

**ALBERTA TRANSPORTATION
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION (PEACE RIVER DISTRICT)
2023 INSPECTION**



Site Number	Location	Name	Hwy	km
SH032-1	Northeast of High Prairie	Salt Prairie	679:06	26.2
Legal Description		UTM Co-ordinates		
SE28-76-14-W5		11U E 556,162	N 6,163,235	

	Date	PF	CF	Total
Previous Inspection (Call-out):	25-Jun-2019	11	3	33 (Callout)
Current Inspection:	5-Jun-2023	9	3	27
Road AADT:	312		Year:	2023
Inspected By:	Kristen Tappenden, TEC Max Shannon, TEC Rodney Johnston, TEC		Ken Froese, Thurber Mark Gallego, Thurber	
Report Attachments:	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input checked="" type="checkbox"/> Maintenance Items			

Primary Site Issue:	Landslide downslope of the pavement on the south side of the 6 m high highway embankment extending to a stream located at the base of the embankment; head scarp crack is about 4.5 m from the edge of the gravel shoulder.		
Dimensions:	The landslide is about 25 m wide parallel to the highway at the toe, and about 12 m long perpendicular to the highway alignment.		
Date of Remediation:	None		
Maintenance:	2019: The highway was paved in 2019 with a thick layer of ACP (600 mm over an initial 200 mm lift).		
Observations:	Description	Worsened?	
<input checked="" type="checkbox"/> Pavement Distress	Cracks previously noted in both driving lanes/shoulders prior to the overlay have not reflected through and are likely unrelated to the landslide.	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Slope Movement	The landslide scarp (about 0.3 m height) is located 4.5 m from the edge of the gravel shoulder with the toe near a stream at the base of the highway embankment.	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Erosion	Stream erosion on both banks causing localized slumping. A sinkhole was observed on the south sideslope during the 2023 inspection.	<input checked="" type="checkbox"/>	
<input type="checkbox"/> Seepage		<input type="checkbox"/>	
<input type="checkbox"/> Bridge/Culvert Distress		<input type="checkbox"/>	
<input type="checkbox"/> Other		<input type="checkbox"/>	
Instrumentation: None			
Assessment:			
The landslide is about 25 m wide parallel to the highway at the toe, and about 12 m long perpendicular to the highway alignment. It is located downslope of the highway WBL within an approximately 6 m high embankment that has an average inclination of about 2.7H:1V. The sideslope is well grassed (except where disturbed by recent slide movements), and there are intermediate scarps within the			

body of the slide. The head scarp of the landslide is located 4.5 m from the edge of the gravel shoulder.

The toe of the slide is located at the toe of the highway embankment, immediately adjacent to a stream channel. The stream channel is less than 1 m in width and less than 1 m deep adjacent to most of the landslide area, except towards the east end where the stream widened/flattened out to about 8 m wide. The stream flows westwards towards the Salt Creek, located about 300 m to the southwest of the site.

It appears that the landslide may have occurred due to stream channel erosion along the toe of the embankment slope. The slide appears to have retrogressed further up the embankment slope due to the progressive loss of toe support. It is postulated that the embankment is composed of highly plastic clay, and gradual loss of cohesion is likely another contributing cause of the failure. In addition, the overall embankment inclination of 2.7H:1V is marginally acceptable for long-term stability of slopes comprised of high plastic clay material.

The open cracks observed in the pavement in 2019 (prior to placement of the overlay) were not thought to be related to this landslide as they were present on both sides of the highway surface and extended beyond the limits of the landslide area. In 2023, these cracks have not reflected through the pavement overlay placed after the 2019 callout.

The main slide scarp crack did not appear to have retrogressed further towards the highway since the last inspection. However, there was a recent movement observed in the landslide mass, which indicates the potential for future retrogression into the highway lane.

Recommendations:

Maintenance/Short Term:

The Maintenance Contractor should regularly monitor this area for further movements and measure the distance between the main scarp crack and the edge of gravel shoulder.

The observed sink hole should be monitored and get backfilled before it gets bigger in size.

If a significant drop occurs within the head scarp crack along with further slide retrogression towards the highway, consideration should be given to placing a guardrail to protect runaway vehicles from the existing hazard.

Medium Term:

Consideration may be given to installing soil nails along the exposed head scarp face to reduce the rate of landslide retrogression into the highway.

Long Term:

The long-term repair option may include any of the following options:

- Excavate the slide mass and replace it with granular fill
- Construct a toe berm to buttress the landslide movement
- Install a driven steel pile wall/sheet pile along the edge of the road

A preliminary engineering assessment is recommended for this site. A 15 m deep test hole, complete with a standpipe piezometer, should be drilled near the edge of the road to assess soil and ground water conditions.

Inspection:

This site should be inspected once per contract as currently scheduled.

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.

Tarek Abdelaziz, Ph.D., P.Eng.
Partner | Senior Geotechnical Engineer

Mark Gallego, M.Eng., P.Eng.
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.

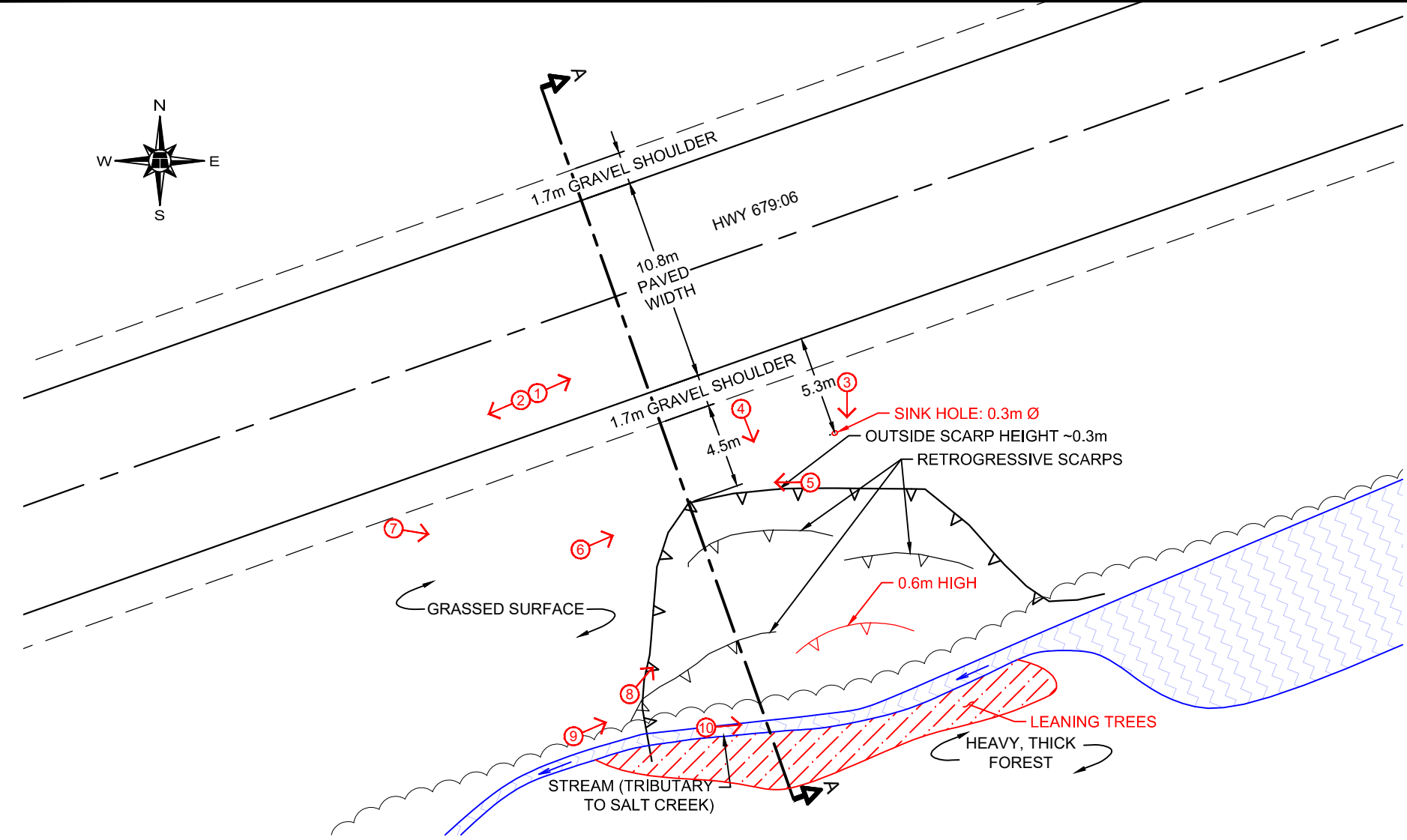
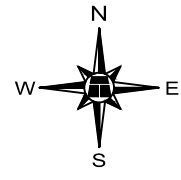
6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

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.

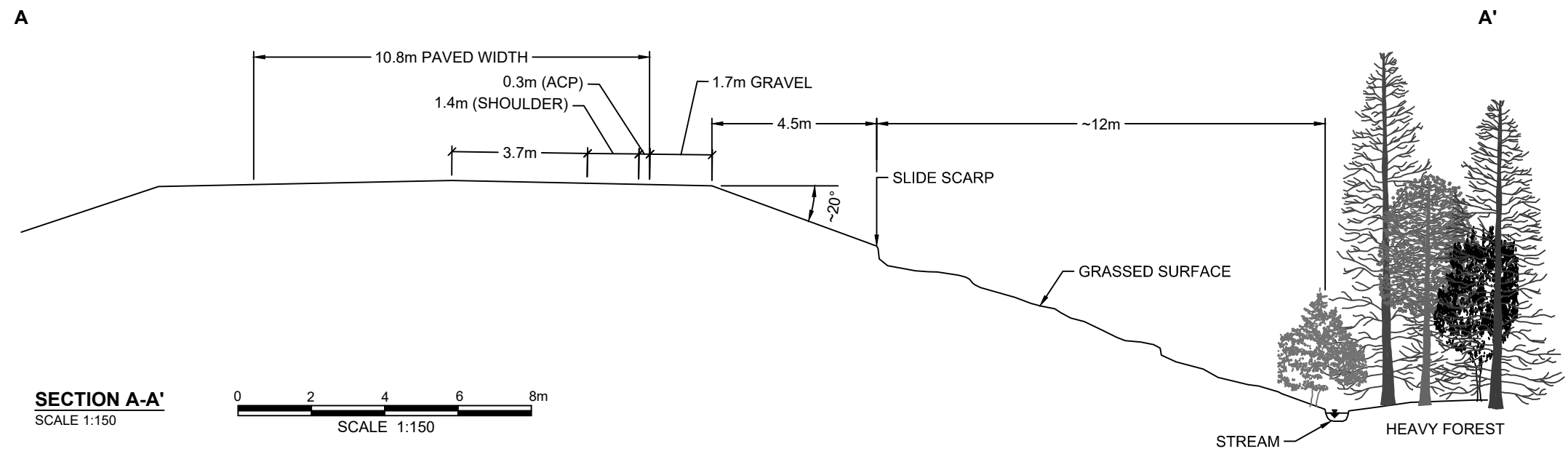
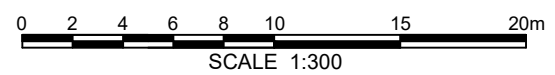
H:\32000\32121\AT GRMP Peace River District 2021-2025\CAD\2023\MG\32121 SH032-1.dwg - 1 - Oct. 10, 2023



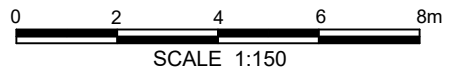
- LEGEND**
- SCARP
 - TREE LINE
 - DIRECTION AND NUMBER OF PHOTO

- NOTES:**
1. SITE FEATURES ARE APPROXIMATE
 2. HIGHWAY PAVED JULY 2019, ACP PLACED: 600mm OVER 200mm.
 3. JUNE 2023 OBSERVATIONS SHOWN IN RED

SITE PLAN
SCALE 1:300



SECTION A-A'
SCALE 1:150



PEACE REGION (PEACE RIVER DISTRICT)

SH032: HWY 679:06, km 26.2
2023 SITE INSPECTION PLAN

DWG NO. 32121-SH032-1

DRAWN BY	ML
DESIGNED BY	MG
APPROVED BY	TSA
SCALE	AS SHOWN
DATE	OCTOBER 2023
FILE No.	32121

THURBER ENGINEERING LTD.



Photo 1 – Looking east along Hwy 679 above the slide site towards the intersection at Hwy 750.



Photo 2 – Looking west along Hwy 679 above the slide site.



Photo 3 – Looking south at small sinkhole that has started to form on the embankment side slope.



Photo 4 – Looking south down along the slide from the edge of the highway.



Photo 5 – Looking west at the slide scarp in the highway south embankment.



Photo 6 – Looking east across the slide site.



Photo 7 – Looking southeast across the slide. The dense forest extends over the stream and right up to the toe of the south highway embankment.



Photo 8 – Looking north up at the slide from the toe of the highway embankment.



Photo 9 – Looking east along the toe of the highway embankment and edge of the stream from the west edge of the slide.



Photo 10 – Looking east at the stream at the toe of the embankment.