REVISED ESTIMATE

TO: Ryan Evanoff, MOTI

RE: 310 Isabella Point Road Bank Replacement March 30, 2017

Dear Ryan,

Please find an estimate to reinstate the Bank and upgrade the drainage.

s.17

If you have any questions, please call.

Regards,

David Turenne

Mainroad South Island Contracting LP.

2895 Westshore Parkway

Victoria, BC V9B 0B2

Tel: 250.391.7310 • Fax: 250.391.7312 • www.mainroad.ca

BRITISH COLUMBIA | Ministry of Transportation and Infrastructure

PROJECT APPROVAL

Finance and Administration Use Only	
Date Received	Project
Entered In Oracle	
Date (yyyy/mm/dd)	Initials

To _____
Project Approving Official *(As per FMM Policy 5.02 - Project Establishment and Approvals)*
Click here to view the Policy.

◉ NEW ○ CHANGE

PART A - PROJECT/WORK PACKAGE INFORMATION

Location: On Isabella Point Road, approximately 450 m south of Musgrave Road

Scope: Reinstate supporting bank and upgrade drainage

Reasons for Work: The eastbound shoulder and partial lane collapsed as a result of heavy rainfall

Investment Strategy Number	Region/Branch	Day Labour
	South Coast Region	%

	Electoral District Name(s)	Electoral District Number(s)	Percentages
(1)	Saanich North and the Islands		100 %
(2)			%
(3)			%

PART B - PROJECT/WORK PACKAGE FUNDING

Current Year Funding Requirements $ _____

Future Year(s) Carry Over $ _____

Total Project/Work Package Budget $ _____

PART C - PROJECT/WORK PACKAGE CODING

Project Number _____ Project Name _____

Project Manager Ryan Evanoff Managing Org. (RC) _____

Project Description _____

Task (Service Line) _____ Sub-project (if appl.) _____ Task Name _____

Task Description _____

Task (Service Line) _____ Sub-project (if appl.) _____ Task Name _____

Task Description _____

PART D - RECOMMENDATION

Prepared by: Curtis Mousseau

Telephone: 250 952-4481

Date (yyyy/mm/dd): 2017/03/31

Recommended by: Ryan Evanoff

Position Title: Operations Manager

PART E - APPROVAL

○ Approved ○ Not Approved

Date (yyyy/mm/dd)

Approving Official Signature Click here to view the Policy.
(As per FMM Policy 5.02 - Project Establishment and Approvals)

Position Title

DISTRIBUTION: Original - Region/Branch Manager, Financial Services
Copy - returned to Project Manager
Copy - forwarded to Manager, Reporting and Analysis, Headquarters
Copy - retained by Approving Official (optional)

Verishine, Leah TRAN:EX

From: Leon Bohmer <lbohmer@mainroad.ca>
Sent: Thursday, February 16, 2017 9:13 AM
To: Evanoff, Ryan TRAN:EX; Rogers, Tina TRAN:EX
Cc: David Turenne
Subject: ISABELLA RIPRAP
Attachments: SnipImage.JPG

Hi Ryan/Tina. The attached indicates two previous records of Rip Rap placed in the vicinity of the current reported failure area south of Musgrave Road.

Dave is on his way to view and take photos and will report findings later today.

Mainroad South Island Contracting LP

Leon Bohmer
Operations Manager
Mainroad South Island Contracting LP

2895 Westshore Parkway
Victoria BC V9B 0B2
250.391.7310 ext.2100
Fax: 250.391.7312
www.mainroad.ca

From: Leon Bohmer
Sent: Thursday, February 16, 2017 9:06 AM
To: Leon Bohmer
Subject: Sent from Snipping Tool

Verishine, Leah TRAN:EX

From: Evanoff, Ryan TRAN:EX
Sent: Thursday, February 16, 2017 8:43 AM
To: Lachmuth, Erik TRAN:EX; Gaib, Sarah E TRAN:EX; Rogers, Tina TRAN:EX
Subject: Isabella Point Road - SSI - Erosion Failure

Hey everyone,
Mainroad is reporting that a landslip has occurred along the water, between the water and Isabella Point Road on Salt Spring Island.

Currently the top edge of the failure reaches the paved edge of the road, which has left a lane of traffic open on the far side. Local Mainroad units will be monitoring the area during the day and their managers will hopefully be there this afternoon to assess and take some pictures for us.

There does not appear to be any immediate danger at this point, but I wanted to make everyone aware. I'll update everyone once the assessment and photos are sent my way.

Ryan Evanoff
Operations Manager – Southern Vancouver Island
Vancouver Island District
Ph: 250-952-5575

BRITISH COLUMBIA Ministry of Transportation and Infrastructure

Verishine, Leah TRAN:EX

From: Evanoff, Ryan TRAN:EX
Sent: Monday, February 20, 2017 10:34 AM
To: Flood, Leanne GCPE:EX
Cc: Rogers, Tina TRAN:EX
Subject: RE: TRAN Media Request: Slide at 300 Isabella Point Road

Our initial assessment is that the mass movement was caused by erosion forces at the toe of the slope (at the water edge) compounded by haphazard road drainage over the edge of the road (towards the water). Our opinion is that the road construction is not to blame for this issue, and the stability of the road has not been compromised due to the erosion – the barriers are up for safety reasons due to the sudden drop off present now.

We are currently looking at a repair plan that involved placing a new culvert underneath the road, to channel water into a single drainage area which will be protected with large rip-rap style rock and drainage rock.

The resulting repair should armor the slope from additional erosion and improve the overall road drainage of the area.

We hope to have a functional design for the repair completed this week with construction to start as soon as possible – weather conditions permitting. Due to the size of the required rip-rap boulders to be placed at the bottom of the slope it requires a second excavator to be used along the water.

Ryan Evanoff
Operations Manager – Southern Vancouver Island
Vancouver Island District
Ph: 250-952-5575

BRITISH COLUMBIA Ministry of Transportation and Infrastructure

---

From: Flood, Leanne GCPE:EX
Sent: Monday, February 20, 2017 10:24 AM
To: Evanoff, Ryan TRAN:EX
Subject: TRAN Media Request: Slide at 300 Isabella Point Road

Good morning – please provide suggested response or give me a call and we can write it up over the phone, thanks!

~Leanne

Reporter
Elizabeth Nolan, Reporter
Driftwood Gulf Islands Media
enolan@gulfislands.net
250-537-9933

Deadline Tuesday, February 21, 2017 12:00 PM

Request
There's been quite a slide at 300 Isabella Point Road apparently, so hoping to get a timeline of repairs and what might

be entailed.

We also received a letter from a resident whose opinion is more damage might have occurred except this portion of the road was constructed fairly recently and to ministry standards. Can you provide a comment as to whether that is the case (that the construction standard prevented an even bigger wash-out)?

Background

Recommendation provide background

Suggested response:

Leanne Flood | Public Affairs Officer
Government Communications and Public Engagement
Ministry of Transportation and Infrastructure
Telephone: 250 356-9048 | Mobile: 250 480-6765
Leanne.Flood@gov.bc.ca | @LeanneFlood

BRITISH COLUMBIA

Ministry of Transportation and Infrastructure

Engineering Services Branch
Geotechnical, Materials and Pavement Section

TECHNICAL MEMORANDUM

Thursday, May 11, 2017

Tina Rogers
Area Manager
Vancouver Island District
Ministry of Transportation and Infrastructure

Re: Salt Spring Island Isabella Point Road Proposed Rip Rap Source Metal Leaching and Acid Rock Drainage Assessment

Introduction

The following ML/ARD Prediction and Prevention Plan Report (PPPR) has been completed for the Salt Spring Island Isabella Point Road (the Site) at the request of Tina Rogers, Area Manager – Vancouver Island District. Isabella Point Road runs north-south and is located on the south end of Salt Spring Island just above Fulford Harbour on its west side. For further information please see the design report for the proposed construction.

Regional Geology

The Isabella Point Road Site is hosted by the Haslam Formation and underlain by the Nanaimo Group as defined by the BC Geological Survey Mapping and the Geological Survey of Canada Mapping. The Haslam Formation is a massive concretionary fossiliferous black shale and mudstone, locally containing coal fragments (Greenwood et al., 2009). The Nanaimo Group is an Upper Cretaceous sequence of boulder, cobble and pebble conglomerate, coarse to fine sandstone, siltstone, shale, and coal (Vliet et al, 1987). The area has undergone Paleozoic metamorphism to develop the greywacke-argillite formation of the Sicker Group, which is comprised of argillite schist, meta-greywacke, and marble (Vliet et al, 1987).

Regional Hydrology

Streams, rivers, water bodies and water wells were evaluated within 1km radius of Isabella Point Road using IMapBC. As of May 10th, 2017 there are a number of private water wells and provincial groundwater observation wells located near and up slope of the Site. The Fulford Harbour is adjacent to Isabella Point Road to the north – northeast.

Site Investigation

A site investigation was not completed by MOTI contaminated site geoscientists, however, representative samples were collected by Ryan Gustafson, P.Eng., MOTI Geotechnical Engineer and Sheldon Harrington, MOTI Aggregate Resource Manager, under the direction of MOTI Senior Geoscientist, Julie Sandusky. The field investigation included visual inspection of rock faces and previously blasted rock to understand the variability of geology across the site. Samples were collected and analyzed to complete this Acid Rock Drainage Assessment.

Samples were selected to represent the geological variation observed at the Site. Six samples were submitted for ML/ARD testing.

Lab Methods

Acid Base Accounting (ABA), Trace Elements by aqua regia digestion with ICP-MS finish and Shake Flask Extraction were completed at Maxxam Analytics International in Burnaby, BC. X-Ray Diffraction with Reitveld Refinement (XRD-R) was subcontracted by Maxxam to the UBC XRD Lab. The following parameters were analyzed for Modified ABA analysis (Marchant and Lawrence, 1991):

- Paste pH
- Total Sulphur by Leco
- Sulphate Sulphur by Na_2CO_3
- Sulphate Sulphur by HCl
- Sulphide Sulphur by HNO_3
- Insoluble sulphur by difference (Total S – (Sulphate S + Sulphide S))
- Total Inorganic Carbon

Results

Acid Base Accounting

Six samples were analyzed using ABA. Acid Base Accounting data for this investigation indicate that the rock sampled in all but one sample is unlikely to generate acidic drainage and is classified as Not Potentially Acid Generating (Non-PAG), however sample SS17HS01 is considered potentially acid generating (PAG) as shown in Table 2 and 3. The Non-PAG classification of this rock is the result of low sulphide and non-extractable sulphur concentrations (<0.02-0.20 wt%; Table 3) and high neutralization capacity (10.3-30.5 kg $CaCO_3$/T). The PAG classification of sample SS17HS01 is the result of high sulphide concentration (1.99 wt%; Table 3) and high neutralization capacity (37.0 kg $CaCO_3$/T).

Table 2: Generic Acid Base Accounting Screening Criteria (Price, 2009)

Classification	ARD Potential	Initial Screening Criteria	Comments
Potentially Acid Generating (PAG) or Acid Generating (AG)	Likely	NPR < 1	Acid generation is likely unless the sulphides are non-reactive or not acid generating
Uncertain (U) and requires further characterization	Uncertain	1 ≤ NPR ≤ 2	Possibly acid generation of 1) NP is insufficiently reactive or 2) NP is depleted at a faster rate than the sulphides
Not Potentially Acid Generating (non-PAG)	Unlikely	NPR > 2	Not potentially acid generating unless 1) significant oxidation of sulphides occurs on preferentially exposed grains within fractures, or 2) the sulphides are extremely reactive in combination with insufficiently reactive NP

Table 3: Acid Base Accounting Summary

Sample ID	Fizz Rating	Paste pH	$CaCO_3$ Equiv.	Total S	Sulphate (HCl Extractable Sulphur)	Sulphide (HNO_3 Extractable Sulphur)	Non Extractable Sulphur (by diff.)	Generation Potential (HNO_3 Extractable and Non-Extractable	Mod. ABA Neutralization Potential	Net Neutralization Potential	Neutralization Potential Ratio (NP/AP)	ARD Classification
Units	N/A	pH Units	Kg $CaCO_3$/T	wt%	wt%	wt%	wt%	Kg $CaCO_3$/T	Kg $CaCO_3$/T	Kg $CaCO_3$/T	N/A	N/A
SS17HS01	Moderate	8.15	35.0	1.99	0.04	1.49	0.46	46.6	37.0	-9.60	0.8	PAG
SS17HS02	Slight	9.94	8.4	0.04	<0.01	0.02	0.02	0.6	10.3	9.7	17.2	Non-PAG
SS17HS03	Moderate	9.91	30.0	<0.02	<0.01	0.01	<0.02	0.3	30.5	30.2	101.7	Non-PAG
SS17HS04	Slight	9.84	18.4	<0.02	<0.01	<0.01	<0.02	<0.3	19.5	19.5	65	Non-PAG
SS17HS05	Slight	9.60	4.8	0.20	<0.01	0.16	0.04	5.0	17.0	12.0	3.4	Non-PAG
SS17HS06	None	9.38	3.0	0.18	<0.01	0.16	0.02	5.0	14.3	9.3	2.9	Non-PAG
Detection Limit	N/A	N/A	*1.8*	*0.02*	*0.01*	*0.01*	*0.02*	*0.3*	*0.1*	*0.1*	*0.1*	N/A

Table 4: Summary of Mineralogical Analyses by XRD-R

Mineral	Quartz	Clinochlore	Calcite	K-feldspar	Plagioclase	Illite/Muscovite	Biotite	Actinolite	Ilmenite	Clinozoisite-Epidote
Formula	SiO_2	$(Mg,Fe^{2+})_5Al(Si_3Al)O_{10}(OH)_8$	$CaCO_3$	$KAlSi_3O_8$	$NaAlSi_3O_8 - CaAlSi_2O_8$	$K_{0.65}Al_{2.0}Al_{0.65}Si_{3.35}O_{10}(OH)_2 - KAl_2(AlSi_3O_{10})(OH)_2$	$K(Mg,Fe^{2+})_3AlSi_3O_{10}(OH)_2$	$Ca_2(Mg,Fe^{2+})_5Si_8O_{21}(OH)_2$	$Fe^{2+}TiO_3$	$Ca_2Al_3(SiO_4)_3(OH) \cdot Ca_2(Fe^{3+},Al)_3(SiO_4)_3(OH)$
SS17HS01	4.9	-	3.8	-	-	-	0.8	-	-	86.9
SS17HS02	41.8	1.5	0.9	-	47.9	6.6	-	-	-	1.4
SS17HS03	41.0	1.2	3.2	2.2	37.0	14.7	-	-	-	0.9
SS17HS05	5.9	3.8	0.6	2.6	29.9	-	1.8	39.6	4.3	11.5

Mineralogy by X-ray Diffraction

Mineralogy by XRD-R was completed on four samples. The results of mineralogical analysis by XRD-R identified no trace amounts of sulphide minerals in three of the four sample and a high percentage (3.6%) of sulphide minerals, such as pyrite, was identified in the SS17HS01 sample. This confirms the ABA results which indicate minimal concentrations of sulphide minerals in most samples, and high concentration of sulphide minerals in the SS17HS01 sample (Table 4). Significant amounts of calcite were identified (0.6-3.8%) and confirm the moderate to high presence of acid neutralizing minerals within the rock samples.

Trace Elements

Trace Elements were analyzed on three samples using an aqua regia leach followed by ICP-MS for 37 elements. Trace element data was compared to the average crustal abundance for basalt (Turekian and Wedepohl, 1961) to identify potential elements of concern for metal leaching. Arsenic, antimony, bismuth, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, molybdenum, nickel, phosphorus, silver, sulphur, titatnium, vanadium and zinc are present in concentrations greater than the average crustal concentration in some, but not all samples (Appendix B; Table A). Antimony, bismuth, cadmium, chromium, cobalt, lead, silver and sulphur concentrations were greater than ten times the average crustal abundance and are interpreted to be anomalous (Appendix B; Table A). Antimony, bismuth, cadmium, chromium, lead, silver and sulphur concentrations were greater than ten times the average crustal abundance for shale in sample SS17HS01. Chromium concentrations were also greater than ten times the average crustal abundance in samples SS17SH02, SS17SH03, SS17SH04, and SS17SH05, and bismuth concentrations were greater than ten times the average crustal abundance in sample SS17HS02. Cobalt concentrations were also greater than ten times the average crustal abundance in samples SS17HS05 and SS17HS06. These geological anomalies are likely due to metamorphism of a shale/mudstone, altering the composition through metamorphism and hydrothermal alteration to schist leading to variant concentrations than those observed in a shale or mudstone.

Shake Flask Extraction Analysis

Four samples were analyzed by Shake Flask Extraction analysis (SFE). The results of the SFE analyses were compared to the British Columbia Approved Water Quality Guidelines (BCWQG) and the Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life – Fresh Water as a screening criteria allowing for the identification of materials that may generate adverse drainage water quality (Appendix A; Table B). It is understood in industry that the SFE analysis often overestimates the potential leachability of elements due to prolonged, vigorous shaking of finely crushed material, which is not representative of natural conditions or the conditions in which the material is stored or intended to be used.

The SFE leachate shows exceedances of aluminum, arsenic, and lead. Elevated aluminum leachate concentrations are likely the result of the presence of colloidal aluminum that passes through the 0.45µm filter during laboratory testing rather than dissolved aluminum. The source of this particulate aluminum cannot be confirmed; however mineralogy results (Table 4) show the presence of multiple chemically resistant aluminosilicate mineral phases including biotite, plagioclase, illite/muscovite, chlinochlore, and K-feldspar

Elevated arsenic concentrations in samples SS17HS02 (0.00642 mg/L) and SS17HS05 (0.00649 mg/L) are slightly above the BCWQG of 0.005 mg/L. Given the inherent overestimation of leachability of elements in SFE analysis, it is unlikely that arsenic in the 500 kg class rip rap proposed for construction will demonstrate the same leachability of arsenic as fine grained materials used in SFE analysis.

Elevated antimony concentrations observed in the SS17HS01 sample (0.0236 mg/L) are 2.6 times greater than the long term BCWQG for freshwater aquatic life (0.009 mg/L). Elevated lead concentrations were also observed in the SS17HS01 sample (0.0125 mg/L). This concentration is three times greater than the hardness dependent short term BCWQG (0.004 mg/L) and 12.5 times greater than the hardness dependent long term CCME guidelines for freshwater aquatic life (0.001 mg/L). Given that the leachability of antimony and lead were significantly greater than guidelines and greater than five times the laboratories detection limit (low level of error in analysis) there is a moderate to high potential for these elements to readily leach from geologically similar materials.

The SFE analyses have highlighted aluminum, antimony, arsenic, and lead as elements which may be present in leachate in concentrations greater than the applicable guidelines. However, based on the evidence presented above and the inherent overestimation of element concentrations in SFE leachate compared to the rip rap, the metal leaching risk of the material for aluminum and arsenic is interpreted to be low. However, based on the evidence provided above there is a moderate to high risk for the metal leaching of elements such as antimony and lead, in particularly for rock geologically similar to the SS17HS01 sample.

s.13

Option 1:
s.13

Option 2:
s.13

s.13

Sincerely,

Prepared by:

Allison Laidlow, M.Sc., P.Geo.
Geoscientist

References

Greenwood, H.J., and M.G. Mihalynuk, 2009. Saltspring Island geology (adjoining quadrants of NTS 93B/11, 12, 13 & 14); BC Ministry of Energy, Mines & Petroleum Resources, Open File 2009-11, 1:25000 scale.

Turekian, K.K. and Wedepohl, K.H., 1961. Distribution of the Elements in some major units of the Earth's crust. Geological Society of America, Bulletin 72: 175-192.

Van Vliet, L.J.P., Green, A.J. and Kenney, E.A., 1987. Soils of the Gulf Islands of British Columbia. Volume 1 Soils of Saltspring Island.

Appendix A – Analytical Data

Table A: Comparison of Trace Metal Concentrations to Average Crustal Abundance for Shale

Sample ID	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%
SS17HS01	**2.3**	8.2	**307**	**243**	2	3.4	7.5	204	2.12	**14.6**	0.7	2.3	2.2	92	**1.4**	**5.3**	**1.4**	4	**2.26**
SS17HS02	0.3	3.7	**70.7**	60	**0.4**	2.5	0.9	129	0.42	3.1	<1	0.8	5.9	11	**0.3**	1	**0.2**	3	0.53
SS17HS03	0.5	2.2	**34.6**	34	**0.2**	2.2	2	351	0.56	2.3	1.6	<0.5	7.5	24	**0.2**	**0.4**	<0.1	2	**1.28**
SS17HS04	0.5	2.4	16.1	21	<0.1	2.4	2.1	323	0.75	0.9	1.3	<0.5	7.4	12	<0.1	0.2	<0.1	4	0.83
SS17HS05	1	**30.3**	**20.7**	**52**	**0.1**	**11.8**	**20.9**	278	**2.67**	**3.7**	0.1	<0.5	0.4	30	0.1	**0.3**	<0.1	**88**	**1.48**
SS17HS06	1	**25.8**	**19.2**	**51**	<0.1	**10.5**	**21.1**	275	**2.83**	**2.5**	<0.1	<0.5	0.4	27	<0.1	0.2	<0.1	**90**	**1.31**
Detection Limits	0.1	0.1	0.1	1	0.1	0.1	0.1	1	0.01	0.5	0.1	0.5	0.1	1	0.1	0.1	0.1	2	0.01
Average Crustal Abundance - Shale*	1.3	10	19	39	0.037	4.5	1	390	1.42	1.5	3	4	17	100	0.13	0.2	0.01	44	0.51
10X Average Crustal Abundance - Shale*	13	100	190	390	0.37	45	10	3900	14.2	15	30	40	170	1000	1.3	2	0.1	440	5.1

Sample ID	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Se	Tl	S	Ga	Se	Te
Units	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
SS17HS01	0.011	4	**89**	0.02	5	0.006	<20	0.56	0.032	0.04	<0.1	<0.01	1.2	<0.1	**1.93**	2	<0.5	<0.2
SS17HS02	0.013	6	**87**	0.13	26	0.016	<20	0.33	0.06	0.07	<0.1	<0.01	0.5	<0.1	<0.05	1	<0.5	<0.2
SS17HS03	0.016	7	**68**	0.09	83	0.02	<20	0.32	0.032	0.17	<0.1	0.02	0.4	<0.1	<0.05	<1	<0.5	<0.2
SS17HS04	0.016	10	**79**	0.14	54	0.038	<20	0.41	0.045	0.15	<0.1	<0.01	0.5	<0.1	<0.05	1	<0.5	<0.2
SS17HS05	**0.157**	4	**42**	**0.82**	39	**0.167**	<20	1.15	0.115	0.11	<0.1	0.02	5.2	<0.1	**0.19**	4	<0.5	<0.2
SS17HS06	**0.174**	4	**36**	**0.97**	24	**0.166**	<20	1.28	0.097	0.07	0.1	0.02	4.7	<0.1	**0.18**	5	<0.5	<0.2
Detection Limits	0	1	1	0.01	1	0	20	0.01	0	0.01	0.1	0.01	0.1	0.1	0.05	1	0.5	0.2
Average Crustal Abundance - Shale*	0.06	55	4.1	0.16	840	0.12	10	7.2	2.58	4.2	2.2	0.08	7	2.3	0.03	17	0.05	-
10X Average Crustal Abundance - Shale*	0.6	550	41	1.6	8400	1.2	100	72	25.8	42	22	0.8	70	23	0.3	170	0.5	-

Source*:

Turekian, K.K. and Wedepohl, K.H. (1961). Distribution of the Elements in some major units of the Earth's crust. Geological Society of America, Bulletin 72. 175-192.

Bold Text indicates concentrations are greater than the average crustal abundance

Bold text and red highlight indicates concentrations are greater than 10X the average crustal abundance

- The data for these elements is missing or unreliable

Table B. Comparison of Shake Flask Extraction Leachate to BCWQG and CCME Guidelines for Freshwater Aquatic Life

Metal	Units	SS17HS01	SS17HS02	SS17HS03	SS17HS05	BCWQ		CCME	
						Short Term	Long Term	Short Term	Long Term
pH	pH Units	8.83	9.62	9.69	9.49	-	-	-	-
EC	uS/cm	118.4	57.1	58.8	59.5	-	-	-	-
SO_4	mg/L	28.1	1.2	0.8	2.1	-	Hardness Dependent	-	-
Hardness	mg/L	42.1	11.5	11.2	16.2	-	-	-	-
Ag	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0001	0.00005	-	0.25
Al	mg/L	**0.421**	**0.81**	**0.862**	**0.708**	0.05	0.1	-	pH Dependent
As	mg/L	0.00197	**0.00642**	0.0013	**0.00649**	0.005	0.005	-	0.005
Ba	mg/L	0.00411	0.00103	0.00255	0.00176	-	5	-	-
Be	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	-	0.0013	-	-
Bi	mg/L	0.000022	0.000006	<0.0000050	<0.0000050	-	-	-	-
B	mg/L	<0.050	<0.050	<0.050	<0.050	1.2	1.2	29	1.5
Ca	mg/L	16.6	4.39	4.21	5.48	-	4-8	-	-
Cd	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	Hardness Dependent	Hardness Dependent	0.001	0.00009
Co	mg/L	0.000019	<0.0000050	<0.0000050	0.000036	0.004	0.11	-	-
Cr^6	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	-	0.001	-	-
Cs	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-
Cu	mg/L	<0.000050	0.000	<0.000050	0.000069	Hardness Dependent	0.002	-	Hardness Dependent
Fe	mg/L	0.0011	0.0084	0.0153	0.0773	0.35	-	-	0.3
Hg	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	-	0.00001	-	0.000026
K	mg/L	0.968	1.83	5.47	2.17	-	-	-	-
La	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-
Li	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-	-
Mg	mg/L	0.149	0.138	0.164	0.616	-	-	-	-
Mn	mg/L	0.00136	0.000428	0.000673	0.00112	Hardness Dependent	Hardness Dependent	-	-
Mo	mg/L	0.00156	0.000427	0.000107	0.00043	2	1	-	0.073
Na	mg/L	0.477	4.82	3.44	3.68	-	-	-	-
Ni	mg/L	0.000058	0.000023	<0.000020	0.000039	-	Hardness Dependent	-	0.025
P	mg/L	<0.0020	0.0032	0.0023	0.019	-	-	-	-
Pb	mg/L	**0.0125**	0.000553	0.000265	0.000152	Hardness Dependent	Hardness Dependent	-	Hardness Dependent
Rb	mg/L	0.000949	0.00137	0.00427	0.00182	-	-	-	-
S	mg/L	12	<10	<10	<10	-	-	-	-

Metal	Units	SS17HS01	SS17HS02	SS17HS03	SS17HS05	BCWQ		CCME	
						Short Term	Long Term	Short Term	Long Term
Sb	mg/L	0.0236	0.00785	0.00173	0.00202	-	0.009	-	-
Se	mg/L	0.000969	0.000121	0.000045	0.000294	-	0.002	-	0.001
Si	mg/L	0.62	3.38	2.39	2.95	-	-	-	-
Sn	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-	-
Sr	mg/L	0.0424	0.00502	0.00733	0.0103	-	-	-	-
Te	mg/L	<0.000020	<0.000020	<0.000020	0.000021	-	-	-	-
Th	mg/L	<0.0000050	0.000013	0.000026	<0.0000050	-	-	-	-
Ti	mg/L	<0.00050	<0.00050	0.00165	0.00751	-	-	-	-
Tl	mg/L	0.000032	0.000003	0.000005	0.000004	-	0.0008	-	0.0008
U	mg/L	0.00017	0.000122	0.000248	0.000047	-	0.0085	-	0.015
V	mg/L	<0.00020	0.00091	0.00107	0.0162	-	-	-	-
W	mg/L	0.000098	0.000084	0.000057	0.00036	-	-	-	-
Zn	mg/L	0.001	0.00052	0.00012	0.00015	0.033	0.075	-	0.03
Zr	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-	-

Metal concentrations exceeding the most stringent BC Water Quality Guidelines for Freshwater Aquatic Life are bold

Metal concentrations exceeding the most stringent CCME Guidelines for Freshwater Aquatic Life are red

* Assumes all Cr (VI)

Verishine, Leah TRAN:EX

From: Luke Maron <lmaron@mainroad.ca>
Sent: Wednesday, July 5, 2017 6:54 AM
To: Rogers, Tina TRAN:EX
Cc: Gustafson, Ryan TRAN:EX; David Turenne
Subject: Re: Isabella Point - July 4 Discussions

Also, since you offered, I will need this excavated slope signed off by an engineer.
Thanks Ryan
Luke

Sent from my iPhone

> On Jul 4, 2017, at 7:03 PM, Rogers, Tina TRAN:EX <Tina.Rogers@gov.bc.ca> wrote:
>
> Thanks Ryan and Luke.
>
> I have no specific requirements as they need to follow Highway Constitution Standards and follow any and all environmental remediation.
>
> Tina
>
> Tina Rogers
>
>> On Jul 4, 2017, at 6:20 PM, Gustafson, Ryan TRAN:EX <Ryan.Gustafson@gov.bc.ca> wrote:
>>
>> Hi Luke,
>> I wanted to summarize our discussions today for clarity and to keep Tina in the loop:
>> -The next hold point from the Ministry's perspective will be the subgrade and key in trench. This must be reviewed and approved prior to placement of any rock or fabric for engineering signoff.
>> -We discussed the geometry of the buttress. The critical dimensions are the final slope on the face, the minimum thickness of the buttress, and a footprint location that is in line with the natural bank (i.e. the rock doesn't protrude outwards onto the beach).
>> -We discussed the need to bench the back slope to create a rough surface as per the note on the design drawing.
>> -We discussed WorksafeBC slope requirements. Mainroad is responsible for this and site safety. If engineering signoff is required to meet WorksafeBC requirements, please advise and I can provide this input and the required documentation.
>> -We discussed the special provisions regarding use of the rock and I provided you two hard copies. Please let me know if there are any questions.
>> -We discussed the drainrock bedding layer above the geotextile. We may accept alternate proposals to protect the geotextile from installation damage, but we will need to approve any alternate method for engineering signoff.
>> -We discussed and reviewed the linear extents of the treatment area; it is my understanding the District wants to go with the "Minimal Treatment" option of ~30 m.
>> -We discussed tree removal. From a geotechnical perspective, the trees on the slide debris can be removed. If living trees on the unfailed bank require removal, we should run this by Tina.
>> -You stated you plan to spoil all of the debris near the shoreline, at the base of the slope. (We did not fully discuss the following on site) From a geotechnical perspective, this is acceptable provided you don't significantly change the shoreline geometry and stable slopes can be achieved (1.5H:1V maximum). It is recommended you segregate the organics from the mineral soil to the extent feasible, such that the spoiled mineral soils can be placed and compacted in

lifts, and then capped with organics or other material. There may be other requirements (e.g. Environmental, District) with regard to spoiling the debris near the foreshore. Tina, please advise asap if the District has any concerns with this proposal.
>>
>> I hope the rest of your day went well. Let me know if you have any comments or questions on the above, or if there is anything I missed.
>>
>> Regards,
>> Ryan
>>
>> Sent from my iPhone

Verishine, Leah TRAN:EX

From: Luke Maron <lmaron@mainroad.ca>
Sent: Wednesday, July 5, 2017 1:38 PM
To: Gustafson, Ryan TRAN:EX
Cc: Rogers, Tina TRAN:EX; David Turenne
Subject: Re: Isabella Point - July 4 Discussions

Hi Ryan,
Ok, understood. Yes tomorrow works.
See you then.
Luke

Sent from my iPhone

> On Jul 5, 2017, at 12:57 PM, Gustafson, Ryan TRAN:EX <Ryan.Gustafson@gov.bc.ca> wrote:
>
> Hi Luke,
>
> Regarding your comments:
> Key in process completed in two parts: There are no issues with this from our end, provided a suitable overlap can be achieved on all joints between pieces of geotextile, and geotextile ends up everywhere it is specified. A minimum overlap of 300 mm should be provided between each piece of fabric.
> Linear dimensions along the slope: That sounds about right; I think we were in general agreement when we were discussing on site. I agree the base will be wider than the crest. The point of this comment was to confirm that we are not doing the "full treatment" outlined on page 5 of the design memo.
> Starting the fabric above shoreline: This would not be acceptable. We need the fabric everywhere it is specified or we may have erosion/separation problems and movement of the buttress.
> WorkSafe Review: Not a problem; just give me some heads up when you are ready. I am planning to come out tomorrow am if that works?
>
> Thanks,
> Ryan
>
>
> -----Original Message-----
> From: Luke Maron [mailto:lmaron@mainroad.ca]
> Sent: Wednesday, July 5, 2017 6:35 AM
> To: Rogers, Tina TRAN:EX
> Cc: Gustafson, Ryan TRAN:EX; David Turenne
> Subject: Re: Isabella Point - July 4 Discussions
>
> Morning Ryan,
> Yes we had a good day, lots of dirt!
> The papers regarding the rock have been delivered to the quarry operator.
> It seems to me the bottom lineal meters would be approximately 30 with the top being approximately 20.
> The key in process may be done in 2 parts, I'll let you know.
> Can I start the geo fabric a couple of meters above the shoreline?
> Luke
>

> Sent from my iPhone
>
>> On Jul 4, 2017, at 7:03 PM, Rogers, Tina TRAN:EX <Tina.Rogers@gov.bc.ca> wrote:
>>
>> Thanks Ryan and Luke.
>>
>> I have no specific requirements as they need to follow Highway Constitution Standards and follow any and all environmental remediation.
>>
>> Tina
>>
>> Tina Rogers
>>
>>> On Jul 4, 2017, at 6:20 PM, Gustafson, Ryan TRAN:EX <Ryan.Gustafson@gov.bc.ca> wrote:
>>>
>>> Hi Luke,
>>> I wanted to summarize our discussions today for clarity and to keep Tina in the loop:
>>> -The next hold point from the Ministry's perspective will be the subgrade and key in trench. This must be reviewed and approved prior to placement of any rock or fabric for engineering signoff.
>>> -We discussed the geometry of the buttress. The critical dimensions are the final slope on the face, the minimum thickness of the buttress, and a footprint location that is in line with the natural bank (i.e. the rock doesn't protrude outwards onto the beach).
>>> -We discussed the need to bench the back slope to create a rough surface as per the note on the design drawing.
>>> -We discussed WorksafeBC slope requirements. Mainroad is responsible for this and site safety. If engineering signoff is required to meet WorksafeBC requirements, please advise and I can provide this input and the required documentation.
>>> -We discussed the special provisions regarding use of the rock and I provided you two hard copies. Please let me know if there are any questions.
>>> -We discussed the drainrock bedding layer above the geotextile. We may accept alternate proposals to protect the geotextile from installation damage, but we will need to approve any alternate method for engineering signoff.
>>> -We discussed and reviewed the linear extents of the treatment area; it is my understanding the District wants to go with the "Minimal Treatment" option of ~30 m.
>>> -We discussed tree removal. From a geotechnical perspective, the trees on the slide debris can be removed. If living trees on the unfailed bank require removal, we should run this by Tina.
>>> -You stated you plan to spoil all of the debris near the shoreline, at the base of the slope. (We did not fully discuss the following on site) From a geotechnical perspective, this is acceptable provided you don't significantly change the shoreline geometry and stable slopes can be achieved (1.5H:1V maximum). It is recommended you segregate the organics from the mineral soil to the extent feasible, such that the spoiled mineral soils can be placed and compacted in lifts, and then capped with organics or other material. There may be other requirements (e.g. Environmental, District) with regard to spoiling the debris near the foreshore. Tina, please advise asap if the District has any concerns with this proposal.
>>>
>>> I hope the rest of your day went well. Let me know if you have any comments or questions on the above, or if there is anything I missed.
>>>
>>> Regards,
>>> Ryan
>>>
>>> Sent from my iPhone

Verishine, Leah TRAN:EX

From: Luke Maron <lmaron@mainroad.ca>
Sent: Thursday, July 6, 2017 8:34 PM
To: Rogers, Tina TRAN:EX
Cc: David Turenne; Gustafson, Ryan TRAN:EX
Subject: Isabella slide
Attachments: IMG_1511.JPG; ATT00001.txt; IMG_1510.JPG; ATT00002.txt; IMG_1509.JPG; ATT00003.txt; IMG_1508.JPG; ATT00004.txt; IMG_1507.JPG; ATT00005.txt

Hi Tina,
Here we are at beach level just beginning the buttress. Ryan was here today and we are all working well together. We should be bringing some rock in tomorrow.
Luke


HITACHI


JOHN DEERE
DEERE
RODD
EXCAVATING


s.22

Verishine, Leah TRAN:EX

From: Gustafson, Ryan TRAN:EX
Sent: Friday, July 14, 2017 11:01 AM
To: Rogers, Tina TRAN:EX
Subject: RE: Isabella Point Road Temporary Shutdown - Geotechnical Requirements/Recommendations

Hi Tina – see below for my edits

I just spoke with Mike and gave him a bit of a run through as well.

Ryan

Hi Mike,

The latest update on Isabella Point is we have to temporarily shut down as we are running low on the specified rip rap material. There is some limited material remaining at the quarry, but it is buried in finer blast rock which does not meet the specification and it is very inefficient to be hunting for the spec material when there is still a significant quantity required (about 160 loads).

Option 1
Current Salt Spring Supplier – Hawthorne Hill Gravel Sales

Pros:

- We have had the rock tested and gone through a 6 week delay for the lab testing/blasting logistics.
- Local supplier
- Cost is less due to local mobilization cost- no ferry or barge
- The rock quarry has permission to blast year and have no risk of being shut down by fire hazard. (Note Darren says the forestry regulation is the blast must be at least 5 m from the fuel source, so likely not a problem in any quarry)

Cons

- 3-4 week delay and job on hold
- Liability risk increased with the slope exposed (Mainroad has agreed to address each item below from Geotechnical Engineer before leaving the site)
- Public anxiety raised when we Mainroad leaves the site

Option 2
Malahat Rock Surplus at Holker Road

Pros:

- ✓ No delays- all cons above no longer a concern.
- ✓ Rock has been tested for ARD/ML
- ✓ Rock belongs to the District, so no material cost other than transport.

Cons:

- ✓ Cost increase due to 160 trucks of rock having to be transported from Malahat to Isabella Point.

- ✓ About 9,000 cubic meters are on site. The gradation is expected to be finer than the specification, but some or all of the 500 kg class rip rap specified could likely be sourced with moderate to extensive on site sorting

Option 3: Other Rock Sources on Saltspring

-Are there any? There is at least 1 other quarry I have heard about at the north end of the island.

From: Gustafson, Ryan TRAN:EX
Sent: Friday, July 14, 2017 8:50 AM
To: 'Luke Maron'
Cc: Rogers, Tina TRAN:EX; Evanoff, Ryan TRAN:EX
Subject: Isabella Point Road Temporary Shutdown - Geotechnical Requirements/Recommendations

Hi Luke,
I understand that due to a material shortage, you are intending to shutdown work at the site for about 1 month while your local supplier produces more rip rap. From a geotechnical perspective we have the following requirements and recommendations for your proposed shutdown:

1) Any hazardous loose material (e.g. any of the imported rock not yet placed in the buttress) must be removed from the slope before demobilizing;
2) The exposed subgrade (except the near vertical portion below the road) should be covered to reduce the extent of the weathering during the shutdown. Heavy poly or the geotextile on site would be sufficient. It will need to be well weighted/pinned down to avoid being blown off the slope by wind. If geotextile is used, it should be considered sacrificial due to the UV exposure;
3) Barriers must be placed at a 1 m minimum horizontal setback from the crest of the slide area fully blocking access and keeping traffic away from the slope;
4) Mainroad must inspect the site every 24 hours, and after any significant weather event (e.g. rain). The purpose of the inspection is to monitor for any change in slope conditions, including but not limited to sloughing, cracking, significant ravelling of material, or changes in seepage rates. An inspection log must be kept with simple comments, and dated/initialed by the Inspector. From our discussions yesterday, it is understood this can be completed as a part of your routine maintenance activities and would be out of the scope of the repair work. Should any changes or concerns be identified, please contact the District and myself immediately;
5) Appropriate signage for pedestrians and traffic must be placed at the crest of the slope and at the beach level warning of slope hazards and stating no entry. I will leave this to Mainroad and the District to determine the specific signage requirements;
6) The WorkSafeBC slope inspection is considered invalid once you have demobilized. I can prepare another one for you once you remobilize to the site; and
7) If you remobilize with a different crew, this will be considered a reset of approved installation methods and we may need to reinstate recommendations such as use of a bedding layer to protect the geotextile during rock placement.

Additional requirements for the temporary shutdown may also apply from the District or your Environmental Monitor. Please let me know if you have any comments or questions regarding the above.

Regards,

Ryan Gustafson, P.Eng.
Geotechnical Engineer
Ministry of Transportation & Infrastructure - South Coast Region
3rd Floor - 2100 Labieux Road, Nanaimo, B.C.
Phone: 250.751.3271 | Cell: 250.713.3795 | Fax: 250.751.3290
Email: ryan.gustafson@gov.bc.ca

Verishine, Leah TRAN:EX

From: David Turenne <dturenne@mainroad.ca>
Sent: Friday, July 14, 2017 12:43 PM
To: Rogers, Tina TRAN:EX
Subject: RE: Isabella Point Rip Rap hauling from Malahat Estimate

Yes, we looked at the existing rock quarries on the Island prior to starting the job and we found the following;

- 1 active quarry (the one we are using)
- 1 inactive quarry off of Musgraves Road, it did not have any suitable rock ready but could be rock drilled and blasted. The problem was the road would need a bit of improvement as it was in the bush and overgrown.
- There was another source but the product was not suitable as it was mostly sandstone and shale.

All of these quarries would need to be tested for acid producing rock and contaminates which takes time and money.
If there are other quarries that I may be missing I will ask around, but as Luke was raised on SSI he knows the locations very well.
Regards,
David

From: Rogers, Tina TRAN:EX [mailto:Tina.Rogers@gov.bc.ca]
Sent: July 14, 2017 11:45 AM
To: David Turenne
Cc: Luke Maron ; Rick Gill
Subject: RE: Isabella Point Rip Rap hauling from Malahat Estimate

Thanks David, remind me again why we could not use another local source on SSI? I think you guys explored but could not source that much rock, but just need to make sure.

From: David Turenne [mailto:dturenne@mainroad.ca]
Sent: Friday, July 14, 2017 11:42 AM
To: Rogers, Tina TRAN:EX
Cc: Luke Maron; Rick Gill
Subject: Isabella Point Rip Rap hauling from Malahat Estimate

Hi Tina,
I've worked out that the additional cost to haul rip rap from the Malahat to Isabella point will ad Approximately **$75 to $80,000** to the job.
This calculation is based on Additional cost above the original estimate;
It includes;

- 4 truck and pups
- 2 additional excavators
- All Ferry costs
- Additional Living out costs(hotel and Food)
- Free rip rap from Holker pit area.

I am working on an estimate for Barging as well.
The completion date will still take us another three weeks, this is based on hauling about 1200 to 1400 metric tonnes.
Let me know how you would like to proceed.
Regards,
David

Verishine, Leah TRAN:EX

From: David Turenne <dturenne@mainroad.ca>
Sent: Friday, July 14, 2017 2:44 PM
To: Rogers, Tina TRAN:EX; Gustafson, Ryan TRAN:EX
Cc: Rick Gill; Luke Maron
Subject: Isabella Point Update, sign draft
Attachments: ISABELLA POINT SIGNS 2017.docx

Hi Tina,
After talking with Luke the new Timelines for this project are as follows;

- July 17th to August 4th – Blasting and sorting rock
- August 7th to 18th – Placing the remaining Rip Rap

If we can get it done earlier then we will start as soon as possible.
We will also keep you up to date if there are any changes to this schedule.
Dale will be monitoring the site and we will install signs as soon as they are fabricated, Draft attached.
Thank you for your patience with this delay change, we are committed to getting this done ASAP.
Regards,
David

3 signs to be made, White reflectorized Background with Black Lettering. The size is 600mm x 900mm Coreplast material.

PLEASE KEEP OUT
UNSTABLE BANK AREA
AVOID WALKING ON UNSTABLE ROCKS

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

Mainroad South Island Contracting LP.

2895 Westshore Parkway

Victoria, BC V9B 0B2

Tel: 250.391.7310 • Fax: 250.391.7312 • www.mainroad.ca

Verishine, Leah TRAN:EX

From: Luke Maron <lmaron@mainroad.ca>
Sent: Monday, July 17, 2017 10:05 AM
To: Rogers, Tina TRAN:EX
Cc: David Turenne; Gustafson, Ryan TRAN:EX
Subject: Re: Isabella Point Rd slide

Hi Tina,
We are in the cranbrook area now. I can have the notification sent out today. We will be back in a few days.
Luke

Sent from my iPhone

> On Jul 17, 2017, at 10:45 AM, Rogers, Tina TRAN:EX <Tina.Rogers@gov.bc.ca> wrote:
>
> Thanks Luke, I worked with Fred on the signage and he is getting them made today, when exactly are you guys all leaving, and when is the stakeholder notification going out?
>
> -----Original Message-----
> From: Luke Maron [mailto:lmaron@mainroad.ca]
> Sent: Friday, July 14, 2017 3:24 PM
> To: Rogers, Tina TRAN:EX
> Cc: David Turenne; Gustafson, Ryan TRAN:EX
> Subject: Isabella Point Rd slide
>
> Hi everyone,
> Everything at the site is taken care of with the exception of signage. I feel the site is safer than when I arrived.
> We will follow your lead Tina.
> Luke
>


CAUTION CAUTION CAUTION CAUTION CAUTION CAUTION


Motorpod

Verishine, Leah TRAN:EX

From: Pearson, Michael TRAN:EX
Sent: Thursday, July 20, 2017 8:43 AM
To: Rogers, Tina TRAN:EX
Cc: Evanoff, Ryan TRAN:EX
Subject: RE: Isabella point signage

Thanks Tina,

It does look pretty good. Thanks for taking care of that.

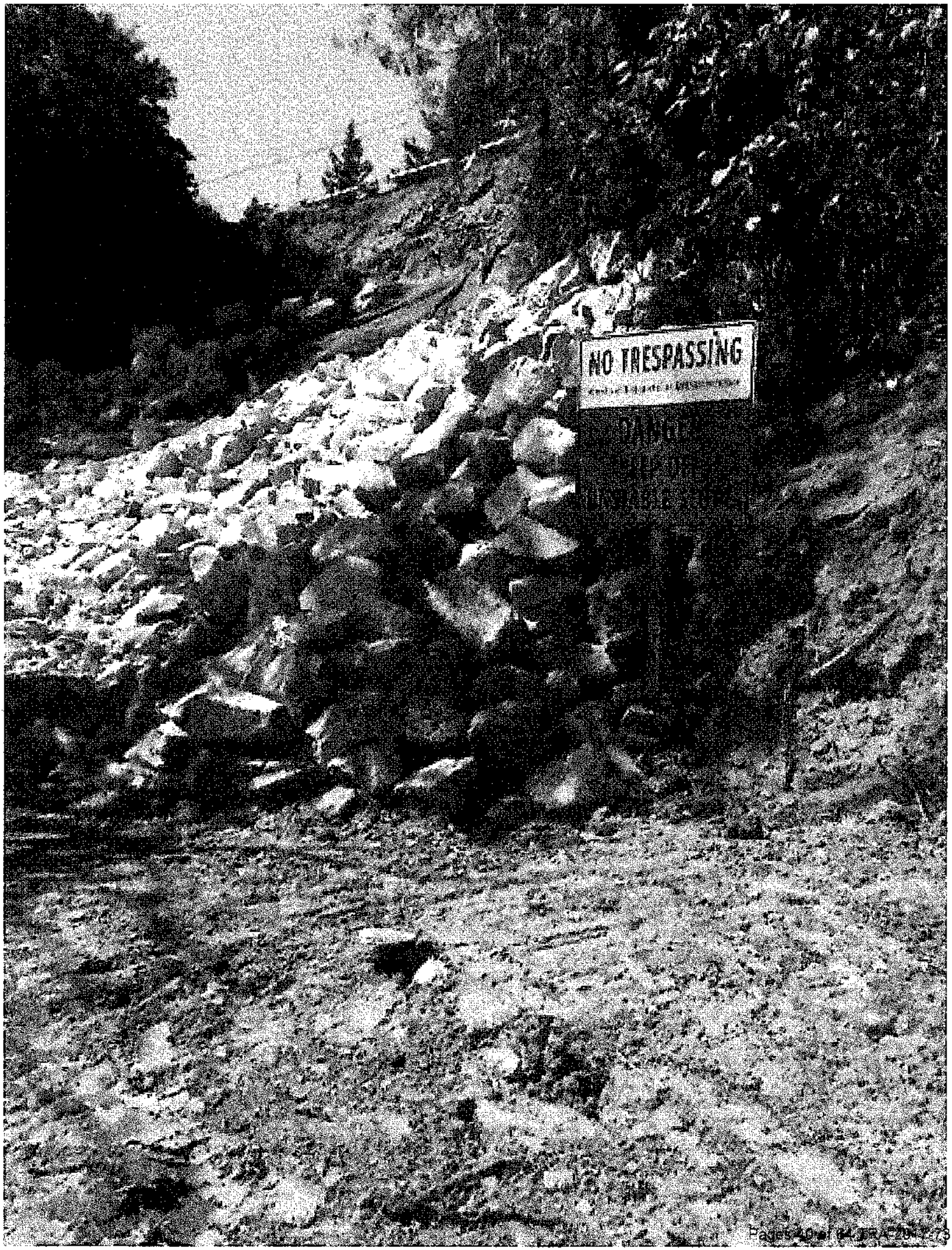
Thanks,
Mike

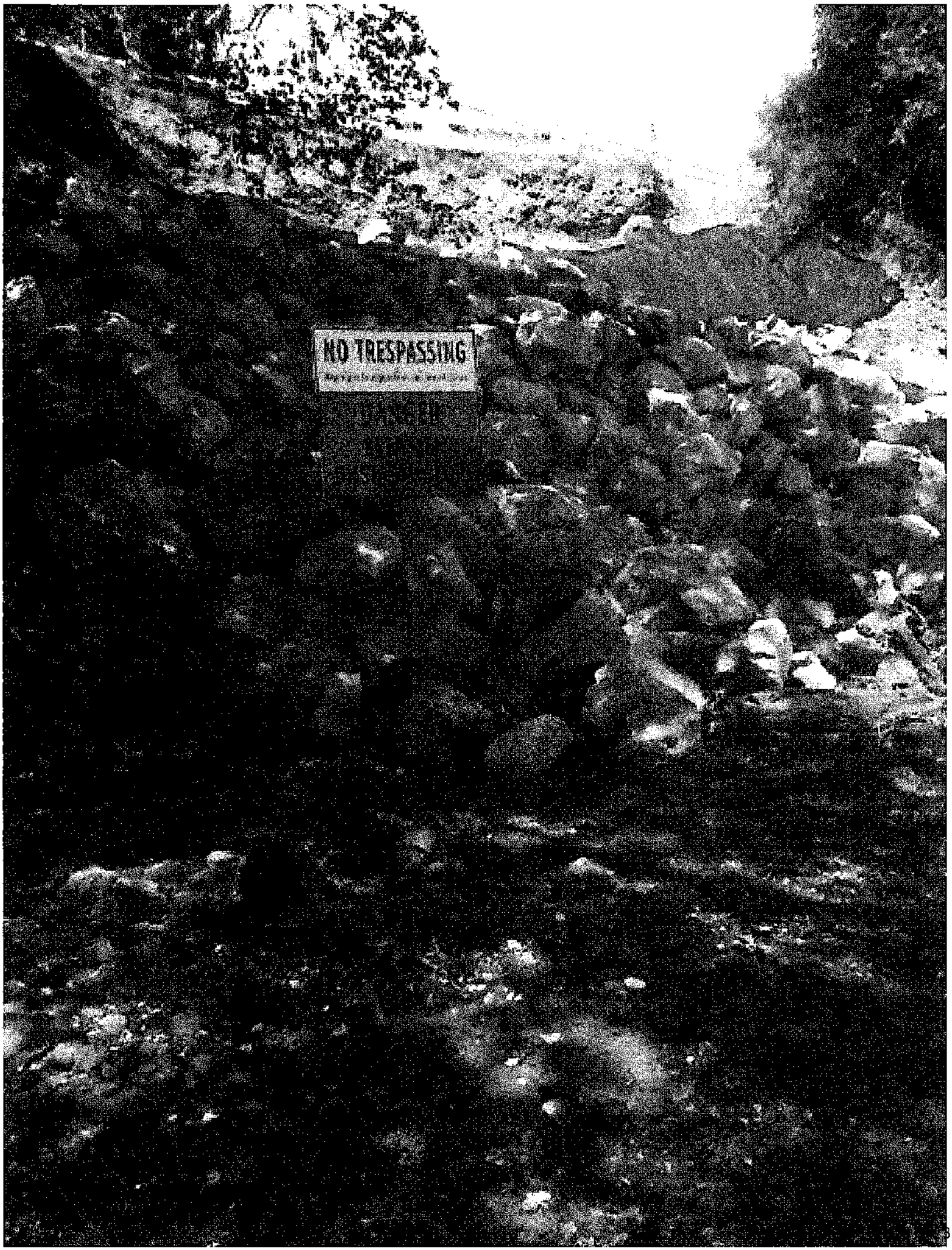
-----Original Message-----
From: Rogers, Tina TRAN:EX
Sent: Wednesday, July 19, 2017 1:53 PM
To: Pearson, Michael TRAN:EX
Cc: Evanoff, Ryan TRAN:EX
Subject: Isabella point signage

FYI - I think they have done a good job signing this.

t
-----Original Message-----
From: Dale Johnson [mailto:djohnson@mainroad.ca]
Sent: Wednesday, July 19, 2017 1:10 PM
To: Rogers, Tina TRAN:EX
Cc: David Turenne
Subject: Isabella point signage

Here are the 2 on the beach


NO TRESPASSING


NO TRESPASSING

Verishine, Leah TRAN:EX

From: David Turenne <dturenne@mainroad.ca>
Sent: Wednesday, July 19, 2017 3:01 PM
To: Elizabeth Nolan
Cc: Rogers, Tina TRAN:EX
Subject: Re: Isabella Point Road Repair Update

Hi Elizabeth,
That would be fine.
The dates are July 18th to August 14th. We then will conclude the project by August 25th.
Thank you for your attention to this.
Regards
David

Sent from my iPhone

On Jul 19, 2017, at 1:37 PM, Elizabeth Nolan <enolan@gulfislands.net> wrote:

> Hi David,
>
> We can post something to our Facebook page - we just publish Wednesdays so the paper's already out for this week. When does the advisory take effect and for how long?
>
> Elizabeth
>
> www.driftwoodgimedia.com
>
> > On Jul 19, 2017, at 11:40 AM, David Turenne <dturenne@mainroad.ca> wrote:
> >
> > Hi Elizabeth,
> > Could you print an traffic Advisory for the Isabella Point Residents?
> > Mainroad South Island Contracting is Placing Rip Rap for Bank Protection on Isabella Point Road.
> > The job is on hold temporarily due to material supply issues, we will resume the project as soon as possible.
> > We would like to warn the public to stay away from the site until we finish the project to prevent any injuries that could occur around the site.
> > Also, we would like to thank the local Residents for their patience during the traffic delays.
> > Regards,
> > David Turenne
> > Bridge and Project Manager
> > Mainroad South Island Contracting LP.

Verishine, Leah TRAN:EX

From: Dale Johnson <djohnson@mainroad.ca>
Sent: Thursday, July 20, 2017 6:09 AM
To: Rogers, Tina TRAN:EX
Cc: David Turenne
Subject: Isabella point
Attachments: image1.JPG; ATT00001.txt; image2.JPG; ATT00002.txt

Signage from road


NO TRESPASSING
DANGER
KEEP OFF
UNSTABLE SLOPE


NO TRESPASSING
DANGER
KEEP OFF
UNSTABIE SLOPE

Verishine, Leah TRAN:EX

From: Luke Maron <lmaron@mainroad.ca>
Sent: Friday, August 18, 2017 11:37 AM
To: Gustafson, Ryan TRAN:EX; Rogers, Tina TRAN:EX
Cc: David Turenne; Tim Carr; Dale Johnson; Mike Sedgwick
Subject: RE: Isabella Point road slide

Good Morning,
Unfortunately we have been delayed one more week due to rock supply. We will be mobilizing to Isabella on Monday August 28 2017 and start hauling rock on Tuesday August 29 2017.
Thank you everyone for your patience on this matter.
Regards,
Luke
-----Original Message-----
From: Gustafson, Ryan TRAN:EX [mailto:Ryan.Gustafson@gov.bc.ca]
Sent: Monday, August 14, 2017 9:27 AM
To: Luke Maron <lmaron@mainroad.ca>; Tina Rogers - BC Govt <Tina.Rogers@gov.bc.ca>
Cc: David Turenne <dturenne@mainroad.ca>; Tim Carr <tcarr@mainroad.ca>; Dale Johnson <djohnson@mainroad.ca>
Subject: RE: Isabella Point road slide

Hi Luke,
Sounds good from my end. Can you let me know when you plan to be on site once you know? I will plan to come over and redo the WorkSafe slope inspection to replace the outdated version. Were there any notable changes in the slope conditions during the shutdown period?
Thanks,
Ryan

-----Original Message-----
From: Luke Maron [mailto:lmaron@mainroad.ca]
Sent: Tuesday, August 8, 2017 12:22 PM
To: Rogers, Tina TRAN:EX; Gustafson, Ryan TRAN:EX
Cc: David Turenne; Tim Carr; Dale Johnson
Subject: Isabella Point road slide

Good afternoon everyone,
I just got confirmation the drillers have arrived to Hawthorn Hill gravel on Saltspring. I will touch base with Jason on Thursday.
I would like to mobilize over to Saltspring early to mid next week. I will be bringing myself, a labourer, and 2 excavators.
Dale do you still have 2 trucks and drivers?
s.22 I will be checking my phone.
Any questions please send a message.
Luke

Sent from my iPhone

Verishine, Leah TRAN:EX

From: Gustafson, Ryan TRAN:EX
Sent: Wednesday, August 30, 2017 5:24 PM
To: 'Luke Maron'; Rogers, Tina TRAN:EX
Subject: Isabella Point Road - August 29 Inspection - Waste site comments
Attachments: Isabella Waste Sketch.pdf

Hi Luke and Tina,
s.13

s.13

Please let me know if you have any comments or questions on the above.

Thanks,

Ryan Gustafson, P.Eng.
Geotechnical Engineer
Ministry of Transportation & Infrastructure - South Coast Region
3rd Floor - 2100 Labieux Road, Nanaimo, B.C.
Phone: 250.751.3271 | Cell: 250.713.3795 | Fax: 250.751.3290
Email: ryan.gustafson@gov.bc.ca

-----Original Message-----
From: Gustafson, Ryan TRAN:EX
Sent: Tuesday, July 4, 2017 6:20 PM
To: Luke Maron
Cc: Rogers, Tina TRAN:EX
Subject: Isabella Point - July 4 Discussions

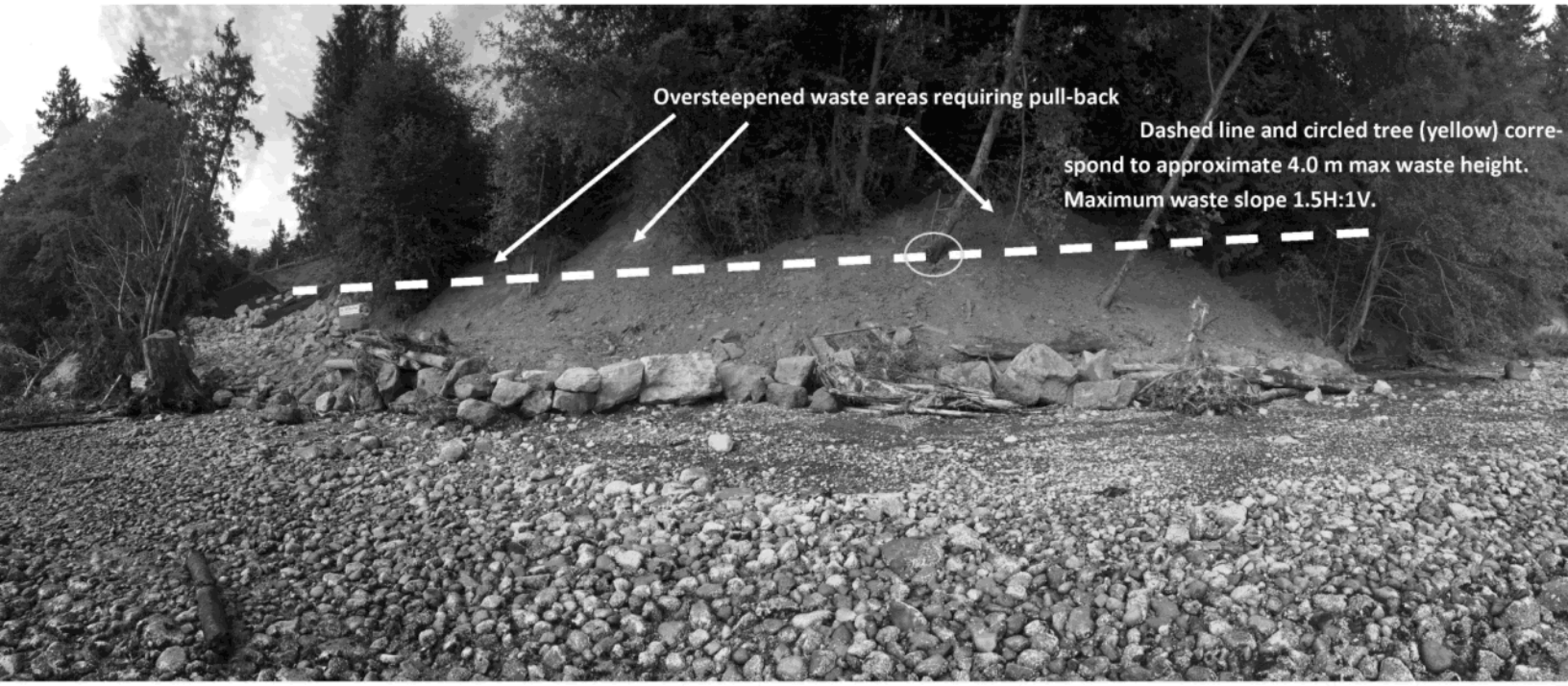
Hi Luke,
s.13

s.13

I hope the rest of your day went well. Let me know if you have any comments or questions on the above, or if there is anything I missed.

Regards,
Ryan

Sent from my iPhone


Oversteepened waste areas requiring pull-back
Dashed line and circled tree (yellow) correspond to approximate 4.0 m max waste height.
Maximum waste slope 1.5H:1V.

Verishine, Leah TRAN:EX

From: Gustafson, Ryan TRAN:EX
Sent: Monday, September 11, 2017 8:49 AM
To: Rogers, Tina TRAN:EX
Subject: RE: Isabella Point Rd Final Inspection

Hi Tina,
s.22 so I want to get everything wrapped up asap in case that happens early. I'll give you a call after I am out there and let you know what I see.
Cheers,
Ryan

From: Rogers, Tina TRAN:EX
Sent: Monday, September 11, 2017 8:43 AM
To: Gustafson, Ryan TRAN:EX
Subject: RE: Isabella Point Rd Final Inspection

I am acting Operations Manager this week here in Saanich therefor need to be close to the office otherwise I would definitely go with you.

My next trip over there is September 20th, which may be too long for you to wait?

T

From: Gustafson, Ryan TRAN:EX
Sent: Monday, September 11, 2017 8:40 AM
To: Rogers, Tina TRAN:EX
Subject: Isabella Point Rd Final Inspection

Hi Tina,
I spoke with Luke this morning and understand they demobilized from site last Thursday. He stated that all the geotechnical recommendations provided have been. I am planning to complete a final as-built inspection sometime early this week so I can wrap up the paperwork from my end; are you interested in joining?

I also discussed the reinstallation of the reflectors (which is what Mainroad was planning) with Dave here in Nanaimo. See below for his comments re: reflectors.

Regards,
Ryan

From: Edgar, David D TRAN:EX
Sent: Friday, September 8, 2017 3:50 PM
To: Gustafson, Ryan TRAN:EX
Subject: Isabella Point Rd

Ryan
I discussed this with Mike Pearson. As you did only a repair we have the option of just doing the reflectors and not adding concrete roadside barriers. But if the budget allows, then we'd prefer to add CRB if warranted. You can ask the

applicable area manager to check the warrant. If you haven't seen it, you can see the Barrier Index Warrant in Chapter 6 of the Supplement to TAC Geometric Design Guide.

Dave

Dave Edgar P.Eng.
Transportation Planning Engineer Ministry of Transportation and Infrastructure
3rd Floor - 2100 Labieux Road Nanaimo, B.C. V9T 6E9
Phone (250) 751-3276 Email David.Edgar@gov.bc.ca
Current Road Conditions: *DriveBC.ca* Find Us Online: *TranBC.ca*

Verishine, Leah TRAN:EX

From: Leon Bohmer <lbohmer@mainroad.ca>
Sent: Thursday, September 14, 2017 1:16 PM
To: Elizabeth Nolan
Cc: Tim Carr
Subject: RE: Isabella Point Road

Hello Elizabeth.

I am not able to answer either of your questions as they are questions for the owners of the roadway... The local Ministry of Transportation and Infrastructure, we (MSI) were contracted to do the work but are not at liberty to discuss our client information.

MOTI personnel can be reached at their local district office phone...number 250-952-4515.

From: Elizabeth Nolan [mailto:enolan@gulfislands.net]
Sent: Thursday, September 14, 2017 12:07 PM
To: Leon Bohmer
Subject: Isabella Point Road

Hi Leon,

Gail is wondering if we can get some stats on the repairs, such as how many truckloads of rock were required to shore up the bank, etc.

As well, we've had a resident say he's concerned there is no plan to install a barrier, especially in light of last week's accident in Fulford. Do you know if any other safety improvments are in the works?

Thanks!

Elizabeth

Elizabeth Nolan | Reporter

DgiM DRIFTWOOD GULF ISLANDS MEDIA

Driftwood Gulf Islands Media

CNA Award Winning Newspaper
328 Lower Ganges Road, Salt Spring Island, BC V8K 2V3
T: 250.537.9933 | F: 250.537.2613

Please consider the environment before printing this email

www.driftwoodgimedia.com

BRITISH COLUMBIA

Ministry of Transportation

South Coast Region
2100 Labieux Road
Nanaimo, BC V9T 6E7

MEMORANDUM

April 6, 2017

Tina Rogers
Area Manager Saltspring Island
Vancouver Island District
Ministry of Transportation and Infrastructure

Re: Isabella Point Road – Site Inspection and Recommended Remedial Measures

Introduction

On February 16, 2017, Mainroad Contracting (Mainroad) reported a failure on Isabella Point Road, located on Saltspring Island. On February 27, 2017, Ryan Gustafson, P.Eng. completed a site inspection to review the failure area, as requested by Tina Rogers, the local Area Manager. During the site inspection, the failure area was examined and the slopes adjacent to the failure and below Isabella Point Road were reviewed. Available background information, observations from this site inspection, discussion on the geotechnical issues that may have caused this failure, as well as recommendations for remediation of the failure are summarized in this memo.

Site Location

Isabella Point Road is located on the south end of Saltspring Island and parallels the west side of Fulford Harbour. The failure is located below the eastbound lane of Isabella Point Road, approximately 450 m south of its intersection with Musgrave Road, at:

- Lat/Long: 48.76424°, -123.45573°.

Background Information

A shoulder slump developed at the site in response to a heavy rainfall event on January 8, 2013. A site assessment was carried out shortly after the instability was initially identified, and is summarized in a memo entitled "Isabella Road Slide Instability", prepared by Sarah Gaib, P.Eng. and dated January 21, 2013. The following items are summarized from the 2013 memo:

- At the time of the 2013 assessment, the slumped material remained in place on the slope, with an approximate 27 m long tension crack along the shoulder of Isabella Point Road. The crack was graded closed and reappeared within 1 day;
- The slope had an overall angle of 43 degrees, and may have been vertical in some locations. Erosion at the base of the slope during high tide appeared to be ongoing as the bottom 0.5 m of slope was scoured out;
- A significant Douglas fir, with a diameter greater than 1 m, was located at the crest of the slope;
- Surficial geology maps for the area indicated the unconsolidated deposits on Saltspring Island consist of till, glaciofluvial gravel and sand, and glaciomarine clay deposits;
- The 2013 assessment judged that the slide had many driving forces contributing to the instability, including:
    - active erosion at the toe of the slope by the ocean,
    - addition of surface runoff from Isabella Point Road,
    - possible addition surface runoff across the road when the concrete basin overflows,

  - addition of water into the embankment from water flow through gaps around the annulus of the HDPS pipe in the concrete basin, and
  - addition of water from driveway ditch whether it be surface or groundwater.
- Recommendations were provided for both drainage improvements, as well as stabilization due to ongoing toe erosion.

Site Observations – February 27, 2017 Site Inspection

On February 27, 2017, Ryan Gustafson, P.Eng. completed a site visit in conjunction with Mr. David Turenne of Mainroad to review the condition of the site. The following observations were made during the inspection:

- No pavement distress was noted above the failure area;
- The failed mass is approximately 18 m wide at the toe and 14 m wide at the crest. The slope height is approximately 12 to 13 m, and the base of the failure slopes at approximately 70% (1.4H:1V);
- Adjacent to the failure area, additional signs of instability were observed south of the site. This included:
  - Immediately adjacent, where the flank of the landslide is also slumping, but remains in place; and
  - Below the CMP culvert extending under Isabella Point Road, approximately 25 m south of the site, where the culvert outfall appears to be slumping in a similar manner, but remains in place and is setback from the road sufficiently that a failure would likely not impact the road prism.
- The upslope drainage is convoluted and appears to be of limited effectiveness. Refer to the 2013 memo for additional detail on the upslope drainage and the role it likely has played in causing the failure;
- At the headscarp, 1.3 m of fill supporting the road structure is exposed. This fill consists of 0.4 m of road based materials and 0.9 m of fine blast rock material;
- Soils in the landslide track can be described as SAND and GRAVEL till, as described in greater detail below. The till material is overlain by a 0.2 m organic mat, except within the road prism where fill materials are present as described as above. A SILT layer, corresponding to that described as (4.4 to 4.7m) below was exposed mid track. A short, near vertical step was present below the silt layer. No seepage was observed above or at the silt layer.

During discussions with Mr. Turenne, the following was indicated regarding construction of a potential repair for the site:

- Rock fill/rip rap availability is limited on Saltspring Island. Rip rap is obtainable, and requires blasting as there is currently no stockpiled material. A one week lead time is required. The rip rap/rock fill available may not meet the Standard Specifications for durability, as it is typically conglomerate with occasional basalt and granite. Costs would be significantly higher to import higher quality rockfill from off of the Island; and
- It would be difficult and costly to remove the standing, large Douglas Fir tree that has slumped down the slope.

An approximate 8 m high soil exposure, sloping at approximately 80°, was observed approximately 30 m north of the site, extending upwards from the shoreline. The exposure was logged visually, with 0 m corresponding to the base of the slope and roughly equivalent to sea level. The following stratigraphy was exposed:

- 0 m to 3.5 m: SAND, silty, gravelly, some clay, trace cobbles, poorly graded, dense (in the unweathered portion 0.1 m below the slope surface), low plasticity to non-plastic, grey, moist, till-like; overlain by:
- 3.5 m to 3.6 m: SAND, silty, occasional fine gravel, poorly graded, dense to very dense, moist, brown; overlain by:
- 3.6 m to 4.4 m: SAND and GRAVEL, trace to some silt, well graded, dense, moist, brown, overlain by:
- 4.4 to 4.7 m: SILT and SAND, poorly graded, non plastic, hard/very dense, moist, brown; overlain by:
- 4.7 to 7.7 m: SAND, silty, gravelly, some clay, trace cobbles, poorly graded, dense (in the unweathered portion 0.1 m below the slope surface), low plasticity to non-plastic, grey, moist, till-like.

Detailed site measurements were taken using handheld tools, which have been used to develop the proposed remedial section.

Discussion

s.13

Recommendations

s.13

s.13

Closure

We trust this memo meets your current requirements. Should you have any questions or comments please to not hesitate to contact the undersigned.

Prepared by:

Apr 6/17

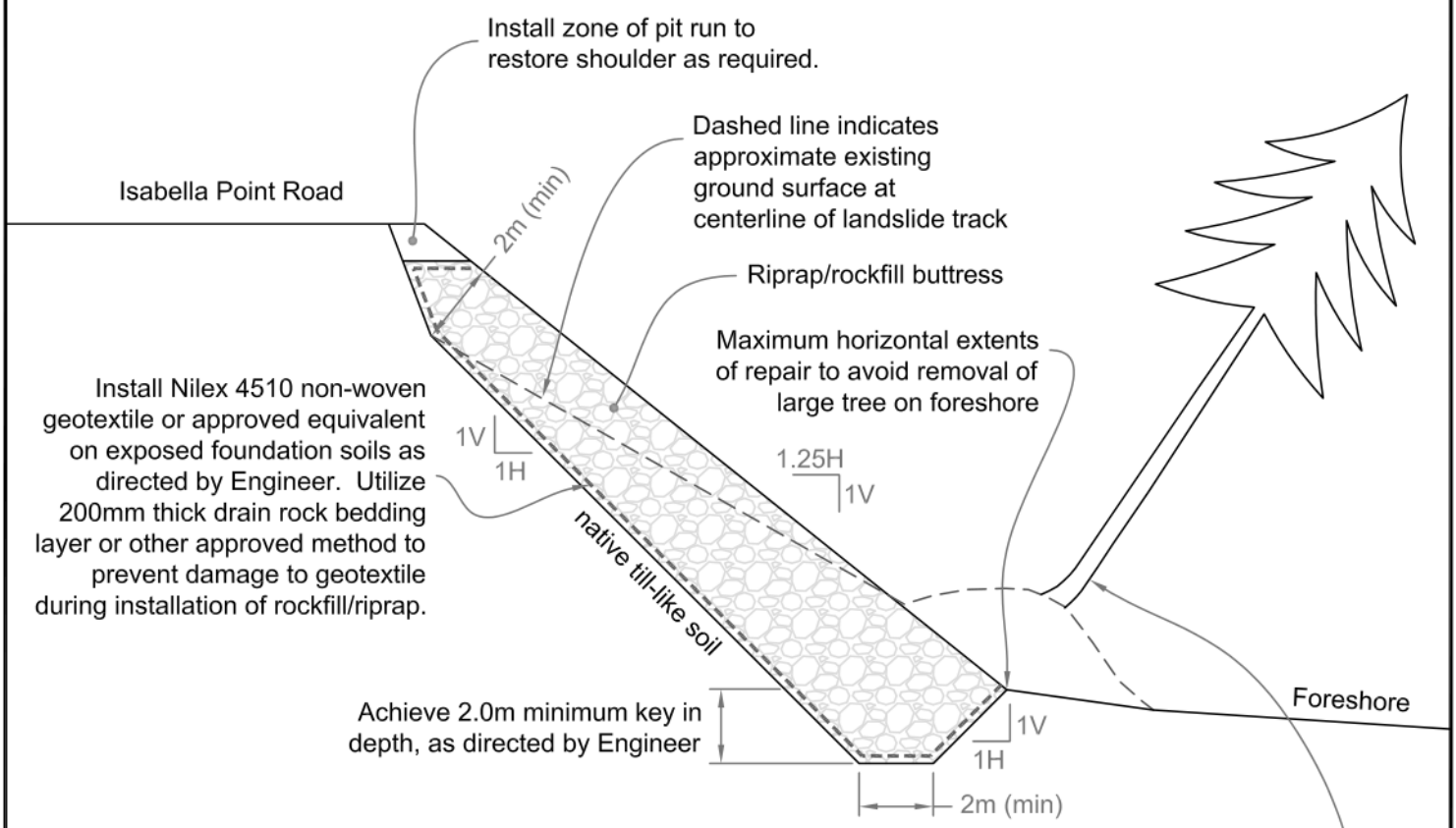
Ryan Gustafson, P.Eng.
Geotechnical Engineer

Reviewed by:

Sarah Gaib, P.Eng., M.Eng.
Lead Geotechnical Engineer, Foundations

Cc: Wayne Janusson, P.Eng.
Senior Geotechnical Liaison Engineer

Attachments:
Figure 1 - Proposed Buttress Design
Photographs 1-10



Extents of treatment area and location of key in to be field fit in conjunction with Engineer on site during work.

Leave existing, slumped tree in place. Some undermining of root mass may be required to achieve key in. Contractor to ensure worker safety during all temporary works. Excavation slopes to be determined in conjunction with Engineer on site.

NOTES:

1. **Cut existing till-like soils to a temporary slope of 1H:1V, such that proposed key in location can be achieved.**
2. **Terrace original ground in a continuous series of steps a minimum of 0.5m wide as buttress rises** (omitted from sketch for clarity).
3. **Install non-woven geotextile and bedding as per sketch.**
4. **Install riprap/rockfill buttress utilizing 500kg class, durable angular riprap/rockfill. Riprap source shall be approved by Engineer prior to blasting and transport to site.**

Drawing is not to scale. Drawing to be utilized in conjunction with design memo. All dimensions in meters unless otherwise noted. Work shall conform to Ministry Standard Specifications.

BRITISH COLUMBIA

Ministry of Transportation and Infrastructure
Geotechnical and Materials Branch

PROPOSED ROCKFILL BUTTRESS SECTION
ISABELLA POINT ROAD
VANCOUVER ISLAND DISTRICT

DRAWN BY:	PROJECTION:		SCALE:
S.Ruiz	UTM Zone 10		NOT TO SCALE
CHECKED BY:	DATUM:		DATE:
R.Gustafson	NAD83		April 5, 2017
FILE No.	PROJECT No.	REG.	DRAWING No.
	01-SS-1006	3	FIGURE 1

N:\GEOTECHNICAL\S.RUIZ_DESIGN\Geotech_Eng\IsabellaPointRd_2017_SlopeFailure(01-SS-1006)\Isabella_Figure1.dwg – Figure1 – Apr. 05, 2017 3:22pm – sruiz

This drawing was originally produced in colour.

PHOTO 1: View of failure looking south.

PHOTO 2: View of headscarp of failure. Note ruler is 2.0 m in length.

PHOTO 3: View of glacial soil exposure described in memo. Note 2.0 m ruler is folded at 1.0 m mark.

PHOTO 4: View of slide debris from base of slope. The proposed remedial measures involve leaving the large logs and tree in the foreground in place, and constructing the buttress behind this material. The dashed line forms the approximate northern end of the "Full Treatment" and "Minimal Treatment" areas. The solid line forms the approximate southern end of the "Minimal Treatment" area, while the southern end of the "Full Treatment" area is out of frame to the left.

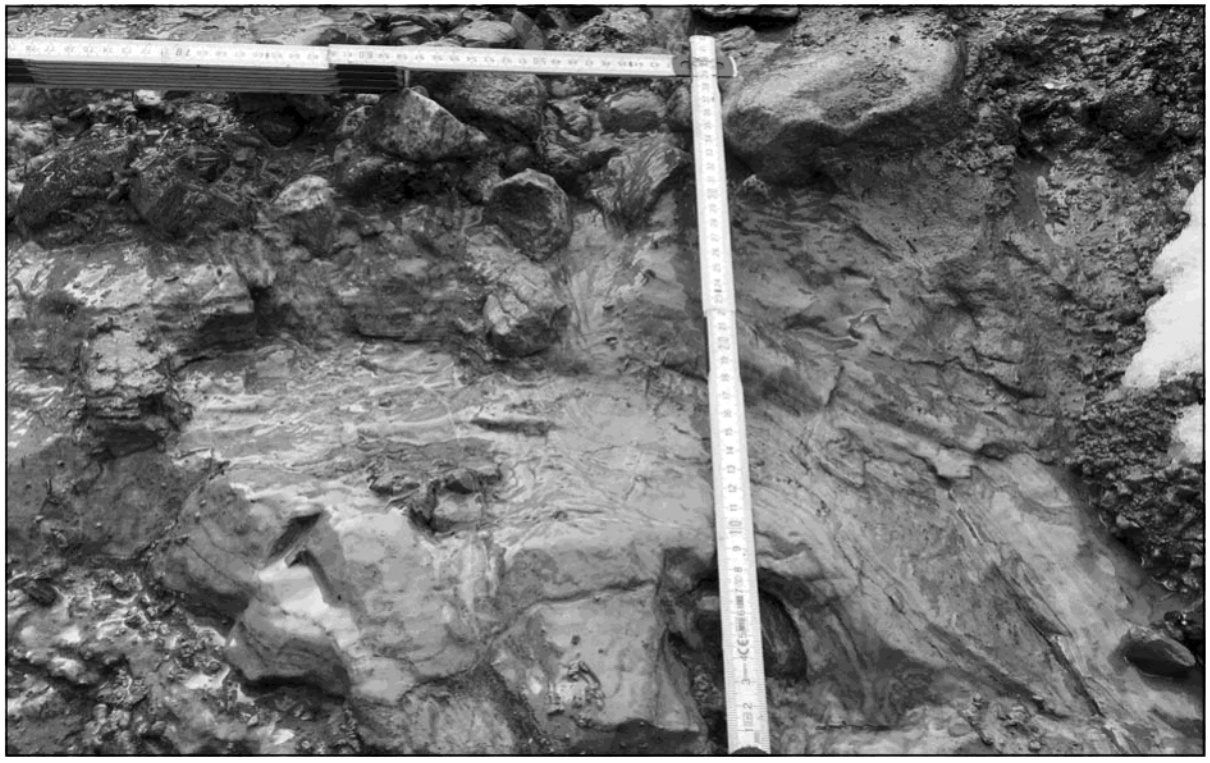


PHOTO 5: View of silt layer exposed in landslide track.

PHOTO 6: Unstable area identified below CMP culvert outfall, located about 25 m south of site. The white dashed line forms the southern end of the "Full Treatment" area.

PHOTO 7: (LEFT) View of failure surface from below. Ruler placed on silt layer in track.

PHOTO 8: (RIGHT) View of buried stump at the right flank of the slide (looking downslope).

PHOTO 9: View of slide debris. Note rip rap material that was incorporated into the slide from the adjacent area.

PHOTO 10 View of slump material remaining in place in the failure area.