

SITE NUMBER AND NAME: C062 Back Slope Failure North of Vermillion Dam		HIGHWAY & KM: 41:20, 2.889	PREVIOUS INSPECTION DATE: July 12, 2019	INSPECTION DATE: June 24, 2020
LEGAL DESCRIPTION: 16-31-050-06 W4M	NAD 83 COORDINATES: UTM Northing Easting 12 5912662 509163		RISK ASSESSMENT: PF: 15 CF: 4 TOTAL: 60	
Average Annual Daily Traffic (AADT): 3770 (north) (Ref No. 997074)			CONTRACTOR MAINTENANCE AREA (CMA): 512	

SUMMARY OF SITE INSTRUMENTATION:		INSPECTED BY:
Operable: One slope inclinometer (SI), six vibrating wire piezometers (VWPs), and one standpipe piezometer installed in April 2018.		Chris Gräpel (KCB)
Inoperable: Two slope inclinometers installed in April 2018.		James Lyons (KCB)
LAST READING DATE: May 16, 2019.		Rishi Adhikari (AT)
		Tom Sommerville (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 2019 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 2019 on the river valley slope (southeast of waypoint 712) 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. An old bench possibly associated with slope movement on the river valley slope is located at waypoint 712.

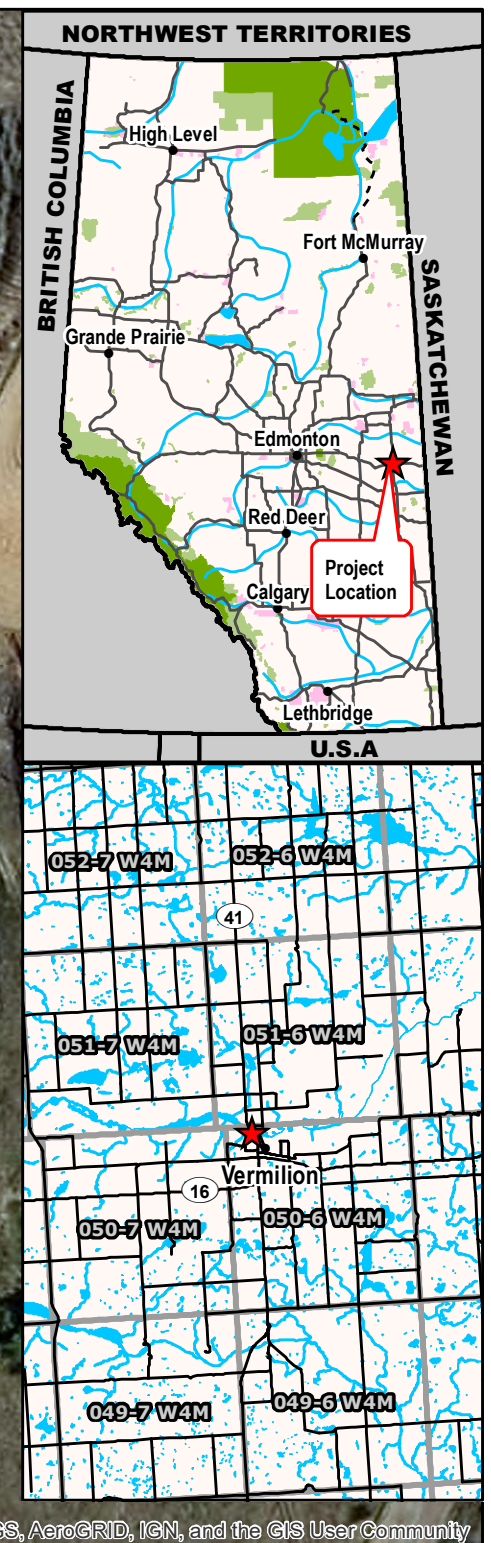
The backscarp has extended further to the southwest (past waypoint 711) as further settlement was observed near the power poles and on the slope below the power poles. The settlement/cracking observed was approximately 0.3 m wide by 0.5 m deep.

A 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 during our June 2020 site inspection (Photo 3).

The slide above the highway appears to be a translational slide that is sliding on a weak horizontal layer/zone within the clay (till). Based on instrumentation data collected in May 2019, the slide appears to be moving at a rate of 40 mm/year to 54 mm/year (previous rate of movement was 26 mm/year to 35 mm/year). S118-C62-01 and S118-C62-02 (at the head and midslope of the slide) have recorded discrete movement at approximately 12 mbgs and 4 mbgs, respectively. By fall 2019 the SIs deflected enough that the slope inclinometer probe should not be lowered downhole anymore due to the risk of the probe being stuck down the SI casing. S118-C62-03 (installed at the toe of the slope) is still readable and has not recorded discernible movement since installation. KCB recommends reading the VWPs in the fall of 2020.

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 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. KCB has not received a response from either party.



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Instrument Location
- GPS Waypoint (June 21, 2018)
- Toe Roll
- Main Scarp
- Minor Scarp
- Crack



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	PROJECT No.	FIG No.
1:1,500	A05115A02	1

Time: 14:07:10 PM
 Date: July 30, 2020
 File: Z:\A\EDM\A05115\A02 ABT Central Region GRM\IP\00 Drawings\2020\2. Section BIM\XD\C062_200713.mxd

Photo 1 Backscarp and toe roll of slide. Photo taken June 24, 2020 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 24, 2020 looking northwest.



Photo 3 Longitudinal tension crack on the downslope edge of the bench built in 2018 as part of the April 2018 geotechnical investigation. Photo taken June 24, 2020 facing northwest.



Photo 4 Location of ground cracking observed southwest of Waypoint 711 near the power poles at the top of the slope. Photo taken June 24, 2020 facing north.

