ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GEOHAZARD ASSESSMENT PROGRAM PEACE REGION (PEACE RIVER DISTRICT) 2025 INSPECTION



Site Number	Location	Name		Hwy	km
PH011-1 PH011-2 PH011-3	North of Peace River	Whitemu	d River	743:02	42.4 to 42.8 43.2 42.8
Legal Description		UTM Co-ordinates			
PH011-1: NE36-87-21-W5M		11V N	6,272,980	E 4	87,129
PH011-2: SW01-88-21-W5		11V N	1 6,272,980	E 4	87,129
PH011-3: SW01-88-21-W5		11V N	1 6,272,586	E 4	87,326

	Date	PF	CF	Total
	21-June-2017	5	4	PH011-1: 20
Previous Inspection:	16-May-2023	9	3	PH011-2: 27
		8	6	PH011-3: 48
	13-May-2025	11	3	PH011-1: 33
Current Inspection:		11	4	PH011-2: 44
		8	6	PH011-3: 48
Road AADT:	180		Year:	2025
In an act of Dec	Rocky Wang, TEC	;	Don Proudfoot, T	hurber
Inspected By:			Ken Froese, Thurber	
Report Attachments:			☐ Maintenance Items	

PH011-1			
Primary Site Issue:	Backslope and sideslope slumping, minor erosion, and slope ravelling.		
Dimensions:	150 m backslope slump from km 42.3 to km 42.25 Repaired culvert embankment from km 42.45 to km 42.7 12 m wide x 25 long slump in west sideslope adjacent to southwest swale Extensive slide in sideslope/valley slope between km 42.49 and km 42.68		
Date of Remediation:	2010: Culvert replacement and embankment rebuilt at km 42.6 2020 (Fall): Backslope slump cut back when crews in the area constructing detours around other failures.		
Maintenance:	ALL SITES: July 13, 2020: Highway closed due to landslide movements at other sites and reopened late in the year after detours had been constructed.		
Observations:	Description	Worsened?	
☐ Pavement Distress	Gravel-surfaced		
⊠ Slope Movement	Ongoing slumping of backslope south of culvert repair leading to toe roll in ditch. Tension cracks have recurred in west sideslope of culvert embankment and extending north of the culvert.	\boxtimes	
⊠ Erosion	Gully at toe of backslope (west ditch) still present; gully in east ditch stable. Erosion that had formed around silt fence on west slope of culvert embankment has become stable. There is a fan of material from the highway on the east slope.		

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⊠ Seepage	Seepage from the subdrain at the culvert outlet and a few bolts within the culvert has remained steady since installation. Seepage from the subdrain at the inlet was only observed in 2016.	
□ Bridge / Culvert	No distress of the culvert (BF77270) observed.	
⊠ Other	Grading has windrowed material up to above bottom of guardrail.	\boxtimes
PH011-2	•	
Primary Site Issue:	A steep backslope cut has been eroding and depositing maditch and on the highway.	
Dimensions:	115 m long measured along the shoulder, the slope is approximately 25 m high, and inclined at 37°.	
Date of Remediation:	None	
Maintenance:	Ongoing grading to keep the ditch and roadway open	
Observations:	Description	Worsened?
	Material accumulating in the east ditch has encroached onto the roadway surface reducing the lane width.	\boxtimes
	There are fresh scarps opening at the top of the slope in 2023 and again in 2025.	\boxtimes
⊠ Erosion	Material has ravelled downward due to erosion with a toe height of about 1.5m.	\boxtimes
☐ Seepage		
☐ Bridge / Culvert		
☐ Other		
PH011-3		
Primary Site Issue:	A landslide scarp has developed across the surface of gravelled road.	
Dimensions:	100 m wide along the shoulder, approx. 400 m wide at t 170 m long from the highway to the creek.	the creek and
Date of Remediation:	None	
Maintenance:	2021: Site regraded to remove unevenness from slide mov	ements
Observations (PH011-3):	Description	Worsened?
□ Pavement Distress	Cracks were crossing both lanes (graded out) and there is a dip in gravel road surface.	
	Cracks and dip across roadway indicate slope movement. LiDAR indicates historical landslide scarps on slope above and below roadway. A new scarp has opened on the west side near the north end of the subsite.	×
☐ Erosion		
☐ Seepage		
☐ Bridge / Culvert		
☐ Other		
Instrumentation:		
None at any of the three sub	sites.	

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Assessment:

The PH011 sites are located on Highway 743:02 on a sidehill alignment ascending the valley slope of a tributary to the Whitemud River. LiDAR provided by Alberta Transportation (Figure 1) shows that the valley slope has been affected by historic landslide movements. It is considered that higher groundwater levels in the years leading into 2020 re-activated large slide blocks which resulted in the temporary closure of the highway due to landslide movements until detours could be constructed at PH039 and PH087. There are three subsites at PH011:

PH011-1 was assigned to the bridge culvert (BF77270-2, km 42.49) installed in 2010 and was expanded to include the high backslope cut on the west side of Hwy 743 south of the bridge culvert.

PH011-2 (km 43.2) is the ravelling shale backslope on the east side of Hwy 743 north of PH011-3 and just south of PH087.

PH011-3 was first noticed on August 4, 2020, while driving to undertake call-out inspections of other sites on Hwy 743 in 2020 shortly before the temporary closure. PH011-3 was the more active sub-site at this location and located just north of PH011-1 bridge culvert but south of the raveling backslope. It was likely activated by the same climatic conditions as those that resulted in the highway closure.

PH011-1 (Drawing 32121-PH011-1)

PH011-1 had not been formally inspected since 2017 since there were no active issues at the bridge culvert. However, as there are ongoing minor slumping and erosion at the backslope, it was typical practice to stop briefly at the site during the Geohazard inspection tour to take a few pictures. During the 2025 inspection, a quick walk across the site noted that there were fresh scarps across the west embankment so a more-thorough inspection was undertaken and the UAV was flown to capture recent imagery.

During the Fall 2020 work to repair the highway from the landslides, some of the slumped material that was blocking the highway ditch and infringing onto the highway surface was removed from the backslope. The work did not include erosion control measures. The backslope has continued to slump somewhat since but, as of 2025, has become semi-stable with vegetation re-establishing. Ideally, the entire slope would be cut back to a flatter angle to improve stability and provide a longer term solution. There are gullies eroding in both ditches that should also be better protected.

At the main culvert site, it was noted that grading practices have resulted in gravel pushed up against the guardrail to the bottom of the W-Beam on the west side (significantly reducing its effectiveness) and material spilling or running onto the east side resulting in a build up partway down the slope. Of greater concern are the landslide features that have formed on the west side of the embankment. There is a slump that has formed in upper portion of the SW quadrant in the drainage channel from the west ditch. This feature is about 25 m by 12 m with a scarp between 0.5 m and 1.6 m in height. There was a clear toe roll identified in the drainage channel.

Further north, there are scarp cracks associated with large slow moving landslide. The upper one was approximately 120 m long in the open area but continued north in the tree line where it connects with the newer PH011-3 site. The scarp heights was 0.1 m high closer to the culvert and increasing up to 0.9 m at the north in the tree line. The lower scarp was more pronounced with scarp heights up to 2 m and two toe rolls near the culvert outlet and SW drainage channel. This lower scarp was at least 90 m long (measured parallel to the road) where it could be readily mapped in the open area. The more noticeable scarps suggesting increased movement is the reason for increasing the Risk Level at this subsite.

PH011-3 (Drawing 32121-PH011-3)

The landslide at PH011-3 is affecting about 100 m of the road surface. At the centre of the disturbance, the highway is located about 25 m above the creek. The valley slope surface, as shown by the crosssection on Drawing 32121-PH011-3, is hummocky, indicating the presence of several possible retrogressive slide blocks between the creek and the road. Movements are slow enough at this site that routine grading is currently able to maintain a safe highway surface. However, the ditches are narrow and poorly-drained. There was a fresh scarp observed at the north end of the site on the west side of the highway and up above the highway on the east side. The new movements seen at PH011-1 could indicate that additional movement should be expected at this site since they are part of the same larger landslide block.

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PH011-2 (Drawing 32121-PH011-2)

The shale backslope at PH011-2 (Drawing 32121-PH011-2) has continued to ravel onto the highway surface and the accumulated debris had resulted in one-lane closure at the time of the 2025 inspection hence the increase in Risk Level at this subsite. In 2023, there was evidence of scarp cracks opening up at the top of the slope which did not appear worse in 2025; however, a mid-slope scarp had also opened up so there remains the potential for a larger mass to fail at this location. Excavated material has been stockpiled just north of the site and should be removed to the designated stockpile outside the south end of the valley.

Recommendations:

Short-Term (<3 months):

- Generally, frequent visits by the Maintenance Contractor are recommended to ensure that the roadway remains safe for the travelling public as there are several slides in this valley that could reactivate and further damage the road, especially following heavy periods of precipitation and the coming spring thaw when groundwater levels could be higher.
- The cracks and slumping at PH011-3 can be managed with routine grading to provide a safe roadway surface. If possible, cutting an upslope ditch that could drain the site could be advantageous for controlling movement rates.
- At the PH011-1 (km 42.4) site, the exposed backslope should be textured (dozer walking up and down the slope), seeded, and covered with a temporary erosion control blanket. Consideration should be given to using a permanent control blanket in the ditch where flow will be concentrated.
- At the PH011-2 (km 43.2) site, the slumped material should be removed from the side of the road and hauled to the disposal area located just south of the valley. Consideration should be given to cutting back the slope to reduce the amount of material that could ravel/slide onto the highway.

Medium-Term:

PH011-3: A vertical realignment of the roadway through the slide could be carried out if the road condition worsens. The reprofiling could lower the road a few meters through the slide zone by taking out the hump in the road profile starting from south of the site. The slide area itself could be further unloaded by subexcavating some of the soil and replacing it with EPS light-weight fill. A subdrain could also be installed along the upslope side of the road to locally lower the groundwater and the shoulder of the road in the slide zone could be cut down to take a bit of the weight of the slide block.

Long-Term (>5 years):

The highway could be realigned south of the Whitemud Creek bridge to rise out of the valley perpendicular to the valley slope and then curve back to cross the tributary creek east of PH011-1, as shown approximately on Figure 1 below. The curved alignment is required due to the proximity of the Peace River valley to the east of the Whitemud Creek valley. This re-alignment would be expensive, and as there would be limited fills, the excavated material would need to be hauled out of the valley and stockpiled at least 300 m from the valley crest. This would also require a significant new road segment on the uplands to bring the new alignment back to the existing highway, as well as a new bridge file culvert and embankment fill at the tributary crossing.

Ongoing Investigation:

- It is recommended that the Geohazard inspection should continue as scheduled every second year.
- Should a major re-alignment be considered in the long-term, preliminary engineering design should be conducted to assess the potential alignment and develop ballpark costs. This would include route selection and geometric planning. Once a route has been selected, it is recommended that a geotechnical investigation be undertaken such that detailed design and tender will have that information available immediately should the realignment be suddenly required due to further movements. Slope stability analyses should be carried out to further develop the option and to determine safe cut slopes for the realignment.

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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.

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

Ken Froese, M.Eng., P.Eng. Senior Associate | Senior Geotechnical Engineer

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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, interpretations 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.



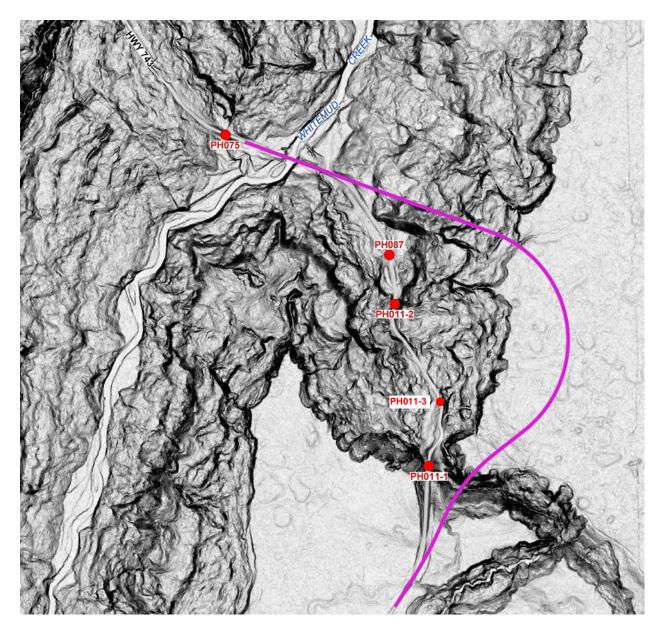
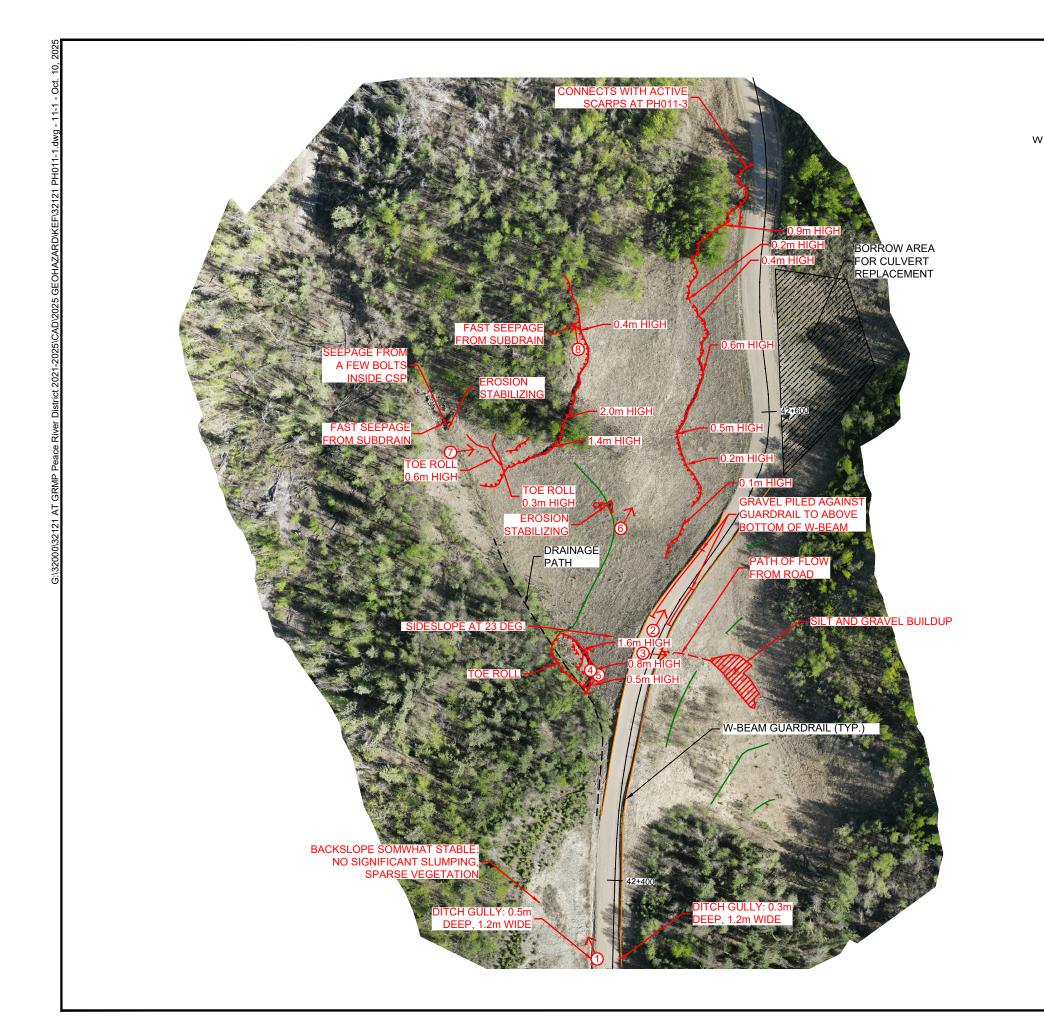
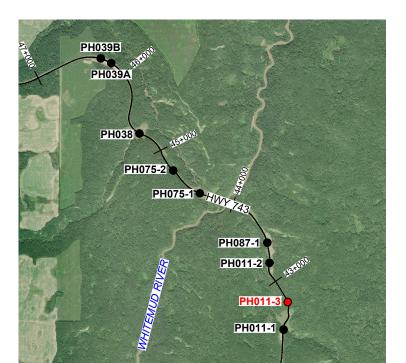


Figure 1: Proposed long-term realignment for Hwy 743:02 south of the Whitemud Creek





KEY PLAN SCALE 1:40 000

<u>LEGEND</u>

VVV ACTIVE LANDSLIDE SCARP

---- SILT FENCE

PHOTOGRAPH NUMBER AND DIRECTION

NOTES

- 1. FEATURE LOCATIONS ARE APPROXIMATE.
- 2. MAY 2025 OBSERVATIONS SHOWN IN RED.
- 3. CULVERT IS BF77270-2



ORTHOMOSAIC DERIVED FROM MAY 2025 UAV IMAGERY FLOWN BY THURBER



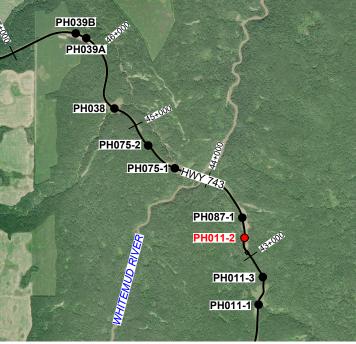
PEACE REGION (PEACE RIVER/HIGH LEVEL AREA)

PH011-1: HWY 743:02 2025 SITE INSPECTION PLAN

DWG No. 32121-PH011-1

DRAWN BY	DLA
DESIGNED BY	KEF
APPROVED BY	DWP
SCALE	1:1500
DATE	OCTOBER 2025
FILE No.	22121





SCALE 1:40 000

LEGEND

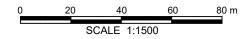
VVV ACTIVE LANDSLIDE SCARP



PHOTOGRAPH NUMBER AND DIRECTION

NOTES

- 1. FEATURE LOCATIONS ARE APPROXIMATE.
- 2. MAY 2025 OBSERVATIONS SHOWN IN RED.



LIDAR PROVIDED BY ALBERTA TRANSPORTATION



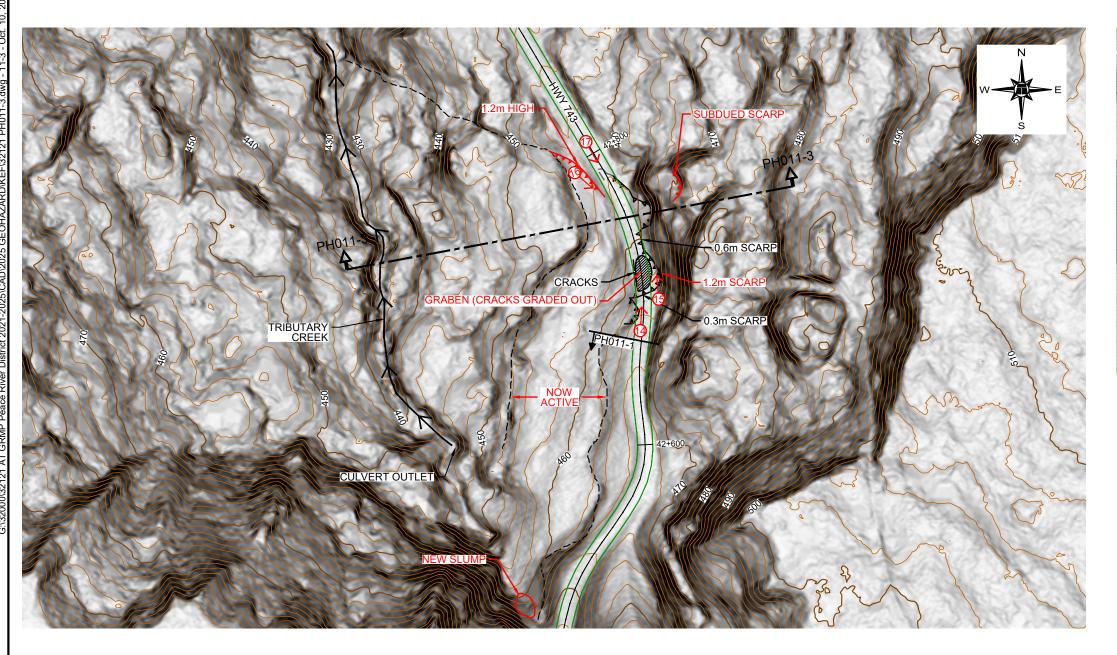
PEACE REGION (PEACE RIVER DISTRICT)

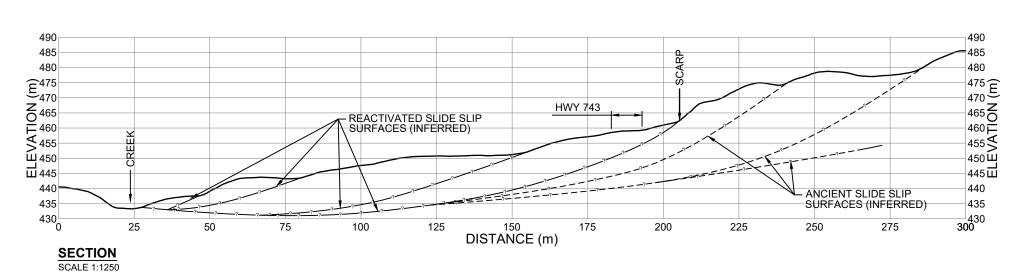
PH011-2: HWY 743:02 2023 SITE INSPECTION PLAN

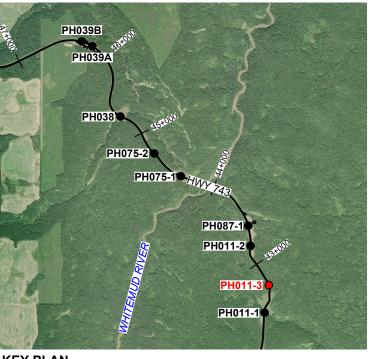
DWG No. 32121-PH011-2

DRAWN BY	DLA
DESIGNED BY	KEF
APPROVED BY	DLA
SCALE	1:1500
DATE	OCTOBER 2025
FILE No.	32121









KEY PLAN SCALE 1:40 000

LEGEND

 $\overline{\ \ \ \ \ \ \ }$ ACTIVE LANDSLIDE SCARP

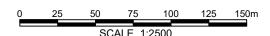
---- ANCIENT LANDSLIDE SCARP



PHOTOGRAPH NUMBER AND DIRECTION

NOTES

- 1. FEATURE LOCATIONS ARE APPROXIMATE.
- 2. MAY 2025 OBSERVATIONS SHOWN IN RED.



LIDAR PROVIDED BY ALBERTA TRANSPORTATION



PEACE REGION (PEACE RIVER/HIGH LEVEL AREA)

PH011-3: HWY 743:02 2025 SITE INSPECTION PLAN

DWG No. 32121-PH011-3

DRAWN BY	DLA
DESIGNED BY	KEF
APPROVED BY	DWP
SCALE	1:2500
DATE	OCTOBER 202
FILE No.	3212







Photo 1 (PH011-1) - Looking at regraded backslope failure area at PH011-1 site (km 42.4).



Photo 2 (PH011-1) - Gravel piles up against both guardrails reducing their effectiveness.

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Photo 3 (PH011-1) – Erosion gully through windrow below guardrail accumulated gravel down below.



Photo 4 (PH011-1) - Looking NW at slump in NW quadrant into drainage channel.

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Photo 5 (PH011-1) - Looking west at slump in NW quadrant into drainage channel.



Photo 6 (PH011-1) – Looking north across west slope at upper of the re-activated scarps.

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Photo 7 (PH011-1) - Looking west across toe roll and south end of the lower re-activated scarp.



Photo 8 (PH011-1) – Looking north at the north end of the lower re-activated scarp.

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Photo 9 (PH011-2) – Looking north at failing backslope and new scarp above the highway (red arrow).



Photo 10 (PH011-2) – There has been a recent movement on this backslope resulting in material accumulating onto the east shoulder of the highway.

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Photo 11 (PH011-2) – Recent scarp movement at the top of the slope.

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Photo 13 (PH011-2) - Additional cracks opening up at the top of the slope.

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Photo 14 (PH011-3) – Looking north at landslide site identifiable by the dip in the highway surface.



Photo 15 (PH011-3) – Looking north along backscarp crack (in the grass and less visible in 2025).

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Photo 16 (PH011-3) - Looking south where a new scarp has opened at the north end of the site.



Photo 17 (PH011-3) – Looking south toward the landslide.

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