

**ALBERTA TRANSPORTATION AND
ECONOMIC CORRIDORS
GEOHAZARD RISK MANAGEMENT PROGRAM
PEACE REGION (PEACE RIVER DISTRICT)
2025 INSPECTION**



Site Number	Location	Name	Hwy	km
SH010-1	Little Smoky River West Valley Slope	Little Smoky River Valley, South Hill – Site #1	744:02	14.4-14.7
Legal Description		UTM Co-ordinates		
NE-13-76-23-W5		11U E 473,759	N	6,160,016

	Date	PF	CF	Total
Previous Inspection:	4-Jun-2024	11	3	33
Current Inspection:	27-May-2025	9	3	27
Road AADT:	290		Year:	2024
Inspected By:	Kristen Tappenden, TEC		Mark Gallego, Thurber Roger Skirrow, Thurber	
Report Attachments:	<input checked="" type="checkbox"/> Photographs		<input checked="" type="checkbox"/> Plans	<input type="checkbox"/> Maintenance Items

Primary Site Issue:	The highway traverses a deep-seated, retrogressive landslide with ongoing creep movement due partly to erosion at toe by the Little Smoky River resulting in cracking and sagging of the pavement surface at several locations. Site #1 is 110 m above and 1.1 km east of the Little Smoky River.		
Dimensions:	170 m scarp located 5 m downslope of the highway (north of culvert) and slumping located 30 m from highway (south of culvert). Cracks and distorted pavement for about 250 m immediately east (upslope) of the main scarp. Two erosion gullies on backslope from overland drainage.		
Date of Remediation:	1974: Highway realigned to east, upslope, to avoid slide movement. 2004: 600 m of additional realignment of highway about 10 m into backslope and construction of small toe berm, roughly between SH10 and SH28.		
Maintenance:	2020/2021: Pavement patching		
Observations:	Description	Worsened?	
<input checked="" type="checkbox"/> Pavement Distress	Crack across highway at km 14.5 with dip and increasing length of cracks forming to the north. Existing cracks continue to coalesce and widen.	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/> Slope Movement	Two older slump blocks north of the culvert and downslope of the highway have become active. Movement on a third block damaged the lower portion of the gabion mattress swale. Scarp cracks between the north slump and the highway are active. Tension cracks formed upslope of the scarp and are retrogressing towards highway. Slumps appear to be less active during 2025 inspection.	<input type="checkbox"/>	
<input checked="" type="checkbox"/> Erosion	Two gullies on backslope: north was >3 m wide and 1.6 m deep and the south still remained >4 m wide but was 2.0 m deep at the crest. Short gully in ditch at km 14.4 remained the same.	<input checked="" type="checkbox"/>	
<input type="checkbox"/> Seepage		<input type="checkbox"/>	

<input checked="" type="checkbox"/> Bridge/Culvert Distress	Downstream apron of 800 mm centreline CSP culvert at km 14.45 damaged by slope movement. The CSP was 1/3 full and corroding. The 800 mm centreline CSP culvert at km 14.69 was in good condition.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Other	Sediment from gullies accumulating over ditch gabion check baskets	<input type="checkbox"/>
Instrumentation: None.		

<p>Assessment:</p> <p>The overall valley slope is moving as several separate slide blocks in response to the toe erosion and downcutting by the Little Smoky River resulting in numerous scarps, sag ponds, and differential movement zones. South of the bridge, the highway intersects the scarps of these blocks at several locations over 2.7 km with the potential for an uneven highway surface and cracking. The highway alignment on the south side of the river valley appears more stable than the north, which is perhaps a consequence of numerous highway realignments on the south side.</p> <p>The highway at this site has been realigned twice: once in 1974 and then again in 2004 after major landslide movements resumed in 1996. Prior to the second realignment, five inclinometers and four piezometers were installed in August 2002; these were destroyed or removed during construction in 2004. The LiDAR surface inset on the Drawing shows the presence of two toe rolls west of the highway (dashed line) below km 14.45. The plateau below the highway beyond the toe rolls appears to be an abandoned river terrace yet the valley slope has become active again in the last five years despite the absence of direct river erosion. Section A-A' highlights the relative topography through the area and indicates the proximity to the highway of the scarps between km 14.48 and km 14.55.</p> <p>In 2021, the movement zone of the slide located north of the culvert expanded an additional 20 m south towards the gabion basket swale, with observed vertical displacements of up to 0.8 m. The tension cracks observed in 2020 between the highway and the main slide have developed into longer and continuous scarps. Fresh movement on most of the scarps was observed in 2022. There was less movement during the 2023 inspection. During the 2024 inspection, tension cracks formed upslope of the main scarp, indicating retrogression into the highway. No changes were observed to the cracks on the highway. The downslope scarps appeared to be less active during the 2025 inspection. Additional cracks were observed north of the highway patch. Measurements of the survey stakes at the scarp crest west of the highway at km 14.45 indicated that the scarp is slowly retrogressing towards the highway.</p> <p>There were no changes observed to the south gully in the backslope. The north gully was observed to be wider and deeper during the 2025 inspection. Portions of the gully sides are eroding and calving, filling the channel bottom, making the gully wider and shallower. These gullies will continue to worsen until repaired. Sediment from the gullies is accumulating in the ditch and culvert inlet and overtopping the gabion check baskets reducing their effectiveness.</p>
<p>Recommendations:</p> <p>Short-Term: The local MCI should continue to monitor the highway surface for movements and seal open cracks to limit surface water infiltration into the landslide mass.</p> <p>The backslope erosion gullies should be repaired, and properly sized swales should be constructed to carry water down the slope to the highway east ditch. Periodic UAV drone imaging can be undertaken to more accurately monitor the progression of existing movement and identify new zones of movement.</p>

Medium-Term:

The large slide mass between km 14.48 and km 14.62 has been active during previous inspections. Determining the feasibility of various mitigation options for this site requires additional investigation and study. It is recommended that a geotechnical investigation be undertaken to better understand the extent of the slide and the stratigraphy. It is recommended that two deep inclinometers be installed within this slide mass (to determine the depth and rate of movement) and a third placed upslope of the km 14.45 slump (to monitor regression toward the highway).

Long-Term:

Overall, the portion of the highway south of the river is relatively stable and required minor periodic maintenance compared to portion of the highway north of the river. However, the main slide is progressing toward the highway and crack are widespread on the highway surface. It is recommended that preliminary engineering be initiated soon as remedial measures may need to be implemented within 5 years. A potential longer-term solution might be to construct a large toe berm on the terrace to buttress the moving slope although this would require significant vegetation clearing and potential stabilization of soft soils located at the toe of the slope. The investigation would need to include an assessment of the valley slope to confirm it could support a toe berm. Alternatively, another re-alignment away from the landslide zone could be considered – this study is underway.

Ongoing Investigations:

Although the ongoing movements observed at this site was not as active during the 2025 inspection, it is recommended that the Geohazard inspection continued to be undertaken annually.

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.

Roger Skirrow, P.Eng.
Senior Geotechnical Engineer

Mark Gallego, P.Eng.
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.

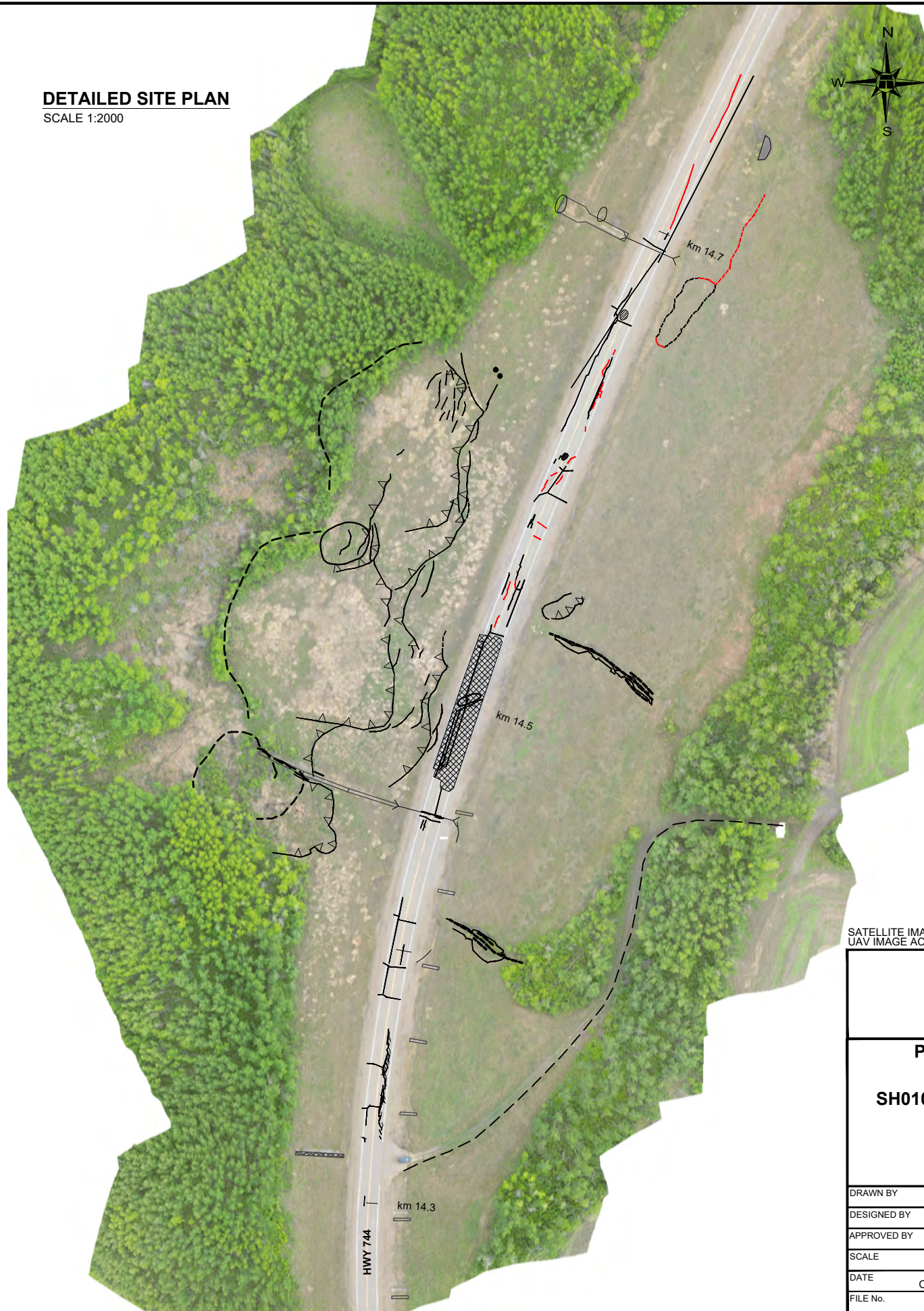
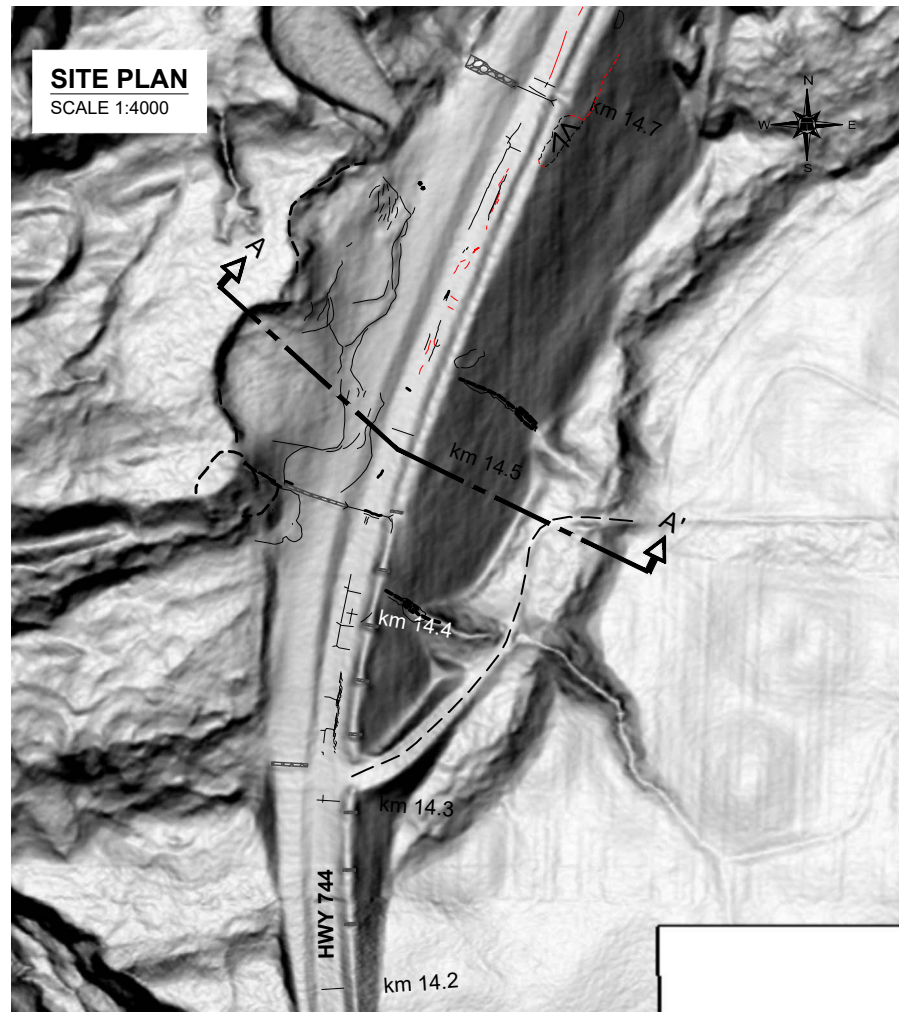
5. INTERPRETATION OF THE REPORT

- 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.

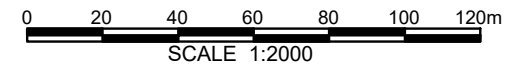
6. INDEPENDENT JUDGEMENTS OF CLIENT

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.

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- LEGEND**
- SCARP
 - TENSION CRACK / TOE ROLL



SATELLITE IMAGE FROM VALTUS IMAGERY (DATED 2014)
UAV IMAGE ACQUIRED BY THURBER (JUNE 2020)

- NOTES**
1. FEATURE LOCATIONS ARE APPROXIMATE. COMMENTS PRIOR TO 2020 REMOVED FOR CLARITY. CONSULT 2023 DRAWINGS FOR HISTORICAL INFORMATION.
 2. TO CONVERT FROM PREVIOUS STATIONING TO CURRENT KILOMETERS, SUBTRACT 7m.
 3. 2013-2015 FROM AMEC FIGURE 1, PROJECT EG10030, PROVIDED BY ALBERTA TRANSPORTATION.
 4. **MAY 2025 OBSERVATIONS SHOWN IN RED.**




PEACE REGION (PEACE RIVER DISTRICT)

SH010: HWY 744:02 LITTLE SMOKY RIVER VALLEY (SITE #1)

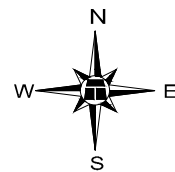
2025 SITE INSPECTION PLAN

DWG No. 32121-SH010-1-1

DRAWN BY	ML
DESIGNED BY	MG
APPROVED BY	RKS
SCALE	AS SHOWN
DATE	OCTOBER 2025
FILE No.	32121



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POSSIBLE SCARP AS TREES BENT/DOWN;
LARGE OPEN AREA TO NORTH MAY BE
PORTION OF OLD HIGHWAY ALIGNMENT
OR WASTE MATERIAL FROM GRADING

LEGEND

- ▽— SCARP
- - - TENSION CRACK / TOE ROLL
- ①➔ DIRECTION AND NUMBER OF PHOTO

100mm WIDE, 80mm DEEP (2022)
100mm WIDE, 200mm DEEP (2023)
100mm WIDE, 300mm DEEP, 10mm DIFF (2024)

1.2m HIGH (2021, 2022)

BACKWARDS TILT
TOE ROLL

0.7m HIGH (2021)
1.5m HIGH (2022)
1.2m HIGH (2023, 2024)

0.8m HIGH
1.5m HIGH (2022)
1.0m HIGH (2023)

0.9m VERTICAL

1.4m HIGH (2022, 2023)

RAVELLED

0.7m HIGH
1.6m HIGH (2020)

TENSION CRACK: 10.3m TO ACP CREST

1.4m HIGH, 9m TO ACP CREST

TWO OLD INSTRUMENTS

BENT

0.4m HIGH

0.8m HIGH (2025)

0.5m HIGH (2025)

DIP

DIP

CRACKS 10-20mm WIDE (2022)
CRACKS 10-30mm WIDE, 0mm DIFF (2024)
5-40mm WIDE, 0mm DIFF (2025)

TENSION CRACK (2023)

1.6m HIGH (2021), 1.5m HIGH (2023, 2025)

20mm WIDE; 25mm WIDE (2025)

0.5m HIGH (TOE ROLL); 0.3m HIGH (2025)

FEATURES SOFTENED BY WEATHERING
AND VEGETATION GROWTH (2025)

SHALLOW SLUMP
0.7m HIGH (2022); 0.9m HIGH (2024, 2025)
1.2m HIGH (2020); 0.6m HIGH (2025)

2.9m WIDE, 1.3m DEEP (2020)
2.0m WIDE, 1.4m DEEP (2022, 2023)

NORTH GULLY, 3.2m WIDE, 1.6m DEEP (2025)

3.1m WIDE, 1.9m DEEP (2020)
2.0m WIDE, 1.5m DEEP (2022, 2023)

GULLY SIDES ERODING AND CALVING,
FILLING CHANNEL BOTTOM (WIDER
AND SHALLOWER) (2025)

1.8m WIDE, 1.2m DEEP (2020)
2.0m WIDE, 2.0m DEEP (2022, 2023)
2.6m WIDE, 1.2m DEEP (2025)

GABION BASKET SWALE

50mm DEPTH OF SILT IN CULVERT, BENT CSP (2025)

CRACK PATCH (2023, 2024)

30-40mm WIDE

km 14.7

50-70mm WIDE, 10mm DEEP (2023, 2024)

800 mm Ø CSP

TOE ROLL, 200 TO 250mm HIGH (2025)

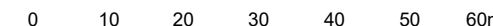
SCARP CRACK, 300mm HIGH
ALONG FLANKS, 900mm HIGH
IN CENTER OF SLIDE (2025)

DIP, CRACKS

ALLIGATOR CRACKING

NOTES

1. FEATURE LOCATIONS ARE APPROXIMATE. COMMENTS PRIOR TO 2020 REMOVED FOR CLARITY. CONSULT 2023 DRAWINGS FOR HISTORICAL INFORMATION.
2. TO CONVERT FROM PREVIOUS STATIONING TO CURRENT KILOMETERS, SUBTRACT 7m.
3. 2013-2015 FROM AMEC FIGURE 1, PROJECT EG10030, PROVIDED BY ALBERTA TRANSPORTATION.
4. MAY 2025 OBSERVATIONS SHOWN IN RED.



SCALE 1:1000

LIDAR FROM ALBERTA TRANSPORTATION (DATED 2006-2008)
SATELLITE IMAGE FROM VALTUS IMAGERY (DATED 2014)
UAV IMAGE ACQUIRED BY THURBER (JUNE 2020)



PEACE REGION (PEACE RIVER DISTRICT)

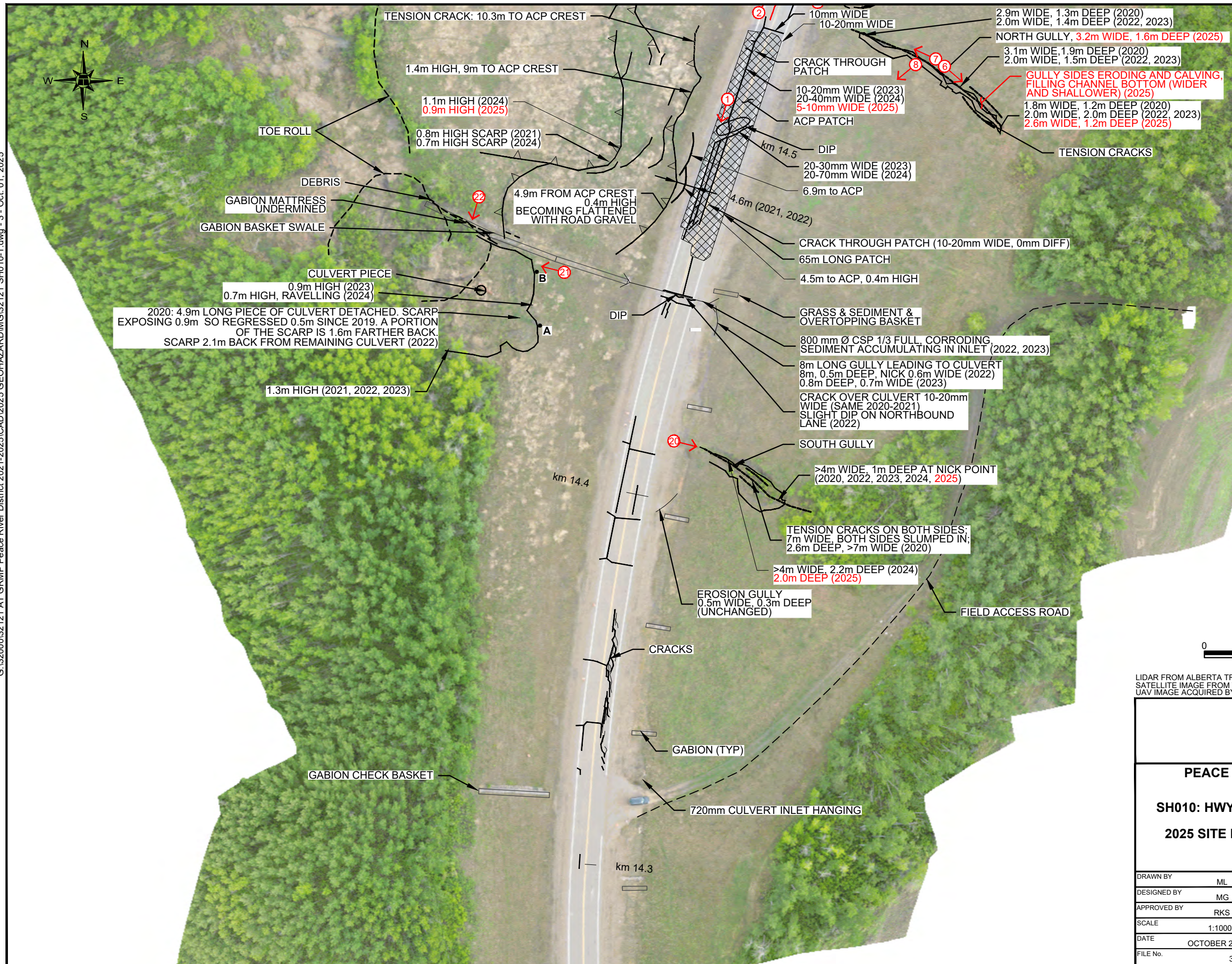
SH010: HWY 744:02 LITTLE SMOKY RIVER VALLEY
(SITE #1)
2025 SITE INSPECTION PLAN - NORTH PORTION

DWG No. 32121-SH010-1-2

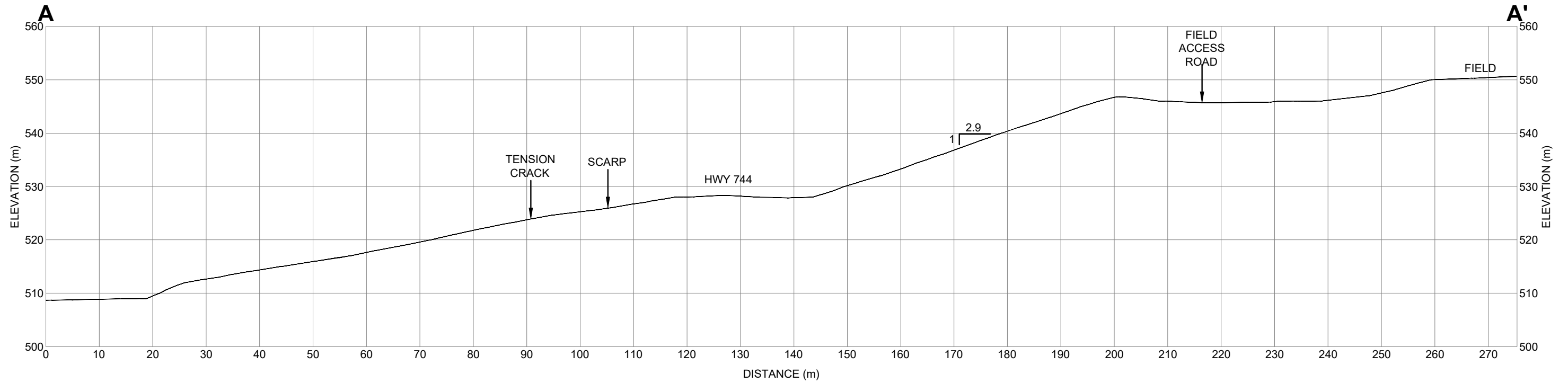
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DATE	OCTOBER 2025
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NOTE
1. GROUND PROFILE FROM 2006-2008 LIDAR DATA PROVIDED BY ALBERTA TRANSPORTATION



PEACE REGION (PEACE RIVER DISTRICT)

SH010: HWY 744:02 LITTLE SMOKY RIVER VALLEY
(SITE #1)
CROSS-SECTION A-A'

DWG No. 32121-SH010-1-4

DRAWN BY	ML
DESIGNED BY	MG
APPROVED BY	RKS
SCALE	1:750
DATE	OCTOBER 2025
FILE No.	32121





Photo 1 – Looking southeast at crack pattern on highway patch.



Photo 2 – Looking north at extended cracks along fog line and outside highway patch.



Photo 3 – Looking east at north gully.



Photo 4 – Looking northeast at slump adjacent to the north gully on the lower part of the slope.



Photo 5 – Looking south at lower slump where vegetative growth was noted.



Photo 6 – Looking east at upslope portion of north gully.



Photo 7 – Looking west and downslope of north gully where vegetative growth was observed.



Photo 8 – Looking southwest at highway patch.



Photos 9 and 10 – Looking north at crack patterns along SBL.



Photo 11 – Looking north at crack pattern and dip along SBL.



Photo 12 – Looking north at crack pattern along SBL at north end of site.



Photo 13 – Looking east at scarp crack at north end of site on east backslope.



Photo 14 – Looking north at dry bare patch on east backslope. Willows were observed downslope of bare patch.



Photo 15 – Looking south at crack pattern along NBL at north end of site.



Photo 16 – Looking southeast at crack pattern along NBL at north end of site with backslope scarp in the background.



Photo 17 – Looking west downslope of CSP culvert outlet at north end of site.



Photo 18 – Looking east at culvert outlet.



Photo 19 – Looking south at scarps downslope of highway at north end of site.



Photo 20 – Looking east at south gully.



Photo 21 – Looking west where slide at km 14.45 cuts into the gabion basket swale. There has been a lot of vegetative growth in this area.



Photo 22 – Looking south at slide at km 14.45 located adjacent to south gabion basket swale.