

**ALBERTA TRANSPORTATION
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION (GRANDE PRAIRIE DISTRICT - NORTH)
2021 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 18, 2018	10	3	30
Current Inspection:	July 14, 2021	7	5	35
Road AADT:	260		Year:	2020
Inspected By:	Barry Meays, Don Proudfoot (Thurber). Ed Szmata, Ken Szmata, Roger Skirrow, Rocky Wang (AT).			
Report Attachments:	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input 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:	7 Horizontal Drains in 1987		
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 Figure PH022-1):

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. 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.

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 a more apparent dip in the embankment in 2021. These cracks, and the fact that cracking has reflected through the freshly patched east dip in 2021 with a scarp crack observed south of the highway, in conjunction with the sunken shoulder in the pavement and south embankment at the west dip, suggests some on-going creep. Seepage traces in the pavement in previous years also indicates 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 formation of surface water concentration rilling.
- b) Place crushed gravel in the runoff 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 containing SI's and Piezometers (as shown on Figure PH22-1) to depths of at least 40 m.

Estimated Cost \$150,000

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.

Don Proudfoot, 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.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE 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. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

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 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.

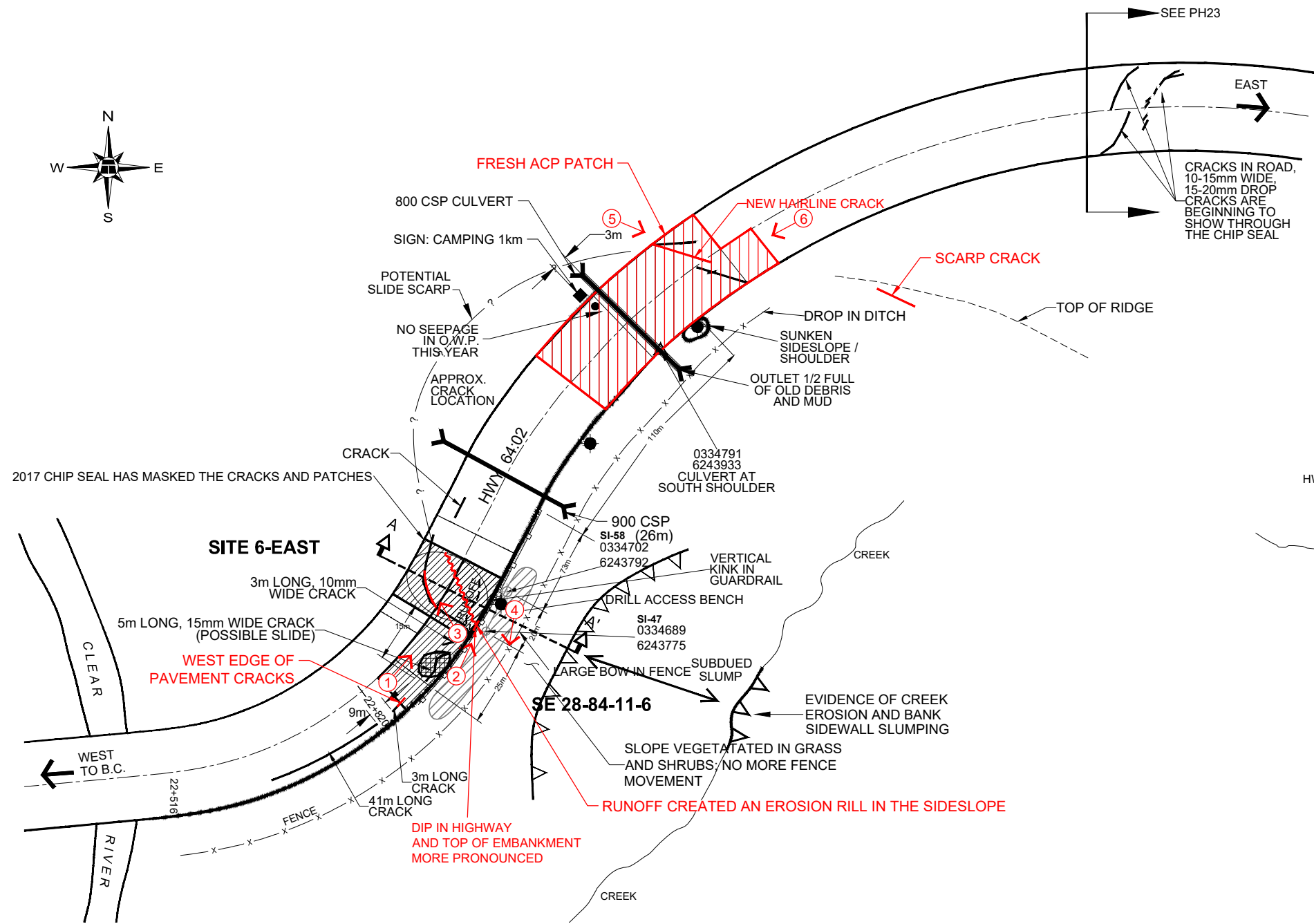
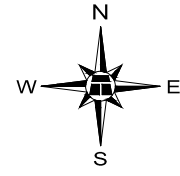
6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

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.

7. 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 others 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.

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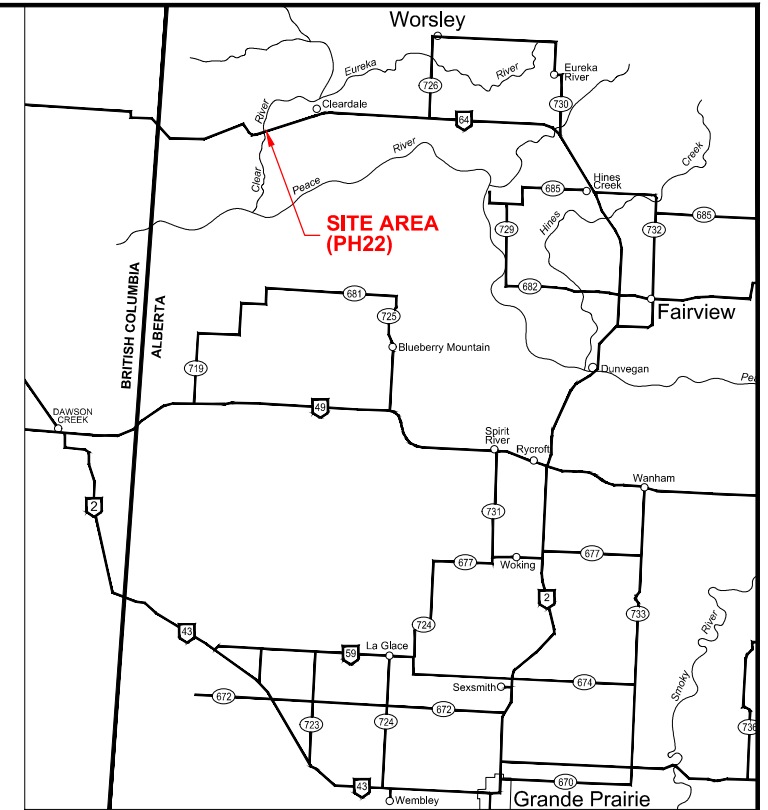
LAYOUT PLAN OF PH022-SITE #6
(SW1/4-28-84-11-6) NOT TO SCALE

LEGEND :

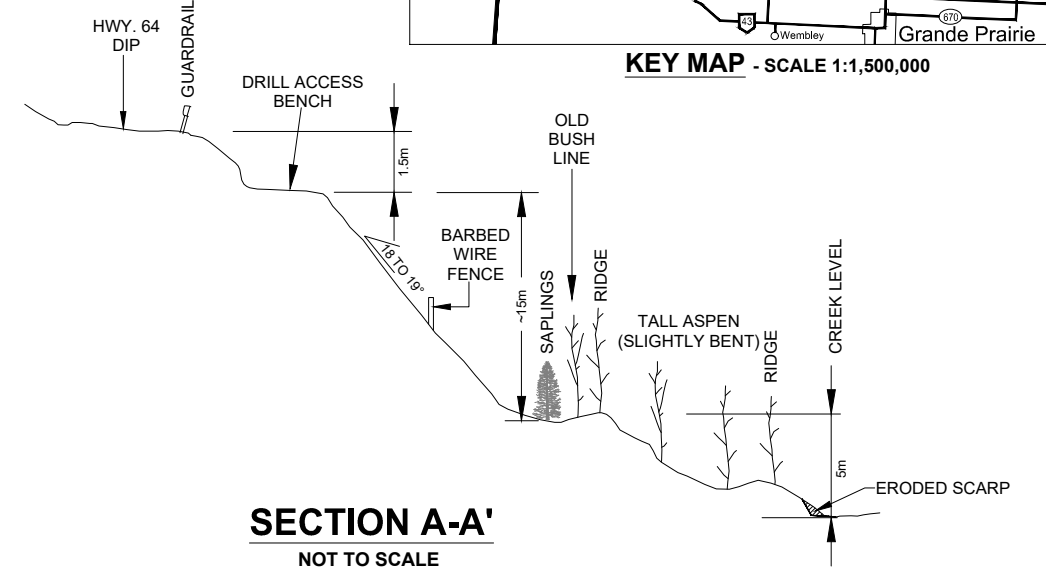
	SLOPE INCLINOMETER <i>(not in use)</i>		GUARDRAIL		CRACK
(26m)	MOVEMENT DEPTH IN METERS		A.C. PATCH		LOW POINT ALONG DIP
	PHOTO & DIRECTION	0334689 6243775	HAND HELD GPS CO-ORDINATES		
	SLUMP SCARP		PROPOSED 40m DEEP SI WITH 2 PNEUMATIC PIEZOMETERS		
	FENCE				

NOTES :

1. BASE PLAN COPIED FROM "GAEA ENGINEERING" DRAWING
2. FEATURE LOCATIONS ARE APPROXIMATE.
3. PREVIOUS OBSERVATIONS SHOWN IN BLACK
4. **JULY 14, 2021 OBSERVATIONS SHOWN IN RED**
5. CHIP SEAL PLACED IN FALL, 2017



KEY MAP - SCALE 1:1,500,000



SECTION A-A'
NOT TO SCALE

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

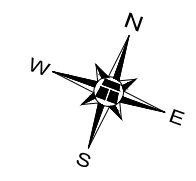
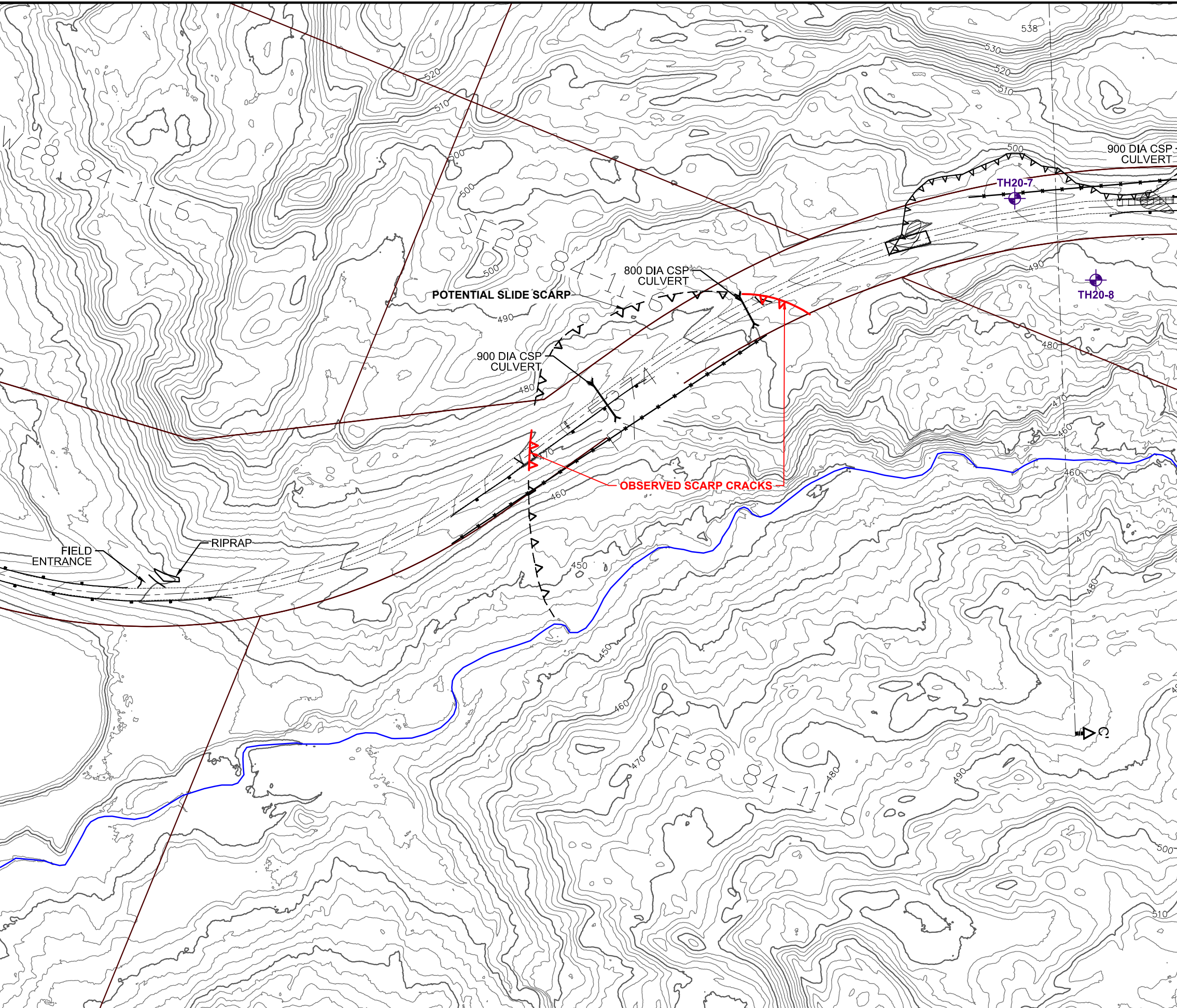
2021 PH022 INSPECTION PLAN

FIGURE PH022-1








DRAWN BY	ML
DESIGNED BY	BDM
APPROVED BY	DWP
SCALE	N.T.S.
DATE	JULY 14, 2021
FILE No.	32123



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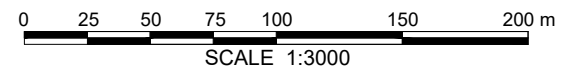


LEGEND

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

NOTES :

1. FEATURE LOCATIONS ARE APPROXIMATE.
2. PREVIOUS OBSERVATIONS SHOWN IN BLACK
3. JULY 14, 2021 OBSERVATIONS SHOWN IN RED



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**

2021 PH022 CONTOUR PLAN

FIGURE PH022-2

DRAWN BY	ML
DESIGNED BY	BDM
APPROVED BY	DWP
SCALE	1:3000
DATE	JULY 14, 2021
FILE No.	32123



THURBER ENGINEERING LTD.



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



Photo 2 - Looking east at the guardrail at the west highway dip. Note the erosion rill in the embankment slope that formed from channelized runoff flowing along the dip in the highway.



Photo 3 - Looking northeast along the scarp crack at the west end of the site. Note the highway dip to the east of the crack.



Photo 4 - Looking southwest at the dip/sunken south highway embankment located at the west end of the site below the hwy scarp crack area. There is also a bow in the fence.



Photo 5 – Looking southeast across the east end of the site at the scarp crack reflecting through the fresh ACP patch.



Photo 6 – Looking west at the fresh ACP patch placed over the east end of the site.