ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION (GRANDE PRAIRIE DISTRICT - NORTH)
2025 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:	May 31, 2023	8	5	40
Current Inspection:	May 7, 2025	8	5	40
Road AADT:	300		**Year:**	2024
Inspected By:	Don Proudfoot, Barry Meays (Thurber). Robert Senior, Chris Newman, April Holt, Mike Rosendahl (TEC).			
Attached Items:	☒ Photographs	☒ Plans	☒ 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**
☒ Pavement Distress	Both the east and west dips over the scarp cracks were freshly patched in 2024. An elongated crack was observed east of the west patch, and 2 cracks have partially reflected through the WB lane at at the west patch.	☒	☐
☒ Slope Movement	At the west dip, the south shoulder, guardrail and embankment are sunken, and the subdued slump located downslope of the hwy at this location is more apparent.	☒	☐
☒ Erosion	Channelized runoff from the highway along the low point in the west dip has formed an erosion rill in the EB shoulder/embankment.	☒	☐
☒ Seepage	Trace in OWP of WB lane east of east dip.	☐	☒
☒ Bridge/Culvert Distress	Two CSP culverts exist - one at the east dip, and another between the two dips.	☐	☒
☒ Other	There is major sand build-up beneath/outside the south guardrail, with a broken hay bale trapping additional sand near the G/R east end.	☒	☐

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 fresh 202 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/outside the south guardrail and remove the broken hay bale, for safety and to prevent deepening gullying 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,
4) Extend the large-scale grading scheme, subdrain system, and new armored channel proposed for the PH023 site remediation, to raise the tributary creek bed with an 18 m high fill over an additional 200 m length below this site, before constructing the grouted gabion dissipation structure (See the PH023 geohazards report for additional details).

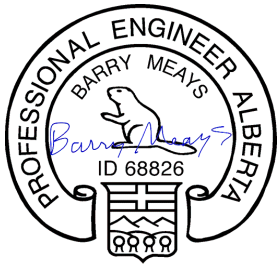
Option 4 Estimated Cost $3,000,000

Alternatively, it is understood that TEC carried out a Functional Planning Study to assess alternate highway realignments for the Hwy 64 crossing of the Clear River Valley to jointly address the retrogressing slide scarp and other issues at this site, and several other geohazard sites that are affecting the highway in an effort to reduce escalating maintenance. To date, it was understood that the study results indicated the cost of a new valley crossing alignment was less favorable/desired than the cumulative cost of repairing/maintaining each geohazard site individually.

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.

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



August 28, 2025

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.
RM SIGNATURE: Don Proudfoot
RM APEGA ID #: 51674
DATE: August 28, 2025
PERMIT NUMBER: P005186
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Barry Meays, P.Eng.
Senior Geotechnical Engineer

THURBER

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 TOTHE 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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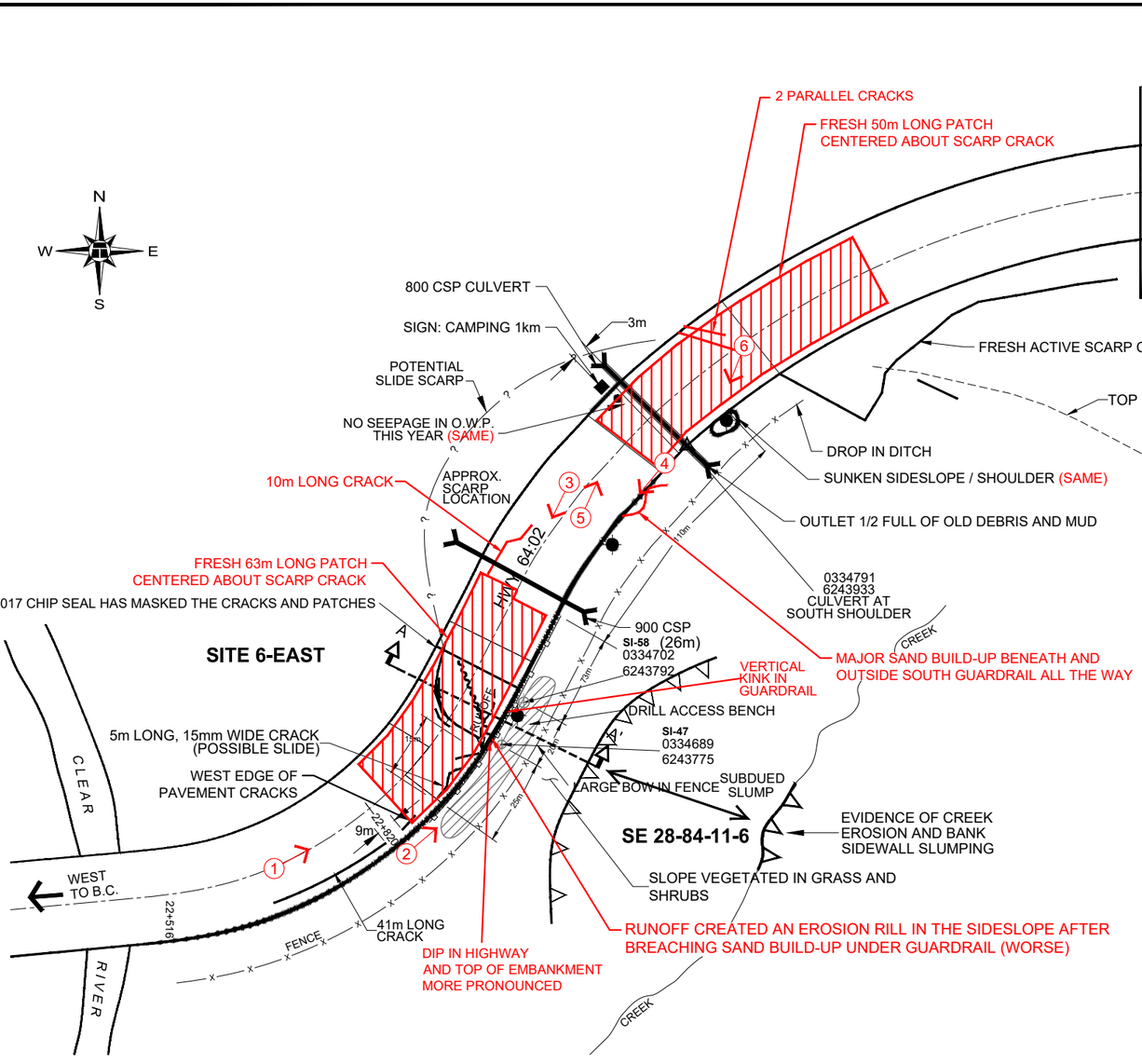
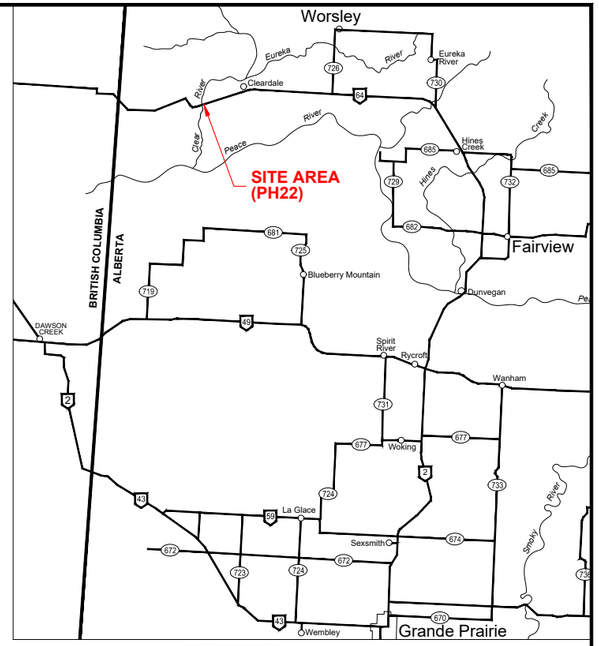
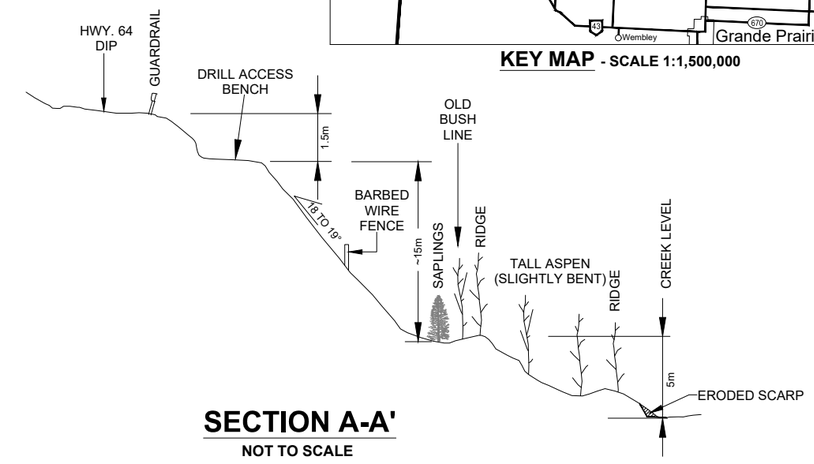


LAYOUT PLAN OF PH022-SITE #6

NOT TO SCALE



KEY MAP - SCALE 1:1,500,000



SECTION A-A'

NOT TO SCALE

LEGEND :

- SLOPE INCLINOMETER *(not in use)*
- (26m) MOVEMENT DEPTH IN METERS
- SLUMP SCARP
- FENCE
- GUARDRAIL
- A.C. PATCH
- 0334689 6243775 HAND HELD GPS CO-ORDINATES
- PROPOSED 40m DEEP SI WITH 2 PNEUMATIC PIEZOMETERS
- CRACK
- LOW POINT ALONG DIP
- (1) PHOTO & DIRECTION

NOTES :

1. BASE PLAN COPIED FROM "GAEA ENGINEERING" DRAWING
2. FEATURE LOCATIONS ARE APPROXIMATE.
3. PREVIOUS OBSERVATIONS SHOWN IN BLACK
4. MAY 7, 2025 OBSERVATIONS SHOWN IN RED
5. CHIP SEAL PLACED IN FALL, 2017

Alberta Transportation

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

2025 PH022 INSPECTION PLAN

FIGURE PH022-1

DRAWN BY	DLA
DESIGNED BY	BDM
APPROVED BY	DWP
SCALE	N.T.S.
DATE	MAY 7, 2025
FILE No.	32123

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W28 84-11-6

SE28 84-11-6

SE28 84-11-6

538
530
520
510
500
490
480
470
460
450

900 DIA CSP CULVERT

TH20-7

TH20-8

800 DIA CSP CULVERT

POTENTIAL SLIDE SCARP

FRESH ACTIVE SLIDE SCARP, 1.3m HIGH

900 DIA CSP CULVERT

OBSERVED SCARP CRACKS

FIELD ENTRANCE

RIPRAP

1
2
3
4
5
6

N
W
E
S

LEGEND

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

NOTES :

1. FEATURE LOCATIONS ARE APPROXIMATE.
2. PREVIOUS OBSERVATIONS SHOWN IN BLACK
3. MAY 7, 2025 OBSERVATIONS SHOWN IN RED

0 25 50 75 100 150 200 m

SCALE 1:3000

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

Alberta Transportation

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

2025 PH022 CONTOUR PLAN

FIGURE PH022-2

DRAWN BY	DLA
DESIGNED BY	BDM
APPROVED BY	DWP
SCALE	1:3000
DATE	MAY 7, 2025
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 fresh patch over the west end scarp crack and the dip in the south guardrail.

Photo 2 - Looking east along the south embankment and the bowed fenceline from the west end of the site. Note the dip in the embankment below the patched west scarp crack area.

Photo 3 - Looking west at the fresh patch and the dip/sunken highway where the slide scarp crosses the west end of the site.

Photo 4 - Looking west along the south guardrail at the location where a broken hay bale is trapping sand along the edge of the highway between the east and west scarp cracks. Note the channelized surface runoff that has been created, and it has breached the sand build-up underneath the south guardrail and created an erosion gully in the hwy embankment slope below the dip in the highway further west.

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

Photo 6 – Close-Up view of the two WB lane cracks reflecting through the east end scarp crack patch shown in Photo 5.