

**ALBERTA TRANSPORTATION
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION (GRANDE PRAIRIE DISTRICT - NORTH)
2023 INSPECTION**



Site Number	Location	Name	Hwy	km
PH022	13 km W. Cleardale	Clear River East Hill-Site 6	64:02	22.8-23.1
Legal Description		UTM Co-ordinates (NAD 83)		
S28-84-11-W6		11 N 6243933	E 334702	

	Date	PF	CF	Total
Previous Inspection:	July 14, 2021	7	5	35
Current Inspection:	May 31, 2023	8	5	40
Road AADT:	160		Year:	2022
Inspected By:	Barry Meays, Don Proudfoot (Thurber). Ken Szmata, Max Shannon, Rishi Adhikari (TEC).			
Report Attachments:	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input checked="" type="checkbox"/> Maintenance Items			

Primary Site Issue:	Slide cutting across highway at 2 locations		
Dimensions:	West dip about 25 m wide (located ~200m west of an east dip)		
Date of any remediation:	The 7 Horizontal Drains installed in 1987 thought to be at this site, may be at a site further west closer to the River?		
Maintenance:	Asphalt overlay in August 2008. Chip seal in Fall, 2017. Intermittent patches.	Worsened?	
Observations:	Description	Yes	No
<input checked="" type="checkbox"/> Pavement Distress	Elongated cracks have reflected through the 2017 chip seal at both the east and west dips. The east dip was freshly patched in 2021.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	At the west dip, the south shoulder and embankment are sunken, and the subdued slump located downslope of hwy at this location is more apparent.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	Channelized runoff from the highway along the low point in the west dip has formed an erosion rill in the EB shoulder/embankment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Seepage	Trace in OWP of WB lane east of east dip.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Bridge/Culvert Distress	Two CSP culverts exist - one at the east dip, and another between the two dips.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Other		<input type="checkbox"/>	<input type="checkbox"/>

Instrumentation:

Nonoperational. Previous Movements in SI-58 was 10 mm/yr at 21 m to 26 m deep.

Assessment (Refer to Figures PH022-1 and -2):

It was concluded in 2011 that the drains mentioned in the old road files 50 m downslope of hwy may not have been installed, since they could not be located – instead they may have been installed at a site closer to the east bridge abutment where some old test hole locations were recently found in the files.

Movements that were previously monitored in SI58 appear to be ongoing (but slow) based on a kink in the south guardrail, and a dip and bow in the fence on the south embankment at this location. It appears that a large slide scarp circles north of highway and joins the two observed dips spaced 200 m apart along the highway. A fresh slide scarp extension south of the highway appears to link this site with the site further east (PH023) by a continuous scarp.

The west dip appears to be enlarging westwards, based on cracks first found in 2013 a distance of 15 m west of the west dip and, which were observed to extend about 50 m west in 2017, and also an increasingly more apparent dip in the embankment with time. These cracks, and the fact that cracking

has reflected through the 2021 patched east dip, and with the fresh scarp crack observed south of the highway, in conjunction with the sunken shoulder in the pavement and south embankment at the west dip, suggest some on-going creep. Seepage traces in the pavement in previous years also indicate a high water table.

Recommendations:

Maintenance:

- a) Clean the accumulated sand from the east highway shoulder and from underneath the guardrail for safety and to prevent deepening gulying caused by surface water concentration runoff.
- b) Place crushed gravel in the runoff gully channel that has formed on the embankment below the guardrail at the west dip.
- c) Monitor the pavement cracks in the two dipped areas for future subsidence/movement and progression of the circular slide scarp affecting the pavement at this location, and crack seal and patch as necessary.

Monitor the culvert outlet (located on the south side of the highway at the east highway dip) and clean it of mud/debris if necessary to promote unrestricted flow (it was previously partially blocked).

Investigation:

Perform a geotechnical Investigation to define the slide plane at this site, consisting of 3 test holes, each containing an SI and two Piezometers (as shown on Figure PH22-1) to depths of at least 40 m.

Estimated Cost \$200,000

Long Term:

- 1) Install horizontal drains, OR
- 2) Reroute the highway further upslope in a short re-alignment around the immediate slide, in combination with some material unloading at the current highway position, OR
- 3) Install a pile wall with tie back anchors.

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.

Renato Clementino, Ph.D., P.Eng.
Principal | Senior Geotechnical Engineer

Barry Meays, 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.

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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.

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- 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.

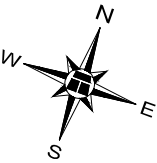
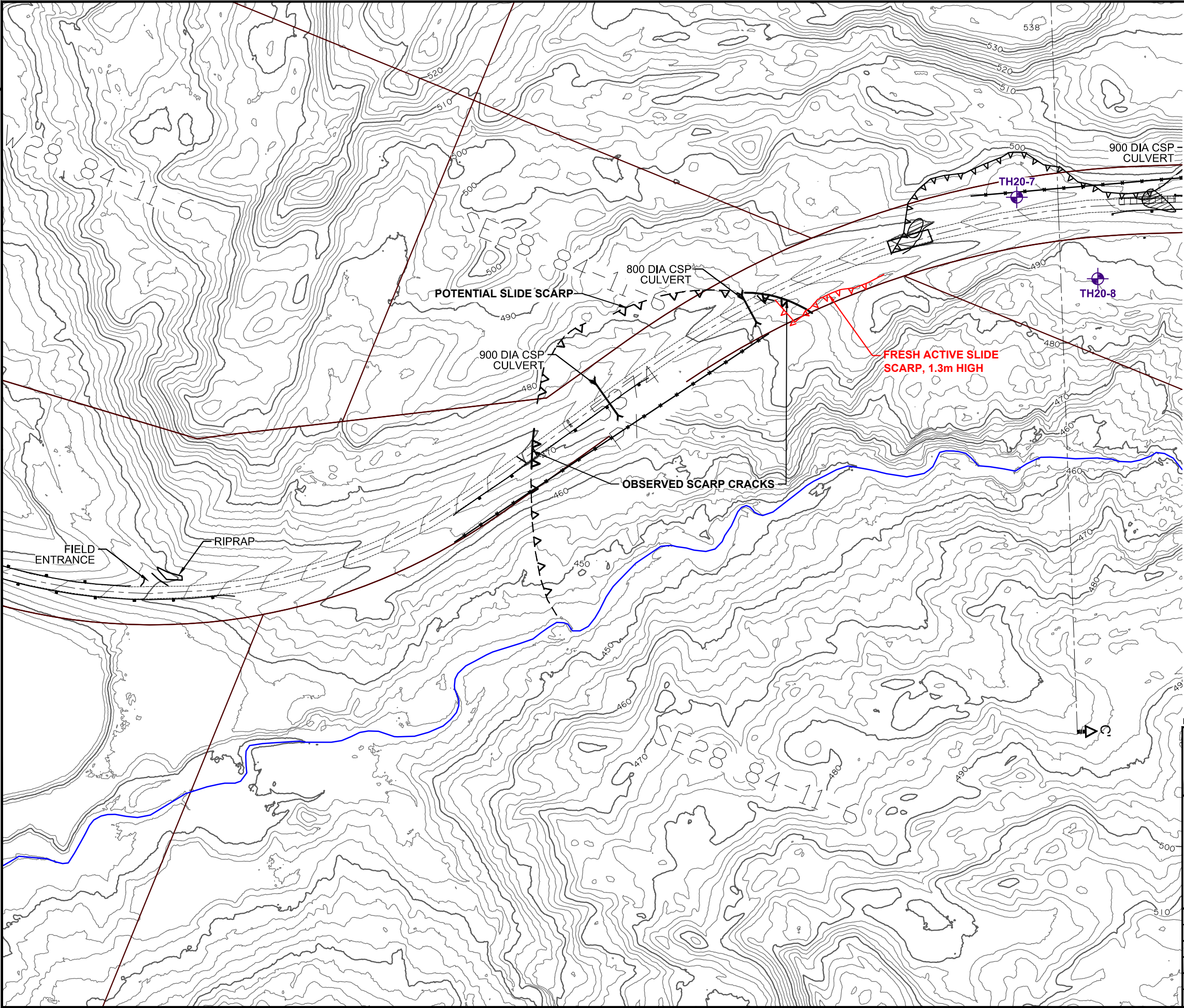
6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

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.

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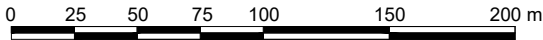


LEGEND

- APPROXIMATE 2020 TEST HOLE LOCATION
- FENCE LINE
- GUARD RAIL
- SETTLEMENTS (JULY 9, 2020)
- CRACKS (JULY 9, 2020)
- SLIDE SCARP
- APPROXIMATE TRIBUTARY CENTERLINE

NOTES :

- FEATURE LOCATIONS ARE APPROXIMATE.
- PREVIOUS OBSERVATIONS SHOWN IN BLACK
- MAY 31, 2023 OBSERVATIONS SHOWN IN RED



SCALE 1:3000

BASE PLAN PROVIDED BY WSP (LIDAR UAV FLOWN SEPT 29/30, 2020)



PEACE REGION (GRANDE PRAIRIE DISTRICT - NORTH)
PH022 HWY 64:02 - CLEAR RIVER EAST HILL REGION

2023 PH022 CONTOUR PLAN

FIGURE PH022-2

DRAWN BY	ML
DESIGNED BY	BDM
APPROVED BY	DWP
SCALE	1:3000
DATE	MAY 31, 2023
FILE No.	32123



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Photo 1 – Looking east along the cracked highway surface from the west end of the site. Note the west dip in the road/guardrail.



Photo 2 - Looking east along the bowed fenceline from the west end of the site.



Photo 3 - Looking south where channelized surface runoff flowing along the dip in the highway has breached the sand build-up underneath the south guardrail and created an erosion gully in the hwy embankment slope below.



Photo 4 - Looking west at the dip/sunken highway where the slide scarp crosses the west end of the site.



Photo 5 – Looking east where the slide scarp crosses the highway at the east end of the site and ACP patch.



Photo 6 – Looking southeast at the scarp crack reflecting through the ACP patch placed over the east end of the site.



Photo 7 – Looking northwest at the same east end scarp crack as in Photo 6.



Photo 8 – Looking at the extended scarp in the bush south of the highway that links this site to PH023.