PROJECT CHANGE REQUEST

PROJECT ID. 0112000126
DISTRICT/EA 01-0B420 PPNO 2340 PGM Doc. 2014 SHOPP PGM Del FY 15/16 PROG CODE 201.131

	Cty	Rte	PM	Description
PROJECT (SCOPE) DESCRIPTION:	HUM	101	110.6/T113.8	Lagoons Slip and Slide

DOES THIS PROJECT INVOLVE PROPOSITION 1B FUND(S)? NO ☒ YES ☐, TYPE(S) (CMIA, Route 99, STIP, SHOPP, etc.) _____

SCOPE, COST & SCHEDULE CHANGES

TYPE OF REQUEST: ☒ PGM COST ☒ PGM YEAR ☒ SCOPE ☐ SPLIT / COMBINE ☐ OTHER: _____

COMPONENT Change ($'s in 1,000's)

	EXISTING (PROGRAMMED)		PROPOSED		COST EXPENDED to Date % COMPLETE			COST CHANGE			
	Value	FY	Value	FY	Expended	% Expended	% Complete	Value	Value%	Yrs	Type
PA&ED	$193	15/16	$270	16/17	$176	91%	85%	$77	40%	1	A
PS&E	$579	15/16	$1020	16/17	$422	73%	50%	$441	76%	1	A
R/W SUP	$28	15/16	$90	16/17	$ < 1	< 1%	5%	$62	221%	1	A
CON SUP	$390	15/16	$1120	16/17	$0	0%	0%	$730	187%	1	A
R/W CAP	$20	15/16	$760	16/17	$0	0%	0%	$740	3700%	1	A
CON CAP	$1950	15/16	$5000	16/17	$0	0%	0%	$3050	156%	1	A
Total	$3160		$8260		$598			$5100	161%		

WHAT PHASE IS THE PROJECT IN? PRE-PGM DELIVERY YR ☒ PGM DELIVERY YR & PRE VOTE ☐ POST VOTE ☐

Cost Change Type	Description	Data Systems Changed	
	Cost Change Request Types	Programmed Budget	Approved Cost
A	Programming Cost Change	CTIPS	AMS Advantage
B	Headquarters Cost Approval		AMS Advantage
C	District Cost Documentation		
NA	No Change Proposed		
	Supplemental Funds Requests		
SFR	Supplemental Funds Request		AMS Advantage If Expenditures < 100%

New Project Description: (Only If Revised) Cty - Rte - PM - Description ____ ____ ____ ____

"010" Safety Project? Yes☐ No☐

Project Performance	EXISTING (PROGRAMMED)		PROPOSED		PERFORMANCE CHANGE		
	2 Value	Loc Units	2 Value	Loc Units	_____ Value	_____ Units	0%

(SHOPP PRIMARY PERFORMANCE OUTPUT BY PROGRAM CODE)

1.) **WHAT IS THE PROPOSED CHANGE?**
The proposed changes are to the increase construction capital, R/W capital, and support costs to reflect increased costs associated with the new repair strategy. The project schedule is also being moved out one year due to wetland mitigation requirements.

2.) **COMPLETE THE FOLLOWING REGARDING THE LATEST TWO COST ESTIMATES. ($'s in 1,000's.)**

1.	**ESTIMATE DATE:** 12/12 (MM/YY),	**Con Capital** $1950,	**RW Capital** $20.
2.	**ESTIMATE DATE:** 10/14 (MM/YY),	**Con Capital** $5000,	**RW Capital** $760.

3.) **WHAT WAS THE REASON FOR THE CHANGE?**
Capital cost for the project has increased due to the hydraulics and geotechnical study determination that the culvert must be replaced utilizing trenchless technology. The culvert was videoed and determined that slip-lining with a pipe was not feasible due to the pipe's offset and damaged condition. The District explored other slip-lining technologies, but the North Coast Regional Water Quality Control Board has prohibited their use. Since there is no feasible way to repair or line the pipe, the pipe must be replaced with a new pipe. The significant depth of the drainage requires the pipe to be replaced via trenchless methods which are significantly more expensive than lining or cut-and-cover methods.

The increase in R/W capital costs are due to the biologist's determination that offsite mitigation is required. Completion of wetland delineation and impact analysis resulted in an area of coastal wetland mitigation in excess of what can be mitigated for onsite. Offsite coastal wetland mitigation opportunities are difficult to locate and costly.

The project schedule was moved out to the 16/17 delivery year due to late California Department of Parks and Recreation input on the draft environmental document and the 4F consultation. Of more significant impact to the project timeline, the identification and location of a wetland mitigation opportunity that meets the approval California Coastal Commission is likely to take up to two years from PA&ED. The coastal wetland mitigation costs have been identified in the R/W capital increase, but the final mitigation has yet to be determined and the PDT may need to move these dollars from R/W capital to construction capital based upon the final coastal wetland mitigation project.

The increase in PS&E and construction support costs reflect the increased effort to design and inspect trenchless culvert work. The increase in R/W support and environmental (PS&E) support costs reflect the increased effort in identifying, designing, clearing and purchasing coastal wetland mitigation.

4.) **WHEN WAS THE CHANGE DISCOVERED?**
The potential change was first identified summer 2014, but capital costs were not finalized until after subsurface studies were completed this fall.

5.) **WHAT HAS BEEN DONE TO MINIMIZE ANY CHANGE?**
The team met with California Department of Parks and Recreation and California Coastal Commission staff on multiple occasions to attempt to minimize the project foot print and the related mitigation needs.

6.) **WHAT CAN BE CONSTRUCTED WITH THE PROGRAMMED FUNDS?**
Current funding amounts would support construction of the storm damage repairs at Location 1, but the damaged culvert at Location 2 would not be able to be constructed. With the requested funding increase the drainage systems at both locations could be restored to full functionality.

7.) **IF THE SCOPE IS REDUCED OR SPLIT, WOULD THE REMOVED WORK NEED TO BE REPROGRAMMED OR ADDED TO ANOTHER PROJECT?**
Yes.

8.) **IS A SUPPLEMENTAL SCOPING DOCUMENT NEEDED? IF YES, STATUS?**
Yes. Approvals for two revised DAFs have been obtained from FHWA. The revised DAFs reflect the change in scope to a culvert replacement strategy with trenchless installation. See attached.

9.) **WAS A VALUE ANALYSIS STUDY CONDUCTED? EXPLAIN THE RESULTS OF THE STUDY OR WHY A STUDY WAS NOT CONDUCTED?**
No.

10.) **COST - WHERE WILL THE REQUIRED FUNDS COME FROM?**
Additional funds will be obtained from FHWA based upon approved revised DAFs (see attached).

11.) **PRIOR PCRs – LIST OTHER PCRs PREVIOUSLY APPROVED.**
A previous PCR was approved in May 2013 to move the delivery year out from FY 13/14 to 15/16.

PROJECT CONCURRENCE

12.) (A) **(STIP-RIP) WHEN DID THE DISTRICT DISCUSS THIS WITH HEADQUARTERS STIP PROGRAM MANAGER AND THE RTPA OR COUNTY TRANSPORTATION COMMISSIONS STAFF? EXPLAIN THEIR REACTION.**
N/A

(B) **(STIP-IIP)WHEN DID THE DISTRICT DISCUSS THIS WITH HEADQUARTERS STIP PROGRAM MANAGER? EXPLAIN THEIR REACTION.**
N/A

(C) **(SHOPP) WHEN DID THE DISTRICT DISCUSS THIS WITH THE HEADQUARTERS PROGRAM MANAGER? EXPLAIN THEIR REACTION.**
The project and proposed PCR were reviewed with Gerald Kracher; he concurred with the current PCR on December 1, 2014.

13.) **LESSONS LEARNED, NEW STRATEGIES** (What new information pertaining to this project could be beneficial to others?)
Recent changes in California Department of Parks and Recreation (CDPR) staff approach to reviews of 4F consultations and draft environmental documents has caused significant delays to project milestones. Even though the project team is conscientious and schedules multiple field meetings with Parks staff early and throughout the project process, the district continues to receive late comments from Parks staff. It is this PDT's recommendation that for future any project adjacent to Parks, the project schedule take these potential delays into consideration and identify "Late Parks Input" as a potential project risk.

14.) District Project Manager Signature

Talitha Hodgson
District Project Manager

12/17/14
Date

(707) 498 - 0901
Phone Number

for Mark Suchanek
Deputy District Director
Program/Project Management

12/17/14
Date

APPROVAL – COMMENTS - CONCERNS

☒ PD Concurrence

☐ PD Objections (detail concerns):

15.) Comments - Concerns:

Jim Deluca
HQ Project Delivery Coordinator

12/10/14
Date

APPROVAL

	Approve	Deny	No HQ Action
Cost	☐	☐	☐
Scope	☐	☐	☐
Schedule	☐	☐	☐
Split / Combine	☐	☐	☐
Other	☐	☐	☐
Revise & Resubmit	☐	☐	☐

Charles Fielder
DISTRICT DIRECTOR

12/17/2014
Date

for JAMES E. DAVIS
HQ DIVISION CHIEF
PROJECT MANAGEMENT

1/20/15
Date

for RACHEL FALSETTI
HQ DIVISION CHIEF
TRANSPORTATION PROGRAMMING

1/22/15
Date

REQUIRED ATTACHMENTS

(a) Attach 1 page copy (screenprint) of project workplan/status schedule.
(b) Attach the current CTIPS project information.
(c) PCR Data Worksheet, if applicable (for splits/combines).
(d) For STIP Projects, please attach the latest Project Programming Request (PPR).
(e) Summary Cost Estimates, if/when needed.

PROJECT ID. 0112000126
DISTRICT/EA 01-0B420

Form: August 2014 MB

01-0B420 Lagoons Slip and Slide

M120	Circ DED	12/1/2014
M200	PA&ED	3/12/2015
M224	R/W Reqts	3/4/2014
M225	R/W Maps	3/21/2015
M377	P&E	11/23/2016
M380	PS&E	2/1/2017
M410	R/W Cert	2/1/2017
M460	RTL	3/1/2017
M480	Advertise	6/19/2017
M490	Bid Open	7/17/2017
M496	Award	8/21/2017
M500	App Cont	9/4/2017
M600	CCA	12/1/2018

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

DAMAGE ASSESSMENT FORM (DAF)

FHWA CA Form
DLA-0001 (Rev. 5/2011)

U.S. Department of Transportation
Federal Highway Administration-
California Division- Title 23
Damage Assessment Form (DAF)

DAF No. CEP - CT01 - 0 2 6 - 1

Sheet #1 of 4 Federal Project # EO ER - ( )

Disaster No. CA 1 1 - 3 PR ER - ( )

Applicant	County	Incident Date (mm/dd/yyyy)	Inspection Date
CALTRANS	HUMBOLDT	03/25/2011	

Location of Damage: Per Site ☑ or ☐ Per Mile

Federal-aid Highway? Y for yes, if no, ineligible for ER funds: Y

Name of Road/Bridge: Route 101

PM Begin: 110.58 PM Length: 500 (in feet)

PM End:

Map No: 1C

Functional Classification Type: Other Principal Arterial

Road/Bridge Data: Bridge No. n/a Type:

Traveled Way: Width 2-12' Type: PCC ☐ AC ☑ Gravel ☐

Shoulder: Width var 2-8' Type: PCC ☐ AC ☑ Gravel ☐

Route # 101

Forest Hwy? Y/N: N Interstate? Y/N: N

Existing ADT: 4,100

Description of Damage: Slipout and Drainage System Damage

COST ESTIMATE

	Type of Repair	Description of Work	Cost Summary	
Emergency Opening (EO)	EO- AGENCY FORCES CT Work Order #(s): EA(s):		PE	
			CE	
			Construction	
	EO- CONTRACT EO EA(s):		PE	
			CE	
			Construction	
			R/W	
	NOTE: Environmental documentation for EO is required. It is generally started after work has begun.		Subtotal Emergency Opening	
Permanent Restoration (PR)	PR- CONSTRUCTION FA requires an approved PIF ☑ Contract ☐ FA PR EAs 0B420	Replace failed downdrain, excavate and remove landslide deposit.	PE	$270,000.00
			CE	$240,000.00
			Construction	$1,200,000.00
	NOTE: PRIOR AUTHORIZATION (APPROVED E-76) IS REQUIRED TO PROCEED WITH PERMANENT RESTORATION R/W & CONSTRUCTION		R/W	$10,000.00
	NOTE: Environmental clearance for permanent restoration is conducted through normal Federal-aid procedures		Subtotal Permanent Restoration	$1,720,000.00

Eligible	Signature	Date		
☐ YES ☐ NO	Local Agency (if applicable):		PE Total	$270,000.00
☑ YES ☐ NO	Caltrans: Sherry Constancio	4/2/14	CE Total	$240,000.00
☐ YES ☐ NO	FHWA*:		Construction Total	$1,200,000.00
			R/W Total	$10,000.00
			TOTAL ESTIMATE	$1,720,000.00

Agency signature name (print): N/A

CT signature Name (print): Sherry Constancio

FHWA Sig. Name (print): Miguel A. Ramos

DAF Prepared by (print): Sherry Constancio

Original: Caltrans District Copies: FHWA, Division of Local Assistance (local roads), Federal Resources (state hwy), HQ Major Damage Engineer (state hwy)
* Write "N/A" in FHWA signature block if the project has no Federal ER funding or Federal ER funding delegated to the State.
FHWA Signature: REQUIRED for all Federal Funded State projects. REQUIRED for any Local Agency projects with 1) any BETTERMENT, 2) more than 2 ROW takes or 3) when paving is more than 50% of the Total Estimated Cost. Reminder: This DAF must be accompanied by photos of the damage.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

DAMAGE ASSESSMENT FORM (DAF)

FHWA CA Form
DLA-0001 (Rev. 6/2011)

DAF No. CEP - CT01 - 0 2 6 - 1

Sheet # 2 of 4

Applicant
CALTRANS

agency EO Calc ☐ EO Contract ☐ PR Calc ☑

Quantity*	Unit*	Labor, Materials, and Equipment	Unit Price	Cost
1	LS	PREPARE SWPPP	$7,500.00	$7,500.00
1	LS	CONSTRUCTION SITE MANAGEMENT	$20,000.00	$20,000.00
1	LS	LEAD COMPLIANCE PLAN	$7,500.00	$7,500.00
1	LS	STREET SWEEPING	$15,000.00	$15,000.00
1300	CY	ROADWAY EXCAVATION	$130.00	$169,000.00
1150	CY	IMPORTED BORROW	$100.00	$115,000.00
600	TON	HOT MIX ASPHALT (TYPE A)	$300.00	$180,000.00
250	CY	AGGREGATE BASE CL2	$225.00	$56,250.00
200	SQYD	COLD PLANE AC	$75.00	$15,000.00
120	SQYD	GEOSYNTHETIC PAVEMENT INTERLAYER	$55.00	$6,600.00
1	LS	REMOVE DRAINAGE INLET & DOWNDRAIN	$25,000.00	$25,000.00
35	LF	24" CSP DOWNDRAIN (0.109" THICK)	$350.00	$12,250.00
1	EA	CABLE ANCHORAGE SYSTEM	$10,000.00	$10,000.00
2000	LF	REMOVE TRAFFIC STRIPING	$4.00	$8,000.00
1500	LF	TRAFFIC STRIPING	$4.50	$6,750.00
125	EA	REMOVE PAVEMENT MARKER	$15.00	$1,875.00
125	EA	PAVEMENT MARKER	$35.00	$4,375.00
5	STA	RUMBLE STRIP	$225.00	$1,125.00
1	LS	TRAFFIC CONTROL SYSTEM	$225,000.00	$225,000.00
2	EA	PORTABLE CHANGEABLE MESSAGE SIGNS	$40,000.00	$80,000.00
1	LS	CONSTRUCTION AREA SIGNS	$30,000.00	$30,000.00
1	LS	MINOR ITEMS	$50,000.00	$50,000.00
1	LS	MOBILIZATION	$100,000.00	$100,000.00
			Total	$1,146,225.00

*Lump Sum will generally only be accepted for non biddable items, such as Mobilization.

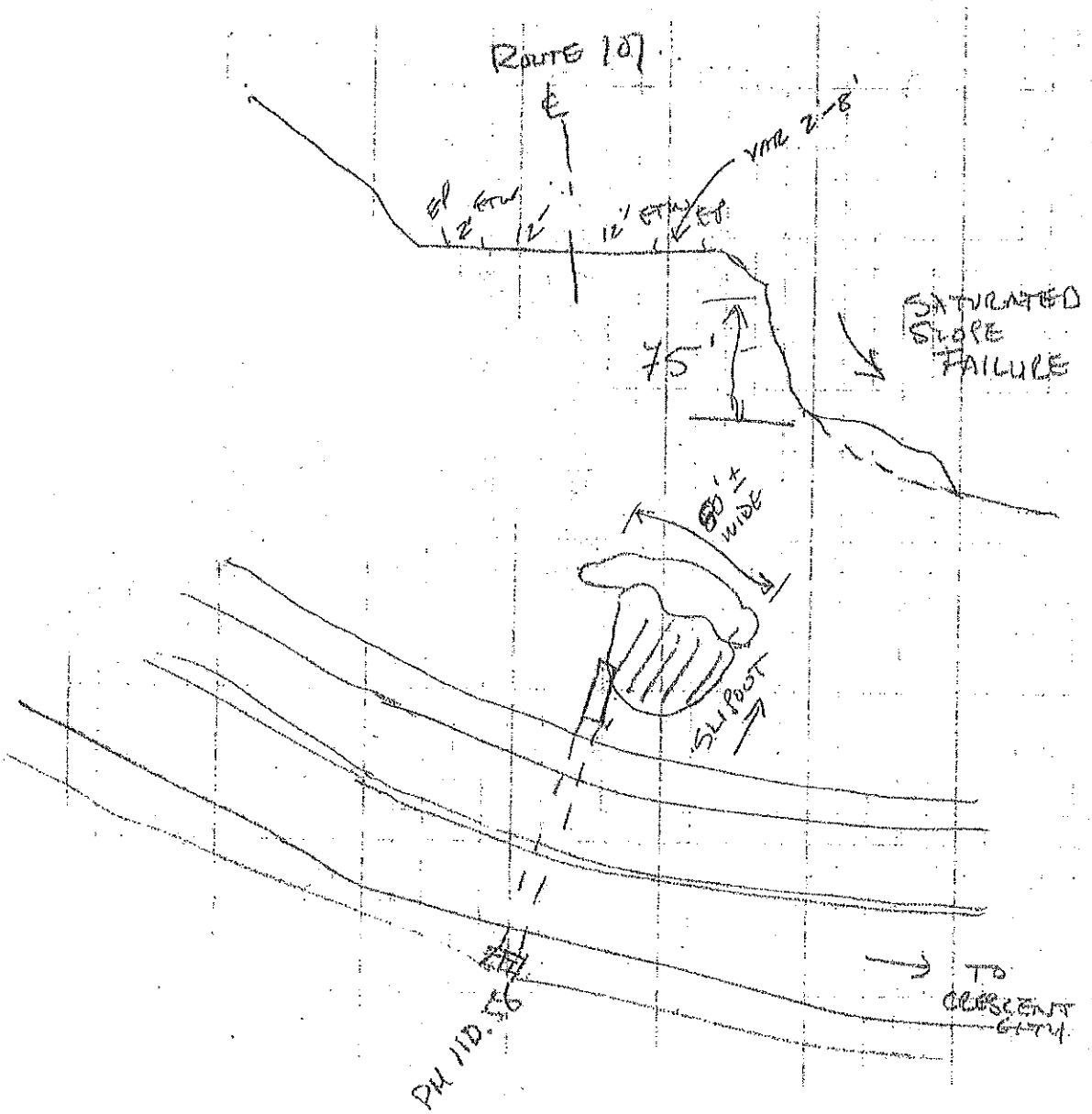
Justifications/comments: Non-typical Scope, PE/CE Cost, Engineering estimates etc.

The attached September 17, 2014 geotechnical site assessment concluded that the March 2011 landslide is a localized failure, resulting in separation of the culvert just below the main scarp of the slide. RSP placement is no longer considered necessary, as replacing the damaged downdrain is sufficient to repair this storm damage location. Replacement of the downdrain will require excavation and removal of the landslide deposit that currently blankets the downdrain outlet.

DAF No. CEP - CT01 - 0 2 6 - 1
Sheet # 3 of 4
Applicant
CALTRANS

Sketches, and/or Narrative

Photo description:
Original Sketch:



DAF No. CEP - CT01 - 0 2 6 - 1

Sheet # 4 of 4

Applicant
CALTRANS

Photos

Photo description: Slipout that Occurred Next to Downdrain Pulled System Apart

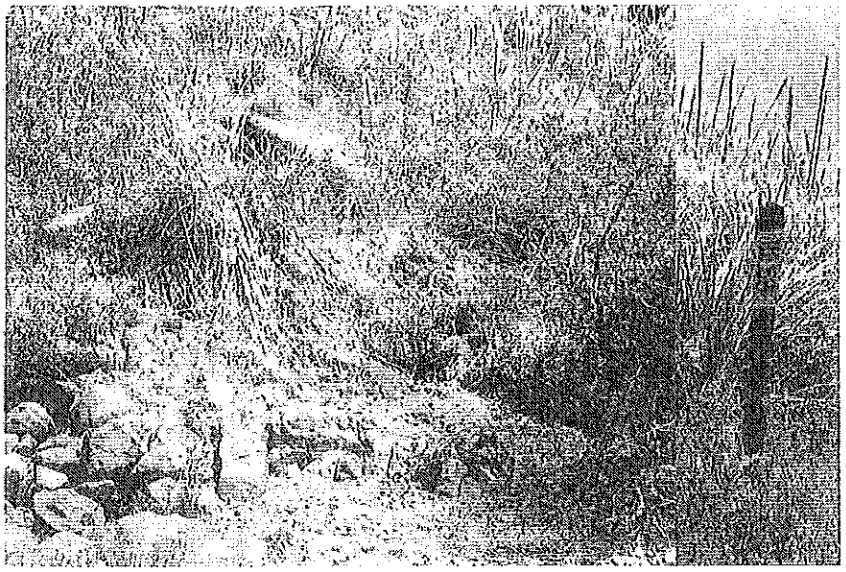
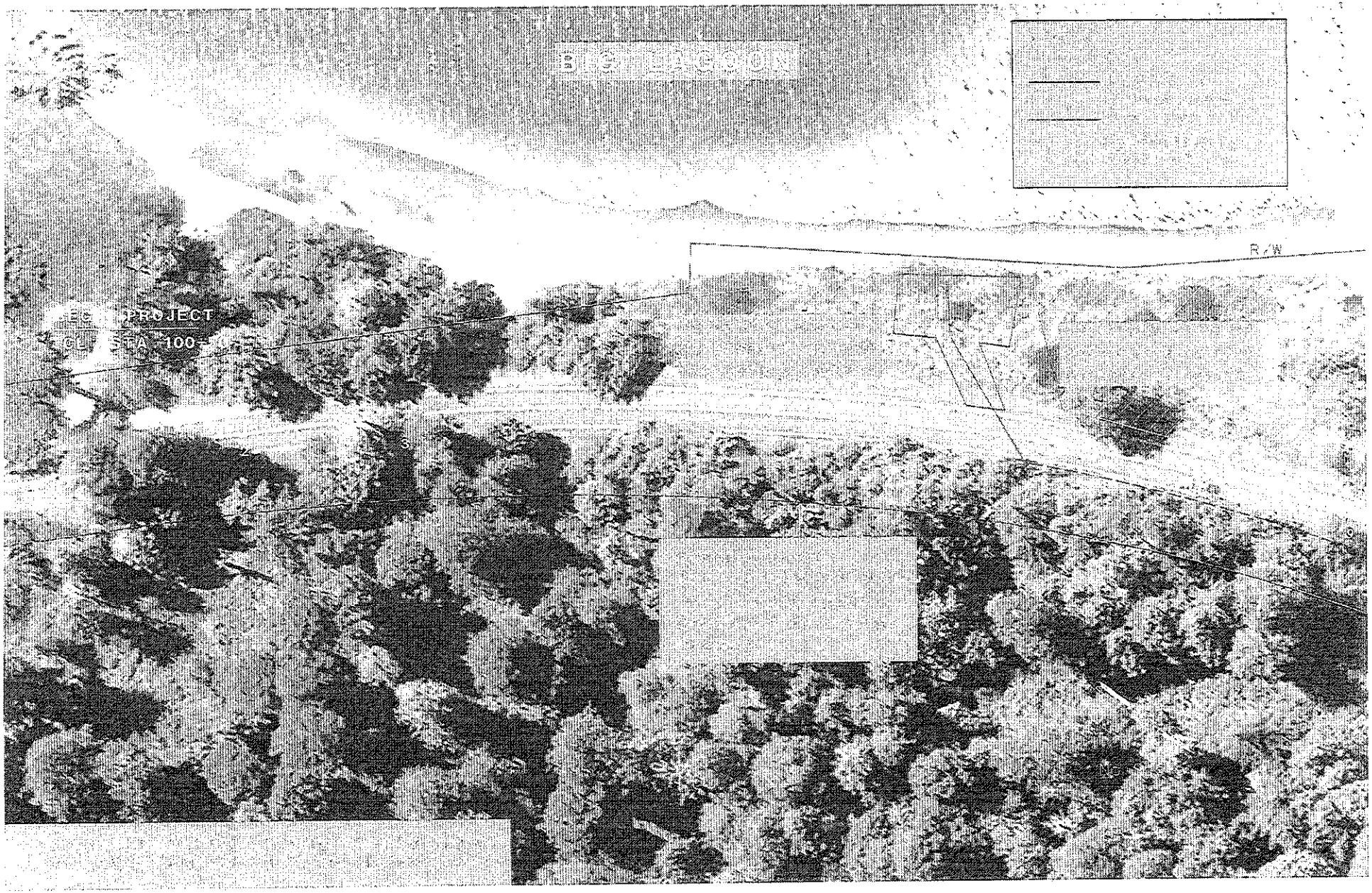


Photo description:


R/W

State of California
Department of Transportation

Business, Transportation and Housing Agency

Memorandum

Serious drought.
Help Save Water!

To: Kelly Timmons
Branch Chief, North Region
Design Branch E-2

Marie Brady
Project Engineer
Design Branch E-2

Date: September 17, 2014

File: 01-HUM-101-PM 110.58
EA: 01-0B4201
EFIS: 0112000126

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL DESIGN NORTH – BRANCH B

Subject: Revised Geotechnical Recommendations

INTRODUCTION

A geotechnical site assessment was conducted by the Office of Geotechnical Design North, Branch B in April of 2012 (Damage Assessment Form (DAF) #CEP-CT01-026-0). A Geotechnical Memorandum of the initial site visit was compiled by D Vann, dated July 25, 2013. A follow up site assessment was conducted in August of 2014 to address questions from Design regarding the July 25, 2013 mitigation recommendations and further assess the slopes condition, i.e. landslide activity, after a two year period. Information contained herein is based on field observations. No subsurface investigation has occurred. The recommendations provided in this memorandum supersede the recommendations provided in the geotechnical recommendations provided in the July 25, 2013 Memorandum.

Caltrans District 01 Maintenance Personnel were questioned regarding past slope stability and maintenance needs. As reported by Daniel Vann following the April 2012 site assessment, the fill slope is prone to shallow translational landslides and has been repaired in the past utilizing select fill and rock slope protection (RSP).

OBSERVATIONS

A shallow landslide occurred following the 2010-2011 winter beneath and within the slope supporting a 24" CMP downdrain draining a drainage inlet at PM 110.58. The landslide is located within the lower half of the fillslope (total fillslope length is approximately 95 feet). The landslide measures 35 feet in total width (25 feet north of downdrain, 8 feet south of downdrain) and extends downslope about 45 feet. The landslide deposit is located above and blankets a portion of the RSP wall at the toe of the slope. The RSP protects the fill from Big Lagoon wave/tide erosion . The downdrain drains to the top of RSP wall. The culvert outlet is partially uplifted and buried by the deposit. Downdrain water appears to have been designed to drain atop the RSP wall. The head and right lateral scarps of the landslide measure 2.5 to 3 feet in height and are near vertical in inclination. The left lateral scarp tapers to indiscernible within 5 feet

downslope of the main scarp. The failure plane is predominantly planar and includes a couple of rafted and perched blocks of slide mass currently supporting pampass grass clumps.

No indication of slope adjustment was observed upslope of the landslide between the headscarp and the roadway edge.

The invert of the downdrain varies from paper thin to nonexistent from rusting throughout the length of culvert within the limits of the landslide. We observed a 2" separation of the culvert just below the main scarp of the landslide and a corresponding gully within the landslide failure plane where water has drained since separation. The gully does not show evidence of chronic and seasonal down cutting and is vegetated with grasses.

The anchors supporting the downdrain atop the slope appear to be in functioning condition. They include 2-2.5" diameter steel pipe typically driven in the earth's surface and perpendicular to the slope. The pipes anchor an upper and lower steel collar that sandwiches the culvert and supports the weight of the steel pipe plus water weight. Two of these structures are within the body of the landslide and have locally limited mass movement.

The adjacent slopes are densely vegetated with pampass grass and less frequent Douglas Fir conifers and other deciduous broadleaf bushes. The conifers range in height from 3 feet to over 25' with breast height trunk diameters to 6 inches. The broadleaf bushes include trunk diameters at breast height in the 3 to 5 inch range.

We did not observe evidence of past RSP repairs in the vicinity as reported by D. Vann in the July 25, 2013 Memorandum.

DISCUSSION

The location of the shallow landslide coincident with the failing downdrain suggests that leakage from the downdrain is a significant causal factor. This addition of water likely saturated the soil supporting the downdrain and resulted in a shallow landslide.

The location of the landslide is in the lower half of the fillslope. The landslide is small with respect to aerial extent and the failure depth is very shallow. Since the failure does not appear to have altered the culvert anchoring system, both within the landslide and upslope, we are confident that the landslide is a localized failure.

Because of the small and shallow nature of the landslide, the prominence of established and dense vegetation throughout the fillslope and no evidence of significant adjacent slope instabilities, we do not recommend placing RSP as reported in the DAF.

Since the primary causal mechanism for this landslide appears to have been water from the failed downdrain, replacing the leaking downdrain should be sufficient to repair this storm damage location.

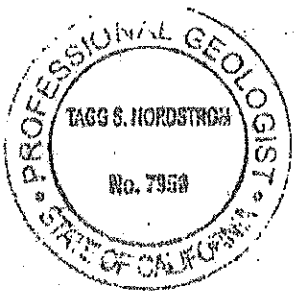
RECOMMENDATIONS

Based on our field observations we recommend the following to address the landslide:

1) Replace the existing failed downdrain and incorporate the same discharge configuration on top of the existing RSP at the toe of the fillslope.
2) Excavate and remove the landslide deposit that currently blankets the outlet of the existing downdrain (for placement of the new downdrain).

Should you have any questions regarding this review or require further assistance, please contact Tagg Nordstrom at 707 445-7884 or Charlie Narwold at 707 445-6036.

Report By:



TAGG NORDSTROM, PG #7950
Engineering Geologist
Office of Geotechnical Design North
Branch B

Reviewed By:

Charlie Narwold, C.E.G. #2335
Senior Engineering Geologist
Office of Geotechnical Design North
Branch B

c: Project Folder

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

DAMAGE ASSESSMENT FORM (DAF)

FHWA CA Form
DLA-0001 (Rev. 5/2011)

U.S. Department of Transportation
Federal Highway Administration-
California Division- Title 23
Damage Assessment Form (DAF)

DAF No. CEP - CT01 - 0 2 8 - 1
Sheet #1 of 5 Federal Project # EO ER - _____ ( )
Disaster No. CA 1 1 - 3 PR ER - _____ ( )

Applicant	County	Incident Date (mm/dd/yyyy)	Inspection Date
CALTRANS	HUMBOLDT	03/26/2011	

Location of Damage: Per Site ☑ or ☐ Per Mile

Name of Road/Bridge: Route 101

PM Begin: 113.76 PM Length: 500 (in feet)

PM End:

Federal-aid Highway?
Y for yes, If no, Ineligible for ER funds: Y

Map No: 1C

Functional Classification Type: Other Principal Arterial

Road/Bridge Data: Bridge No. n/a Type:

Traveled Way: Width 2-12' Type: PCC ☐ AC ☑ Gravel ☐

Shoulder: Width var 4-10' Type: PCC ☐ AC ☑ Gravel ☐

Route # 101

Forest Hwy? Y/N: N Interstate? Y/N: N

Existing ADT: 4,100

Description of Damage: Slipout

COST ESTIMATE

	Type of Repair	Description of Work	Cost Summary	
Emergency Opening (EO)	EO- AGENCY FORCES CT Work Order #(s): EA(s):		PE	
			CE	
			Construction	
	EO- CONTRACT EO EA(s):		PE	
			CE	
			Construction	
	NOTE: Environmental documentation for EO is required. It is generally started after work has begun.		R/W	
		Subtotal Emergency Opening		
Permanent Restoration (PR)	PR- CONSTRUCTION FA requires an approved PIF ☑ Contract ☐ FA PR EAs 0B420	Install subsurface horizontal drains and replace culvert using trenchless excavation method	PE	$1,110,000.00
			CE	$880,000.00
			Construction	$4,500,000.00
	NOTE: PRIOR AUTHORIZATION (APPROVED E-76) IS REQUIRED TO PROCEED WITH PERMANENT RESTORATION R/W & CONSTRUCTION		R/W	$50,000.00
	NOTE: Environmental clearance for permanent restoration is conducted through normal Federal-aid procedures	Subtotal Permanent Restoration		$6,540,000.00

Eligible	Signature	Date		
			PE Total	$1,110,000.00
☐ YES ☐ NO	Local Agency (if applicable):		CE Total	$880,000.00
☑ YES ☐ NO	Caltrans: Sherry Constancio	11/12/2014	Construction Total	$4,500,000.00
☐ YES ☐ NO	FHWA*:		R/W Total	$50,000.00
			TOTAL ESTIMATE	$6,540,000.00

Agency signature name (print): N/A
CT signature Name (print): Sherry Constancio

FHWA Sig. Name (print): Miguel A. Ramos
DAF Prepared by (print): Sherry Constancio

Original: Caltrans District Copies: FHWA, Division of Local Assistance (local roads), Federal Resources (state hwy), HQ Major Damage Engineer (state hwy)
* Write "N/A" in FHWA signature block if the project has no Federal ER funding or Federal ER funding delegated to the State.
FHWA Signature: REQUIRED for all Federal Funded State projects. REQUIRED for any Local Agency projects with 1) any BETTERMENT, 2) more than 2 ROW takes or 3) when paving is more than 50% of the Total Estimated Cost. Reminder: This DAF must be accompanied by photos of the damage.

DAMAGE ASSESSMENT FORM (DAF)

DAF No. CEP - CT01 - 0 2 8 - 1

Sheet # 2 of 5

Applicant
CALTRANS

agency EO Calc ☐ EO Contract ☐ PR Calc ☑

Quantity*	Unit*	Labor, Materials, and Equipment	Unit Price	Cost
1	LS	PREPARE SWPPP/LEAD COMPLIANCE PLAN	$15,000.00	$15,000.00
1	LS	CONSTRUCTION SITE MANAGEMENT	$20,000.00	$20,000.00
1	LS	STREET SWEEPING	$15,000.00	$15,000.00
3800	CY	EARTHWORK	$140.00	$532,000.00
320	CY	HOT MIX ASPHALT (TYPE A)	$300.00	$96,000.00
460	CY	AGGREGATE BASE CL2	$210.00	$96,600.00
150	SQYD	COLD PLANE AC	$75.00	$11,250.00
120	SQYD	GEOSYNTHETIC PAVEMENT INTERLAYER	$55.00	$6,600.00
1800	LF	FURNISH/INSTALL Hz DRAIN PIPE	$40.00	$72,000.00
1800	LF	DRILLING - HORIZONTAL DRAIN HOLES	$100.00	$180,000.00
430	LF	JACK AND BORE CULVERT	$3,000.00	$1,290,000.00
115	LF	48" ALTERNATIVE CULVERT	$2,000.00	$230,000.00
140	LF	24" ALTERNATIVE CULVERT	$550.00	$77,000.00
120	LF	36" CSP DOWNDRAIN (0.109" THICK)	$240.00	$28,800.00
1	EA	CABLE ANCHORAGE SYSTEM	$10,000.00	$10,000.00
3	CY	STRUCTURAL CONCRETE, HEADWALL	$6,500.00	$19,500.00
1	EA	ABANDON CULVERT	$10,000.00	$10,000.00
1	EA	REMOVE DOWNDRAIN AND INLET	$25,000.00	$25,000.00
115	LF	REMOVE CULVERT	$345.00	$39,675.00
1	EA	48" PRECAST CONCRETE PIPE MANHOLE	$15,000.00	$15,000.00
1200	LF	REMOVE/INSTALL STRIPING	$4.50	$5,400.00
1	LS	TRAFFIC CONTROL SYSTEM	$225,000.00	$225,000.00
2	EA	PORTABLE CHANGEABLE MESSAGE SIGNS	$40,000.00	$80,000.00
1	LS	CONSTRUCTION AREA SIGNS	$30,000.00	$30,000.00
1	LS	WETLAND MITIGATION	$700,000.00	$700,000.00
1	LS	MINOR ITEMS	$200,000.00	$200,000.00
1	LS	MOBILIZATION	$400,000.00	$400,000.00
			Total	$4,429,825.00

*Lump Sum will generally only be accepted for non biddable items, such as Mobilization.

Justifications/comments: Non-typical Scope, PE/CE Cost, Engineering estimates etc.

This project is within the Coastal Zone and borders State Parks, requiring multiple iterations in Geotechnical analysis to determine a roadway stabilization method that will prevent impacts to old growth redwood trees within the project limits. The environmental process has revealed that an offsite wetland mitigation site is required. The increase in cost is largely due to the price of the construction method for replacing the failed cross culvert that is piping fines away, saturating the roadway prism and contributing to the landslide. The culvert cannot be slip-lined due to the offset in the pipe damaged by the March 2011 slide. The only feasible method to repair the pipe is to use trenchless technologies that are significantly more expensive than slip-line repairs. Failure to replace the pipe could result in the complete loss of the roadway during the next large storm event. The resulting cost to repair a lost four-lane roadway and mitigate for potential impacts to the neighboring State Parks would likely exceed $10 million.

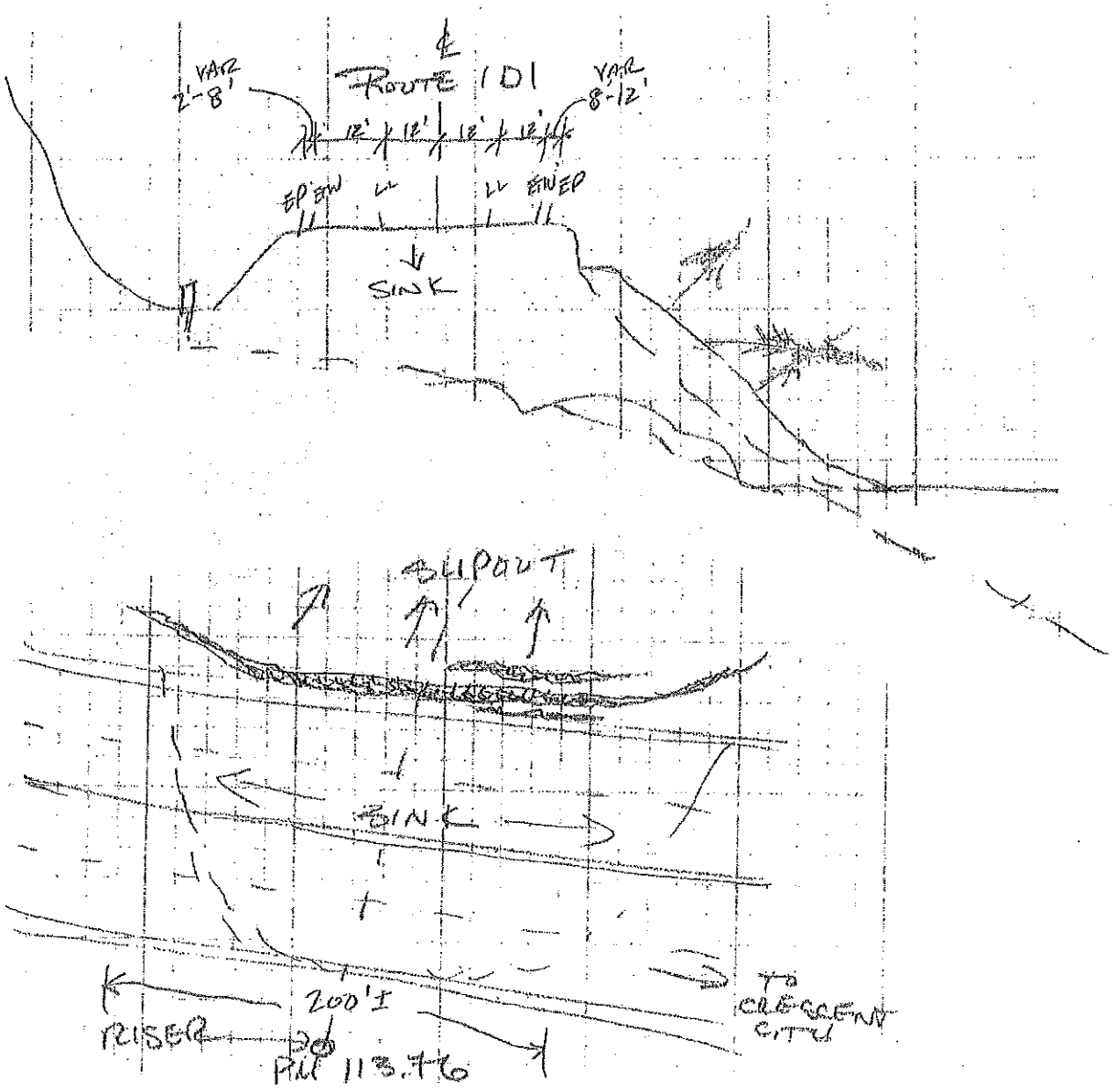
DAF No. CEP - CT01 - 0 2 8 - 1

Sheet # 3 of 5

Applicant
CALTRANS

Sketches, and/or Narrative

Photo description:
Original Sketch:



DAF No. CEP - CT01 - 0 2 8 - 1

Sheet # 4 of 5

Applicant
CALTRANS

Photos

Photo description: Slipout Scarp

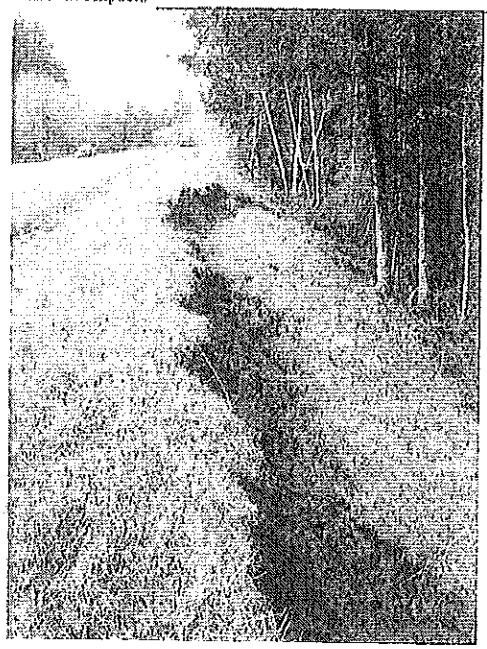


Photo description: Slipout Scarp

DAF No. CEP - CT01 - 028 - 1
Sheet # 5 of 5
Applicant CALTRANS

Photos

Photo description: Slipout Scarp

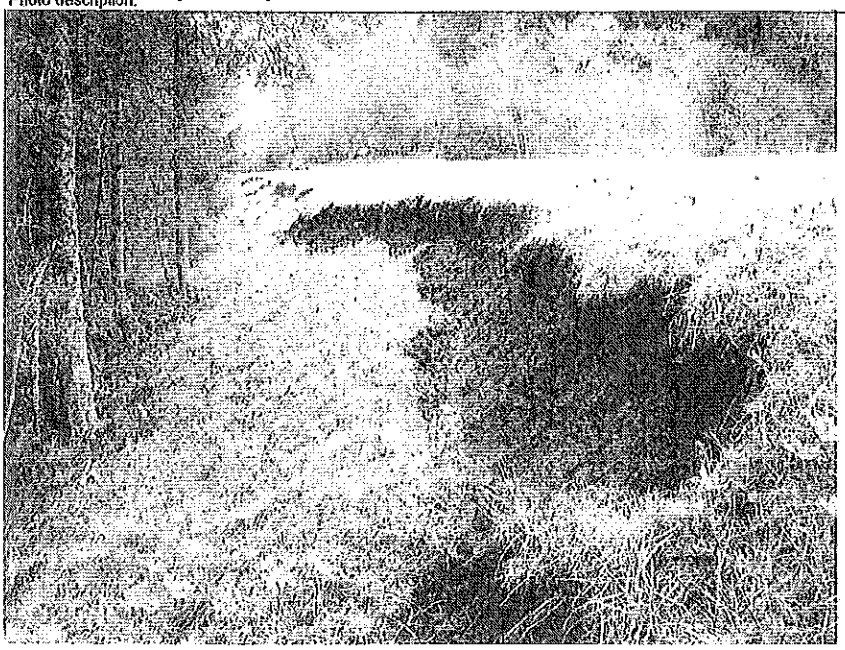
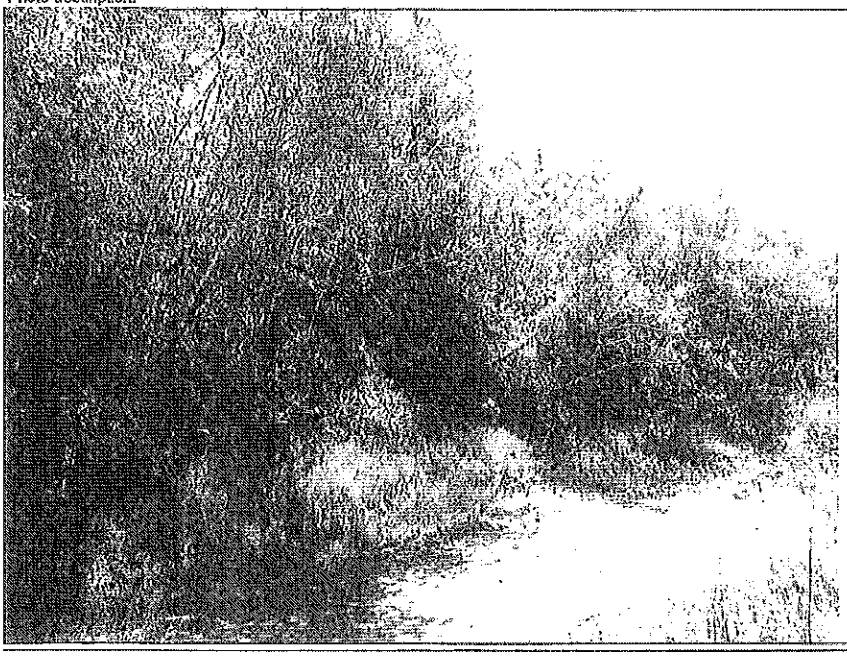
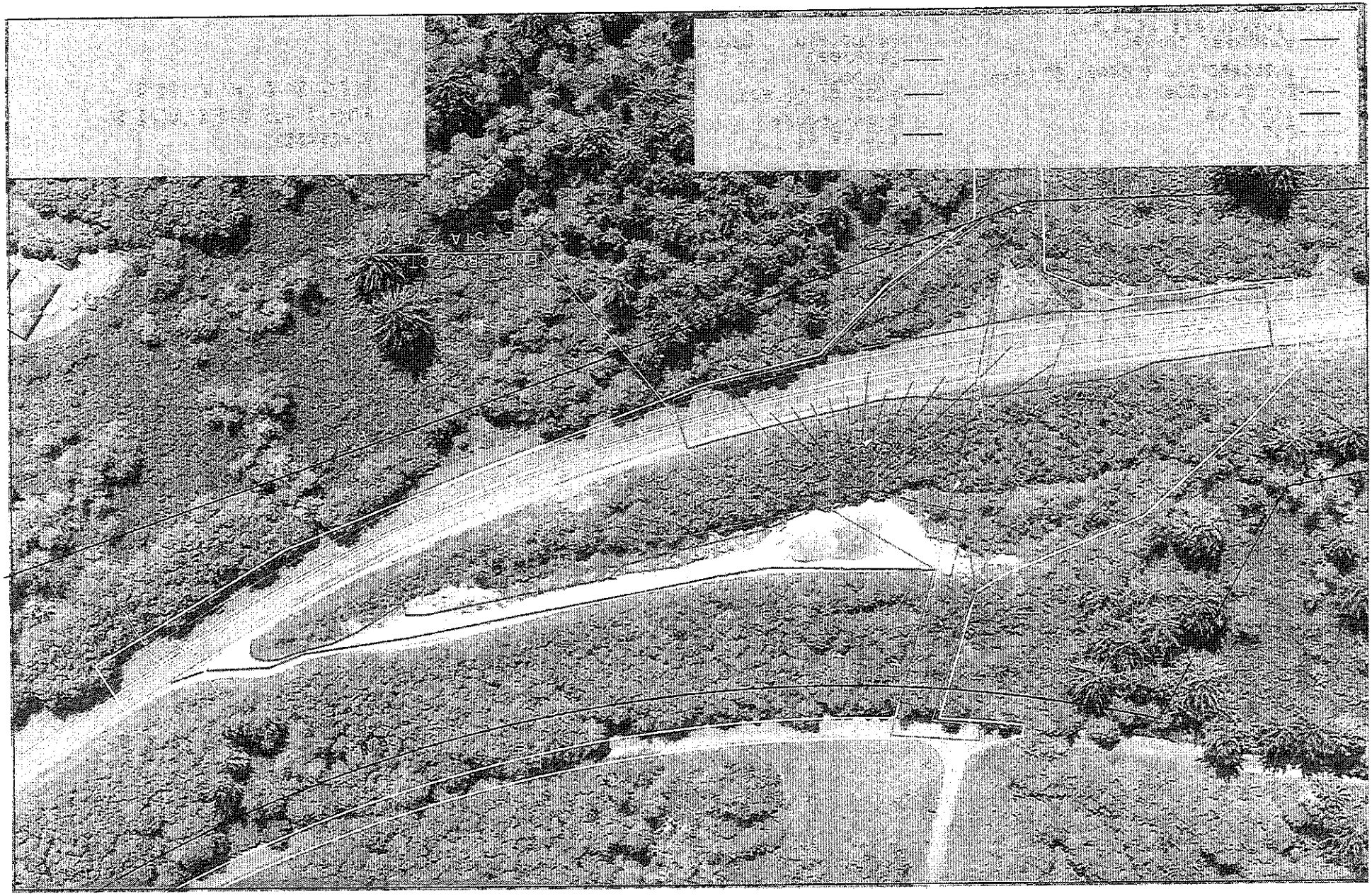


Photo description: Leaning Trees at Toe of Slipout





State of California
Department of Transportation

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: KELLY TIMMONS
BRANCH CHIEF
Design Branch E2

Date: June 2, 2014

File: 01-HUM-101 PM 113.76
EA: 01-0B420
EFIS ID: 0100000126

Attn: Marie Brady, Project Engineer

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN NORTH-BRANCH B

Subject: Geotechnical Recommendations

INTRODUCTION

The Office of Geotechnical Design North (OGDN) is providing Geotechnical Design recommendations for the storm damage site located on U.S. Route101 at PM 113.76 (Figure 1). This memorandum is based on field observations during 2013 and 2014, reconnaissance of the terrain within and adjacent to the project limits, interviews with staff members of Caltrans Maintenance, drilling one hole at the center of the highway, and Microstation files provided by Design Branch E2. In January 2014, we drilled one boring in the center of the roadway to characterize the fill for culvert replacement.

DISSCUSSION

After several intense rainfall events during the winter of 2011, the existing left-side embankment failed along the left shoulder between Station 22+00 and Station 26+00 (Figure 2). The top of the failure begins along the outside edge of the roadway shoulder and terminates downhill at the toe of the embankment.

OGDN staff observed groundwater discharge from a U.S. Route 101 through-cut south of the project site. The water flowed downhill and into the failure zone at the project site.

In April of 2013, OGDN staff observed several springs and seeps emerging within the two southbound lanes adjacent to the embankment failure and at least nine springs at the

base of the embankment, adjacent to the Caltrans access road. In January 2014, we observed subtle, linear, sunken areas aligned parallel to the failing shoulder in the southbound number 2 lane.

The profile (Figure 3) shows 92 feet of roadway fill at centerline, based on as-built plans (1971-1973). The existing culvert is perched at a depth of 72 feet and the new culvert will be at approximately 64 feet below the center of the highway. Deterioration of culvert pipes saturates the lower fill and leads to subsurface erosion beneath the roadway.

The Office of Geotechnical Design North Branch B drilled one boring (RC-14-001) to a depth of 81.5 feet (elevation 111.8 feet) to investigate the composition of the fill. We performed Standard Penetration Tests (SPT) at five-foot intervals and collected and described soil and rock samples. While back filling the boring, we observed a void beneath the structural section in the center of the highway.

Subsurface data show the fill is composed mostly of clay and some gravel. In the interval of the proposed new pipe, we encountered lean CLAY with SAND and gravelly lean CLAY. We found a 30-inch boulder of very hard rock at an elevation of approximately 155 feet (at depths from 36.5 feet to 39 feet).

The site is not corrosive, based on the analysis of a composite sample of soil collected from a depth of 60-66 feet (the new culvert pipe is to be installed at a depth of 64 feet). The pH of that sample is 7.71, chloride is 6 ppm, and sulfate is 123 ppm.

RECOMMENDATIONS

The DAF #028 recommended constructing a rock buttress, dewatering the subsurface and surface, reconstructing the shoulder as necessary, and repairing or replacing the culvert at PM 113.76. The current plan is to (1) dewater the subsurface using an array of horizontal drains, and (2) replace the existing culvert at PM 113.76 using a trenchless excavation construction method.

Horizontal Drains

1.) Install horizontal drains prior to the new culvert pipe. The inclination of a horizontal drain drilled at a positive angle of 10° can be expected to drop approximately 2.5° per 100 feet based on instrumental measurements (Cornforth, D.H., 2005). We do not want to risk any damage to a new culvert pipe during drilling for horizontal drains.
2.) Install an array of 11 horizontal drains. The approximate location of the array is 120 feet left of the center line, between Station 25+37 and Station

25+72 (Figure 1) at the base of the embankment on the left side of the roadway. The drill pad should be at least 20 feet by 30 feet and cut so horizontal drains can be drilled from approximately 4 feet above the base of the pit.

a. The horizontal drains should be drilled approximately 2 feet apart, and
b. Oriented at 10-degree horizontal angles to one another.

3.) Table 1 shows the approximate lengths and positive angles of the horizontal drains, based on the profiles provided by design.

4.) Design the drains to extend a maximum distance through the artificial fill at a maximum positive angle (up to 15°) without intersecting the surface. The inclination of each horizontal drain may drop in inclination along its length per Cornforth, D.H. (2005).

5.) The drains should consist of slotted plastic pipe, with solid plastic pipe at the final ten feet. (Figure 4).

6.) Use the largest slot width of 0.05 inch for the slotted pipe.

7.) Figure 4 and the Standard Specifications Section 68-3 provide design and construction details for horizontal drains.

8.) We estimate 11 horizontal drains should be installed (Figure 2 and Table 1).

9.) Contact this office with completed project plans to allow review of the locations of the horizontal drains.

Horizontal Drains		
Number	Length	Angle (°)
1	130	15
2	120	15
3	120	15
4	120	15
5	120	15
6	130	15
7	130	15
8	160	15
9	175	10
10	260	15
11	290	10

Table 1. – Approximate lengths and angles of horizontal drains (Figure 2).

Culvert Replacement

The plan is to replace the failing existing 42-inch diameter, 426-foot-long culvert, which is set at a gradient of -7.21%. The proposal is to install a 42-inch diameter welded steel pipe, shown as 488.9-foot-long, and set at a gradient of -2.5%. The new pipe will be installed higher in the fill. .

1. We recommend that the proposed new culvert be installed after drilling and installation of the horizontal drains. This construction sequence will protect the new culvert pipe from damage during horizontal drilling and lower groundwater before trenchless excavation for the new culvert.

2. We recommend that the new culvert pipe be installed using trenchless excavation (Appendix 2), because the depth makes open-cut (trench) construction infeasible.

3. We recommend further geotechnical investigations. At least two additional borings should be drilled across the roadway to characterize the nature of the fill.

4. For accuracy, we recommend using Pipe Jacking[1] or Microtunneling[2] to install welded steel casing of sufficient thickness to withstand the installation forces.

    a. After additional geotechnical investigation, if the likelihood of obstacles is high and groundwater is sufficiently low, we recommend Open-Shield Pipe Jacking a 48-inch welded steel casing.

    If the likelihood of obstacles is high and groundwater is high, we recommend dewatering and Open-Shield Pipe Jacking the 48-inch welded steel casing. Installation of the Horizontal Drains may dewater the outlet portion of the site.

    b. If the likelihood of obstacles is low within the interval of pipe installation and the groundwater level is high, we recommend

[1] Open-Shield Pipe Jacking can be done in low groundwater areas in soils having low permeability (K. Wallin, Bennett Trenchless Engineers, pers. com, May 2014) The Caltrans NSSP for Pipe Jacking is attached (Appendix 3).
[2] In high groundwater, microtunneling will ensure face stability and safe installation (K. Wallin, Bennett Trenchless Engineers, pers. com, May 2014).

Microtunneling a 42-inch pipe.

5. We recommend monitoring the new pipe for deterioration and leaks to avoid saturation, subsurface erosion, and creation of voids within the lower 30 feet of the fill.

6. We recommend a hole diameter consistent with (not larger than) the size of the culvert pipe. The purpose is to minimize piping caused by seepage along the culvert barrel. Seepage will remove fill and form a hollow area. Fine soil can be washed out along the hollow and erosion of the fill material can cause failure of the culvert or the embankment (DIB 83-03).

7. We recommend filling the abandoned 42-inch diameter 426-foot-long culvert to prevent deformation within the lower fill.

CONSTRUCTION CONSIDERATIONS

1.) It is likely that loose soil, rock, and groundwater will be encountered during drilling.

2.) Boulders of very hard rock may be encountered (Boring Records, Appendix 1).

We recommend that this office be contacted when the project plans and specifications are completed to allow for a final review.

REFERENCES

Cornforth, D.H., Landslides in practice – investigation, analysis, and remedial/preventative options in soils: Wiley, 624 p.

Design Information Bulletin No. 83-03, Caltrans Supplement to FHWA Culvert Repair Practices Manual: California Department of Transportation, 202 pages.

Federal Highway Administration Publication No. FHWA-RD-94-096, 1995, Culvert Repair Practices Manual, Volumes 1 and 2. (See Volume 1, Chapter 7 – Culvert Replacement, p. 7-38 to 7-45.)

If you have any questions or comments, please contact Dawn McGuire at (707)441-3994 or Charlie Narwold at (707)445-6036.

Report by:

DAWN MCGUIRE, C.E.G. #2280
Engineering Geologist
Office of Geotechnical Design - North
Branch B

Reviewed by:

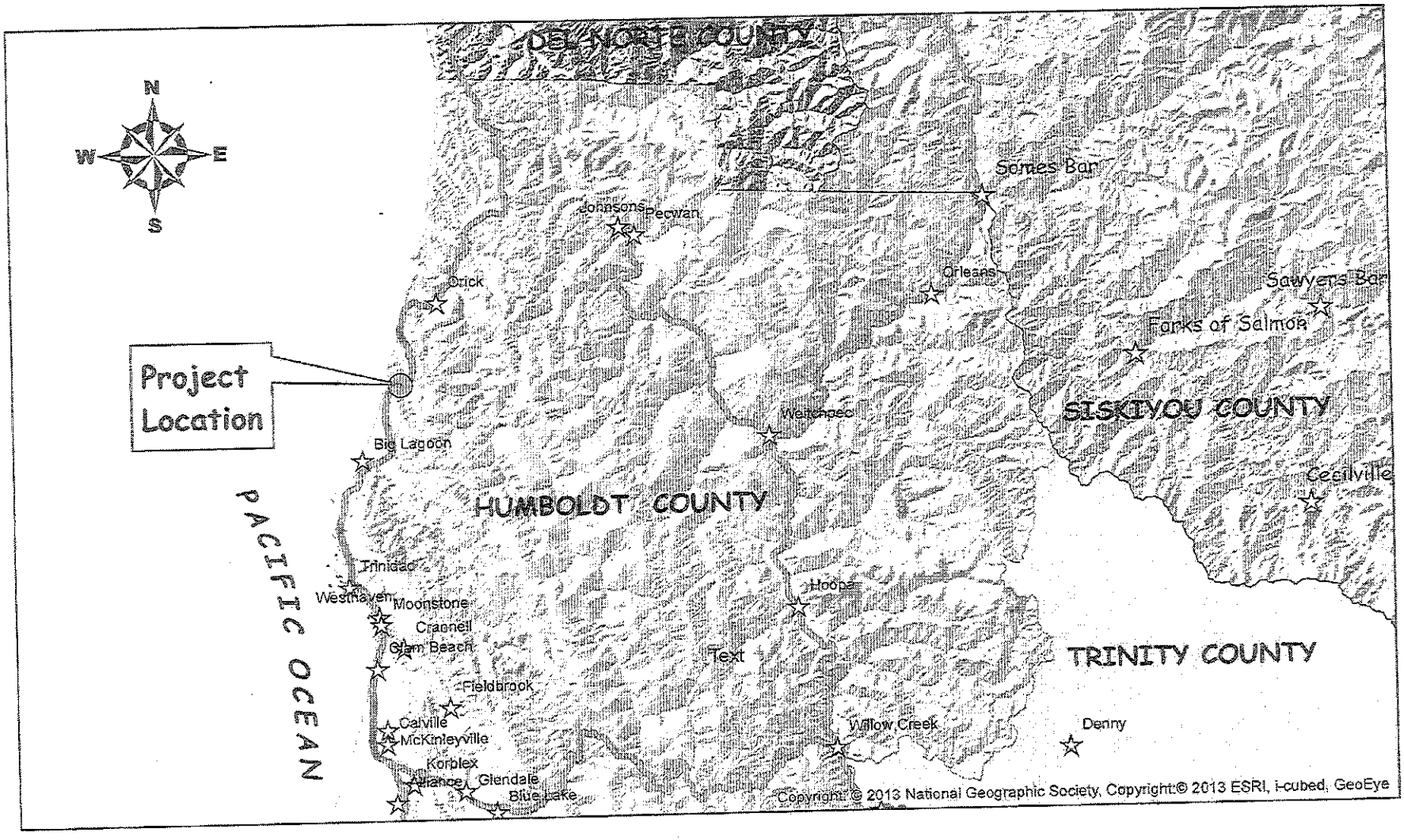
CHARLIE NARWOLD, C.E.G. #2335
Senior Engineering Geologist
Office of Geotechnical Design - North
Branch B

Attachments:

Figure 1. – Vicinity map.
Figure 2. – Plan map.
Figure 3. – Profile showing proposed new culvert.
Figure 4. -- Typical design details for a horizontal drain.

Appendix 1: Boring Record, RC-14-001, HUM 101 PM 113.76

c: OGDN Project File



Department of Transportation Division of Engineering Services Office of Geotechnical Design North Branch B	EFIS: 0112000126 DATE: MAY 2014	VICINITY MAP
	HUM 101 PM 113.76 HORIZONTAL DRAINS & CULVERT REPLACEMENT	FIGURE 1

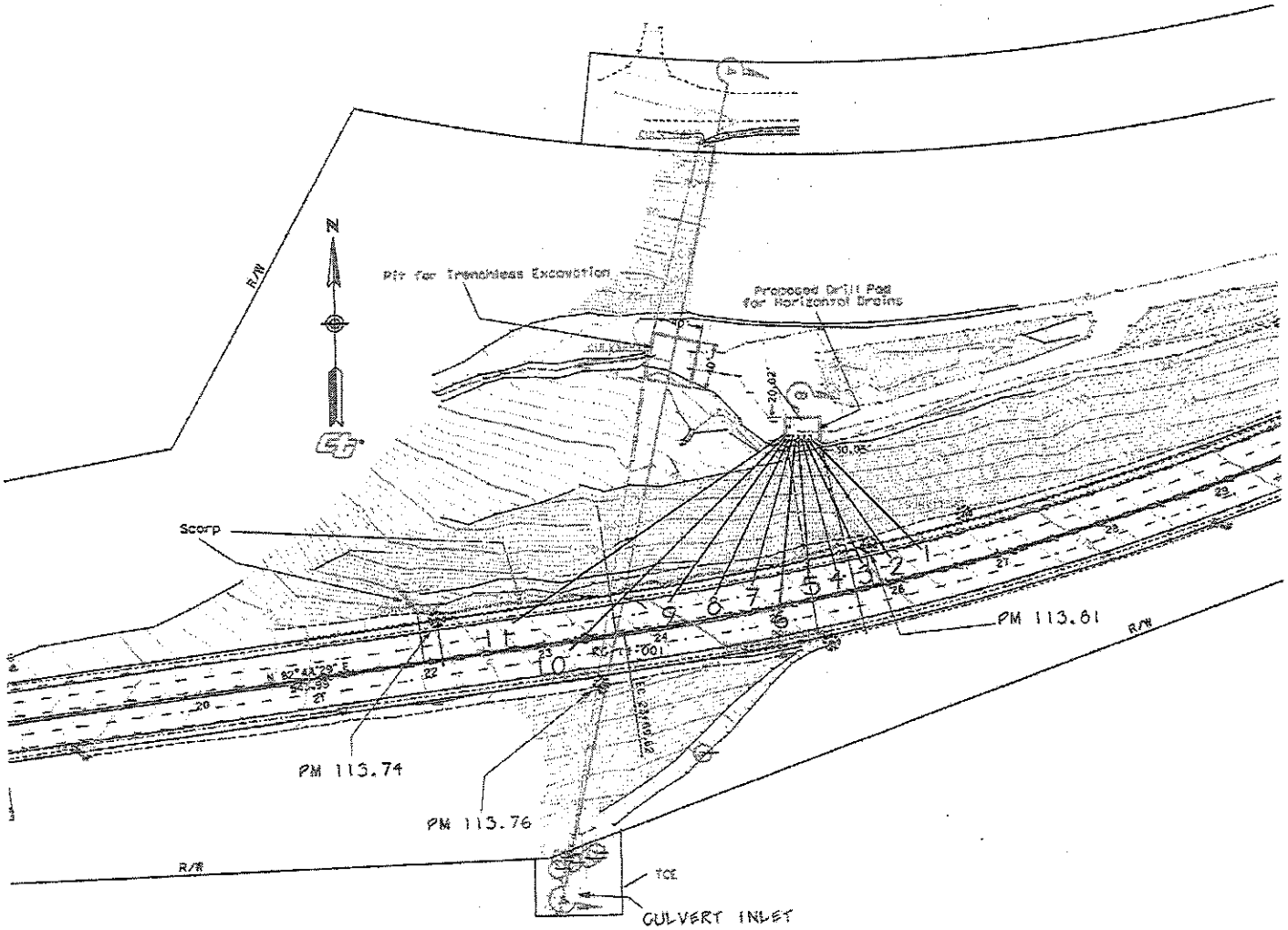


Figure 2. -- Plan map of U.S. Route 101 at PM 113.76, EA 01-0B420, showing horizontal drains and location of the new culvert.

PROPOSED PROFILE OF NEW & EXISTING CULVERT

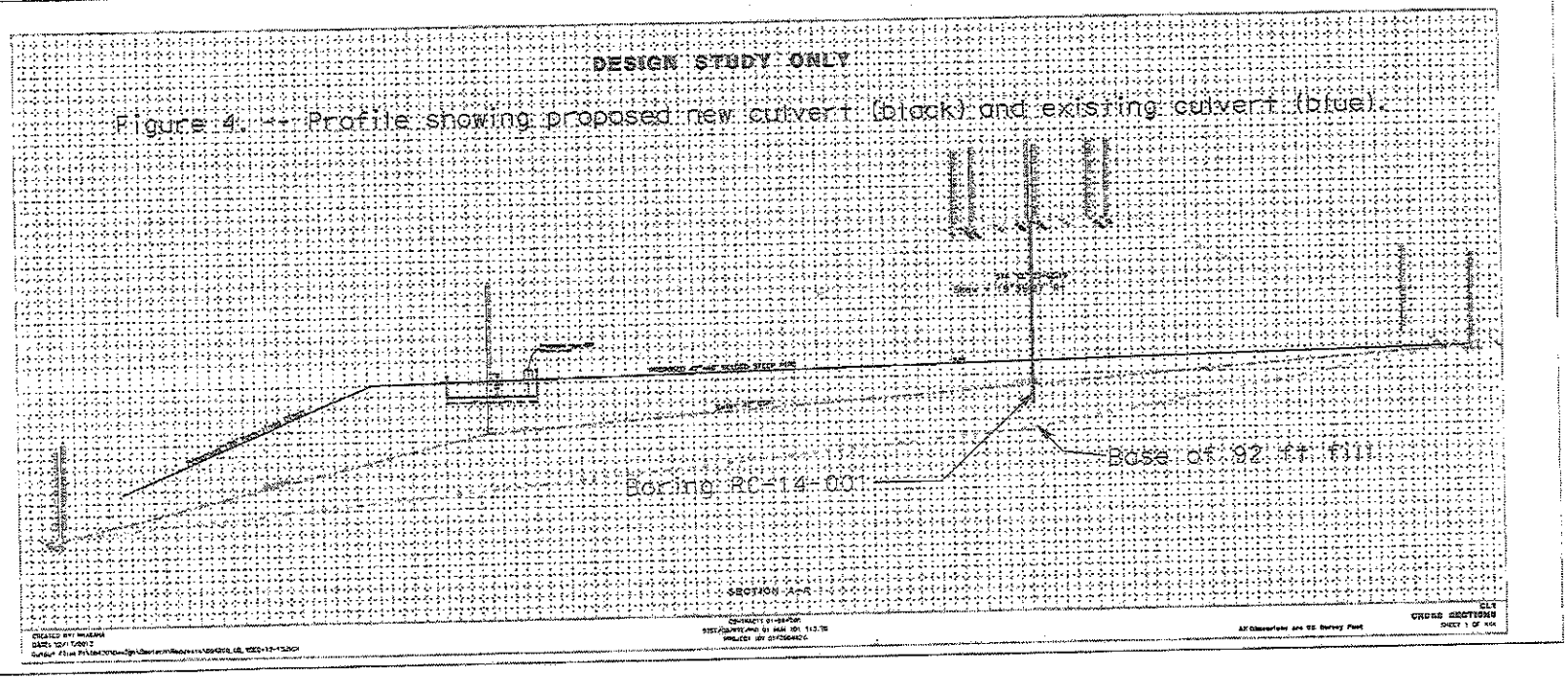
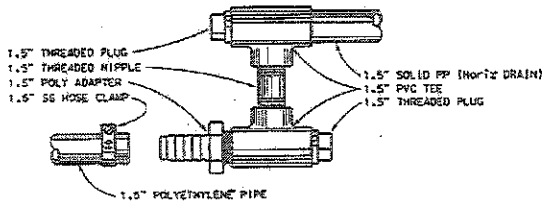


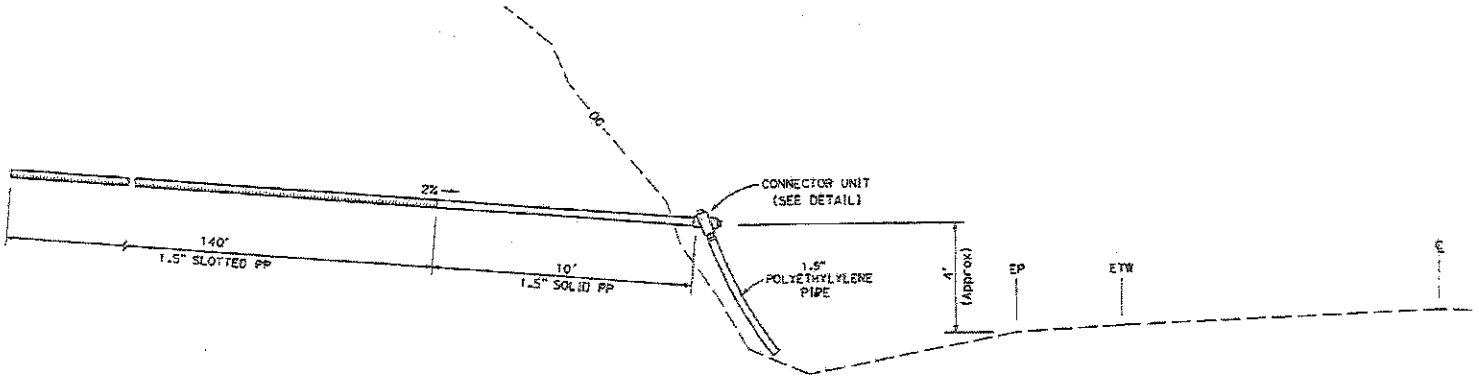
Figure 4. -- Profile showing proposed new culvert (black) and existing culvert (blue).

Figure 3. -- Typical design details for a horizontal drain.



PLAN VIEW

HORIZONTAL DRAIN CONNECTOR UNIT



PROFILE

HORIZONTAL DRAIN

NO SCALE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — CIVIL — STATE OF CALIFORNIA

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
FUNCTIONAL SUPERVISOR
DESIGNED
CALCULATED/ REVISED BY
CHECKED BY
REVISED BY
DATE REVISED

USERNAME => D. Medeiros
DGN FILE => #REQUEST

BORDER LAST REVISED 7/2/2010

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

GEOTECH

PROJECT NUMBER & PHASE 01120001121

DESIGNED DATE PLOTTED => 8-8-11
00-00-00 TIME PLOTTED => #TIME

APPENDIX 1

BORING RECORD

RC-14-001

HUM 101 PM 113.76

ROTARY FIELD NOTES

TL-1271a (REV. 01/31/00)

BORING NUMBER	DATE
RC-14-001	Jan. 29-30, 2014

DIST	CO	RTE	P.M. (K.P.)	BRIDGE #
01	HUM	101	113.76	

LOCATION (STA/OFFSET or NORTHING/EASTING)
23+37.5 on Centerline, see map below

BRIDGE OR PROJECT NAME
Lagoon Slips, Culvert Replacement

EA NUMBER
01-0B420

TOP HOLE ELEVATION
194.2'

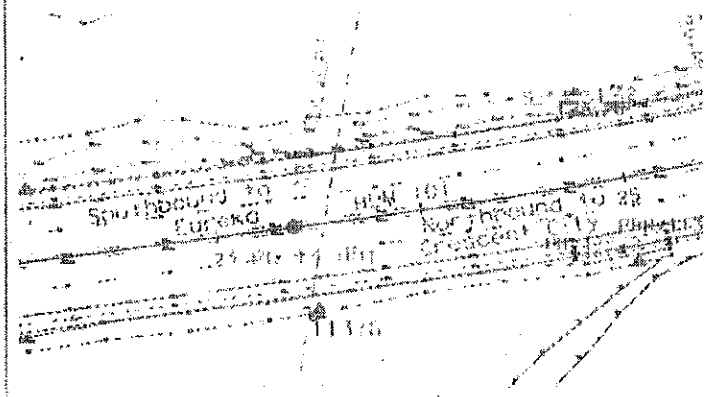
CREW
R. Gingel, M. Brown, D. Douglas

EQUIPTMENT
Acker 1974

CHC NUMBER

HAMMER ID#
ER_f=69%, Correction Factor=1.15

SITE LOCATION MAP (Inc. North Arrow & Benchmark Datum)



LOGGER
D. McGuire

GW	DATE
GWS	DATE
CASING SIZE 1.5"	CASING DEPTH 81.5'
CASING SIZE	CASING DEPTH
SLURRY TYPE	

SURFACE CONDITIONS (Slope, Water, Vegetation, etc)
Rain, wet

REMARKS (Tool Sizes/Type - Rods & Bits, etc) (Hole Condition – Caving, Squeezing, Loss of Circulation, etc. Drill Rig reactions – stowing, chattering, slipping, blocking off)	FIELD TESTING: SAMPLE #	BLOWS PER 6"	SPT (N)	RECOVERED	DEPTH	GRAPHIC LOG	DESCRIPTION (Soil Classification (group name, group symbol, consistency/relative density, color, moisture, particle size, gradation, plasticity, structure, cementation, organics, fill, q... s... Other characteristics) Rock Classification (rock name, color, degree of weathering, relative hardness, bedding, discontinuity characteristics, voids, staining, odor, other characteristics))
4.5-inch finger bit					1		ASPHALT CONCRETE (2.5')
					2		
					3		AGGREGATE BASE (1.5')
					4		
		3			5		GRAVELLY lean CLAY (CL); soft; gray with yellowish brown mottling; moist; mostly fines; some GRAVEL, fine and coarse; little SAND, from fine to coarse; very high dry strength; weak cement.
		6			6		
		7	13		7		
					8		
					9		
					10		
		2			11		Lean CLAY (CL); stiff grading to very stiff; dark gray with yellowish brown mottling; moist; mostly fines; few GRAVEL, fine and coarse; very high dry strength; weak cement; PP=1.0, 2.75.
		5			12		
		7	12		13		
					14		
					15		15: very stiff; yellowish brown; little GRAVEL, fine; few SAND, from fine to coarse; moderate cement; PP=3.0, 3.75, 4.0. Interbedded SANDY lean CLAY with GRAVEL (CL); stiff; dark gray; moist very high dry strength; moderate cement; PP=2.0.
Push		P			16		
Push		P			17		
3		3	3		18		
					19		
					20		

ROTARY FIELD NOTES

TL-1270 (REV. 01/31/00)

BORING NUMBER	DATE	DIST	CO.	RTE.	P.M. (K.P.)
RC-14-001	Jan. 29-30, 2014	01	HUM	101	113.76

LOCATION (STA/OFFSET or NORTHING/EASTING)	TOP HOLE ELEVATION	BRIDGE #	EA NUMBER
23+37.5 on Centerline	194.2'		01-0B3420

REMARKS (Tool Sizes/Type - Rods & Bits, etc) (Hole Condition – Caving, Squeezing, Loss of Circulation, etc Drill Rig reactions – slowing, chattering, skipping, blocking off)	FIELD TESTING: SAMPLE #	BLOWS PER 6"	SPT (N)	Recovery %	DEPTH	GRAPHIC LOG	DESCRIPTION (Soil Classification (group name, group symbol, consistency/relative density, color, moisture, particle size, gradation, plasticity, structure, cementation, organics, fill, q_u, s_u, Other characteristics) Rock Classification (rock name, color, degree of weathering, relative hardness, bedding, discontinuity characteristics, voids, staining, odor, other characteristics))
Push		P			21		20-25: Lean CLAY with GRAVEL (CL); soft to very soft grading to very stiff; dark gray with brownish yellow mottling; moist; mostly fines; little GRAVEL, fine; few SAND, from fine to coarse; very high dry strength; moderate cement; PP (22') = 0, 0.25, 0.25 and PP (25') =3.25, 2.25, 2.75.
		I			22		
		2	3		23		
					24		
					25		
		2			26		25-28.5: Lean CLAY (CL); from medium stiff to very stiff; dark gray mottled with yellowish brown; moist; mostly fines; few GRAVEL, fine; trace SAND, fine; very high dry strength; moderate cement; PP (27') =0.75, 1.25; PP(28')=1.5, 2.0.
		2			27		
		8	10		28		
					29		
					30		28.5-35: GRAVELLY lean CLAY with SAND (CL); from medium stiff to very stiff; dark gray interlayered with brownish yellow; moist; mostly fines; some GRAVEL; fine and coarse; little SAND, from fine to coarse; very high dry strength; moderate cement; PP=2.0, 4.0.
		6			31		
		6			32		
		7	13		33		
					34		
					35		
		P 2 22	24		36		35-36.5: Lean CLAY with GRAVEL (CL); from very soft to stiff; dark gray; moist; mostly fines; little GRAVEL, fine and coarse; few SAND, from fine to coarse; moderate cement; PP= <0.25, 0.25. 0.75, 1.75, 1.0.
					37		36.5-39: Boulder of Metamorphic Rock. Metaconglomerate; very fine grained; very dark gray; fresh; very hard; intensely fractured by drilling.
					38		
No Recovery, 39-40'					39		
					40		No Recovery 39-40'.
No SPT: too much debris in hole after bit "punched through" boulder					41		40-45: GRAVELLY lean CLAY with SAND (CL); soft (dark gray) and very stiff (brown); interlayered dark gray and yellowish brown; moist; mostly fines; little GRAVEL, fine; little SAND, from fine to coarse; very high dry strength; moderate cement; PP=0.5. 45-50: from stiff to very stiff; yellowish brown and gray mottling; little GRAVEL, fine and coarse; PP= 1.0, 2.25, 2.5, 3.5.
					42		
					43		
					44		
					45		
		2			46		50-52.5: Lean CLAY (CL); medium stiff to stiff; very dark gray interlayered with yellowish brown; moist; mostly fines; few GRAVEL, fine and coarse; trace SAND, from fine to coarse; very high dry strength; moderate cement; PP=0.5, 1.25.
		7			47		
		8	15		48		
					49		
					50		
		I			51		52.5: Lean CLAY with GRAVEL (CL); very stiff; very dark gray mottled with yellowish brown; moist; mostly fines; little GRAVEL, fine and
		5			52		
		9	14		53		

ROTARY FIELD NOTES

TL-1271b (REV. 01/31/00)

BORING NUMBER	DATE	DIST	CO	RTE	PM (KP)
RC-14-001	Jan. 29-30, 2014	01	HUM	101	113.76

LOCATION (STA/OFFSET or NORTHING/EASTING)	TOP HOLE ELEVATION	BRIDGE #	EA NUMBER
23+37.5 on Centerline	194.2'		01-0B420

REMARKS (Tool Sizes/Type - Rods & Bits, etc) (Hole Condition - Caving, Squeezing, Loss of Circulation, etc. Drill Rig reactions - slowing, chattering, skipping, blocking off)	FIELD TESTING: SAMPLE #	BLOWS PER 6"	SPT (N)	Recovery %	DEPTH	GRAPHIC LOG	DESCRIPTION (Soil Classification (group name, group symbol, consistency/relative density, color, moisture, particle size, gradation, plasticity, structure, cementation, organics, fill, q_u, ε_{50}, Other characteristics) Rock Classification (rock name, color, degree of weathering, relative hardness, bedding, discontinuity characteristics, voids, slaking, odor, other characteristics))
					54		coarse; few SAND, from fine to coarse; very high dry strength; moderate cement; PP=2.75, 3.5, 4.0;
					55		
		3			56		55: soft; very dark gray; PP= 0, 0.5.
		8			57		
		15	23		58		
					59		
					60		Lean CLAY with SAND (CL); soft; very dark gray; moist; mostly fines; little GRAVEL, fine; little SAND, from fine to coarse; very high dry strength; moderate cement.
		5			61		
		9			62		
		10	19		63		61.5-65: No Recovery,
					64		
					65		
		3			66		65: GRAVELLY lean CLAY (CL); very stiff; dark gray with yellowish brown lenses; moist; mostly fines; some GRAVEL, fine and coarse; few SAND, fine to coarse; very high dry strength; moderate cement; PP=3.0, 3.5, 4.0.
		10			67		
		13	23		68		
					69		
					70		
Abundant SAND at 70'		7			71		GRAVELLY lean CLAY with SAND (CL); stiff; dark gray; moist; mostly fines; some GRAVEL, fine and coarse; little SAND, from fine to coarse; very high dry strength; moderate cement; PP=1.0.
		15			72		
		20	35		73		
					74		74-75: Lean CLAY (CL); very stiff; dark gray; moist; mostly fines; little GRAVEL, fine; few SAND from fine to coarse; very high dry strength; moderate cement; PP=4.
					75		
		6			76		GRAVELLY lean CLAY with SAND (CL); medium stiff to stiff; dark gray; moist; mostly fines; some GRAVEL, coarse; little SAND, fine; weak cement. (No PP, sample too small.)
		9			77		
		11	20		78		
					79		
					80		
		4			81		80-81.5: Lean CLAY with GRAVEL (CL); stiff grading to medium stiff; dark gray grading to yellowish brown; moist; mostly fines; little GRAVEL, fine; trace SAND, from fine to coarse; very high dry strength; moderate cement; PP=1.5,2.0, 0.75.
		7			82		
Bottom of boring at 81.5'. Boring terminated at planned depth.		8	15		83		
Installed piezometer and backfilled hole with sand to 28 ft. Bentonite seal 25-28'. Bentonite seal at the surface.							