

**ALBERTA TRANSPORTATION AND  
ECONOMIC CORRIDORS GRMP  
NORTH CENTRAL (ATHABASCA AND FORT  
McMURRAY DISTRICTS)  
2024 SITE INSPECTION**



Site Number	Location	Name	Hwy	km
NC 62	3.3 km south of the junction between Hwy 881:15 and 55:14	<b>SOUTH OF BEAVER RIVER</b>	881:16	29
<b>Legal Description</b>		<b>UTM Co-ordinates (NAD 83)</b>		
SE- 12-63-9-W4M		12 N 603423	E 480622	

	Date	PF	CF	Total
<b>Previous Inspection:</b>	June 08, 2022	10	4	40
<b>Current Inspection:</b>	June 03, 2024	10	4	40
<b>Road WAADT:</b>	520	<b>Year:</b>		2023
<b>Inspected By:</b>	Tarek Abdelaziz, José Pineda (Thurber) Rocky Wang, Arthur Kavulok (TEC)			
<b>Report Attachments:</b>	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input type="checkbox"/> Maintenance Items			

<b>Primary Site Issue:</b>	Appearance of cracks on the highway surface within the limits of the remediated portion of the highway side slope.
<b>Dimensions:</b>	About 120 m along the highway
<b>Date of any remediation:</b>	Re-construction of the failed slope and the highway section was undertaken in 2004
<b>Maintenance:</b>	Remediated highway section was paved in 2004; pavement overlay placed in November 2008; stepped gabion baskets over geotextile replaced the above-ground culvert in late 2008

Observations:	Description	Worse?
<input checked="" type="checkbox"/> Pavement Distress	Twist on Hwy surface between two sets of diagonal cracks; 20 mm dip in the northern section of the site; 15 mm dip within the middle section of the site	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	30 - 100 mm landslide reflective cracks on the highway surface; up to 15 to 20 mm drop across the cracks; old slump above the creek channel appears to be more active than in the past.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	Deadfall and significant erosion downstream and around the mouth of the gabion basket channel; erosion created a gap below the gabion basket at the mouth of the channel	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Seepage	Fast flow from the outlet of sub-drain pipe No. 7	<input type="checkbox"/>
<input type="checkbox"/> Bridge/Culvert Distress		<input type="checkbox"/>
<input checked="" type="checkbox"/> Other	Six beaver dams noted at the toe of the landslide; stepped gabion baskets showing sign of distortion	<input checked="" type="checkbox"/>
<b>Instrumentation: None</b>		

**Assessment (Refer to attached Figure):**

The highway condition is worse than observed in 2022, as evidenced by opening/extension of existing highway cracks, and the more distinct dip within the middle section of the site.

The appearance of cracks on the highway surface is probably a reflection of continued creep movement of the repaired slope. Infiltration of surface water into open cracks and rise in groundwater levels within the embankment are likely the main causes for the observed movement. The old slump located immediately above the creek channel appears to be active and loss of toe support with time can result in an accelerated movement of the highway side slope.

The rise in groundwater levels within the embankment can be attributed to (a) partial or complete plugging of subdrain pipes located at the bottom of the slope, and (b) presence of multiple large beaver ponds within the creek channel below the highway.

At present, the movement appears to have a moderate impact on the highway condition, except for the twist developed on the highway surface which creates a very rough ride to motorists.

It is anticipated that the highway condition will continue to deteriorate progressively unless groundwater levels are reduced within the repaired slope area.

The gap developed below the mouth of the gabion basket channel should be treated; otherwise, it may get bigger and wider, and retrogress to completely undermine the integrity of the stepped gabion basket channel.

**Recommendations:**

It is recommended that the site be visited again in 2026.

In the short-term, the local MCI should undertake the following:

- Seal all open cracks in the highway surface to prevent surface water infiltration into the landslide mass.
- Watch closely for new cracks or extension of existing cracks.
- Mill the highway surface at the twist location and place ACP to provide a smooth ride to motorists.
- Clear the beaver dam(s) to reinstate proper creek flow and avoid damming of water within the limits of the repaired slope area.
- Locate and clean up the subdrains located at the toe of the slope.
- Monitor erosion developing around the mouth of the gabion basket. The gap below the gabion basket should be backfilled, and riprap rock should be placed at the mouth of the channel to reduce the likelihood of undermining the entire channel.

It is recommended to install geotechnical instruments to quantify slope movement rates at this site.

**Closure:**

It is a condition of this letter report that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

Yours very truly,  
Thurber Engineering Ltd.  
Tarek Abdelaziz, Ph. D, P.Eng.  
Partner | Senior Geotechnical Engineer

José Pineda, M.Eng., P.Eng.  
Associate | Senior Geotechnical Engineer



## STATEMENT OF LIMITATIONS AND CONDITIONS

### 1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

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All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment 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.

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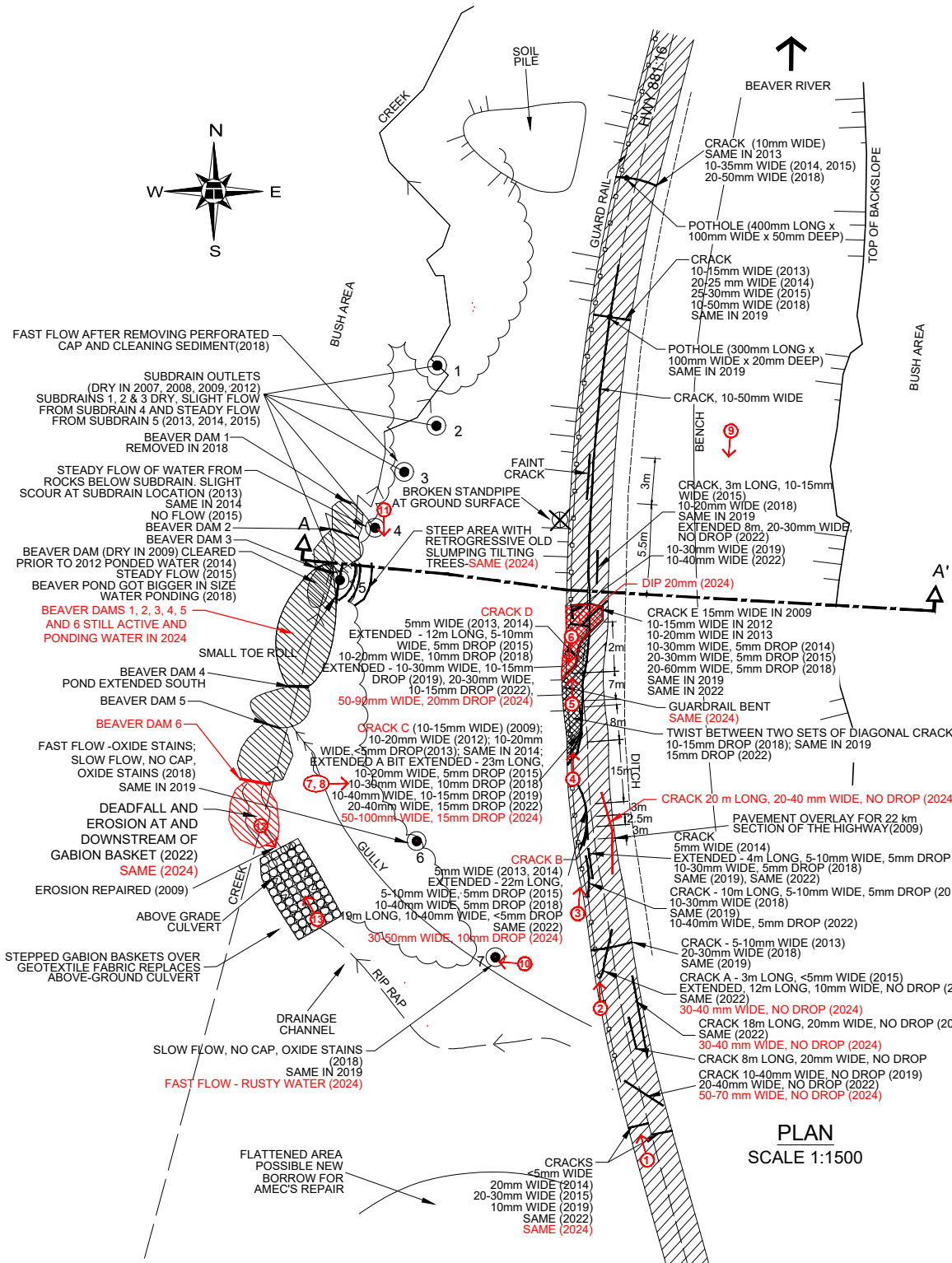
- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. 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 persons making use of such documents or records with our express written consent should 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 persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should 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 on the basis of conditions in evidence at the time of site inspections and on the basis of 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 as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons 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 should 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 detailed in the contract documents should 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 in order to confirm and document that the site conditions do not materially differ from those interpreted 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. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

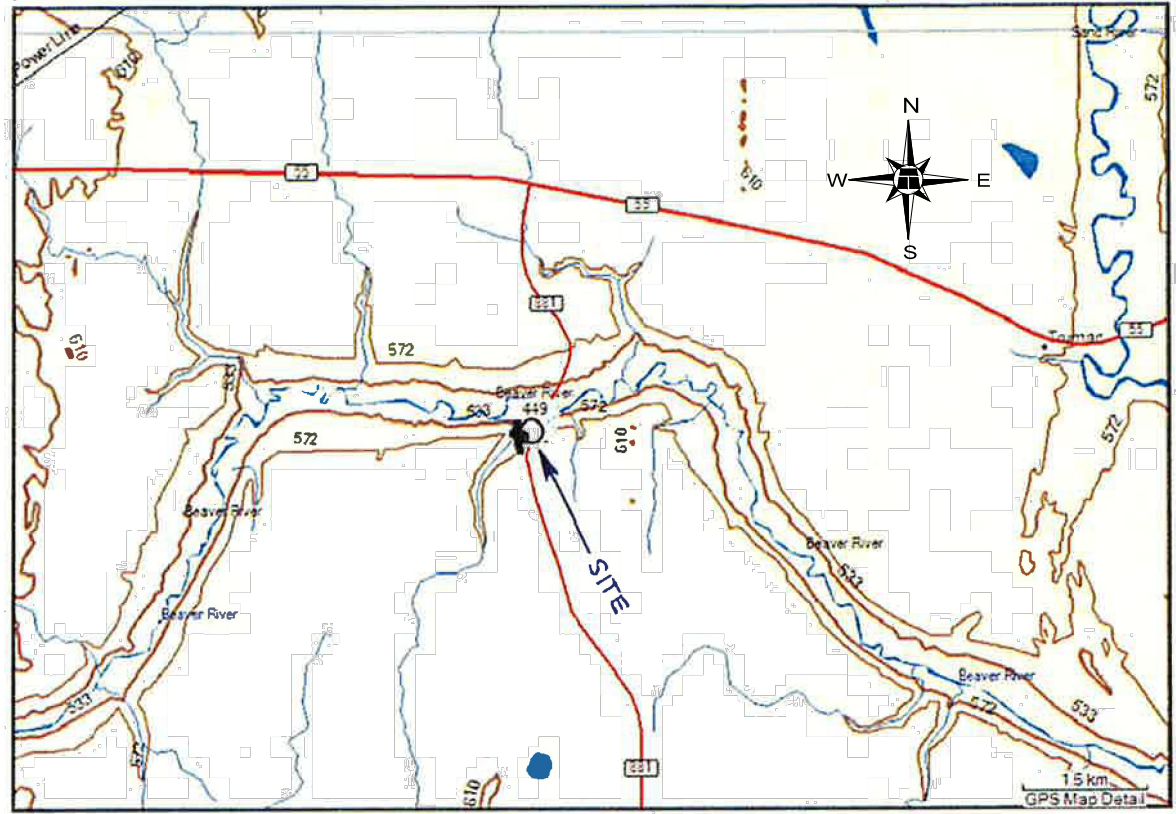
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### 7. INDEPENDENT JUDGEMENTS OF CLIENT

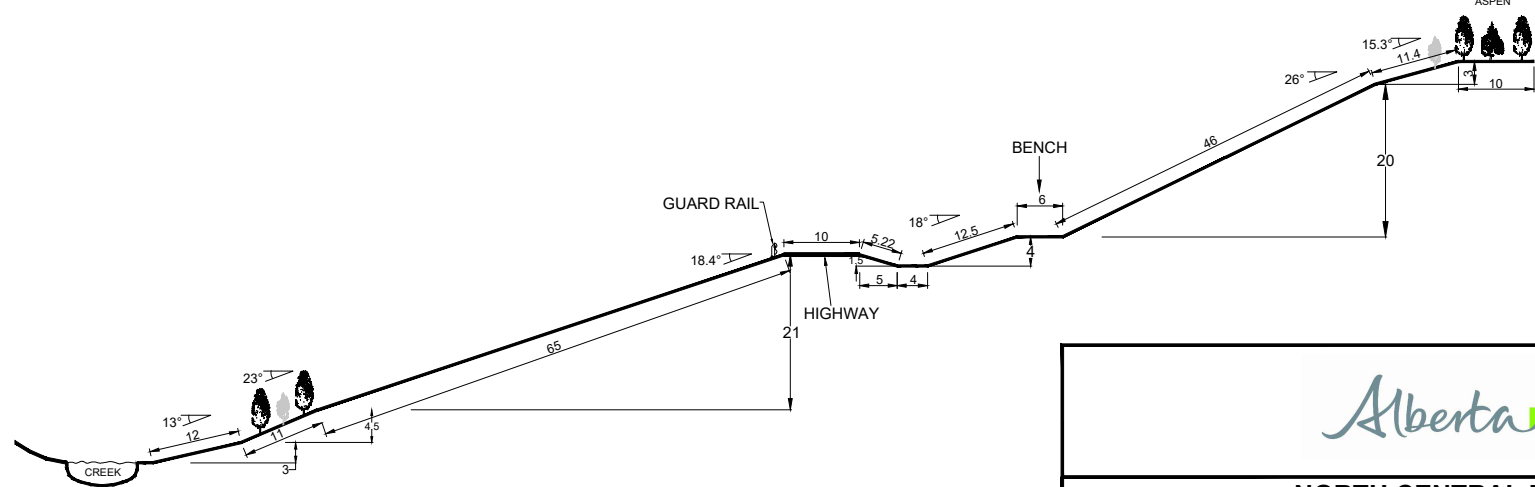
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PLAN SCALE 1:1500



LOCATION MAP N.T.S.



SECTION A-A' SCALE 1:1000

NOTE: -ALL DIMENSIONS ARE IN METERS.

Table with 4 columns: SUBDRAIN NO., EASTING (m), NORTHING (m). Rows 1-7 provide coordinates for subdrains.

NOTE: JUNE 5, 2024 OBSERVATIONS SHOWN IN RED

LEGEND

- Legend items: 200mm HDPE PERFORATED SUBDRAIN OUTLET, GUARDRAIL, PAVEMENT OVERLAY, CRACKS, BUSH LINE, PHOTOGRAPH NUMBER, AND APPROXIMATE LOCATION AND DIRECTION, BEAVER POND.



NORTH CENTRAL REGION (ATHABASCA AND FORT MCMURRAY DISTRICTS) 2024 GEOHAZARD ASSESSMENT NC 62: HWY 881: 16 SOUTH OF BEAVER RIVER (km 3.3) SITE PLAN AND CROSS - SECTION DWG NO. 32122-NC062-1

Table with 2 columns: Field name (DRAWN BY, DESIGNED BY, APPROVED BY, SCALE, DATE, FILE No.) and Value (ML, JGP, TSA, AS SHOWN, JULY 2024, 32122).





Photo No.1 - Looking north from the southern limit of the site at transverse and longitudinal cracks on the highway



Photo No.2 - Looking north from the southern limit of the site at diagonal Crack A



Photo No.3 - Looking north from the southern limit of the site at 30-50 mm wide diagonal Crack B, no drop



Photo No.4 – Looking north at the arc-shaped reflective Crack C (50 -100 mm wide, 15 mm drop)



Photo No. 5 Looking north at the arc-shaped reflective Crack D (50-90 mm wide)



Photo No. 6 – Looking south at arc-shaped reflective Crack D





Photo No. 7 – Aerial photo showing Cracks A, B, C, and D



Photo No. 8 – Close up aerial photo showing Cracks B, C, and D above a steep area on the lower portion of the side slope where a retrogressive old slumping ( possibly a remnant of original creek bank) with tilting trees and exists above the creek channel



Photo No. 9 – Aerial photo looking south showing overall site features. Backslope does not show signs of slope movement. The more prominent cracks on the highway are located above an old slump on the bottom right corner of the photo. Note the presence of at least five beaver dams within the creek channel.



Photo No.10 – Rusty water flowing out of Subdrain 7 outlet



Photo No.11 – Tilting trees and deadfall downslope of the most distressed area on the highway surface (i.e. location of old slump above creek channel).



Photo No.12 - Looking at the mouth of the gabion basket channel. Note erosion around and below the base of the gabion basket



Photo No.13 – Gabion basket channel performing satisfactorily but showing signs of distortion