ALBERTA TRANSPORTATION
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION – PEACE RIVER DISTRICT
2021 INSPECTION

THURBER ENGINEERING LTD.

Site Number	Location	Name	Hwy	km
PH009A-1	Shaftesbury	Bricks Hill Slide	684:02	9.240
Legal Description		**UTM Co-ordinates**		
SE¼ 21-082-23 W5M		11U E 467287	N 6219688	

	Date	PF	CF	Total
Previous Inspection:	11-June-2020	5	2	10
Current Inspection:	8-July-2021	5	2	10
Road AADT:	480		**Year:**	2020
Inspected By:	Don Proudfoot, Thurber			
	Ed Szmata, Kristen Tappenden, Max Shannon, Erwin Kurz. AT			
Report Attachments:	☑ Photographs	☑ Plans	☑ Maintenance Items	

Primary Site Issue:	On July 9, 2016, the EB paved shoulder of Hwy 684:02 had been affected by a slide which extended downslope. This site lies adjacent to the west side of the previously monitored Bricks Hill wash-out feature which was repaired in 2004.	
Dimensions:	A landslide with approximate dimensions of 85 m in length by 40 m in width extended up into the edge of the SBL, affecting approximately 15 m of shoulder pavement.	
Maintenance/Remediation:	A 36-m long patch the full width of the EB driving lane and shoulder was placed in September 2015. In the fall of 2016, pending a decision on a repair, Alberta Transportation built an ACP paved single lane detour along the north side of the NBL and closed the SBL. In addition, the NBL ditch was regraded and armored with rip rap. Concrete jersey barriers were placed along the edge of the backscarp. A pile wall was constructed between 2018 and 2019 to stabilize the landslide area. It consisted of 63 CIP tangent 1200 mm diameter concrete piles. The slope above the wall was reconstructed with geogrid reinforced granular fill. The south ditch was conveyed along the back of the pile wall through a ½ CSP culvert. The road surface was re-established with pavement and the riprap in the upslope ditch was enhanced.	
Observations:	**Description**	**Worsened?**
☑ Pavement Distress	A short section of the edge of the pavement had been eroded (photo 12).	☐
☑ Slope Movement	There are two grassed over small old slumps in the backslope (photo 11).	☐
☑ Erosion	Small section of eroded pavement edge as noted above (photo 12).	☐
☑ Seepage	A wet sideslope area (photo 9)	☑
☐ Bridge/Culvert Distress		☑
☑ Other	Mowers had rutted the surface of the sideslope fill in the landslide repair area	☐

Instrumentation:

Three slope inclinometers were installed in the pile wall and the readings to date are as follows:

- SI18-P6 - pile head deflection = 5.9 mm
- SI18-P23 - pile head deflection = 10.6 mm
- SI18-P40 - pile head deflection = 15.8 mm

Two standpipes remain on site. In spring 2021 the groundwater level in SP17-2 had risen by 5.4 m since the fall 2020 reading back to near the level it was at in spring 2020. SP17-6 was dry in all readings prior to spring 2021 at which time a water level of 9.7 m below ground surface was measured.

Assessment:

The recent remedial measures appear to be performing well to date. The rehabilitated highway surface and sideslope do not show any signs of movement and pile head deflections are well within predicted values.

The minor erosion along the edge of pavement is considered to be due to a fast spring runoff that was channelized against the pavement by a compacted windrow of frozen snow.

Minor seepage from the sideslope is near where some wetness was noted last year in the pavement. There might be a spring in this area.

The old slumps in the backslope are grassed over and relatively dormant, likely a result of weathering and loss of cohesion in the clay soils.

Recommendations:

Maintenance:
The damaged end terminal of the guardrail should be replaced.
It is understood that a pavement overlay is planned for 2021 up the Hwy 684 hill section. AT mentioned that they would include some repairs to the eroded highway shoulder using extra riprap as part of this work.

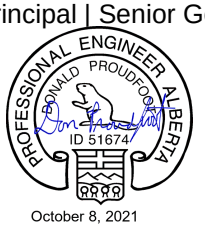
The side slope area that was rutted by the mowers should be repaired by raking out the ruts, seeding and covering the slope with additional TRM. In the future this part of the slide repair should be mowed by hand, not with heavy tractors as the slope is steep and prone to disturbance under wheel traffic. AT suggested that “No Mowing” signs be placed on the steep sideslope above each end of the pile wall to remind the mowing crew of this.

Assuming that these maintenance items are carried out, this site could be removed from the regular geohazard inspection program.

CLOSURE

It is a condition of this letter report that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

Don Proudfoot, P.Eng.
Principal | Senior Geotechnical Engineer



October 8, 2021

October 8, 2021

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.
RM SIGNATURE: _____
RM APEGA ID #: 91085
DATE: October 8, 2021
PERMIT NUMBER: P005186
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Tarek Abdelaziz, P.Eng.
Review Principal

THURBER

STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

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5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.

d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

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W E
S

REQUESTED HIGHWAY R/W

GRASS COVERED BACKSLOPE SLUMPS

CRASH TERMINAL DAMAGED BY TRAFFIC

SLIGHT EROSION ALONG EDGE OF PAVEMENT
0.5m WIDE X 0.2m DEEP - SHOULD ADD RIPRAP
DURING COMING ASPHALT OVERLAY JOB

INSTALLED GUARDRAIL

SLOPE TRANSITIONS
FROM 3.25:1 TO 3:1

INSTALLED NEW BARBED WIRE FENCE
WIRES LOOSE
WET SPOT RUTTED BY MOWERS

RE-INSTATED RIPRAP

INSTALLED BURIED 800mm Ø CSP PIPE

FILL TIED INTO EXISTING DITCH

800 mm Ø 1/2 CULVERT

SW22 82-23-5

WALER / PILE WALL

TRENCHED IN
SUBDRAIN

GRADED AREA DOWNSLOPE
OF THE PILE WALL

MOWERS HAVE CREATED RUTTING AND
DISTURBANCE OF THE SOIL COVERING
AND UNDERLYING CLAY CAP AND GRAVEL

LIMIT OF 2017-06-08
SURVEY BY WSP

INSTALLED
RIPRAP

800mm Ø CSP CULVERT
GROUTED AND ABANDONED
DURING CONSTRUCTION

INSTALLED RIPRAP

INSTALLED NEW
BARBED WIRE FENCE

HWY 684:02

HIGHWAY R/W

TH17-2 (SP)
TH17-3
TH17-4
TH17-6 (SP)
TH17-9 (SP)

9+100
9+200
9+300
9+400

465 460 455 450 445 440 430 420 415 410 405

LEGEND

- APPROXIMATE TEST HOLE LOCATION
- (SP) STANDPIPE PIEZOMETER
- (SI) SLOPE INCLINOMETER
- (PN) PNEUMATIC PIEZOMETER
- RIPRAP
- SCARP CRACK
- GUARD RAIL
- x BARBED WIRE FENCE
- TREE LINE
- CULVERT
- DESIGN GRADING LIMITS
- ① PHOTOGRAPH NUMBER, AND APPROXIMATE DIRECTION AND LOCATION
- SLIDE SCARP (APPROXIMATE)

NOTES:

1. JULY 8, 2021 SITE OBSERVATION SHOWN IN RED
2. WOULD HAVE BEEN BETTER TO HAVE SET NEW GUARDRAIL ABOUT 50 mm HIGHER IN ANTICIPATION OF FUTURE OVERLAY PROJECT.

0 10 20 30 40 50 60m
SCALE 1:1000

Alberta

PEACE REGION (PEACE RIVER DISTRICT)
PH009A-1: HWY 684:02 BRICK'S HILL LANDSLIDE

2021 INSPECTION PLAN

DWG No. 32121-PH009A-1

DRAWN BY	ML
DESIGNED BY	DWP
APPROVED BY	DWP
SCALE	1:1000
DATE	OCTOBER 2021
FILE No.	32121

THURBER ENGINEERING LTD.

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	**Photo 1.** Looking east along Hwy 684 at landslide repair
	**Photo 2.** Looking east at landslide repair from inlet of drainage ditch

	**Photo 3.** Looking northeast at the pile wall
	**Photo 4.** Looking east at the slope below the pile wall

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	**Photo 5.** Looking east along the drainage trough and pile wall
	**Photo 6.** Looking west along the drainage trough and pile wall. Note the disturbance caused by mowers to the fill slope surface above the drain trough

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	**Photo 7.** Looking west at slide repair fill
	**Photo 8.** Looking east along ditch east of slide repair

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	**Photo 9.** Wet area in fill sideslope where mower has rutted the ground surface
	**Photo 10.** Looking west at slide repair along Hwy 684

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	**Photo 11.** Grass covered backslope slumps
	**Photo 12.** Looking west at eroded shoulder of road

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	**Photo 13.** Looking west along upslope highway ditch