

ALBERTA TRANSPORTATION AND
ECONOMIC CORRIDORS
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION GRANDE PRAIRIE DISTRICT - NORTH
2025 INSPECTION



Site Number	Location	Name	Hwy	km
GP031	South slope of the Peace River Valley near the Shaftesbury ferry crossing	Shaftesbury Slide, South Site	740:02	49.3
Legal Description		UTM Co-ordinates (NAD 83)		
LSD 4-9-82-23-W5M		11U N 6 216 300	E 466 120	

	Date	PF	CF	Total
Previous Inspection:	May 6, 2024	11	3	33
Current Inspection:	May 16, 2025	11	3	33
Road AADT:	80		Year:	2024
Inspected By:	Don Proudfoot, (Thurber) Rocky Wang (TEC)			
Report Attachments:	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans		<input checked="" type="checkbox"/> Maintenance Items	

Primary Site Issue:	A landslide was affecting the original alignment of the highway over a 70 m width. A pile wall, which had been constructed along the shoulder of the road, failed and the highway was shifted onto a detour around the backscarp of the slide. The slide extended down the slope to the terrace where Range Road No.234 is located 35 m below the highway. The backslope, which was about 7 m high, had also been subject to slumping.
Dimensions:	The main slide was 70 m wide along the highway. Three slumps were affecting the backslope over a combined width of about 80m, west of the main slide.
History and Date of any Remediation:	<p>The original slide occurred in 2007. A pile wall was completed in 2009. It consisted of 114 driven steel HP310x79 piles and 45 screw anchors (Chance anchors). The piles along the main section of the wall were 22 m long while the “wing wall” piles at each end were 15 m long. The tie-back anchors were 25 m long. Prior to the slide the highway had dropped and was built back up behind the wall with a MSE zone against the wall and granular subbase further away from the wall.</p> <p>The wall failed in July 2014 due to loss of soil support on the downslope side and the highway was shifted onto a gravel detour behind the backscarp of the slide.</p> <p>In 2018 and 2019, remediation was carried out and consisted of a realignment of the highway into the hillside, cutting back the backslope to a flatter inclination, constructing a toe berm to buttress the highway slope and constructing a concrete tangent pile wall along the downslope shoulder of the highway. The piles were 900 mm in diameter and 17.2 m long connected across the top by a 1.5 m deep by 1.1 m wide reinforced concrete waler.</p>
Maintenance:	Maintenance has not been required since the construction of the latest stabilization measures

Observations:	Description	Worse?
<input checked="" type="checkbox"/> Pavement Distress	Some diagonal cracks have developed in the pavement surface near the east end of the wall and a dip is present in the road surface further to the east. These cracks had grown and opened up a bit more since last year. Several arc shaped hairline cracks were observed in the westbound lane shoulder possibly due to settlement along a poorly packed shoulder, a transverse crack just west of the culvert was also observed. The extents of the cracks were similar to last year.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	A small slump is present in the cut slope above the west riprap channel but has not changed for several years. A slide crack was noted in the valley slope downslope of the pile wall, which appears to be the backscarp of the original landslide. It now has a maximum differential of 0.25 m. There is an active landslide with a backscarp varying from 0.8 m to 1.4 m in height in the bush east of the toe berm which appeared to be very active and is potentially associated with cracking of the road surface above this area.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	There is evidence of erosion outside the project limits resulting in silt accumulating in a low spot in the southwest highway ditch which now has vegetation growing on top of the silt. There is an erosion gully at the outlet of a centreline culvert at the same location. This gully is up to 3 m wide x 15 m long in the downslope direction.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Seepage	There was a steady drip coming from the drainpipe indicating the presence of groundwater, indicating that the drainpipe is performing as per design.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Bridge/Culvert	The inlet and outlet of a centreline culvert are blocked by silt and erosion /slumping, respectively	<input checked="" type="checkbox"/>
<input type="checkbox"/> Other		<input type="checkbox"/>

Instrumentation:

4 slope inclinometers were installed in the pile wall and by spring 2025 have measured deflections as follows:

- SI18-P10 = 2.4 mm of pile head deflection
- SI18-P30 = 5.0 mm of pile head deflection
- SI18-P50 = 3.1 mm of pile head deflection
- SI18-P70 = 8.6 mm of pile head deflection

The pile head deflections have increased by up to a couple of millimeters in some piles since 2023 but are still well within the design expectation.

Assessment:

The previous failure occurred because the slope below the original pile wall slid away leaving the wall unsupported. This resulted in a catastrophic failure of the steel piles, which were severely bent over. High groundwater levels were also a factor. In addition, the backslope inclination was too steep for the clayey soils that were present in it.

The new design added a large toe berm and cut back the backslope to reduce the overall inclination of the combined fill and backslope. A drainage blanket was constructed under the berm to prevent a buildup of groundwater behind the new berm fill. The pile wall was added to protect the new road surface from the existing landslide scarp that was located at the edge of the temporary detour fill. Surface drainage was also controlled by draining the upslope ditch water into a welded SWSP drop pipe, and precipitation and groundwater seepage from the slide mass into a riprap lined swale, both of which were extended down to the terrace at the toe of the valley slope.

The remedial measures appear to be performing well to date. Pile deflections are all within expected ranges and the global stability of the toe berm and backslope appeared to be in good condition. Grass growth is well established on the site and the erosion prevention measures appear to be working.

The slide crack downslope of the wall appears to be near the same location as the backscarp of the original slide. In its failed state the slide mass was broken and loose and it is believed that the slide mass has crept downslope as it tightens and consolidates against the toe berm. The piles were designed to protect the road from this creep movement if a significant gap and differential across the crack do not occur. The design assumed a maximum unsupported cantilever of 4m from the top of waler to the slip surface of the slide. However, the wall was designed to accommodate tie-backs, in case the cantilever height is more than 4m.

There is an active landslide within the bush area to the east of the repair. The cracks in the highway at the east end of the wall and the dip in the road at Station 49+170 are located above this active slide and might indicate that the slope above the slide is straining due to the loss of support in the slope, which might ultimately lead to the slope failure extending to the road level at this location in the future. For this reason, the risk level for the site was increased previously.

The slump located above the west riprap channel has not changed since 2023 and appears to have reached a stable grassed condition.

Recommendations:

Monitoring

Given the appearance of the new slide cracks downslope of the pile wall and the new cracks and dip in the pavement east of the previous repair, it is recommended that the inspection frequency for this site be annually. It is also recommended to install two new slope inclinometers at the site to help monitor these areas, with one downslope of the scarp crack below the middle of the wall and another on the north side of the north highway ditch at about Sta. 49+220.

Maintenance

If further deformation of the slope below the wall occurs it would be beneficial to do some grooming of the area to avoid ponding of surface water and to fill the scarp crack with some clay or topsoil to limit seepage of precipitation runoff into the slip surface of the slide.

Remediation

If the active landslide in the bush to the east of the repair continues to affect the road some future remedial measures will be required and might involve extending the width of the toe to the east and potentially shifting the highway into the backslope at this location. Excess material from the previous repair was stockpiled over the former gravel pit north of Range Road No. 234 and could be used for the toe berm extension.

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.

Yours very truly,
Thurber Engineering Ltd.
Don Proudfoot, M.Eng., P.Eng.
Partner | Senior Geotechnical Engineer

Nicole Wilder, M.Eng., P.Eng.
Associate | 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.



Photo 1. Looking east along hwy from Sta. 49+450.



Photo 2. Looking west at pile wall alignment.



Photo 3. Looking west at cracks in road beyond east end of pile wall.



Photo 4. Looking east at cracks in pavement beyond east end of pile wall.



Photo 5. Looking west at the site. Note cracks in north shoulder of pavement.



Photo 6. Looking east at the cracks in the north shoulder of the road pavement.



Photo 7. Looking west at the remediated slide area.



Photo 8. Looking southwest at backscarp crack located downslope of the pile wall.



Photo 9. Thermal cracks in the top of the concrete waler of the pile wall.



Photo 10. Drain pipe is dripping.



Photo 11. Looking south at upper slope and west riprap channel. No change in the shallow slump condition. It is grassed over.



Photo 12. Looking north at drop pipe outlet – in good condition.



Photo13. Looking west at toe berm.



Photo 14. Looking east at landslide backscarp in bush area.



Photo 15. Looking south at the erosion gully downslope of the culvert outlet.