CENTRAL REGION GRMP
SITE INSPECTION FORM

SITE NUMBER AND NAME: **C060 Slide East of Blackfalds**	HIGHWAY & KM: 597:02, 11.299	PREVIOUS INSPECTION DATE: June 9, 2020	INSPECTION DATE: **May 30, 2022**
LEGAL DESCRIPTION: 01-16-039-26 W4M 16-09-039-26 W4M	NAD 83 COORDINATES: UTM 12 Northing 5802987 Easting 317570	RISK ASSESSMENT: PF: 5 CF: 6 TOTAL: 30	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 1120 (west) & 2910 (east) (Ref No. 97337 & 89330)		CONTRACT MAINTENANCE AREA (CMA): 516	

SUMMARY OF SITE INSTRUMENTATION:	INSPECTED BY:
Operational: Four vibrating wire piezometers (VWPs) and two slope inclinometers (SIs) installed in March 2017. Inoperable: All instruments installed before 2017 are inoperable (one piezometer and one SI). LAST READING DATE: June 27, 2022	Chris Gräpel (KCB) James Lyons (KCB) Rocky Wang (AT) Dewayne Wlad (AT)

PRIMARY SITE ISSUE: A slide through the foundation of the highway embankment that is exacerbated by creek erosion at the toe of the slope and high groundwater table. The slide is located on the south side (eastbound lane) of Hwy 597 near the west abutment. A tributary creek of the Red Deer River is located at the toe of the slope.

APPROXIMATE DIMENSIONS: The slide is approximately 50 m wide at the crest of the slope and located near the highest section of the highway embankment (approximately 20 m high).

DATE OF ANY REMEDIAL ACTION: 1976 – highway realigned to present location; November 1983 – seven horizontal drains installed; 1983 – toe berm with shear key constructed; after 1992 – riprap armored toe berm constructed; February 2012 – three deep horizontal drains composed of 50-mm-diameter slotted PVC pipe installed; Summer 2012 – highway repaired to remove dip.

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		There are pavement cracks in the eastbound and westbound lanes, and a reoccurring pothole near the west extent of the site.	X	
Slope Movement	X		Creek partially blocked by slide; graben blocks at upper limit of riprap; fence deflected within slide area.	X	
Erosion	X		Creek erosion at toe of slope; minor erosion at CSP slope drain outlet.	X	
Seepage		X	No seepage observed.		X
Culvert Distress		X	800 mm diameter CSP culvert open with minor sag.		X

COMMENTS

In March 2017, a geotechnical site investigation was conducted by KCB. Four VWPs and two SIs were installed to monitor groundwater conditions and depth of movement. Since installation, SI17-C60-02 (located at the toe berm crest) has not recorded any discernible movement. SI17-C60-01 is recording movement at the interface between embankment fill and bedrock foundation (approximately 14 mbgs).

The fence north of the highway appears to have settled above (upslope) the slide area (Photo 1).

The pavement appears to have deteriorated (i.e., alligator cracking) in the eastbound and westbound lanes since the pavement patch was completed in 2020 (Photo 1). There is a transverse crack near the east extent of the

pavement patch that extends across both lanes. Pavement cracking could lead to increased infiltration and softening of the highway subgrade.
There is a reoccurring pothole near the west extent of the pavement patch (Photo 2) in the south (westbound) lane, which may be attributed to a soft zone in the highway subgrade. The MCI told KCB that the previous subgrade repair to reduce settlement in the highway included placing foam under a gravel subgrade. During gravel placement, the foam could be heard cracking.
The headbox protecting BH17-C060-01 instrumentation was damaged during pavement patching completed in 2020, resulting in damage to the slope inclinometer (SI17-C060-01) and vibrating wire piezometer cables (VW42623 and VW42625) (Photo 3). KCB repaired the headbox (removed pavement riser, stripped the VW cables, and replaced headbox cap) during the 2022 spring instrumentation readings.
Water flow from the north ditch is conveyed across the highway through an 800 mm diameter CSP culvert that drains into a CSP slope drain, which then discharges onto the toe berm. Erosion was observed (approximately 0.5 m to 0.75 m deep) at the outlet of the CSP culvert, which had formed between the 2020 and 2022 inspections (Photo 4).
A wet area was observed on the crest of the toe berm west of SI17-C60-02 during the 2019 inspection. However, this area has been dry during the 2020 and 2022 inspections. If the ponding water returns, the drainage on the toe berm crest should be improved to reduce the risk of infiltration that could elevate pore water pressures in the toe berm material.
A large wasp nest was observed in the oil tank on the toe berm crest, near BH17-C60-02.
The creek is partially blocked by the slide on the north bank, with a slide on the south bank further constricting creek flow. A toe roll is present on the south bank and the trees are tipping north towards the creek.
Evidence of recent movement was observed downslope near the creek. Eventually the crest of the slope will “catch up” with the toe of the slope, resulting in larger movements of the pavement
Prompted by the MCI, a site approximately 400 m west of C060 was inspected by KCB and AT during the inspection. • The site was the expired C008 site that was repaired in 2007 (soil nails and embankment reconstruction). • Pavement cracking was observed in the north and south lanes along the site (Photo 5). • The repaired slope is creeping and is deforming the highway surface (Photo 6). • AT could consider improving the drainage by building a deep ditch drain in the north (westbound) ditch to intercept ground water. One borehole should be completed in the north ditch and a piezometer could be installed to assess the ground water level.
Maintenance/Repair/Monitoring Recommendations: • The pavement along the site should be milled and repaved to address pavement cracking. The extent of the pavement patch should be larger than the previous patch to address the new pavement cracking east of the slide. • In the areas where the pavement deterioration is the most significant (i.e., zone of cracking and pothole near the west extent of the exiting pavement patch) the subgrade should be excavated and replaced with more competent material (e.g., Des. 2 Cl. 40). AT informed KCB that paving may be completed in fall 2022 or 2023. • The erosion observed at the outlet of the CSP culvert (WP 142) should be repaired by backfilling the eroded areas with riprap (e.g., Class 1M)

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October 7 2022
I.D. # 58463

Chris Gräpel, M.Eng., P.Eng.
Senior Civil Engineer, Associate

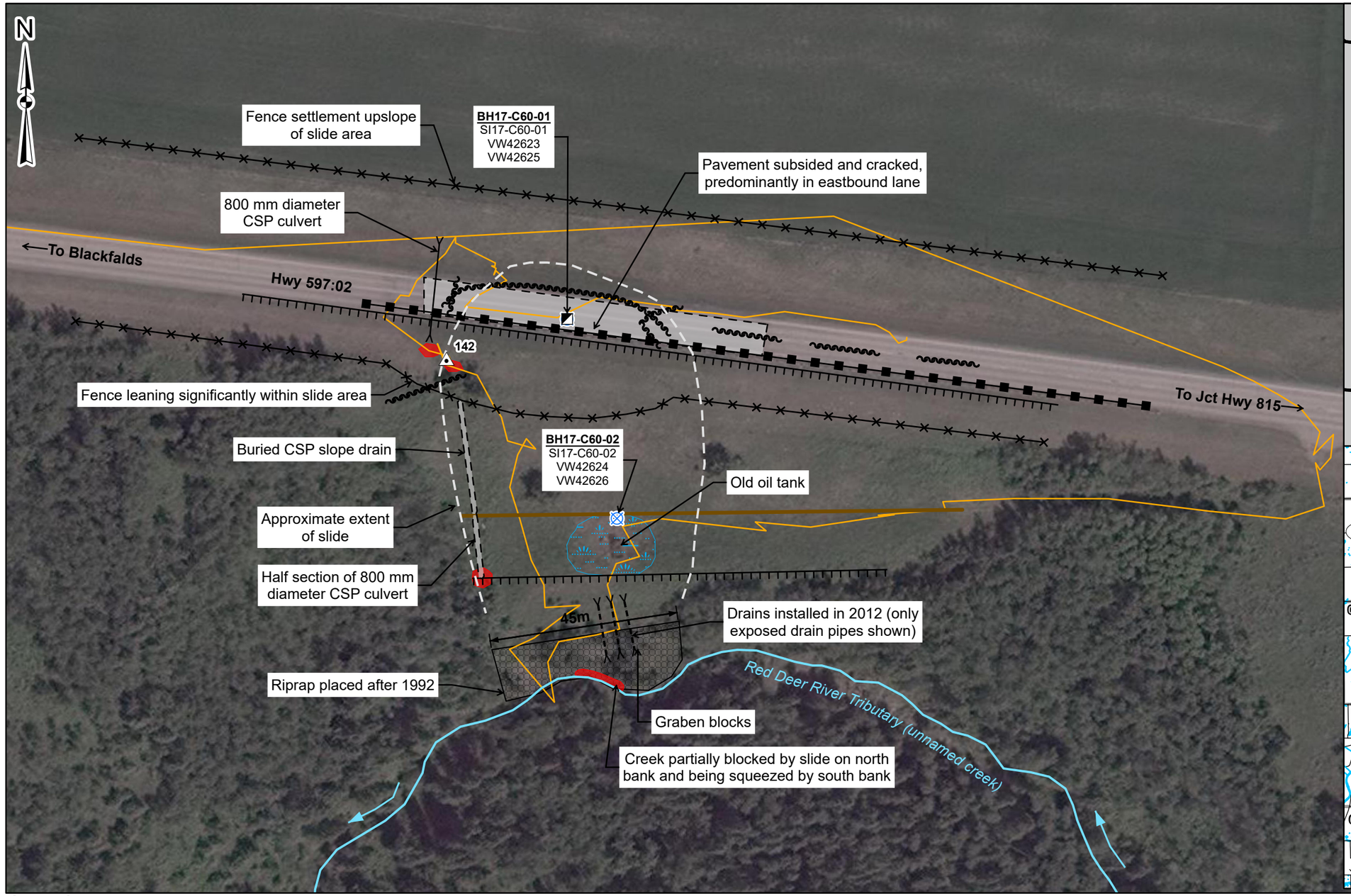
PERMIT TO PRACTICE
KLOHN CRIPPEN BERGER LTD.

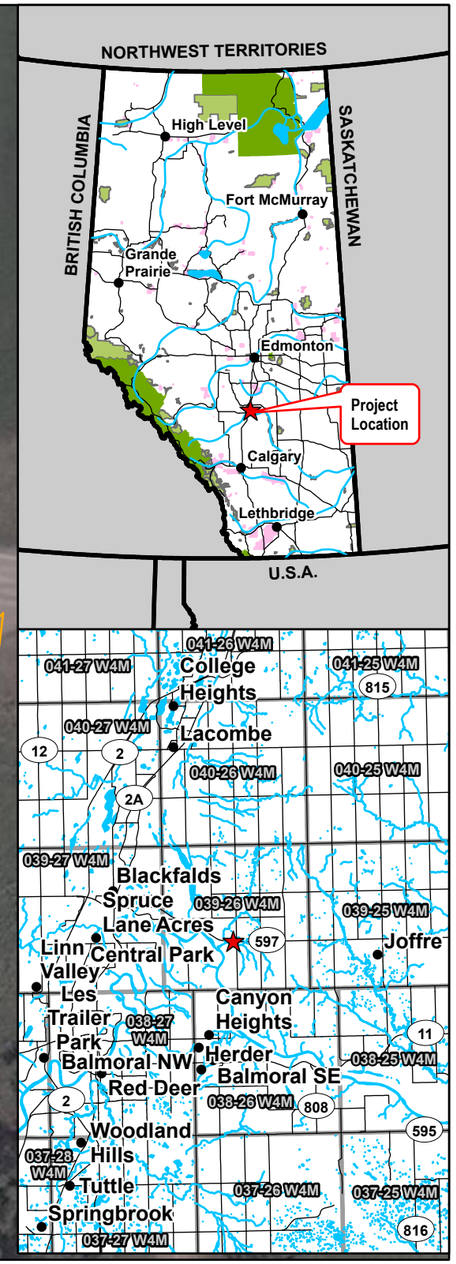
RM SIGNATURE: Pamela Jones

RM APEGA ID #: 187607

DATE: 7 Oct. 2022

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





Legend

- Slope Inclinometer
- Vibrating Wire Piezometer
- GPS Waypoint (May 30, 2022)
- GPS Track (May 30, 2022)
- Slide Extent
- Top of Slope
- Crack
- Culvert
- Drain
- Fence
- Guardrail
- Measure
- Top of Berm Upslope Crest
- Flow Direction
- Watercourse
- Buried CSP
- Wet Area
- Erosion
- Riprap
- Pavement Patch

0 50 Metres

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM ZONE 12N
3. IMAGE SOURCE: 2022 MICROSOFT CORPORATION, 2022 MAXAR CNES, DISTRIBUTION AIRBUS DS
4. LOCATION OF INSTRUMENTS IS APPROXIMATE (NOT SURVEYED)

CLIENT: Alberta

Klohn Crippen Berger

PROJECT: CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE: Site Plan
C060 - Slide East of Blackfalds
Hwy 597:02, km 11.299

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

File: \\int.klohn.com\Proj\Data\AIEDM\A05116A02 ABT Central Region GRMP\400 Drawings\GIS\MXD\2022\C060_220616.aprx Date: Time: Creator: : aharrison

Inspection Photographs

Photo 1 **Alligator cracking has been regularly observed in both lanes upslope the C060 slide and appears to have worsened since the 2020 inspection. Photo taken May 30, 2022, facing northwest.**

Photo 2 **A recurring pothole was observed near the west extent of the pavement patch that may be attributed to poor subgrade condition. The pavement patch was completed in 2020. Photo taken May 30, 2022, facing southwest**

Photo 3 **The flush-mounted head box in the south (eastbound) lane protecting the instrumentation installed in BH17-C060-01 was damaged during pavement patching completed in 2020. Photo taken May 30, 2022.**

Photo 4 **An erosion gully has formed at the CSP culvert underlying Hwy 597 (WP 142) between the 2020 and 2022 inspections. Photo taken May 31, 2022, facing north.**

Photo 5 **The expired C008 site was visited during the C060 inspection. Alberta Transportation's (AT's) Maintenance Contract Inspector (MCI) informed KCB during the inspection that pavement cracking and settlement appears to have worsened since 2021. Photo taken May 30, 2022, facing east.**

Photo 6 **Pavement cracking and settlement above the C008 slide. Photo taken May 30, 2022, facing southeast.**