

SITE NUMBER AND NAME: C062 Back Slope Failure North of Vermillion Dam		HIGHWAY & KM: 41:20, 2.889	PREVIOUS INSPECTION DATE: June 24, 2020	INSPECTION DATE: June 29, 2021
LEGAL DESCRIPTION: 16-31-050-06 W4M	NAD 83 COORDINATES: UTM Northing Easting 12 5912662 509163		RISK ASSESSMENT: PF: 9 CF: 3 TOTAL: 27	
Average Annual Daily Traffic (AADT): 3070 (north) (Ref No. 997074)			CONTRACTOR MAINTENANCE AREA (CMA): 512	

SUMMARY OF SITE INSTRUMENTATION: Operable: One slope inclinometer (SI), six vibrating wire piezometers (VWPs), and one standpipe piezometer installed in April 2018. Inoperable: Two slope inclinometers installed in April 2018. LAST READING DATE: June 11, 2021	INSPECTED BY: Chris Gräpel (KCB) Roger Skirrow (AT) Tony Penney (AT)
PRIMARY SITE ISSUE: Large deep-seated-translational earth slide on back/cut slope of highway. Toe roll starting to block ditch. The landslide is expanding laterally around the “nose” of the cut slope to the north Vermillion River valley slope. The landslide on the Vermillion River valley slope is impacting powerline transmission towers (ATCO) and is above the outlet channel from the Vermillion Dam spillway.	
APPROXIMATE DIMENSIONS: Approximately 200 m wide at highway and 50 m along the river valley slope. The fence at crest of back slope undermined over a 70 m length. Back slope is approximately 25 m high, sloped at approximately 3H:1V.	
DATE OF ANY REMEDIAL ACTION: None	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress		X			X
Slope Movement	X		Movement has occurred since 2018 inspection at head/back scarp of slide and at the toe of slope		X
Erosion		X			X
Seepage		X			X
Culvert Distress		X	N/A – No culverts present		X

COMMENTS
Slide area extends along the crest of the back slope to the river valley slope south of the power poles. Bench on river valley slope is located at the previous Hwy 41 alignment, before it was realigned across Vermillion Dam in 1981.
Since the 2020 inspection, the toe roll of the slide appears to have deformed further into the ditch. However, due to the height of the vegetation, the amount of movement was difficult to determine.
Cracking was observed in 2020 on the river valley slope (southeast of Waypoint 0060) and directly north of the outlet channel from the Vermillion Dam spillway. The grass on the backslope and river valley slope is approximately 2 ft high (0.6 m) and may be obscuring other slide features.
The backscarp has extended further to the southwest (past Waypoint 0060) as further settlement was observed near the power poles and on the slope below the power poles. The settlement/cracking observed was

approximately 0.3 m wide by 0.5 m deep. A sinkhole approximately 1 m long and 0.3 m wide was observed during the June 2021 inspection, near the cracking that was observed in 2020 (WP0060).

A tension crack was observed on the downslope bench created during the geotechnical investigation completed in April 2018 (bench constructed in March 2018). The tension crack was approximately 25 mm wide in June 2020 and was not found in June 2021 due to tall vegetation.

Discussed remedial actions:

- Install either horizontal drains or flatten the slope (i.e., excavating the head of the slide). If AT decides they want to flatten the slope to increase slope stability, they should consult with the Town of Vermilion on a material stockpile location or if there is any local uses for the removed material.
- With AT's permission, KCB contacted ATCO and Alberta Environment and Parks (AEP) on July 18, 2019 and advised them of the possible impact of slide movement to the powerline tower and outlet channel from Vermilion Dam spillway, respectively. AEP had the slide area reviewed in a recent dam safety review and the slide was judged to not be an issue to the dam spillway. KCB has not heard from Fortis.

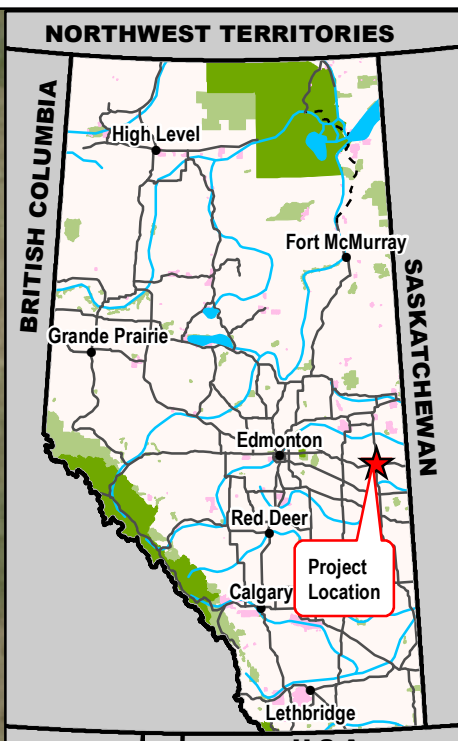
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- (iii) KCB should be consulted regarding the interpretation or application of the findings and recommendations in the report.

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



- Legend**
- GPS Waypoint (June 29, 2021)
 - GPS Track (June 29, 2021)
 - Instrument Location
 - Main Scarp
 - Crack
 - Toe Roll
 - Minor Scarp



NOTES:
 1. HORIZONTAL DATUM: NAD83
 2. GRID ZONE: UTM Zone 12N
 3. IMAGE SOURCE: World Imagery, ESRI ArcGIS Online
 Source date May 21, 2015

CLIENT

PROJECT CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM		
TITLE Site Plan C062 - Back Slope Failure North of Vermilion Dam Hwy 41:02, km 2.889		
SCALE 1:1,500	PROJECT No. A05116A02	FIG No. 1

Time: 15:09:49 PM
 Date: November 08, 2021
 File: Z:\AEDM\A05116A02\ABT_Central Region_GRIIP\400 Drawings\GIS\MXD\2021\Section\B\C062_B_211108.mxd

Inspection Photographs

Photo 1 Backscarp and toe roll of slide. Benches cut into slope were completed during KCB's 2018 drilling and instrumentation installation program. Photo taken June 29, 2021 looking southeast.



Photo 2 Ditch bottom and toe roll of the slope east of Hwy 41:02. Recent movement difficult to determine due to height of the vegetation on the slope. Photos taken June 29, 2021 looking northwest.



Photo 3 Very little change in the slope, head scarp, and fence line at the top of the slope. Photo taken June 29, 2021 facing north.



Photo 4 Location of a sinkhole (approximately long 1.0 m and 0.3 m wide) near the power poles at the top of the slope. Sinkhole at WP0060 obscured by tall vegetation. Photo taken June 29, 2021 facing north.

