

**ALBERTA TRANSPORTATION AND
ECONOMIC CORRIDORS
GEOHAZARD RISK MANAGEMENT PROGRAM
PEACE REGION (PEACE RIVER DISTRICT)
2025 INSPECTION**



Site Number	Location	Name	Hwy	km
SH034	East of Arcadia	Near Arcadia Embankment Slide	2:50	44.42
Legal Description		UTM Co-ordinates		
NE9-74-14-W5		11U N 6,139,489	E 557,842	

	Date	PF	CF	Total RISK LEVEL
Previous Inspection:	5-June-2023	10	3	30
Current Inspection:	28-May-2025	11	4	44
Road AADT:	2050		Year:	2024
Inspected By:	Kristen Tappenden, TEC		Roger Skirrow, 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:	Shallow slide in WBL.	
Dimensions:	50 m length of highway affected.	
Date of any remediation:	None	
Maintenance:	2017: Milled and overlay Prior to 2023: Asphalt patch	
Observations:	Description	Worsened?
<input checked="" type="checkbox"/> Pavement Distress	Longitudinal cracks in WBL within and east of patched area. Longitudinal cracks in EBL (26 m long).	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	Slight dip near north shoulder; toe roll in ditch below.	<input checked="" type="checkbox"/>
<input type="checkbox"/> Erosion		<input type="checkbox"/>
<input checked="" type="checkbox"/> Seepage	Ponded water present in the north ditch.	<input type="checkbox"/>
<input type="checkbox"/> Bridge/Culvert Distress		<input type="checkbox"/>
<input type="checkbox"/> Other		<input type="checkbox"/>

Instrumentation:

None.

Assessment:

The site was added to the list of geohazard sites after a 2020 call-out inspection.

The site is located on the north side of Highway 2:50 east of High Prairie near Arcadia about 9.3 km east of Highway 750 and 285 m west of Township Road 143. The highway embankment is about 1.7 m in height with sideslopes inclined at 2.7H:1V. The ditch bottom is about 3.3 m wide and the backslope on both sides rises to slightly higher than the embankment. Based on information from the AT Map, the highway structure following the overlay undertaken in 2017 is 430 mm of ACP over 150 mm of cement-stabilized base over predominantly high plastic clay.

The surrounding terrain is level and the ditch gradients are relatively flat. Published geological mapping indicates that the site is located within a glaciolacustrine unit which are typically flat-lying and predominantly clay in composition. The mapping estimates the depth to bedrock at between 5 m and 10 m, and the bedrock type to be marine shales and siltstones of the Puskwaskau Formation.

During the call-out inspection in 2020, approximately 21 m length of the west-bound lane (WBL) had an arch-shaped crack in the middle of the lane with a dip between the crack at the south shoulder. This main crack was up to 50 mm in width and 40 mm of height differential. There was a secondary crack near the shoulder on the north side of the dip which was up to 30 mm wide with 30 mm of differential.

There appeared to be a toe roll in the lower part of the sideslope. The crack in the centre of the lane continued an additional 30 m east indicating that a greater extent of movement was likely.

Prior to the 2021 inspection, a 70 m long section of the WBL was patched. A similar length was patched between the 2021 and 2023 inspections (date unknown). During the 2023 and 2025 inspections, it appeared that the features observed during the call-out inspection were continuing to reflect through the corresponding patch. According to the MCI, the site has a long history of being patched (since 1995). The cracking continues to the east beyond the area that was patched. However, it does not appear that the cracks have extended further east from the 2023 inspection.

The site appears similar to other failures seen in the general area such as at SH030 and SH031 thus a similar mechanism is expected: higher-than average precipitation over a few years prior to and including 2020 resulting in elevation of the groundwater table or saturation of the high plastic foundation soils leading to shallow rotation failure. Given the terrain, it will be difficult to improve the drainage. Thus, mitigation will need to either reduce the loading on the foundation soils or improving the embankment and foundation strength. The types of repairs used at SH030 and SH031 are also appropriate for this site which included excavating and replacing with granular fill and constructing earth fill toe berms, respectively.

Recommendations:

Short-Term:

- Road maintenance should continue as necessary to maintain an even, safe roadway surface and may consist of milling, patching, and crack sealing of the pavement. The site was patched after the call-out inspection in 2020 and annual inspection in 2023, but the cracks have reflected through and vertical displacement is occurring as the slide continues to move. The cracks should be sealed to avoid surface water infiltration into the tracks and additional patching as needed to maintain a safe highway surface.
- Further pavement deformation and landslide movement would disrupt highway traffic creating the need for alternating traffic and/construction of a temporary detour. A geotechnical investigation is recommended so that preliminary engineering recommendations are available should the WBL be closed due to landslide movements. The geotechnical investigation can be combined with other projects in the area to reduce mobilization costs. A design could be done for this low-height embankment without an investigation, but it may be conservative and therefore more costly than an informed design would be. Construction contracts are also more prone to claims since actual ground conditions are assumed, not known.

Long-Term:

There are three remedial options that could be considered at this site based on successful repair of similar sites:

- Slope flattening: flatten the highway sideslope to a minimum of 4H:1V using imported low plastic or granular fill. This would require shifting the ditch further away from the embankment; however, there appears to sufficient distance to do this without impacting the overhead power line. Ideally, the main slide mass should also be excavated and replaced to reduce the amount of highway distress before the slope flattening slows or halts movement.
- Toe berm: stabilized the north sideslope with a 3 m to 4 m wide toe berm that extends halfway up the embankment. This option would also require imported fill and realigning the ditch. The long term performance would also be improved with full or partial excavation of the slide mass.
- Gravel replacement: The failed portion of the highway embankment should be excavated with slopes no steeper than 1H:1V and to about 0.5 m deeper than the ditch with a 1 m deep and 1.5 m wide shear key excavated at the toe of the embankment. The excavation should be backfilled with Des. 2-20 gravel compacted to at last 95 percent SPMDD separated from the embankment and native soils by a non-woven geotextile.

All of these options will involve excavation and hauling of material. The toe berm or slope flattening options will require ditch realignment but can be readily extended further east or west if more of the embankment fails. The gravel wedge would maintain the existing shape of the embankment and ditch but is likely more expensive due to the higher-cost material and disruption to traffic. Checks on available

right-of-way should be done for the slope flattening and toe berm options. The estimated costs are in the order of \$250,000 to \$350,000.

Inspection:

This site should be inspected every two years as currently scheduled in the current contract.

Closure

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

Roger Skirrow, P.Eng.
Senior Geotechnical Engineer

Mark Gallego, P.Eng.
Geotechnical Engineer

STATEMENT FOR USE AND INTERPRETATION OF REPORT

1. STANDARD OF CARE

This Report has been prepared in a manner consistent with that degree of care and skill ordinarily exercised by members of the same profession currently practicing under similar circumstances at the same time and in the same or similar locality and in compliance with all applicable laws.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment, including this Statement For Use and Interpretation of Report, 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, AS DESCRIBED ABOVE. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE OF THE 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 for the development, design objectives, and/or purposes described to Thurber by the Client. **NO OTHER PARTY MAY USE OR RELY ON THE REPORT OR ANY PORTION THEREOF FOR OTHER THAN THE CLIENT'S BENEFIT IN CONNECTION WITH THE PURPOSES DESCRIBED IN THE REPORT.** Any use which a third party makes of the Report is the sole responsibility of such third party and is always subject to this Statement for Use and Interpretation of Report. Thurber accepts no liability or responsibility for damages suffered by any third party resulting from use of the Report for purposes outside the reasonable contemplation of Thurber at the time it was prepared or in any manner unintended by Thurber.

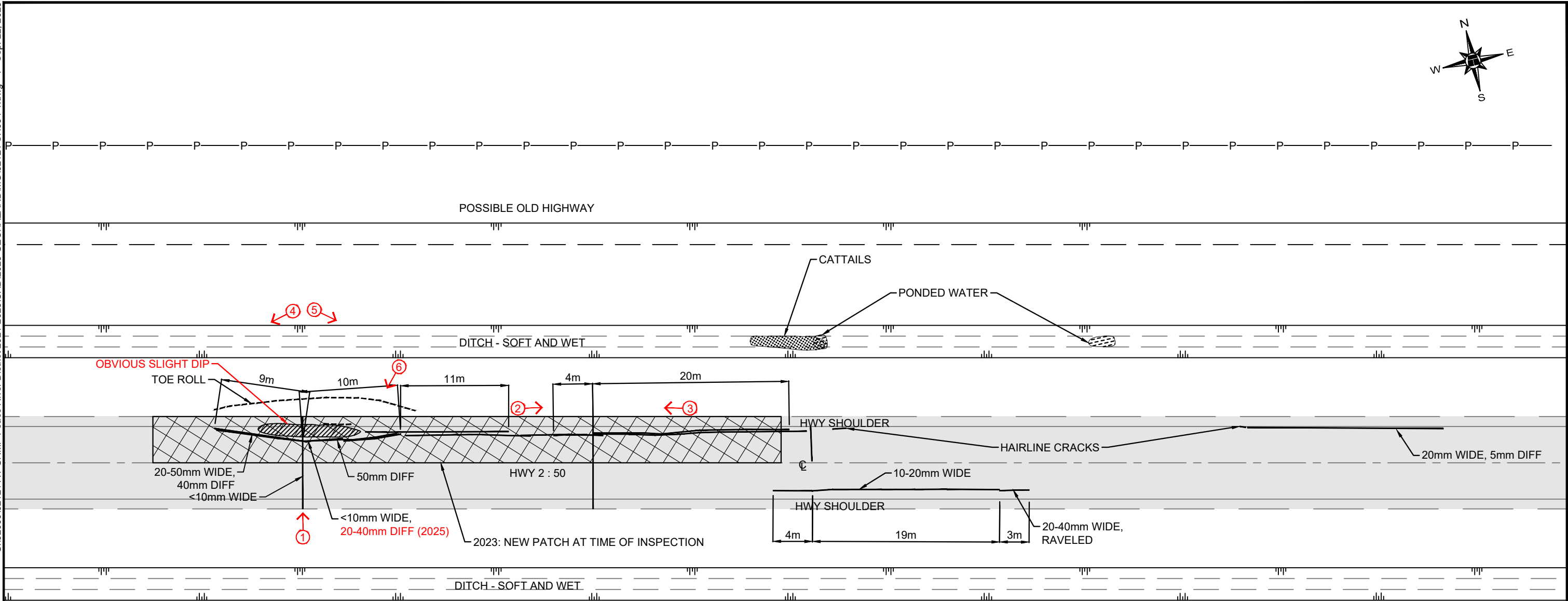
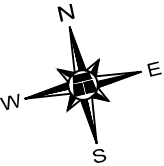
5. INTERPRETATION OF THE REPORT

- 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 is inherently judgement-based. 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 parties making use of such documents or records with or without our express written consent need to 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 parties. Some conditions are subject to change over time and those making use of the Report need to be aware of this possibility and understand that the Report only presents the interpreted conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client must 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 based on conditions in evidence at the time of site inspections and based on 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 resulting from misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other parties 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 is recommended to 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 need to 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 to confirm and document that the site conditions do not materially differ from those 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. 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 other parties 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, unless such decisions expressly form part of the stated purpose of the Report as described in Paragraph 3.

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LEGEND

- CRACK
- POWER LINE
- PHOTOGRAPH NUMBER, AND APPROXIMATE DIRECTION AND LOCATION

NOTES

- FEATURE LOCATIONS ARE APPROXIMATE.
- MAY 2025 OBSERVATIONS SHOWN IN RED.



PEACE REGION (PEACE RIVER DISTRICT)

SH034-1 HWY 2:50 KM 44.4, EAST OF ARCADIA
2025 SITE INSPECTION PLAN

DWG No. 32121-SH034-1

DRAWN BY	ML
DESIGNED BY	MG
APPROVED BY	RKS
SCALE	1:400
DATE	SEPTEMBER 2025
FILE No.	32121





Photo 1 – Looking north at transverse crack that crosses the main landslide’s head scarp crack and highway dip.



Photo 2 – Looking east along the WBL at longitudinal cracks that extends west from the main landslide crack.



Photo 3 – Looking west at the extended longitudinal cracks that lead to the main landslide.



Photo 4 – Looking west at the highway sideslope from the north ditch.



Photo 5 – Looking east at the highway sideslope from the north ditch.



Photo 6 – Looking southwest at the sideslope below the main crack where a toe roll is present in the ditch.