CENTRAL REGION GRMP
SITE INSPECTION FORM

SITE NUMBER AND NAME: **C023-1 and -2 Battle River Crossing Erosion and Slope Failure**	HIGHWAY & KM: 854:01, 14.017	PREVIOUS INSPECTION DATE: May 31, 2022	INSPECTION DATE: **June 17, 2024**
LEGAL DESCRIPTION: 16-07-043-17 W4M	NAD 83 COORDINATES: UTM 12 Northing 5839557 Easting 402074	RISK ASSESSMENT: **C023-1** PF: 8 CF: 3 TOTAL: 24 **C023-2** PF: 8 CF: 4 TOTAL: 32	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 120 (south) & 80 (north) (Ref No. 114370 & 997079)		CONTRACTOR MAINTENANCE AREA (CMA): 513	

SUMMARY OF SITE INSTRUMENTATION:	INSPECTED BY:
There is no instrumentation at the C023 site. LAST READING DATE: N/A	Chris Gräpel (KCB) James Lyons (KCB) Tony Penney (TEC) Rocky Wang (TEC)

PRIMARY SITE ISSUE: C023-1: Erosion on north bank of Battle River valley. West side of highway: erosion of unvegetated area upslope of Battle River. East side of highway: failure of gabion mattress armoured ditch. C023-2: A small landslide on the south bank of the Battle River, partially beneath the bridge.

APPROXIMATE DIMENSIONS: C023-1: West side – 30 m wide by 50 m long (parallel to highway) area of unvegetated soil; East side – 20 m long length of gabion mattress armoured ditch. C023-2: Slide on south bank is approximately 30 m wide and approximately 5 m high.

DATE OF ANY REMEDIAL ACTION: October 2003 – gabion chute and stilling basin constructed in east ditch. (cross-culvert under road carries west ditch flow to gabion mattress lined ditch); 2015 – sediment and vegetation removed from gabion-basket catch basins.

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress		X	Gravel surfaced road		X
Slope Movement	X		C023-2: Slide appears similar to during 2022 inspection.		X
Erosion	X		C023-1: Rill and gully erosion continue to develop on exposed soil upslope of riverbank on west side of highway. Steep downstream section of gabion mattress armoured channel on east side of highway is progressively failing from edge of water to top of slope.	X	
Seepage		X	N/A – none observed during the 2024 inspection.		X
Culvert Distress	X		C023-1: Overgrown vegetation observed in gabion catch basins at culvert inlet and outlet.		X

COMMENTS

C023-1:

- Since 2018, the west side gabion catch basin inlet structure has overflowed onto the unvegetated slope, resulting in erosion gullies downslope of the gabion catch basin inlet structure (Photo 1). The erosion gullies appear to have enlarged slightly between 2022 and 2024 inspections. The erosion gullies will continue to enlarge if not repaired.
- There is poor vegetative cover downslope of the gabion catch basin inlet structure, where coir rolls, now deteriorated, were previously installed.

- The inlet and outlet gabion catch basin structures on the north side of the bridge remain partially clogged with sediment and vegetation (Photos 2 and 3). The amount of sediment appears to have increased between the 2022 and 2024 inspections.
- The gabion mattress armoured ditch east of the highway has not been repaired (Photo 4). The gabion mattress armoured ditch appears to be in similar condition as during the 2022 inspection. However, water will continue to undermine the mattress until it is repaired.
- The gabion mattress armoured channel at/upslope of the discharge point into Battle River is well vegetated and in good condition.
- The east slope upslope (east) of the gabion mattress armoured ditch, protected with a rolled erosion control product (RECP), appears to be in similar condition as during the 2022 inspection. (Photo 5). There is relatively poor vegetation cover and there are small erosion gullies below the RECP where it is being undermined.

C023-2:

- The riverbank along the south abutment directly below the bridge is showing signs of retrogressive slope failure. A steep (approximately 1H:1V) riverbank slope 4 m to 5 m high is located at the edge of the river, with approximately 15 m between the crest of the slope and the bridge abutment. The riverbank slope failure does not appear to have changed significantly since the 2022 inspection.

Maintenance/Repair/Monitoring Recommendations:

General:

- The site should continue to be regularly inspected by TEC's Maintenance Contract Inspector (MCI).
- The site should be inspected every two years as part of the Central Region GRMP Section B Inspections.

C023-1:

- The sediments and vegetation in the gabion basket inlet and outlet structures should be removed (e.g., via vac truck).
- The erosion gullies on the slope and berm downstream of the gabion basket inlet structure should be backfilled with compacted fine-grained non-dispersive material. The slope should be graded and seeded with a suitable Badlands seed mix to promote grass growth. Given that bedrock is exposed at surface, to give the seeds a better chance to germinate and form a stable vegetative cover on the western erosion site, the seed could be applied via hydro-mulch or a bonded-fiber matrix. Silt fencing should be erected at the toe of the slope and maintained until vegetation is established.
- The failed gabion mattress downslope of the gabion basket outlet structure should be removed. The area should be graded to a channel shape, lined with suitable bedding material, underlying non-woven geotextile, and armoured with riprap. Check trenches should be installed at regular intervals to reduce the likelihood of undermining the non-woven geotextile and riprap.

C023-2:

- The slope failure observed on the west side of and adjacent to the south bridge abutment should be monitored. Potential repair options include:
    - armouring the riverbank to control erosion upstream of and underneath the bridge deck;
    - soil nailing could be used to stabilize the slide;
    - flattening the slope beneath the bridge.

In September 2022, KCB issued a Request for Quotation (RFQ) and c-estimate for the repair of the C023-1 site. However, the quotes received by TEC were significantly higher than expected, and the work was not awarded. No further work has been completed by KCB since the RFQ was issued.

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PROFESSIONAL ENGINEER ALBERTA
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ID 247708
2024-09-26

James Lyons, P.Eng.
Civil Engineer

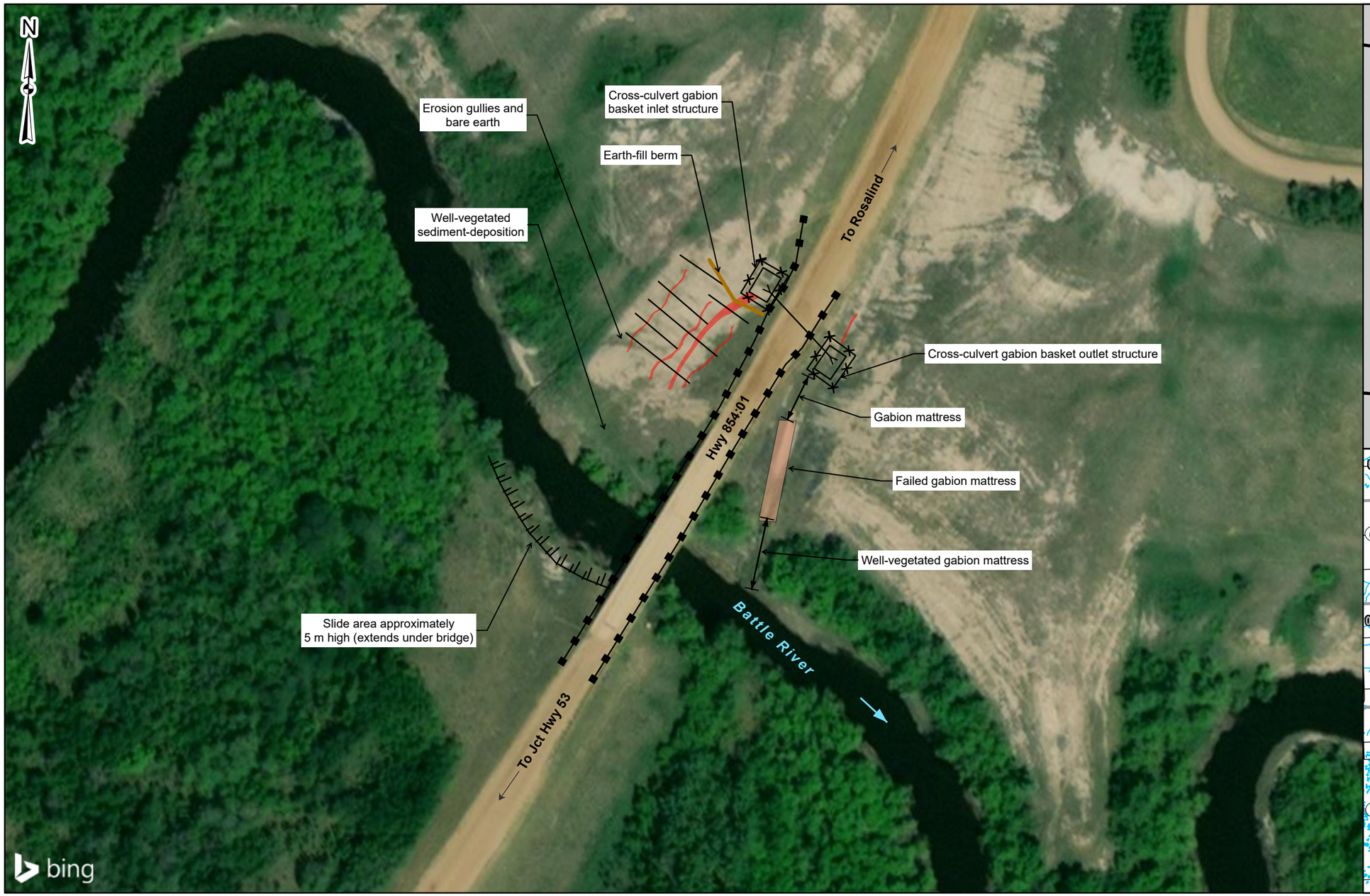
PERMIT TO PRACTICE
KLOHN CRIPPEN BERGER LTD.

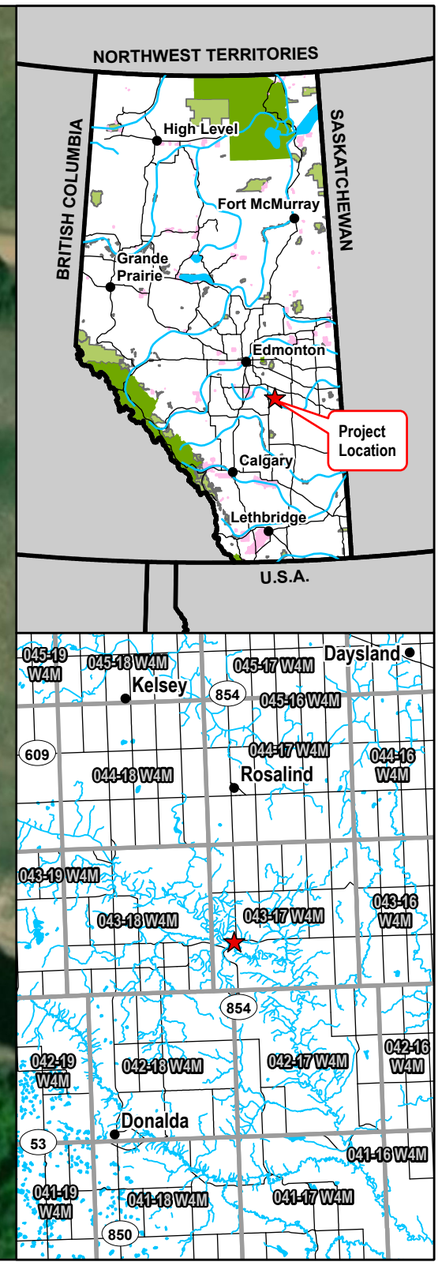
RM SIGNATURE: _____

RM APEGA ID #: 187607

DATE: 26 Sep. 2024

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





Legend

- Flow Direction
- Fence
- Earth Berm
- Scarp
- Guardrail
- Coir Roll
- Culvert
- Failed Gabion Mattress
- Erosion

0 50 Metres

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM ZONE 12N
3. IMAGE SOURCE: 2024 MICROSOFT CORPORATION, MAXAR, CNES DISTRIBUTION AIRBUS DS.

CLIENT: Alberta

Klohn Crippen Berger

PROJECT: CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE: Site Plan
C023 - Battle River Crossing Erosion and Slope Faiure
Hwy 854:01, km 14.017

SCALE	PROJECT No.	FIG No.
1:1,250	A05116A02	1

File: Z:\AEDM\A05116A02 ABT Central Region GRMP400 Drawings\GIS\02_ProFiles\2024\Section B\AT_CentralRegion_SectionB_240627\AT_CentralRegion_SectionB_240627.aprx Date: Time: Creator: : EQuine

Photo 1 **Erosion gullies on the north slope of the river valley, south of the gabion basket inlet structure. Gullying is most likely caused by the inlet structure overflowing during precipitation events, since it is clogged with sediment and vegetation. Photo taken June 17, 2024, facing northeast.**

Photo 2 **Vegetation and sediment build-up at the catch basin structure at the culvert inlet. Photo taken June 17, 2024, facing northeast.**

Photo 3 **Gabion basket outlet structure on east side of highway is clogged with sediment and dense vegetation. Photo taken June 17, 2024, facing north.**

Photo 4 **Erosion gully downstream of the failing gabion mattress in the east (northbound) ditch. Dense vegetation (grass, shrubs, and trees) growing within erosion gully. Photo taken June 17, 2024, facing south.**

Photo 5 **Relatively poor vegetation cover on the slope east of the highway and gabion mattress lined ditch, where a rolled erosion control product was previous installed. Photo taken June 17, 2024, facing east.**

Photo 6 **No significant changes to the slide on the south abutment were observed between the 2022 and 2024 inspections. Photo taken June 17, 2024, facing southwest.**