

SITE NUMBER AND NAME: C017-I, -II, and -III Truckstop Slide	HIGHWAY & KM: 575:04, 26.631 to 26.050	PREVIOUS INSPECTION DATE: June 10, 2020	INSPECTION DATE: June 23, 2021
LEGAL DESCRIPTION: C017-I 04-26-29-21 W4M C017-II 01-27-29-21 W4M C017-III 01-27-29-21 W4M	NAD 83 COORDINATES: UTM Northing Easting 12 5707574 370869 12 5707733 370415 12 5707738 370340	RISK ASSESSMENT: PF: 4 CF: 3 TOTAL: 12 PF: 7 CF: 4 TOTAL: 28 PF: 10 CF: 4 TOTAL: 40	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 800 (east) and 870 (west) (Ref No. 105240 & 106230)		CONTRACT MAINTENANCE AREA (CMA): 517	

SUMMARY OF SITE INSTRUMENTATION: One slope inclinometer (SI) and two vibrating wire piezometers (VWPs) were installed in fall 2020 at C017-III. LAST READING DATE: June 12, 2021	INSPECTED BY: Chris Gräpel (KCB) James Lyons (KCB) Roger Skirrow (AT) Tony Penney (AT)
PRIMARY SITE ISSUE: C017 – I: a shallow embankment slope failure on the north side (eastbound lane) of Hwy 575; C017 – II: an erosion gully that has formed downslope of a culvert outlet on the north side of Hwy 575; and C017 – III: a moderately deep-seated slide (5 to 6 m deep based on an SI installed in 2019) on the north side of Hwy 575 where the highway crosses a creek and enters a cut section in the valley wall	
APPROXIMATE DIMENSIONS: The slides at C017 – I and III are approximately 20 m and 40 m wide, respectively. The zone of sliding onto Hwy 837 was approximately 100 m long (total) in various locations on June 13, 2017.	
DATE OF ANY REMEDIAL ACTION: Unknown.	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		C017 –II, and III: Pavement cracked in both lanes of Hwy 575.		X
Slope Movement	X		C017 -- I: Little to no change. C017 – III: Minor retrogression towards Hwy 575.	X	
Erosion	X		C017 – II: Erosion gully retrogressing towards Hwy 575 guardrail. Ditch erosion in south ditch with gullies up to 1.2 m deep.	X	
Seepage		X	None observed		X
Culvert Distress	X		C017 – II: Culvert inlet buried; and outlet undermined, hanging, and detached		X

COMMENTS
At C017 – I:
<ul style="list-style-type: none"> Slide shows little to no change since 2020 inspection. No new cracks or deformations observed in road surface and the lateral extent of the slide has not changed.
At C017 – II:
<ul style="list-style-type: none"> The erosion gully is similar in size as during the 2020 inspection. However, the erosion gully was partially backfilled in fall 2020 to allow access for the excavator completing test pits at the C017-III site (monitored

by KCB). The culvert inlet on the south side of the highway is completely buried with eroded materials deposited over the inlet. Flow through the culvert towards the C17-II erosion gully could be re-established in the culvert during a heavy rainfall event leading to increased erosion in the gully.

At C017 – III:

- Slide expansion was observed in 2021, near the north end of the backscarp, where an erosion gully approximately 2 m wide and 1.5 m has formed since the 2020 inspection.
- A longitudinal crack was observed between the backscarp and the shoulder of Hwy 575 since the 2020 inspection. Longitudinal cracking in the westbound lane could indicate potential retrogression of the backscarp onto the highway.
- The north ditch is conveying surface water flow over the slide area.
- Ditch erosion in the south (eastbound) ditch between C017-II and C017-III continues worsen, with gullies up to 1.2 m in depth.

Discussed remedial actions:

C017-I:

- An excavate and replace repair option was considered in 2020 and not conducted because of the high backslopes that would be left above the contractor when excavating the failure plane. The estimated cost of excavate and replace was also quite high, due to the limited access and risks associated with the high backslope. In 2021 KCB and AT concluded that a soil-nail reinforced backslope would help maintain and protect the highway surface, while allowing the lower part of the slide to progress with potential need for additional stabilization with soil nails in the future. The advantage of soil nails is that they could be installed from the highway surface, addressing the limited access working on the steep highway embankment slope. An additional borehole should be drilled in the westbound lane to assess ground conditions for a soil nail repair.

C017 – II:

- Decommission and permanently block the 600-mm-diameter CSP culvert underlying Hwy 575 and divert drainage down slope in the south ditch with consideration for the downstream impacts and erosion control in the south ditch. The existing south ditch needs to be repaired. AT is currently backfilling the ditch with material excavated from the C018 site, and it will eventually erode and reform the ditch gullies.

C017 – III:

- Since the failure plane appears to be approximately 5 m to 6 m below ground surface, the backscarp should be reinforced with soil nails. The slide may continue to move and require additional soil nail stabilization in the future. Like the C017-I site, the soil nail repair could be conducted by working from the highway surface. An additional borehole should be drilled in the westbound lane to assess ground conditions for a soil nail repair. Surface water flows from the ditch north of the slide should be re-routed to the toe of the slope with an intake structure installed in the ditch bottom, a buried pipe from the intake structure to the toe of the slope, and energy dissipating structure at the pipe outlet.

KCB will submit a proposal for preliminary engineering, final design, tendering, contract administration, and post-construction services for slope and ditch repairs at the C17 site.

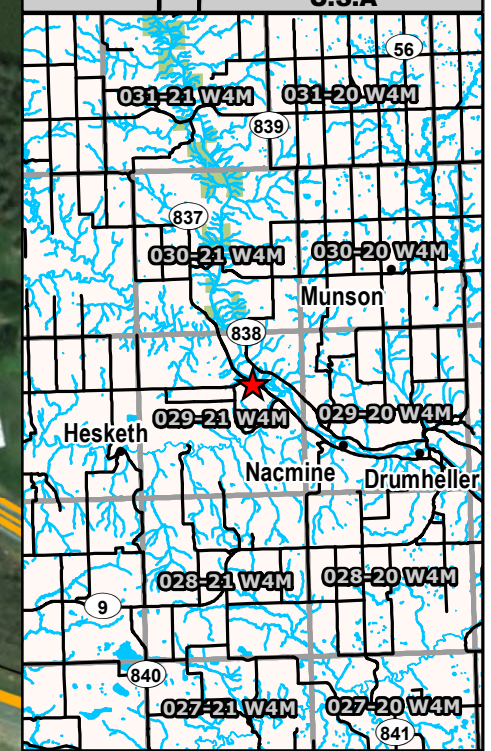
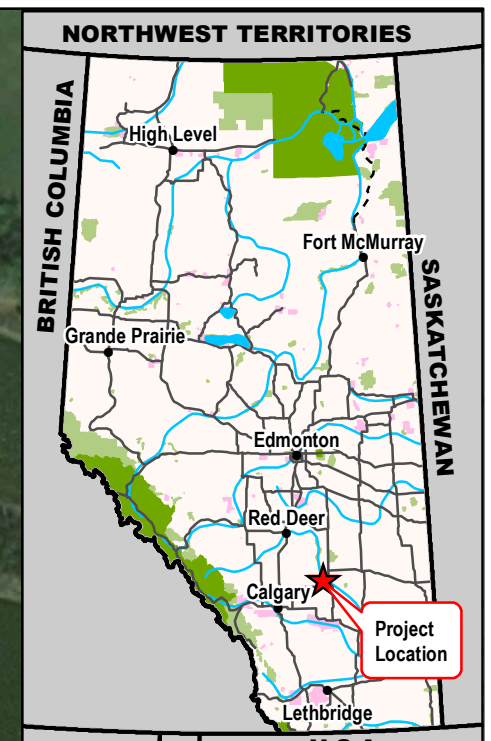
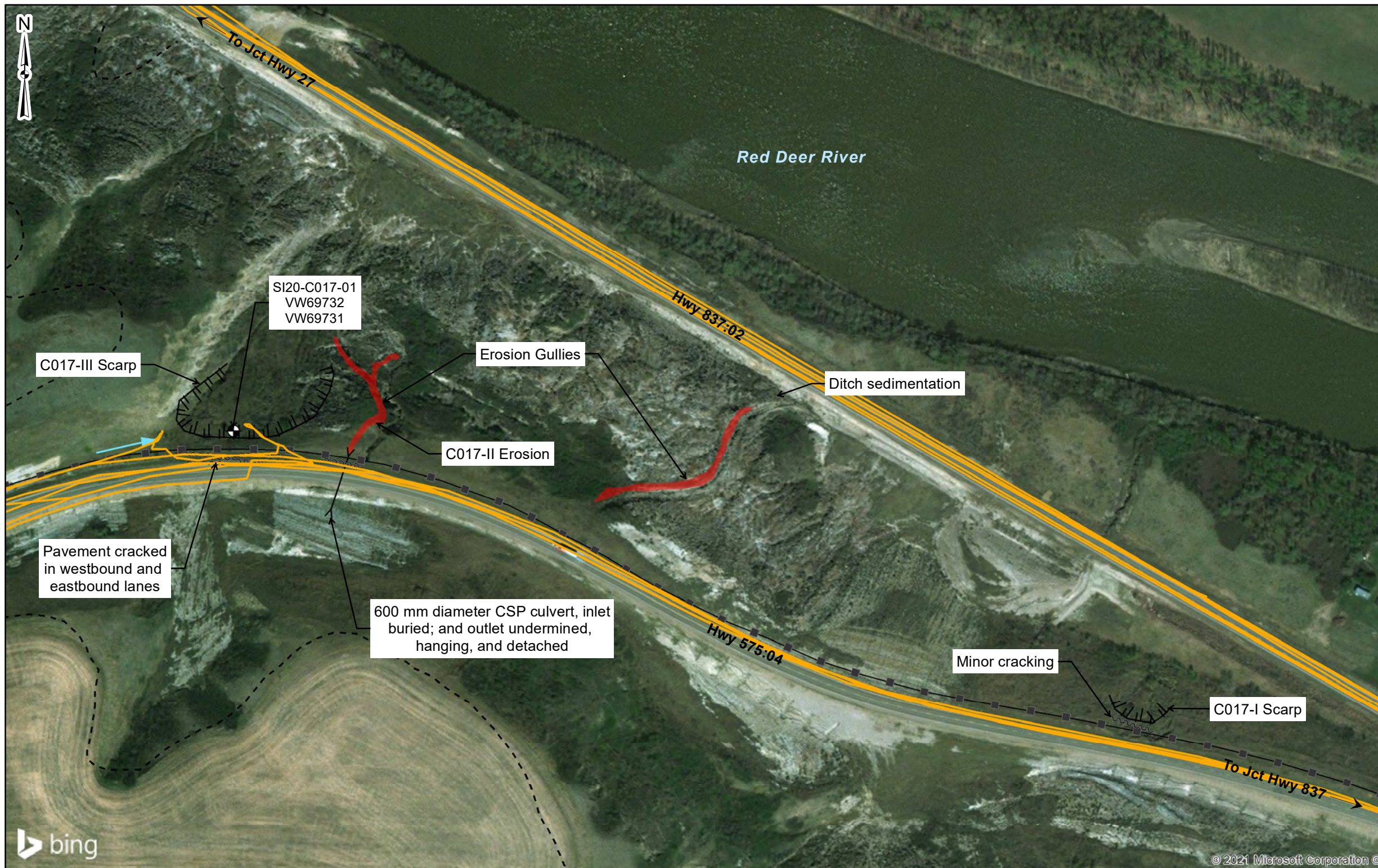
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Chris Gräpel, M.Eng., P.Eng.
Civil Engineer, Associate



- Legend**
- ▲ GPS Waypoint (June 24, 2021)
 - ⊕ Instrument Location
 - GPS Track (June 24, 2021)
 - Flow Direction
 - ~ Crack
 - ⊥ Scarp
 - - - Top of Bank
 - Guardrail
 - > Culvert
 - ⊗ Erosion

NOTES:
 1. HORIZONTAL DATUM: NAD83
 2. GRID ZONE: UTM Zone 12N
 3. IMAGE SOURCE: World Imagery, ESRI ArcGIS Online
 Source dates June 20, 2018 and July 25, 2019

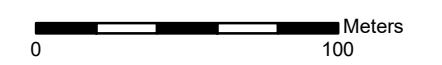
CLIENT

PROJECT CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM		
TITLE Site Plan C017 - I, II and III Hwy 575:04, km 26.631		
SCALE 1:2,500	PROJECT No. A05116A02	FIG No. 1

Time: 14:25:49 PM
 Date: November 08, 2021
 File: Z:\AEDM\A05116A02\ABT_Central Region_GRI\IP\400 Drawings\GIS\MXD\2021\Section\B\C017_B_211108.mxd



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Inspection Photographs

Photo 1 Comparison of the C017-I slope failure from Hwy 837 in 2020 and 2016. Photos taken looking southwest.



Photo 2 Comparison of the C017-II erosion gully in 2020 and 2021. Gully appears to have been partially backfilled since June 2020, likely due to a traffic accident that resulted in an 18-wheeler truck crashing through the guardrail and into this gully. The inlet of the culvert is locked with soil in the south ditch, but erosion could result in flows discharging into the gully again. The outlet of the 600 mm CSP culvert is detached and hanging. Photos taken looking northeast.



Photo 3 Comparison of the C017-III head-scarp in 2020 and 2021. The slight appears to be relatively inactive since 2020. Instrumentation installed in October 2020 are indicated by black circle. Photos taken looking east.



Photo 4 The headscarp of the C017-III slide is approximately 1.5 m to 2.0 m in height. The area of the headscarp that has retrogressed towards the highway since 2020 is indicated by red circles. Photos taken June 23, 2021 looking southeast.



Photo 5 Gully erosion in the ditch south of Hwy 575 has expanded slightly since 2020. Photo taken June 13, 2021 facing north.

