CENTRAL REGION GRMP
SITE INSPECTION FORM

SITE NUMBER AND NAME: **C034-2 Abraham Lake Erosion**	HIGHWAY & KM: 11:04, 11.056	PREVIOUS INSPECTION DATE: July 9, 2019	INSPECTION DATE: **June 27,2023**
LEGAL DESCRIPTION: 07-07-38-17 W5M	NAD 83 COORDINATES: UTM 11 Northing 5789173 Easting 539996	RISK ASSESSMENT: PF: 13 CF: 6 TOTAL: 78	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 395 (west) & 375 (east) (Ref No. 50110250)		CONTRACT MAINTENANCE AREA (CMA): 514	

SUMMARY OF SITE INSTRUMENTATION: There is no instrumentation at the C034-2 site. LAST READING DATE: N/A	INSPECTED BY: Chris Gräpel (KCB) James Lyons (KCB) Rishi Adhikari (TEC) Tony Penney (TEC) Pramaya Kannel (TEC)

PRIMARY SITE ISSUE: Erosion and retrogression of a slope along the south (eastbound lane of H11:04 on the west side of Abraham Lake (a reservoir created by the Bighorn Dam (owned and operated by TransAlta Generation Partnership) on the North Saskatchewan River). The erosion is caused by precipitation, surface water runoff from the highway surface, and wave action when the reservoir level is high.

APPROXIMATE DIMENSIONS: The site is approximately 250 m to 300 m long, and the slope is approximately 6 m to 8 m high sloped between 1H:1V to 1.5H:1V.

DATE OF ANY REMEDIAL ACTION: C034-1: July 2006 – slope reinforced with soil nails, steel mesh, and shotcrete; Spring 2017 – the highway was realigned to the north (upslope) towards the backslope, a 3-cable high-tension-cable barrier (HTCB) was installed, and an asphalt curb was installed to redirect pavement surface runoff away from the erosion gullies on the eroded slope. March 2018 – erosion gullies backfilled with gravel and asphalt curb partially removed. July 2019 – construction of a temporary rockfill berm at the toe of the eroding slope using coarse material raked from the beach. April to August 2020 – the slope was repaired by PME Inc. and construction was monitored by KCB. The repair consisted of rebuilding the embankment with rockfill (including a shear key and subdrains) with the bottom portion of the slope armoured with riprap. During the work a culvert at the north extent of the slope was extended, the guardrail was removed and replaced, and a washout south of the site was backfilled (near Hoodoo Creek). C034-2: N/A

ITEM	**CONDITION EXISTS**		**DESCRIPTION AND LOCATION**	**NOTICABLE CHANGE FROM LAST INSPECTION**	
	YES	NO		YES	NO
Pavement Distress	X		Pavement cracking was observed upslope of the C034-2 site (transverse cracks or perpendicular to the highway alignment).	X	
Slope Movement		X	N/A – none observed during the 2023 inspection.	N/A	
Erosion	X		The south (eastbound) slope is eroding and retrogressing towards the edge of the south (eastbound) lane. The eroding slope is most likely exacerbated by wave action from Abraham Lake.	X	
Seepage		X	N/A – none observed during the 2023 inspection.	N/A	
Culvert Distress		X	N/A – none observed during the 2023 inspection.		X

COMMENTS
The C034-1 site was repaired in 2020 (Contract No. CON0019442) and was not inspected during the 2023 inspection.
The guardrail along the south (eastbound) lane is in good condition.
The south (eastbound) highway embankment slope is eroding. The site is approximately 250 m to 300 m long and the erosion scarp along the east portion of the site is approximately 2 m to 3 m in height (Waypoint 366) (Photo 1). The erosion scarp is approximately 3 m and 4 m near the west extent of the site.
There is a short stretch along the slope where the erosion has not progressed as close to the highway (Waypoint 367) as further to the east and west.
The overall slope height near the west extent of the site is estimated to be between 6 m and 7 m tall (Waypoint 368).
The erosion scarp is approximately 3 m to 6 m away from the guardrail (approximately 3 m near the east extent of the site and 6 m at the west extent of the site).
Fine-grained material is being eroding from the upper portion of the erosion scarp and being deposited further down the slope (Photos 1, 2, and 3). The erosion appears to be more severe than during the 2022 test pitting program. The exposed material on the slope is sand and gravel with some cobbles.
Vegetation (i.e., trees and shrubs) on the slope near the west (right) flank of the eroding slope are failing into Abraham Lake due to ongoing erosion (Photo 5).
In 2022, KCB submitted a proposal to TEC in May 2022 for engineering work to complete a repair design for the C034-2 site. The proposal was approved and in July 2022, a test pitting program to support design work (i.e., assessing ground conditions and ground water level) was completed. The program included six (6) test pits along the toe of the embankment slope. In August 2022, a site visit was also to support an environmental and regulatory work. The design work (including engineering and environmental work) was completed in 2022. However, the project was temporarily put on hold due to insufficient funding. In 2023, KCB was authorized by TEC to restart work and to prepare a tender and complete environmental work (i.e., regulatory and permitting). In 2022 and 2023, KCB issued TEC the following documents: • Water Act and Public Land Act Application Supporting Documentation (July 29, 2022) • Fish and Fish Habitat Assessment (August 23, 2022) • Environmental Evaluation (EE) Report (October 7, 2022) • Environmental Risk Assessment (ERA) (September 21, 2023) • Tender Package (Tender No. TND0023985) (including c-estimate and Issued for Tender (IFT) Drawings) (October 5, 2023)
<u>Maintenance/Repair/Monitoring Recommendations:</u> • The site should be regularly inspected by TEC's Maintenance Contract Inspector (MCI), especially after significant precipitation events. • The site should be repaired as per KCB's design included as part of the tender package submitted to TEC on October 5, 2023 (i.e., buttressed with rockfill and armoured with Class 2 riprap).

This report is an instrument of service of Klohn Crippen Berger Ltd. (KCB). The report has been prepared for the exclusive use of Alberta Transportation and Economic Corridors (Client) for the specific application to the Central Region Geohazard Risk Management Program (Contract No. CON0022160) and it may not be relied upon by any other party without KCB's written consent.

KCB has prepared this report in a manner consistent with the level of care, skill, and diligence ordinarily provided by members of the same profession for projects of a similar nature at the time and place the services were rendered. KCB makes no warranty, express or implied.

Use of or reliance upon this instrument of service by the Client is subject to the following conditions:

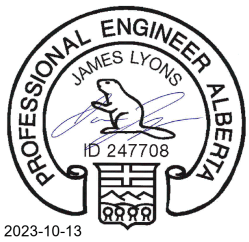
(i) The report is to be read in full, with sections or parts of the report relied upon in the context of the whole report.

(ii) The observations, findings and conclusions in this report are based on observed factual data and conditions that existed at the time of the work and should not be relied upon to precisely represent conditions at any other time.

(iii) The report is based on information provided to KCB by the Client or by other parties on behalf of the client (Client-supplied information). KCB has not verified the correctness or accuracy of such information and makes no representations regarding its correctness or accuracy. KCB shall not be responsible to the Client for the consequences of any error or omission contained in Client-supplied information.

(iv) KCB should be consulted regarding the interpretation or application of the findings and recommendations in the report.

(v) This report is electronically signed and sealed and its electronic form is considered the original. A printed version of the original can be relied upon as a true copy when supplied by the author or when printed from its original electronic file.



James Lyons, P.Eng.
Civil Engineer

PERMIT TO PRACTICE
KLOHN CRIPPEN BERGER LTD.

RM SIGNATURE: _____

RM APEGA ID #: 187607

DATE: 13 Oct. 2023

PERMIT NUMBER: P009196
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Inspection Photographs

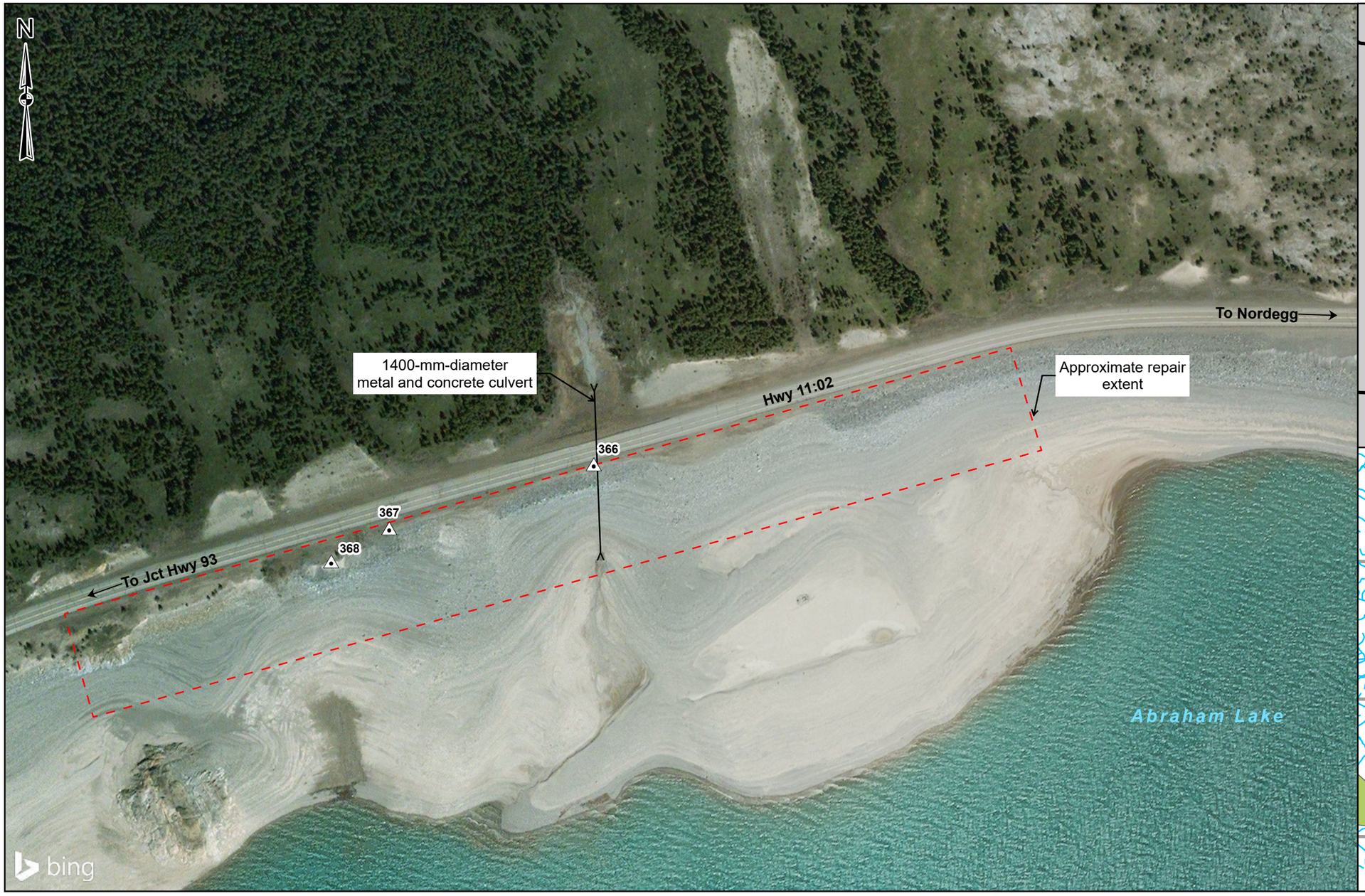
Photo 1 **An aerial photo of the C034-2 site. The site is approximately 250 m to 300 m in length and up to 6 m to 7 m in height. The erosion scarp along the site varies from approximately 2 m to 3 m in height and within 3 m to 6 m of the south (eastbound) guardrail. Photo taken June 27, 2023, facing northwest.**

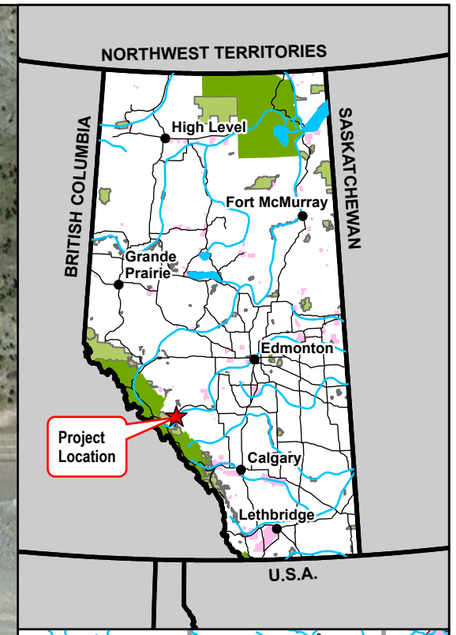
Photo 2 **The erosion scarp near the east (left) flank of the C034-2 site. The erosion scarps are approximately 2 m to 3 m in height. Photo taken June 27, 2023, facing west.**

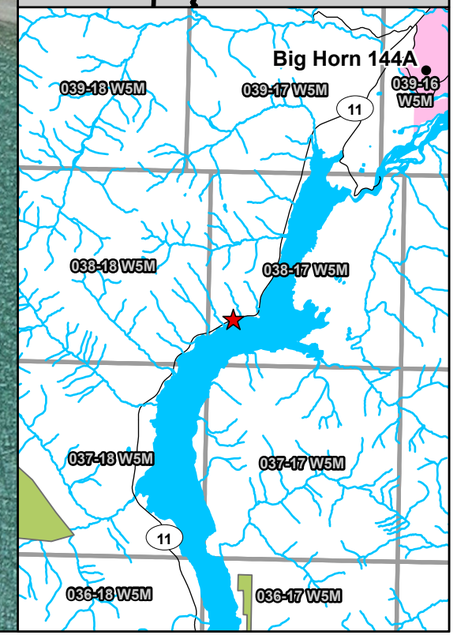
Photo 3 **The erosion scarp near the east (left) flank of the C034-2 site. Material has been eroded and deposited downslope (indicated by red arrow). Photo taken June 27, 2023, facing west.**

Photo 4 **The erosion scarp along the C034-2 site (Waypoint 367). Photo taken June 27, 2023, facing east.**

Photo 5 **Vegetation (trees and shrubs) located near the right (west) flank of the C034-2 site. The vegetation has begun to fail due to ongoing erosion and trees were observed at the toe of the slope. Photo taken June 27, 2023, facing west.**







Legend

- GPS Waypoint (June 27, 2023)
- Culvert
- Repair Extent

0 100 Metres

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM ZONE 11N
3. IMAGE SOURCE: 2023 MICROSOFT CORPORATION, 2023 MAXAR CNES, DISTRIBUTION AIRBUS DS

CLIENT: Alberta

Klohn Crippen Berger

PROJECT: CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE: Site Plan
C034-II - Abraham Lake
Hwy 11:02, km 11.056

SCALE	PROJECT No.	FIG No.
1:3,000	A05116A02	1

File: Z:\AED\MA\05116A02 ABT Central Region GRMP\400 Drawings\GIS\02_ProFiles\2023\Section B\ABT_Central_SectionB_230724\ABT_Central_SectionB_230724.aprx Date: Time: Creator: : aharrison