ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP NORTH CENTRAL (ATHABASCA AND FORT MCMURRAY DISTRICTS) 2025 SITE INSPECTION

Site #	Location	Name	Hwy	km
NC096	13 Km north of Wandering River	Wandering River Bridge (75731N)	63:04	2.85
Legal Description		**UTM Co-ordinates (NAD 83)**		
NW 12-73-17 W4		12U N6130357.92 E405776.13		

	Date	PF	CF	Total
Previous Inspection:	June 4, 2024	15	5	75
Current Inspection:	May 14, 2025	15	5	75
Road WAADT	4,140		**Year:**	2024
Inspected By:	José Pineda, Bruce Nestor (Thurber) Arthur Kavulok, Rishi Adhikari (TEC)			
Report Attachments:	☒ Photographs ☒ Plans ☐ Maintenance Items			

Primary Site Issue	Two slumps developed beside the NBL bridge south headslope. The west slump exposed the NW wing wall and extended below bridge headslope.
Dimensions:	The slump on the east side of the bridge (Slump 1) is approximately 25 m wide (perpendicular to bridge alignment) and 13 m long (parallel to bridge alignment); the erosion gully to the east of Slump 1 is about 10 m wide, 20 m long, and up to 2.5 m deep. The slump on the west side of the bridge (Slump 2) is approximately 27 m wide (perpendicular to bridge alignment) and 19 m long (parallel to bridge alignment).
Site History:	The existing bridge structure has been in service since 2014 as part of the twining of Highway 63 to Fort McMurray. As part of the bridge construction, the Wandering River was re-aligned by creating a bend that would allow a more perpendicular river flow under the new bridge. The new highway embankment was constructed by placing approximately 4 to 8 m of fill over the native ground on the south and north of the river alignment, respectively. The approach fill head slopes are inclined at 2H:1V and the north head slope also has a 2 m wide bench halfway up the slope. The side slopes of the approach fill are inclined at approximately 3H:1V on both sides of the highway. As part of the bridge construction, the wandering river channel was also realigned to the south. The three-span concrete girder bridge structure has a total length of 51 m. The abutment/wing walls are supported on driven steel H piles (310x125) and the piers are supported on 610 mm diameter x 12.5 mm thick closed end pipe piles filled with concrete. A geotechnical investigation was conducted by EBA in 2011 for the design of the existing bridge. During the 2011 geotechnical investigation, two boreholes were drilled as shown on Figures 1 and 2. Borehole BF3-2, drilled on the north highway embankment, showed that at least 0.6 m of peat were buried under approximately 8 m of fill.

	Borehole BF3-1, drilled on the south highway embankment, did not encounter any peat. Both boreholes encountered clay till below either the peat or fill. The clay till extended to depths ranging between 15 to 17 m below the ground surface at the time of the investigation. BF3-1 and BF3-2 were terminated in sandstone at elevations of 541 m and 542 m, respectively. Groundwater was measured at an elevation of 561 m and 563 m on the north and south embankments, respectively. The bridge headslope was designed with a factor or safety of 1.3, which is less than typically recommended for bridge headslopes (i.e., a FOS of 1.5). Review of satellite images indicate that the highway NBL east ditch conveys surface drainage from a low-lying area about 135 m to the south of the bridge to the re-aligned river channel; the images also show that a riprap lined channel was constructed at the mouth of the east ditch within the riverbank slope. Slumping of the riverbank by the bridge head slope was first noted by TEC on August 28, 2020. A geotechnical investigation, consisting of drilling four test holes along with the installation of slope inclinometers and piezometers, was completed by Thurber in 2020. The test holes showed the soil conditions mainly consist of medium to high plastic clay fill over high plastic clay over clay till.	
Maintenance/Repairs:	Beaver dam that used to block muskeg terrain drainage path located east of the highway southbound lanes was removed and did not reappear since 2022.	
Observations:	**Description**	**Worse?**
☒ Pavement Distress	25 to 30 mm dip on the south approach slab with a 40 to 70 mm wide crack.	☒
☒ Slope Movement	A slump developing on each side of the bridge headslope. Slump 1 on the east side of the highway: head scarp cracks up to 1.5 deep and 1.5 m wide. Slump 2 on the west side of the highway: head scarp cracks up to 4 m deep and 1 m wide; multiple tension cracks within the Slump 2 slide area. The eastern flank of Slump 2 extends under the bridge by at least 2 m and has exposed the underside of the wingwall. Slump 2 sheared off existing 150 mm diameter subdrain pipe and developed a 200 mm gap under the southwest wing wall. Slumps 1 and 2 are both well vegetated. Both slumps 1 and 2 are toeing out into the river channel and are narrowing the river channel by approximately 1.2 m; Open, wide cracks noted within the bridge headslope downslope of the abutment seat location and cracks were noted to be similar to last inspection.	☐
☒ Erosion	Erosion developed east of Slump 1 at the mouth of the north facing riprap lined channel. Erosion is at least 3.5 m deep and has distorted the existing riprap within the channel. Scattered and subdued riprap areas along the outside bend of the river channel	☐
☒ Seepage	Ground surface within Slumps was soft and wet (particularly at Slump 2 location); a steady flow in the highway east ditch originating from the low-lying area located to the south of the bridge location; subdrain pipe near west flank of Slump 1 was dry.	☐

☒ Bridge/Culvert Distress	Slump 2 continues to impact the bridge northbound lanes headslope; bridge headslope fill showed signs of distress since 2024.	☐
☒ Other	Both slumps restricted the river channel width; sediment accumulation within the stream at the mouth of the erosion gully; more vegetation within Slump 2 mass.	☐

Instrumentation Readings (Two SP and Four VW Piezometers; Spring 2025):

SI20-1, installed within Slump 1 to the east of the bridge, sheared off at a depth 1.5 m below ground surface. Prior to shearing off, SI20-1 showed a maximum rate of movement of 292 mm/yr. SI20-3, installed within Slump 2 to the west of the bridge, sheared off at 2.1 m below ground surface. Prior to shearing off, SI20-3 showed a maximum rate of movement of 103.1 mm/yr.

Standpipe piezometers SP20-2 and SP20-4 showed groundwater depths of 2.3 m and 4.1 m, respectively, corresponding to decreases in groundwater level of 0.3 in both piezometers since they were last read in the fall of 2024.

Vibrating wire piezometers VW20-1A, VW20-1B and VW20-3A show current groundwater depths of 1.8 m, 1.2 m, and 1.2 m, respectively. VW20-3B currently shows an above-ground (artesian) groundwater level of -3.2 m. The vibrating wire piezometers showed decreases in groundwater level of 0.5 m and 0.3 m, respectively, in VW20-1A and VW20-1B, since the fall of 2024 readings. VW20-3A showed an increase in groundwater level of 0.1 m since the fall of 2024 readings, while VW20-3B showed negligible change in groundwater level.

Assessment (Refer to attached Figures and Photos)**:**

The site condition continues to deteriorate since the 2024 site inspection.

The placement of relatively steeply inclined deep high plastic clay fill (i.e., 2H:1V), elevated groundwater levels within the slope, potential winter construction of embankment fills, and ongoing toe erosion by the river are likely the triggering factors for the observed slumps. In addition, the existing riprap (mainly Class 1M) along the riverbank is relatively smaller in size than what is typically used to armour riverbanks in similar bridge projects.

Placement of geogrid layers within the south headslope was recommended in EBA's geotechnical report to achieve the target factor of safety. It is suspected that the geogrid layers were not placed within the bridge headslope or approach fills, and this may have been another contributing factor to observed instabilities. However, there are no detailed construction notes/records to confirm this hypothesis.

The existing erosion gully was similar to the 2024 inspection. It appears that the east ditch was not properly designed to carry the current flow. It is anticipated that the gully will continue get deeper and wider with time, resulting in more sediment accumulation in the stream and loss of land/trees to the east of the gully.

The slumps within the south approach fills, on each side of the bridge, did not appear to have yet impacted the integrity of the bridge and the highway. However, Slump 2 has exposed the base of the NW wing wall, and its flank extended below the headslope of the bridge downslope of the abutment location.

The approach fill slumps, to the east and the west of the bridge headslope, are very active, moving at very high rates and will continue to grow bigger in size. Future erosion of the toe of the landslides at the river location and/or rise in groundwater levels within the landslides may result in (a) failure of the majority of the headslope under the bridge deck, and (b) distress of the wing walls and exposure of abutment seat and a few of the pile supports (particularity at Slump 2 location). In addition, the complete failure of these closely spaced slumps, if occurs with time, could significantly restrict the width of the river channel and (a) cause flooding of areas located upstream of the site and/or (b) result in the development of additional slumps above the restricted channel width on the north side of the bridge.

The bridge headslope, between the two slumps, is likely in a meta-stable condition and the complete failure of the headslope may take place abruptly similar to the currently active slumps. The observed cracks within the headslope may reflect a slope movement. The dip noted on the highway approach slab could be a reflection of the headslope movement.

A structural assessment completed in 2022 indicated that the bridge structure may not be impacted in response to future movements of the slopes. However, the roadway condition will be significantly impacted. If the roadway fails at this location in response to future landslide movements, a major detour will be required. Alternatively, the SBLs may be used to accommodate traffic through this area.

Recommendations:

This site should be visited again in the spring of 2026.

Short-Term Repair Measures

In the short term, consideration should be given for the following:

- Monitor the highway periodically for signs of distress and watch closely for the development of new cracks or widening of existing cracks.
- Monitor existing cracks under the bridge headslope and check for signs of movement of the headslope.
- Place heavy rock riprap (Min. Class 1) at the base of the slumps (near the river location) to provide additional buttress and erosion protection.
- Reshape the failed riprap-lined channel within the east ditch and add heavy rock riprap (Min Class 2) to armor the re-graded channel. This should prevent future accumulation of sediment in the river channel and reduce the probably of further loss of land/trees to the east of the gully location.
- Undertake slight grading to seal open cracks within landslide masses.
- Insert a flexible HDPE pipe into the void below the NW wing wall to convey as much flow as possible from the location of the sheared off subdrain pipe to the river channel.

Long-Term Repair Measures

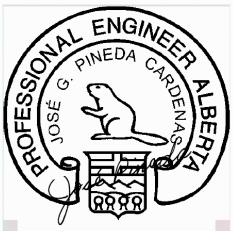
Various long-term repair options were presented in the preliminary engineering report prepared by Thurber in 2022 to deal with the ongoing stabilities of the active slumps and potential future instability of the meta-stable bridge headslope. The repair options included: a) dig and replace with granular material, b) installation of soil nails, c) installation of sheet pile walls, or d) a combination of options a) to c). In 2023, TEC selected the dig and replace option for Slumps 1 and 2 along with the implementation of erosion protection measures within the east ditch and along the south bank of the river at the bridge location. The tender package of the selected option was submitted to TEC for review.

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.

Yours very truly,
Thurber Engineering Ltd.
José Pineda, M.Eng., P.Eng.
Associate | Senior Geotechnical Engineer

July 22 2025



2025-07-23

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.
RM SIGNATURE: _____
RM APEGA ID #: 91085
DATE: July 23, 2025
PERMIT NUMBER: P005186
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Bruce Nestor, M.Eng., P.Eng.
Geotechnical Engineer

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.

150mm-300mm DIAMETER ROCKS IN THE BANK;
~70% SMALLER SIZE ROCK

SEVERE EROSION ALONG RIPRAP ARMORED CHANNEL (MIX OF CLASS 1M AND CLASS 2 RIPRAP) DOWNSTREAM OF BEAVER DAM (SAME 2021)

CLASS 1M RIPRAP

NW 12–73–17–4

REALIGNED CHANNEL
2.5m DEEP (2022)
3.5m DEEP (2023)

1~2m DROP x 0.8m WIDE

500mm DEEP (2022)
700 mm DEEP, 900 mm WIDE (2025)

BOULDERS >700mm DIAMETER WITHIN GULLY SAME (2024)

GULLY, 900mm DEEP, 2.7m WIDE (2022), VEGETATED (2025)

WATER FLOWING IN DITCH (2021)
SLOWLY FLOWING IN 2022
STEADY FLOW (2023, 2024, 2025)

DRAINAGE FROM LOW-LYING AREA

CATTAILS WITHIN PONDING AREA (2024) SAME (2025)

PONDING WATER (2022) SAME (2024, 2025)

NEW CHANNEL

OLD CHANNEL

SUBDUED ZONE SAME (2024, 2025)

BEAVER DAM, REMOVED BY AT IN THE FALL OF 2020 (SOME DEBRIS LEFT IN PLACE AFTER REMOVAL OF BEAVER DAM)

DISTURBED / SCATTERED RIPRAP (WATER FLOWING UNDER RIPRAP) (SAME 2022)

SEDIMENT IN STREAM CHANNEL (2023) SAME (2024, 2025)

CRACK 300mm DROP (2023); UP TO 1m DROP (2024); UP TO 1 m DEEP BY 1 m WIDE (2025)

WANDERING RIVER

DRAIN

SI20-1/ VW20-1A/ WV20-1B
15m

0.8m DROP x 1m WIDE (2020),1.5m DROP x 1.5m WIDE (2021, 2022,2023)

15m SP20-2

SUBDRAIN PIPE (DRY IN 2021) (SAME 2022)

DISTINCT TOE ROLL (SAME 2022, 2025)

CRACK (50mm WIDE X 10mm DEEP) (SAME 2021, 2022, 2023, 2024, 2025)

CRACK (40-70mm WIDE X 150mm DEEP X NO DROP) (2024)
~~40-70 mm WIDE X 150 mm DEEP, 30 mm DROP ON EAST SIDE (2025)~~

CRACKS:
30mm WIDE X 10mm DEEP
10-80 mm WIDE, 80 mm DEEP (2025)

SLUMP 1
100mm DEEP

DRAIN TROUGHS

APPROACH SLAB: 10 TO 20mm DROP, THE DROP IS MORE DISTINCT ON THE WESTERN HALF BETWEEN YELLOW LINE AND EDGE OF PAVEMENT (SAME 2022, 2023), 25mm DROP (2024, 2025)

TH BF3–1

1m WIDE x 0.7-2.2m DROP (2020), 1m WIDE x 0.8-3.8m DROP (2021)
1.1m DROP (2021); 1.5m DROP (2023), SAME (2025)

MILLED AREA 5 m LONG BY 400 mm WIDE (2025)

GRABEN FEATURE (NOT VISIBLE IN 2021)

15m SP20-4

4.0m DROP (SAME 2022, 2023, 2024, 2025)

GABION MATTRES (10m WIDE):
4m BOTTOM AND 3m SIDESLOPES INCLINED AT 5H:1V ON BOTH SIDES OF THE CHANNEL

NEW CRACK - 100mm WIDE, 300mm DROP (2023)
5 TO 700 mm WIDE, 300 mm DEEP AT 10 m WEST OF SUBDRAIN (2024, 2025)

TH BF3–2

1m DROP

150mm DIAMETER SUBDRAIN PIPE (FLOWING IN 2020)

2m DROP

15m
SHEARED AT 3.0m
SI20-3/ VW20-3A/ WV20-3B

DRAIN
0.7m WIDE X 1m DROP

DISTINCT TOE ROLL (SAME 2021, 2022, 2024, 2025)

SLUMP 2

0.9m WIDE x 0.5m DROP (2020)
0.9m WIDE X 0.9m DROP (2021)

GROUND SOFT AND WET (2023, 2024)
MORE VEGETATED (2024),SAME (2025)

CRACK: 40mm WIDE X 30mm DEEP
CRACK: 100mm WIDE X 30mm DROP

600mm DROP
SAME (2025)

EXISTING BRIDGE

APPROACH SLAB SETTLED AND CAUSED A HUMP AT END OF BRIDGE

CP690

ASCM 55112–7

APPROACH SLAB SETTLED AND CAUSED A HUMP AT END OF BRIDGE

GAP: 500mm WIDE X 500mm DEEP X 2m LONG
(GAP EXPOSED THE 300mm THICK APPROACH SLAB)

SLUMP 3

SEVERE PAVEMENT DISTRESS WITH MULTIPLE POTHOLES CRACK, 200 - 250mm WIDE X 40 - 50mm DROP

CRACK: 60mm WIDE X 25mm DEEP

HWY 63 NBL

HWY 63 SBL

EXISTING BRIDGE FILLS

NOTE:
1. MAY 14, 2025 OBSERVATIONS ARE SHOWN IN RED.

0 10 20 30 40 50m
SCALE 1:800

BASE PLAN PROVIDED BY ALBERTA TRANSPORTATION DRAWING 35349-P

LEGEND

- APPROXIMATE INSTRUMENT LOCATION (DEPTH (m))
- APPROXIMATE TEST HOLE LOCATION (BY EBA)
- ACTIVE HEADSCARP (APPROXIMATE)
- EXISTING RIPRAP (150 - 300mm)
- TREE LINE (APPROXIMATE)
- PHOTOGRAPH NUMBER, AND APPROXIMATE DIRECTION AND LOCATION
- SI SLOPE INCLINOMETER
- VW VIBRATING WIRE PIEZOMETER
- SP STANDPIPE PIEZOMETER

Alberta

NORTH CENTRAL REGION (ATHABASCA AND FORT MCMURRAY DISTRICTS) 2025 GEOHAZARD ASSESSMENT

NC096: HWY 63:04 WANDERING RIVER BRIDGE (km 2.85) SITE PLAN SHOWING APPROXIMATE SITE FEATURES

FIGURE 1

DRAWN BY	ML
DESIGNED BY	JGP / BWN
APPROVED BY	TSA
SCALE	1:800
DATE	JUNE 2025
FILE No.	32122

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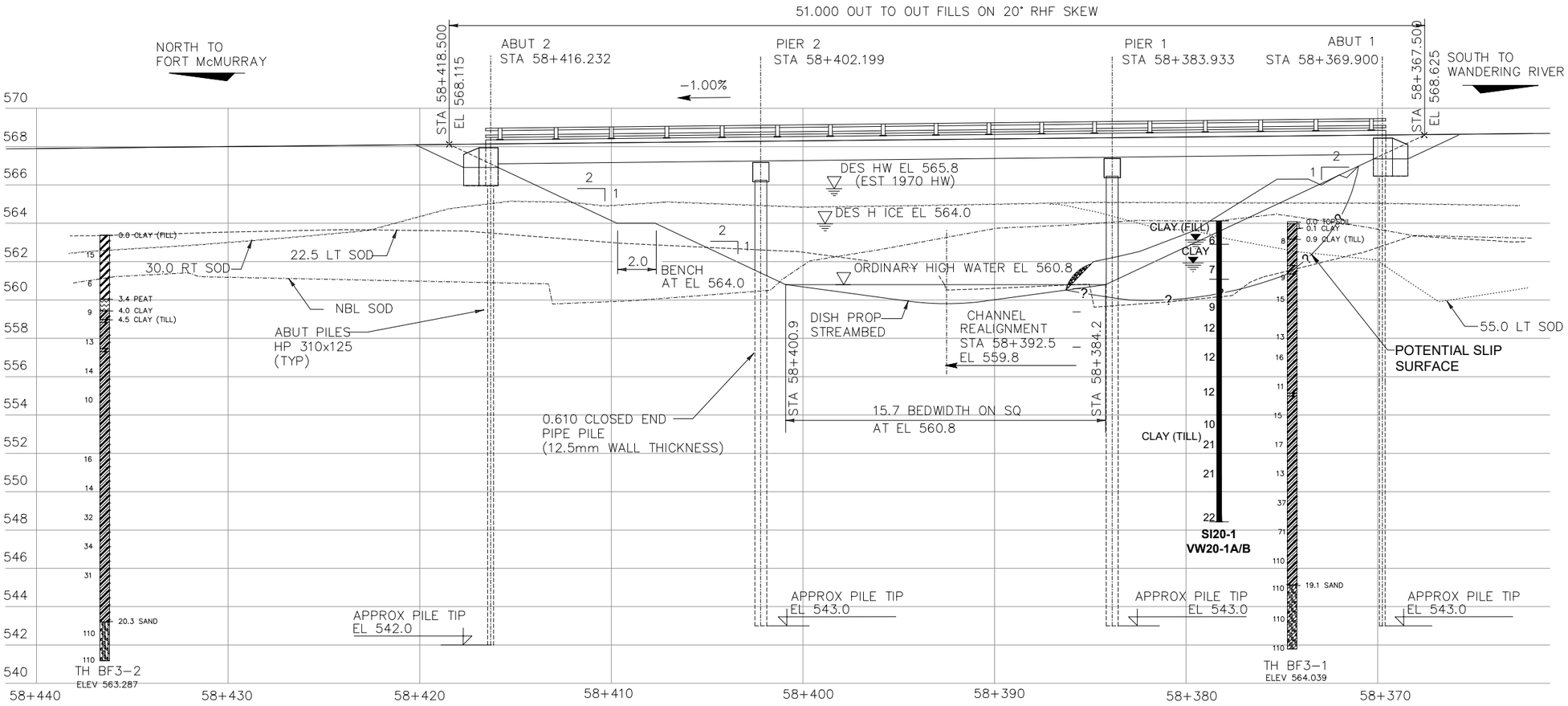
G:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\CAD\2025 GEO HAZARD\32122 NC096 Drawings.dwg - 1 - Jul. 22, 2025



NOTES:

1. MAY 14, 2025 OBSERVATIONS ARE SHOWN IN RED.
2. SLUMP 1 IS WITHIN THE RIVERBANK SLOPE TO THE EAST OF THE BRIDGE HEADSLOPE.

Alberta

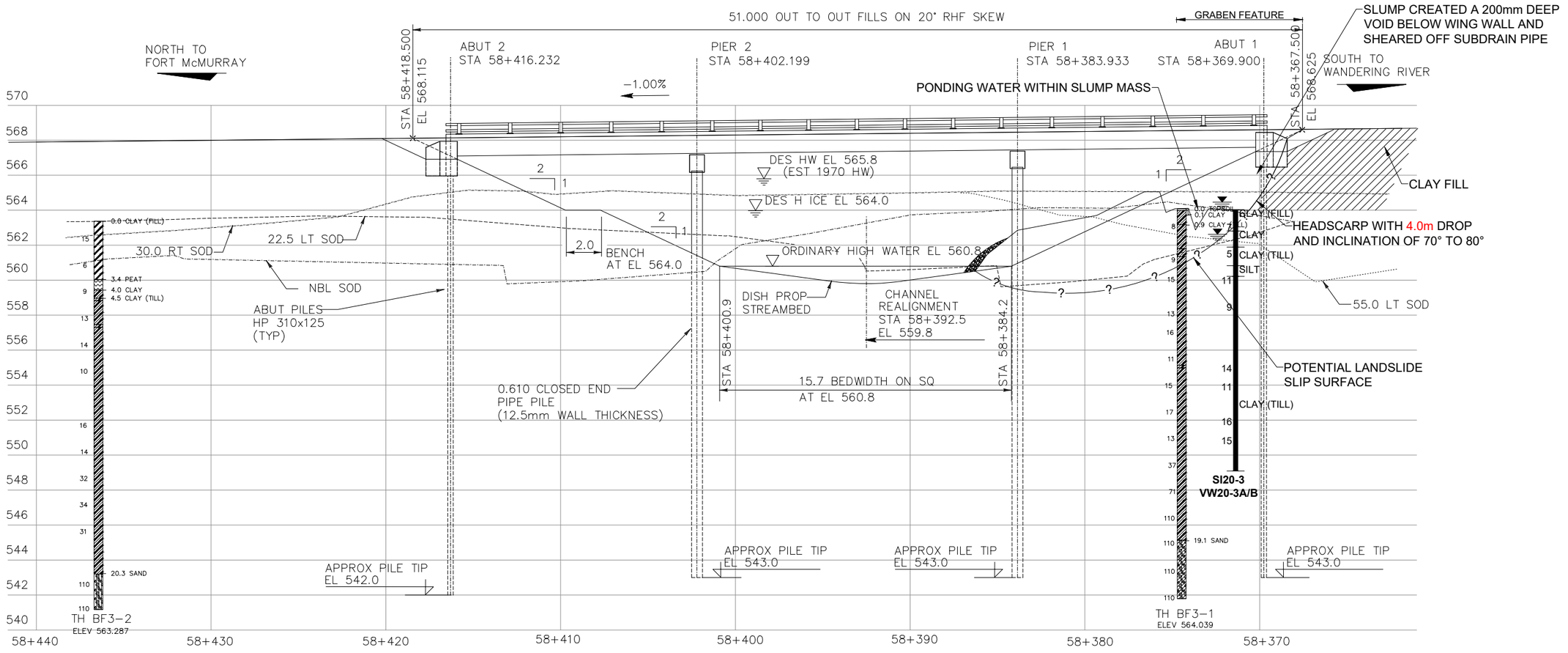
NORTH CENTRAL REGION
(ATHABASCA AND FORT MCMURRAY DISTRICTS)
2025 GEOHAZARD ASSESSMENT

CROSS - SECTION A - A'
SHOWING SLUMP 1 - EAST OF BRIDGE HEADSLOPE

FIGURE 2

DRAWN BY	ML
DESIGNED BY	JGP / BWN
APPROVED BY	TSA
SCALE	1:250
DATE	JUNE 2025
FILE No.	32122

THURBER



NOTES:

1. MAY 14, 2025 OBSERVATIONS ARE SHOWN IN RED.
2. SLUMP 2 IS WITHIN NORTHWEST APPROACH FILL TO THE WEST OF BRIDGE HEADSLOPE. THE EASTERN FLANK OF THE SLUMP EXTENDS INTO BRIDGE HEADSLOPE.
3. SLUMP 2 IS TOEING OUT NEAR THE MOST WESTERN BRIDGE PIER SUPPORT.

Alberta

NORTH CENTRAL REGION
(ATHABASCA AND FORT MCMURRAY DISTRICTS)
2025 GEOHAZARD ASSESSMENT

CROSS - SECTION A - A'
SHOWING SLUMP 2 - WEST OF BRIDGE HEADSLOPE

FIGURE 3

DRAWN BY	ML
DESIGNED BY	JGP / BWN
APPROVED BY	TSA
SCALE	1:250
DATE	JUNE 2025
FILE No.	32122

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Photo 1. Looking east at the low-lying area south of the bridge.

Photo 2. Looking northeast at the north facing riprap channel to the east of the bridge location.

Photo 3. Looking southeast at mouth of the severe erosion channel.

Photo 4. Slumping within the riverbank to the east of the Hwy (slump no. 1) and to the west of the Hwy (slump no. 2). Note distinct toe rolls in the river channel.

Photo 5. Looking southwest at slump no. 2 area. Slump area is well vegetated.

Photo 6. Looking at crack on headslope extending to the subdrain on the east side of the bridge. Crack is 5 mm wide at the subdrain and 700 mm at 10 m west of the subdrain.

Photo 7. Looking southwest at slump no. 2 flank. There is a 0.65 m drop from the original fill height at the abutment (shown as the soil staining in the photo).

Photo 8. Dip (25 mm to 30 mm) at the bridge south approach slab. Crack is 40-70 mm wide.