SOUTHERN REGION GRMP
SITE INSPECTION FORM

SITE NUMBER AND NAME: **S063 Lethbridge RV Park**	HIGHWAY & KM: 3:09 km 1.370	PREVIOUS INSPECTION DATE: September 9, 2020	INSPECTION DATE: **July 8, 2021**
LEGAL DESCRIPTION: 16-02-09-22 W4	NAD 83 COORDINATES: UTM: 12 Northing: 5508224 Easting: 364831	RISK ASSESMENT: PF: 8 CF: 6 TOTAL: 48	
AVERAGE ANNUAL DAILY TRAFFIC: 30420 (east) & 22320 (west) (Ref. No. 50000001)		CONTRACTOR MAINTENANCE AREA (CMA): 25	

SUMMARY OF SITE INSTRUMENTATION: None present LAST READING DATE: N/A	INSPECTED BY: Chris Morgan (KCB) Margot Lederman (KCB) Roger Skirrow (AT) Alex Frotten (AT)
PRIMARY SITE ISSUE: Surface erosion due to corrosion and failure of buried CSP slope drains that were installed in the late 1960s.	
APPROXIMATE DIMENSIONS: Largest erosion gully is located 7 m downslope of the guardrail and is approximately 2 m deep and up to 3.5 m wide. A possible sinkhole is forming between the highway and the erosion gully.	
DATE OF ANY REMEDIAL ACTION: N/A	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Transverse cracking on pavement appears to correlate with locations of buried highway drainage		X
Slope Movement		X	None observed		X
Erosion	X		Surface runoff erosion due to culvert degradation	X	
Seepage		X	None observed		X
Culvert Distress	X		Corrosion of buried CSP slope drains (particularly at the invert) leading to erosion gullies forming on embankment side slope		X

COMMENTS
Site identified for inclusion in the GRMP due to a landowner complaint in 2020. Initial site visit was documented as a call-out in March 2021.
The site is located adjacent to the Oldman River. Highway 3 is a paved four-lane highway, oriented southeast to northwest. The highway is constructed on a well vegetated embankment up to 25 m high with an average slope of 2.5H:1V to 3H:1V.
The embankment construction material is unknown; material exposed in erosion gullies is silty and sandy fill.
The AT ROW is reported to extend from the highway surface to the toe of the embankment. The AT ROW includes the drainage channel that extends northeast from the toe of the embankment to the Oldman River (perpendicular to the highway).

2021: The embankment was observed to be in good condition, with no clear evidence of slope instability or erosion (other than at the buried CSP culvert locations). Undermining of the exposed culvert was noted to be worse in 2021, when compared to 2020 observations.

The highway pavement appeared in good condition with no evidence of longitudinal cracking, dislocation, or slope instability. Transverse cracking was noted on the pavement and appears to be located over buried highway drainage pipes.

Buried CSP slope drains are corroding at the invert, leading to leakage and washout of embankment material around buried culverts and formation of an erosion gully. Culvert joints are separating as erosion retrogresses towards the highway.

Culvert leakage has contributed to the formation of one large erosion gully and two smaller erosion features at the buried slope drains. The largest erosion gully is located near waypoint 144 and is approximately 7 m downslope of the guardrail. In 2021, the gully was measured as up to 2 m deep and between 3.0 m and 3.5 m wide.

Highway surface drainage is reported to consist of vertical drains from the pavement, connected to cross-drains which report to three concrete vaults on the east side of the highway. Each concrete vault is understood to drain east via a buried 1 m diameter CSP slope drain. Highway drainage was reportedly constructed in approximately 1967, prior to the construction of the RV Park. The condition of slope drains and highway drainage is unknown.

A possible sinkhole was observed near the crest of the embankment during the 2020 and 2021 site inspections, between the highway and the erosion gully (waypoint 144).

Independent of the pavement drainage, a reinforced concrete underdrain (culvert) is present at the toe of the highway embankment. The underdrain is reported to be 900 mm diameter and provides an outlet for surface water from a catchment area (unknown size) west of the highway. A part of the landowner complaint related to overland flooding in the RV Park due to flows through the underdrain, which reports to the Oldman River via a single channel through the RV Park.

Recommended Mitigation Measures:

<u>Short-Term</u>

- Carry out CCTV survey to evaluate layout and condition of the pavement drainage.
- Complete a stormwater and hydrological assessment to confirm the catchment area for the underdrain to the west of the highway, and evaluate potential flood level flows at the RV Park.
- Carry out preliminary design for RV Park surface water management.

<u>Long-Term</u>

- Upgrade the surface water drainage channel through the RV Park.
- Evaluate and upgrade the buried slope drains on the east side of the highway to reduce embankment erosion. Construct a collector drain at the downstream toe.

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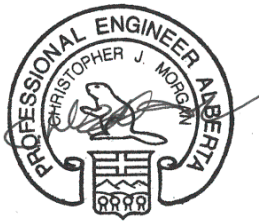
(ii) The observations, findings, and conclusions in this report are based on observed factual data and conditions that existed at the time of the work, and should not be relied upon to precisely represent conditions at any other time.

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



2021-11-24

Chris Morgan, M.Sc., P.Eng.
Senior Geotechnical Engineer

PERMIT TO PRACTICE
KLOHN CRIPPEN BERGER LTD.

RM SIGNATURE: _____

RM APEGA ID #: 187607

DATE: 25 Nov. 2021

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

Photo 1 **Surface runoff erosion gully (approximately 2 m deep and 3.5 m wide) viewed from crest of embankment. Photo was taken facing northeast on July 8, 2021.**

Photo 2 **Surface runoff erosion gully viewed from lower part of the embankment. Photo was taken facing west on July 8, 2021.**

Photo 3 **Highway drainage includes buried 1 m diameter CSP culvert slope drains (reportedly installed in the 1960s). The culverts have corroded leading to erosion gullies forming on the slope. Photo taken on July 8, 2021.**

Photo 4 **Possible sinkhole forming near crest of slope, near to a utility box. Photo taken facing south on July 8, 2021.**

Legend

- GPS Waypoint (July 9, 2021)
- Highway underdrain (900 mm reinforced concrete culvert)
- GPS Track (July 9, 2021)
- Highway surface drainage
- Drainage channel
- Surface runoff erosion gullies on embankment side slope

Metres: 0 – 100

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM Zone 12N
3. IMAGE SOURCE: World Imagery, ESRI ArcGIS Online. Source date August 31, 2018 (Lethbridge County)

CLIENT: Alberta Government

Klohn Crippen Berger

PROJECT: SOUTHERN REGION GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE: Site Plan
S063 - Hwy 3: Lethbridge RV Park
Hwy 3:09, km 1.37

SCALE	PROJECT No.	FIG No.
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