions detailed in Caltrans 2010 Standard Specifications 13-4.03C(1). In addition, fueling, maintenance, storage and staging of vehicles and equipment shall be prohibited within waters of the state (e.g., gravel bars, seeps, ephemeral streams) and riparian areas.

12. Fueling, maintenance, and/or staging of individual equipment types within waters of the state or riparian areas may be authorized if Caltrans first prepares a plan for review and approval by Regional Water Board staff that:

    i) Identifies the specific piece of machinery that may require fueling, maintenance, and/or staging within waters of the state or riparian areas;

    ii) Provides justification for the need to refuel, maintain, or stage within state waters or riparian areas. The justification shall describe why conducting the activity outside of jurisdictional waters is infeasible; and

    iii) Includes a narrative of specific BMPs that shall be employed to prevent discharges to state waters and riparian areas;

13. Caltrans shall not use leaking vehicles or equipment within state waters or riparian areas.

14. Only 100-percent biodegradable erosion and sediment control products that will not entrap or harm wildlife shall be used. Photodegradable synthetic products are not considered biodegradable. 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. This condition does not prohibit the use of plastic sheeting used in water diversion or dewatering activities. Caltrans shall request approval from the Regional Water Board if an exception to this requirement is needed for a specific location.

Standard Conditions (continued)

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

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

17. Gravel bags used within state waters shall:

    i) Comply with Caltrans 2010 Standard Specifications sections 13-5.02G and 88-1.02F;

    ii) Be immediately removed and replaced if the bags have developed or are developing holes or tears; and

    iii) Be filled only with clean washed gravel.

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

18. This certification does not authorize drafting of surface waters.

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

20. Initial water pollution control training described in Caltrans 2010 Standard Specifications 13-1.01D(2), Training, shall apply to all Caltrans employees, contractors, and sub-contractors. Initial water pollution control training topics shall include Regional Water Board 401 certification and construction general permit requirements, identification of state waters and riparian areas, and violation avoidance and discharge reporting procedures.

21. Caltrans shall maintain logs of all Caltrans staff, contractors, and sub-contractors trained pursuant to the Caltrans 2010 Standard Specifications 13-1.01D(2). The logs shall include the names of trainees, training dates, and summary of the scope of training. Caltrans shall provide evidence of this documentation upon the request of the Regional Water Board.

22. 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

Standard Conditions (continued)

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 Regional Water Board shall be notified no more than 24 hours after the discharge occurs.

23. Uncured concrete shall not be exposed to state waters or surface waters that may discharge to state waters. Concrete sealants may be applied to the concrete surface where difficulty in excluding flow for a long period may occur. If concrete 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.

24. Ground and surface water that has come into contact with fresh concrete, and all other wastewater, shall not be discharged to state waters or to a location where it may discharge to state waters; the wastewater shall be collected and re-used or disposed of in a manner approved by the Regional Water Board.

25. 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 consideration of acceptance.

26. Caltrans shall provide a copy of this certification and State Water Resources Control Board (SWRCB) Order No. 2003-0017-DWQ 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 and subcontractors.

27. The validity of this certification is conditioned upon total payment of any fee required under title 23, California Code of Regulations, section 3833. The total application fee is $8,127. The Regional Water Board received $8,127 from Caltrans on September 24, 2015.

28. This certification will be subject to annual billing during the construction phase ("Annual Active Discharge Fee") and during the monitoring phase of the Project ("Annual Post Discharge Monitoring Fee"), per the current fee schedule, which can be found on our website: http://www.swrcb.ca.gov/northcoast/water_issues/programs/water_quality_certification.shtml. These fees will be automatically invoiced to Caltrans.

29. Caltrans shall notify the Regional Water Board upon Project construction completion to request termination of the Annual Active Discharge Fee and to receive a "Notice of

Standard Conditions (continued)

Completion of Discharges Letter." If the Project is subject to the Annual Post Discharge Monitoring Fee, then Caltrans shall also notify the Regional Water Board at the end of the monitoring period to request termination of the fee and receive a "Notice of Project Complete Letter." Caltrans may be required to submit completion reports at the end of each of these phases. Regional Water Board staff may request site visits at the end of each Project phase to confirm Project status and compliance with this certification.

30. 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.

31. 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 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.

32. 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.

33. In the event of any change in control of ownership of land presently owned or controlled by Caltrans, Caltrans shall notify the successor-in-interest of the existence of this certification by letter and shall and shall email a copy of the letter to the following email address: NorthCoast@waterboards.ca.gov.

    To discharge dredged or fill material under this certification, the successor-in-interest must email the Regional Water Board Executive Officer at: NorthCoast@waterboards.ca.gov a written request for the ownership change and the

Standard Conditions (continued)

effective date of the change. The request must contain the requesting entity's full legal name, the state of incorporation if a corporation, and the address and telephone number of the person(s) responsible for contact with the Regional Water Board.

The request must also describe any changes to the Project proposed by the successor-in-interest or confirm that the successor-in-interest intends to implement the Project as described in this certification. Except as may be modified by any preceding conditions, all certification actions are contingent on: a) the discharge being limited to and all proposed mitigation being completed in strict compliance with the Applicant's Project description, and b) compliance with all applicable requirements of the Water Quality Control Plan for the North Coast Region (Basin Plan).

34. Except as may be modified by any preceding conditions, all certification actions are contingent on:

    i) The discharge being limited, and all proposed revegetation, avoidance, minimization, and mitigation measures being completed, in strict compliance with Caltrans's project description and CEQA documentation, as approved herein;

    ii) Caltrans shall construct the Project in accordance with the project described in the application and the findings above; and

    iii) 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 certification 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 certification, and Caltrans may be subject to Regional Water Board enforcement actions.

35. The authorization of this certification for any dredge and fill activities expires five years from the date of this certification. Conditions and monitoring requirements outlined in this certification are not subject to the expiration date outlined above, and remain in full effect and are enforceable.

Conditions 1, 2, and 3 are requirements for information and reports. Any requirement for a report made as a condition to this certification is a formal requirement pursuant to California Water Code 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 certification, 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 Scientist, Brandon Stevens at (707) 576-2377, or via e-mail, at Brandon.Stevens@waterboards.ca.gov, if you have any questions.

_____

Matthias St. John
Executive Officer

160209_BDS_CDOT_MEN101_PeregrineSlides_401

Original to: Mr. Steven Blair, Caltrans, District 1, 1656 Union Street, Eureka, CA 95501
Steven.Blair@dot.ca.gov

cc: Holly Costa, U.S. Army Corps of Engineers Holly.N.Costa@usace.army.mil
JoAnn Dunn, California Department of Fish and Wildlife JoAnn.Dunn@wildlife.ca.gov
State Water Resources Control Board Stateboard401@waterboards.ca.gov
Environmental Protection Agency, Region 9 R9-WTR8-Mailbox@epa.gov
Allison Kunz, Caltrans Allison.Kunz@dot.ca.gov

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

North Coast Regional Water Quality Control Board

February 17, 2016

California Department of Transportation
Attn: Mr. Steve Blair
1656 Union Street
Eureka, CA 95501

Dear Mr. Blair:

Subject: Amendment to the Federal Clean Water Act, Section 401, Water Quality Certification for the Peregrine Slides Repair Project

Files: CDOT Highway 101 Peregrine Slides Repair Project
ECM PIN CW-813833, WDID No. 1B15029WNME
Caltrans EA No. 01-0B500

On February, 16, 2016, we received your email requesting an amendment to the February, 10, 2016, Federal Clean Water Act, Section 401, Water Quality Certification (certification) for the Peregrine Slides Repair Project (Project).

In response to your request, this letter serves as an amendment to Finding 5, Finding 8, and Condition 2 in the Project-Specific Conditions of the certification, modifying the project description, as outlined below:

Finding 5: The Project is expected to require 190 days of construction. The Project is proposed to begin in the spring of 2017, and be completed in the fall of 2018. In-stream construction shall occur only during the dry season (June 15 to October 15) to minimize impacts to surface waters.

Finding 8: Project implementation would result in approximately 0.79 acres of new impervious surface. To control roadway pollutants, post-construction, Caltrans shall install two bioswales in series with 4 inches of compost incorporated to a depth of 12 inches to treat no less than 0.79 acres of impervious surface. Caltrans shall install a sediment trap within the Project

limits. The trap shall be made up of two weirs located on the rock lined ditch at PM 4.95, beneath the Korean War Veterans Viaduct.

Project-Specific Conditions:

Condition 2: Caltrans shall install two bioswales to treat no less than 0.73 acres of impervious surface runoff. The bioswales shall be amended with 4 inches of compost incorporated to a depth of 12 inches. The bioswales shall be vegetated using native grass seed. Caltrans shall submit photographs of completed and fully vegetated bioswales no later than June 1, 2019.

I hereby issue an amendment to the project description in Finding 5, Finding 8, and Condition 2 in the Project-Specific Conditions of the certification for the Peregrine Slides Repair Project (WDID No. 1B15029WNME) certifying that the remainder of the Water Quality Certification sections of the February, 10, 2016, Order are still valid.

If you have any questions or comments, please contact Brandon Stevens at (707) 576-2377 or at Brandon.Stevens@waterboards.ca.gov.

Sincerely,

FOR Clayton S. Creager 2016.02.17 11:20:15 -08'00'

Matthias St. John
Executive Officer

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
NORTHERN REGION
619 SECOND STREET
EUREKA, CALIFORNIA 95501

LAKE OR STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2015-0396-R1
Unnamed Tributaries, Russian River Watershed

6 Encroachments
Mr. Steven Blair
California Department of Transportation
PEREGRINE SLIDES REPAIR PROJECT
RUSSIAN RIVER WATERSHED, MENDOCINO COUNTY

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Wildlife (CDFW) and the California Department of Transportation (Caltrans) (Permittee) as represented by Mr. Steven Blair.

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, Permittee notified CDFW on September 24, 2015, and provided revised project information on December 9, 2015 that Permittee intends to complete the project described herein.

WHEREAS, pursuant to FGC section 1602, CDFW 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 along State Route, (SR) 101 between post miles (PM) 3.7 – 5.3, near Hopland, and affects six unnamed tributaries to the Russian River, thence the Pacific Ocean, in the County of Mendocino, State of California; Sections 2 and 11, Township 12N, Range 11W; Mt. Diablo Base and Meridian, in the Hopland, Calif. 7.5-minute quadrangle, U.S. Geological Survey (USGS) map, approximately N 38.8966, W 123.05716, and N 38.91608, W 123.05735, Decimal Degrees, (NAD 83), within the Caltrans right of way, and Assessor Parcel Numbers (APNs), 0520-280-08 and 050-250-14.

PROJECT DESCRIPTION

The project includes six encroachment activities, and is limited to the following: 1) an existing 24" pipe culvert at PM 3.72 will be replaced and installed at a lower elevation to match the elevation of the proposed underdrain, 2) a 24" cross drainage culvert at PM 4.95 that was damaged will be replaced with a rock lined channel, 3) the last 40 feet of existing 24" culvert at PM 5.07 will be replaced with 24" corrugated steel pipe, 4) an existing 18" culvert at PM 5.11 will be up-sized to a 36" culvert to convey the additional flow from a new tie-back wall, 5) a 24" abandoned culvert at PM 5.17 will be reconstructed at a lower elevation to take the flow from an underdrain at the bottom of the new tie-back wall and horizontal drains, and 6) an existing rock lined ditch and drainage at PM 5.22 will be removed and filled by the construction of a tie-back wall. 1,000 square of riparian vegetation will be removed at this drainage. Mitigation for the project will be accomplished at a 3:1 ratio using riparian plantings within the project limits as identified in the project Restoration Plan.

PROJECT IMPACTS

Existing fish or wildlife resources the project could substantially adversely affect include but are not limited to: riparian habitat, downstream populations and/or individuals of steelhead trout (*Oncorhynchus mykiss*), Chinook salmon (*O. tshawytscha*), lamprey (*Lampetra spp.*), Russian River tule perch (*Hysterocarpus traskii pomo*), foothill yellow-legged frog (*Rana boylii*), western pond turtle (*Actinemys marmorata*), peregrine falcon, (*Falco peregrinus*) and other fish and wildlife species.

The adverse effects the project could have on the fish or wildlife resources identified above include:. direct and/or incidental impacts, damage to spawning and/or rearing habitat, increased erosion and/or sedimentation, disruption to nesting birds, water quality degradation, and 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 CDFW 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 CDFW 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, CDFW shall contact Permittee to resolve any conflict.

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

1.5 CDFW Notification of Work Initiation and Completion. The Permittee shall contact CDFW within the 7-day period preceding the beginning of work permitted by this Agreement. Information to be disclosed shall include Agreement number, and the anticipated start date. Subsequently, the Permittee shall notify CDFW no later than 7 days after the project is fully completed.

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.

GENERAL CONDITIONS:

2.1 Listed Species. This Agreement does not allow for the take, or incidental take of any state or federal listed threatened, endangered or candidate species.

2.2 Permitted Project Activities. Except where otherwise stipulated in this Agreement, all work shall be in accordance with the forms, work plans, maps and drawings submitted with Notification No. 1600-2015-0396-R1. This Agreement pertains to six encroachments along SR 101, affecting six unnamed tributaries to the Russian River.

2.3 Erosion and Sediment Control. Adequate and effective erosion control and siltation control measures shall be used where necessary to prevent sediment and turbid and/or silt-laden water from entering any river, lake or stream. All bare mineral soil exposed in conjunction with project related activities shall be treated for sediment transport and erosion, immediately upon completion of work, and prior to the onset of precipitation capable of generating run-off. Treatments shall include using native slash or seeding and mulching of all bare mineral soil exposed in conjunction with encroachment work. No known invasive grass seed shall be used such as annual or perennial ryegrass (*Lolium multiflorum or L. perenne*, which are now referred to as *Festuca perennis*).

2.4 Wildlife Safe Products Only. Only wildlife-friendly 100 percent biodegradable erosion and sediment control products that will not entrap or harm wildlife shall be used. Erosion control products shall not contain synthetic (e.g., plastic or nylon) netting. Photodegradable synthetic products are not considered biodegradable.

2.5 Site Maintenance. The Permittee shall provide site maintenance including, but not limited to, re-applying erosion and sediment control as necessary to comply with condition 2.3 of this Agreement.

2.6 Equipment Refueling. 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.

2.7 Accidental Spill Reporting Procedures. All significant releases or threatened releases of hazardous materials are required by law to be immediately reported to the local emergency response agency (911 or the local fire department), and the State Office of Emergency Services at 1-800-852-7550. CDFW shall also be notified by the Permittee and consulted regarding clean-up procedures

2.8 Hazardous and Deleterious Substances. Raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, rubbish or any other substances which could be hazardous to aquatic life, resulting from project related activities, shall be prevented from contaminating the soil and/or entering the waters of the state. No soil, silt, sand, bark, slash, sawdust, or other organic or earthen material from project activities shall be allowed to enter into, or be placed where it may be washed by rainfall or runoff into waters of the state.

2.9 Prohibited Plant Species. Permittee shall not plant, seed or otherwise introduce invasive exotic plant species. Prohibited exotic plant species include those identified in the California Exotic Pest Plant Council's database, which is accessible at: http://www.cal-ipc.org/ip/inventory/weedlist.php.

SITE-SPECIFIC CONDITONS:

2.10 No Water Drafting or Diversions. No water shall be diverted or drafted from a river, lake or stream under this Agreement, (excluding activities required to de-water wetted project work area(s), as provided in condition 2.11 of this Agreement).

2.11 De-water Wetted Work Area. If flowing surface water is present within the project work area(s) during operations and cannot be avoided, the Permittee shall adhere to the following conditions:

a) Cofferdams shall be installed to divert stream flow; isolate and dewater the work area; catch and retain sediment-laden water; and minimize sediment

transport downstream. Cofferdams shall be constructed of non-polluting materials including sand-bags, on-site rock, and/or plastic sheeting. Mineral soil shall not be used in the construction of cofferdams.

b) Flowing water shall be cleanly bypassed and/or prevented from entering the work area through pumping or gravity flow, and cleanly returned to the stream below the work area. Flow diversions shall be done in a manner that shall prevent pollution and/or siltation and provides flows to downstream reaches.

c) Permittee shall remove any turbid water and sediment present in the work area prior to restoring water flow through the project site, and place them in a location where they cannot enter waters of the state.

d) Permittee shall remove all sandbags and plastic sheeting from the stream channel and restore normal flows to the effected stream reach immediately upon completion of work at the project location.

2.12 Discharge of Silty/Turbid Water Prohibited. Silty/turbid water shall not be discharged into any river, stream or into storm drains. Permittee shall pump all turbid water from the excavation and/or project activities into a holding facility or into a settling basin located outside of the stream channel and/or sprayed over a large area outside the stream channel to allow for natural filtration of sediments. At no time shall turbid water from settling ponds be allowed to enter back into the stream channel until water is clear of silt.

2.13 Work Period. All work within affected stream channels 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 period October 15 through November 1, provided adherence to all conditions of this Agreement and a) – c) below:

a) The Permittee shall complete any unfinished encroachment work, including erosion control measures, within 24 hours of CDFW 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 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 the encroachment and refrain from starting any new work at the encroachment prior to the rain event.

2.14 Pre-construction Survey. The project biologist shall perform a pre-construction survey within the work area, immediately prior to commencement of ground disturbing activities to ensure the work area is clear of wildlife. If necessary, non-listed reptile and/or amphibian species may be re-located by the project biologist to suitable habitat outside the immediate work area.

If bats are found during the pre-construction survey, Permittee and the project biologist shall consult with CDFW Environmental Scientist Wes Stokes to determine feasible avoidance, minimization and mitigation measures. Work shall not commence until authorized by Mr. Stokes or another CDFW representative.

2.15 Notification to the California Natural Diversity Database. If any special status species are observed during project surveys, Permittee or designated representative shall submit California Natural Diversity Data Base (CNDDB) forms to the CNDDB for all preconstruction survey data within five (5) working days of the sightings, and provide notice to the CDFW Regional office of the sightings within five (5) working days.

2.16 Nesting Birds. Nesting birds or occupied nests shall not be disturbed or disrupted by project activities. To avoid take of active bird nests or migratory bird species, tree removal and trimming shall be confined to the period September 15 to March 1. If tree removal and trimming will be conducted outside of this period, the Permittee shall develop a comprehensive bird survey plan for review and approval by CDFW staff.

2.17 Isolate Cement from Stream. To prevent the release of materials that may be toxic to fish and other aquatic species, poured concrete and/or cement shall be isolated from stream flow and allowed to dry/cure for a minimum of 30 days. For water that is isolated from the stream flow but has come into contact with poured concrete and/or cement, the Permittee shall monitor the pH. If this water has a pH of 9.0 or greater, the water shall be pumped to tanker truck or to a lined off-channel basin and allowed to evaporate, treated to NCRWQCB standards and discharged to an upland location or hauled off-site for proper disposal. During the pH monitoring period, all water that has come in contact with poured concrete shall be isolated and not allowed to flow downstream or otherwise come in contact with fish and other aquatic resources. The water shall be retested until pH values become less than 9.0. Once this has been determined, the area no longer needs to be isolated and water may be allowed to flow downstream. Results of pH monitoring shall be made available to CDFW upon request.

2.18 Culvert Criteria. Each culvert shall be adequately sized to carry the 100-year storm flow of each affected tributary. All culverts shall be aligned with their respective natural stream channels and installed and maintained to assure resistance to washout, and prevent erosion of the stream bed, stream banks and/or fill.

2.19 Culvert Outlet Rock Armoring. Rock sizing and placement shall meet professionally engineered design specifications. Only clean non-grouted material such as, rock riprap that is free of trash, debris and deleterious material shall be used. Asphalt shall not be considered an acceptable material.

2.20 Riparian Mitigation. Mitigation for project impacts to riparian habitat shall be provided at a 3 to 1 ratio, as provided in the revised Project Revegetation Plan submitted to CDFW with the project notification.

3. Reporting Measures

Permittee shall meet each reporting requirement described below.

3.1 CDFW Staff Contact. Permittee shall notify CDFW, in writing, at least seven (7) days prior to initiation of project work activities and at least seven (7) days following completion of project work activities. Notification shall be provided to CDFW Environmental Scientist, Wes Stokes via e-mail at wesley.stokes@wildlife.ca.gov.

3.2 Monitoring Report – Mitigation Effectiveness. Permittee shall submit an annual monitoring report to CDFW, by December 31 of each year, for five (5) years after the commencement of operations. The report shall specify the effectiveness of the mitigation measures and any corrective actions recommended or taken.

CONTACT INFORMATION

Any communication that Permittee or CDFW 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 CDFW specifies by written notice to the other.

To Permittee:

Mr. Steven Blair
Caltrans
1656 Union Street
Eureka, CA 95501
Steven.Blair@dot.ca.gov

To CDFW:

California Department of Fish and Wildlife
Region 1
619 Second Street, Eureka, California 95501
Attn: Lake and Streambed Alteration Program – Wes Stokes
Notification #1600-2015-0396-R1
E-mail: wesley.stokes@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 CDFW'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

CDFW 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 CDFW 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 CDFW 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 CDFW to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes CDFW 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 CDFW'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

CDFW may amend the Agreement at any time during its term if CDFW 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 CDFW and Permittee. To request an amendment, Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in CDFW'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 CDFW 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 CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in CDFW'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 CDFW a completed CDFW "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in CDFW's current fee schedule (see Cal. Code Regs., title 14, § 699.5). CDFW 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 CDFW's signature, which shall be: 1) after Permittee's signature; 2) after CDFW 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.widlife.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

No Exhibits.

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 CDFW in accordance with FGC section 1602.

CONCURRENCE

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

FOR CALIFORNIA DEPT. OF TRANSPORTATION

Steven Blair — Date 1/11/16

FOR DEPARTMENT OF FISH AND WILDLIFE

Gordon Leppig — Date 1/14/16
Senior Environmental Scientist (Supervisor)

Prepared by: Wes Stokes
Environmental Scientist, on December 22, 2015

State of California
Department of Transportation

Business, Transportation and Housing Agency

Memorandum

To: JEFF SIMS, CHIEF
Bridge Design Branch 1
Office of Bridge Design North & Central
Structure Design
Division of Engineering Services

Date: August 20, 2015

File: 01-Men-101-PM 3.72
Formoli Slide SPGA retaining wall
ERS No. 10E0037
EA 01-0B5001
EFIS 0112000133

Attn: Keith Stillmunkes

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

Subject: Foundation Report

Scope of Work

A Foundation Report (FR) is provided for the above referenced project. The proposed project is located in rural Mendocino County between Cloverdale and Hopland. Construction of a soldier pile ground anchor retaining wall is proposed to stabilize slope failures in the natural ground above and to the east of the northbound lanes. Review of published geologic data and previous geotechnical reports, field reconnaissance, and design calculations were performed to prepare this Foundation Report. This Foundation Report supersedes any previous planning or design communications, including the April 1, 2008 Geotechnical Design Report. The purpose of this report is to document geotechnical conditions and provide foundation recommendations.

Our Office has evaluated the site conditions and geology based on a review of available geologic literature and mapping, aerial photograph interpretation, multiple site visits and a subsurface investigation completed during October 2013.

The following publications and reports were used to assist in the preparation of this Foundation Report:

1. *Geologic Map of the Santa Rosa Quadrangle, Sonoma County, California*, California Division of Mines and Geology, Wagner and Bortugno, 1982.
2. *Geotechnical Services Design Manual, Version 1.0*, (Division of Engineering Services, August 2009).
3. *AASHTO LRFD Bridge Design Specifications,* 6th Edition, 2012.
4. *Geotechnical Design Report, EA 01-478001,* Luke Leong, P.E., April 1, 2008.

Project Description

The general plan sheet (dated 8/17/2015) and the foundation plan sheet (dated 3/10/2015) show that a soldier pile ground anchor (SPGA) retaining wall is proposed. The retaining wall will be approximately 339 feet long, with an approximate maximum lagged height of 31 feet. At its greatest height, three levels of ground anchors will be employed.

The foundation recommendations provided in this report are based on the NAVD 88 (vertical datum) and horizontal coordinates are based on the NAD83 (horizontal datum), unless otherwise noted.

Exceptions to Policy

There are no requested exceptions to Geotechnical Services policy.

Field Investigation and Testing Program

A 2007 field investigation to support the Geotechnical Design Report (4/1/2008) included three mud rotary borings located in the unpaved northbound shoulder and one mud rotary boring located in the number 2 northbound lane. These borings are located within, and adjacent to the toe of the landslide. Slope inclinometers were installed in the four boreholes. The slope inclinometers were backfilled with sand which permitted the measurement of water levels. The project LOTB includes the 2007 borehole data. Slope movement data and water level measurements made in 2007-2009 from the 2007 boreholes, are attached to this report.

The Office of Geotechnical Design-North conducted a subsurface investigation during October 2013. Seven mud rotary borings were drilled in the landslide. Three of the mud rotary borings were advanced using a self-cased wire line drilling apparatus that provided continuous soil samples and rock cores. Four of the boreholes were drilled with conventional drilling methods with no sampling or logging of the encountered materials. In the three sampled boreholes, Standard penetration tests (SPT), ASTM test method 1586, were performed at selected depth intervals to estimate in-place density of the native soil. Empirical correlations of soil strength parameters with SPT blow counts were used to estimate strength parameters of in-situ cohesionless soils. Pocket penetrometer measurements were used to estimate the undrained shear strength of cohesive soils. The maximum depth of investigation was 101.5 feet. Soils and rock were visually classified in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (June 2010).

A summary of the borings drilled during the 2007 and 2013 subsurface investigations is provided in Table 1.

Table 1: Subsurface Investigation Summary for the Formoli SPGA wall

Boring No.	Completion Date	Drill Rig Type	Hammer Type	Hammer Efficiency (%)	Approx. Ground Surface Elevation (ft)	Boring Depth (ft)
RC-07-001	03/29/2007	CME 85	Automatic	68	430.0	42.5
RC-07-002	03/28/2007	CME 85	Automatic	68	430.8	62.5
RC-07-003	03/27/2007	CME 85	Automatic	68	431.3	52.5
RC-07-004	03/27/2007	CME 85	Automatic	68	431.5	50.0
RC-13-001	10/09/2013	Acker	Automatic	69	468.5	101.5
RC-13-002	10/15/2013	Acker	N/A	N/A	472.7	20.0
RC-13-003	10/15/2013	Acker	N/A	N/A	464.2	20.0
RC-13-004	10/15/2013	Acker	N/A	N/A	466.0	40.0
RC-13-005	10/16/2013	Acker	N/A	N/A	462.9	20.0
RC-13-006	10/23/2013	Acker	Automatic	69	464.9	101.5
RC-13-007	10/29/2013	Acker	Automatic	69	463.2	100.0

Laboratory Testing Program

Laboratory testing was performed on selected samples of the subsurface materials obtained from the 2007 and 2013 subsurface investigations. Soil and rock samples were collected and submitted to the Headquarters Geotechnical Laboratory for grading analyses (CT 202), Atterberg Limits testing, water content determination and corrosion potential testing (CT 643). The corrosion test results for the soil samples may also be found in the Corrosion Evaluation section of this report. Laboratory test results are summarized in Attachment 1.

Site Geology and Subsurface Conditions

Regional Setting and Area Geology

The project is located within the Coast Ranges geomorphic province of California. The Coast Ranges are northwest trending mountain ranges and valleys. The northern Coast Ranges are dominated by irregular, knobby, landslide topography of the Franciscan Complex. The Coast Ranges geomorphic province is bounded to the west by the Pacific Ocean and to the east by Great Valley geomorphic province.

The Geologic Map of the Santa Rosa Quadrangle (CDMG, 1982), was reviewed to determine the geologic features within the project limits. The map indicates that the geologic unit underlying the project is Quaternary landslide deposits developed from Central and Eastern Belt Franciscan Complex rocks. The Cretaceous age rocks of the Franciscan formation at this location are mapped as belonging to mélange terrain. The geologic map describes the material as chaotic mixtures of fragmented rock masses in a sheared shaly matrix. The fragmented rock bodies

shown on the geologic map in the vicinity of the project include serpentinized ultra mafic rock, sandstone and graywacke. Many of these rocks have been metamorphosed.

The Maacama Fault zone is less than a mile east of the proposed retaining wall.

Subsurface Conditions

Soils encountered by the 2013 boreholes include approximately 30 to 35 feet of soil developed from the weathering of the underlying rock and displacement by slope failures. The soils encountered by the 2013 boreholes are considered to be landslide deposits. The landslide soils are described as lean clay, lean clay with sand, lean clay with gravel, clayey gravel with sand, clayey sand with gravel, gravelly silt, silty gravel and well graded sand with clay. The rock observed in the boreholes is predominately shale and siltstone, with some serpentinite and meta-graywacke found as small coherent masses or gravel sized fragments within the shale and siltstone.

Three of the boreholes drilled in 2013 were completed as slope inclinometers. The slope inclinometers were constructed by placing a 2.75 inch diameter Geo-Lok SI pipe in a 4.5 inch diameter borehole. The annular spaces between the SI pipes and the borehole walls were filled with cement grout that was placed through a tremie pipe connected to a foot valve in the bottoms of the SI pipes.

An 18 gauge Time Domain Reflectometry (TDR) cable was attached to the outside of the slope inclinometer casing in borehole RC-13-007. The TDR cable was sheared by landslide movement at elevation 450.4.

Four of the boreholes drilled in 2007 were completed as slope inclinometers. The slope inclinometers were constructed by placing a 2.75 inch diameter slope inclinometer casing in a 4.5 inch diameter borehole. The annular spaces between the SI pipes and the borehole walls were filled with sand. The ground surface elevations provided for the 2007 slope inclinometers have been estimated.

A summary of the elevation of lateral ground displacement measured in the slope inclinometers and TDR is provided in Table 2. Graphical presentation of the slope inclinometer and TDR data is provided in Attachment 2.

The boreholes used for the development of these recommendations will be shown on the Log of Test Borings (LOTBs) for the Formoli Slide Retaining Wall. The LOTBs will be provided at a future date and are to be attached to the plans.

Table 2: Slope Inclinometer and TDR Summary

Boring Number	Ground surface elevation at SI or TDR (feet)	Elevation of bottom of SI or TDR (feet)	Elevation of observed lateral movement (feet)
RC-13-001 (SI)	468.5	376.92	450.3
RC-13-006 (SI)	464.9	370.74	442.2
RC-13-007 (SI)	463.2	364.4	444.4
RC-13-007 (TDR)	463.2	364.4	450.4
RC-07-001 (SI)	430.0	Estimated 390	418.5
RC-07-002 (SI)	430.8	Estimated 370	424.8
RC-07-003 (SI)	431.3	Estimated 380	No movement detected
RC-07-004 (SI)	431.5	Estimated 384	Data not definitive

Groundwater

Four of the 2013 boreholes were completed as piezometers. The piezometer construction details and water level observations are provided in the following tables.

Table 3: Piezometer Installation Summary

Boring Number	Ground surface elevation at piezometer (feet)	Elevation of top of piezometer pipe (feet)	Elevation of bottom of piezometer slotted pipe (feet)
RC-13-002	472.7	474.06	454.06
RC-13-003	464.2	465.11	445.11
RC-13-004	466.0	466.66	426.66
RC-13-005	462.9	463.93	443.93

A summary of the estimated water levels observed in the slope inclinometers constructed in 2007 is provided in Table 4. The construction specifics of the 2007 slope inclinometers are not known; it is not known whether the SI pipe was perforated before installation.

Table 4: 2007 Slope Inclinometer Groundwater Elevation Observations (feet)

	Borehole Number			
Date	RC-07-001	RC-07-002	RC-07-003	R-07-004
03/28/2007	406.0	419.0	No data	No data
04/04/2007	394.0	401.2	399.1	394.5
06/22/2007	397.4	395.2	392.9	392.6
07/19/2007	397.2	394.2	393.0	392.4
08/01/2007	396.8	394.0	No data	392.5
08/16/2007	392.0	393.0	392.8	392.7
09/19/2007	No data	No data	No data	No data
10/03/2007	No data	No data	No data	No data
10/30/2007	No data	No data	No data	No data
11/29/2007	397.5	393.7	392.7	392.4
12/19/2007	397.0	394.0	No data	392.0
03/25/2008	402.5	394.5	No data	No data
05/14/2008	397.0	393.0	No data	No data
06/12/2008	397.0	No data	No data	No data
07/10/2008	397.0	393.2	395.0	No data
08/27/2008	396.5	394.0	No data	No data
12/01/2008	397.3	393.0	No data	No data
01/23/2009	398.0	393.4	No data	No data
03/03/2009	No data	399.0	No data	No data

A summary of the measured water level elevations from the piezometers constructed in 2013 is provided in Table 5.

Table 5: Piezometer Groundwater Elevation Observations (feet)

	Borehole Number			
Date	RC-13-002	RC-13-003	RC-13-004	RC-13-005
11/14/2013	457.5	no water observed	446.0	no water observed
12/05/2013	456.9	no water observed	435.1	no water observed
1/15/2014	n/a	no water observed	433.4	no water observed
2/5/2014	n/a	no water observed	433.4	no water observed
4/2/2014	468.4	no water observed	433.0	no water observed
5/15/2014	462.6	no water observed	434.2	no water observed
6/18/2014	460.8	no water observed	436.7	no water observed
7/24/2014	459.6	no water observed	437.2	no water observed
9/25/2014	458.1	no water observed	436.0	no water observed
10/22/2014	457.3	no water observed	434.3	no water observed
11/18/2014	456.4	no water observed	433.0	no water observed
1/8/2015	468.0	no water observed	no water observed	no water observed
3/5/2015	467.7	no water observed	446.7	454.2
5/5/2015	461.7	no water observed	446.8	444.0

Saturated surficial soils were observed during several of the field visits that took place during fall, winter and spring months. Weather patterns preceding construction will determine the degree of soil saturation and the distribution of subsurface water. The water level observations clearly indicate that ground water vertical and lateral distribution is both chaotic and is subject to seasonal fluctuations. It is therefore reasonable to expect that subsurface water may occur at higher or lower elevations than those observed over the short period of this study, with water levels dependent upon climatic conditions and normal seasonal variations.

Scour Evaluation

The project site does not cross a water course. A scour evaluation was not performed.

Corrosion Evaluation

Representative soil samples taken during the subsurface investigation were tested for corrosion potential. The Department considers a site 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:

- Chloride concentration is greater than or equal to 500 ppm
- Sulfate concentration is greater than or equal to 2000 ppm
- The pH is 5.5 or less

Since resistivity serves as an indicator parameter for the possible presence of soluble salts, tests for sulfate and chloride are usually not performed unless the resistivity of the soil is 1,000 ohm-cm or less.

The results of the laboratory tests determined that composite sample C706286A is considered to be corrosive on the basis of the sulfate content. Refer to Table 6 for test results.

Table 6: Corrosion Test Summary

TL 101 Number	Boring Number	Sample Depth (ft)	pH	Minimum Resistivity (ohm-cm)	Chloride Content (ppm)	Sulfate Content (ppm)
C722802	RC-07-002	4.0 – 6.0	7.81	854	7	1002
C722803	RC-07-002	7.5 – 11.0	7.97	625	14	541
C722806	RC-07-002	41.5 – 42.5	8.08	3386	N/A	N/A
C722807	RC-07-003	17.5 – 21.0	7.19	5782	N/A	N/A
C875055	RC-13-001	20.0-22.5	8.54	1621	N/A	N/A
C706286A	RC-13-001	35.0-36.5	9.69	1033	30	3200
C875052	RC-13-001	36.0-40.0	7.81	975	N/A	N/A
C706286B	RC-13-001	40.0-41.5	9.39	1150	30	575
C875051	RC-13-006	5.0-13.0	7.59	811	5	1344
C706286C	RC-13-006	25.0-26.5	9.86	1413	N/A	N/A
C875053	RC-13-006	50.0-52.5	8.06	1065	7	806
C875054	RC-13-006	58.0-59.0	7.99	598	7	1624

Seismic Recommendations

Ground Motion

The Caltrans ARS Online Tool was used to determine peak ground accelerations for deterministic and probabilistic seismic prediction models. The analysis used an estimated average shear wave velocity of 1840 ft/sec (560 m/s) for the upper 100 feet (30 meters) of soil and rock at the project site. A basin factor of 1.0 was utilized.

The Maacama Fault Zone is located in the closest active or potentially active fault to the project site. For the deterministic method, ground motions resulting from activity on the Maacama Fault Zone yielded an estimated peak ground acceleration of 0.56g. The estimated peak ground acceleration for the probabilistic case is 0.70g. For design, it is recommended that the following values be considered: $k_h = 0.23g$ and $k_v = 0.12g$.

Table 7: Active or Potentially Active Fault

Fault Name	Fault Type	Moment magnitude of maximum credible earthquake	Distance from fault to project site (miles)	Deterministic peak ground acceleration (gravity)
Maacama Fault Zone (North Section)	Strike Slip	7.4	0.9	0.56

Ground Rupture

Ground rupture hazard at the retaining wall location is considered low. No known active or potentially active faults project toward or cross the retaining wall location.

Liquefaction

Liquefaction is a near-total loss of soil strength due to an increase in pore water pressure during cyclic loading, such as occurs during an earthquake. Loose sands and gravels with 20 percent fines or less that have the potential of being saturated are susceptible to liquefaction. There is no potential for liquefaction at the project site.

As-built Foundation Data

There is no as-built information for the project location.

Foundation Recommendations

The following recommendations are for the proposed earth retaining system at the location known as the Formoli slide, as indicated on the Foundation Plan sheet dated March 10, 2015.

Slope failure morphology and stability analysis

Overall stability of the proposed SPGA retaining wall was analyzed for static loading. The analyses utilized the soil and rock parameters found in Table 8. The soil and rock strength parameters were developed using correlation methods found in the Bridge Design Specifications 6th Edition (2012) and the FHWA Soils and Foundation Manual (FHWA HI-88-009, July 1993). The subsurface model included a material boundary inclination of approximately 14 degrees upward to the east. The slope condition behind the retaining wall is variable, as shown on Attachment 4. The analyses were based on the assumption that the finished ground in front of the SPGA retaining wall will be approximately level at approximately elevation 431 feet.

Two failure surfaces were analyzed. The limits of the failures were mapped in October 2012, and are shown on Attachment 3. The first is a smaller rotational failure with head scarp approximately 136 feet right of the existing roadway centerline, and with the toe located approximately 32 feet right of the existing roadway centerline. This failure surface is responsible for the observed encroachment of landslide debris on the northbound roadway shoulder. The second failure has a complex non-circular cross section that originates approximately 322 feet right of the existing roadway centerline, and terminates approximately 10 feet right of the existing roadway centerline. This failure surface is responsible for the observed uplift of the roadway surface. The failure surface is modeled to approximately follow along the boundary between zone 1 and zone 2. Limit equilibrium stability analyses were performed with both of these failure surfaces using the program Slope/W. Both Spencer and Morgenstern-Price methodologies were used for the limit equilibrium analyses.

Table 8: Design analysis soil and rock parameters

Zone No.	Layer boundaries at retaining wall layout line	Material Type assumed for design model	Estimated Engineering Parameters
1a	Original ground to 5' below original ground	Mixed landslide deposit soils including lean clay, clayey sand, and clayey gravel	ϕ = 24 degrees, c = 0 psf, γ_m = 125 pcf
1b	5' below original ground to elev. 420	Mixed landslide deposit soils including lean clay, clayey sand, and clayey gravel	ϕ = 24 degrees, c = 0 psf, $\gamma_{buoyant}$ = 68 pcf
2	Elevation 420 to 404	Franciscan Complex Rock including shale, graywacke, serpentinite and siltstone	ϕ = 25 degrees, c = 200 psf, $\gamma_{buoyant}$ = 73 pcf
3	Below elevation 404	Franciscan Complex Rock including shale, graywacke, serpentinite and siltstone	ϕ = 35 degrees, c = 200 psf, $\gamma_{buoyant}$ = 73 pcf

Several different ground water profiles were used for design modeling. The critical water level profile for design is considered to be parallel to the existing ground surface at a depth of 5 feet. A typical cross section used for the slope stability analyses is included in Attachment 4.

Landslide retention force

The slope stability analysis for the case where the ground water surface is approximately 5 feet below the existing ground surface and the failure surface indicated on the cross section in Attachment 4 was used to develop the landslide retention force. A force of approximately 45 kips per foot is required for a soldier pile ground anchor retaining wall located as shown on the General Plan, 75 feet right of the G1 line, between RW LOL Stations 10+29.5 and 13+09.5. This retention force results in a safety factor of 1.3 (resistance factor of 0.77).

Recommended earth pressure diagram and material properties

It is recommended that a trapezoidal apparent earth pressure diagram be used for wall design. Both the Tributary Area Method and the Hinge Method are provided in the AASHTO 2012 LRFD Bridge Design Specifications. Effective strength parameters have been provided for the earth pressure design. However, since the material being retained is not free-draining, it is important that the design consider water pressure generated from the retained material that is anticipated to be saturated from an elevation that is 5 feet below the proposed finished grade.

Ground anchor configuration recommendations

The recommended maximum factored design load (FDL) is 200 kips. A minimum anchor inclination of 15 degrees is recommended. The anchor minimum unbonded lengths based on the configuration of the landslide and the location of the earth retention system is 80 feet for Level A ground anchors, 70 feet for Level B ground anchors and 60 feet for Level C ground anchors.

Lagging or wall face recommendations

Between RW LOL stations 10+30 and 13+00, where the retaining wall crosses the slide mass, the bottom of lagging varies between approximately elevations 416 and 423. This is close to the contact between the Zone 1b and Zone 2 materials.

Pile length recommendations

If pile embedment below the lagging will be used to develop the Resistance Force R, as shown on Figure C11.9.5.1-2 of the Bridge Design Specifications, then an arching factor of 1.0 is applicable to the foundation materials between elevations 420 and 426. An arching factor of 2.5 may be used between elevations 404 and 420. Below elevation 404, an arching factor of 3.0 is recommended.

Pile lengths must be sufficient to resist the vertical downward component of the ground anchor loads and enhance basal stability of the retention system. It is recommended that all soldier piles be embedded below the bottom of the lagging a minimum of 24 feet.

Subsurface drainage

Three subsurface drainage elements are recommended: an underdrain at the front toe of the wall, timber shims between the lagging and filter fabric behind the lagging, and horizontal drains installed from the retaining wall face and into the retained zone.

The underdrain in front of the wall (2010 Standard Plans sheet D102, Excavation and Backfill, Outside Subgrade Area detail) will provide an outlet for any water that moves through the subgrade below the bottom of lagging. Fully encapsulate a two-foot wide layer of Class 3 permeable material (2010 Standard Specifications Section 68-2.02F(4)) in Class A geosynthetic filter fabric (2010 Standard Specifications Section 68-2.02G and Section 88-1.02B). The bottom of the underdrain should be at the lowest elevation for which an outlet can be provided. The top of the underdrain should terminate 2 feet below finished grade and be capped with roadway embankment. Place an 8" diameter perforated plastic pipe (2010 Standard Specifications Section 68-2.02D) 6" above the base of the permeable material to collect and convey water from the permeable material. Outlet the perforated collector pipe with a solid pipe section sloped to drain to an adjacent cross culvert that is outside the lateral limit of the landslide. A minimum gradient of 1% is recommended for the outlet pipe. Underdrain clean-outs should be provided per standard practice.

The plans indicate that the face of the retaining wall will consist of exposed lagging. Shims should be placed between the timber lagging to provide gaps for water passage. The timber lagging should be separated from the retained material with a geosynthetic filter fabric.

Horizontal drains should be installed from the retaining wall face and extend into the retained zone. The horizontal drains should conform to the 2010 Standard Specifications Section 68-3, pp. 772-4, for the materials, construction and payment. It is recommended that the horizontal

drains exit the wall face at a point approximately 2 feet above the adjacent finished grade. They should be located midway between every other soldier pile, a distance of 16 feet. The horizontal drains should be inclined upward from the wall face at a grade of 10%, and be 250 feet long. The horizontal drains should connect to a collector system located within a toe berm constructed at the front toe of the retaining wall. The berm should bury both the collector pipe and the horizontal drain outlets to a minimum depth of approximately 1 foot. The solid wall collector pipe should connect to an outlet pipe which will drain to an adjacent cross culvert that is outside the lateral limit of the landslide. A minimum gradient of 1% is recommended for the outlet pipe. Clean-out connections should be provided for the horizontal drains and the collector pipe.

Surface drainage

Grade the slope immediately behind the wall to prevent ponding and promote surface drainage toward the landslide margins.

Notes to Designer

Per Caltrans practice, a minimum of four ground anchors should be performance tested and all of the ground anchors should be proof tested. A minimum of two of the performance tested ground anchors should be located in the uppermost row of ground anchors. The other two ground anchors should be randomly distributed.

Construction Considerations

General construction considerations

1. Retaining wall construction between December 1st and May 1st is not advisable. The ground conditions become wet and saturated from rainfall and ground water movement. Slope movement occurs in the winter and spring months when the ground water level and the soil/rock moisture content rises. During the winter and spring months the shear strength of the foundation materials decrease and the slope becomes less stable.

2. It is recommended that the plans and specifications require that the SPGA retaining wall be constructed in a top-down manner. Removing the toe of the landslide from existing ground to proposed finished grade in one stage is strongly cautioned against. Lagging should be installed between the soldier piles as soon as the excavation configuration permits. Ground anchors should also be installed as soon as possible. Ground anchors should be grouted immediately after the ground anchor borehole is completed.

Rock Cores

1. Rock core samples from the 2007 and 2013 subsurface investigation are available for bidder viewing at the California Department of Transportation, Translab, 5900 Folsom Blvd., Sacramento, CA. Caltrans Standard Specifications 2-1.06B, Supplemental Project

Information, describes the core view request process. It is highly recommended that the Contractor inspect/observe the core samples before bidding.

2. During the 2013 subsurface investigation, rock and soil samples were collected from several borings. Samples were submitted to the Caltrans Transportation laboratory for testing. A summary of the laboratory test data is provided in Attachment 1 to this report.

3. Based on observations made during the field exploration program, ground water may be encountered in any subsurface excavations.

Foundation Construction

1. Groundwater was encountered during the 2011 subsurface investigation. It is expected that groundwater will be encountered during the construction of soldier piles and ground anchors. Groundwater surface elevation is subject to seasonal fluctuations and may occur at a higher or lower elevation than indicated on the Log of Test Borings (LOTB) sheets and this report. Measures to control groundwater inflows are normal construction considerations and it is expected that the contractor will use his expertise to employ the appropriate groundwater control measure. This applies to soldier pile excavations, ground anchor excavations, and the excavation required to install the lagging and underdrain.

2. Due to the mélange nature of the Franciscan Complex foundation material, the contractor should anticipate foundation conditions that: 1) do not match the vertical distribution shown in any of the boreholes, 2) vary significantly from foundation location to foundation location, and 3) vary significantly in the vertical sequence at each foundation location. The data from the boreholes indicates that the variability will include the rock and soil type distribution, degree of rock weathering, degree of rock fracturing, degree of rock shearing, rock hardness and soil strength. This variability also extends to the distribution of groundwater and the hydraulic conductivity of the rock and soil.

3. Caving of the foundation materials into the soldier pile and ground anchor excavations is a possibility due to the presence of soil, the presence of very soft rock, moderately weathered rock, highly sheared and very intensely fractured rock, and groundwater. The contractor is expected to use his expertise to determine the appropriate construction techniques to construct the soldier piles and ground anchors.

4. The ground anchors will be installed through an earth mass that has undergone a great deal of disturbance due to landslide movement. Open fractures produced by ground movement may be intercepted by the ground anchors, and provide avenues for fluid and grout loss. Controlling measures such as the use of "grout socks" may be necessary.

Project Information

Standard Specifications Section 2-1.06B, "Supplemental Project Information," indicates that the special provisions will make supplemental project information to bidders. 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 include:

A. None

Data and Information included in the Information Handout include:

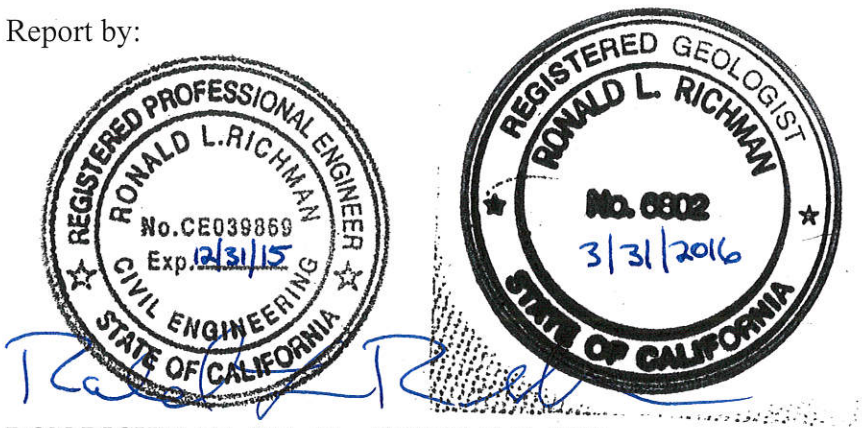
A. Foundation Report (Formoli Slide SPGA retaining wall, ERS No. 10E0037, Dated August 20, 2015.
B. Geotechnical Design Report, EA 01-478001, Luke Leong, P.E., April 1, 2008.

Information available for viewing at the Caltrans Transportation Laboratory:

A. Soil and rock core samples from the 2007 and 2013 subsurface investigations.

The Foundation Recommendations included in this Foundation Report are based on the location, dimensions, and structural configuration information that has been provided by the Office of Bridge Design North & Central. If you have any questions or comments, please contact Ron Richman (805) 549-3385.

Report by:



RON RICHMAN, P.E., No. 039869, P.G. 6802
Senior Materials & Research Engineer
Office of Geotechnical Design-North

c: Job File / Branch D Records
Traci Menard

LIST OF ATTACHMENTS

Laboratory Test Results	Attachment 1
Slope inclinometer and TDR graphical data	Attachment 2
Plan view showing approximate slope failure limits	Attachment 3
Typical cross section and design material parameters	Attachment 4

MATERIAL PROPERTIES SUMMARY

Formoli SPGA retaining wall

Men-101-3.65/3.86

DESCRIPTION	BORING	RC-13-001				RC-13-006				
	STATION	263+95				264+50				
	LINE	"G1-A1" Line				"G1-A1" Line				
	DISTANCE FROM LINE (Rt. or Lt.)	158 feet right				140 feet right				
	DATE SAMPLED	10/8/2013	10/8/2013	10/8/2013	10/8/2013	10/16/2013	10/16/2013	10/16/2013	10/16/2013	10/16/2013
	SAMPLE ID	C875055	C706286A	C875052	C706286B	C875051	C706286C		C875053	C875054
	DEPTH OR ELEVATION (FEET)	20.0' - 22.5'	35.0' - 36.5'	36.0' - 40.0'	40.0' - 41.5'	5.0 - 13.0	25.0 - 26.5	40.0 - 41.5	50.0 - 52.5	58.0 - 59.0
	USCS CLASSIFICATION									
PARTICLE SIZE ANALYSIS	50 mm (2")									100
	38 mm (1 1/2")			100		100				100
	25 mm (1")	100		96		90			100	100
	19 mm (3/4")	97		96		88			98	100
	12 mm (1/2")	96		95		84			97	100
	9.5 mm (3/8")	95		93		83			96	100
	4.75 mm (No. 4)	91		84		69			89	100
	2.36 mm (No. 8)	86		77		64			82	99
	1.18 mm (No. 16)	82		70		60			74	
	600 μm (No. 30)	77		63		55			67	
	300 μm (N0. 50)	73		57		50			61	
	150 μm (No. 100)	66		52		44			56	
	75 μm (N0. 200)	59		47		38			55	
	5 μm	43		27		18			27	
	1μm	22		16		10			14	
PI	LIQUID LIMIT	34	26	26	27	28	35	31	24	
	PLASTICITY INDEX	17	12	12	14	11	17	16	10	
CORROSION	RESISTIVITY (ohm-cm)	1621	1033	975	1150	811	1413		1065	598
	pH	8.54	9.69	7.81	9.39	7.59	9.86		8.06	7.99
	CHLORIDES (ppm)		30		30	5			7	7
	SULFATES (ppm)		3200		575	1344			806	1624
MAXIMUM DRY DENSITY										
OPTIMUM MOISTURE CONTENT										
UNCONFINED COMPRESSIVE STRENGT (psi)										

Attachment 1

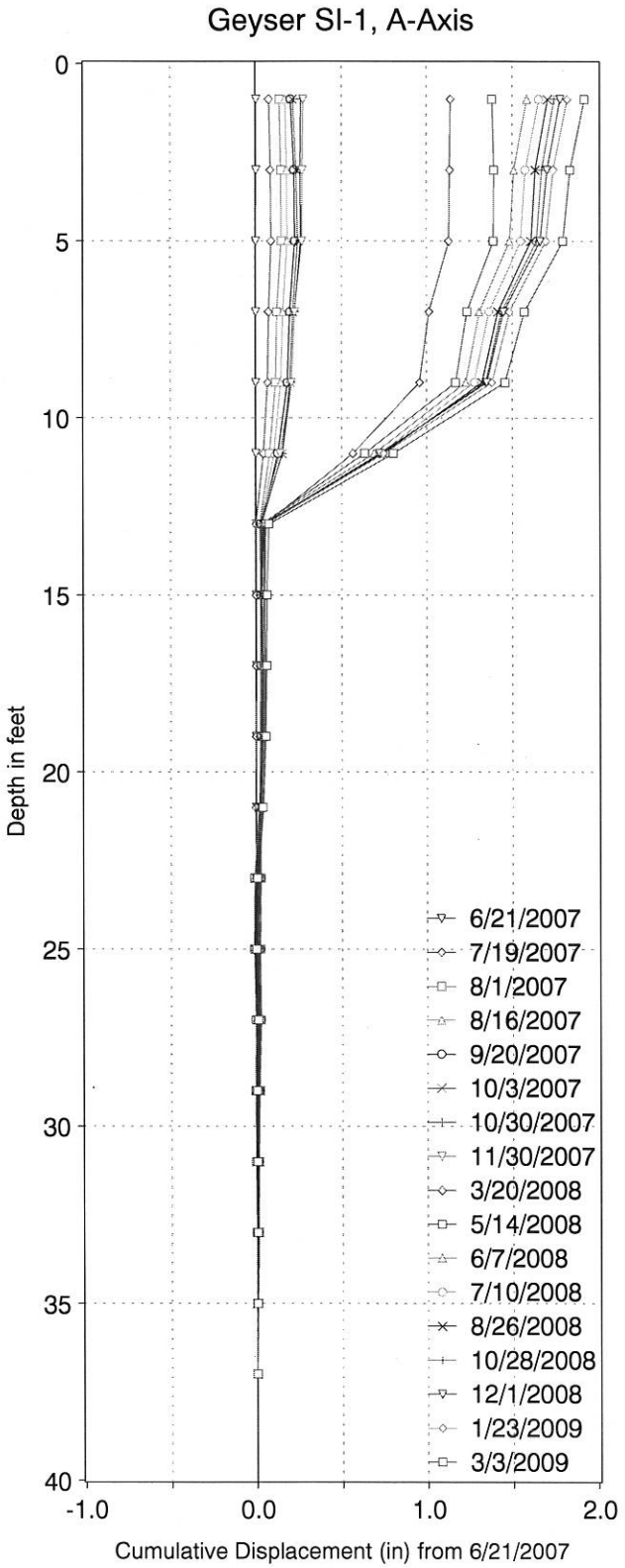
MATERIAL PROPERTIES SUMMARY

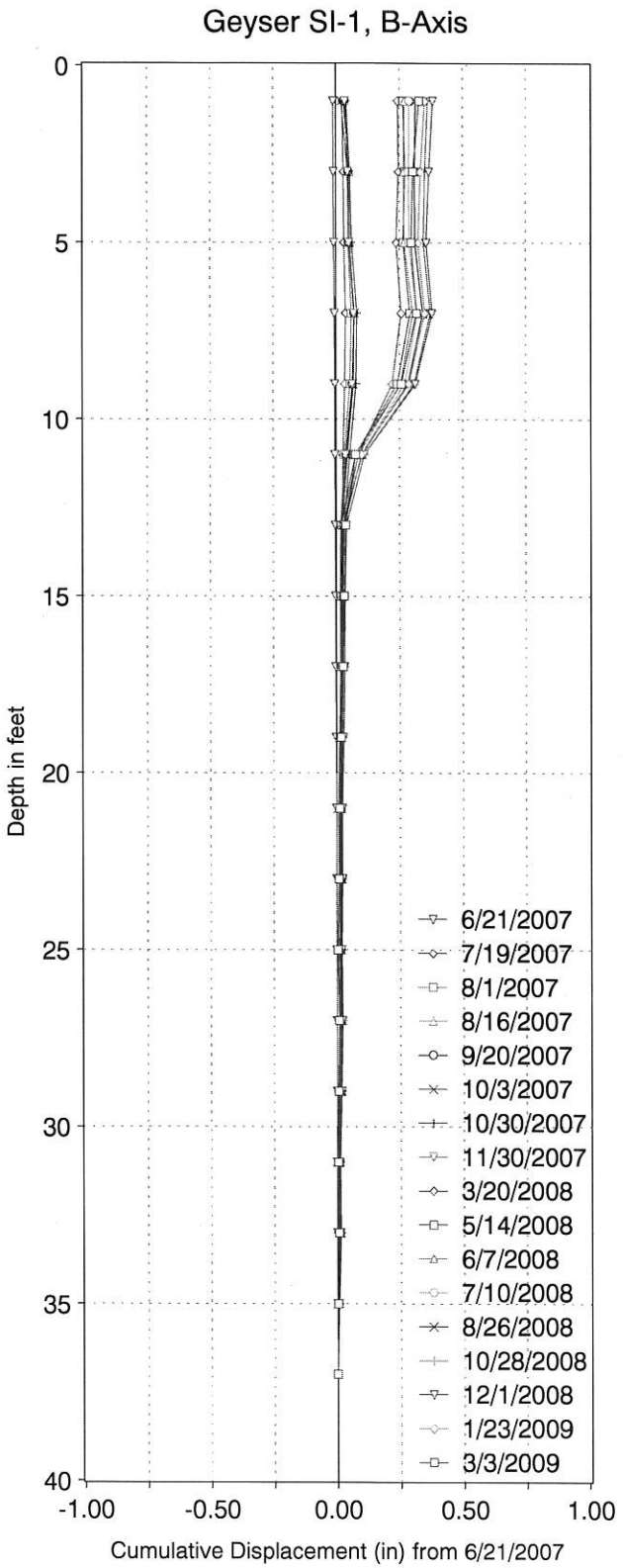
Formoli SPGA retaining wall

Men-101-3.65/3.86

DESCRIPTION	BORING	R-07-002						R-07-003	
	STATION								
	LINE	"G1-A1" Line						"G1-A1" Line	
	DISTANCE FROM LINE (Rt. or Lt.)								
	DATE SAMPLED	3/28/2007	3/28/2007	3/28/2007	3/28/2007	3/28/2007	3/28/2007	3/27/2007	3/27/2007
	SAMPLE ID	BH02-01	BH02-02	BH02-03	BH02-07	BH02-11	BH02-17	BH03-07	BH03-11
	DEPTH OR ELEVATION (FEET)	4.0 - 6.0	6.0 - 7.5	7.5 - 11.0	17.5 - 21.0	27.5 - 31.0	41.5 - 42.5	17.5 - 21.0	27.5 - 31.0
	USCS CLASSIFICATION								
PARTICLE SIZE ANALYSIS	50 mm (2")					100			100
	38 mm (1 1/2")		100		100	96			95
	25 mm (1")		92		91	88			88
	19 mm (3/4")		86		83	78			82
	12 mm (1/2")		86		71	67			77
	9.5 mm (3/8")		86	100	64	63	100	100	75
	4.75 mm (No. 4)	100	85	98	49	50	98	98	68
	2.36 mm (No. 8)	87	80	82	41	43	91	87	62
	1.18 mm (No. 16)	79	76	71	36	37	80	76	57
	600 μm (No. 30)	73	70	63	33	32	66	62	48
	300 μm (N0. 50)	68	64	56	29	24	52	46	37
	150 μm (No. 100)	63	57	51	24	18	41	33	28
	75 μm (N0. 200)	58	50	47	20	14	32	26	23
	5 μm	29	26	22	9	6	13	12	11
	1μm	13	17	11	4	3	6	6	6
PI	LIQUID LIMIT	29		32				26	
	PLASTICITY INDEX	14		16				9	
CORROSION	RESISTIVITY (ohm-cm)	854		625			3386	5782	
	pH	7.81		7.97			8.08	7.19	
	CHLORIDES (ppm)	7		14					
	SULFATES (ppm)	1002		541					
MAXIMUM DRY DENSITY									
OPTIMUM MOISTURE CONTENT									
UNCONFINED COMPRESSIVE STRENGT									
(psi)									

Attachment 1





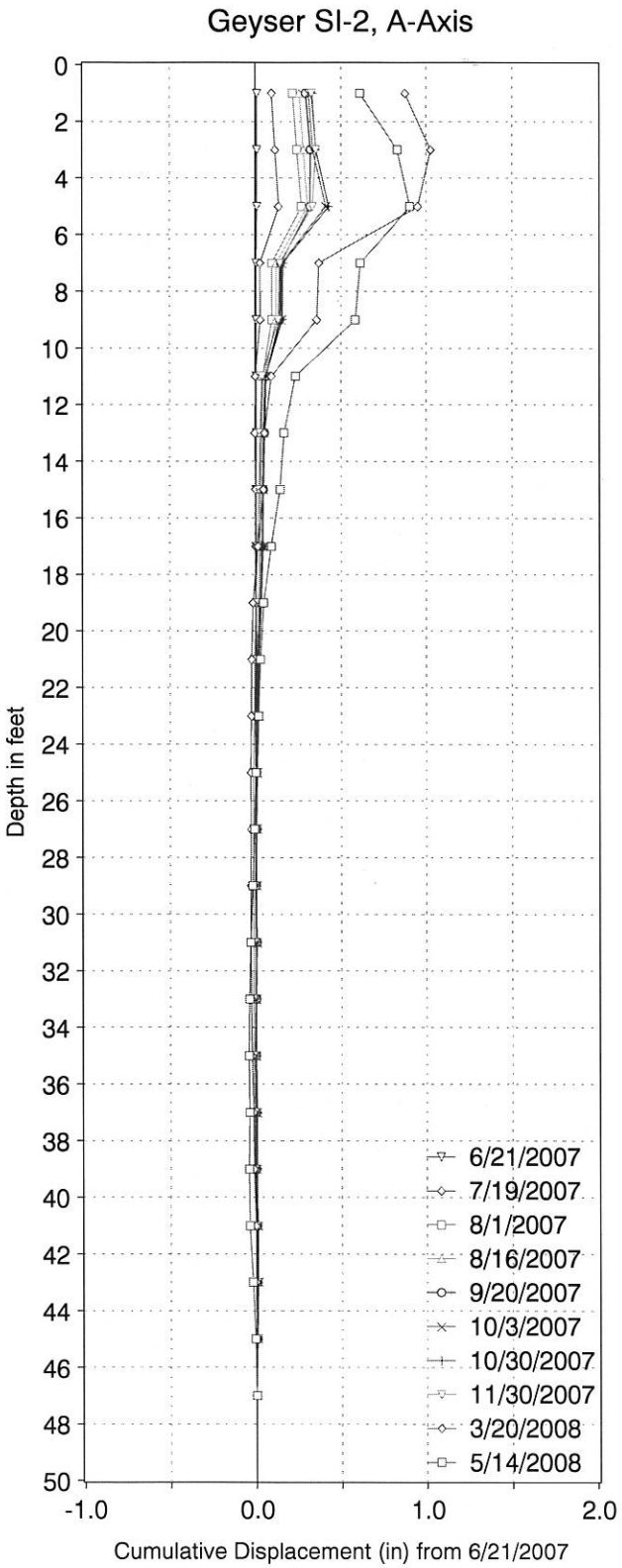
Attachment 2

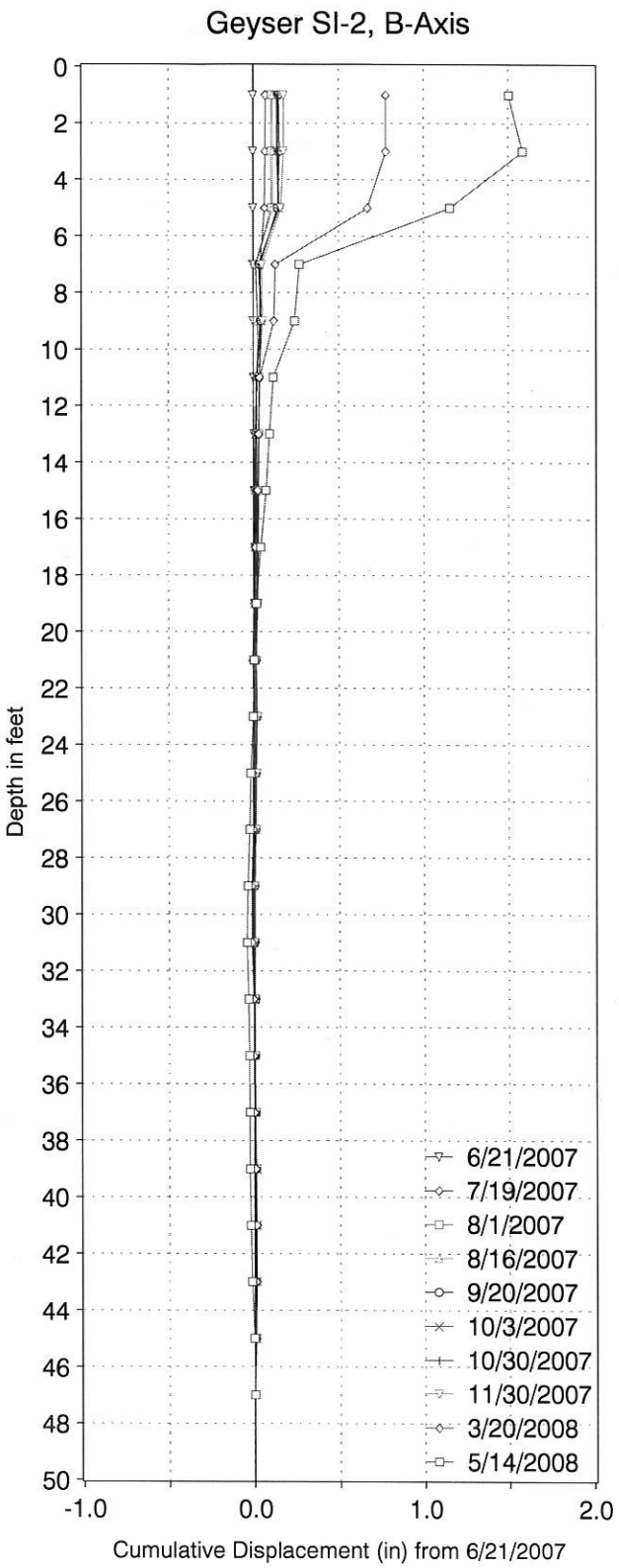
INCLINOMTER RESULTS

Caltrans

01-MED-101- P.M 3.72
Geyser Uplift
E.A. No: 01-478001

DEPTH OF INCLINOMETER CASING: 40 feet
Ao DIRECTION: 272* (magnetic North)
Location (WGS-84) : 38* 53.52' N ; 123*03.24' W





Attachment 2

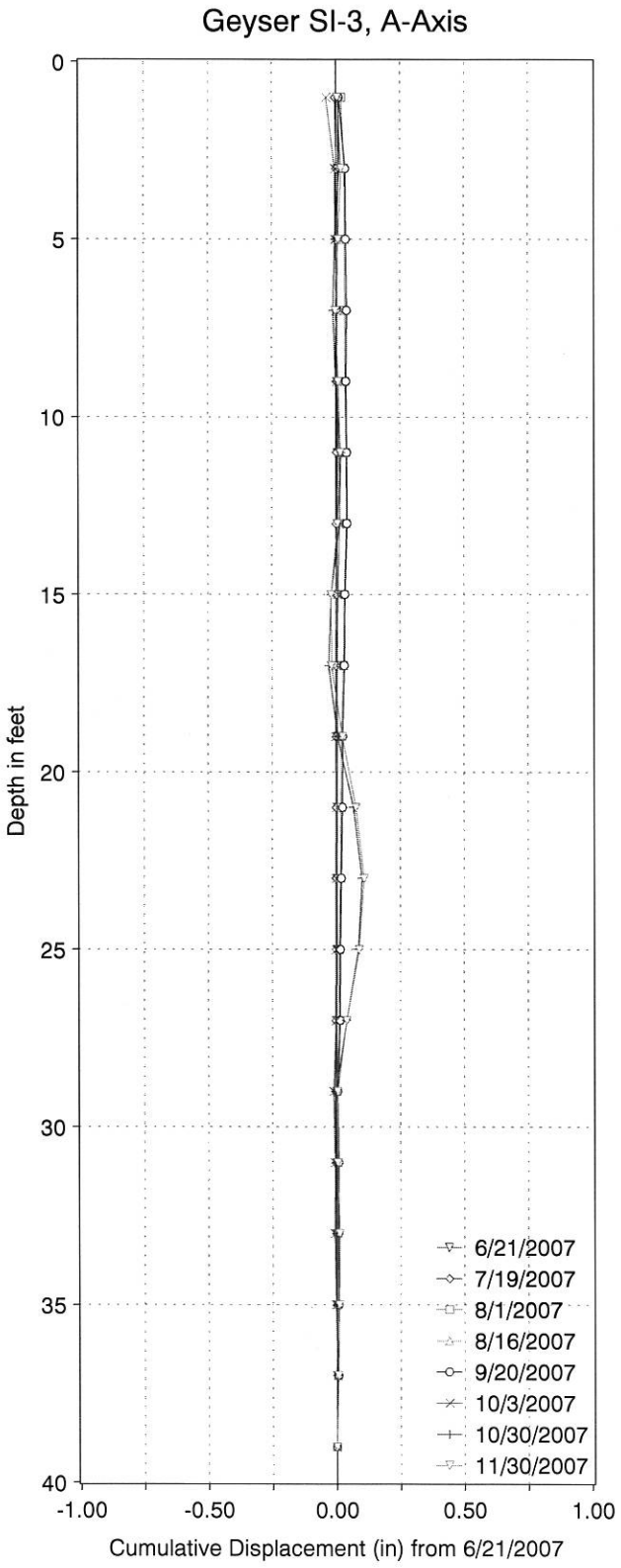
INCLINOMTER RESULTS

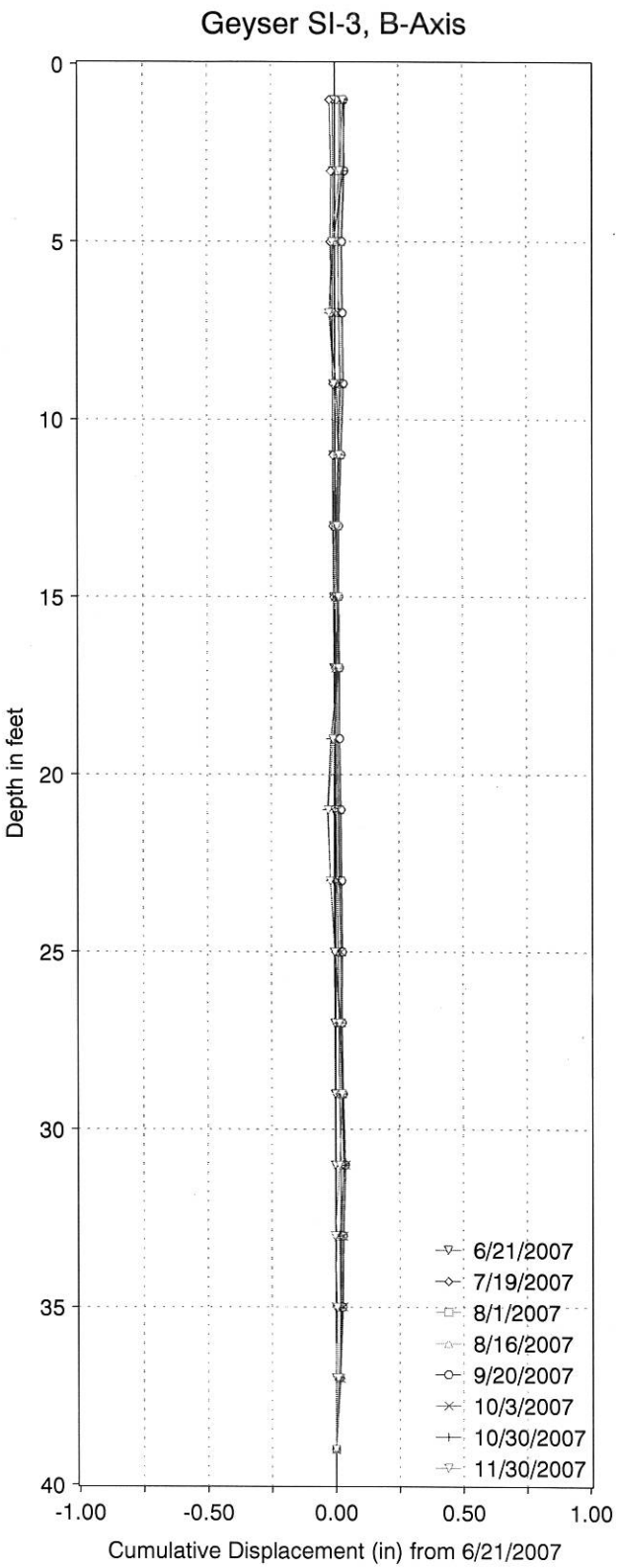
Caltrans

01-MED-101- P.M 3.72
Geyser Uplift
E.A. No: 01-478001

DEPTH OF INCLINOMETER CASING: 50 feet
Ao DIRECTION: 279* (magnetic North)
Location (WGS-84) : 38* 53.52' N ; 123*03.24' W

RC-07-003





Attachment 2

Caltrans

INCLINOMTER RESULTS

01-MED-101- P.M 3.72

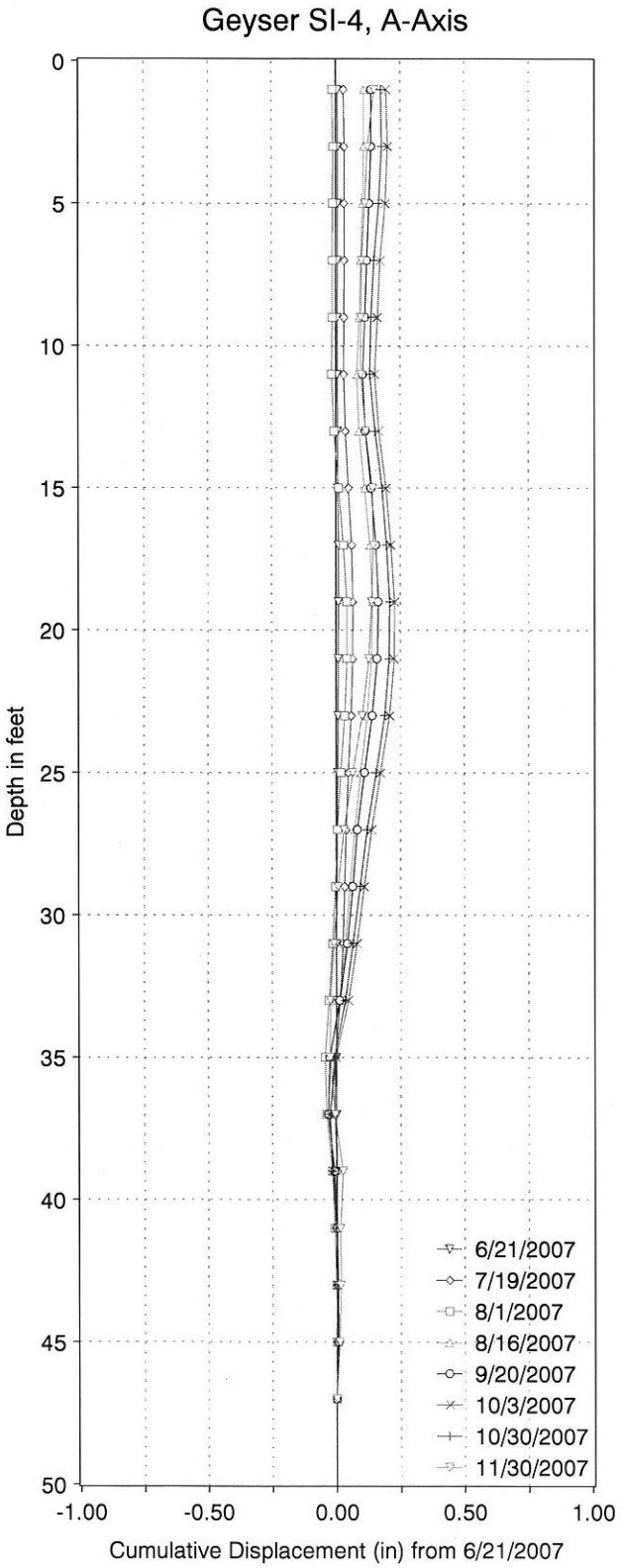
Geyser Uplift

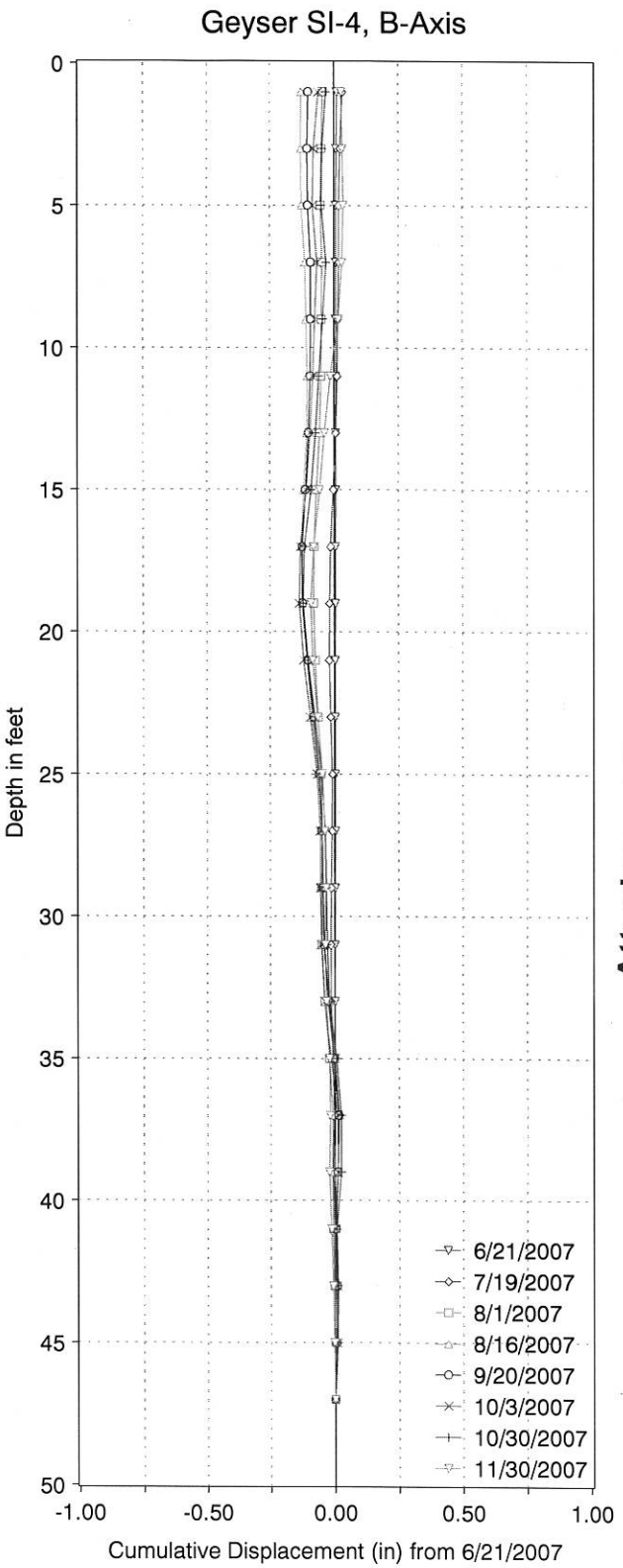
E.A. No: 01-478001

DEPTH OF INCLINOMETER CASING: 42 feet

Ao DIRECTION: 283* (magnetic North)

Location (WGS-84) : 38* 53.52' N ; 123*03.24' W





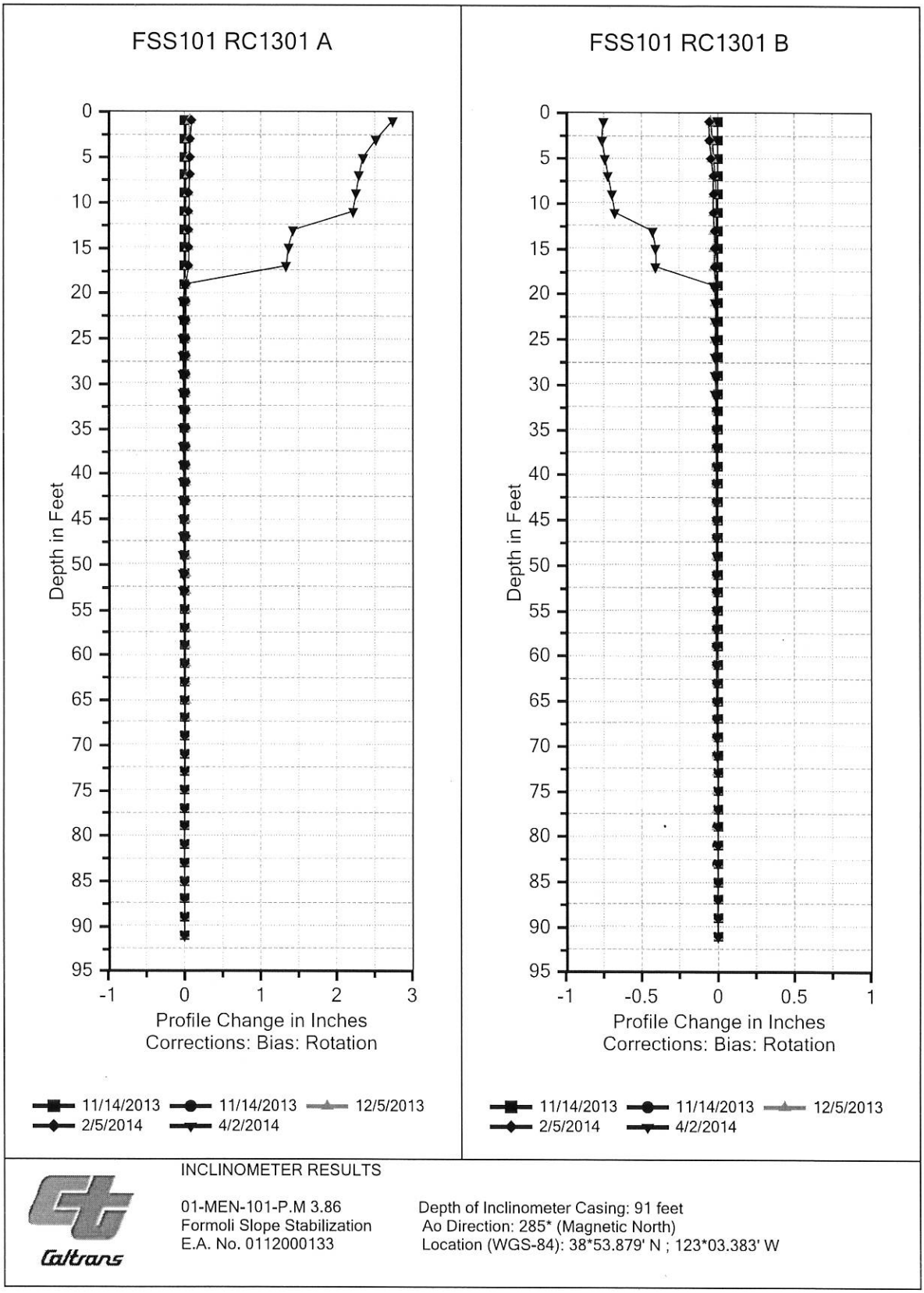
Attachment 2

Caltrans

INCLINOMTER RESULTS

01-MED-101- P.M 3.72
Geyser Uplift
E.A. No: 01-478001

DEPTH OF INCLINOMETER CASING: 50 feet
Ao DIRECTION: 279* (magnetic North)
Location (WGS-84) : 38* 53.53' N ; 123*03.23' W



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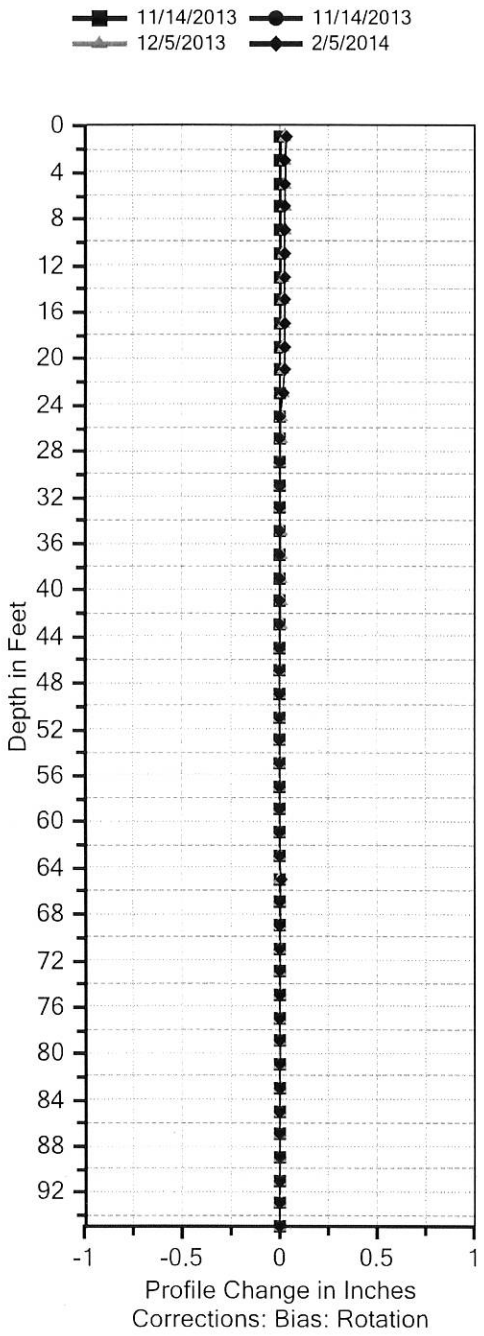
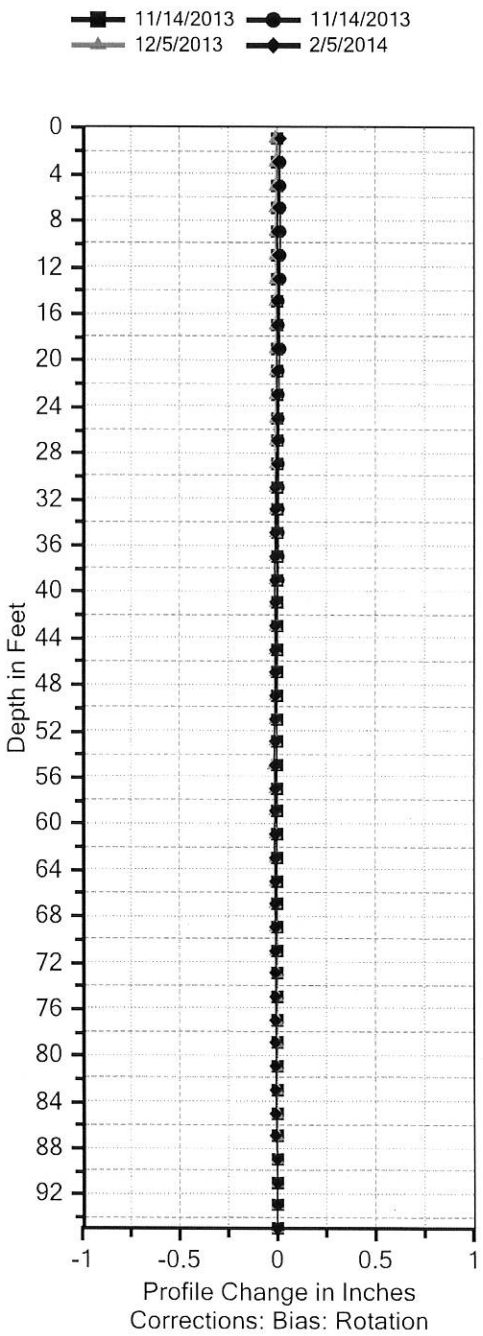




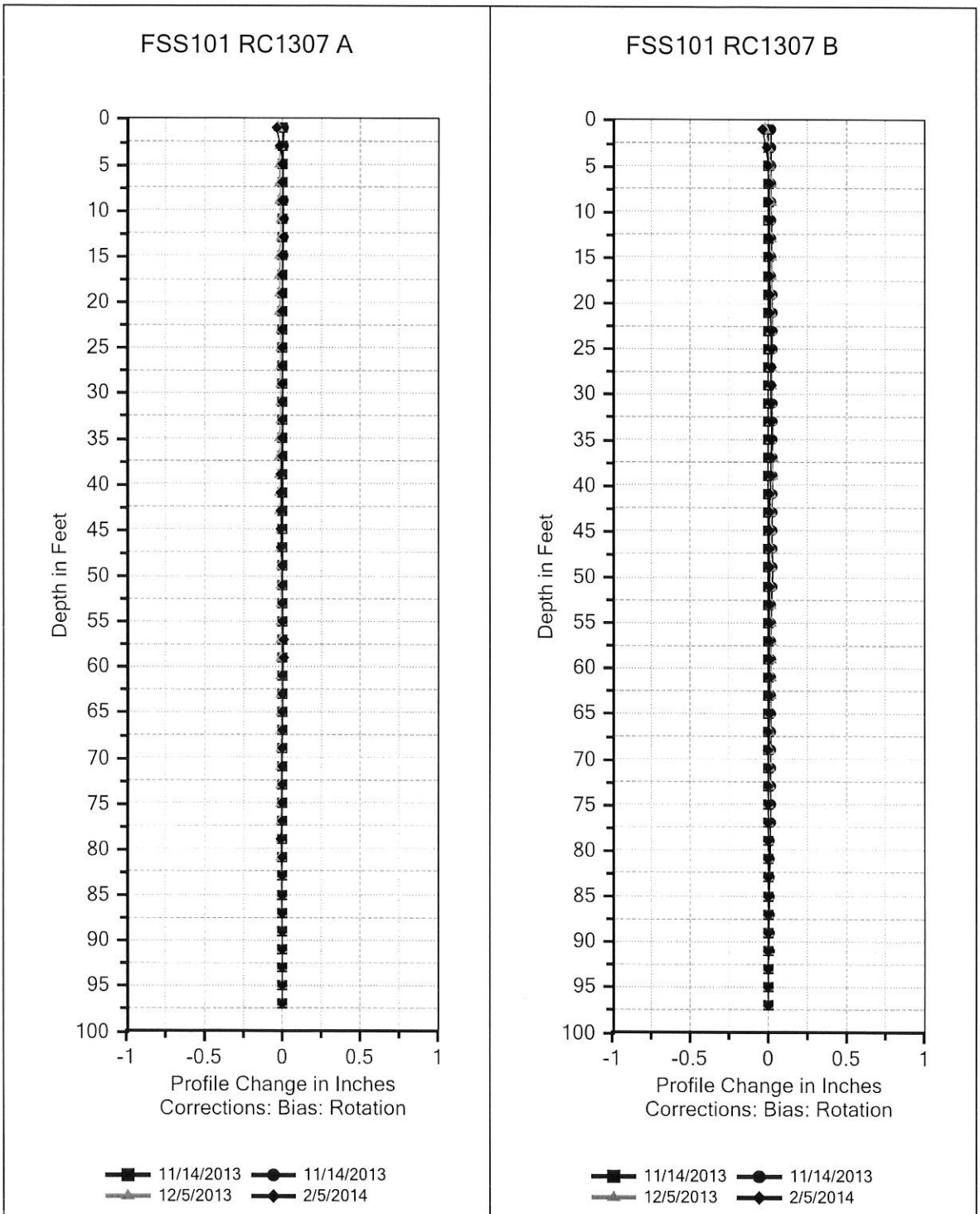
Caltrans

INCLINOMETER RESULTS

01-MEN-101-P.M 3.86
Formoli Slope Stabilization
E.A. No. 0112000133

Depth of Inclinometer Casing: 95 feet
Ao Direction: 275* (Magnetic North)
Location (WGS-84): 38*53.886' N ; 123*03.378' W

Attachment 2



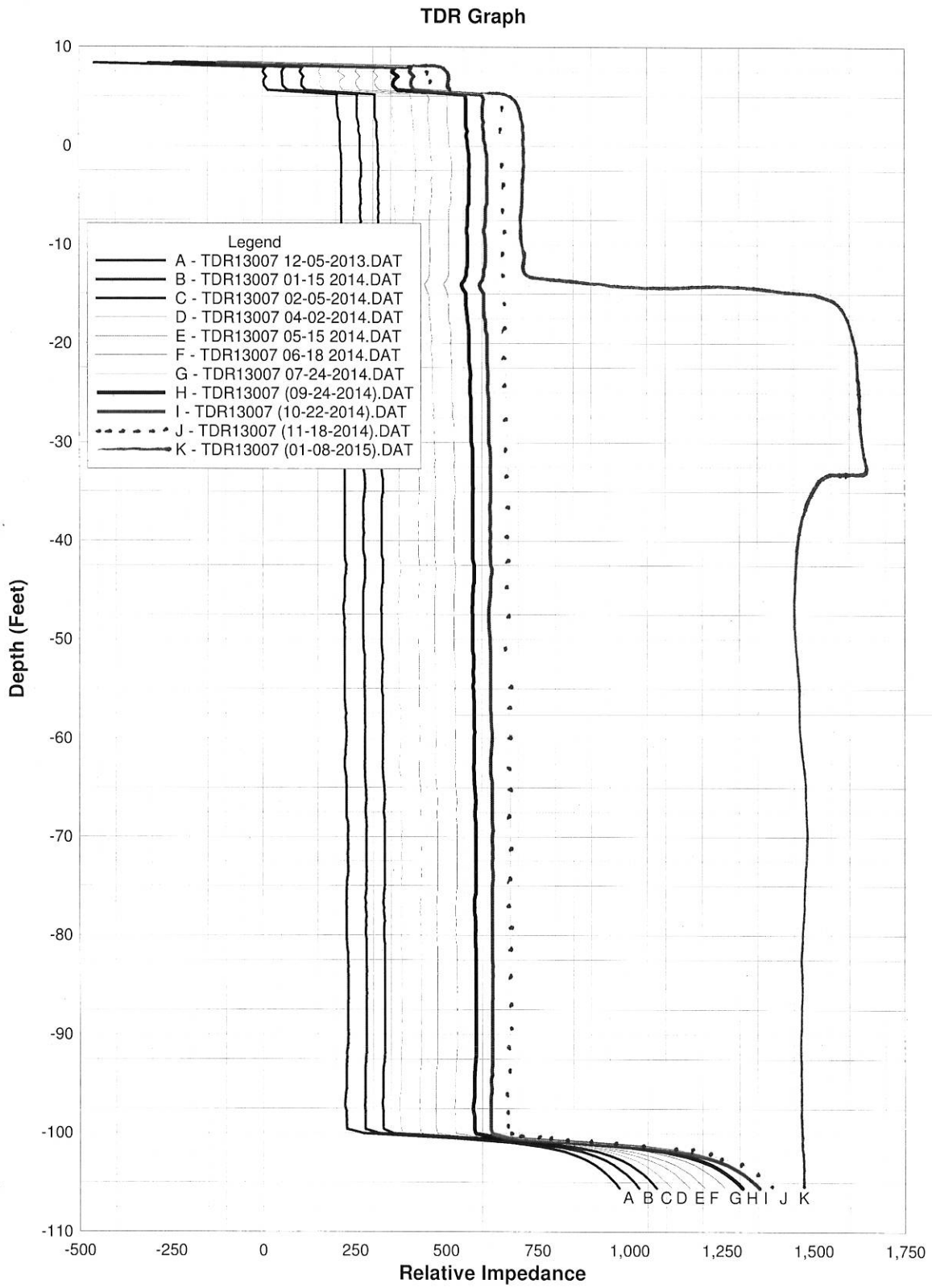
Caltrans

INCLINOMETER RESULTS

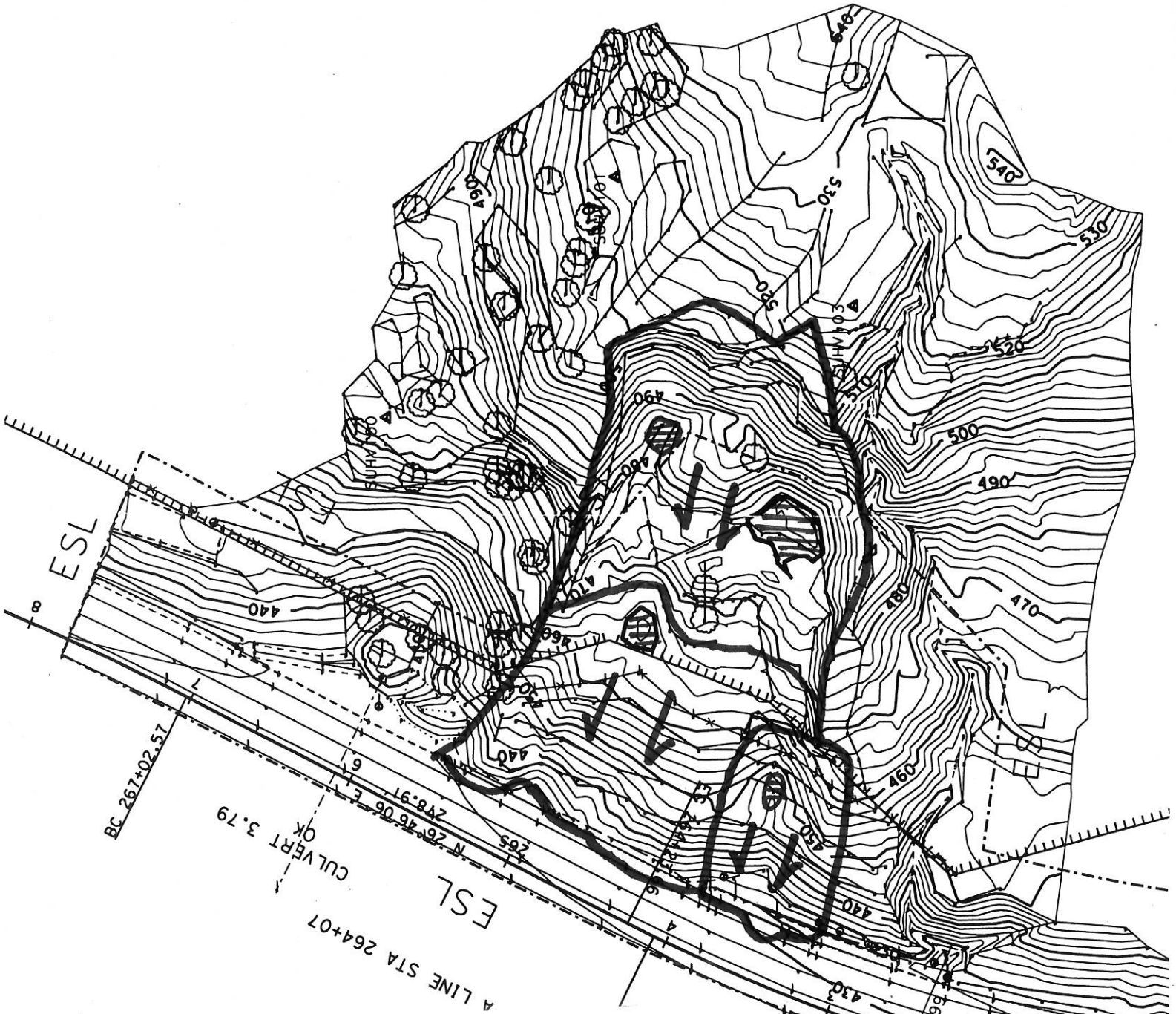
01-MEN-101-P.M 3.86
Formoli Slope Stabilization
E.A. No. 0112000133

Depth of Inclinometer Casing: 97 feet
Ao Direction: 283* (Magnetic North)
Location (WGS-84): 38*53.891' N ; 123*03.375' W

Attachment 2



Attachment 2

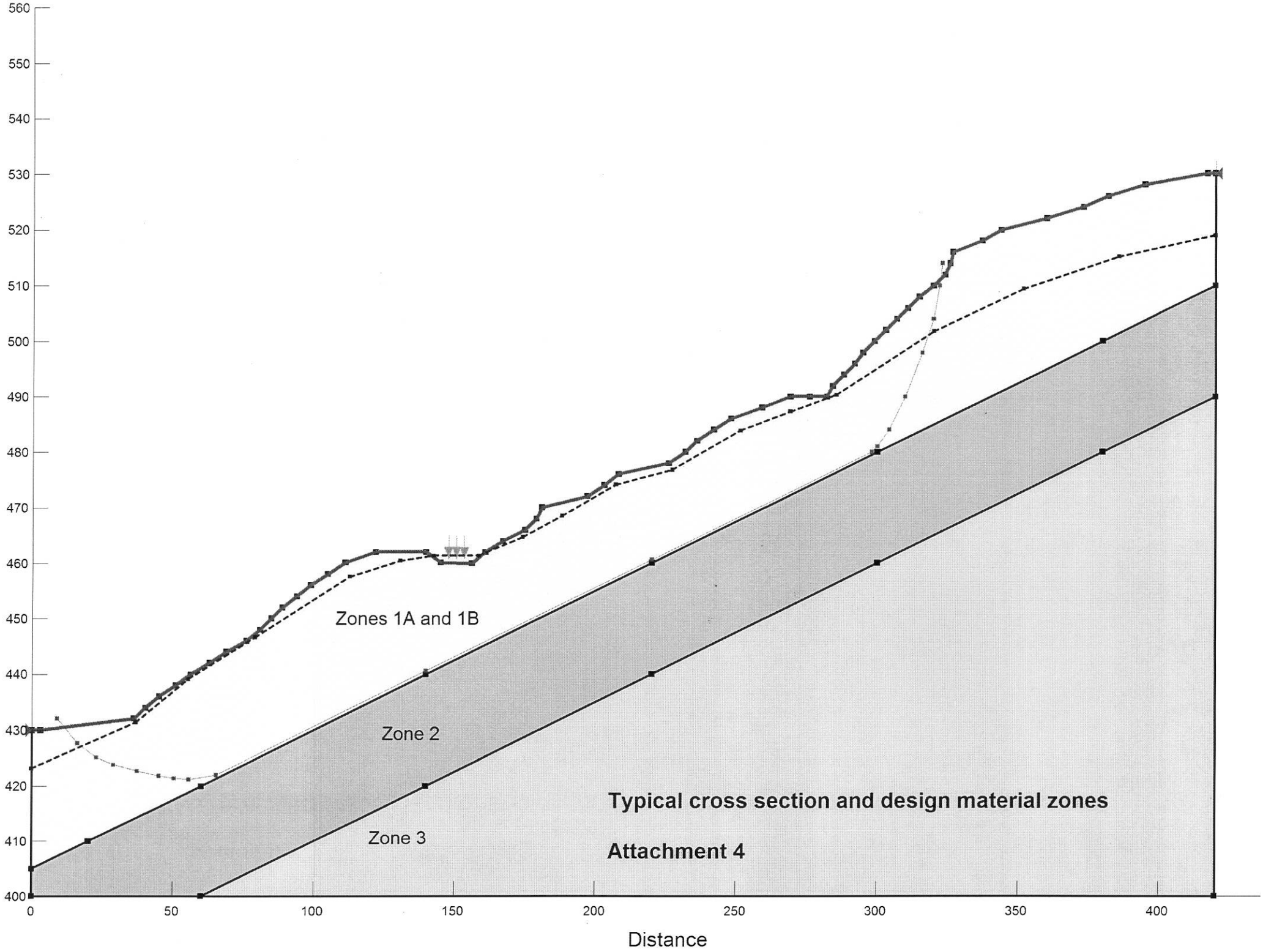


Primary direction of slope movement

Standing water observed on 10-2012

Plan view showing approximate slope failure limits

Attachment 3


560
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430
420
410
400
0
50
100
150
200
250
300
350
400
Distance
Zones 1A and 1B
Zone 2
Zone 3
Typical cross section and design material zones
Attachment 4

State of California
Department of Transportation

Business, Transportation and Housing Agency

Memorandum

To: JEFF SIMS, CHIEF
Bridge Design Branch 1
Office of Bridge Design North & Central
Structure Design
Division of Engineering Services

Date: August 20, 2015

File: 01-Men-101-PM 5.16
Peregrine Slide SPGA retaining wall
ERS No. 10E0036
EA 01-0B5001
EFIS 0112000133

Attn: Keith Stillmunkes

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

Subject: Foundation Report

Scope of Work

A Foundation Report (FR) is provided for the above referenced project. The proposed project is located in rural Mendocino County between Cloverdale and Hopland. Construction of a soldier pile ground anchor retaining wall is required to stabilize slope failures in the natural ground above and to the east of the northbound lanes. Review of published geologic data and previous geotechnical reports, field reconnaissance, and design calculations were performed to prepare this Foundation Report. This Foundation Report supersedes any previous planning or design communications. One of these older reports is listed below as a reference, and is included as attachment 9. It is being made available to provide historical observations and factual data. The content of this report is considered secondary and supplemental to the information presented in this report.

This Foundation Report supersedes any analyses and conclusions presented in preceding reports. The purpose of this report is to document geotechnical conditions and provide foundation recommendations for the design of a soldier pile ground anchor retaining wall.

Our Office has evaluated the site conditions and geology based on a review of available geologic literature and mapping, aerial photograph interpretation, multiple site visits and subsurface investigations completed during June through July 2011, June 2012, December 2013, and July through August 2014.

The following publications and reports were used to assist in the preparation of this Foundation Report:

1. *Geologic Map of the Santa Rosa Quadrangle, Sonoma County, California*, California Division of Mines and Geology, Wagner and Bortugno, 1982.

2. *Geotechnical Services Design Manual, Version 1.0*, (Division of Engineering Services, August 2009).

3. *AASHTO LRFD Bridge Design Specifications,* 6th Edition, 2012.

4. *Squaw Rock North Slide – PM 5.2,* Caltrans Office of Geotechnical Engineering, Gary Garofalo, June 22, 1992.

Project Description

The general plan sheet (dated 08/06/2015) and the foundation plan sheet (dated 07/28/2015) show that a soldier pile ground anchor (SPGA) retaining wall is proposed. The retaining wall will be approximately 423 feet long, with a maximum lagged height of approximately 60 feet. At its greatest height, seven levels of ground anchors will be employed. The retaining wall will be located 140 feet right of the G1 line.

The foundation recommendations provided in this report are based on the NAVD 88 (vertical datum) and horizontal coordinates are based on the NAD83 (horizontal datum), unless otherwise noted.

Exceptions to Policy

There are no requested exceptions to Geotechnical Services policy.

Field Investigation and Testing Program

A 2011-2 field investigation to support preliminary design efforts included four mud rotary borings located east of the northbound shoulder and one mud rotary boring located in the unpaved turnout west of the southbound lane. These borings are located within the landslide. These five mud rotary borings were advanced using a self-cased wire line drilling apparatus that provided continuous soil samples and rock cores. The upper sixty feet of borehole RC-11-004 was drilled with no sampling or logging of the encountered materials. In the five sampled boreholes, Standard penetration tests (SPT), ASTM test method 1586, were performed at selected depth intervals to estimate in-place density of the soil-like material. Empirical correlations of soil strength parameters with SPT blow counts were used to estimate strength parameters of in-situ cohesionless soils. Pocket penetrometer measurements were used to estimate the undrained shear strength of cohesive soils. The maximum depth of investigation was 200 feet. Soils and rock were visually classified in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (June 2010).

A 2013-4 field investigation to support design efforts included nine mud rotary borings located east of the northbound shoulder. All nine mud rotary borings were drilled in the landslide. Seven of the mud rotary borings were advanced using a self-cased wire line drilling apparatus that provided continuous soil samples and rock cores. Two of the boreholes were drilled with conventional drilling methods with no sampling or logging of the encountered materials. In the

seven sampled boreholes, Standard penetration tests (SPT), ASTM test method 1586, were performed at selected depth intervals to estimate in-place density of the soil-like material. Empirical correlations of soil strength parameters with SPT blow counts were used to estimate strength parameters of in-situ cohesionless soils. Pocket penetrometer measurements were used to estimate the undrained shear strength of cohesive soils. The maximum depth of investigation was 130 feet. Soils and rock were visually classified in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (June 2010).

A summary of the borings drilled during the subsurface investigations is provided in Table 1.

Table 1: Subsurface Investigation Summary for the Peregrine SPGA wall

Boring No.	Completion Date	Drill Rig Type	Hammer Type	Hammer Efficiency (%)	Approx. Ground Surface Elevation (ft)	Boring Depth (ft)
RC-11-001	06/23/2011	B47	Automatic	57	500.3	80.0
RC-11-002	07/24/2011	Acker	Automatic	80	573.9	200.0
RC-11-003	07/19/2011	Acker	Automatic	80	539.3	164.0
RC-11-004	07/26/2011	Acker	Automatic	80	576.5	100.0
RC-11-005	07/28/2011	Acker	Automatic	80	542	382
RC-12-020	06/27/2012	Acker	Automatic	80	498.2	85.0
R-13-001	12/03/2013	Acker	N/A	N/A	540.7	120.0
RC-13-002	12/04/2013	Acker	N/A	N/A	525.3	130.0
RC-13-003	12/17/2013	Acker	Automatic	69	562.7	123.0
RC-14-001	07/30/2014	Acker	Automatic	69	553.0	120.0
RC-14-002	08/05/2014	Acker	Automatic	69	540.1	120.0
RC-14-003	08/12/2014	Diedrich	Automatic	64	536.7	130.0
RC-14-004	07/30/2014	Acker	Automatic	69	536.6	50.2
RC-14-005	09/03/2014	Acker	Automatic	69	525.0	100.0
RC-14-006	08/20/2014	Acker	Automatic	69	546.4	130.0

Laboratory Testing Program

Laboratory testing was performed on selected samples of the subsurface materials obtained from the subsurface investigations. Soil and rock samples were collected and submitted to the Headquarters Geotechnical Laboratory for grading analyses (CT 202), Atterberg Limits testing, unit weight determination, water content determination, corrosion potential testing (CT 643), consolidated undrained triaxial testing and unconfined compressive strength testing. The corrosion test results may also be found in the Corrosion Evaluation section of this report. Laboratory test results are summarized in Attachment 1. The triaxial test data is provided in Attachment 2.

One specimen of sandstone core was evaluated using the unconfined compressive strength test. The results are provided in Attachment 3. The specimen contained numerous fractures healed with calcite. The appearance of the specimen after the test, with numerous intersecting curved fracture surfaces, indicates that the failure load was heavily influenced by the presence of the healed fractures. The unconfined compressive strength measured by the test (608 psi) does not reflect the unconfined compressive strength of the intact rock, but is a function of both the shear strength along healed fractures and through intact rock. It is anticipated that the unconfined compressive strength of rock lacking healed fractures or any other discontinuity type will be greater than the measured 608 psi.

Bulk samples were collected by shovel from the toe of the landslide at approximately 46 feet right of G1 station 335+90. The landslide material was tested by the Headquarters Geotechnical Laboratory for gradation, Atterberg Limits, compaction (moisture density curve and optimum moisture content) and consolidated undrained triaxial testing of samples compacted to 90% maximum dry density (at optimum moisture content). The maximum dry density was determined to be 132.5 pcf at an optimum moisture content of 8.0%. Two series of three samples were tested to determine the shear strength parameters. The following effective strength parameters were determined from the two test series: friction angle of 30 degrees and cohesion of 0 psf. The laboratory test results are provided in Attachment 4.

Two jar slake tests were performed on samples from RC-14-006. The specimens at elevations 483.4 and 523.9 were found to have $I_j = 2$. When submerged in water, the specimens break rapidly and form many fragments.

Site Geology and Subsurface Conditions

Regional Setting and Area Geology

The project is located within the Coast Ranges geomorphic province of California. The Coast Ranges are northwest trending mountain ranges and valleys. The northern Coast Ranges are dominated by irregular, knobby, landslide topography of the Franciscan Complex. The Coast Ranges geomorphic province is bounded to the west by the Pacific Ocean and to the east by Great Valley geomorphic province.

The Geologic Map of the Santa Rosa Quadrangle (CDMG, 1982), was reviewed to determine the geologic features within the project limits. The map indicates that the geologic unit underlying the project is Quaternary landslide deposits developed from Central and Eastern Belt Franciscan Complex rocks. The Cretaceous age rocks of the Franciscan formation at this location are mapped as belonging to mélange terrain. The geologic map describes the material as chaotic mixtures of fragmented rock masses in a sheared shaly matrix. The fragmented rock bodies shown on the geologic map in the vicinity of the project include serpentinized ultra mafic rock, sandstone and graywacke. Many of these rocks have been metamorphosed.

The Maacama Fault zone is less than a mile east of the proposed retaining wall.

Surface Conditions

The limits of the primary slope failures and multiple secondary slope failures were mapped in October 2012. Attachment 6 shows the locations and limits of these features.

Subsurface Conditions

Soil and rock types encountered by boreholes drilled between 2011 and 2014 are fully described in the Log of Test Borings. The boreholes closest to the layout line of the proposed SPGA retaining wall are RC-14-005, RC-13-002, RC-14-004 and RC-14-003. The landslide deposits encountered by these boreholes includes lean clay, sandy lean clay with gravel, sandy lean clay with boulders of decomposed serpentinite, lean clay with gravel, clayey sand, fat clay with gavel, sandy fat clay and fat clay with sand. Materials observed in the boreholes below the landslide deposits include sandy lean clay with gravel, fat clay with gravel, gravelly fat clay with sand, sandy fat clay and gravelly fat clay. The boreholes nearest the retaining wall layout line also encountered Franciscan Complex rock consisting predominately of shale, with some serpentinite and metagraywacke.

Similar material was encountered by the boreholes in the areas where the ground anchors will be located. The depth below existing ground to material with rock texture, decreases toward the ends of the retaining wall.

Instrumentation

Three of the boreholes drilled in 2014 were completed as slope inclinometers. The slope inclinometers were constructed by placing a 2.75 inch diameter Geo-Lok SI pipe in a 4.5 inch diameter borehole. The annular spaces between the SI pipes and the borehole walls were filled with cement grout that was placed through a tremie pipe connected to a foot valve in the bottoms of the SI pipes.

Four of the boreholes drilled in 2011 and 2012 were completed as slope inclinometers. The slope inclinometers were constructed by placing a 2.75 inch diameter slope inclinometer casing in a 4.5 inch diameter borehole. The annular spaces between the SI casings and the borehole walls of RC-11-001 and RC-12-020 were filled with sand. The annular space between the SI casing and the borehole wall of RC-11-002 was filled with cement grout. In addition to the SI casing, an RG59 coaxial Time Domain Reflectometry (TDR) cable was attached to the outside of the slope inclinometer casing in borehole RC-11-002. The material type used to backfill the annular space of RC-11-005 is not known.

RG59 coaxial Time Domain Reflectometry (TDR) cable was installed in borehole RC-11-003. RG11 coaxial Time Domain Reflectometry (TDR) cable was installed in boreholes R-13-001 and RC-13-002. These TDR installations were completed by backfilling the borehole with cement grout.

A summary of the elevation of lateral ground displacement measured in the slope inclinometers and TDRs is provided in the following table. Graphical presentation of the slope inclinometer

and TDR data is provided in Attachment 5. There is no graphical data for the slope inclinometer in RC-11-002 because the casing was sheared before the casing inclination could be measured.

Table 2: Slope Inclinometer and TDR Summary

Boring Number	Ground surface elevation at SI or TDR (feet)	Elevation of bottom of SI or TDR (feet)	Elevation of observed lateral movement (feet)
RC-11-001 (SI)	500.3	424.3	481.3
RC-11-002 (SI)	573.9	374.4	526.9
RC-11-002 (TDR)	573.9	374.4	526.9
RC-11-003 (TDR)	539.3	375.3	507.8
RC-11-005 (SI)	Estimated 542	Estimated 387	Approximately 510
RC-12-020 (SI)	498.2	418.2	441.2
R-13-001 (TDR)	540.7	420.7	490.7
RC-13-002 (TDR)	525.3	395.3	No movement detected
RC-14-001 (SI)	553.0	433.0	No movement detected
RC-14-003 (SI)	536.7	406.7	517.7
RC-14-006 (SI)	546.4	416.4	No movement detected

The boreholes used for the development of these recommendations will be shown on the Log of Test Borings (LOTBs) for the Peregrine Slide Retaining Wall. The LOTBs will be provided at a future date and are to be attached to the plans.

Groundwater

Six observation wells were constructed in approximately 2006. Details of the depth of the observation wells, the elevation of the slotted pipe and the backfill material are not available. The following table provides the location of these observations wells. The water level observations are provided in Table 5. They should be interpreted with caution because the elevations of the water flowing into and out of the observation wells, as well the effect of different hydraulic conductivities and hydraulic heads is not known.

Table 3: Observation Well location summary

Observation Well Number	Ground surface elevation at observation well (feet)	Location
P-11-010	533.6	161 feet right G1 Sta. 335+49
P-11-011	Estimated 533.6	Approx. 161 feet right G1 Sta. 336+80
P-11-012	533.7	172 feet right G1 Sta. 335+18
P-11-013	560.6	336 feet right G1 Sta. 335+59
P-11-014	566.7	370 feet right G1 Sta. 334+67
P-11-015	573.0	452 feet right G1 Sta. 335+18

Five piezometers were constructed from 2011 to 2014. Details of the depth of the piezometers, the elevation of the slotted pipe and the backfill material are provided below. The following two tables provide the location of construction details of the piezometers. Their locations are shown on the Log of Test Borings.

Table 4: Piezometer Installation Summary

Borehole Number	Ground surface elevation at piezometer (feet)	Elevation of top of slotted piezometer pipe (feet)	Elevation of bottom of piezometer slotted pipe (feet)
RC-11-004	576.5	486.5	476.5
RC-13-003	562.7	455.7	439.7
RC-14-002	540.1	470.1	420.1
RC-14-004	536.6	506.6	486.6
RC-14-005	525.0	465.0	425.0

The elevations of water measured in the observation wells constructed in approximately 2006 are provided in Table 5.

Table 5: Observation Well Water Level Summary

	Observation Well Number					
Date	P-11-010	P-11-011	P-11-012	P-11-013	P-11-014	P-11-015
9/20/2011	No observation	No observation	No observation	No observation	No observation	546.80
10/18/2011	No observation	No observation	No observation	No observation	No observation	546.60
11/29/2011	No observation	No observation	No observation	No observation	No observation	546.50
10/08/2012	No observation	No observation	No observation	No observation	No observation	552.00
12/12/2012	529.35	530.22	523.15	547.30	557.50	551.20
02/06/2013	529.90	Blocked at elev. 529.62, dry	523.55	547.80	No observation	555.00
04/17/2013	528.80	Blocked at elev. 529.62, dry	524.40	Blocked at elev. 547.7, dry	Blocked at elev. 557.50, dry	554.00
05/21/2013	526.95	No observation	521.35	Blocked at elev. 547.7, dry	Blocked at elev. 557.50, dry	554.00
08/28/2013	526.75	No observation	519.20	No observation	No observation	555.30
12/05/2013	526.55	No observation	518.95	No observation	No observation	553.35
01/14/2014	526.40	No observation	518.80	No observation	No observation	552.70
04/03/2014	531.25	No observation	524.70	No observation	No observation	553.85
05/15/2014	529.15	No observation	522.55	No observation	No observation	555.40
06/17/2014	526.90	No observation	520.80	No observation	No observation	555.70
07/23/2014	526.85	Blocked at elev. 529.62, dry	519.35	Blocked at elev. 547.7, dry	Blocked at elev. 557.50, dry	555.30
09/24/2014	526.70	Blocked at elev. 529.62, dry	517.85	Blocked at elev. 547.7, dry	Blocked at elev. 557.50, dry	554.10
10/20/2014	526.70	Blocked at elev. 529.62, dry	517.80	Blocked at elev. 547.7, dry	Blocked at elev. 557.50, dry	553.60
11/18/2014	526.60	Blocked at elev. 529.62, dry	518.05	Blocked at elev. 547.7, dry	Blocked at elev. 557.50, dry	552.80
01/06/2015	530.25	Blocked at elev. 529.62, dry	523.70	Blocked at elev. 547.7, dry	Blocked at elev. 557.50, dry	554.40
03/04/2015	529.60	Blocked at elev. 529.62, dry	523.25	Blocked at elev. 547.7, dry	Blocked at elev. 557.50, dry	556.55

A summary of the elevations of water measured in the piezometers constructed between 2011 and 2014 is provided in Table 6.

Table 6: Piezometer Observation Summary

	Borehole Number				
Date	RC-11-004	RC-13-003	RC-14-002	RC-14-004	RC-14-005
09/13/2011	564.65	No observation	No observation	No observation	No observation
12/12/2012	566.40	No observation	No observation	No observation	No observation
02/06/2013	567.30	No observation	No observation	No observation	No observation
04/17/2013	567.00	No observation	No observation	No observation	No observation
05/21/2013	565.95	No observation	No observation	No observation	No observation
08/28/2013	563.20	No observation	No observation	No observation	No observation
12/05/2013	561.10	No observation	No observation	No observation	No observation
01/14/2014	560.30	539.70	No observation	No observation	No observation
04/03/2014	566.90	539.15	No observation	No observation	No observation
05/15/2014	567.00	538.85	No observation	No observation	No observation
06/17/2014	565.45	538.75	No observation	No observation	No observation
07/23/2014	563.95	538.50	No observation	No observation	No observation
09/24/2014	561.90	538.40	519.00	522.80	511.60
10/20/2014	561.30	538.30	518.40	522.15	509.40
11/18/2014	560.70	537.90	517.70	521.30	507.95
01/06/2015	566.00	538.55	517.35	523.30	515.50
03/04/2015	567.45	538.75	517.45	523.65	518.05

Additional water level observations were made from the slope inclinometer casings. The slope inclinometers were not constructed with the purpose of observing groundwater levels; the annular space around the casings were uniformly backfilled with either sand or grout. Therefore it is not known the elevation or elevations at which water is entering the casing and/or exiting the casing. These water levels should be interpreted carefully and considered secondary to the water level observations from the purpose built observation wells and piezometers. The observations are provided in Table 7.

Table 7: Slope Inclinometer Groundwater Observation Summary

	Borehole Number						
Date	RC-11-001	RC-11-002	RC-11-005	RC-12-020	RC-14-001	RC-14-003	RC-14-006
09/13/2011	490.6	558.65	531.1	No observation	No observation	No observation	No observation
09/20/2011	493.05	558.00	530.6	No observation	No observation	No observation	No observation
11/29/2011	494.10	557.67	530.00	No observation	No observation	No observation	No observation
07/03/2012	No observation	No observation	No observation	436.40	No observation	No observation	No observation
07/17/2012	No observation	No observation	No observation	435.20	No observation	No observation	No observation
08/06/2012	No observation	No observation	No observation	434.60	No observation	No observation	No observation
09/20/2012	No observation	No observation	No observation	434.95	No observation	No observation	No observation
10/08/2012	No observation	No observation	No observation	434.30	No observation	No observation	No observation
12/12/2012	497.60	552.70	534.55	437.60	No observation	No observation	No observation
02/06/2013	497.65	554.20	534.80	435.75	No observation	No observation	No observation
02/27/2013	No observation	No observation	No observation	435.50	No observation	No observation	No observation
04/17/2013	495.60	553.60	533.60	435.80	No observation	No observation	No observation
05/21/2013	495.50	553.95	532.35	435.55	No observation	No observation	No observation
08/28/2013	496.55	553.10	528.65	434.80	No observation	No observation	No observation
12/05/2013	No observation	551.40	526.40	435.50	No observation	No observation	No observation
01/14/2014	No observation	550.70	525.65	435.10	No observation	No observation	No observation
04/03/2014	494.75	550.65	535.00	446.35	No observation	No observation	No observation
05/15/2014	495.20	551.70	532.65	435.20	No observation	No observation	No observation
06/17/2014	495.80	552.45	531.40	434.90	No observation	No observation	No observation
07/23/2014	Dry	552.55	529.55	434.85	No observation	No observation	No observation
09/24/2014	Dry	552.00	527.00	435.40	537.25	526.40	533.85
10/20/2014	496.05	551.45	526.20	435.35	536.20	526.05	533.35
11/18/2014	495.40	550.80	525.45	435.30	536.05	525.90	533.25
01/06/2015	494.60	550.70	533.40	435.70	535.70	527.85	532.80
03/04/2015	494.85	551.85	533.95	434.05	535.45	521.15	532.80

The groundwater level observations east of route 101 indicate a general pattern of rising groundwater levels beginning in early fall, and peaking in mid-spring. The groundwater levels gradually decline from late spring and through the summer. Increases in groundwater levels coincide with increased rates of slope movement as reported by maintenance and empirically indicated by the slope inclinometer data.

Saturated surficial soils were observed during several of the field visits that took place during fall, winter and spring months. Weather patterns preceding construction will determine the degree of soil saturation and the distribution of subsurface water. The water level observations clearly indicate that ground water vertical and lateral distribution is both chaotic and is subject to seasonal fluctuations. It is therefore reasonable to expect that subsurface water may occur at higher or lower elevations than those observed over the short period of this study, with water levels dependent upon climatic conditions and normal seasonal variations.

Scour Evaluation

The project site does not cross a water course. A scour evaluation was not performed.

Corrosion Evaluation

Representative soil samples taken during the subsurface investigation were tested for corrosion potential. The Department considers a site 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:

- Chloride concentration is greater than or equal to 500 ppm
- Sulfate concentration is greater than or equal to 2000 ppm
- The pH is 5.5 or less

Since resistivity serves as an indicator parameter for the possible presence of soluble salts, tests for sulfate and chloride are usually not performed unless the resistivity of the soil is 1,000 ohm-cm or less.

The results of the laboratory tests determined that the samples are considered to not be corrosive. Refer to Table 8 for test results.

Table 8: Corrosion Test Summary

TL 101 Number	Boring Number	Sample Depth (ft)	pH	Minimum Resistivity (ohm-cm)	Chloride Content (ppm)	Sulfate Content (ppm)
C725759A	RC-11-001	27	9.11	1229	N/A	N/A
C725759B	RC-11-001	59	8.58	893	29	245
C725759C	RC-11-002	25	8.48	3192	N/A	N/A
C725759D	RC-11-003	9.5	8.10	1669	N/A	N/A
C725759E	RC-11-003	64	9.08	801	4	169
C725759F	RC-11-004	97.5	9.29	811	3	213
C707193	RC-14-001	20.0-22.0	8.63	1184	1	508
C707194	RC-14-001	35.0-37.0	8.64	821	2	452
C707195	RC-14-001	63.0-64.5	9.18	733	12	517
C707197	RC-14-002	58.0-59.0	8.83	1124	N/A	N/A
C707198	RC-14-002	68.0-69.0	9.15	1177	5	250
C707191	RC-14-004	19.5 – 21.5	8.97	701	0	641
C707192	RC-14-004	49.0 – 50.2	9.37	846	2	287
C707189	RC-14-005	40.0 – 42.0	8.86	2831	N/A	N/A
C707190	RC-14-005	60.0 –62.0	8.66	664	1	693

Seismic Recommendations

Ground Motion

The Caltrans ARS Online Tool was used to determine peak ground accelerations for deterministic and probabilistic seismic prediction models. The analysis used an estimated average shear wave velocity of 1840 ft/sec (560 m/s) for the upper 100 feet (30 meters) of soil and rock at the project site. A basin factor of 1.0 was utilized.

The Maacama Fault Zone is located in the closest active or potentially active fault to the project site. For the deterministic method, ground motions resulting from activity on the Maacama Fault Zone yielded an estimated peak ground acceleration of 0.61g. The estimated peak ground acceleration for the probabilistic case is 0.73g. For design, it is recommended that the following values be considered: $k_h = 0.24g$ and $k_v = 0.12g$.

Table 9: Active or Potentially Active Fault

Fault Name	Fault Type	Moment magnitude of maximum credible earthquake	Distance from fault to project site (miles)	Probabilistic peak ground acceleration (gravity)
Maacama Fault Zone (North Section)	Strike Slip	7.4	0.6	0.73

Ground Rupture

Ground rupture hazard at the retaining wall location is considered low. No known active or potentially active faults project toward or cross the retaining wall location. The project location does not lie within an Alquist-Priolo Earthquake Fault Zone.

Liquefaction

Liquefaction is a near-total loss of soil strength due to an increase in pore water pressure during cyclic loading, such as occurs during an earthquake. Loose sands and gravels with 20 percent fines or less that have the potential of being saturated are susceptible to liquefaction. There is no potential for liquefaction at the project site.

As-built Foundation Data

There is no as-built information for the project location.

Foundation Recommendations

The following recommendations are for the proposed earth retaining system at the location known as the Peregrine slide, as indicated on the General Plan sheet dated June 1, 2015.

Slope failure morphology and stability analysis

Peregrine Rock Landslide has been an active slope failure for tens, and perhaps hundreds or thousands of years. The landslide was active when Highway 101 was a two lane road at this location. In 1997-9, Highway 101 was widened to four lanes, with outside paved shoulders and a paved median. Following construction, the landslide movement increased. Several geotechnical studies have examined the configuration of the slope failure and the mechanism of movement. The most pertinent of these studies are attached to this report (Attachment 9). Several slope stabilization concepts were proposed in the last 38 years, but none were developed into engineered designs.

A simplified subsurface model was developed for the site. It was developed in consideration of several sources of information. The actual distribution of soil and rock types is much more chaotic and complex than the subsurface model. However, it is necessary to develop a simplified model to perform the design analyses. The subsurface model utilized the exploratory boreholes which provided an indication of the geo-material and groundwater distributions, as well as slope movement depths as indicated by slope inclinometers and TDR cables. Laboratory triaxial compression testing data was considered. Surficial mapping of landslide features was also an important component in the development of the subsurface model and the subsequent slope stability analyses.

The complexity of the landslide configuration and naturally complex nature of the Franciscan Complex rock and derived soils has resulted in a landslide complex that consists of several

modes of movement. The main slide body exhibits three failure modes: an earth flow and two earth/rock slides. A generalized cross section drawn at approximately the longitudinal axis of the failure mass is provided as Attachment 7.

The following is a brief description of the three failure masses that were analyzed. All other mapped slope failure masses are considered secondary and move only in response to movement of one of the three primary failure modes. The most developed failure mode is an earth flow. The earth flow was analyzed as rotational failure with head scarp approximately 830 feet right of the existing roadway centerline, and with the toe located approximately 30 feet right of the existing roadway centerline. The maximum depth of this failure is approximately 30 feet. This failure mode is responsible for the observed encroachment of landslide debris on the northbound roadway.

The second failure mode has a complex non-circular cross section that originates approximately 1300 feet right of the existing roadway centerline, and terminates approximately at the edge of the paved southbound roadway shoulder. The inclination of the majority of the failure surface is 11 degrees downward toward the west. This failure surface is responsible for the observed uplift of the roadway surface. This slide mass is largely inhibited from pushing into the Russian River by a mass of strong material that underlies the area between the Russian River and the southbound shoulder. This is considered to be a combination of an earth slide and a rock slide. The failure surface is modeled to approximately follow through the zone 3 material, whose properties are shown in Table 10.

The third and least active failure surface originates at the same location as the second failure, and it also has a complex non-circular cross section. It terminates 120 feet left of the existing roadway centerline, in the east bank of the Russian River. This is the maximum limits of the primary landslide mass, and it is moving at a slow rate into the Russian River. At the location of Highway 101, the direction of movement is very close to horizontal. This is also considered to be an earth/rock slide. The upper portion of this failure has a bottom surface that coincides with that of the second failure mode described above (Zone 3 material properties). The distal end of the failure mass, which is beneath the roadway and the flat area between the roadway and the Russian River, is modeled to have the following parameters: phi of 35 degrees, cohesion of 500 psf and moist unit weight of 140 pcf. This is considered a resistant toe block. The sheared and remolded failure surface material designated as Zone 3 in Table 10 is not considered to be present between the toe block and the underlying Zone 4 material.

Slope stability analyses were performed on each of the three failure modes. The results were used to back-calculate material strengths and determine likely groundwater levels that result in activation of each of the failure modes. Limit equilibrium stability analyses were performed using the program Slope/W. Both Spencer and Morgenstern-Price methodologies were used for the limit equilibrium analyses. The back-calculated material strengths are provided in Table 10.

The overall stability of the configuration of the proposed project was also analyzed for static loading conditions. The finished project will include a SPGA retaining with a finished ground in front of the wall at approximately elevation 500 feet. The ground in front of the SPGA retaining

wall will slope gently downward to Highway 101. In addition to the overall stability of the three failure modes described above, the analyses provided a landslide retention force for the design of the SPGA retaining wall. These analyses also utilized the soil and rock parameters found in Table 10.

Table 10: Design analysis soil and rock parameters at SPGA location

Zone No.	Layer boundaries at retaining wall layout line	Material Type assumed for design model	Estimated Engineering Parameters
1a	Original ground to elevation 529	Mixed landslide deposit soils consisting of a predominately clay with sand, gravel and large boulders	ϕ = 23 degrees, c = 0 psf, γ_m = 125 pcf
1b	Elevation 499 to elevation 529	Mixed landslide deposit soils consisting of a predominately clay with sand, gravel and large boulders	ϕ = 23 degrees, c = 0 psf, $\gamma_{buoyant}$ = 68 pcf
2	Elevation 484 to 499	Mixed landslide deposit soils consisting of a predominately clay with sand, gravel and large boulders	ϕ = 28 degrees, c = 200 psf, $\gamma_{buoyant}$ = 73 pcf
3	Elevation 483 to 484	Failure plane – Sheared and remolded mixed landslide deposit soils	ϕ = 12 degrees, c = 100 psf, $\gamma_{buoyant}$ = 68 pcf
4	Below elevation 483	Franciscan Complex Rock consisting of sheared shale with blocks of metagraywacke, serpentinite, sandstone, metasiltstone and chert	ϕ = 35 degrees, c = 500 psf, $\gamma_{buoyant}$ = 78 pcf

Several different ground water profiles were used for design modeling. The critical water level profile for design is considered to be parallel to the existing ground surface at a depth of 7 feet. A typical cross section used for the slope stability analyses is included in Attachment 8.

The strategy detailed in this Foundation Report will stabilize the portion of the Peregrine Rock landslide that lies west and downslope of the proposed SPGA retaining wall. The slope stability safety factor for anticipated groundwater conditions will exceed 1.3 (resistance factor of 0.77). This will eliminate lateral and vertical displacement of the roadbed caused by landslide movement. Continued stability is contingent upon maintaining the approximately level area between the base of the wall and the roadway clear of debris and any stock piled material.

In order to maximize the stabilizing effect of this project on the stability of the portion of the landslide complex behind the soldier pile ground anchor retaining wall, it is necessary to raise the elevation of the ground surface behind the retaining wall, thereby providing an earthen toe buttress to this this portion of the slide mass. It is recommended that the ground surface in the retained zone immediately behind the wall be raised a minimum of 10 feet. Structure Plan Sheets No. 1 through 3 (dated 08/07/2015) indicated that the resulting finished ground surface immediately behind the SPGA retaining wall will be between elevations 537 and 544. The upper surface of the buttress should be approximately horizontal, but graded to promote surface drainage toward the retaining wall and toward the landslide margins. Slope stability analyses have utilized the following assumed parameters for the earthen toe buttress: phi of 26 degrees, cohesion of 200 psf and moist unit weight of 125 pcf.

Slope stability analyses indicated that the portion of the landslide east and above the retaining wall is expected to be stable in years of average and below average rainfall. During years when the rainfall is above normal, slope analyses indicated that the portion of the landslide retained by the SPGA wall, may displace over the top of the retaining wall. The location and configuration of the SPGA wall has been selected to prevent overtopping landslide debris from moving directly onto the traveled way. The need for periodic debris removal has been discussed with the Project Development Team and District 1 Maintenance. It is understood that this is an unavoidable consequence of the size, configuration and geology of the Peregrine Rock landslide.

Landslide retention force

The slope stability analysis for the case where the ground water surface is approximately 7 feet below the existing ground surface and the failure surface indicated on the cross section in Attachments 7 and 8 were used to develop the landslide retention force. A force of approximately 220 kips per foot is required for a soldier pile ground anchor retaining wall located as shown on the General Plan, 140 feet right of the G1 line. This retention force results in a safety factor of 1.3 (resistance factor of 0.77).

Recommended earth pressure diagram and material properties

It is recommended that a trapezoidal apparent earth pressure diagram be used for wall design. Both the Tributary Area Method and the Hinge Method are provided in the AASHTO 2012 LRFD Bridge Design Specifications. Effective strength parameters have been provided for the earth pressure design. However, since the material being retained is not free-draining, it is important that the design consider water pressure generated from the retained material that is anticipated to be saturated below elevation 529 feet.

Ground anchor configuration recommendations

The recommended maximum factored design load (FDL) is 280 kips. A minimum ground anchor inclination of 15 degrees is recommended. The ground anchor minimum unbonded length based on the configuration of the landslide and the location of the earth retention system will vary with ground anchor level and location along the wall length. The following Table provides recommended unbonded anchor lengths between soldier piles 8 and 46. The purpose of varying the unbonded lengths is to increase the volume of foundation material over which the anchor reaction forces are distributed.

Table 11: Recommended ground anchor unbonded lengths

Ground anchor level	Unbonded ground anchor length for locations at odd numbered soldier pile	Unbonded ground anchor length for locations at even numbered soldier pile
Level A	160 feet	190 feet
Level B	170 feet	140 feet
Level C	120 feet	150 feet
Level D	130 feet	100 feet
Level E	80 feet	110 feet
Level F	90 feet	60 feet
Level G	40 feet	70 feet

Lagging or wall face recommendations

At the location of the critical design cross section, RW LOL station 12+18, it is recommended that the bottom of the lagging be placed at approximately elevation 481. The elevation of the bottom of the lagging may rise to elevation 483 at RW LOL stations 10+80 and 13+55 to accommodate site topography. Between the beginning of the SPGA retaining wall and station 10+80, and station 13+55 and the end of wall, the elevation of the bottom of the lagging can be the minimum necessary to achieve sufficient cover.

Pile length recommendations

If pile embedment below the lagging will be used to develop the Resistance Force R, as shown on Figure C11.9.5.1-2 of the Bridge Design Specifications, then an arching factor of 1.0 is applicable to the foundation materials between elevations 499 and the ground surface. An arching factor of 2.5 may be used between elevations 483 and 499. Below elevation 483, an arching factor of 3.0 is recommended.

Pile lengths must be sufficient to resistant the vertical downward component of the ground anchor loads and enhance basal stability of the retention system. It is recommended that the soldier piles between RW LOL station 10+71.5 and RW LOL station 13+65.5 be embedded below the bottom of the lagging a minimum of 70 feet. Between RW LOL stations 10+01.5 and 10+71.5, and between RW LOL 13+65.5 and 14+21.5, the soldier pile lengths below the bottom of the lagging should vary linearly between 70 feet and 30 feet.

Subsurface drainage

Three subsurface drainage elements are recommended: an underdrain at the front toe of the wall, geocomposite drain panels on the retained side of the wall, and horizontal drains installed from the retaining wall face and into the retained zone.

The underdrain in front of the wall (2010 Standard Plans sheet D102, Excavation and Backfill, Outside Subgrade Area detail,) will provide an outlet for any water that moves through the subgrade below the bottom of lagging. Fully encapsulate a two-foot wide layer of Class 3 permeable material (2010 Standard Specifications Section 68-2.02F(4)) in Class A geosynthetic filter fabric (2010 Standard Specifications Section 68-2.02G and Section 88-1.02B). The underdrain should be designed to the lowest flow line possible. The bottom of the underdrain should be at the elevation of the bottom of the lagging, if an outlet can be provided. The top of the underdrain should terminate 2 feet below finished grade and be capped with roadway embankment. Place an 8" diameter perforated plastic pipe (2010 Standard Specifications Section 68-2.02D) 6" above the base of the permeable material to collect and convey water from the permeable material. Outlet the perforated collector pipe with a solid pipe section sloped to drain to an adjacent cross culvert that is outside the lateral limit of the landslide. A minimum gradient of 1% is recommended for the outlet pipe. Underdrain clean-outs should be provided per standard practice.

A back-of-wall drainage system consisting of geocomposite drain panels and a collector system should be installed on the retained earth side of the wall face.

Previous studies have observed artesian groundwater conditions within the landslide mass. To manage piezometric pressures which lower slope stability, horizontal drains should be installed from the retaining wall face and extend perpendicular to the wall face into the retained zone. The horizontal drains should conform to the 2010 Standard Specifications Section 68-3, pp. 772-4, for the materials, construction and payment. Construct one level of horizontal drains. It is recommended that the horizontal drains exit the wall face at a point approximately 2 feet above the adjacent finished grade. They should be located midway between every other soldier pile, a distance of 14 feet. This applies to portion of the wall between soldier piles 11 through 52. The horizontal drains should be inclined upward from the wall face at a grade of 10%, and be 250 feet long. The horizontal drains should project through the retaining wall and connect to a collector system located within a toe berm constructed at the front toe of the retaining wall. The berm should bury both the collector pipe and the horizontal drain outlets to a minimum depth of approximately 1 foot. The solid wall collector pipe should connect to an outlet pipe which will drain to an adjacent cross culvert that is outside the lateral limit of the landslide. A minimum gradient of 1% is recommended for the outlet pipe. Clean-out connections should be provided for the horizontal drains and the collector pipe.

Surface drainage

Grade the slope immediately behind the wall to prevent ponding and promote surface drainage toward the landslide margins. The finished ground in front of the SPGA retaining wall should be graded to drain away from the retaining wall and to prevent ponding.

Notes to Designer

It is recommended that a minimum of twenty five percent of the performance tested ground anchors be located in Level A, and a minimum of twenty percent of the performance tested ground anchors should be located in Level B. The tested ground anchors should be distributed at approximately even intervals between RW LOL stations 10+80 and 13+50. The remaining performance tested ground anchors should be randomly distributed at locations determined by the Engineer.

Construction Considerations

General construction considerations

1. Retaining wall construction between December 1st and May 1st is not advisable. The ground conditions become wet and saturated from rainfall and ground water movement. Slope movement is reactivated in the rainy season when the ground water level and the soil/rock moisture content rises. The shear strength of the material that comprises the landslide mass decreases and the slope become less stable.

2. It is recommended that the plans and specifications require that the SPGA retaining wall be constructed in a top-down manner. Removing the toe of the landslide from existing ground to proposed finished grade in one stage is strongly cautioned against. Lagging should be installed between the soldier piles as soon as the excavation configuration permits. Ground anchors should also be installed as soon as the excavation process allows. Ground anchors should be grouted immediately after the ground anchor borehole is completed.

3. It is recommended that construction be sequenced such that concrete has "set" in immediately adjacent soldier pile excavations, prior to beginning excavation of the neighboring soldier pile. This is intended to minimize ground disturbance and cross flow of concrete between adjacent soldier piles.

4. It is recommended that construction be sequenced such that the grout has "set" in immediately adjacent ground anchor excavations, prior to beginning excavation of the neighboring ground anchors. This is intended to minimize the cross flow of grout between adjacent ground anchors.

Rock Cores

1. Rock core samples from the 2011 through 2014 subsurface investigations are available for bidder viewing at the California Department of Transportation, Translab, 5900 Folsom Blvd., Sacramento, CA. Caltrans Standard Specifications 2-1.06B, Supplemental Project Information, describes the core view request process. It is highly recommended that the Contractor inspect/observe the core samples before bidding.

2. During the 2011-2014 subsurface investigation, rock and soil samples were collected from several borings. Samples were submitted to the Caltrans Transportation laboratory for testing. Laboratory test data is provided in Attachments 1-4 of this report.

3. Based on observations made during the field exploration program, ground water may be encountered in any subsurface excavations.

Foundation Construction

1. Eight auger borings were advanced through the mass of the landslide in September and October of 1998. The records for five of the boreholes indicate "material flowing freely from hole" or "liquid bubbled up out of hole". This is interpreted to indicate artesian ground water conditions. The borehole field logs, borehole locations and the results of pump tests are provided in Attachment 10.

   Groundwater was encountered during the 2011 through 2014 subsurface investigations. It is expected that groundwater will be encountered during the construction of the soldier piles, ground anchors and placement of the lagging. Groundwater surface elevation is subject to seasonal fluctuations and may occur at a higher or lower elevation than indicated on the Log of Test Borings (LOTB) sheets and this report. As can be seen from the groundwater observations presented here, groundwater distribution is chaotic and difficult to predict. The groundwater distribution is influenced by the complex geology, the presence of rock fractures and shears, and landslide shear planes related to the extensive slope movement. Measures to control groundwater inflows are normal construction considerations and it is expected that the contractor will use his expertise to employ the appropriate groundwater control measure. Measures to provide a firm and safe subgrade for construction activities may require common enhancement measures such as placement of geosynthetic layers and imported granular soils.

2. Due to the mélange nature of the Franciscan Complex rock and soils developed from the weathering and displacement of the Franciscan Complex rock, the contractor should anticipate foundation conditions that: 1) do not match the vertical distribution shown in any of the boreholes, 2) vary significantly from foundation location to foundation location, and 3) vary significantly in the vertical sequence at each foundation location. The data from the boreholes indicates that the variability will include the rock and soil type distribution, degree of rock weathering, degree of rock fracturing, degree of rock shearing, rock

hardness and soil strength. This variability also extends to the distribution of groundwater and the hydraulic conductivity of the rock and soil.

3. Caving of the foundation materials into the soldier pile and ground anchor excavations is a possibility due to the presence of soil, the presence of very soft rock, moderately weathered rock, highly sheared and very intensely fractured rock, and groundwater. The contractor is expected to use his expertise to determine the appropriate construction techniques to construct the soldier piles and ground anchors.

4. The soldier piles and ground anchors will be installed through an earth mass that has undergone a great deal of disturbance due to landslide movement. Open fractures produced by ground movement may be intercepted by the bored holes, and provide avenues for air, fluid and grout loss. Controlling measures such as the use of casings and "grout socks" may be necessary.

Project Information

Standard Specifications Section 2-1.06B, "Supplemental Project Information," indicates that the special provisions will make supplemental project information to bidders. 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 include:

A. None

Data and Information included in the Information Handout include:

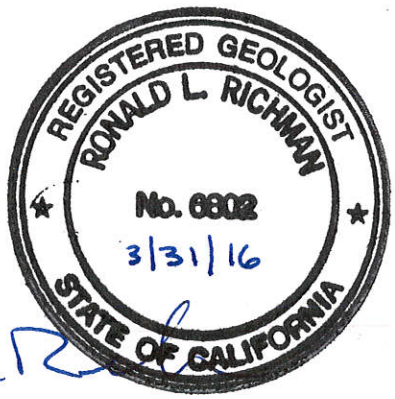
A. Foundation Report (Peregrine Slide SPGA retaining wall, ERS No. 10E0036), Dated August 20, 2015.

Information available for viewing at the Caltrans Transportation Laboratory:

A. Soil and rock core samples from the 2011 through 2014 subsurface investigations.

The Foundation Recommendations included in this Foundation Report are based on specific project information regarding structure type and structure location that has been provided by the Office of Bridge Design North & Central. If you have any questions or comments, please contact Ron Richman (805) 549-3385.

Report by:



RON RICHMAN, P.E., No. 039869; P.G. 6802
Senior Materials & Research Engineer
Office of Geotechnical Design-North

c: Job File / Branch D Records
Traci Menard

LIST OF ATTACHMENTS

ATTACHMENT 1

MATERIAL PROPERTIES SUMMARY

Peregrine Rock SPGA Retaining Wall

MEN-101-5.16

DESCRIPTION	BORING	RC-11-001						
	STATION	335+05						
	LINE	"G1" Line						
	DISTANCE FROM LINE (Rt. or Lt.)	24.7 feet right						
	DATE SAMPLED	6/21/2011						
	SAMPLE ID	1	2	3	4	5a	5b	5c
	DEPTH OR ELEVATION (FEET)	27.0	48.5	59.0	64.5	78.5	79.0	79.5
	USCS CLASSIFICATION							
PARTICLE SIZE ANALYSIS	50 mm (2")							
	38 mm (1 1/2")							
	25 mm (1")							
	19 mm (3/4")							100
	12 mm (1/2")							98
	9.5 mm (3/8")	100		100	100			92
	4.75 mm (No. 4)	99	100	94	98			73
	2.36 mm (No. 8)	95	90	86	95			67
	1.18 mm (No. 16)	87	87	79	89			47
	600 μm (No. 30)	77	83	73	83			39
	300 μm (N0. 50)	67	78	67	77			35
	150 μm (No. 100)	57	69	62	72			33
	75 μm (N0. 200)	52	60	59	68			32
	5 μm	25	4	33	35			17
	1μm	11	3	16	15			10
PI	LIQUID LIMIT	33	87	30	30			62
	PLASTICITY INDEX	17	69	12	12			35
CORROSION	RESISTIVITY (ohm-cm)	1229		893				
	pH	9.11		8.58				
	CHLORIDES (ppm)			29				
	SULFATES (ppm)			245				
DRY DENSITY (pcf)		124.2	107.8	124.9	127.3			
MOISTURE CONTENT		10.0	16.5	10.8	10.5	14.6	17.1	16.6
UNCONFINED COMPRESSIVE STRENGTH (psi)								

MATERIAL PROPERTIES SUMMARY

Peregrine Rock SPGA Retaining Wall

MEN-101-5.16

DESCRIPTION	BORING	RC-11-002					RC-11-003		
	STATION	335+09					335+55		
	LINE	"G1" Line					"G1" Line		
	DISTANCE FROM LINE (Rt. or Lt.)	458.5 feet right					198.7 feet right		
	DATE SAMPLED	7/14/2011					7/19/2011		
	SAMPLE ID	6a	6b	6c	7	8	9	10	11
	DEPTH OR ELEVATION (FEET)	8.0	8.5	9.0	25.0	39.0	9.5	38.5	49.5
	USCS CLASSIFICATION								
PARTICLE SIZE ANALYSIS	50 mm (2")								
	38 mm (1 1/2")								
	25 mm (1")							100	
	19 mm (3/4")							95	100
	12 mm (1/2")			100				86	97
	9.5 mm (3/8")			98	100	100	100	70	93
	4.75 mm (No. 4)			77	99	99	99	46	66
	2.36 mm (No. 8)			72	94	93	96	31	40
	1.18 mm (No. 16)			66	88	88	94	28	39
	600 μm (No. 30)			60	78	84	90	26	37
	300 μm (N0. 50)			56	65	80	84	24	36
	150 μm (No. 100)			51	51	76	77	22	34
	75 μm (N0. 200)			45	39	69	70	19	32
	5 μm			28	14	33	32	12	23
	1μm			18	5	12	13	5	11
PI	LIQUID LIMIT			44	33	35	31	29	28
	PLASTICITY INDEX			21	11	17	12	11	12
CORROSION	RESISTIVITY (ohm-cm)								
	pH						1669		
	CHLORIDES (ppm)						8.1		
	SULFATES (ppm)								
DRY DENSITY (pcf)					112.2	125.5	103.9	121.4	129.8
MOISTURE CONTENT		26.8	12.0	29.5	17.9	13.0	19.1	10.1	10.2
UNCONFINED COMPRESSIVE STRENGTH (psi)									

MATERIAL PROPERTIES SUMMARY

Peregrine Rock SPGA Retaining Wall

MEN-101-5.16

DESCRIPTION	BORING	RC-11-003			RC-11-004	RC-14-001		
	STATION	335+55			335+20	336+47		
	LINE	"G1" Line			"G1" Line	"G1" Line		
	DISTANCE FROM LINE (Rt. or Lt.)	198.7 feet right			530.0 feet right	271.7 feet right		
	DATE SAMPLED	7/19/2011			7/27/2011	7/30/2014		
	SAMPLE ID	12	13	14	15	C707193	C707194	C707195
	DEPTH OR ELEVATION (FEET)	49.5	57.5	64	97.5	20.0-22.0	35.0-37.0	63.0-64.5
	USCS CLASSIFICATION							
PARTICLE SIZE ANALYSIS	50 mm (2")							
	38 mm (1 1/2")							
	25 mm (1")	100						
	19 mm (3/4")	96			100			
	12 mm (1/2")	95			99			
	9.5 mm (3/8")	94	100	100	90	100	100	100
	4.75 mm (No. 4)	83	96	99	71	82	88	94
	2.36 mm (No. 8)	73	79	86	53	70	80	93
	1.18 mm (No. 16)	65	72	79	49	60	74	87
	600 μm (No. 30)	57	66	72	46	54	70	67
	300 μm (N0. 50)	50	61	65	43	48	66	49
	150 μm (No. 100)	45	58	59	41	42	62	34
	75 μm (N0. 200)	41	56	55	37	36	58	30
	5 μm	30	40	38	28	19	36	14
	1μm	13	20	17	16	12	21	8
PI	LIQUID LIMIT	32	31	30	25	21	32	31
	PLASTICITY INDEX	14	13	14	11	9	18	16
CORROSION	RESISTIVITY (ohm-cm)			810	811	1184	821	733
	pH			9.08	9.29	8.63	8.64	9.18
	CHLORIDES (ppm)			4	3	1	2	12
	SULFATES (ppm)			169	213	508	452	517
DRY DENSITY (pcf)		132.4	124.4	126.5	124.4			
MOISTURE CONTENT		9.6	10.5	10.2	10.0			
UNCONFINED COMPRESSIVE STRENGTH (psi)								

MATERIAL PROPERTIES SUMMARY

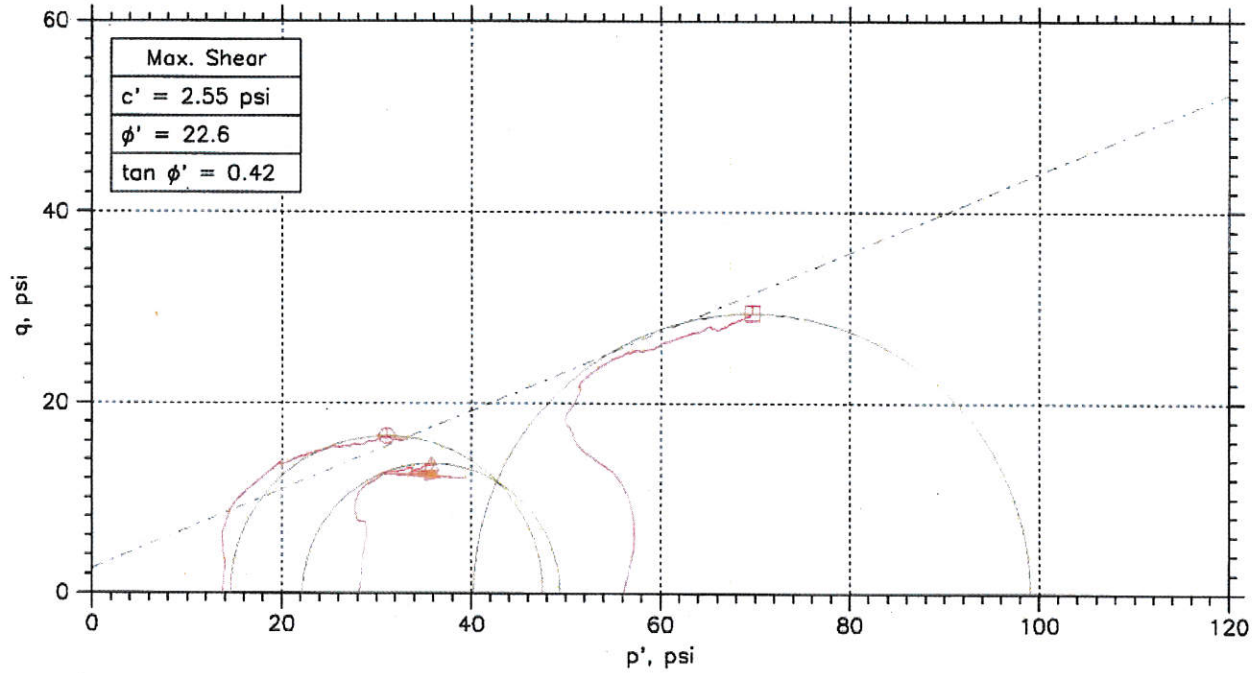
Peregrine Rock SPGA Retaining Wall

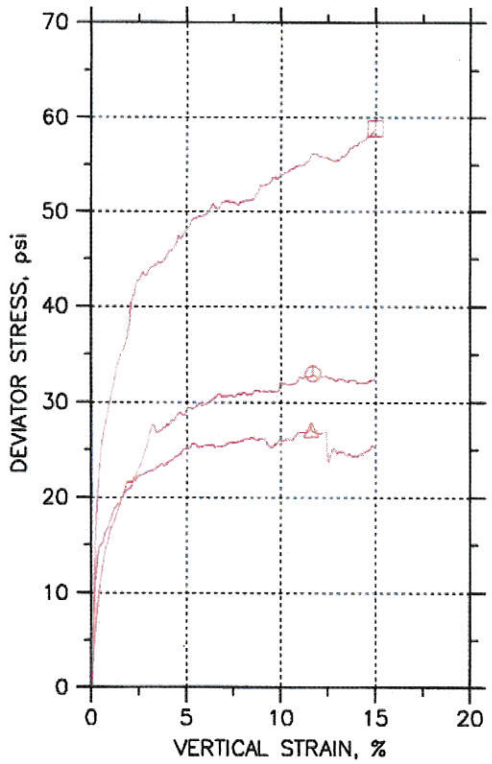
MEN-101-5.16

DESCRIPTION	BORING	RC-14-002			RC-14-004		RC-14-005	
	STATION	334+91			335+83		334+44	
	LINE	"G1" Line			"G1" Line		"G1" Line	
	DISTANCE FROM LINE (Rt. or Lt.)	256.5 feet right			185.5 feet right		149.1 feet right	
	DATE SAMPLED	8/5/2014			7/30/2014		9/3/2014	
	SAMPLE ID	C707196	C707197	C707198	C707191	C707192	C707189	C707190
	DEPTH OR ELEVATION (FEET)	39.6-40.6	58.0-59.0	68.0-69.0	19.5-21.5	49.0-50.25	40.0-42.0	60.0-62.0
	USCS CLASSIFICATION							
PARTICLE SIZE ANALYSIS	50 mm (2")				100	100	100	100
	38 mm (1 1/2")				100	100	100	100
	25 mm (1")				100	100	100	100
	19 mm (3/4")				100	100	100	100
	12 mm (1/2")				100	100	100	100
	9.5 mm (3/8")		100	100	100	100	100	100
	4.75 mm (No. 4)		84	82	93	92	94	96
	2.36 mm (No. 8)		77	73	87	81	91	85
	1.18 mm (No. 16)		70	64				
	600 μm (No. 30)		64	58				
	300 μm (N0. 50)		59	51				
	150 μm (No. 100)		54	46				
	75 μm (N0. 200)		50	41				
	5 μm		29	21				
	1μm		5	12				
PI	LIQUID LIMIT		29	23				
	PLASTICITY INDEX		15	10				
CORROSION	RESISTIVITY (ohm-cm)		1124	1177	701	846	2831	664
	pH		8.83	9.15	8.97	9.37	8.86	8.66
	CHLORIDES (ppm)			5	0	2		1
	SULFATES (ppm)			250	641	287		693
DRY DENSITY (pcf)								
MOISTURE CONTENT								
UNCONFINED COMPRESSIVE STRENGTH (psi)		608						

ATTACHMENT 2

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767





Symbol		⊙	△	□	
Sample No.		05-a	05-b	05-c	
Test No.		C11-004A	C11-004B	C11-004C	
Depth		78.5	79.5	79.5	
Initial	Diameter, in	2.39	2.5	2.54	
	Height, in	5	5.18	5.14	
	Water Content, %	14.9	17.1	16.4	
	Dry Density, pcf	119.3	114.3	113.3	
	Saturation, %	93.0	93.6	87.3	
	Void Ratio	0.439	0.501	0.515	
Before Shear	Water Content, %	18.2	17.1	18.4	
	Dry Density, pcf	114.4	116.9	114.	
	Saturation*, %	100.0	100.0	100.0	
	Void Ratio	0.5	0.468	0.507	
	Back Press., psi	102.	104.4	101.4	
Ver. Eff. Cons. Stress, psi		13.87	25.55	56.12	
Shear Strength, psi		16.5	13.57	29.4	
Strain at Failure, %		11.7	11.6	15	
Strain Rate, %/min		0.1	0.1	0.1	
B-Value		0.95	0.95	0.96	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		---	---	---	
Plastic Limit		---	---	---	

Caltrans

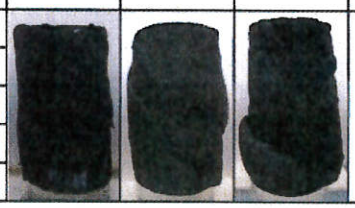
Project: Lover's Leap Slide

Location: 01-MEN-101-5

Project No.: 01-0A8703

Boring No.: R-11-001

Sample Type: TUBE



Description: Moist, Very Stiff, Grey, Clayey Silt with Large Gravel. Patched.

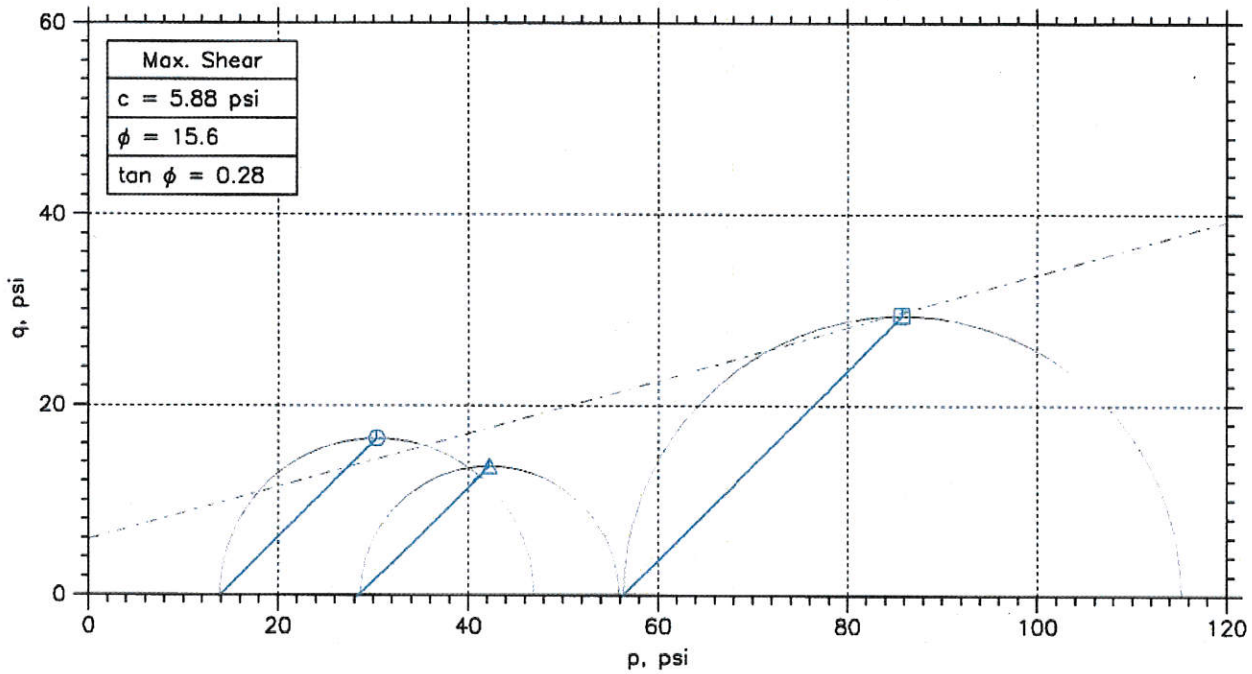
Remarks: GL NO. 11-090. Sample description is not a soil classification. B & C chamber leaked.

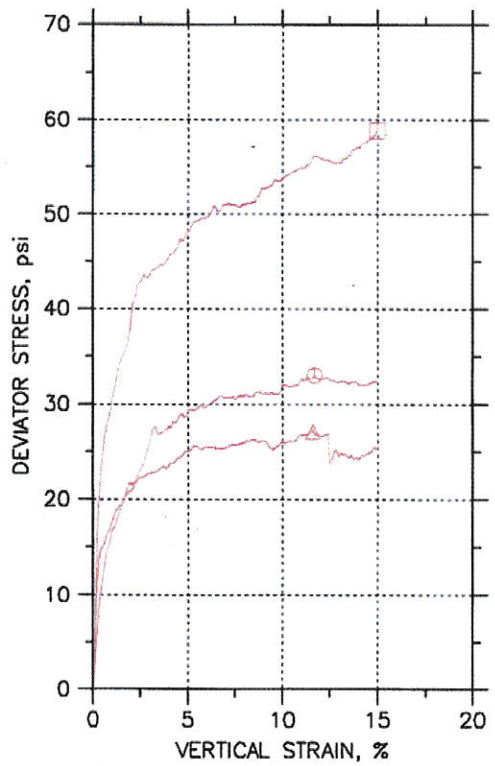
Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

4/25/11

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767





Symbol		⏲	△	⏍	
Sample No.		05-a	05-b	05-c	
Test No.		C11-004A	C11-004B	C11-004C	
Depth		78.5	79.5	79.5	
Initial	Diameter, in	2.39	2.5	2.54	
	Height, in	5	5.18	5.14	
	Water Content, %	14.9	17.1	16.4	
	Dry Density, pcf	119.3	114.3	113.3	
	Saturation, %	93.0	93.6	87.3	
	Void Ratio	0.439	0.501	0.515	
Before Shear	Water Content, %	18.2	17.1	18.4	
	Dry Density, pcf	114.4	116.9	114.	
	Saturation*, %	100.0	100.0	100.0	
	Void Ratio	0.5	0.468	0.507	
	Back Press., psi	102.	104.4	101.4	
Ver. Eff. Cons. Stress, psi		13.87	25.55	56.12	
Shear Strength, psi		16.5	13.57	29.4	
Strain at Failure, %		11.7	11.6	15	
Strain Rate, %/min		0.1	0.1	0.1	
B-Value		0.95	0.95	0.96	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		---	---	---	
Plastic Limit		---	---	---	

Caltrans

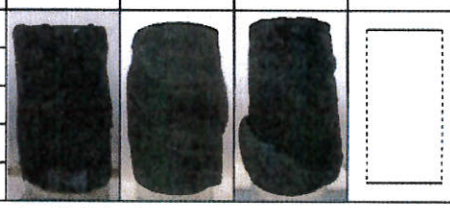
Project: Lover's Leap Slide

Location: 01-MEN-101-5

Project No.: 01-0A8703

Boring No.: R-11-001

Sample Type: TUBE



Description: Moist, Very Stiff, Grey, Clayey Silt with Large Gravel. Patched.

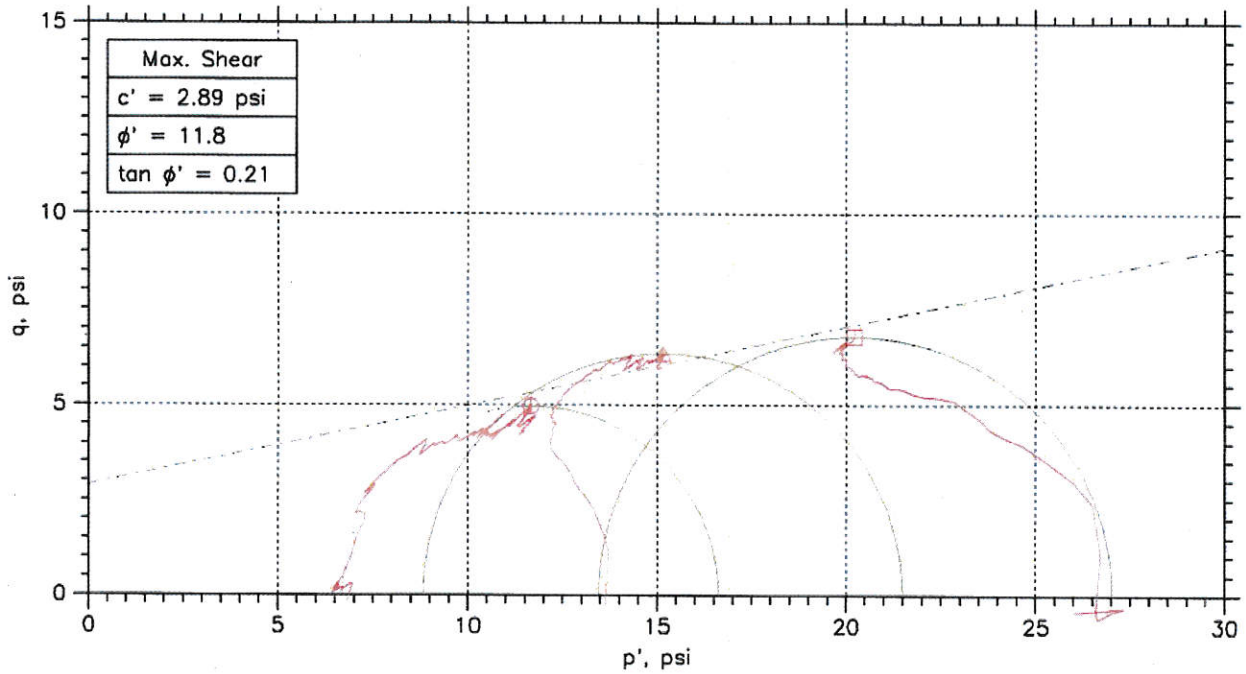
Remarks: GL NO. 11-090. Sample description is not a soil classification. B & C chamber leaked.

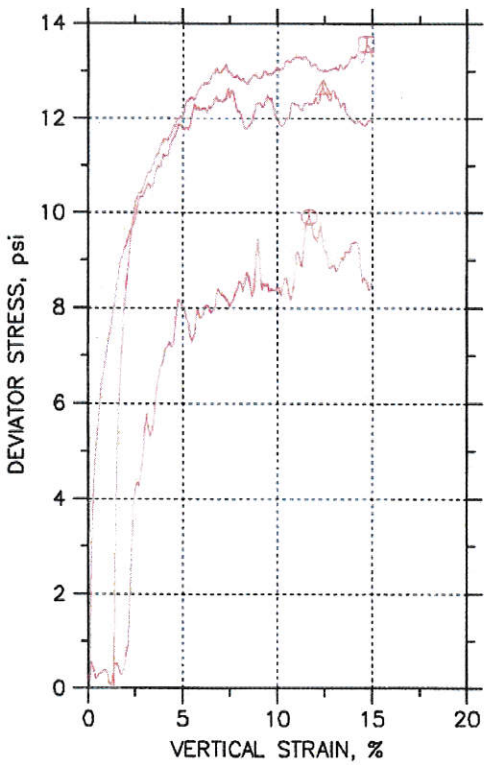
Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

11/25/11

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767





Symbol		⊙	△	⊡	
Sample No.		07	06-b	06-c	
Test No.		C11-005A	C11-005B	C11-005C	
Depth			79	79.5	
Initial	Diameter, in	2.45	2.46	2.52	
	Height, in	5.89	5.12	5.12	
	Water Content, %	24.3	28.1	28.8	
	Dry Density, pcf	111.1	97.58	94.92	
	Saturation, %	100.0	100.0	98.0	
	Void Ratio	0.545	0.759	0.809	
Before Shear	Water Content, %	25.6	27.6	24.0	
	Dry Density, pcf	100.7	97.53	103.5	
	Saturation*, %	100.0	100.0	100.0	
	Void Ratio	0.704	0.76	0.659	
	Back Press., psi	102.	82.01	81.92	
Ver. Eff. Cons. Stress, psi		6.938	13.88	27.84	
Shear Strength, psi		4.953	6.334	6.779	
Strain at Failure, %		11.7	12.4	14.7	
Strain Rate, %/min		0.05	0.05	0.05	
B-Value		0.96	0.95	0.96	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		---	---	---	
Plastic Limit		---	---	---	

Caltrans

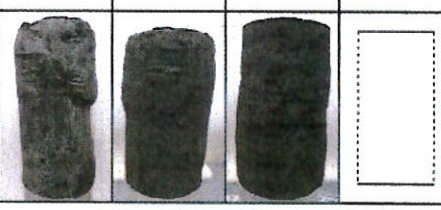
Project: Lover's Leap Slide

Location: 01-MEN-101-5

Project No.: 01-0A8703

Boring No.: R-11-002

Sample Type: TUBE



Description: A: Firm, Green/Grey, Silt/Clay. B-C: Very Stiff, Grey-Brown, Clay/Silt w/Gravel. Patched.

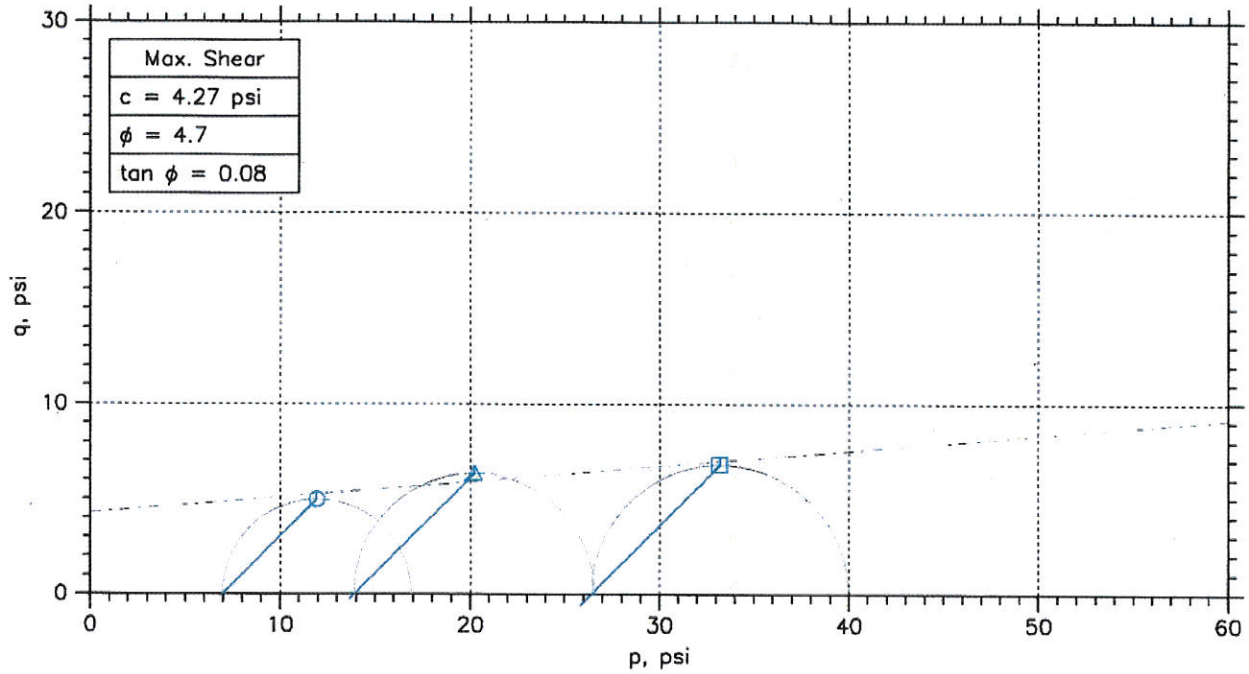
Remarks: GL NO. 11-090. Sample description is not a soil classification. Specimen B chamber leak.

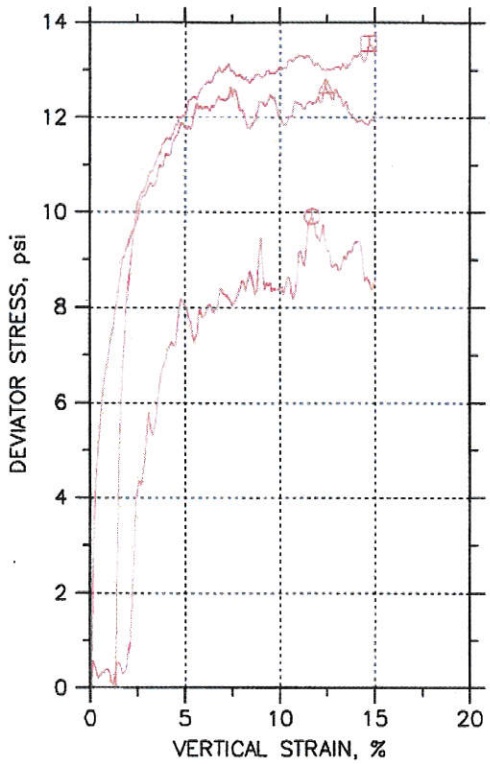
Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

11/15/11

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767





Symbol		⏀	△	⏍	
Sample No.		07	06-b	06-c	
Test No.		C11-005A	C11-005B	C11-005C	
Depth			79	79.5	
Initial	Diameter, in	2.45	2.46	2.52	
	Height, in	5.89	5.12	5.12	
	Water Content, %	24.3	28.1	28.8	
	Dry Density, pcf	111.1	97.58	94.92	
	Saturation, %	100.0	100.0	98.0	
	Void Ratio	0.545	0.759	0.809	
Before Shear	Water Content, %	25.6	27.6	24.0	
	Dry Density, pcf	100.7	97.53	103.5	
	Saturation*, %	100.0	100.0	100.0	
	Void Ratio	0.704	0.76	0.659	
	Back Press., psi	102.	82.01	81.92	
Ver. Eff. Cons. Stress, psi		6.938	13.88	27.84	
Shear Strength, psi		4.953	6.334	6.779	
Strain at Failure, %		11.7	12.4	14.7	
Strain Rate, %/min		0.05	0.05	0.05	
B-Value		0.96	0.95	0.96	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		---	---	---	
Plastic Limit		---	---	---	

Caltrans

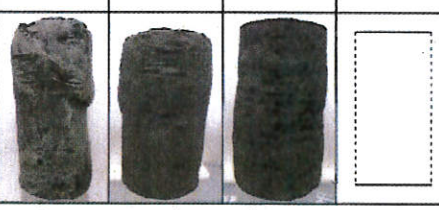
Project: Lover's Leap Slide

Location: 01-MEN-101-5

Project No.: 01-0A8703

Boring No.: R-11-002

Sample Type: TUBE



Description: A: Firm, Green/Grey, Silt/Clay. B-C: Very Stiff, Grey-Brown, Clay/Silt w/Gravel. Patched.

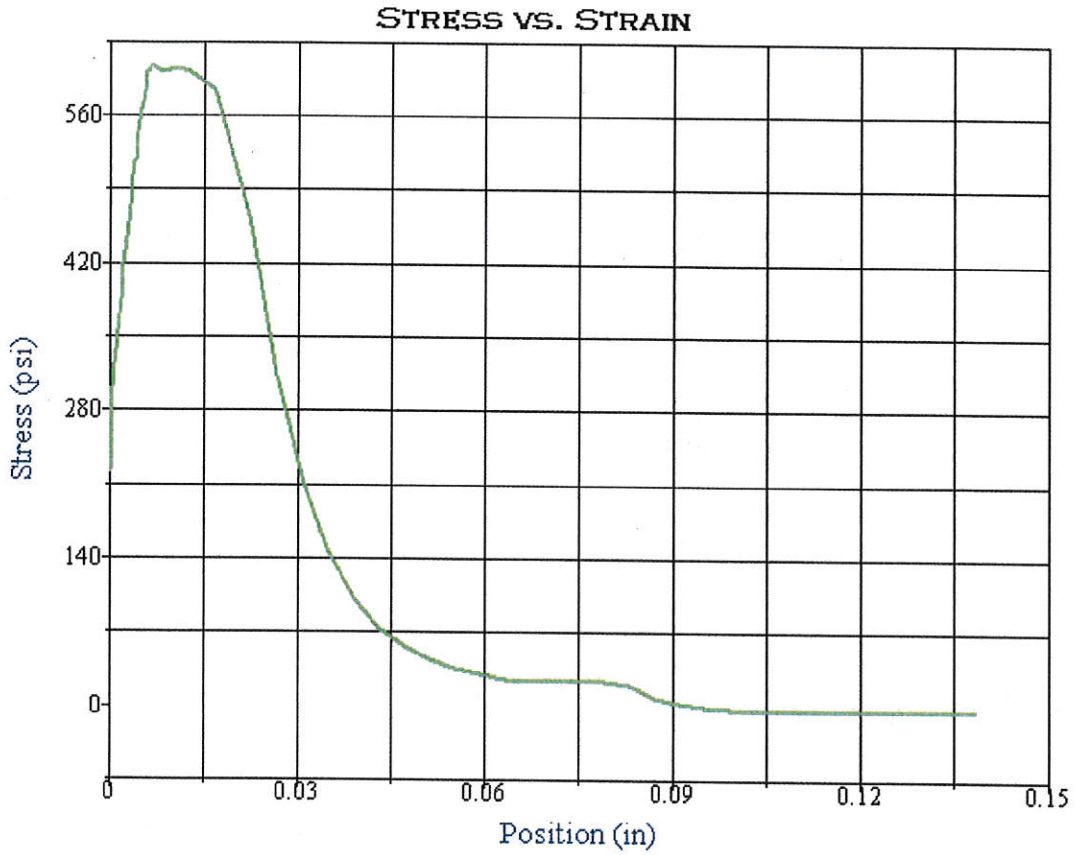
Remarks: GL NO. 11-090. Sample description is not a soil classification. Specimen B chamber leak.

Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

12/13/11

ATTACHMENT 3



Test Summary

Counter:	0
Elapsed Time:	00:00:12
Operator:	AZM
Sample:	RC-14-002-39.6-40.6
Ticket:	GL# 14-060
E.A. NUMBER:	01-0B5001
Procedure Name:	ASTM D7012 Method C
Start Date:	11/13/2014
Start Time:	2:57:44 PM
End Date:	11/13/2014
End Time:	2:57:56 PM
Workstation:	D1K00YB1
Tested By:	AZM
Lab:	Q14-315

Test Results

Specimen Gage Length:	5.5700 in
Diameter:	2.4100 in
Area:	4.5617 in²
Maximum Load:	2775 lbf
Compressive Strength:	608 psi

Remark: Metamorphosed Sandstone, Dark green partially serpentinized fine to coarse grained calcite veins (totally healed fractures).

ATTACHMENT 4

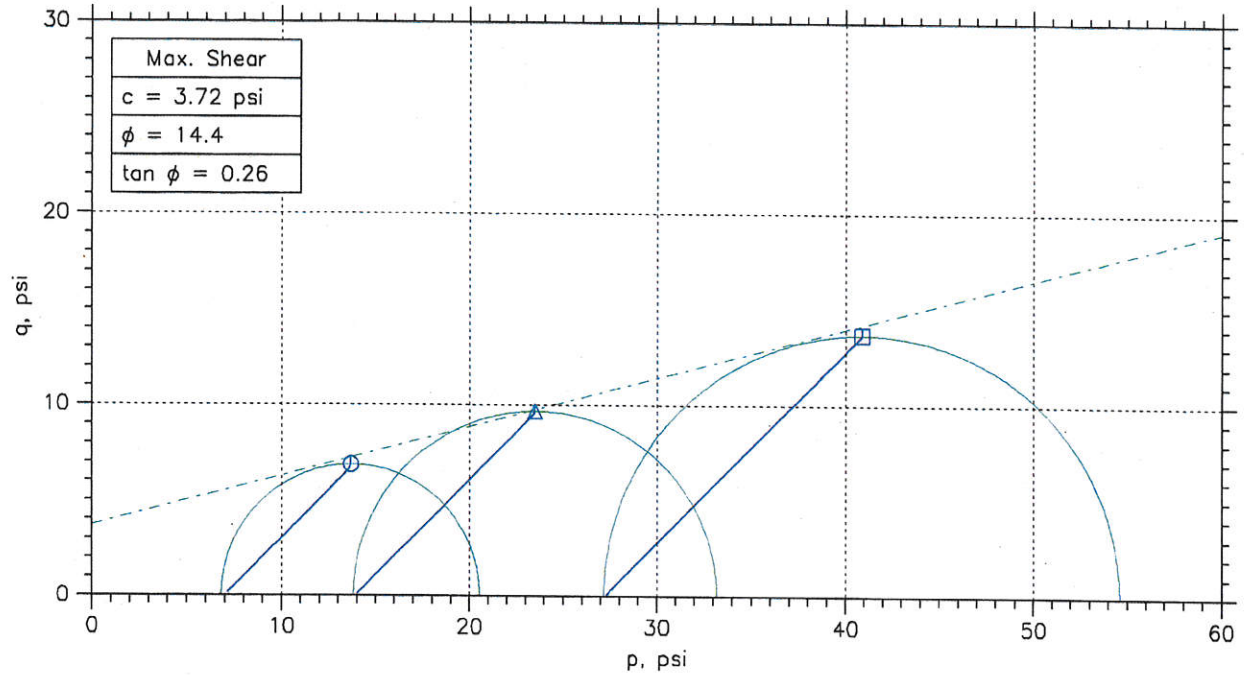
CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

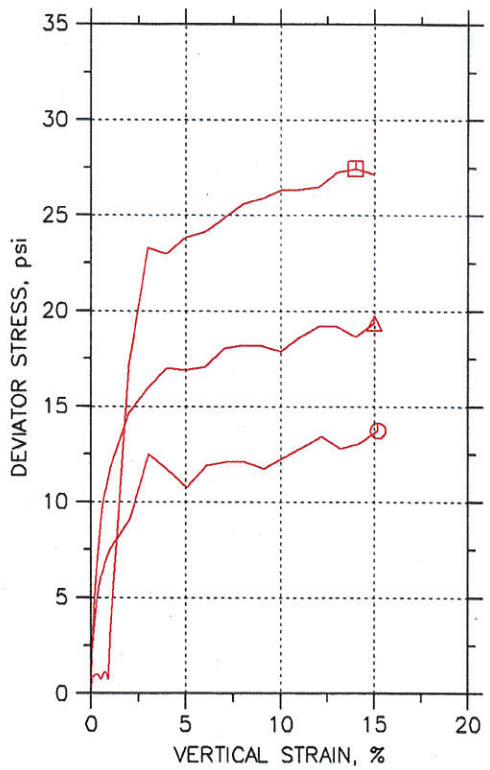
GL TRACKING NO : 12-089
Dist - EA: 01-0B5001
Report Date: December 14, 2012
Page: 1/1

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
335+_90				100	99	98	96	94	88	80	72	66	60	54	48	22	10	32	14			
335+_90-1																						
335+_90-2																						
335+_90-3																						
335+_90B																		33	14			
335+_90B-1																						
335+_90B-2																						
335+_90B-3																						

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767





Symbol		⊙	△	□	
Sample No.		90-1	90-2	90-3	
Test No.		C13-01A	C13-01B	C13-01C	
Depth					
Initial	Diameter, in	2.8	2.8	2.8	
	Height, in	6	6	6.08	
	Water Content, %	7.9	8.0	8.0	
	Dry Density, pcf	119.5	119.3	117.8	
	Saturation, %	49.8	50.4	48.0	
	Void Ratio	0.437	0.439	0.457	
Before Shear	Water Content, %	17.6	16.1	16.0	
	Dry Density, pcf	115.7	118.9	119.3	
	Saturation*, %	100.0	100.0	100.0	
	Void Ratio	0.484	0.444	0.439	
	Back Press., psi	103.	103.	97.4	
Ver. Eff. Cons. Stress, psi		6.947	13.88	28.35	
Shear Strength, psi		6.871	9.687	13.72	
Strain at Failure, %		15.2	15	14	
Strain Rate, %/min		0.1	0.1	0.1	
B-Value		0.95	0.95	0.95	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		---	---	---	
Plastic Limit		---	---	---	

Project: Lovers Leap Landslide

Location: 01-MEN-101-5.22-

Project No.: 01-0B5001

Boring No.: 335+

Sample Type: REMOLD

Description: Lightly Moist, Stiff, Dark Gray, Clayey Silt with Gravel and Few Organics

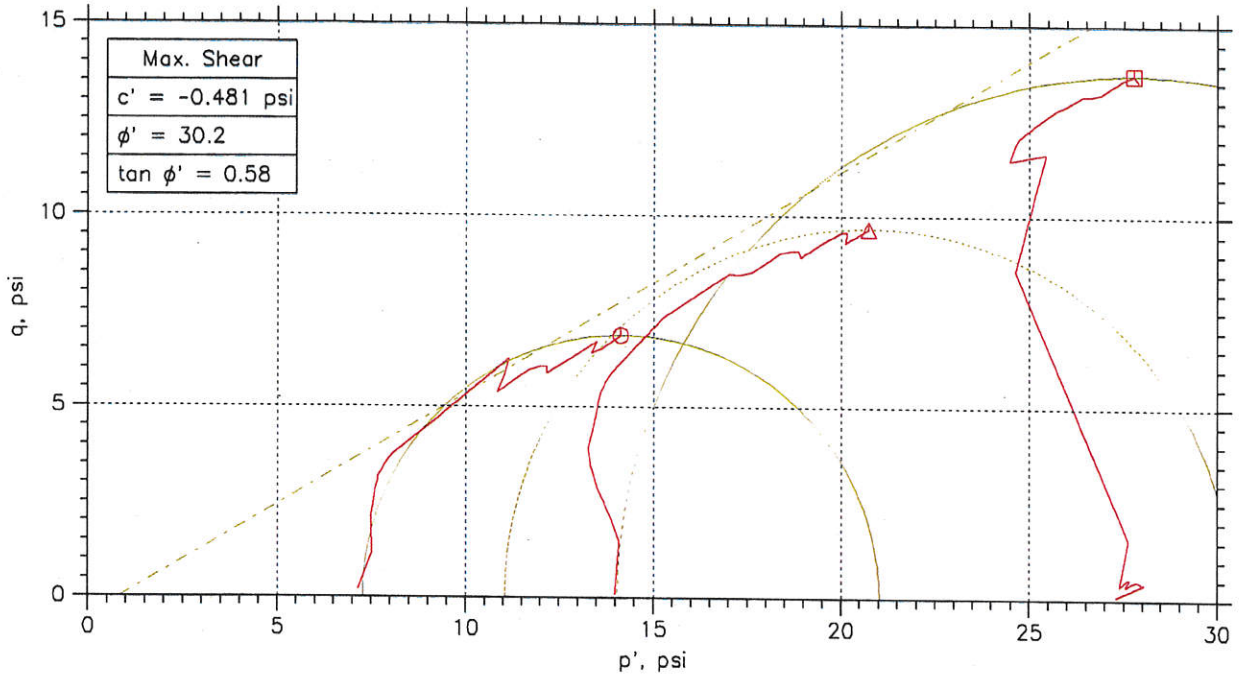
Remarks: GL NO. 12-089

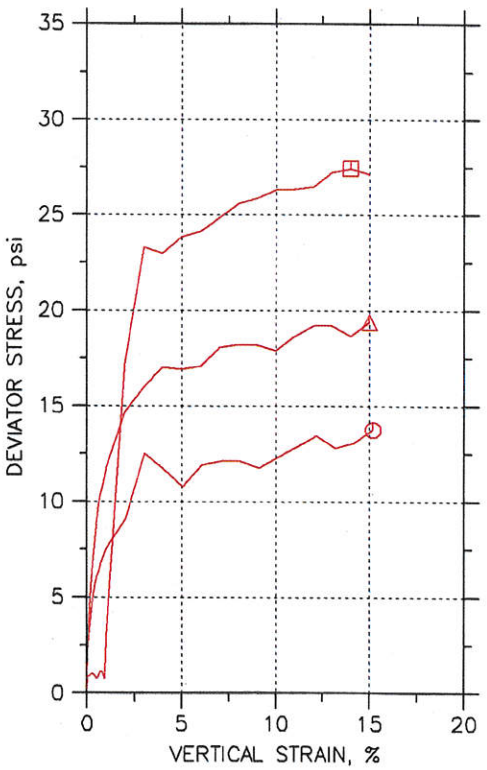
2/11/13

Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767





Symbol		⊙	△	⊡	
Sample No.		90-1	90-2	90-3	
Test No.		C13-01A	C13-01B	C13-01C	
Depth					
Initial	Diameter, in	2.8	2.8	2.8	
	Height, in	6	6	6.08	
	Water Content, %	7.9	8.0	8.0	
	Dry Density, pcf	119.5	119.3	117.8	
	Saturation, %	49.8	50.4	48.0	
	Void Ratio	0.437	0.439	0.457	
Before Shear	Water Content, %	17.6	16.1	16.0	
	Dry Density, pcf	115.7	118.9	119.3	
	Saturation*, %	100.0	100.0	100.0	
	Void Ratio	0.484	0.444	0.439	
	Back Press., psi	103.	103.	97.4	
Ver. Eff. Cons. Stress, psi		6.947	13.88	28.35	
Shear Strength, psi		6.871	9.687	13.72	
Strain at Failure, %		15.2	15	14	
Strain Rate, %/min		0.1	0.1	0.1	
B-Value		0.95	0.95	0.95	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		---	---	---	
Plastic Limit		---	---	---	

Caltrans

Project: Lovers Leap Landslide

Location: 01-MEN-101-5.22-

Project No.: 01-0B5001

Boring No.: 335+

Sample Type: REMOLD

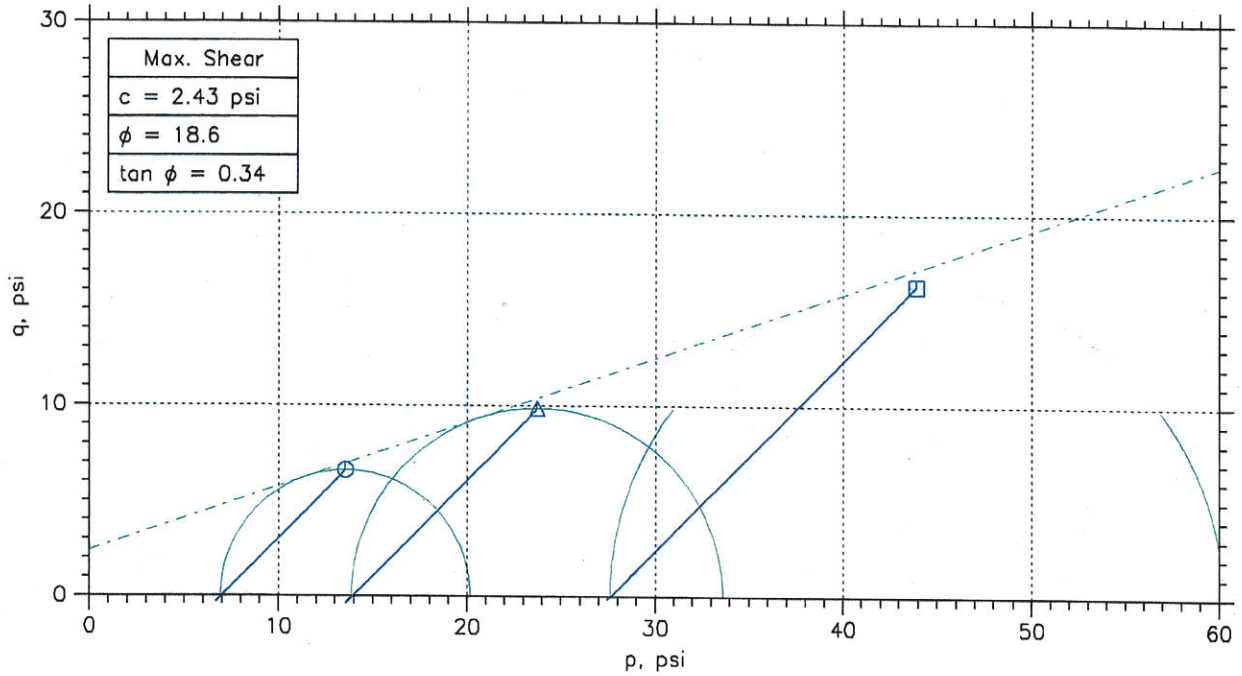
Description: Lightly Moist, Stiff, Dark Gray, Clayey Silt with Gravel and Few Organics

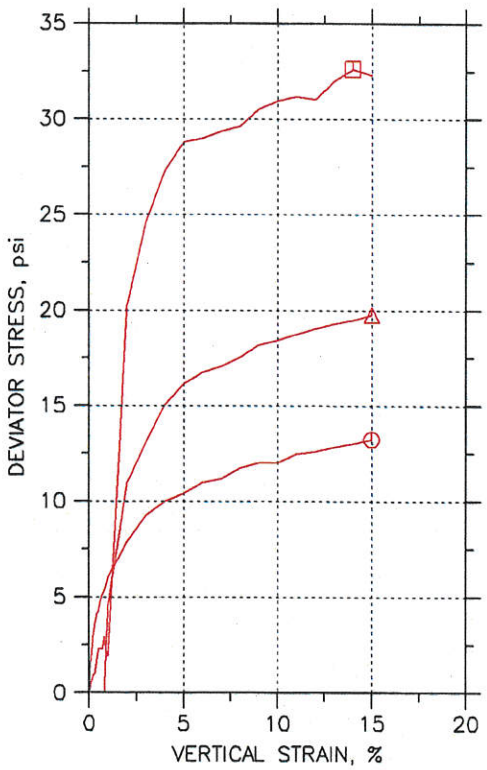
Remarks: GL NO. 12-089

Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

CONSOLIDATED UNDRAINED TRIAXIAL TEST





Symbol		⏲	△	⊡	
Sample No.		90B-1	90B-2	90B-3	
Test No.		C13-02A	C13-02B	C13-02C	
Depth					
Initial	Diameter, in	2.8	2.8	2.8	
	Height, in	6	6	6	
	Water Content, %	12.8	13.1	13.2	
	Dry Density, pcf	119.7	119.3	119.4	
	Saturation, %	80.7	82.3	82.7	
	Void Ratio	0.435	0.439	0.437	
Before Shear	Water Content, %	19.5	18.0	19.0	
	Dry Density, pcf	111.8	114.9	112.7	
	Saturation*, %	100.0	100.0	100.0	
	Void Ratio	0.535	0.494	0.523	
	Back Press., psi	103.	103.	102.5	
Ver. Eff. Cons. Stress, psi		6.946	13.89	28.41	
Shear Strength, psi		6.618	9.878	16.31	
Strain at Failure, %		15	15	14	
Strain Rate, %/min		0.1	0.1	0.1	
B-Value		0.95	0.95	0.95	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		---	---	---	
Plastic Limit		---	---	---	

Caltrans

Project: Lovers Leap Landslide

Location: 01-MEN-101-5.22-

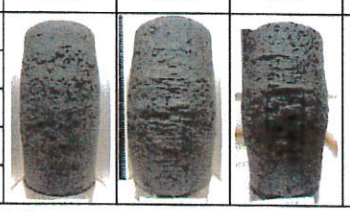
Project No.: 01-0B5001

Boring No.: 335+

Sample Type: REMOLD

Description: Moist, Stiff, Dark Gray, Clayey Silt with Gravel and Few Organics

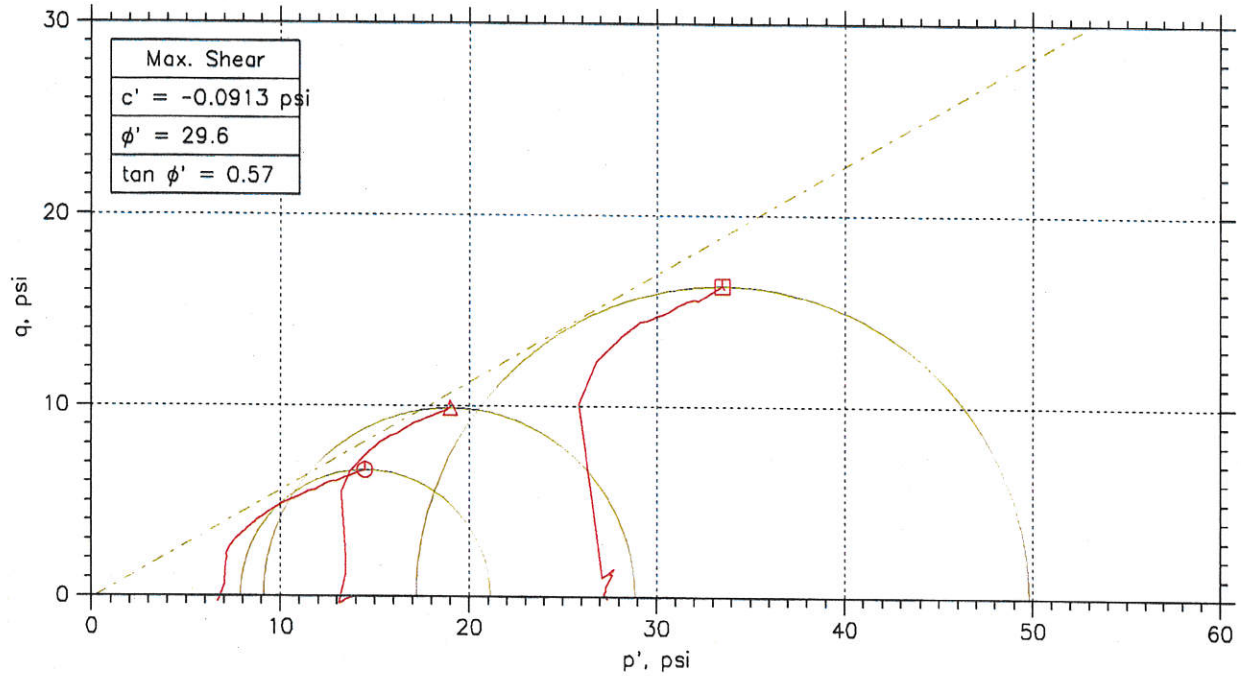
Remarks: GL 12-089

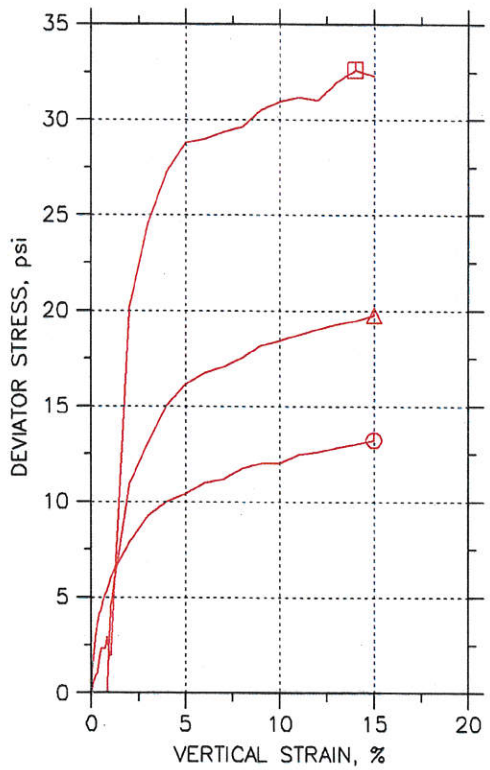


Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

CONSOLIDATED UNDRAINED TRIAXIAL TEST





Symbol		⊙	△	⊡	
Sample No.		90B-1	90B-2	90B-3	
Test No.		C13-02A	C13-02B	C13-02C	
Depth					
Initial	Diameter, in	2.8	2.8	2.8	
	Height, in	6	6	6	
	Water Content, %	12.8	13.1	13.2	
	Dry Density, pcf	119.7	119.3	119.4	
	Saturation, %	80.7	82.3	82.7	
	Void Ratio	0.435	0.439	0.437	
Before Shear	Water Content, %	19.5	18.0	19.0	
	Dry Density, pcf	111.8	114.9	112.7	
	Saturation*, %	100.0	100.0	100.0	
	Void Ratio	0.535	0.494	0.523	
	Back Press., psi	103.	103.	102.5	
Ver. Eff. Cons. Stress, psi		6.946	13.89	28.41	
Shear Strength, psi		6.618	9.878	16.31	
Strain at Failure, %		15	15	14	
Strain Rate, %/min		0.1	0.1	0.1	
B-Value		0.95	0.95	0.95	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		---	---	---	
Plastic Limit		---	---	---	

Caltrans

Project: Lovers Leap Landslide

Location: 01-MEN-101-5.22-

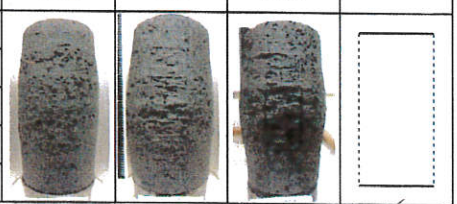
Project No.: 01-0B5001

Boring No.: 335+

Sample Type: REMOLD

Description: Moist, Stiff, Dark Gray, Clayey Silt with Gravel and Few Organics

Remarks: GL 12-089



Phase calculations based on start and end of test.

* Saturation is set to 100% for phase calculations

Division of Engineering Services
Geotechnical Laboratory

Compaction Curve

CTM 216

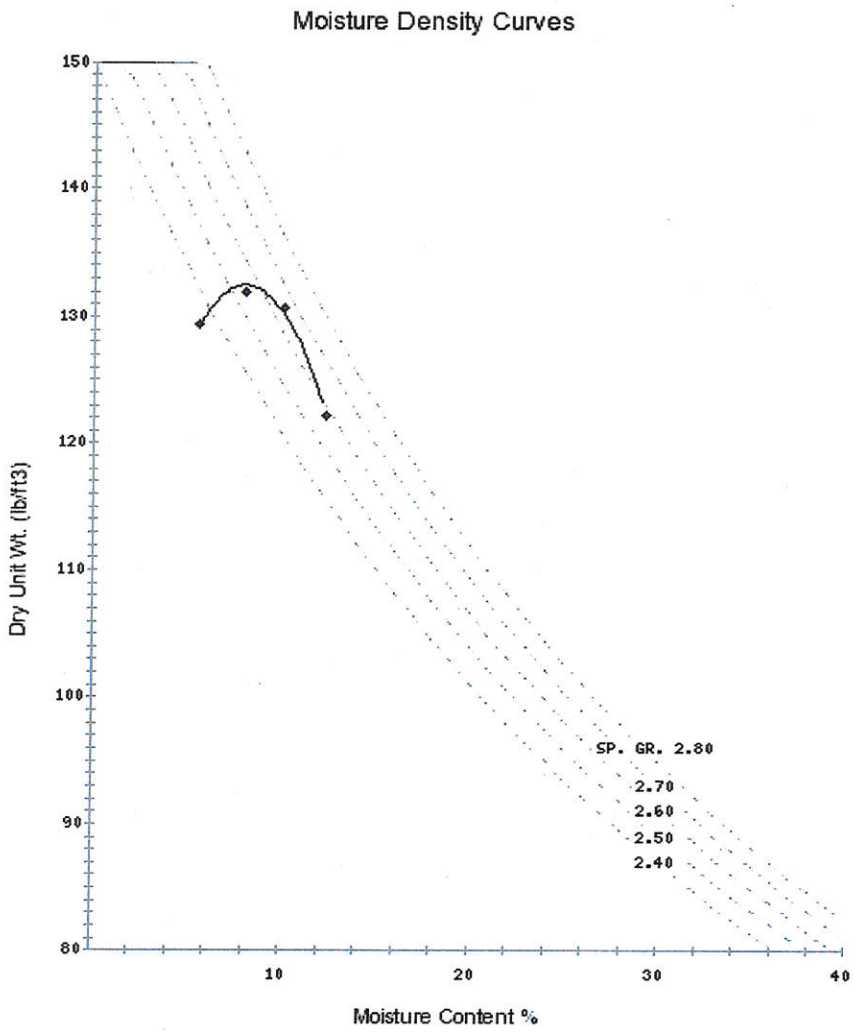
Dist-EA: 01-0B5001
Dist-Co-Rte-PM: MEN-101-5.22/
Sample ID: 335+_90
GI Tracking No.: 12-089

Maximum Dry Density: 132.5 pcf
Optimum Moisture: 8.0 %
Moisture (as Received:) 6.5 %
Approved: January 3, 2013

Trial No.	Moisture Adjustment	Tamper Reading	Wet + Tare Weight (g)	Dry + Tare Weight (g)	Tare (g)	Moisture Content (%)	Dry Unit Weight (pcf)
1	50	9.70	3061	2943	810	5.5	129.4
2	100	9.50	3116	2945	814	8.0	132.0
3	150	9.60	3148	2934	799	10.0	130.8
4	200	10.30	3145	2882	742	12.3	122.2
5							
6							

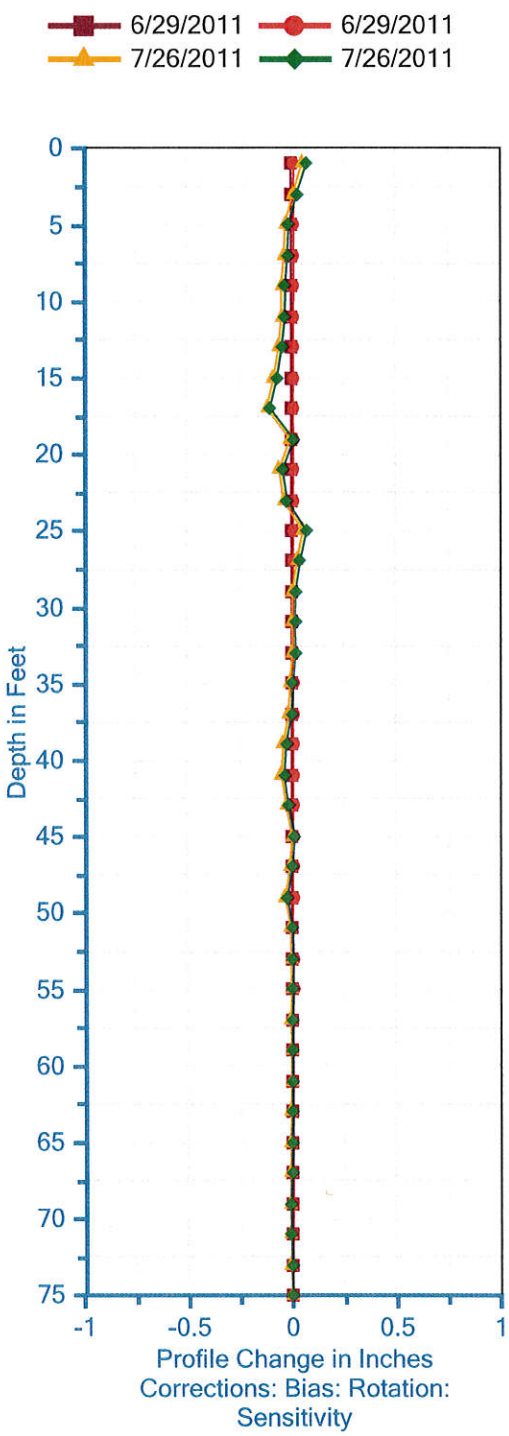
Soil Description : GRAY,SILTY SOIL

Remarks:

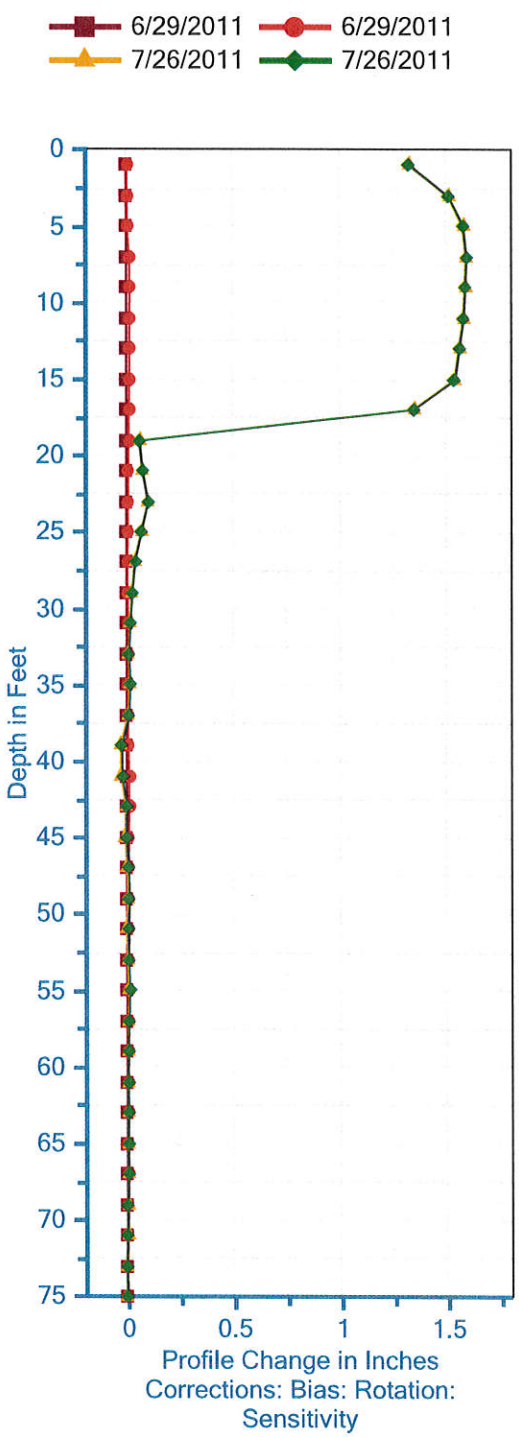


ATTACHMENT 5

LL SI-R-11-001, A-Axis



LL SI-R-11-001, B-Axis



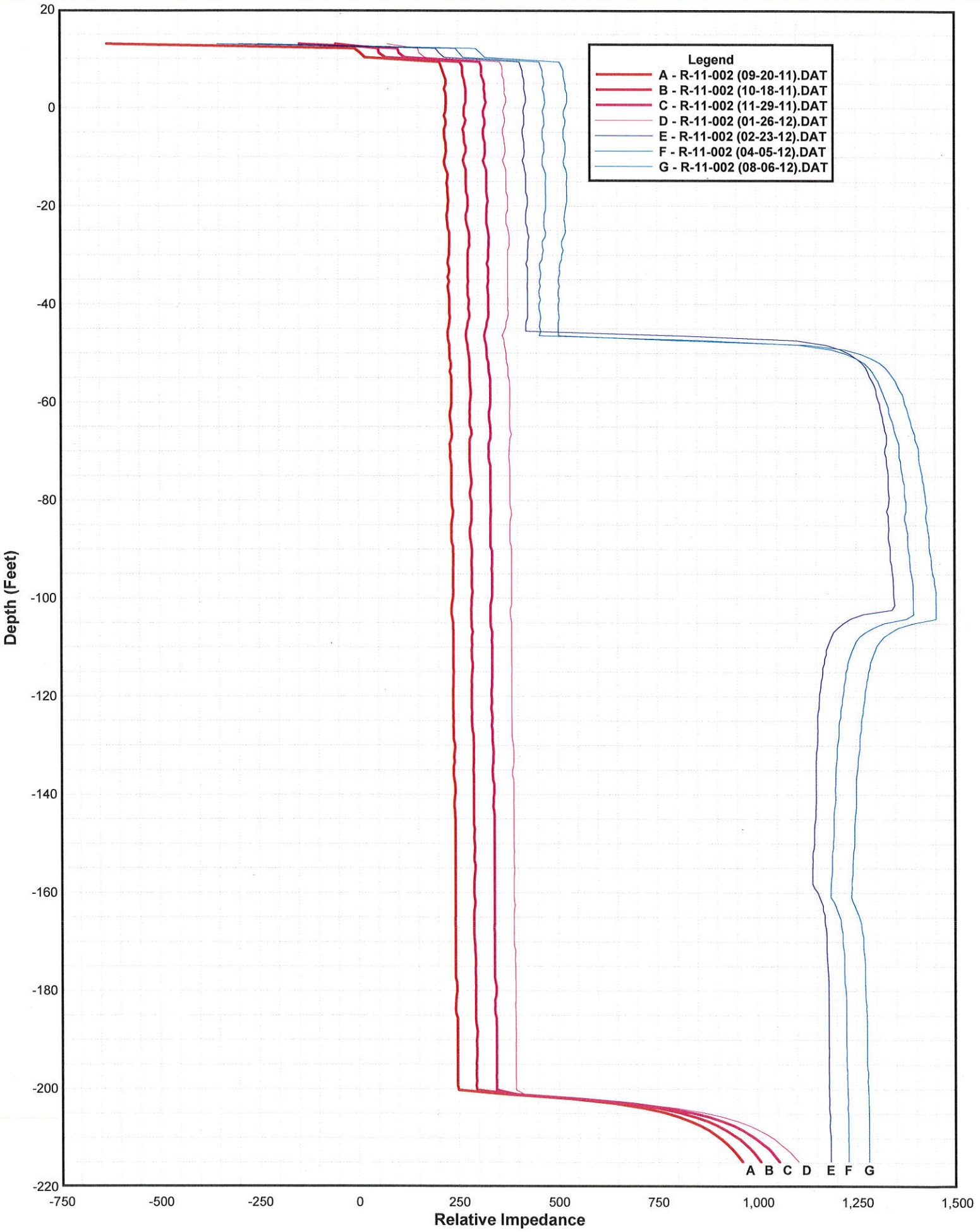
INCLINOMTER RESULTS

01-MEN-HWY 101 P.M. 5.0
Lover's Leap Landslide
EFIS No. 0100020413

Depth of Inclinometer Casing: 76 feet
Ao Direction: (Magnetic North)
Location: 01-MED HWY 101 P.M 5.0

Kane GeoTech
TDR Graph

8/9/2012

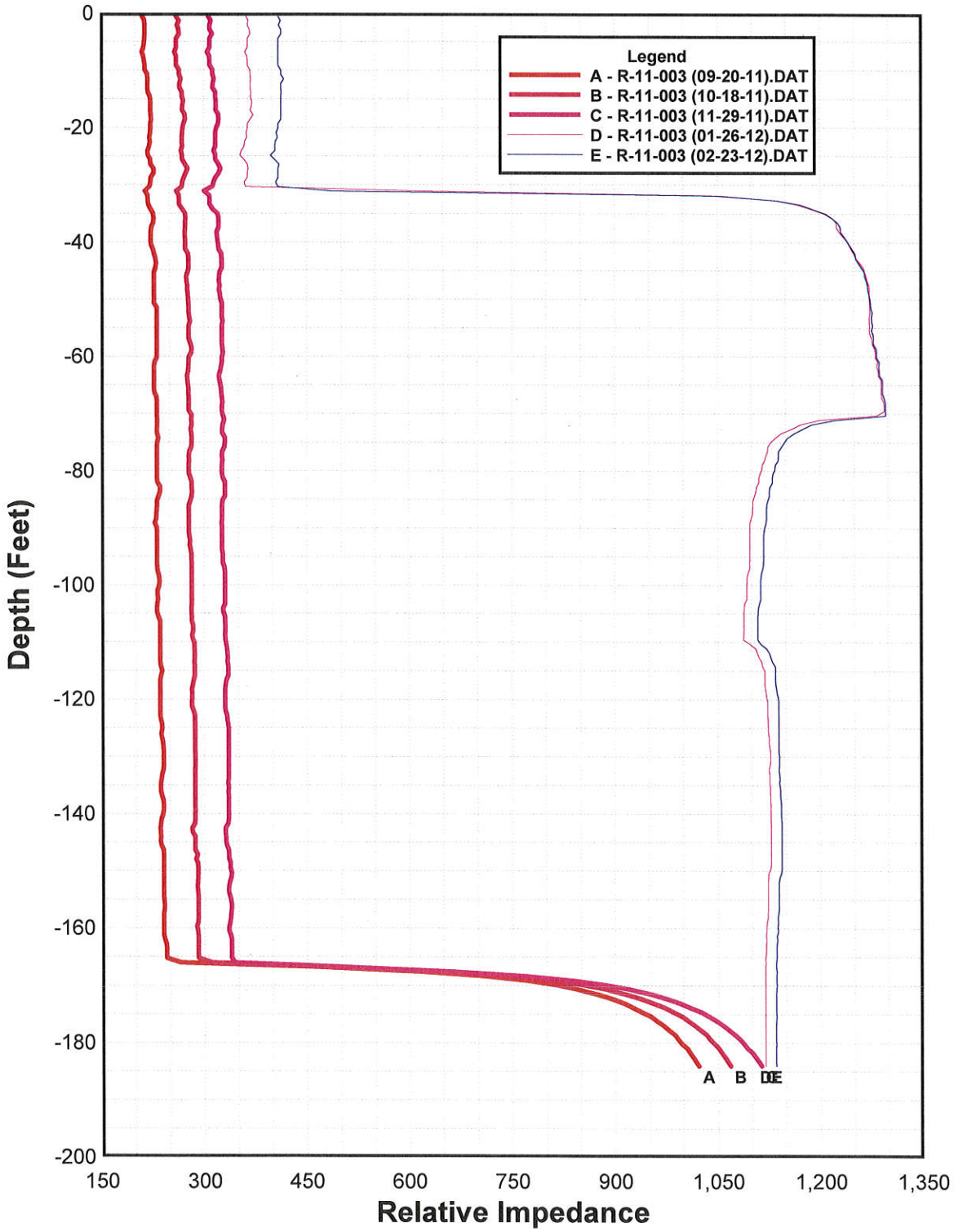


Kane GeoTech

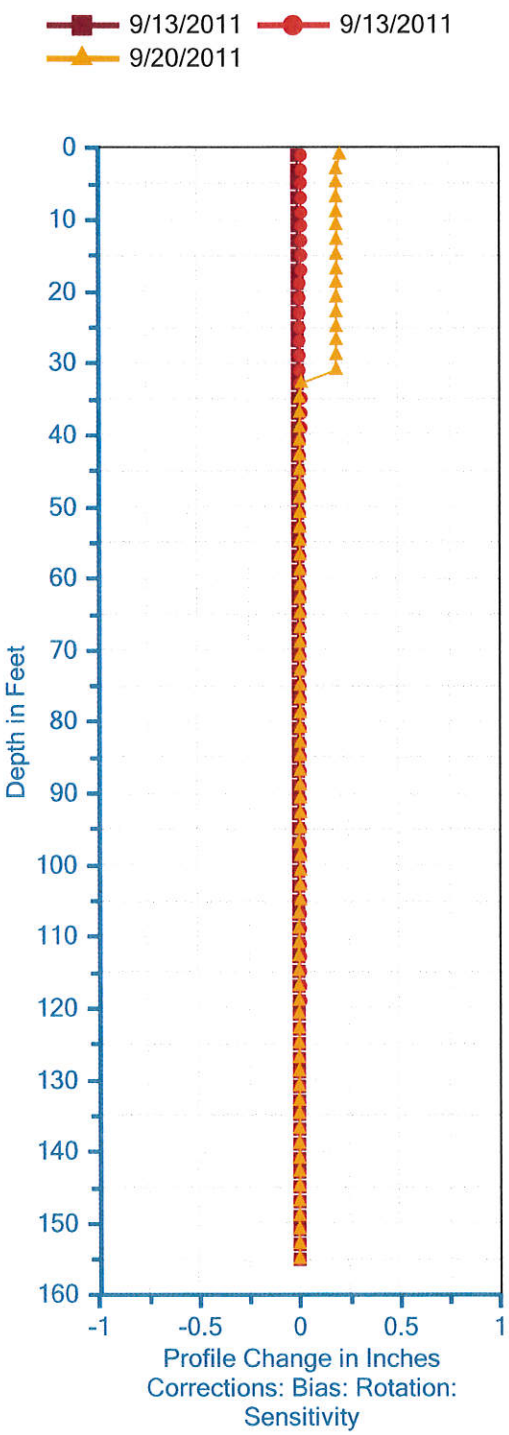
2/24/2012

TDR Graph

Lover's Leap Slide



LL SI-R-11-005, A-Axis



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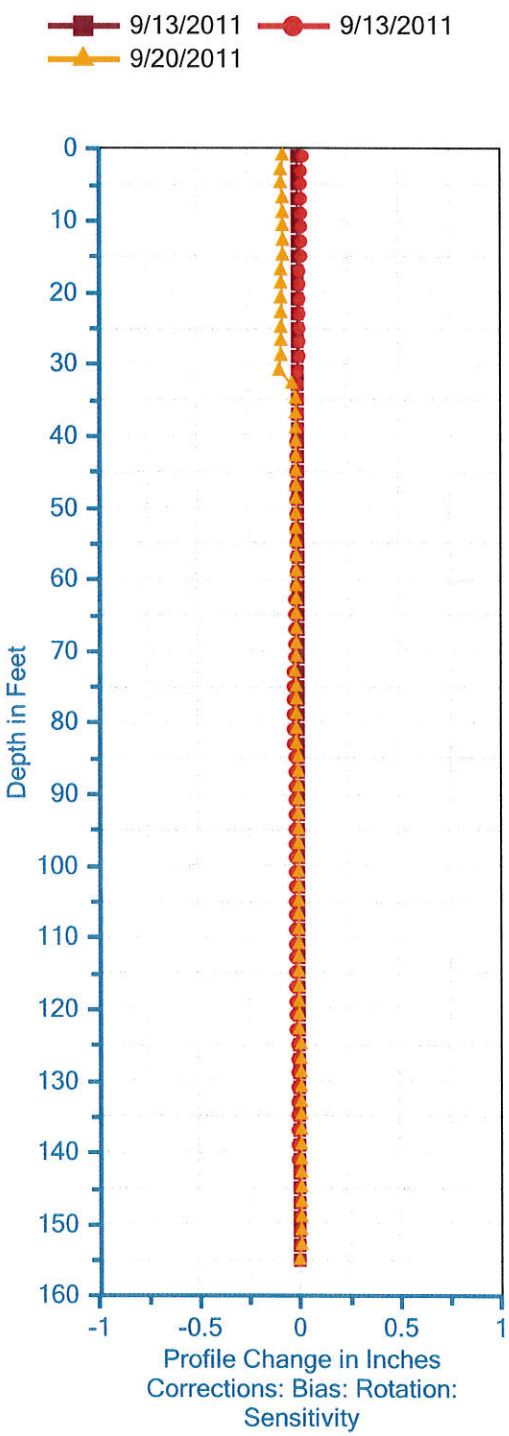


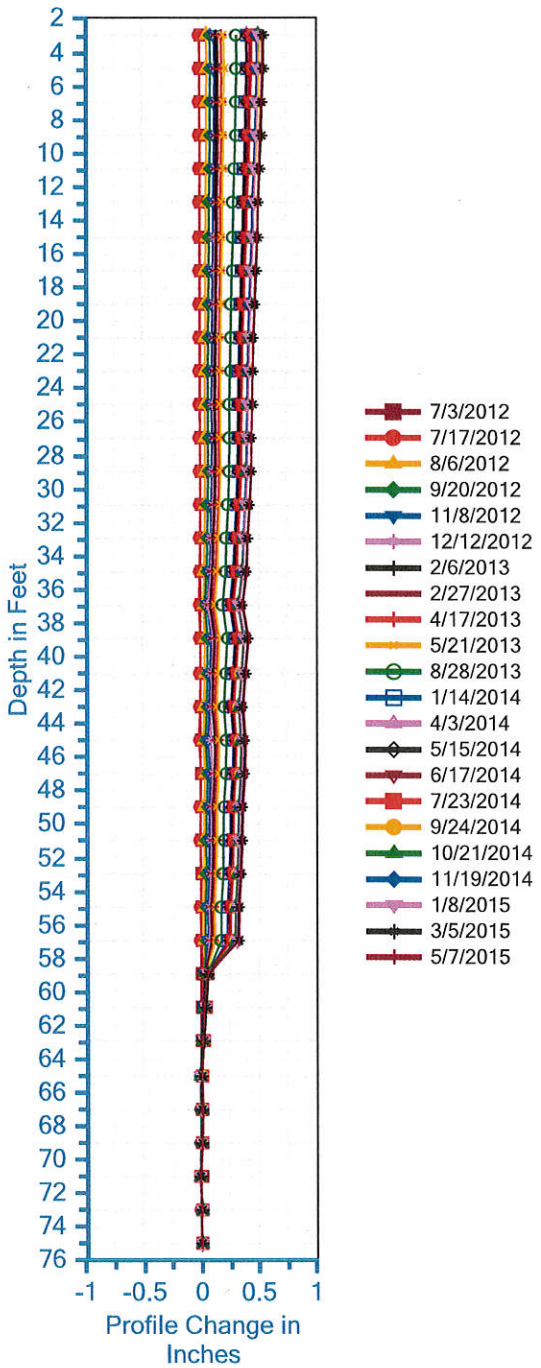
INCLINOMTER RESULTS

Caltrans

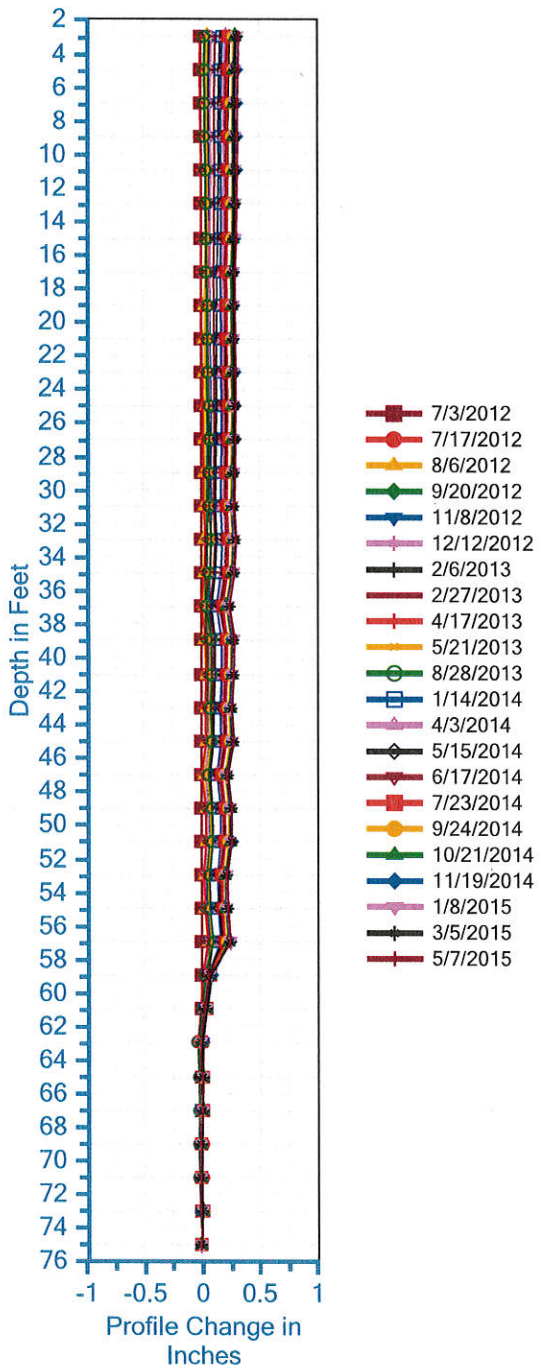
01-MEN-HWY 101 P.M. 5.0
Lover's Leap Landslide
EFIS No. 0100020413

Depth of Inclinometer Casing: 76 feet
Ao Direction: (Magnetic North)
Location: 01-MED HWY 101 P.M 5.0

LEAP 12020 A



LEAP 12020 B



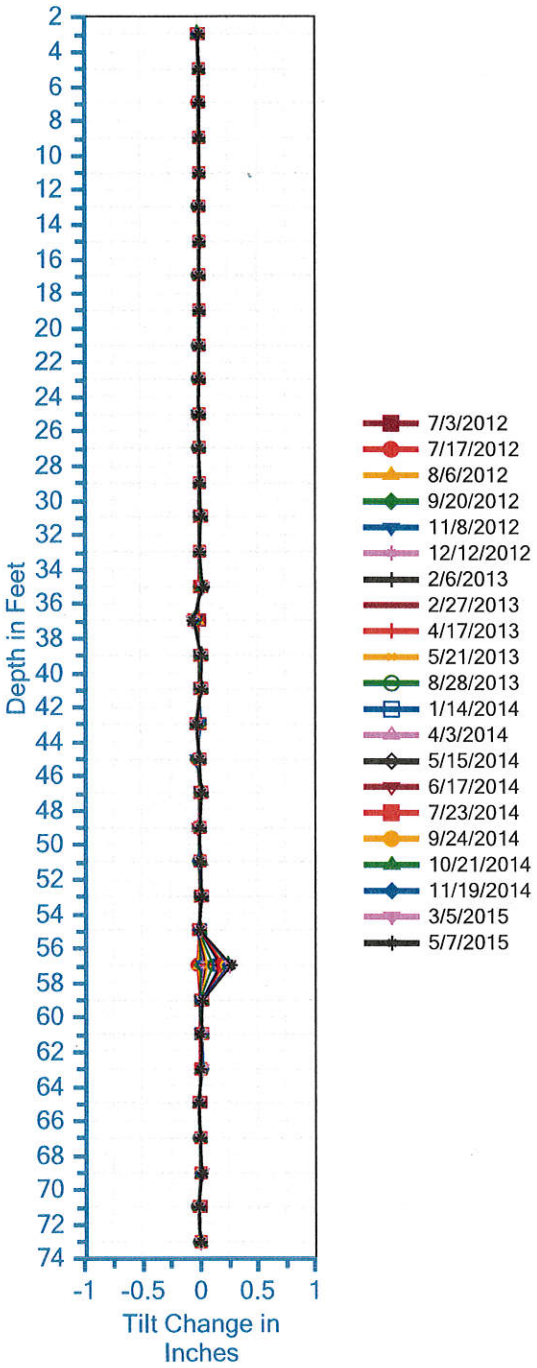
INCLINOMTER RESULTS

Caltrans

01-MEN-HWY 101 P.M. 5.2
Lover's Leap Landslide
EFIS No. 0100020413

Depth of Inclinometer Casing: 73 feet
Ao Direction: 135 (Magnetic North)
Location: 01-MED HWY 101 P.M 5.2

LEAP 12020 A



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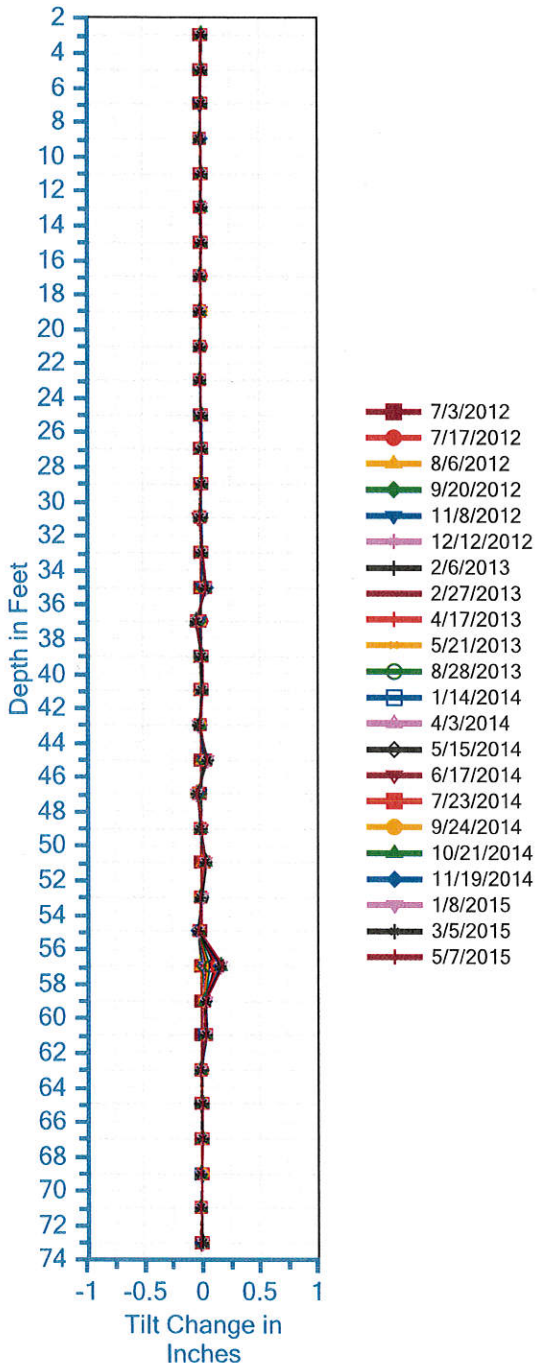


INCLINOMTER RESULTS

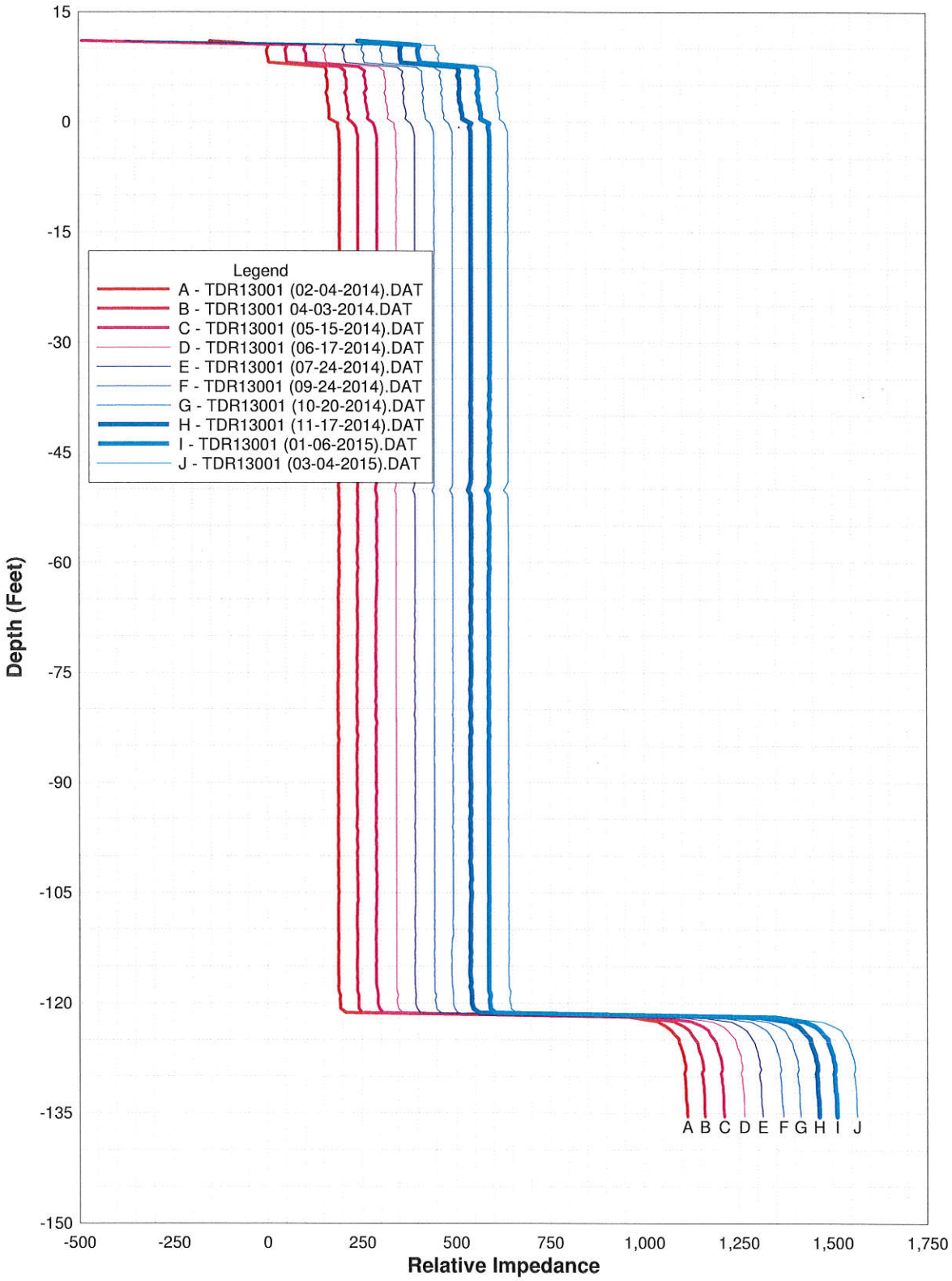
01-MEN-HWY 101 P.M. 5.2
Lover's Leap Landslide
EFIS No. 0100020413

Depth of Inclinometer Casing: 73 feet
Ao Direction: 135 (Magnetic North)
Location: 01-MED HWY 101 P.M 5.2

KANE GeoTech

3/6/2015

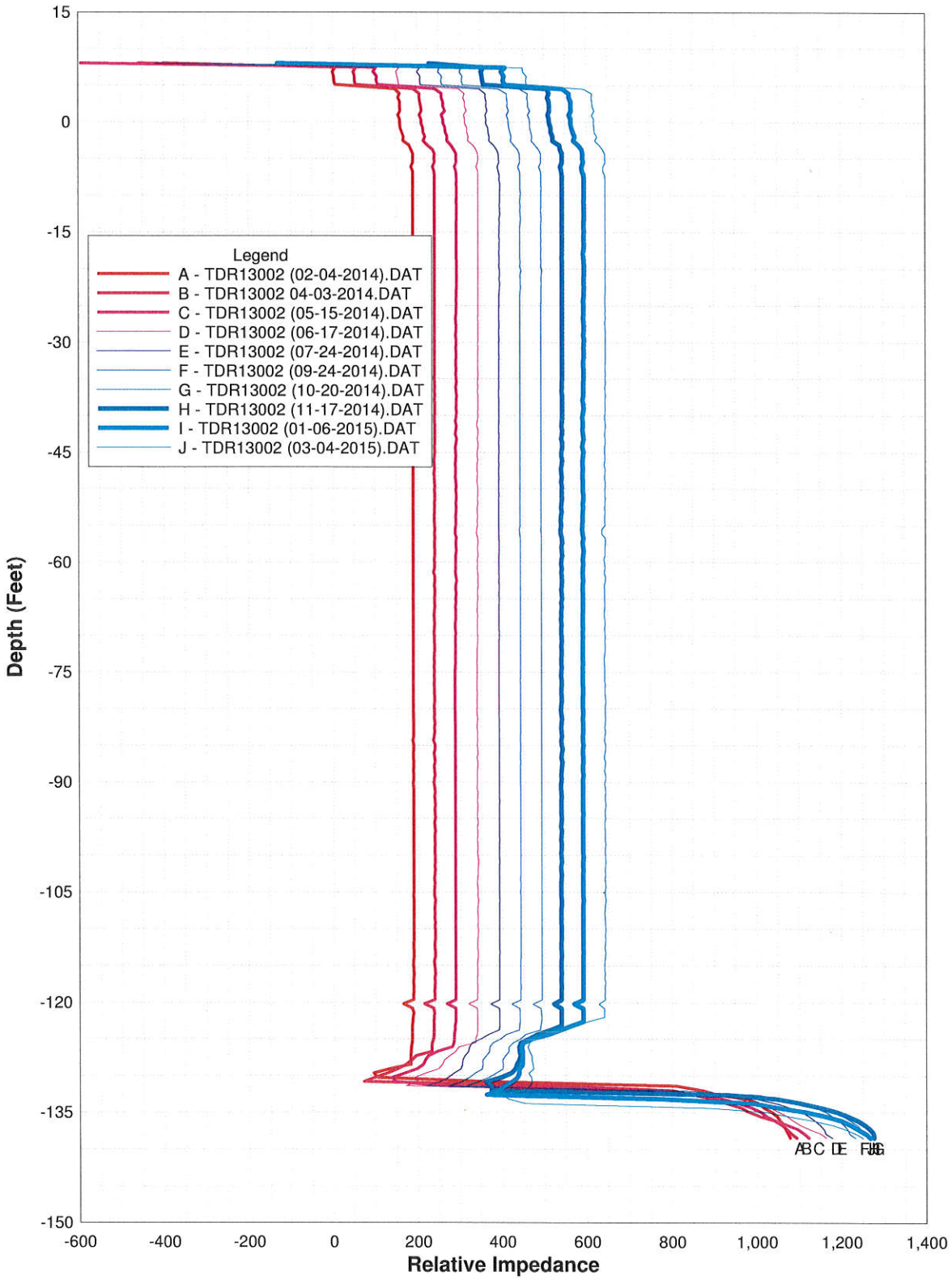
TDR Graph



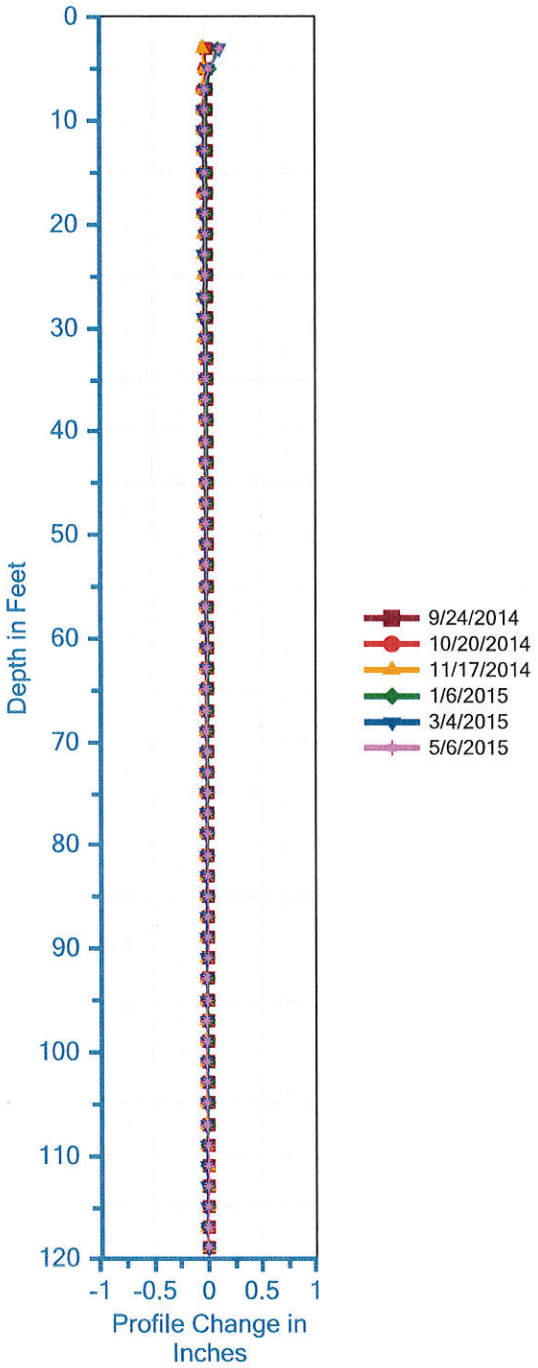
KANE GeoTech

TDR Graph

3/6/2015



LEAP SI1401 A



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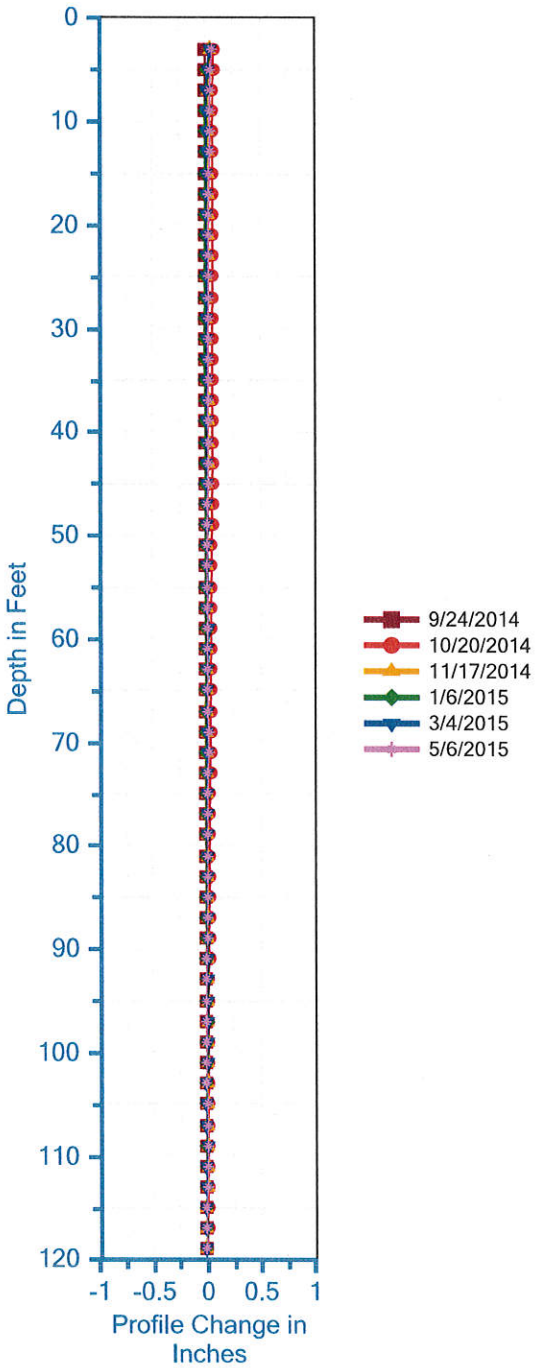


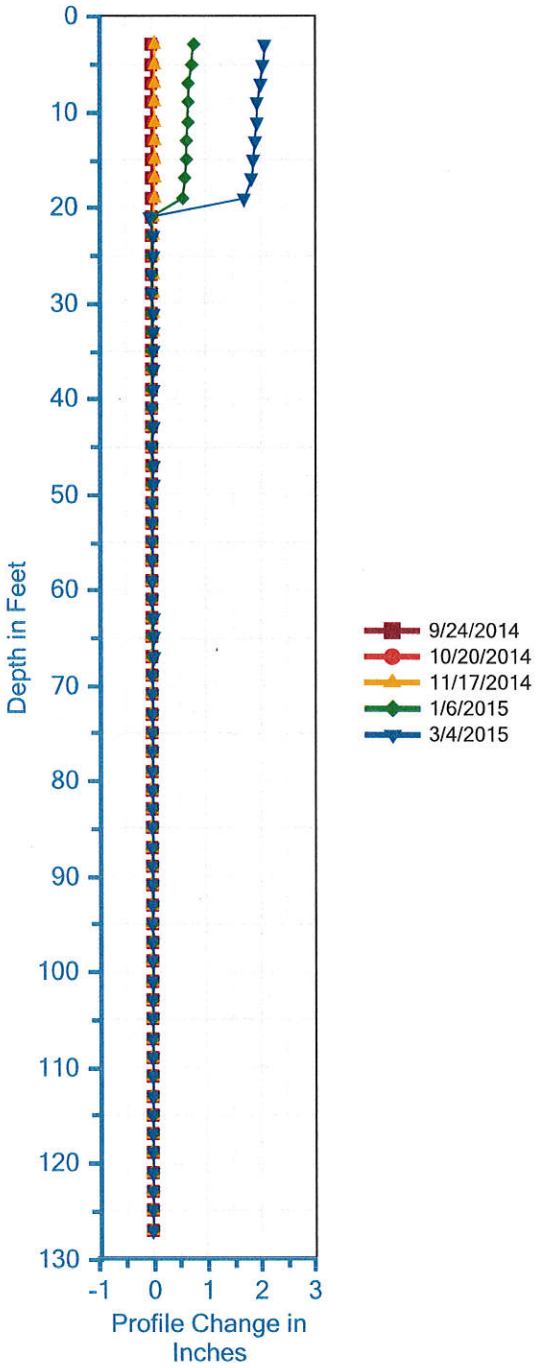
INCLINOMTER RESULTS

Caltrans

01-MEN-HWY 101 P.M. 5.16
Lover's Leap Landslide
EFIS No. 0112000133

Depth of Inclinometer Casing: 119.92 feet
Ao Direction: 229 (Magnetic North)
Location: 01-MED HWY 101 P.M 5.16

LEAP SI1403 A



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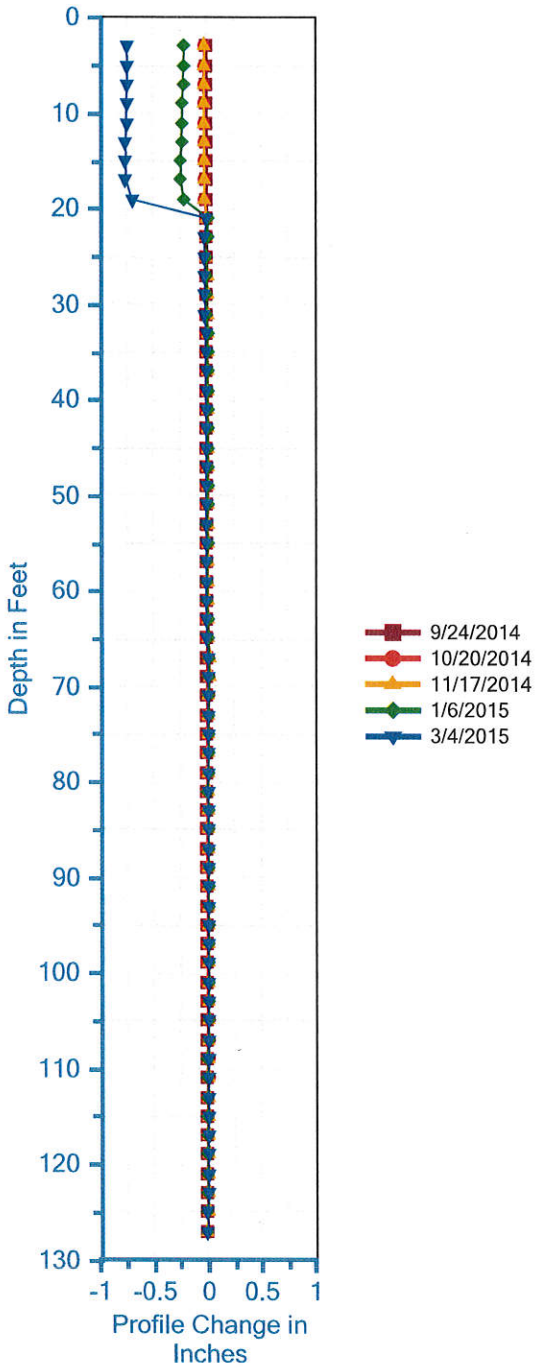


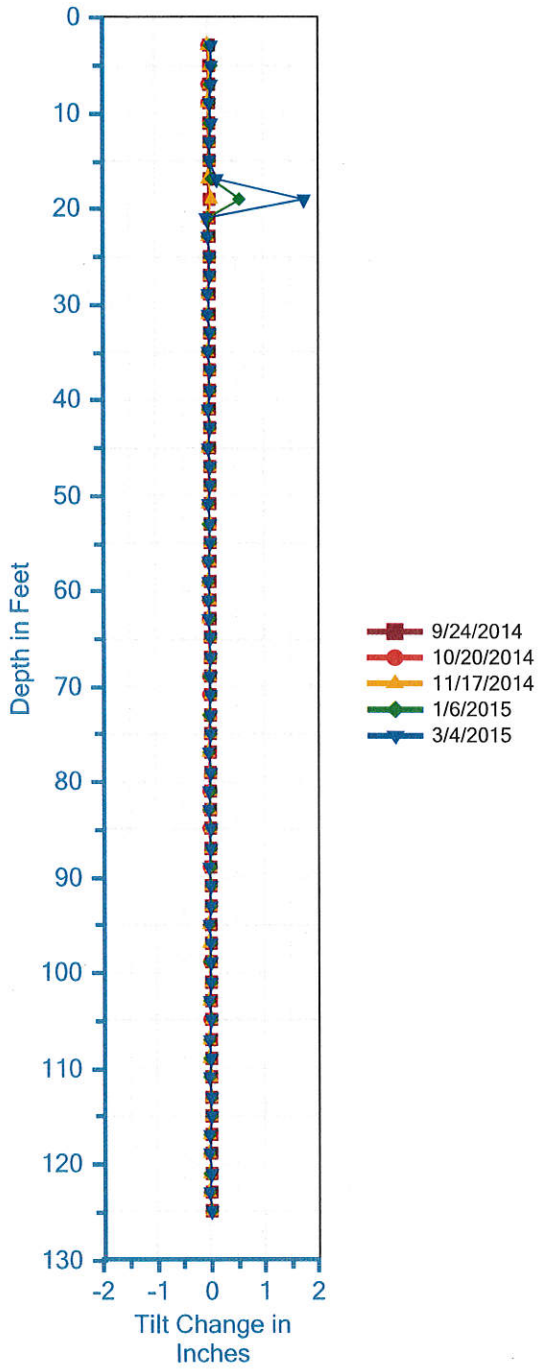
INCLINOMTER RESULTS

Caltrans

01-MEN-HWY 101 P.M. 5.2
Lover's Leap Landslide
EFIS No. 0100020413

Depth of Inclinometer Casing: 73 feet
Ao Direction: 135 (Magnetic North)
Location: 01-MED HWY 101 P.M 5.2

LEAP SI1403 A



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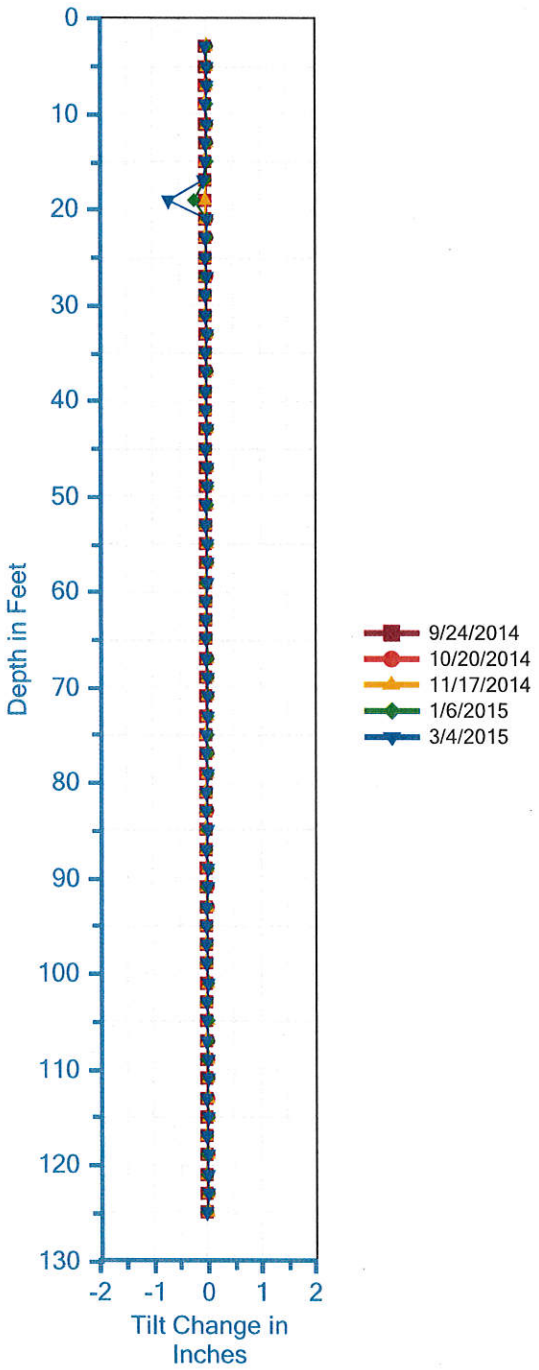
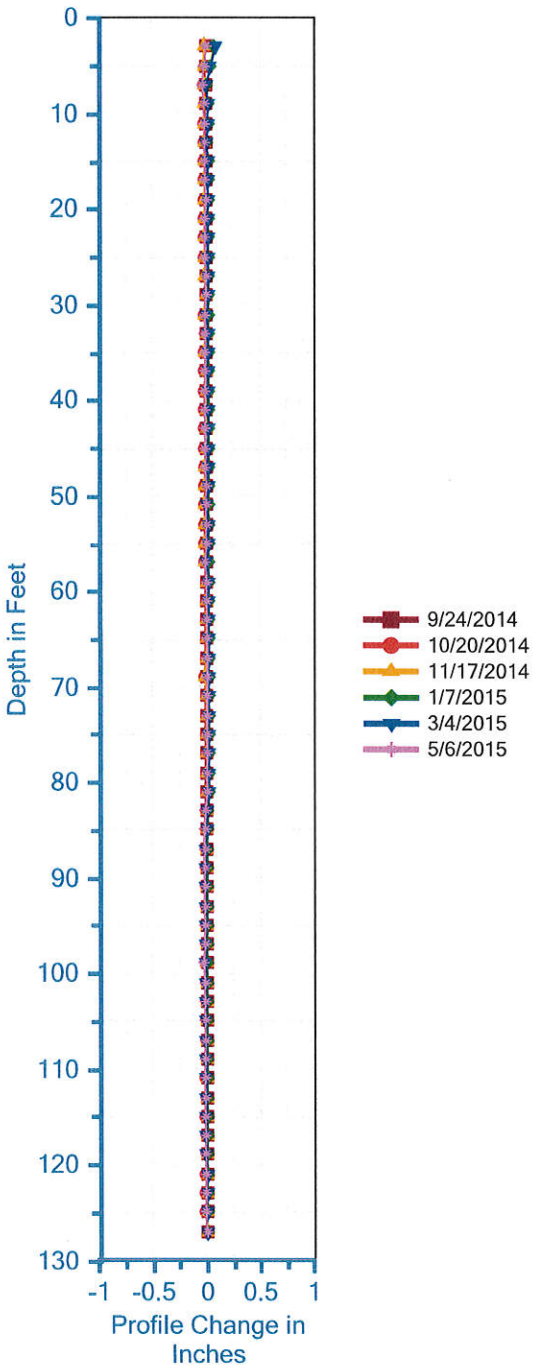


INCLINOMTER RESULTS

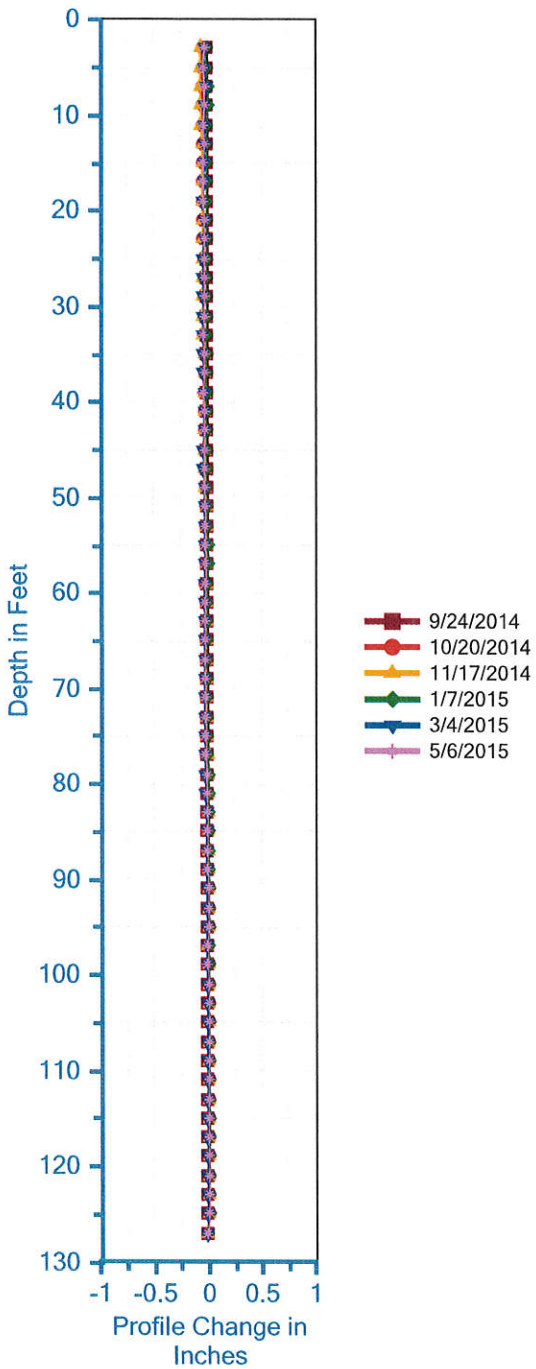
01-MEN-HWY 101 P.M. 5.2
Lover's Leap Landslide
EFIS No. 0100020413

Depth of Inclinometer Casing: 73 feet
Ao Direction: 135 (Magnetic North)
Location: 01-MED HWY 101 P.M 5.2

LEAP SI1406 A



LEAP SI1406 B



INCLINOMTER RESULTS

Caltrans

01-MEN-HWY 101 P.M. 5.16
Lover's Leap Landslide
EFIS No. 0112000133

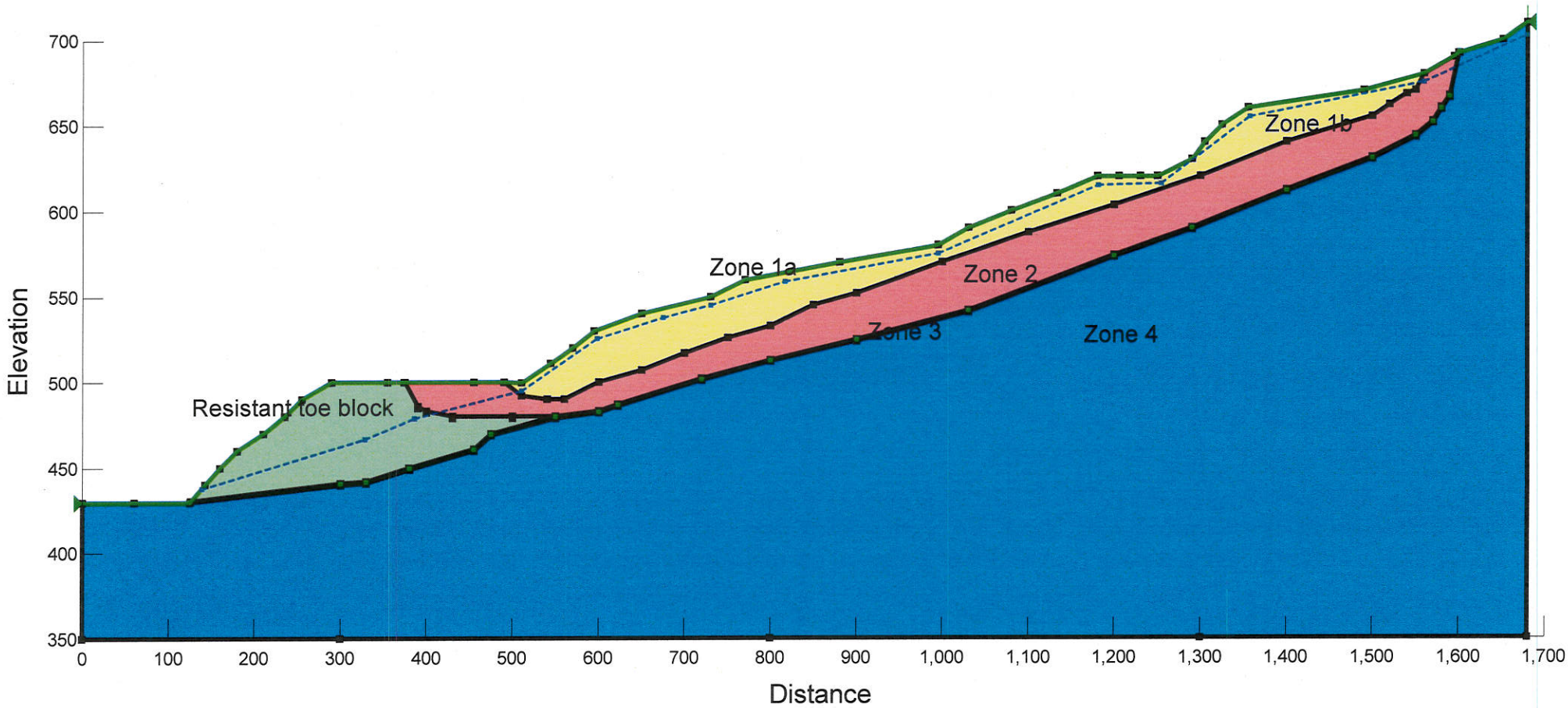
Depth of Inclinometer Casing: 128 feet
Ao Direction: 226 (Magnetic North)
Location: 01-MED HWY 101 P.M 5.16

ATTACHMENT 6

ATTACHMENT 7

ATTACHMENT 8

Department of Transportation Division of Engineering Services Geotechnical Services Office of Geotechnical Design North	EA: 01-0B5001	Typical cross section and design material properties
	DATE: 6/10/2015	
	01-MEN-101-5.16 Foundation Report: Peregrine Rock Landslide SPGA Retaining Wall	Attachment No. 8



ATTACHMENT 9

State of California

Business, Transportation and Housing Agency

Dist. file
(See Job File for Attachments)

Memorandum

To : MR. GENE WAHL - 01
DISTRICT DIRECTOR

Attention MR. JOHN BULINSKI
Associate Transportation Engineer

Date : June 22, 1992

File No. : 01-Men-101-4.9/9.2 PM
01-195621

From : **DEPARTMENT OF TRANSPORTATION**
Division of New Technology, Materials and Research
Office of Geotechnical Engineering

Subject : Squaw Rock North Slide - PM 5.2

Summary

The slide mass at Squaw Rock North was analyzed for two realignments. The proposed roadway alignment was judged very likely to increase the rate of slide movement from the current level and has some possibility of inducing a new failure surface at the toe of the cut on the uphill side of the roadway. The "2/92" alignment presents a reasonable tradeoff between geotechnical stability and traffic operations characteristics and is favored over the "proposed" alignment. When constructed with a feature that partially unloads the upper portion of the slide mass, the comparative factor of safety on the failure plane for the 2/92 alignment is about equal to that which exists today. Of the realignment schemes analyzed, the 2/92 alignment with a removal is recommended by this office.

Background

In a memorandum dated December 3, 1991, this office was requested by the District to conduct studies for a non-structural solution to effect a realignment and widening at this site. The existing two-lane roadway traverses over a slow-moving, massive landslide. However, all realignments are proposed to cut into the resistant mass of the slide to provide additional roadway width.

A previous study using a structural solution (slope stressing), based in part on preliminary recommendations given on November 20, 1989, and August 28, 1990, in memoranda from the Office of Engineering Geology to the Office of Structure Design, did not prove effective . That study was halted as described in a memorandum from the Office of Structure Design to the District dated November 20, 1991. Several earlier reports were developed by the then Office of Transportation Laboratory but those reports appear to have dealt exclusively with the Squaw Rock South landslide.

At this time the level of maintenance required near the slide is periodic patching and overlays especially at the flanks of slide where the slide crosses under the roadway.

By convention, the two slides near Squaw Rock are termed the Squaw Rock North Landslide and Squaw Rock South Landslide. In actuality, each slide has more of the characteristics and would more properly be called a deep earth flow, with that definition denoting a slow rate of movement. However, this study does continue the convention of labeling the Squaw Rock North area as a landslide.

This study consisted of stability analyses of three alignments; these are referred to as the "existing alignment," the "proposed alignment" (based on cross sections dated November 30, 1989), and the "2/92 alignment" (based on cross sections dated February 27, 1992). These two "build" alignments were also studied with a removal from the zone of the slide mass that provides the bulk of the driving forces. For all conditions studied, the stability was evaluated with the assumption that the existing conditions had a factor of safety of just above unity on a slide plane determined by slope indicators. As noted in a discussion with District representatives on March 3, 1992, the District will evaluate means to effect the widening and realignment (which directly relate to the traffic operational characteristics) in addition to the stability aspects discussed here.

Geology

The slide mass consists primarily of Franciscan Melange that is characterized by rock fragments and blocks of all sizes resting in a matrix of clayey material. The slide mass sits on top of more competent shale, sandstone, and greenstone [adopted from the August 1990 memorandum].

Map 2A of the Santa Rosa Quadrangle (1982, from the California Geologic Atlas) lists the surface soil as a Qls unit - landslide deposits - for about nine miles along Route 101. The Squaw Rock area is shown as the northerly terminus of the slide deposit area and the Russian River at the Mendocino County line as the southerly terminus; some of this geologic unit is also present on the west side of the Russian River.

A fault is shown branching from the Maacama Fault near the project limits (as shown on Map 2A of the Santa Rosa Quadrangle). It is believed that

this fault has shown no evidence of movement during the Quaternary period. However, fault zones are usually highly sheared and other slides and unstable areas have been associated with fault zones.

Drilling field notes taken by District personnel during the installation of slope indicators are available from the District Materials Office.

Discussion of the Slide Mass

The November 20, 1989 memorandum describes the slide as having three sections: a main instability extending 800 ft uphill from the existing roadway, a tributary instability striking the main instability at an oblique angle about 500 ft uphill from the existing roadway, and "Slice A" described as the critical section within the main slide mass. Slice A extends about 600 ft uphill from the existing roadway. Slice A was described as probably controlling the entire slide mass. An attachment from that memorandum showing the three slide masses projected on a topographic map is provided with this memorandum. In plan view, the slide mass appears somewhat trapezoidal. At its lower end it measures about 250 ft across; at the upper end of the critical section the slide mass in measures about 350 ft across. The depth of the slide mass is discussed below. This study is based entirely on a stability analysis of the slide mass described as the critical section.

The estimated weight of the critical section is about 250×10^3 tons. The proposed alignment would employ a 1.5H:1V cut slope and would remove about 38×10^3 tons of soil from that portion of the slide mass that provides resistance to movement. The 2/92 alignment also would employ a 1.5:1 cut slope but would remove about one-third of the weight of soil from the resisting zone as compared to the proposed alignment, that is, about 13×10^3 tons. The 2/92 alignment also would place embankment material at the river's edge that would serve as a buttress to the slide; the weight of that embankment material is about 2×10^3 tons.

Slope Indicator Data

Slope indicators were placed by the District between June and August 1989 and have been periodically read since. The slope indicators were placed roughly perpendicular to Station 335+10 of the proposed alignment. The last reading supplied to this office was taken on January 14, 1992, and are supplied with this memorandum. These is consistent with the trend of other recent

data. All slope indicator data is available from the District Materials Branch. Locations of the slope indicators are provided below and are referenced to the proposed alignment centerline.

Slope Indicator Locations and Depth to Slide Plane Data

Slope Indicator	Move-ment	Depth to the slide plane	Depth to ground water	Station and Offset.
1	3.2 in.	66 ft	16 ft	335+10 x125 ft Rt
2	2.0 in.	53 ft	15 ft	335+10 x360 ft Rt
3	1.1 in.	67 ft	25 ft	335+10 x100 ft Lt

Figures 1 through 3 present plotted data for top of casing movement and depth the ground water. The data points related to movement are somewhat scattered and this is interpreted as adjustments at the top of the casing from one of a number of sources. Readings taken on other days or at a depth somewhat below the top of the casing would probably present a smoother plot. Nonetheless, if all data were plotted, while other of these perhaps erratic readings would be noted, the trend is clear and the depth of the movement is consistent.

It also should be noted that others have interpreted SI 3 to show a slide plane at 21 ft from the surface. This would have been based on early data which did support that reading. Later readings would place the depth to the failure plane at 67 feet below the surface and that depth was used for this study.

An anomaly in the amount of movement in the two upslope slope indicators relative to the one downslope slope indicator was noted. This anomaly gives rise to speculation that a deep cut into the slide mass at roadway elevation may initiate a new slide plane exiting at the toe of the cut.

A comparison of the rate of movement as given by the slope indicator data and a rate estimated from movement to a fence near Slope Indicator 3 is interesting. Based on aerial two photographs taken in 1971 and 1986, the estimated rate of the movement on the fence line is about 6 inches per year although the scale of the photographs makes precision difficult. [These photographs are available in the District Office and the estimated movement was developed by District Project Development personnel at my request.] Between the years 1986 and 1990 the movement appears minor and the slope indicators show data representing the period from mid-1989 to the present. Based on this

large difference in the rate of movement, it is suggested that the rainfall totals during the period between 1971 and 1986 be reviewed to provide insight into the effects of rainfall versus movement on the slide plane.

Results of the Stability Analyses

The offset distances from the Russian River and the actual elevations at Station 335+00 of the 2/92 alignment were used to analyze all conditions with two minor exceptions: the elevation at the top of Slope Indicator 1 was used resulting in a topographic change of +9 ft and a surface point 30 ft uphill was adjusted by +3 ft. This cross section superimposes very nearly identically on Station 335+00 of the proposed alignment except that the 2/92 alignment is shifted 42 ft west relative to the proposed alignment. This station does represent a very good "typical cross section" in that, when the volumes of cuts for each alignment are averaged over the length of the slide at the roadway elevation, the cut at Station 335+00 is near the average. The embankment construction needed for the 2/92 alignment is not evident until north of this station.

The stability runs were calculated using the pc-based computer program XSTABL and all outputs are provided. The existing roadway alignment and depth to slide plane given by the slope indicator data were input and the slide surface analyzed such that a factor of safety equalled near unity (FS = 1.002). The soil was assumed as purely granular in that only frictional resistance was assumed to resist the slide movement. All other conditions were then referenced to those topographic and soil strength conditions. While the factors of safety are reported to the nearest 0.001, it should be realized that this accuracy is for the sake of relative comparison and the precision of the study is not reflected to that degree.

Both the proposed alignment and the 2/92 alignment were also studied after a removal of material from the driving zone was effected. The removal of mass from the driving area was assumed as a 2:1 cut to achieve a removal to a depth of 10 ft. The limits of the removal were between 116 ft and 360 ft for the proposed alignment and between 220 ft and 340 ft from the centerline of the 2/92 alignment. The dig-out area would be contoured into the higher topography at the flanks of the slide and would be graded to drain using lined surface drains. The weight of the removed material from the driving section of the slide is 26 x 10^3 tons for the proposed alignment and about 13 x 10^3 tons for the 2/92 alignment.

A summary of the results of the stability analyses is shown below. The Janbu method was used for all analyses. As simply viewing the factor of safety is uninformative as to the magnitude of the driving and resisting forces, both of these are also shown. To calculate the forces over the width of the failure plane at the roadway elevation, the forces should be multiplied by about 250.

Factors of Safety on the Failure Plane Located by the Slope Indicators

Alignment	Factor of Safety	Driving Force	Resisting Force[1]
Existing	1.002	6.742E+06 lbs	6.756E+06 lbs
Proposed alignment with removal	1.004	5.801E+05	5.823E+05
2/92 with removal	1.002	6.265E+05	6.276E+05
2/92	0.997	6.557E+05	6.538E+05
Proposed alignment	0.989	6.389E+05	6.320E+05

As a sensitivity study, a new failure plane was defined as: the toe of the 1.5:1 cut to the east of the centerline connected to the failure plane at SI 1 and SI 2 and on up to the head scarp area. The purpose of this analysis was to evaluate the possibility of initiating a new failure surface due to the cut. While it is acknowledged that this scenario is not supported directly by any subsurface investigation nor by the existing topography, the stability through this zone may be controlled by blocks or rock that may not extend horizontally beyond the cut. The calculated factors of safety are:

Factors of Safety through the Toe of the 1.5:1 Cut

Alignment	Factor of Safety	Driving Force	Resisting Force
Existing	1.096	4.375E+06 lbs	4.793E+06 lbs
2/92 with removal	0.986	4.238E+05	4.177E+05
2/92	0.980	4.530E+05	4.441E+05
Proposed alignment with removal	0.929	3.837E+05	3.565E+05
Proposed alignment	0.918	4.442E+05	4.063E+05

[1]On the computer print-outs, the printed resisting force must be multiplied by the Janbu correction factor (f_o) to establish the actual resisting force.

Discussion

1. As related to the factor of safety against sliding on the failure plane in all cases, the proposed alignment represents the worst case. The 2/92 alignment with the removal and the proposed alignment with the removal trade positions as the best case depending on which slide plane (i.e., the slide plane given by the slope indicators or the slide plane through the toe of the cut) is involved. Overall, the 2/92 alignment with removal is judged better as it would be less likely to initiate a failure surface exiting at the base of the 1.5:1 cut slope.

2. The soil strength derived on the failure plane showed strength much lower that assumed for the Nov. 20, 1989 study and below many of the samples subjected to triaxial testing. However, the data from slope indicators was sufficiently probative to override strength testing of a limited number of samples. It should be noted that in situ sampling within a landslide is difficult, that sampling was conducted before the slide plane was precisely known, and that a slide plane can occur on fairly thin surfaces.

The decision to model the soil as granular in nature rather than as a frictional/cohesive or purely cohesive soil is a conservative but not an unreasonable assumption as the conditions could be said to represent the long term, drained condition.

3. The shape of the slide is such that the driving forces are greater by a factor believed somewhat less than the width of the slide mass at the head of the slide divided by the width at roadway elevation (300/250 or 20%). If this fact were included into the model cross section, it would have several effects on elements of each stability analysis but in total it would not change the relative ranking of the alignments. This "shape effect" does show the need for caution when cutting into the resisting slide mass at this site.

4. Within the limited period of mid-1989 to the present, depth to ground water as found in the slope indicator holes was not found to trend strongly on the rate of movement in the slide mass. It is intuitively believed that this slide mass is affected to some degree by the ground water which in turn would be associated with the surface hydrology and rainfall. However, ground water was not input into the study cross section and in effect a total stress analysis was used. It is believed that, since the depths to ground water were found to vary greatly since the placement of the slope indicators but without having a clearly defined relationship to slope indicator movement, the omission of a ground water surface is not unrealistic.

5. Notwithstanding the above, the project area has received lower than average rainfall for six of the preceding seven years based on data collected at either Cloverdale or Ukiah. The cumulative deviation below normal is estimated at 90 inches or about 30 per cent. This fact should be considered when evaluating recommendations for cuts into the resisting zone of the slide, and, as noted above, the rainfall from 1971 to 1986 should be summarized by the District as an input in the selection process.

6. A stabilization trench to increase the shear resistance on the failure plane was not specifically studied. It was judged by this office that, as the slide plane is nearly 70 ft beneath the existing roadway surface, the construction of a stabilization trench was unfeasible.

Other means to stabilize a cut slope, such as a tied-back wall, also share the same difficulty as the stabilization trench, which is depth to the failure plane. The use of slope stressing also shares this problem. The use of slope stressing does not appear to be needed in the 2/92 alignment with removal. It could be considered later if the 2/92 alignment with removal were found to result in unacceptably high maintenance costs..It may be that a specific study would be required to ascertain pull-out capacity of the resistant zone.

The use of a raised profile grade was investigated briefly. As a comparison between the 2/92 alignment and the proposed alignment, the profile grade of the 2/92 alignment (without the uphill removal) would need to be raised by 8 ft to achieve a unity factor of safety on the failure plane while the proposed alignment would need to be raised by 30 ft. For the proposed alignment, this analysis simply reflects volume of material that would be removed rather than presenting a viable alternative for the roadway profile. However, for the 2/92 alignment this analysis shows the 2/92 alignment affects the overall stability much less than the proposed alignment as shown by the relatively low profile change required reestablish stability.

Recommendations

1. It is recommended that the District proceed with the 2/92 alignment with removal. This alignment disturbs the present equilibrium to a much less degree than the proposed alignment and has a good chance of working successfully. When the size of the slide is considered along with the fact that the area has received below-average rainfall for the last five rain seasons, the concerns for

stability of the slide mass should be given due regard in selecting an alternative. The profile grade, if possible, should be raised to limit the mass of the cut and to provide additional weight in the resistance zone of the slide. Within the dig-out area, an area around the slope indicators should not be disturbed so that monitoring may continue during and after construction. Ideally, the uphill dig-out would take place before or at least shortly after the cutting of the slope and this should be so stated in project special provisions.

It is noted that this recommendation is in keeping with the preferred solution given in the November 20, 1989 memorandum which was to "avoid the instability by routing the roadway away from the slide."

2. As an alternative if other factors prevail in the selection of an alignment, the proposed alignment with a removal upslope is recommended. It would also be recommended that an embankment be constructed to the left of the alignment and below the roadway that would serve as a buttress to the extent possible within environmental or other constraints. Strong consideration is also suggested for limiting the width of the shoulders and slightly realigning the centerline as the alignment goes through the slide zone to limit the amount of cutting into the slope.

3. Whichever alignment is selected, the inside roadway shoulder (if placed) should be given the same structural section as the traveled way to accommodate traffic loading after translational movement of the roadway. Also, every effort should be made to begin and end subsurface piping at the limits of the slide mass. (It is assumed that the pavement structural section will be made of asphalt concrete.)

4. While the conditions are not ideal for horizontal drains, the use of horizontal drains on the Hopland 1 project at one location has appeared successful and horizontal drains could be considered as an added measure of insurance. The horizontal drains could also be considered later after construction based on the performance of the selected alternative and a review of the subsurface conditions at the location on the Hopland 1 project. This second alternative is recommended.

5. While the erosion within the drainages, especially on the southern flanks of the slide, do not appear to exacerbate any problems with the slide at this time, it is recommended that District Landscape develop plans for check dams or other measures to slow the rate of erosion. This will be especially important as a method to prevent silting within the dig-out area. Additionally, large depressed

areas within the slide larger mass which serve as infiltration basins would ideally be regraded to prevent ponding.

Future Studies

This office will work with the District Project Development if other alignments are proposed and with the District Materials Unit to determine the need for an additional subsurface investigation after an alignment is selected.

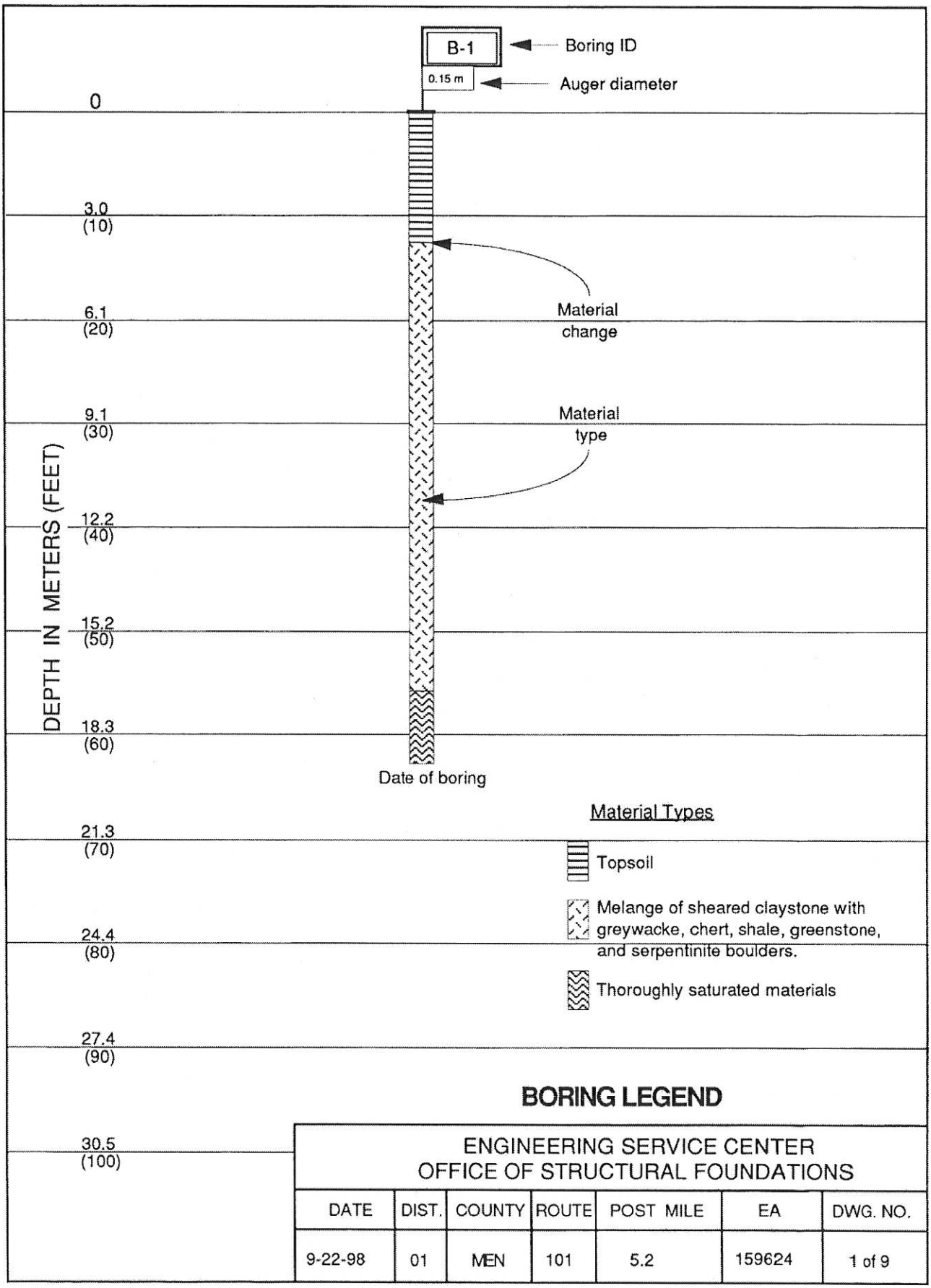
If you have any questions or comments regarding this study, please call me at (916) 739-5435 or (ATSS) 497-5435.

GARY GAROFALO, C.E. 36467
Senior Materials and Research Engineer
Office of Geotechnical Engineering

Attachments

cc: RHPrysock
DIrwin, DME - 1
Office of Engineering Geology - 2 copies
JDuffy - District 5
TOstrom - OSD Branch B, Design Section 5

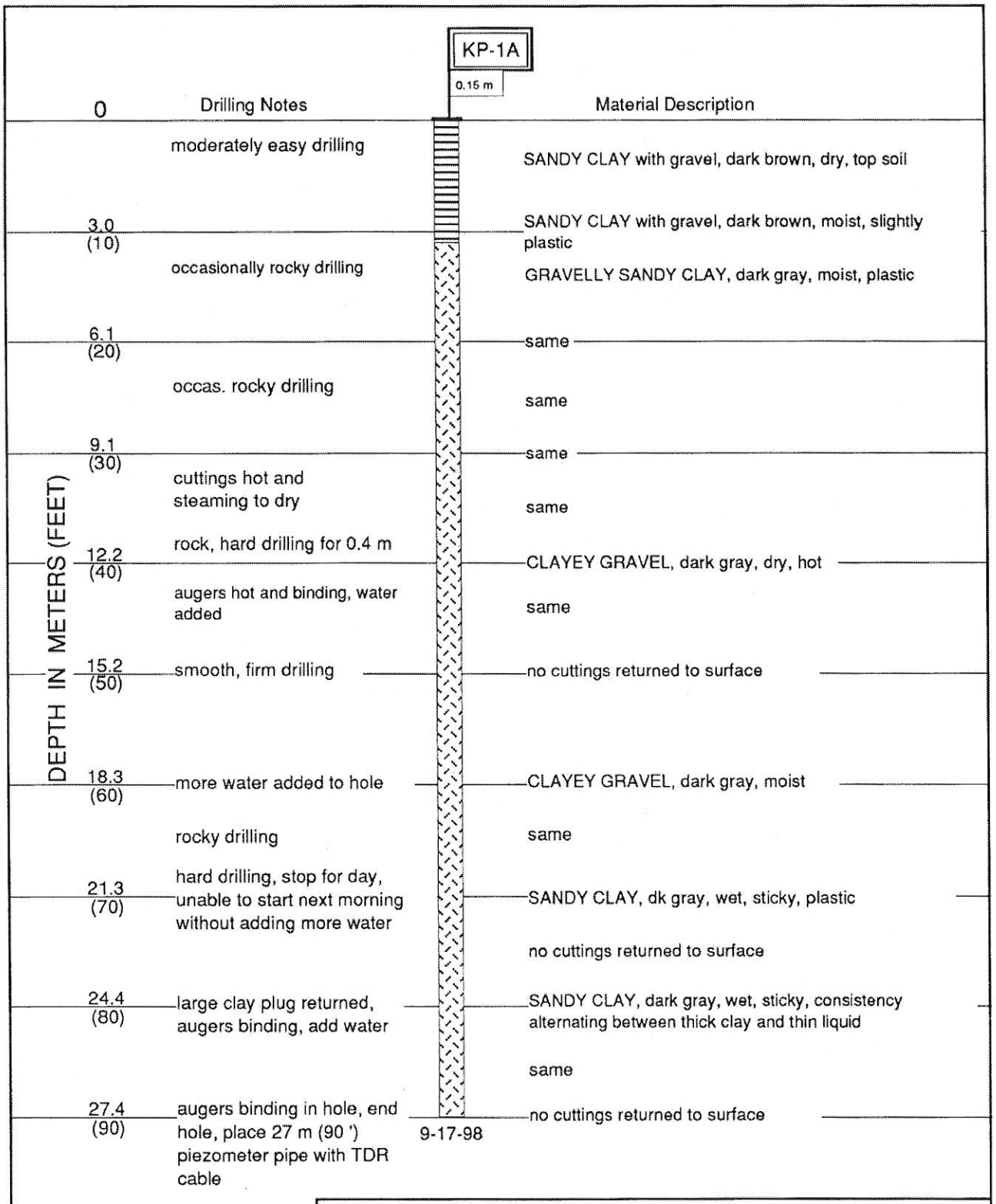
ATTACHMENT 10



BORING LEGEND

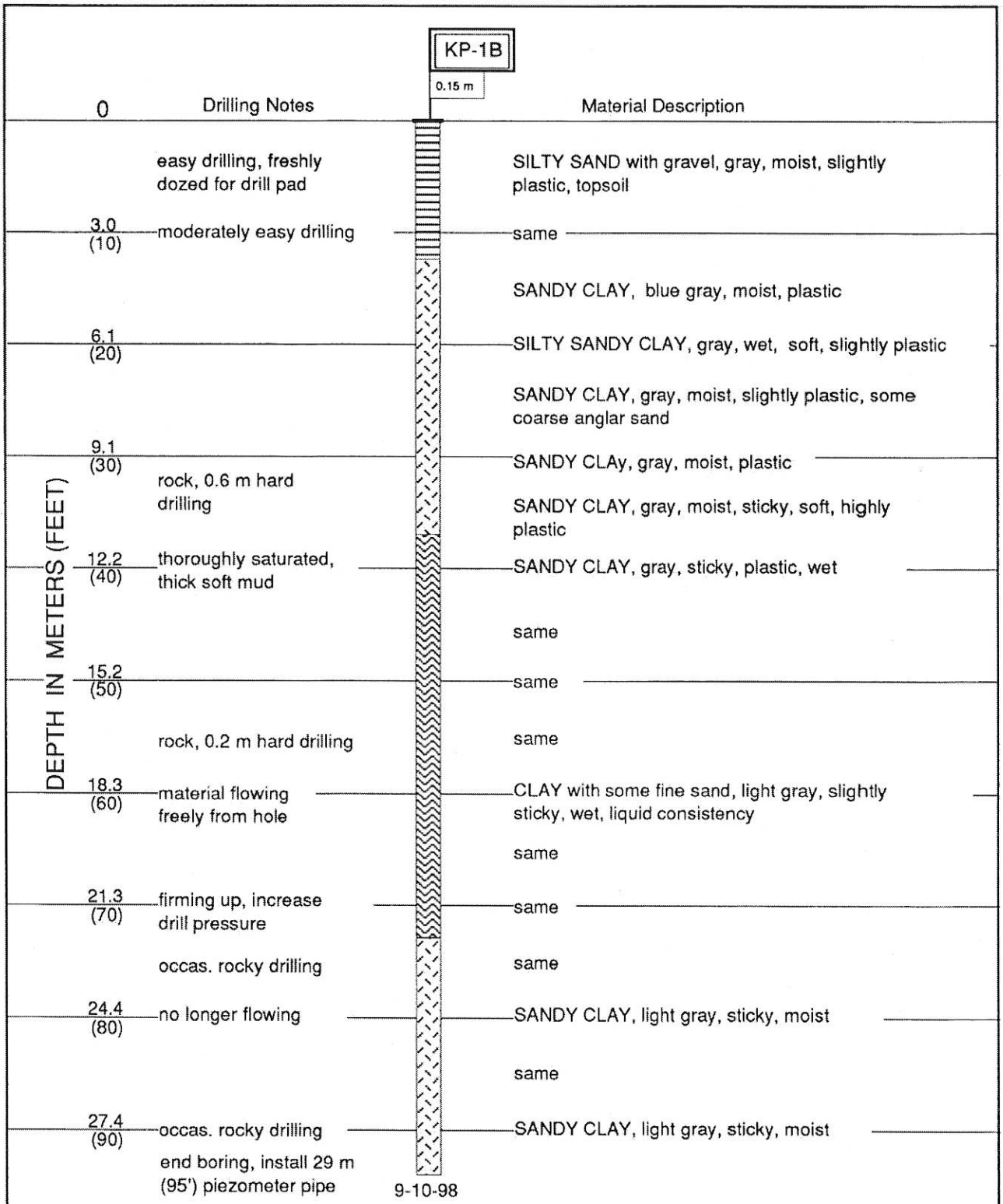
ENGINEERING SERVICE CENTER
OFFICE OF STRUCTURAL FOUNDATIONS

DATE	DIST.	COUNTY	ROUTE	POST MILE	EA	DWG. NO.
9-22-98	01	MEN	101	5.2	159624	1 of 9



ENGINEERING SERVICE CENTER
OFFICE OF STRUCTURAL FOUNDATIONS

DATE	DIST.	COUNTY	ROUTE	POST MILE	EA	DWG. NO.
9-22-98	01	MEN	101	5.2	159624	2 of 9



ENGINEERING SERVICE CENTER
OFFICE OF STRUCTURAL FOUNDATIONS

DATE	DIST.	COUNTY	ROUTE	POST MILE	EA	DWG. NO.
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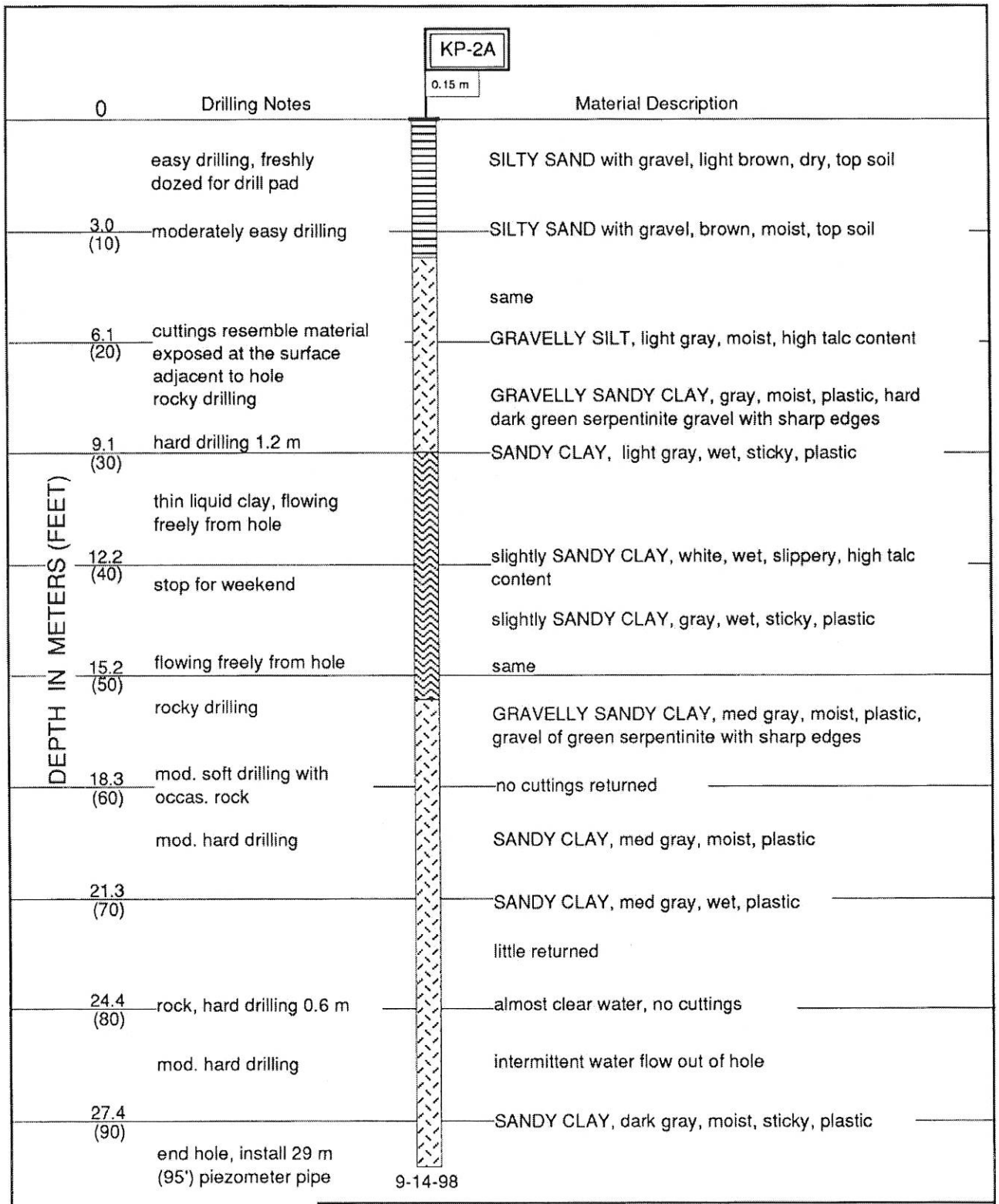
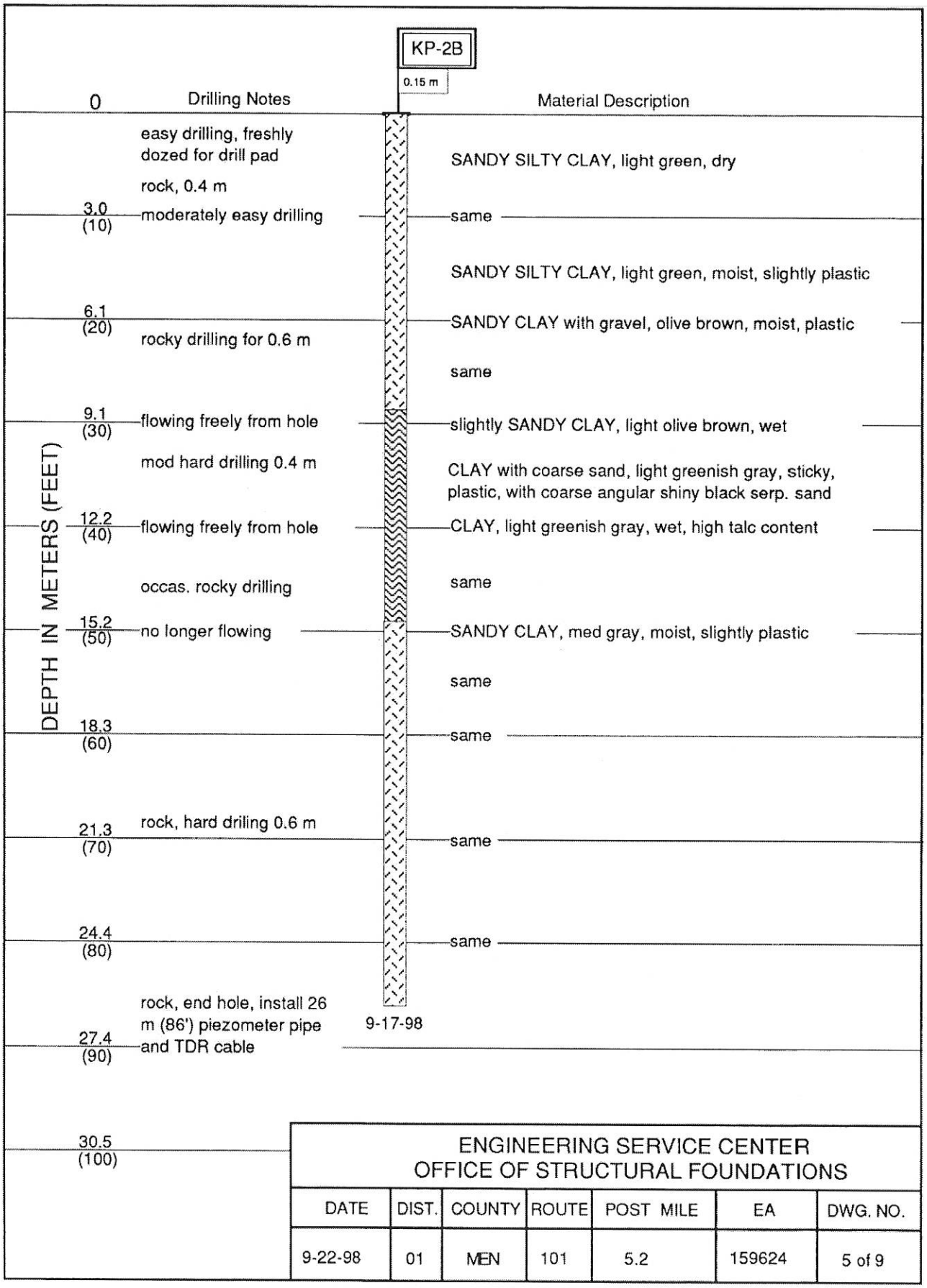


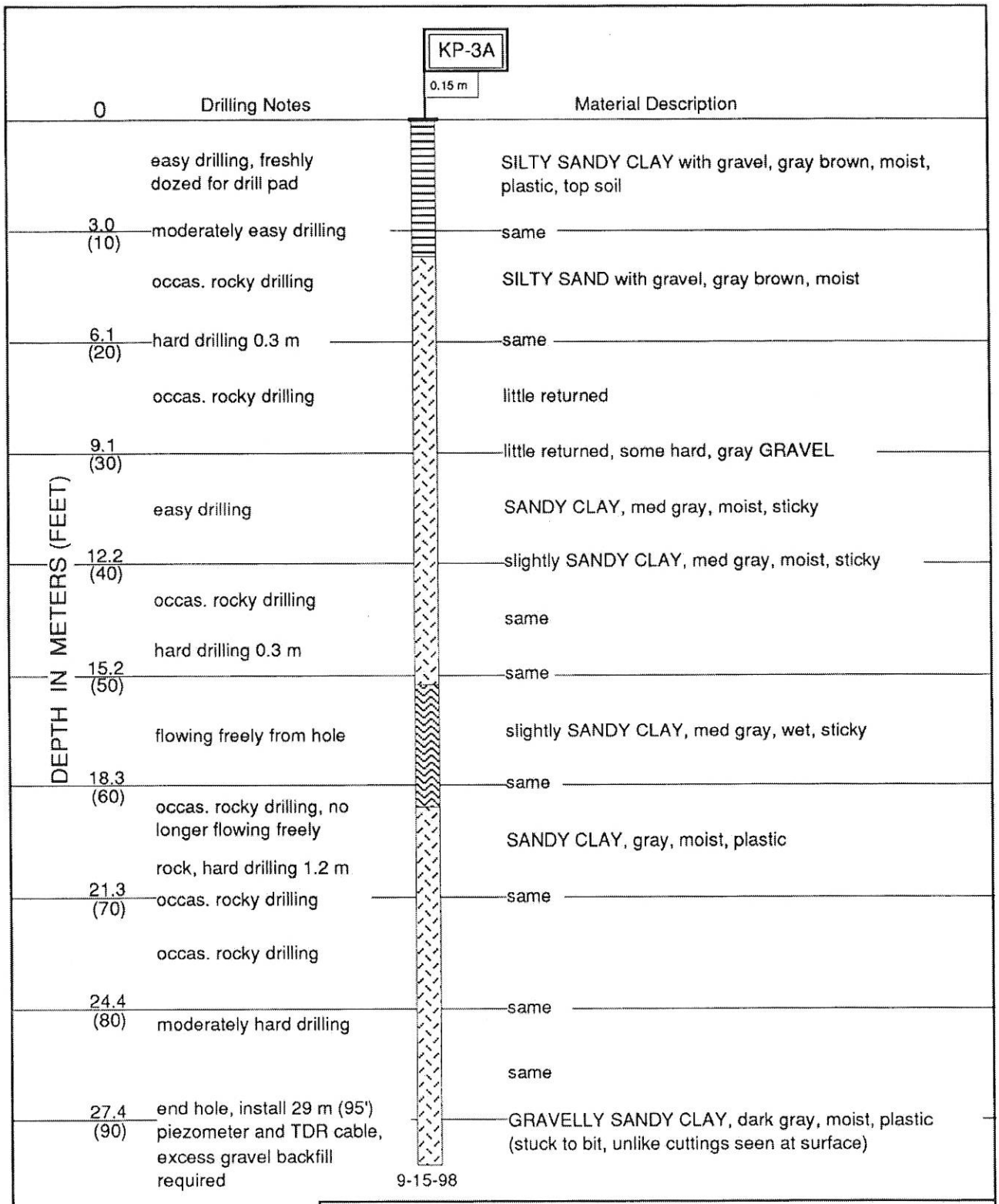
ENGINEERING SERVICE CENTER
OFFICE OF STRUCTURAL FOUNDATIONS

DATE	DIST.	COUNTY	ROUTE	POST MILE	EA	DWG. NO.
9-22-98	01	MEN	101	5.2	159624	4 of 9



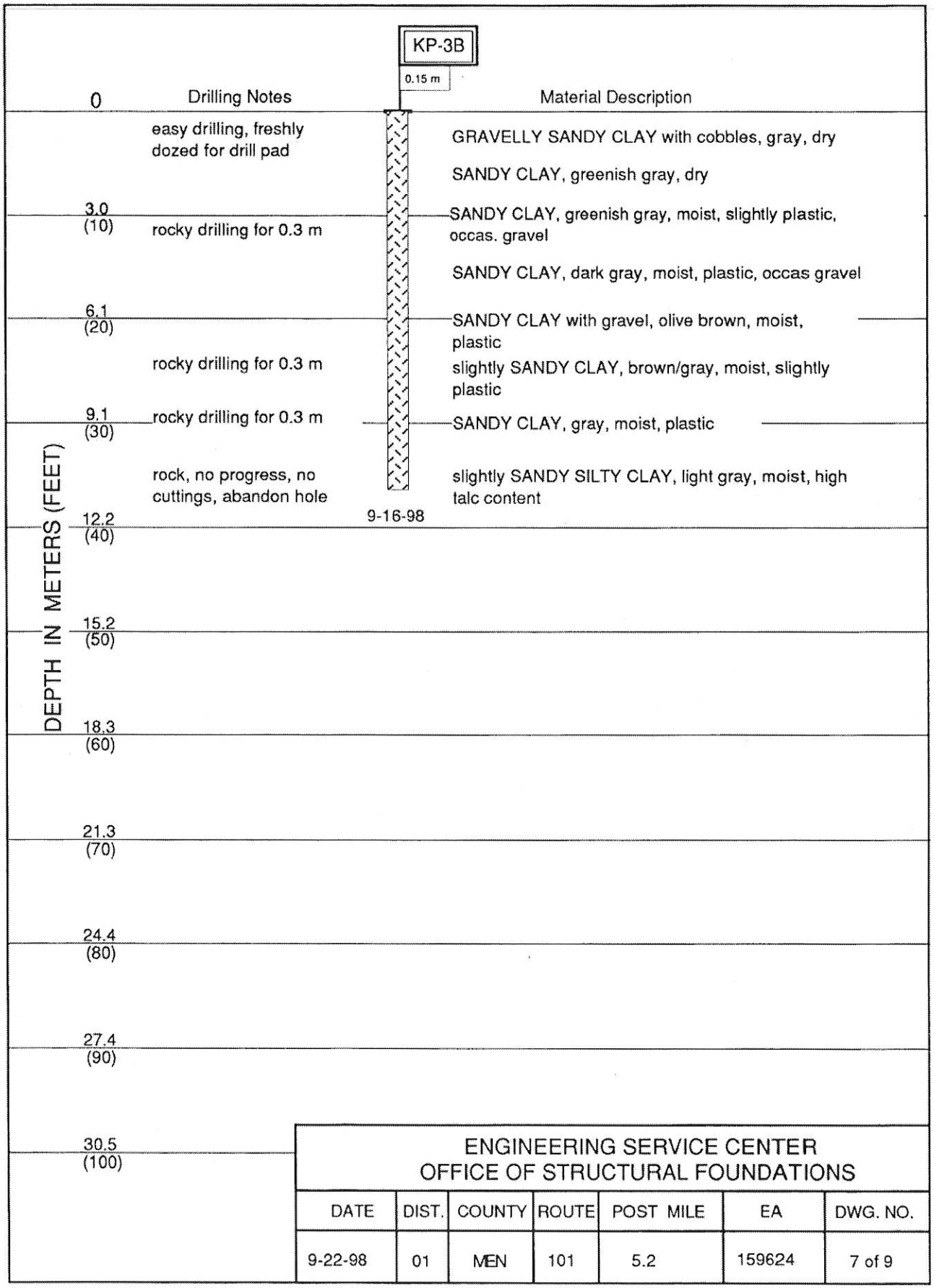
ENGINEERING SERVICE CENTER
OFFICE OF STRUCTURAL FOUNDATIONS

DATE	DIST.	COUNTY	ROUTE	POST MILE	EA	DWG. NO.
9-22-98	01	MEN	101	5.2	159624	5 of 9



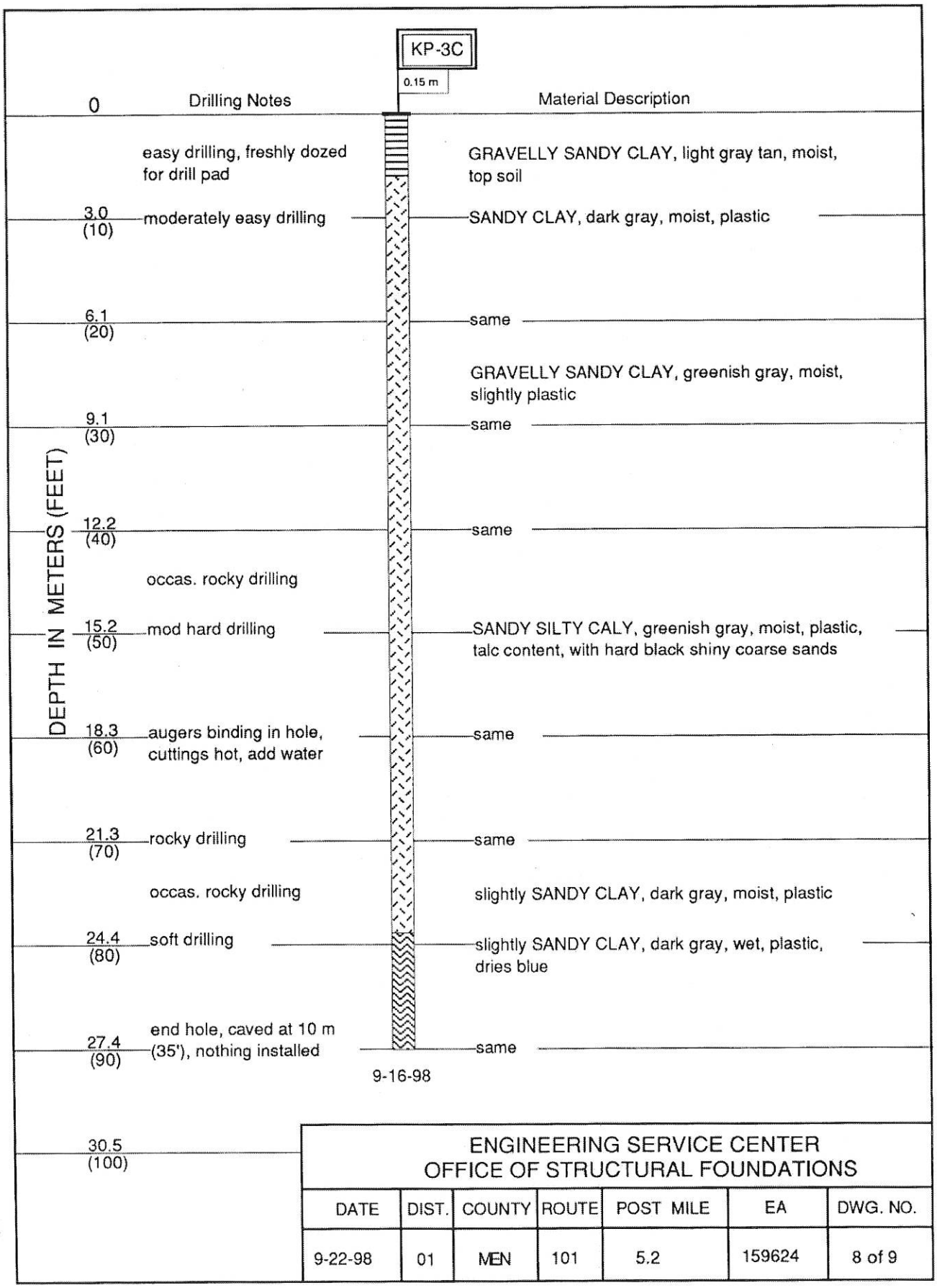
ENGINEERING SERVICE CENTER
OFFICE OF STRUCTURAL FOUNDATIONS

DATE	DIST.	COUNTY	ROUTE	POST MILE	EA	DWG. NO.
9-22-98	01	MEN	101	5.2	159624	6 of 9



ENGINEERING SERVICE CENTER
OFFICE OF STRUCTURAL FOUNDATIONS

DATE	DIST.	COUNTY	ROUTE	POST MILE	EA	DWG. NO.
9-22-98	01	MEN	101	5.2	159624	7 of 9



ENGINEERING SERVICE CENTER
OFFICE OF STRUCTURAL FOUNDATIONS

DATE	DIST.	COUNTY	ROUTE	POST MILE	EA	DWG. NO.
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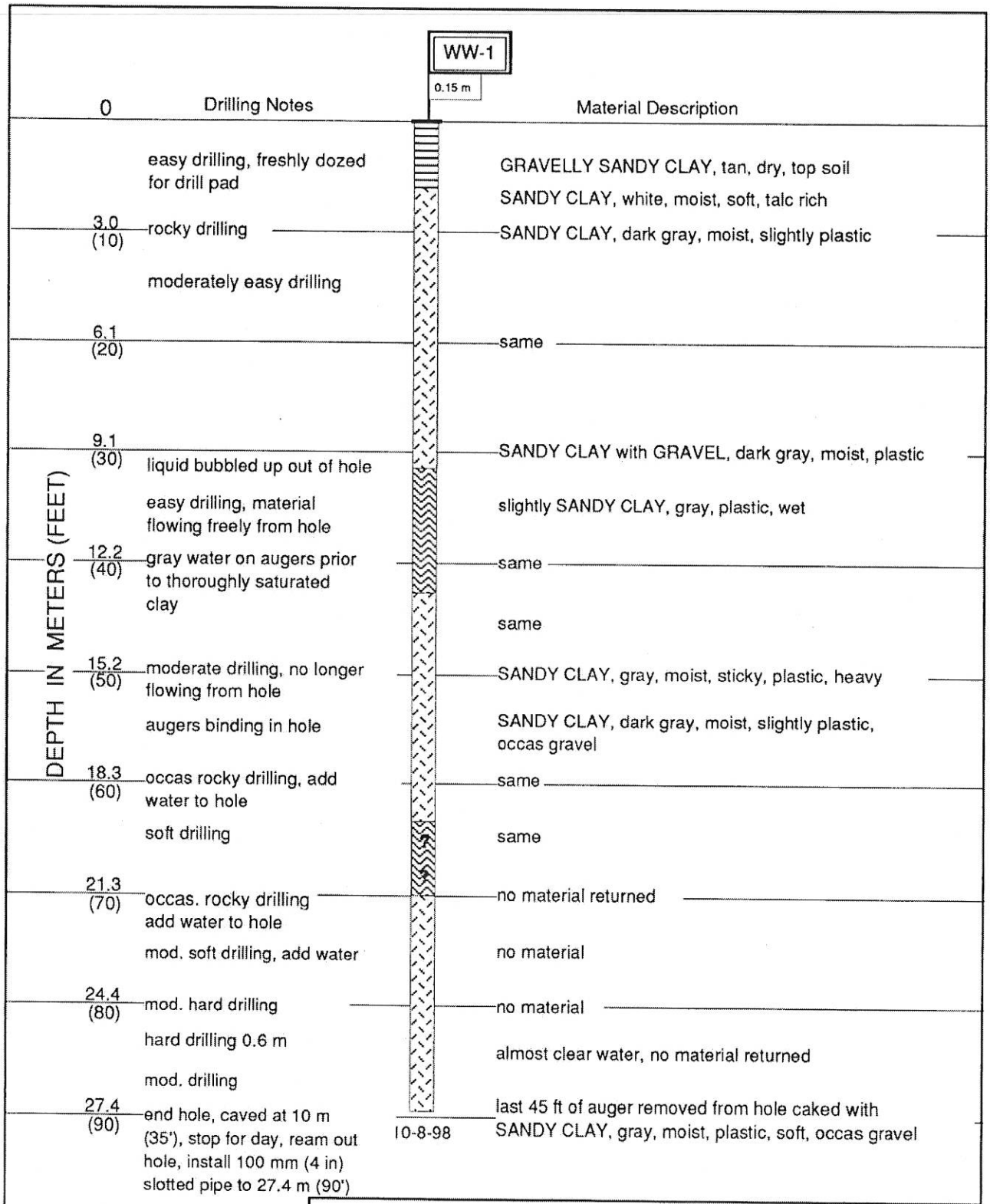

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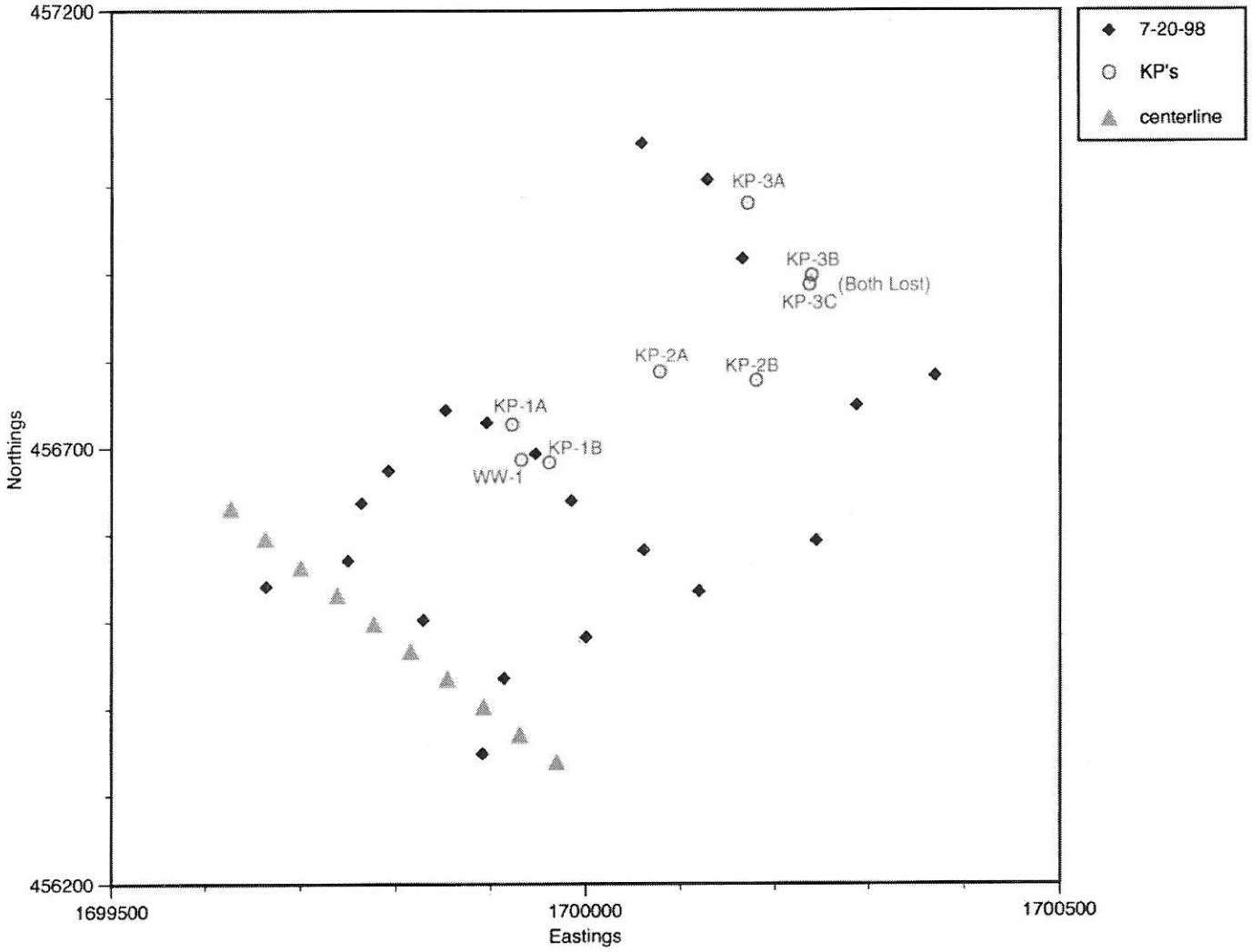
DATE	DIST.	COUNTY	ROUTE	POST MILE	EA	DWG. NO.
9-22-98	01	MEN	101	5.2	159624	9 of 9

Piezometer Location Map

Using Monitoring Stations from July 20, 1998



KP's

by surveys

Boring	N	E	elv	full depth	sat. zone	sat. zone
KP-1A	456717.441	1699919.014	548.055	90	0	
KP-1B	456688.276	1699972.029	546.24	95	60	486.24
KP-2A				95	40	-40
KP-2B	456777.085	1700140.178	576.772	86	40	536.772
KP-3A	456975.417	1700188.277	596.274	95	55	541.274
KP-3B				36	0	
KP-3C				90	>90	
WW-1	456699.465	1699943.856	546.644	90	(32)/63	483.644

water levels

Boring	9/18/98	9/22/98	10/7/98	10/9/98	11-20-98	12-8-98
KP-1A	-	30	11.4	12.3	12.2	10.0
KP-1B	15	14	15.2	15.0	15.1	11.0
KP-2A	20	20	20.5		21.1	19.3
KP-2B	17	21	21.2		17.2	9.2
KP-3A	8.5	9	9.4		~3	10.0
KP-3C	21	12	7.0		lost	—
WW-1				23.2	14.9	surface

boring test — during a storm

by calcs

Boring	N	E	elv	full depth	sat. zone	sat. zone
KP-1A	456727.2	1699922.1	547.825	90	0	
KP-1B	456683	1699961.7	543.241	95	60	483.241
KP-2A	456787.6	1700078	577.963	95	40	537.963
KP-2B	456777.2	1700179.9	586.963	86	40	546.963
KP-3A	456980.7	1700170.8	590.963	95	55	535.963
KP-3B	456897.2	1700238.6	580.963	36	0	
KP-3C	456887.2	1700236.6	581	90	>90	
WW-1	456686.2	1699931.9	544.241	90	(32)/63	481.241

Pump Testing Notes

Placed 90 feet of pipe, 4 inch in diameter. Lower most 30 feet slotted by hand tools and 2 ten-foot sections of ready made slotted pipe at 30 and 50 feet. Used two different types of pipe. The different wall thicknesses required a pipe coupler at 50 feet depth. OD was the same, but ID was larger in upper 50 feet. Backfilled with Monterey sand. Water was added to the hole during installation of the pipe and sand backfill. Water level was 9.1 ft after installation.

Used a 4-inch Goulds submersible down-hole pump borrowed from District 1 Hydraulics. Pump easily lowered to 50 feet with solid 2-inch PVC pipe. Very tight fit to 60 feet. Required generator borrowed from Ukiah Maintenance.

First draw down lowered water to 42 feet with the pump at 50 feet. The water level then rose as follows.

12 sec per foot 42 to 40 feet	12s/f, 5 fpm
2.3 feet in 1 minute 33 to 35 feet	26s/f, 2.3 fpm

2nd draw down

6.6 feet in 1:48 at 37 to 44 feet	16s/f, 3.7 fpm
1 foot in 22 sec at 39 to 38 feet	22s/f, 0.4 fpm

Both times the water pumped out very dark with clay. Removed pump and inserted PVC pipe to bottom of hole to flush with clear water.

Suspect the 6-inch augered boring not uniform in diameter over its depth from 60 to 25 feet. The boring may have a larger overall diameter where the drilling was easy from 30 to 40 feet, than through the firmer materials below 40 ft. Pushed pump down to 60 feet and pumped down to 51 feet. Water quickly rose to 45 feet, moderately fast to 36 feet, slowly to 25 feet. Leave over night to stabilize.

Next morning run pump test with pump at 60 feet. Limit to draw down approximately 51 feet. Monitor rise in water level to approximately 36 feet.

Monitor both adjacent piezometers, with KP-1A 30.7 feet west of the well and KP-1B 30.3 feet east of it. KP-1A is 1.4 feet higher in elevation.

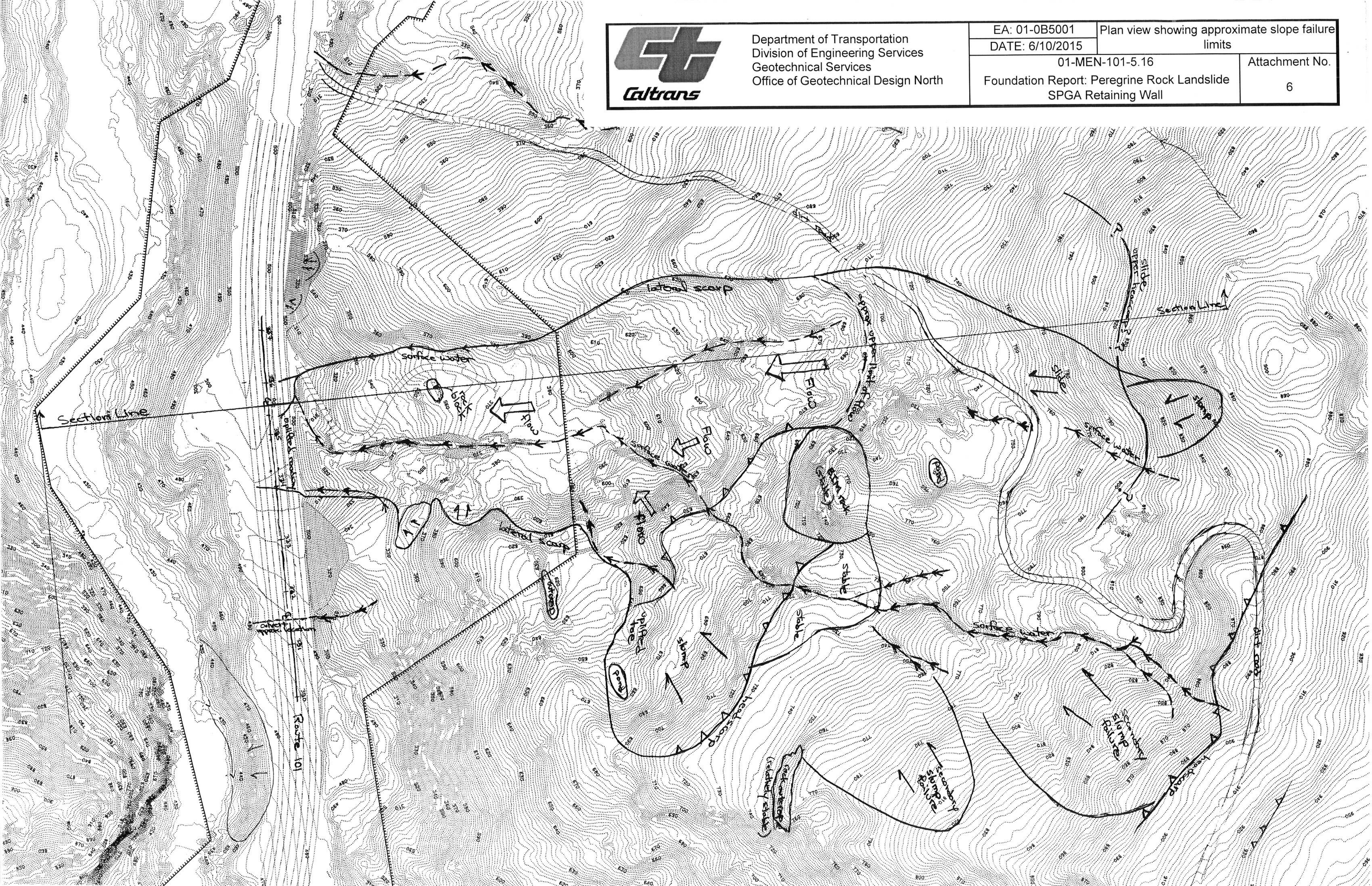
Pump Test 10-9-98

Time	KP-1A	KP-1B	WW-1	Comments
8:30	12.3	15.0	23.2	Initial readings
8:40				Pump down from 60'
8:42		15.0	51.0	
8:44			44.4	18s/f, 3.00 fpm
8:47			43.2	150s/f, 0.40 fpm
8:50		15.0	42.5	257s/f, 0.23 fpm
8:53	12.3			
8:55			41.5	0.20 fpm
9:00		15.0	40.6	0.18 fpm
9:10			39.0	0.16 fpm
9:21			37.5	0.14 fpm
9:23		15.0		
9:26	12.3			
9:27				Pump down from 60'
9:28			51.6	
9:46		15.0	47.8	0.21 fpm
9:49	12.2			
9:51			46.9	0.18 fpm
10:09				unable to pump from well
10:18			47.1	after pulling pump from well
10:30				Place concrete collar and cap

Calculations by surveyed locations

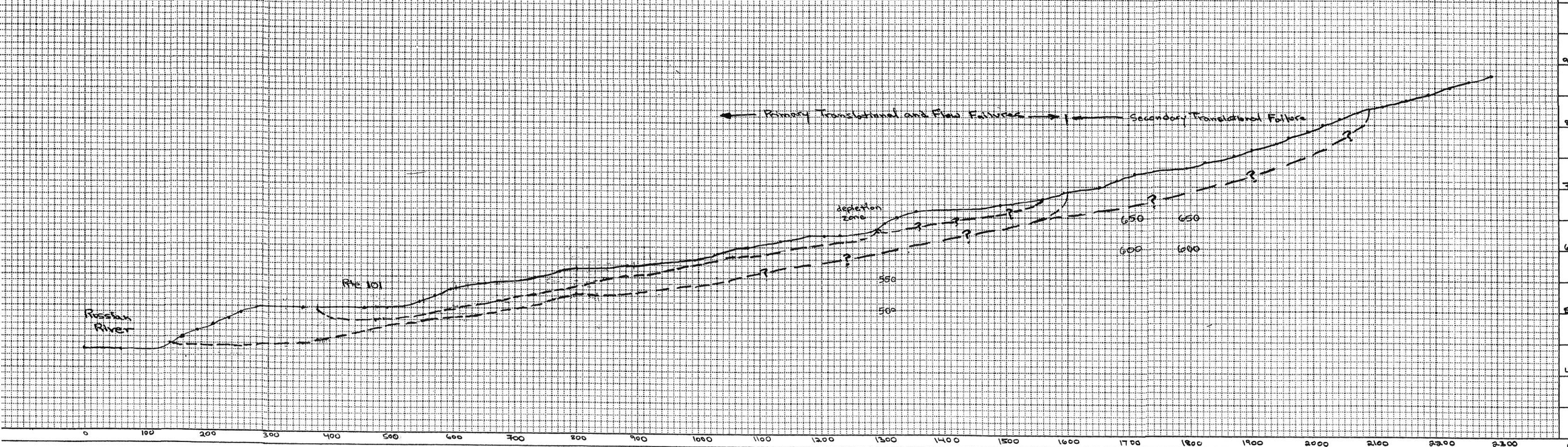
10/12/98	N:	E:	ELEV:			centerline	N	E
KP-1A	456717.441	1699919.014	548.055				456339.642	1699969.8
KP-1B	456688.276	1699972.029	546.24				456371.482	1699931.15
KP-2A							456403.265	1699892.59
KP-2B	456777.085	1700140.178	576.772				456435.064	1699854.03
KP-3A	456975.417	1700188.277	596.274				456466.877	1699815.36
MW-30/WW-1	456699.465	1699943.856	546.644				456498.666	1699776.85
							456530.51	1699738.34
MW-5	456726.796	1699998.527	553.906	10/12/98	Old SI, sheared off		456562.744	1699700.13
MW-5	456810.726	1700071.05	577.127	11/3/97			456596.266	1699663.05
							456630.968	1699626.94

Boring	N	E	elv	Δ N	Δ E	dist	Δ elv	
KP-1A	456717.441	1699919.014	548.055	18.0	24.8	30.7	1.4	
KP-1B	456688.276	1699972.029	546.24	11.2	28.2	30.3	0.4	
WW-1	456699.465	1699943.856	546.644	-	-	-	-	
MW-5	456726.796	1699998.527	553.906	83.9	72.5	110.9	23.2	10/12/98
	456810.726	1700071.05	577.127					11/3/97



Caltrans	Department of Transportation Division of Engineering Services Geotechnical Services Office of Geotechnical Design North	EA: 01-0B5001 DATE: 6/10/2015	Plan view showing approximate slope failure limits
		01-MEN-101-5.16 Foundation Report: Peregrine Rock Landslide SPGA Retaining Wall	Attachment No. 6

Caltrans	Department of Transportation Division of Engineering Services Geotechnical Services Office of Geotechnical Design North	EA: 01-0B5001 DATE: 6/10/2015	Generalized cross section of slope failures
		01-MEN-101-5.16 Foundation Report: Peregrine Rock Landslide SPGA Retaining Wall	Attachment No. 7



Hasan, Nasim@DOT

From: Johnson, T Chris C@DOT
Sent: Tuesday, October 13, 2015 1:28 PM
To: Hasan, Nasim@DOT
Subject: FW: Water Availability for Project 01-0B500

Hi Nasim,

Non-potable water is available for this project from the City of Healdsburg. See contact information below.

Please include this email with your submittal to District Office Engineer.

T. Chris Johnson
District Landscape Architect
North Region - District 3
(530) 741-4436
(530) 741-4127 (Fax)

***Caltrans Mission**: Provide a safe, sustainable, integrated, and efficient transportation system to enhance California's economy and livability.*
***Caltrans Vision:** A performance-driven, transparent, and accountable organization that values its people, resources and partners, and meets new challenges through leadership, innovation, and teamwork*.

From: Rob Scates [mailto:rscates@ci.healdsburg.ca.us]
Sent: Tuesday, October 13, 2015 11:47 AM
To: Johnson, T Chris C@DOT
Subject: RE: Water Availability for Project 01-0B500

Chris,

I have about 700,000 gallons per day to offload, so you should be OK. We have 2 available hydrants near the City, so you will have a relatively short haul.

I look forward to hearing from you next year.

ROB SCATES | Water/Wastewater Operations Superintendent
City of Healdsburg Municipal Utilities Department
401 Grove St. Healdsburg, CA 95448
707.431.3346 | rscates@ci.healdsburg.ca.us

From: Johnson, T Chris C@DOT [mailto:tchris.johnson@dot.ca.gov]
Sent: Tuesday, October 13, 2015 9:43 AM
To: Rob Scates
Subject: Water Availability for Project 01-0B500

Hi Rob,

Caltrans will advertise a Storm Damage project in May 2016 with a construction start date in July or August 2016. The location is on State Route 101 in Mendocino County (see attached project title sheet).

The department is required to identify sources of non-potable water for our projects and if non-potable is not available then we need to identify potable water sources.

Please let us know whether sufficient quantity of potable or non-potable water is available for this project. Approximately 1,278,000 gallons of water will be required during construction.

If there are any questions regarding this request, please contact me.

T. Chris Johnson
District Landscape Architect
North Region - District 3
(530) 741-4436
(530) 741-4127 (Fax)

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