

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



| Site Number | Location | Name | Hwy | km |
|------------------------------|---|--|--------|----------------------------|
| SH013-14 SH013-15 | Little Smoky River - East Valley Slope | Little Smoky River Valley, North Hill – Sites #14 & #15 | 744:02 | 21.61-21.80 21.55-21.61 |
| Legal Description | | UTM Co-ordinates | | |
| Site 14: SE28/SW27-76-22-W5M | | 11U E 478,675 | N | 6,163,221 |
| Site 15: SE28/SW27-76-22-W5M | | 11U E 478,647 | N | 6,163,070 |

| | Date | PF | CF | Total |
|----------------------|---|-------------|---|-------|
| Previous Inspection: | 4-Jun-2024 | Site 14: 11 | 4 | 44 |
| | | Site 15: 11 | 3 | 33 |
| Current Inspection: | 27-May-2025 | Site 14: 11 | 4 | 44 |
| | | Site 15: 11 | 3 | 33 |
| 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 checked="" type="checkbox"/> Maintenance Items | |

| | | |
|---|---|-------------------------------------|
| Primary Site Issue: | <p><u>Site 14:</u> Highway is adjacent to slumps resulting from aggressive erosion along a ravine leading south and easterly to Peavine Creek. The erosion has progressed northerly over the years and now affects the east ditch of the highway and a centreline culvert.</p> <p><u>Site 15:</u> As the highway enters the Peavine Creek Valley, it traverses a deep-seated, retrogressive landslide with ongoing creep movement due partly to erosion at toe by the Peavine Creek resulting in cracking and sagging of the pavement surface at numerous locations. Approx. 4 km of the highway crosses this unstable north valley slope. This Site is 25 m above and 90 m away from the tributary gully of the Peavine Creek.</p> | |
| Dimensions: | <p><u>Site 14:</u> 55 m length of highway parallels active erosion area.</p> <p><u>Site 15:</u> 40 m length of highway with distortion and cracking. The cracking at this site likely represents the northern flank of a much larger instability. The main scarp can be observed extending +75m into the treeline along the west side of the highway.</p> | |
| Date of Remediation: | None | |
| Maintenance: | <p>Routine crack sealing, milling, and patching, when required.</p> <p>2017: Overlay through Sites 13, 15, and 14</p> <p>2019: Milling at Site 15</p> <p>2020: Spot patching over crack at Site 15</p> <p>2021: Hwy upgrades on north valley slope including 50 mm overlay, new guardrails, line painting, and ditch improvements</p> <p>2023: Milling at Site 15</p> | |
| Observations (Site 14): | Description | Worsened? |
| <input checked="" type="checkbox"/> Pavement Distress | Transverse crack over twin culverts | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> Slope Movement | Slumps have developed along the tributary gully and are retrogressing as it continues to downcut. Scarp adjacent to highway did not appear to retrogress further towards the highway during the 2025 inspection. | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> Erosion | Significant erosion along the east highway ditch and ravine leading to Peavine Creek. | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> Seepage | Ponded water observed in the east ditch. | <input checked="" type="checkbox"/> |

| | | |
|---|---|-------------------------------------|
| <input checked="" type="checkbox"/> Bridge/Culvert | Riprap apron at north pipe outlet collapsed with the riprap accumulating in the channel. | <input type="checkbox"/> |
| <input type="checkbox"/> Other | | <input type="checkbox"/> |
| Observations (Site 15) | Description | Worsened? |
| <input checked="" type="checkbox"/> Pavement Distress | Previous longitudinal and traverse cracks have reflected through and extended. Main crack area had multiple coalescing and parallel cracks with vertical displacement. | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> Slope Movement | Site is located on the north flank of an active deep-seated landslide moving toward the Peavine Creek. There is also a slump at the top of the backslope, although no change was observed during the 2025 inspection. The scarp that extends from the road into the treeline appears to have moved more. It is not definitively known where the slide crack intersects the highway on the south side of the slide mass. | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> Erosion | Erosion control consisting of matting and GeoRidges installed in west ditch where gully was previously observed. Minor rills forming on portions of the sideslope and ditch. New gullies are developing upstream outside of the erosion control area. | <input type="checkbox"/> |
| <input type="checkbox"/> Seepage | | <input type="checkbox"/> |
| <input type="checkbox"/> Bridge/Culvert | | <input type="checkbox"/> |
| <input type="checkbox"/> Other | | <input type="checkbox"/> |

Instrumentation: None.

Assessment:

The Little Smoky River, Peavine Creek and Peavine tributary creek valley slope are moving as several separate slide blocks in response to the toe erosion and downcutting of two different rivers. There are numerous head and intermediate scarps, tilted slide blocks, sag ponds, and differential movement zones going in slightly different directions. The highway intersects the scarps of several of these blocks resulting in an uneven highway surface and cracking. Periodic milling, patching and pavement overlays have managed the issues to date and are expected to be required for the foreseeable future.

Site 14:

The highway is adjacent to a ravine that acts as an ephemeral tributary to the Peavine Creek. The channel flows to the south until it joins with the outflow from the culvert at Site 13 where it abruptly turns to the east and enters Peavine Creek. The ravine bed has aggressively downcut over the years with a mobile nick point (the start point of downcutting) that has exited the ravine and is now moving northward along the highway east ditch. Embankment slumping, related to the downcutting is extensive along the slopes of the ravine and is less than 20 m from the highway. There are two nick points, one moving along the east ditch and one moving westerly toward a centerline culvert. The westerly moving nick point is about 14 m from a culvert outlet and is about 2 m high. The ditch erosion is due to overland flow carried by the highway east ditch, augmented by flow diverted from the west ditch through a centreline culvert. Heavy spring runoff and rain falls in 2019 and 2020 significantly increased the extents of the erosion. Survey lathes were installed upstream of the nick points to monitor progression of the bank erosion and bed scour. The remaining lathe for was reset in 2019 and the offset from the crest of the slumping decreased from 4.95 m in 2019 to 1.3 m in 2022. Additional stakes were placed in 2023 to monitor the regression of the slide scarps including one near the south end of the roadside turnout. During the 2024 and 2025 inspections, it appears that the slide scarp near the south end of the roadside turnout is continuing to retrogress. The scarp north of the twin culverts is 7.5 from the edge of the pavement. It does not appear to have retrogressed further towards the highway prior to the 2025 inspection. The erosion occurring in the highway ditch could be controlled with erosion control products; however, the downcutting along the tributary channel would require extensive works to reduce the erosion potential and provide a robust transition from the current ditch grade north of the nick point to a stable ditch bottom south of the nick point.

Site 15:

Large scale valley movements produce a diagonal crack across the highway at this location. The crack likely represents the northern flank of the uppermost scarp of deep-seated, retrogressive movements in the valley. The dip in the highway surface on the downslope side of the crack was removed with the highway overlay in 2021. The main crack pattern has re-established after the overlay. Increased crack width was observed in 2023; however, the vertical difference was reduced as the main crack area had been recently milled. During the 2024 inspection, the main crack area had multiple coalescing cracks, and the cracks continued to widen. The cracks were infilled with sand and gravel. Additional parallel cracks were observed during the 2025 inspection. There is some erosion located downslope (east) of the highway and shallower scarp which may both be contributing to the movement at the highway. During the 2024 inspection, the scarp on the roadway was observed to extend southwest into the treeline. Additional scarp movement in the treeline was observed during the 2025 inspection. There is also a backslope slump that has formed about 1 m from the valley crest which may be the result of cut slope angle rather than the overall valley movement. There were no observed changes to the backslope slump during the 2025 inspection.

Recommendations:**Short-Term:**

- Road maintenance should continue as necessary to maintain a safe roadway surface and may consist of milling, patching, and crack sealing of the ACP.
- Riprap could be placed at the nick points to slow the rate of downcutting and scour retrogression.

Medium-Term:

- There are no practical medium-term options considered for Site 15.
- For Site 14 consideration could be given to the installation of a proper channel drop structure. The location of the drop structure could be downstream of the two nick points, and the channel bed between the nick points and the drop structure would be restored and armored. Preliminary engineering should be undertaken so that this remediation can be implemented quickly when required. A hydrotechnical assessment would be required to determine flow conditions for sizing of the drop structure(s).

Long-Term:

- The functional planning study currently underway by CIMA+ is examining a long-term complete realignment of Highway 744 north of the Little Smoky River. The cost of this option may be prohibitive relative to the current traffic volume and operational cost to maintain the highway. Smaller scale realignments of localized portions of the highway may provide some short-term relief to the current situation and may be a practical hazard management solution.
- For Site 14, additional ravine channel bed stabilization could be undertaken to protect the highway from erosion induced ravine slope instabilities, and from lateral migration of the channel bed. This might consist of armouring the channel bed with heavy rip rap and inclusion of a series of drop structures and stilling ponds.

Ongoing Investigation:

- It is recommended that the annual Geohazard inspection should continue as scheduled.
- Minimum offset distances or triggers should be established so that remedial measures can be determined and implemented prior to distress of the highway.
- Additional future LiDAR data could be obtained and used for a future differential movement study that could identify and monitor movement patterns, rates of movement and help to better assess future mitigation options within the Little Smoky River and Peavine Creek valleys.

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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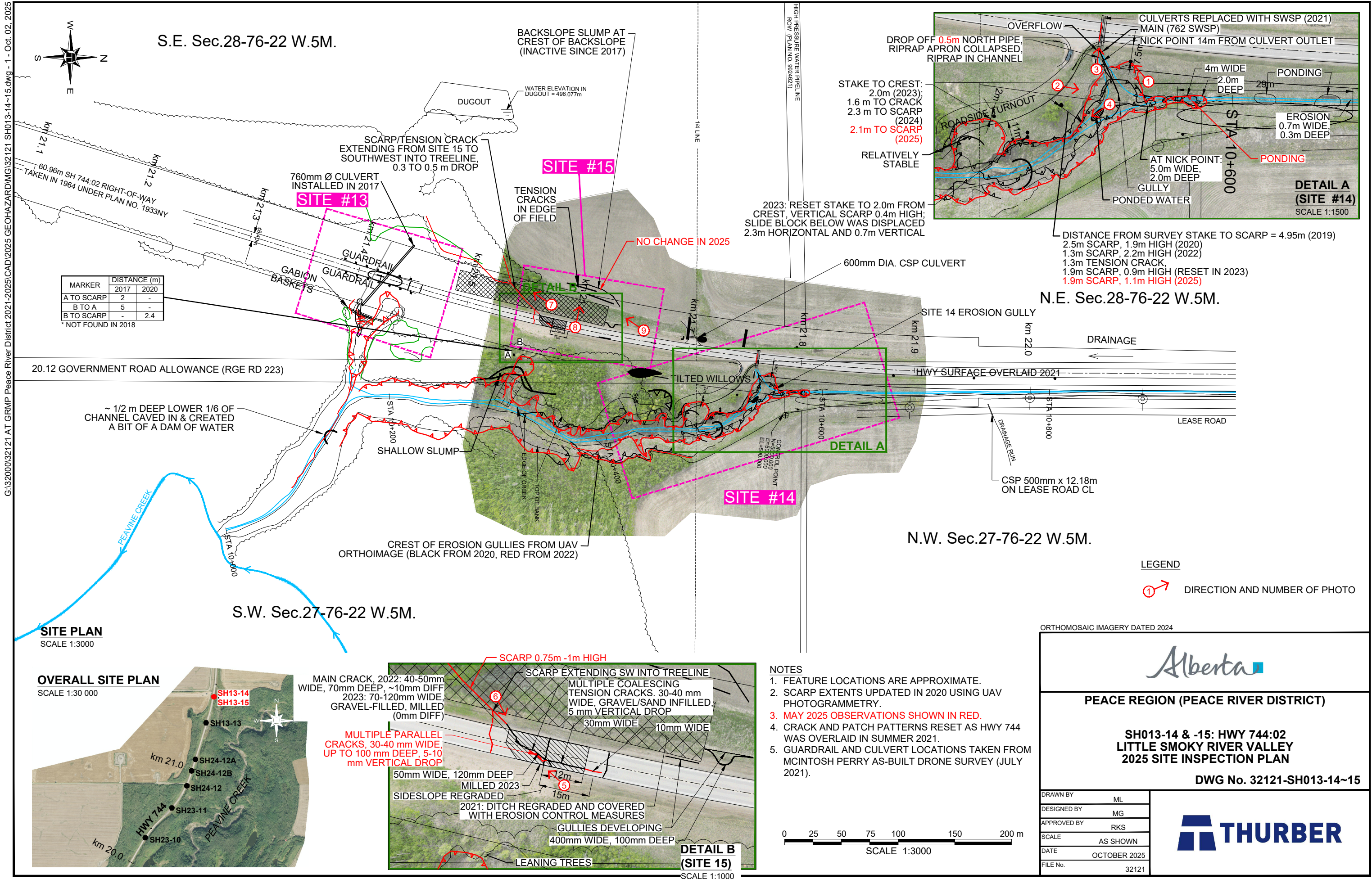




Photo 1, Site 14 – Looking southwest at slide scarp north of twin culverts that is retrogressing towards the highway.



Photo 2, Site 14 – Looking north towards the east ditch.



Photo 3, Site 14 – Looking at outlets of SWSP twin culverts outlets. The riprap apron at the north SWSP had collapsed.



Photo 4, Site 14 – Looking south at slumping along the tributary channel.



Photo 5, Site 15 – Looking southwest at diagonal crack intersecting the highway.



Photo 6, Site 15 – Looking northeast at the main crack. Scarp from road extends southwest into the treeline.



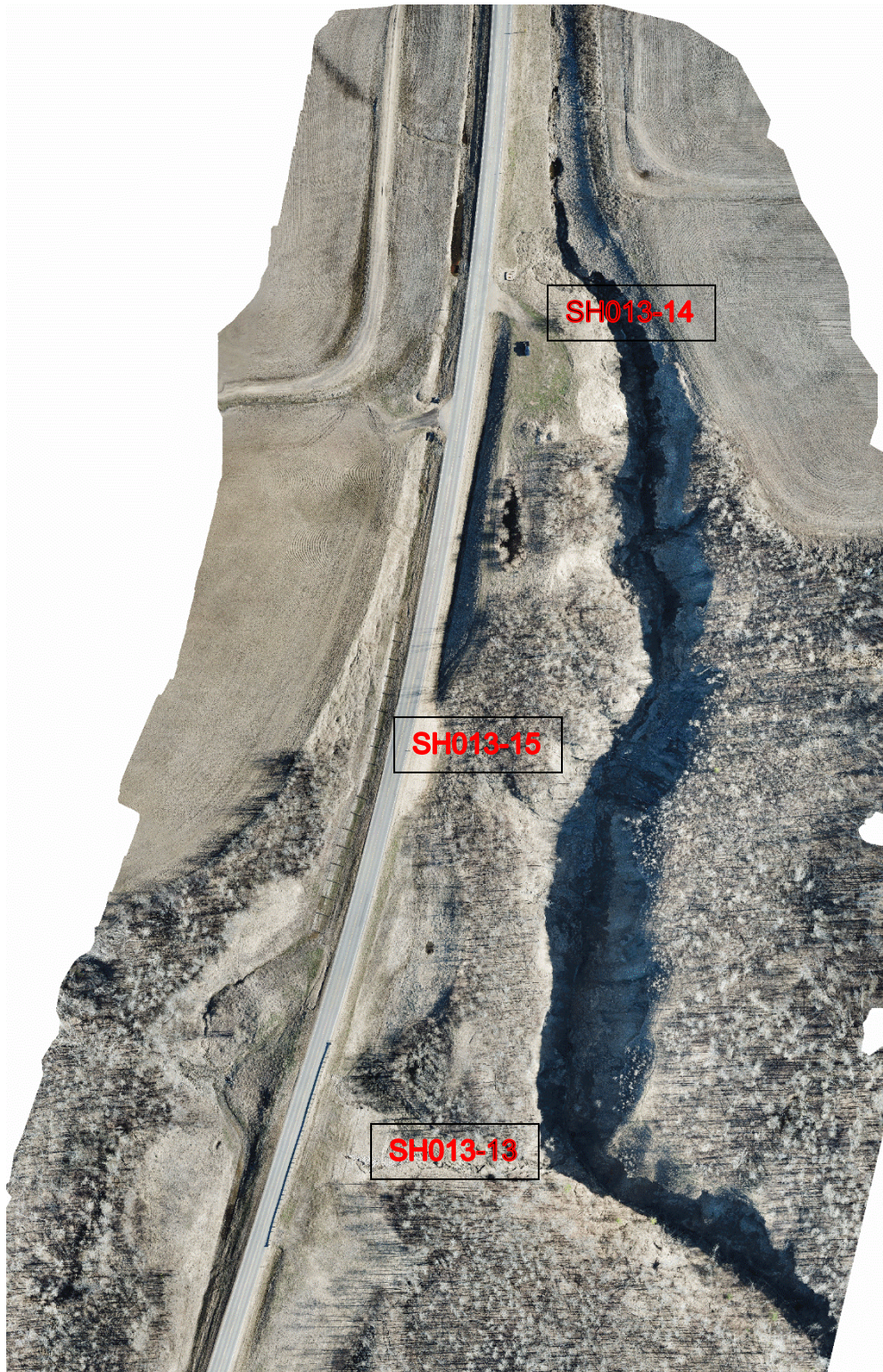
Photo 7, Site 15 – Looking southwest where scarp extends into the treeline.



Photo 8, Site 15 – Looking west at backslope slump. No changes observed in 2025 inspection.



Photo 9, Site 15 – Looking southwest at backslope slump at valley crest.



2022 UAV orthomosaic of the erosion gully at SH013-13, SH013-14, and SH013-15 locations.