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

Site Number	Location	Name	Hwy	km
PH081	Shaftesbury Trail	Shaftesbury Trail North Slides	684:02	28.4
Legal Description		**UTM Co-ordinates (NAD 83)**		
NW¼ 19-083-021 W5M		11U E 481381	N 6230300	

	Date	PF	CF	Total
Previous Inspection:	May 29, 2024 South Slides	11	2	22 (Slide Risk Rating)
	North Slide	9	4	36 (Slide Risk Rating)
Current Inspection:	May 14, 2025 South Slides	11	2	22 (Slide Risk Rating)
	North Slide	9	4	36 (Slide Risk Rating)
Road WAADT:	880		**Year:**	2024
Inspected By:	Tyler Clay (Thurber).			
Report Attachments:	☒ Photographs	☒ Plans	☐ Maintenance Items	

Primary Site Issue:	**South Slides:** Two landslide features are present to the east of Hwy 684:02 in the crest of the steep high riverbank slope above an arm in the Peace River. The backscarps have sharp 3 m drop offs and are retrogressing into the highway right-of-way (Photos 1 to 4). Both landslides have failed down to the sandy till ledge which is about 5 m below the existing ground surface. There is a marked gas utility pipeline at the backscarp of Slide 1. **North Slide:** A landslide (first observed in 2019), evidenced by a dip and cracking in the pavement, was observed to the north of Slides 1 and 2. The location of this slide is above a subdivision at km 28.6. (Photos 5 and 6).
Dimensions:	Slide 1 is about 13 m wide, with a 3 m drop off along the backscarp which is about 3.2 m east of the NBL guardrail. Slide 2 is about 14 m wide, with a 3 m drop off along the backscarp which is about 7.6 m east of the NBL guardrail. The slide at km 28.6 is approximately 25 m wide. Tension cracking had been observed to the highway centreline prior to the 2021 overlay.
Date of any remediation:	None.
Maintenance:	The road was repaved, and new guardrail installed in 2021.

Observations:	Description:	Worsened?	
		Yes	No
☒ Pavement	There are no signs of any cracking in the pavement structure above Slides 1 and 2. Transverse cracks across both lanes that were previously identified in the asphalt north and south of the km 28.6 slide had no visible change. Previous tension cracks were not observed since road was repaved in 2021 and there was no apparent expansion from the previous inspection. (Photos 5 and 6)	☐	☒
☒ Slope Movement	Minor slumping is occurring at the south landslides with bare backslopes (Photos 1 to 4). Slide 1 has shown some signs of minor ravelling and no visible retrogression of the main scarp since 2024. The minimum offset from the headscarp to the guardrail was unchanged at 3.2 m. The backscarp at Slide 2 did not appear to have significant change and there was an offset of 7.6 m to the guardrail which is unchanged from the 2024 inspection. (Photo 4) The vertical dip in the pavement and guardrail at the slide at km 28.6 since the 2021 repaving appeared unchanged from the 2024 condition (Photo 6).	☐	☒
☐ Erosion		☐	☐
☒Seepage	Minor seepage was visible at the base of the main scarp face of Slide 2 (Photo 3).	☒	☐
☐ Bridge/Culvert		☐	☐
☒ Other	There is a marked natural gas utility pipeline that appears to cross beneath the highway from west to east at the south end of Slide 1 and could possibly be affected by Slide 1. Thurber did not find any record of the pipeline.	☐	☒

Instrumentation:

Spring 2025 data from instrumentation installed during the 2020 geotechnical investigation is summarized below.

Slide 1:
TH20-7 Vibrating Wire (VW) – the VW tip is approximately 18 mbgs and has been dry since installation.
TH20-7 Slope Inclinometer (SI) – showed a cumulative movement of 12.5 mm over 0.3 m to 13.7 m depth, with a rate of movement of 0.1 mm/yr.

Slide 2:
TH20-8 VW - the VW tip is approximately 12 mbgs and has recorded groundwater depth range between approximately 5 to 6.1 mbgs. There has been a notable downward trend of 0.5 to 1.0 m depth since March 2023.

KM 28.6 Slide:
TH20-6 VW (x2) – the upper VW tip is installed approximately 8.5 mbgs was found to be dry since January 2024, and the lower VW tips is installed approximately 20 mbgs and the recorded groundwater depth is approximately 19 mbgs. Groundwater depths have been relatively consistent since installation with variance below 2.0 m.

TH20-6 SI - showed a cumulative movement of 1.4 mm over 6.6 m to 8.4 m depth, with a rate of movement of less than 1 mm/yr since the Spring 2024 readings.

Assessment (Refer to Drawings PH081-1-1 to PH081-1-5)**:**

Intermittent movement and retrogression is occurring at Slides 1 and 2 and the headscarps are expected to continue to move toward the highway. The newer slide at km 28.6 previously caused distress in the old pavement and guardrail and is located above a residential subdivision with a higher consequence of failure. Based on vertical deflection of the guardrail at the slide location it appears slide movement is ongoing; however, SI data since 2022 indicates that movement is at intermittent or very slow rates.

It is possible that the landslides are caused by fluctuations in a perched groundwater table that is within the alluvial terrace soils that sit above of the harder/denser soil and bedrock layers, combined with softening and weathering of the very steep riverbank slope. The overburden soils overlie hard bedrock at the north landslide. If a landslide failure occurred at km 28.6, the slide mass could move overtop the steep bedrock face and runout into the backyards of the residences.

Recommendations:

Monitoring:
Annual inspections should continue with the next inspection occurring in the Spring of 2026.

Maintenance:
- No immediate maintenance measures required at this time.

Short-term Measures:
- Regularly inspect the road and crest of the riverbank to check for cracks and possible backscarp retrogression.
- Post slide warning signs and be prepared to build an emergency detour in the upslope ditch if the landslides retrogress closer to within a few meters of the NBL of the highway.

Long-term Measures:
- The most feasible remedial solution is likely a pile wall at each of the south landslide locations to protect the road from the landslides given the proximity of the highway to the steep riverbank slope, and the presence of private residences on the west side of the highway. ($1M - 2M)
- At the north landslide, a concrete pile wall anchored into bedrock is a potential remedial option. ($1M)

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, P.Eng.
Partner | Senior Geotechnical Engineer

PROFESSIONAL ENGINEER ALBERTA
TYLER T. CLAY
ID: 120965
October 8, 2025

Tyler Clay, P.Eng.
Geological Engineer

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.
RM SIGNATURE: Don Proudfoot
RM APEGA ID #: 51674
DATE: October 8, 2025
PERMIT NUMBER: P005186
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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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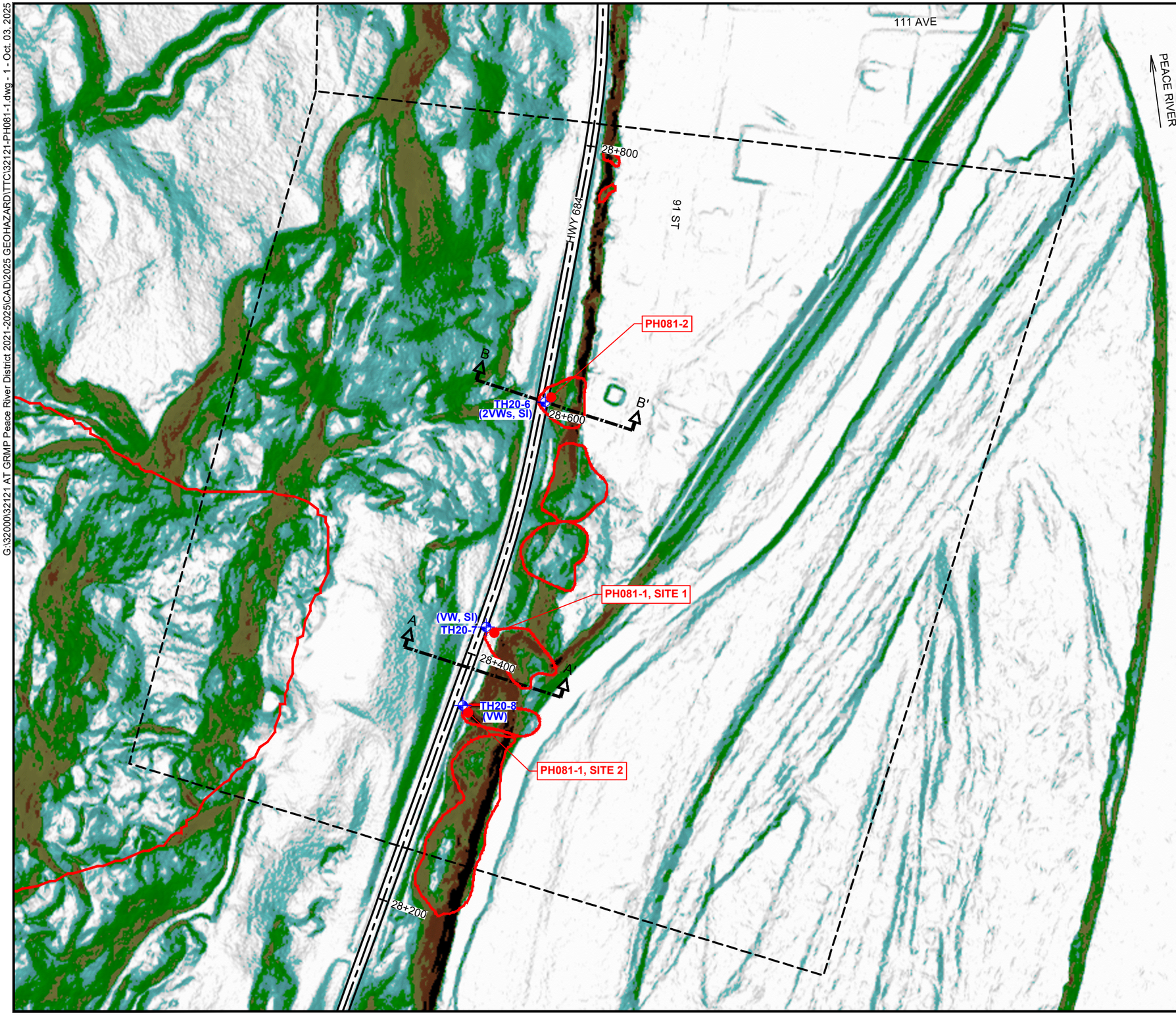

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W E
S

LEGEND

- APPROXIMATE TEST HOLE LOCATION
- APPROXIMATE INSTRUMENT LOCATION
- VW — VIBRATING WIRE PIEZOMETER
- SI — SLOPE INCLINOMETER
- ACTIVE LANDSLIDE BOUNDARY
- PH053 — GEOHAZARD SITE NUMBER
- A A' — SLOPE STABILITY ANALYSIS CROSS - SECTION LOCATION

SLOPE (DEGREE)

50°
40°
30°
20°
10°
0°

0 25 50 75 100 150 200 m
SCALE 1:3000

DRAWING BASED ON 2007 LIDAR WITH 1m POINT GRID

Alberta

PEACE REGION (PEACE RIVER DISTRICT)

PH081-1: HWY 684:02, KM 28.4
SHAFTESBURY TRAIL NORTH SLIDES -
SLOPE SHADER OVERALL PLAN MAP

DWG No. 32121-PH081-1-1

DRAWN BY	ML
DESIGNED BY	TCC
APPROVED BY	DWP
SCALE	1:3000
DATE	OCTOBER 2025
FILE No.	32121

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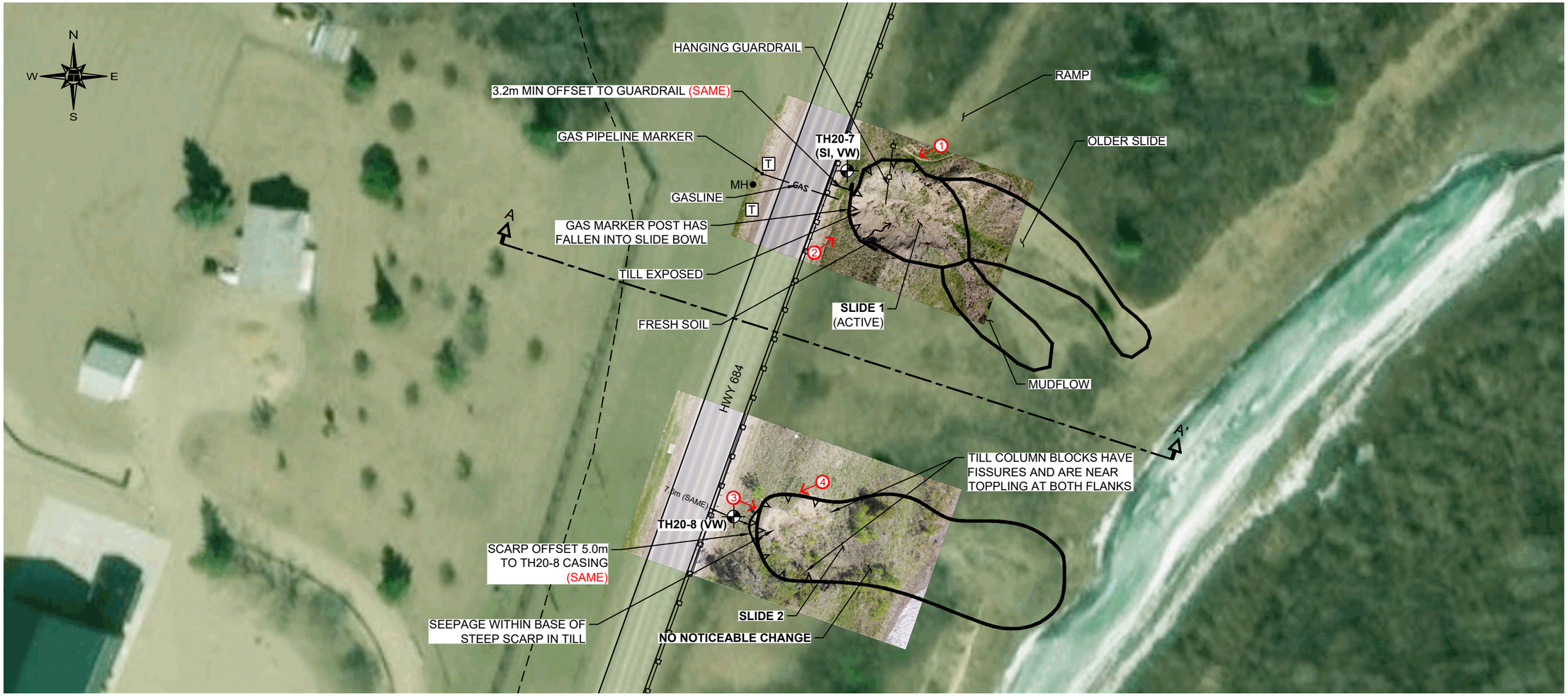

0 10 20 30 40 50m

SCALE 1:750

SATELLITE IMAGERY FROM ESRI WORLD IMAGERY (DOWNLOADED 2025-10-03)

LEGEND

- TOP OF BACKSLOPE
- GUARDRAIL
- T — TELUS PEDESTAL
- MH — MANHOLE
- SEEPAGE
- SCARP CRACK
- DIRECTION AND NUMBER OF PHOTO
- APPROXIMATE TEST HOLE LOCATION
- SI — SLOPE INCLINOMETER
- VW — VIBRATING WIRE PIEZOMETER

NOTES :

1. FEATURE LOCATIONS ARE APPROXIMATE
2. MAY 14, 2025 OBSERVATIONS SHOWN IN RED.
3. BASE IMAGERY OF SLIDE AREAS FROM THURBER DRONE IMAGERY COLLECTED MAY 2022.

Alberta

PEACE REGION (PEACE RIVER DISTRICT)

PH081-1: HWY 684:02, KM 28.4
SHAFTESBURY TRAIL NORTH SLIDES
2025 SITE INSPECTION PLAN

DWG No. 32121-PH081-1-2

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

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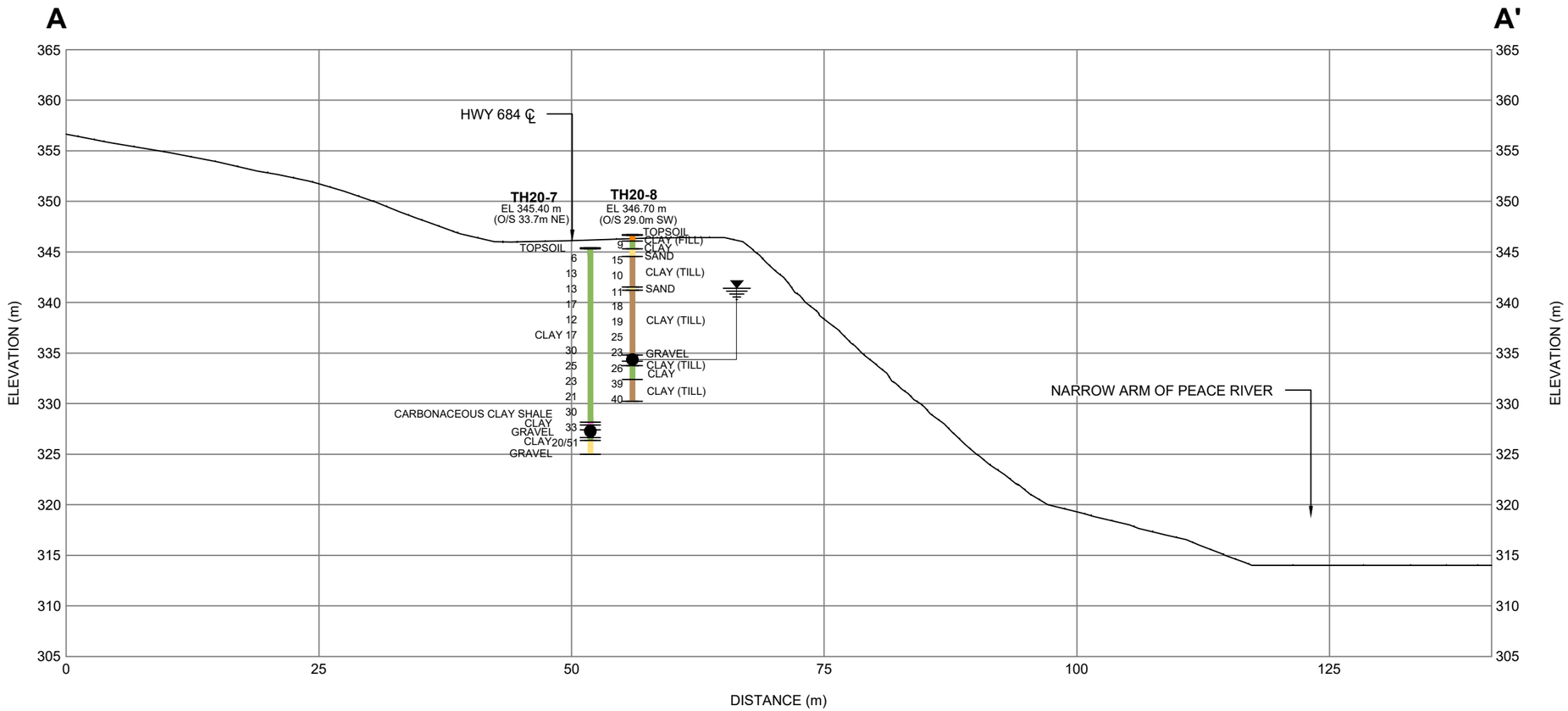

LEGEND

15 SPT N VALUE

WATER LEVEL IN PIEZOMETER (MAY 10, 2021)

VIBRATING WIRE PIEZOMETER TIP

NOTES:

1. DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT THE TEST HOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN TEST HOLES HAS BEEN INFERRED FROM GEOLOGICAL EVIDENCE AND SO MAY VARY FROM THAT SHOWN.
2. CROSS-SECTION CUT FROM 2007 LIDAR WITH 1m GRID ACCURACY

Alberta

PEACE REGION (PEACE RIVER DISTRICT)

PH081-1: HWY 684:02, KM 28.4
SHAFTESBURY TRAIL NORTH SLIDES
STRATIGRAPHIC CROSS - SECTION A - A'

DWG No. 32121-PH081-1-2

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

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LEGEND

- SCARP CRACK
- GUARDRAIL
- ① DIRECTION AND NUMBER OF PHOTO
- APPROXIMATE TEST HOLE LOCATION
- SI SLOPE INCLINOMETER
- VW VIBRATING WIRE PIEZOMETER

NOTES :

1. FEATURE LOCATIONS ARE APPROXIMATE
2. MAY 14, 2025 OBSERVATIONS SHOWN IN RED.

0 5 10 15 20 25 30m

SCALE 1:500

SATELLITE IMAGERY FROM ESRI WORLD IMAGERY (DOWNLOADED 2022-09-28)

Alberta

PEACE REGION (PEACE RIVER DISTRICT)

PH081-1: HWY 684:02, KM 28.4
SHAFTESBURY TRAIL NORTH SLIDES
2025 SITE INSPECTION PLAN AND CROSS-SECTION

DWG No. 32121-PH081-1-4

DRAWN BY	ML
DESIGNED BY	TTC
APPROVED BY	DWP
SCALE	AS SHOWN
DATE	OCTOBER 2025
FILE No.	32121

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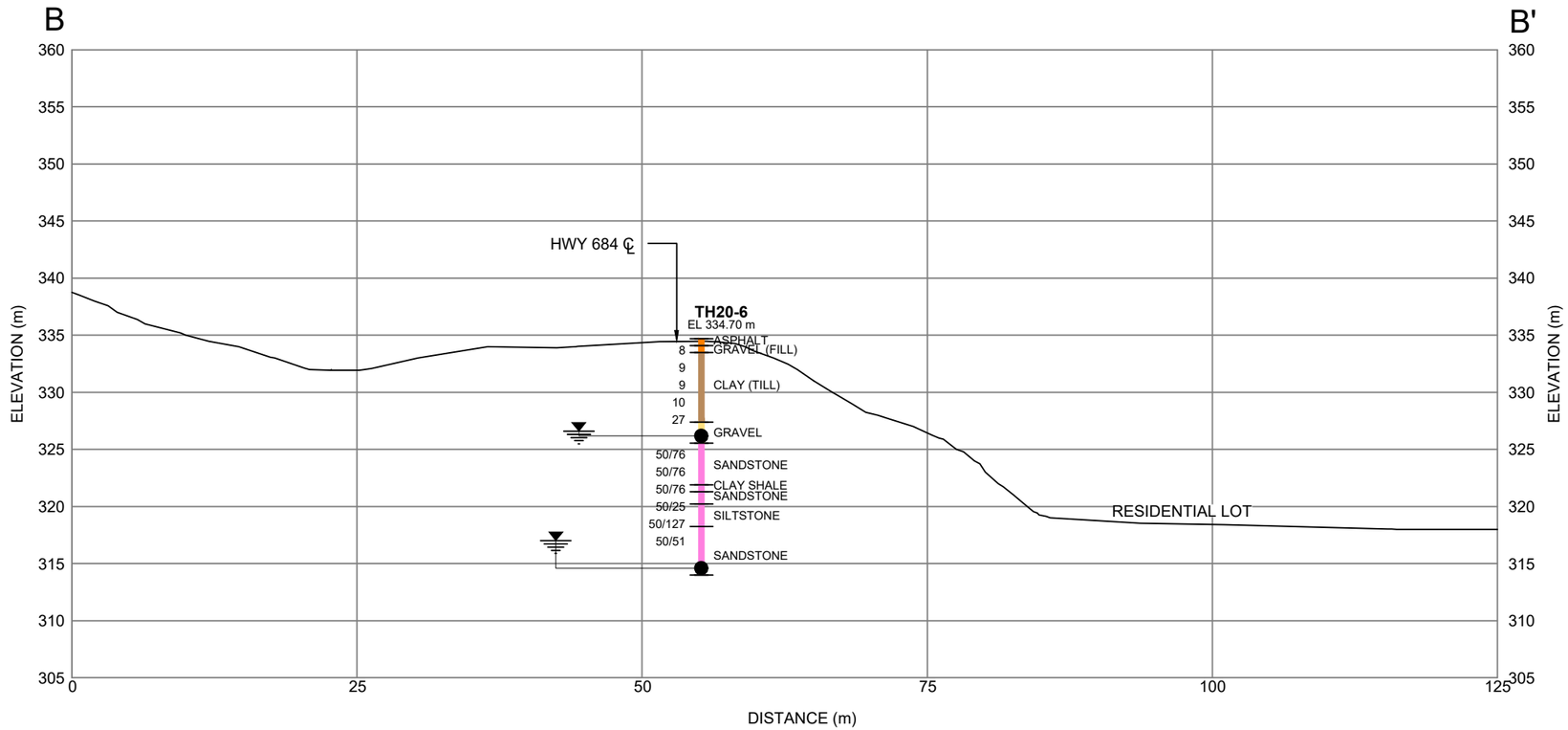

LEGEND

15 SPT N VALUE

WATER LEVEL IN PIEZOMETER (MAY 10, 2021)

VIBRATING WIRE PIEZOMETER TIP

NOTES:

1. DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT THE TEST HOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN TEST HOLES HAS BEEN INFERRED FROM GEOLOGICAL EVIDENCE AND SO MAY VARY FROM THAT SHOWN.
2. CROSS-SECTION CUT FROM 2007 LIDAR WITH 1m GRID ACCURACY

Alberta

PEACE REGION (PEACE RIVER DISTRICT)

PH081-1: HWY 684:02, KM 28.4
SHAFTESBURY TRAIL NORTH SLIDES
STRATIGRAPHIC CROSS - SECTION B - B'

DWG No. 32121-PH081-1-5

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

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Photo 1.

Looking southwest from the north flank of Slide 1. Minor ravelling and erosion within the vertical scarp face along the south flank. No retrogression was measured at the main scarp since 2024.

Photo 2.

Looking northeast from the south side of the main scarp of Slide 1. No visible lateral expansion of the north slide flank since 2024.

Photo 3.

Looking east and downslope from the top of the main scarp of Slide 2. Ongoing erosion within the exposed and disturbed soils but no expansion or retrogression towards the highway since 2024. Minor seepage was present near the base of the main scarp face.

Photo 4.

View southwest towards the main scarp face of Slide 2. No additional retrogression towards the road since 2024. Offset from the scarp to the casing protector for test hole TH20-8 was 5.0 m.

	**Photo 5.** Looking north at the slide at km 28.6. No visible changes to the slope below the road. No visible change to transverse cracks in the pavement or dip at the guardrail since 2024.
	**Photo 6.** Looking south at the slide at km 28.6. No visible changes to the road or slope since 2024.