

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



Site Number	Location	Name	Hwy	km
PH037	Dunvegan	Dunvegan South 1+250 to 2+000	2:68	15.674
Legal Description		UTM Co-ordinates (NAD 83)		
NW¼ 06-080-04 W6M		11U E 398514	N 6197340	

	Date	PF	CF	Total
Previous Inspection:	May 24, 2024	10	7	70
Current Inspection:	May 9, 2025	11	6	66
Road AADT:	2,730		Year:	2024
Inspected By:	Don Proudfoot, José Pineda (Thurber). Chris Newman (TEC).			
Report Attachments:	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input type="checkbox"/> Maintenance			

Primary Site Issue:	<p>Flow slides and shallow slumps occur along gullies eroded below the highway where ditch drainage is directed downslope towards Dunvegan Creek at Sta. 2+000.</p> <p>There is a large deep-seated landslide which crosses the highway between Sta. 1+650 and Sta.1+850 (Photos 5, 6, and 7). There are several slides downslope of the SBL shoulder between Sta. 1+350 and 1+650, the largest of these being at Sta. 1+400, with a backscarp that has retrogressed into the highway shoulder (Photos 11, 12, 13, and 14).</p> <p>There are old rotational features further downslope at Sta. 1+860 and at Sta. 1+600 to 1+700, with a sag pond. There are several shallow slumps upslope of the NBL at Sta. 1+455, 1+610, 1+860, 1+900 and 1+985.</p>		
Dimensions:	The 1+800 slide is 160 m to 200 m wide at the downslope road shoulder, and the backscarp appears to be along the upslope ditch. The 1+400 slide is 40 m wide with the backscarp crack ranging from 0.7 m to 1.8 m from the new guardrail.		
Maintenance:	An ACP patch was placed over the dip and ruts in the ACP at the south end of the 1+800 slide in October of 2017 and at the north end of the 1+800 slide in 2019. ACP patch was also placed in the summer of 2020 on the northbound lane at the south flank of the 1+800 landslide. The highway was realigned in the fall of 2024 to shift the highway further from the retrogressing slide at Sta. 1+400. New guardrail was installed, an asphalt overlay was placed and new lines were painted.		
Observations:	Description	Worsened?	
		Yes	No
<input checked="" type="checkbox"/> Pavement	There were no noticeable signs of pavement distress or cracking in the new asphalt overlay.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	Additional slope movement downslope of Sta. 2+000 to 1+900 indicated by cracking at crests of gullies further downslope. The backscarp crack noted in the upslope ditch at the Sta. 1+800 landslide might be retrogressing to the south. There is ongoing movement in the slide features below the highway in the sideslopes. The slide at 1+860 has a backscarp that is at 1 m from the guardrail.	<input checked="" type="checkbox"/>	<input type="checkbox"/>

	The backscarps at the sliding zone below the highway between Sta. 1+400 to 1+490, range between 5 to 7 m high and the distance to the newly installed guardrails ranges between 0.7 m and 1.8 m. Backslope slumps between 2+000 to 2+100 continue to show activity and are partially blocking the ditch.		
<input checked="" type="checkbox"/> Erosion	Major erosion gullies on the upslope ditch were filled during the realignment work completed in the fall of 2024. However, no substantial grass cover was noted in some areas between Sta. 1+700 to 1+900. The gullies' conditions in the side slope below the highway were similar to those observed in 2024.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Seepage	The seepage zone below the highway between Sta. 1+540 and 1+600 was noted to be damp in 2025.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Bridge/Culvert Distress		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other		<input type="checkbox"/>	<input type="checkbox"/>

Instrumentation:

Twelve slope inclinometers, 21 piezometers (19 pneumatic and 2 standpipe) were read on June 19, 2025. Overall, the slope inclinometers showed an increasing rate of movement compared to the fall of 2024 with readings ranging from -23 mm/yr at a depth of 3 m in SI18-10 in the sideslope at Station 1+500 to 41.2 mm/yr at 1.7 m depth in SI-54 in the backslope above the 1+500 slide. No new zones of movements have been observed since the fall of 2023.

The slope inclinometers on the sideslope below 1+800 slide (SI-18-8 and 18-9) showed a rate of movement of about 3 mm/yr corresponding to an increasing rate of movement of less than 1 mm per year. Slope inclinometers on the sideslope near the north and south flanks of the 1+400 slide show a rate of movement of up to 1 mm/yr corresponding to a change of rate of movement of less than 0.2 mm since the fall of 2024.

Standpipe piezometer SP09-6 and SP09-8 continued to be dry. The change in water levels on the pneumatic piezometers from the Fall of 2024 to current readings ranged from a decrease of 0.2 m in PN18-1 to an increase of 0.98 m in PN18-14A.

Assessment:

Ongoing slide activity was observed at the Sta. 1+400 slide in 2016 right through 2025. Soil below the matting and around the soil nails, installed in 2010, has failed superficially, with more substantial failure extents below the surface treated area. It is anticipated that the rate of retrogression will likely accelerate above the areas where the soil nails have been bent downward due to a combination of confining soil loss and slope movement. The backscarp located at the shoulder of the SBL ranges between 5 to 7 m high. The SI's installed within the footprint of the 1+400 slide had rapid rates of movement in the spring and summer of 2018 (50 to 700 mm/yr.) and sheared off at a depth of 2 m as a result of a mud flow after the fall of 2018. Although the highway realignment completed in the fall of 2024 has moved the highway lanes further from the slide backscarp cracks, the 1+400 slide continues to retrogress rapidly. This minor road realignment was intended to extend the service life of the highway for some time while the long-term realignment construction is completed.

The 1+800 slide is a deep-seated slide that is currently affecting all three lanes of the highway over a 200 m length with the backscarp likely within the NBL ditch bottom. Based on the ongoing slope inclinometer monitoring, the 1+800 slide plane depth varies within the embankment of the highway from about 18 m near the SBL shoulder to a depth of 28 m below the NBL shoulder with the toe of the landslide is likely situated some 300 m further downslope towards Dunvegan Creek. Rates of movement in the 1+800 slide typically vary from small creep movements to 17 mm/yr. The 1+800 slide continues to exhibit moderate rates of movement; however, its footprint currently affects the entire highway embankment whereby a complete closure of the highway could result from a sudden increase in slide activity.

Thurber provided a preliminary engineering assessment report with three remedial options with ballpark "A" cost estimates to address the features affecting the highway through the site in July of 2018.

Furthermore, in the winter of 2025, Thurber completed supplementary geotechnical investigation on the two highway realignment options preferred by TEC. The results of the winter 2025 investigation were reviewed by Egis and TEC who selected a longer realignment option with less risk of slope instability. Currently, Thurber is assisting Egis with the geotechnical aspects of the highway realignment design.

Shallow surface movement elsewhere is expected to continue, with the possibility of further shallow surface failures developing. This is likely a function of the soil type at this location and is triggered by rainfall or snowmelt and gradual loss of cohesion in the surface due to weathering.

Erosion and slope movement downslope of the highway near Sta. 2+000 are a function of water flows in the ditch and are expected to worsen.

Recommendations:

Short Term

The toe of the slumps located on the highway back slope between Sta. 2+000 to 2+100 should be graded, topsoiled and seeded to promote controlled drainage in this zone. As, grass has not grown in the ditch between 1+700 to 1+900, TEC should consider placement of seed and TRM in this zone.

Long Term

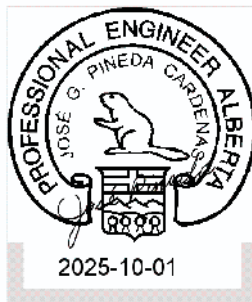
TEC is planning to re-align the highway away from all the landslides at PH037. The engineering assignment is underway and will locate the new highway in a shallow ravine further east outside the Dunvegan Creek valley.

Since the re-alignment will take several years to design and construct, this site should be inspected again in 2026.

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.

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



José Pineda, P.Eng.
Associate | Senior Geotechnical Engineer

PERMIT TO PRACTICE THURBER ENGINEERING LTD.

RM SIGNATURE: Don Proudfoot

RM APEGA ID #: 51674

DATE: October 2, 2025

PERMIT NUMBER: P005186

The Association of Professional Engineers and
Geoscientists of Alberta (APEGA)



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.

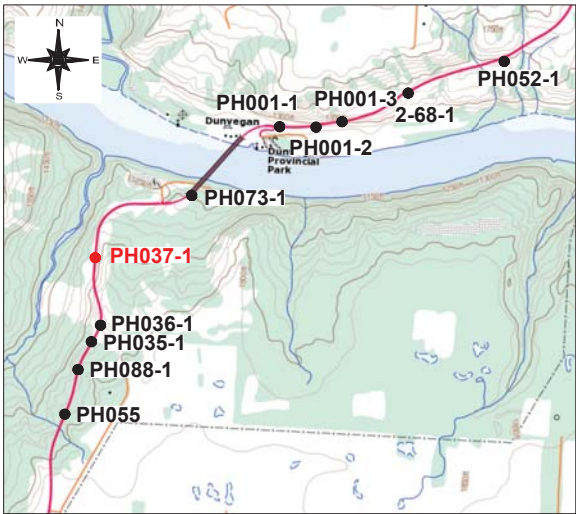
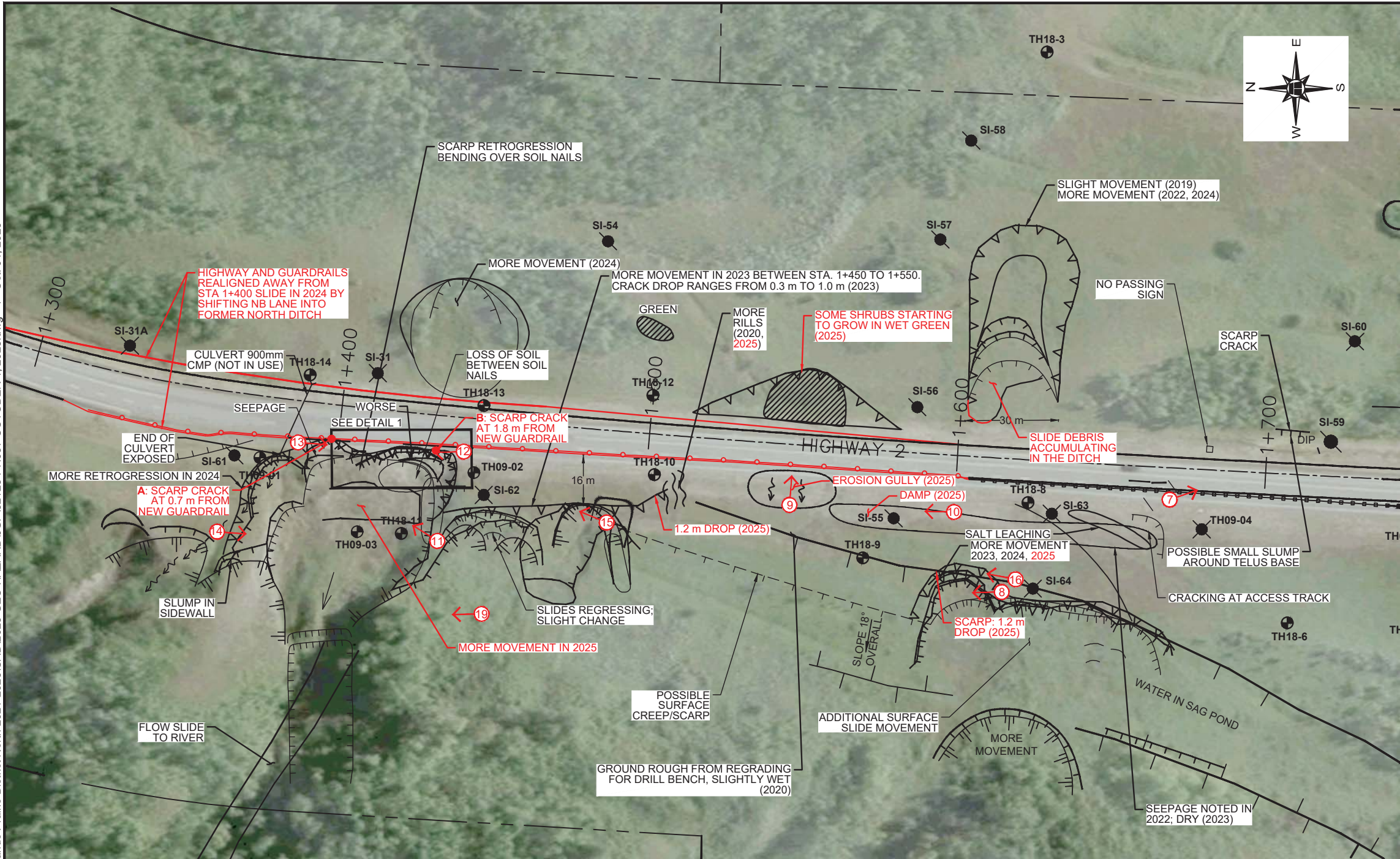
5. INTERPRETATION OF THE REPORT

- 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.

G:\32000\32123 AT GRMP Grande Prairie District North 2021-2025\CAD\2025 GEO HAZARD\JGP\32123-PH037 OCTOBER 1, 2025.dwg - 1 - Oct. 01, 2025



KEY PLAN
SCALE: 1:75 000

LEGEND

- SLOPE INDICATOR
- SLOPE INDICATOR (INACTIVE/DESTROYED)
- TEST HOLE LOCATION
- SCARP CRACK
- DIRECTION AND NUMBER OF PHOTO
- OLD GUARDRAIL
- 2024 INSTALLED GUARDRAIL
- EDGE OF PAVEMENT FROM 2024 REALGNMENT

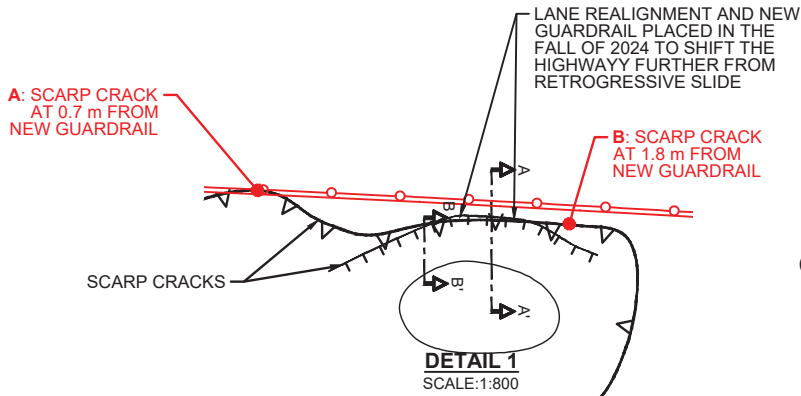
NOTES:

- LOCATION DATA RECORDED USING HAND HELD GPS RECEIVER. ALL LOCATIONS ARE APPROXIMATE AND ARE FOR ILLUSTRATIVE PURPOSES ONLY.
- MAY 9, 2025 OBSERVATIONS SHOWN IN RED
- HIGHWAY REALIGNMENT, PAVEMENT OVERLAY, NEW PAINT LINES AND GUARDRAILS COMPLETED IN THE FALL OF 2024.

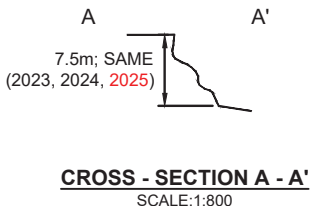


SCALE 1:1500

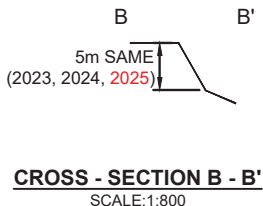
AIR PHOTO FROM ESRI EXPORTED 2025-10-01



DETAIL 1
SCALE:1:800



CROSS - SECTION A - A'
SCALE:1:800



CROSS - SECTION B - B'
SCALE:1:800



PEACE REGION (GRANDE PRAIRIE DISTRICT - NORTH)
PH037 DUNVEGAN SOUTH - 1+250 TO 2+000

2025 PH037 INSPECTION PLAN

FIGURE 1

DRAWN BY	ML
DESIGNED BY	JGP
APPROVED BY	DWP
SCALE	1:1500
DATE	SEPTEMBER 2025
FILE No.	32123





Photo 1: Looking northwest from Sta. 2+000 at erosion gully in SBL ditch south of ditch block



Photo 2: Looking north from Sta. 1+980 below the SBL highway. More movement noted in 2025



Photo 3: Looking east at backslope skin failure at Sta. 1+950. More active in 2025



Photo 4: Looking north from Sta. 1+890 at the slump in the sideslope of the SBL. More movement in 2025. The scarp is 1.8 m high and 1.0 m from the guardrail.



Photo 5: Looking north from Sta. 1+800. The erosion gully noted on the ditch up to 1.7 m wide and 0.7 m deep in 2024 was regraded. Currently rills are less than 200 mm wide by 200 mm deep.



Photo 6: Looking north across the former dip in the highway at the south end of the 1+800 slide. No slide cracks or dips visible in the recently (2024) paved highway surface.



Photo 7: Looking south at the north end of the 1+800 slide. No slide cracks or dips visible on the recently (2024) paved highway surface.



Photo 8: Looking north near Sta. 1+670 at slumping occurring on the highway side slope approximately 20 m from the edge of pavement. More movement noted in 2025



Photo 9: Looking north near Sta. 1+550 at erosion rills and gullies on the highway side slope becoming worse.



Photo 10: Looking north near Sta. 1+560 at rough area (drill access bench) with some seepage and tension cracks. Access bench was damp in 2025



Photo 11: Looking east at failed soil matting and soil nails which were installed in August 2010 at Sta. 1+450 slide. Backscarp (5 m to 7.5 m high) continues retrogressing and impacting the highway embankment.



Photo 12: Looking north from Sta. 1+450 backscarp.



Photo 13: Looking south from Sta. 1+390 at the backscarp of the 1+400 slide.



Photo 14: Looking south towards the 1+400 slide. There is a 5 m to 7.5 m drop below the guardrail.



Photo 15: Looking south at slumping occurring from Sta. 1+480. Scarp measured 1.3 m deep in 2025



Photo 16: Looking north at slumping occurring from Sta. 1+500..



Photo 17: Drone view showing slumps along the highway sideslope and backslope. Overall backslope slumps are more active and partially blocking the upslope ditch.



Photo 18: Drone view showing the area of the deep slide at Station 1+800



Photo 19: Drone view showing slide at Station 1+400



Photo 20: Drone view looking at south half of the site showing backslope slumps located north of Pile Wall at PH035