Alberta Transportation

CENTRAL REGION GRMP
SITE INSPECTION FORM

Klohn Crippen Berger

SITE NUMBER AND NAME: **C060 Slide East of Blackfalds**	HIGHWAY & KM: 597:02, 11.299	PREVIOUS INSPECTION DATE: July 11, 2019	INSPECTION DATE: **June 09, 2020**
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): 1,640 (west) & 3480 (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 instrumentation installed before 2017 is inoperable. One standpipe and one SI (sheared by October 2011) installed in November 2010. One replacement SI (sheared by October 2012) installed in September 2012. LAST READING DATE: May 06, 2020	Chris Gräpel (KCB) James Lyons (KCB) Tony Penney (AT) Kristen Tappenden (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.

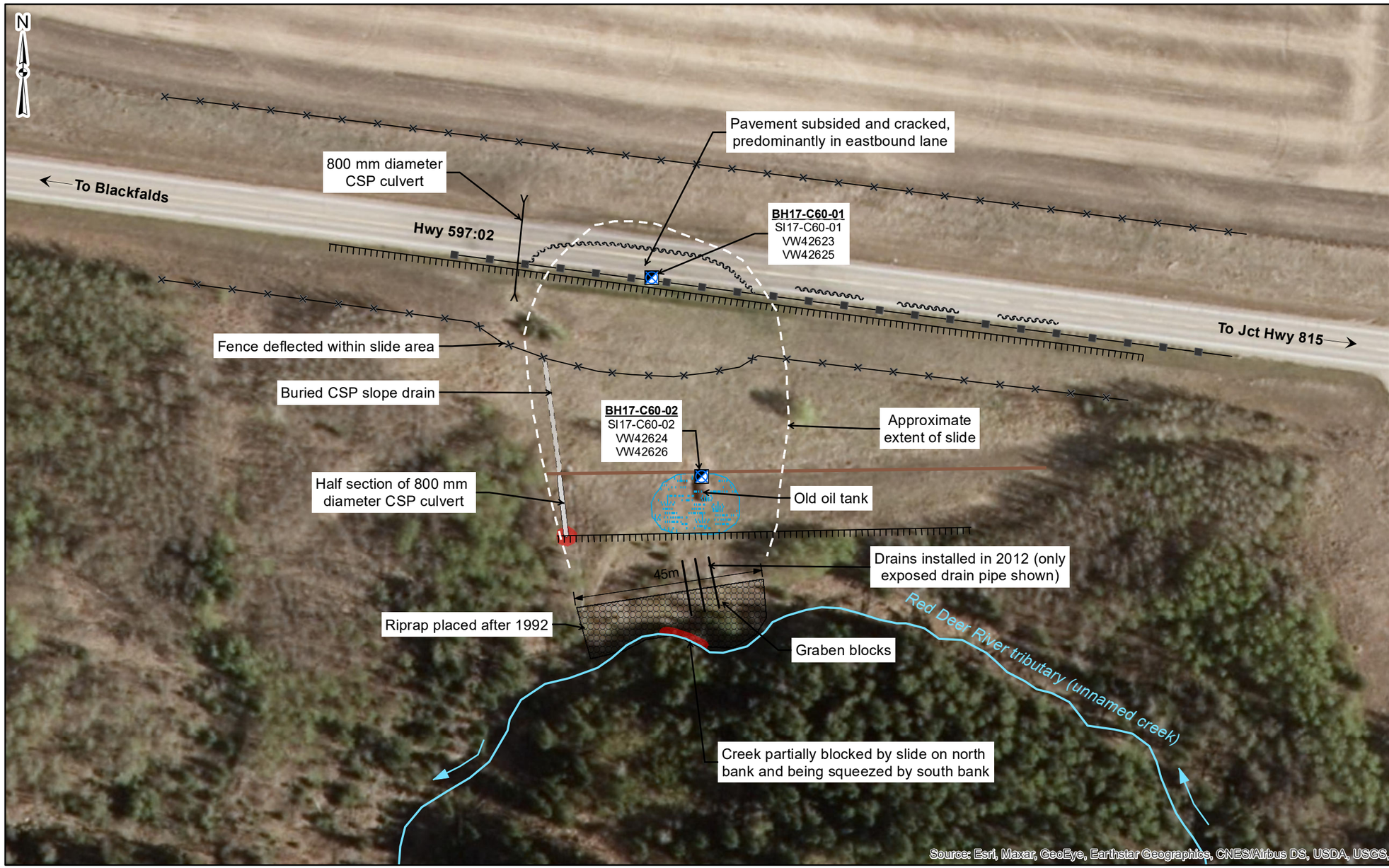
ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		The pavement appears to have settled a bit more since 2019. Some eastbound vehicles were pulling into the west bound lane to avoid the pavement impacted by the geohazard.	X	
Slope 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

Pavement patch appears to have deteriorated in the eastbound and westbound lanes since the 2019 inspection. Eastbound vehicles were observed moving into the westbound lane to avoid the deteriorated pavement in eastbound lane. The increased traffic from the eastbound lane may be exacerbating pavement wear in the westbound lane.

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). After recording an increased rate of movement in the fall of 2019 (approximately 8 mm/year), the movement rate has decreased to less than 1 mm/year.
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.
Water flow from the north ditch is conveyed across the highway via an 800 mm diameter culvert that drains into a CSP slope drain, which then discharges onto the toe berm. Minor erosion was observed at the CSP-slope-drain outlet.
A wet area was observed on the crest of the toe berm west of S17-C60-02 (Photo 3). This area should be inspected during the fall 2020 instrument readings. If the ponding water continues, 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.
The pavement above the slide may be milled and resurfaced in 2020.
Options for repair of the slide at this site include: • Extending the CSP slope drain to discharge surface water into the creek and not onto the slide surface; • Installing drainage on the west abutment to intercept any groundwater that may be entering the embankment fill from the original valley slope; • Enlarging the toe berm and passing creek flows with a culvert; • Placing additional riprap at the toe of the slope; • Installing a pile wall, or a double row of pile walls.



Legend

- Vibrating Wire Piezometer (VW)
- Slope Inclinometer (SI)
- Fence
- Guardrail
- Culvert
- Crack
- Top of Slope
- Toe Berm Upslope Crest
- Creek
- Flow Direction
- Wet Area
- Erosion
- Riprap

Meters
0 50

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM Zone 12N
3. IMAGE SOURCE: World Imagery, ESRI ArcGIS Online Source date January 15, 2018 (Red Deer County 2018)
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	A05115A02	1

Time: 16:07:27 PM
Date: July 30, 2020
File: Z:\AEDM\A05115A02 ABT Central Region GRMP\400 Drawings\2020\2. Section B\MXD\C060_200713.mxd

Photo 1 **The pavement above the slide area in the eastbound and westbound lanes continues to degrade over time. Photos taken June 9, 2020 looking southwest.**

Photo 2 **Photo showing the condition of pavement above the slide area. Condition of pavement in the westbound lane (red ellipse) has worsened since the 2019 inspection. Photo taken June 9, 2020 looking southwest.**

Photo 3 **Wet area observed on the bench near SI17-C60-02 (indicated by red rectangle). Photo taken June 9, 2020 facing east.**

Photo 4 **Slope below highway showing no signs of deformation or slope movement since 2019 inspection. Photo taken June 9, 2020 facing west.**