

**A LBERTA TRANSPORTATION  
GEOHAZARD ASSESSMENT PROGRAM  
NORTH CENTRAL REGION – ATHABASCA &  
FORT MCMURRAY DISTRICTS  
2021 SITE INSPECTION**



Site Number	Location	Name	Hwy	km
NC058	6.5 km west of the junction between Hwy 881 and 858 to the north of Lac La Biche	Slide 45 Km N of Hwy 55	858:02	45.85
Legal Description		UTM Co-ordinates		
SW- 30-68-13-W4M		1 2 N 6085029		E 436771

	Date	PF	CF	Total
<b>Previous Inspection:</b>	June 12, 2019	7	3	21
<b>Current Inspection:</b>	June 25, 2021	6	3	18
<b>Road AADT:</b>	250	<b>Year:</b>		2020
<b>Inspected By:</b>	José Pineda, Tarek Abdelaziz (Thurber) Kristen Tappenden, Bernard Ching (Alberta Transportation)			
<b>Report Attachments:</b>	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input type="checkbox"/> Maintenance Items			

<b>Primary Site Issue:</b>	Active landslides occurred between 2008 and 2013 after heavy rainfall events, causing pavement distress on the eastbound and westbound lanes of the highway. The south slide (eastbound lane landslide) was first noticed in 2008 and the north slide (westbound lane landslide) was first noticed in 2013.
<b>Dimensions:</b>	<p><b>The south slide:</b> About 75 m along the highway and 30 m perpendicular to the highway centerline</p> <p><b>The north slide:</b> About 95 m along the highway and 35 m perpendicular to the highway centerline</p>
<b>Date of any remediation:</b>	<p><b>The south slide:</b> The remedial measure, completed in July 2011 to stabilize the eastbound lane landslide, involved the construction of a 90 m long pile wall to retain the landslide mass. The pile wall consisted of 15 m long driven steel H piles (HP 310x110 piles), installed at a center-to-center spacing of 0.62 m.</p> <p><b>The north slide:</b> The remedial measure, completed between October 2016 and May 2017 to stabilize the westbound lane landslide, involved the construction of a 120 m long pile wall to retain the landslide mass. The pile wall consisted of 15 m long driven steel H piles (HP 310x110 piles), installed at a center-to-center spacing ranging between 0.66 m and 0.8 m.</p>
<b>Maintenance:</b>	ACP patch was placed on the highway eastbound lane in July 2011 after construction completion; highway eastbound and westbound cracks sealed in spring 2012; both highway lanes patched again in fall 2012; WBL open cracks sealed in spring 2012; ACP patch placed on the highway WBL surface in fall 2012 and fall 2013; ACP patch placed on the EBL and WBL in fall 2014. ACP patch placed on the WBL in September 2015; clay fill was used by AT to contour highway WBL side slopes after completion of the north pile wall; ACP overlay placed on both lanes in the fall of 2016 and in the summer of 2018; crack sealing on both lanes in the spring of 2019

<b>Observations:</b>	<b>Description</b>	<b>Worse?</b>
<input checked="" type="checkbox"/> Pavement Distress	Eastbound lane: 10 mm dip within the central portion of the landslide Westbound lane: 5 mm dip near the eastern flank of the landslide	<input type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	Reflective cracks (5 to 40 mm wide) with less than 5 to 10 mm drop	<input type="checkbox"/>
<input type="checkbox"/> Erosion		<input type="checkbox"/>
<input type="checkbox"/> Seepage		<input type="checkbox"/>
<input type="checkbox"/> Bridge/Culvert Distress		<input type="checkbox"/>
<input checked="" type="checkbox"/> Other	Voids formed around a few of the south landslide piles; voids are not visible due to vegetation growth	<input type="checkbox"/>
<b>Instrumentation: (3PNs)</b>  Between the fall of 2020 and the spring of 2021, ground water levels decreased by 0.21 m in PP10-3, increased by 0.07 m in PN14-2, and remained unchanged in PN14-2. The groundwater levels ranged from 0.55 m to 1.6 m below existing ground surface.		
<b>Assessment (Refer to attached Figure):</b>  The implemented remedial measures have been effective in stabilizing the EBL and WBL landslides. However, future crack sealing and/or patching (as needed) should be anticipated until the pile walls mobilize the full magnitudes of the landslide stabilizing forces.		
<b>Recommendations:</b>  As discussed, this site will be removed from the GRMP.  The local MCI should continue to monitor the site and watch closely for the development of any new cracks or depressions on the highway surface. Open cracks should be sealed to prevent surface water infiltration into the landslide mass and ACP patch should be placed as needed to provide a smooth ride to motorists.  Existing voids along the tops of the eastbound lane landslide piles should be filled with compacted clay or gravel to eliminate tripping hazards.		
<b>Closure</b>  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.  Tarek Abdelaziz, Ph.D., P.Eng. Principal   Senior Geotechnical Engineer              José Pineda, M.Eng., P.Eng. Senior Geotechnical Engineer		



## 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.

### 4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

### 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.

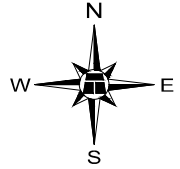
### 6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

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.

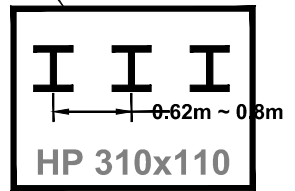
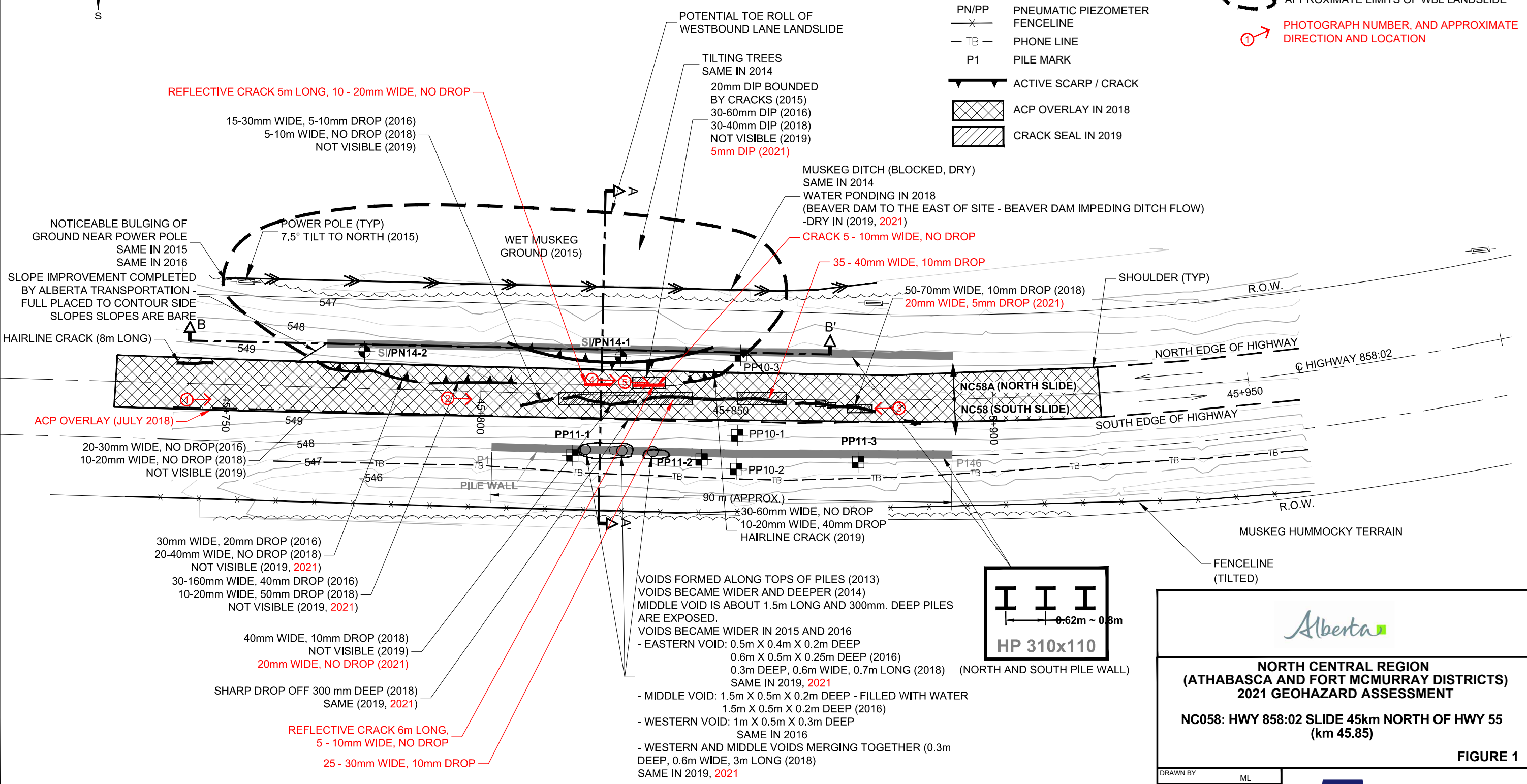
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SW 30 68-13-4

**LEGEND**

- 2014 TEST HOLE LOCATION
- 2010/2011 TEST HOLE LOCATION
- DESTROYED INSTRUMENT LOCATION
- SLOPE INCLINOMETER
- PNEUMATIC PIEZOMETER
- FENCELINE
- PHONE LINE
- PILE MARK
- ACTIVE SCARP / CRACK
- ACP OVERLAY IN 2018
- CRACK SEAL IN 2019
- TREE LINE (APPROX.)
- MUSKEG DITCH (APPROX.)
- 548 GROUND CONTOURS
- APPROXIMATE LIMITS OF WBL LANDSLIDE
- PHOTOGRAPH NUMBER, AND APPROXIMATE DIRECTION AND LOCATION



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**NOTE:**  
JUNE 25, 2021 OBSERVATIONS ARE SHOWN IN RED

SCALE 1:750

**NORTH CENTRAL REGION  
(ATHABASCA AND FORT MCMURRAY DISTRICTS)  
2021 GEOHAZARD ASSESSMENT**

**NC058: HWY 858:02 SLIDE 45km NORTH OF HWY 55  
(km 45.85)**

**FIGURE 1**

DRAWN BY	ML
DESIGNED BY	JGP
APPROVED BY	TSA
SCALE	1:750
DATE	AUGUST 2021
FILE No.	32122

**THURBER ENGINEERING LTD.**





Photo No.1 - General view of the highway lanes at the landslide locations (looking east); the highway was overlaid in July 2018



Photo No.2 - Looking east from the western flank of the eastbound landslide (South Slide) at a reflective crack (20 mm wide, no drop) on the east bound lane



Photo No.3 - Looking west from the eastern flank of the eastbound lane landside at a reflective crack (20 mm wide, 5 mm drop) on the eastbound lane



Photo No.4 - Looking east at a reflective crack on the highway westbound lane (10 to 20 mm wide, no drop)





Photo No.5 - Looking east at a reflective crack on the westbound lane (5 to 10 mm wide, no drop)