

SITE NUMBER AND NAME: <b>C075-I and -II Hwy 609 and Hwy 56 Ditch Erosion</b>		HIGHWAY & KM: 609:02, 16.42	PREVIOUS INSPECTION DATE: June 29, 2021	INSPECTION DATE: <b>May 31, 2022</b>
LEGAL DESCRIPTION: NW 08-44-19-W4M & SW 17-44-19-W4M	NAD 83 COORDINATES: UTM Northing Easting 12 5849463 383508		RISK ASSESSMENT: <b>C075-I:</b> PF: 9 CF: 3 TOTAL: 27 <b>C075-II:</b> PF: 5 CF: 2 TOTAL: 10	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 500 (east) & 420 (west) (Reference No. 107370 & 110370)			CONTRACT MAINTENANCE AREA (CMA): 517	

SUMMARY OF SITE INSTRUMENTATION:  There is no instrumentation at the C075 site.  LAST READING DATE: N/A	INSPECTED BY: Chris Gräpel (KCB) James Lyons (KCB) Rocky Wang (AT) Dwight Rewega (AT)
PRIMARY SITE ISSUE: Erosion features (ditch erosion and gullies) located along Hwy 609 and a corroding culvert underlying Hwy 609. On Hwy 56 (expired C054 site) there is a large erosion gully that is approaching the highway at the outlet of a centerline culvert.	
APPROXIMATE DIMENSIONS: The erosion is impacting approximately 600 m of the north (westbound) ditch and short sections of the south (eastbound) ditch.	
DATE OF ANY REMEDIAL ACTION: March 2021 – The CSP culverts underlying Hwy 609 and Hwy 56 were sleeved with a smooth walled steep pipe culvert and riprap aprons were built at the culvert inlets and outlets.	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		None observed		X
Slope Movement		X	None observed		X
Erosion	X		Ongoing ditch erosion is the north (westbound) ditch	X	
Seepage		X	None observed		X
Culvert Distress		X	The bottom of the 1200 mm diameter CSP culvert is corroding		X

<b>COMMENTS</b>
The site was first inspected by KCB and AT on June 24, 2020, when KCB conducted a call-out report (final report issued to AT on January 27, 2021).
C075-I: North (westbound) ditch erosion:
<ul style="list-style-type: none"> <li>The 1200 mm diameter CSP culvert was corroding at the base and corrosion was observed at the culvert inlet and outlet. In March 2021, the culvert was sleeved with a smaller-diameter smooth walled culvert and riprap aprons were built at the culvert inlet and outlet (Photos 1 through 3). KCB noted that non-woven geotextile was not placed beneath the riprap aprons. A length of the barbed wire fence near the culvert outlet was also replaced during the work. AT informed KCB the work was completed by Inline Group Inc.</li> <li>The erosion gullies downstream (northeast) of the culvert outlet have increased in size since the 2021 inspection and is moving upslope (west) (Photo 2). The erosion is within 9 m of the edge of the highway, approximately 2.5 m deep, and within the clear zone.</li> <li>A steep slope failure was observed above the erosion gully at the culvert outlet. The slope outside of the gully is approximately 15%. The ditch upslope (west) of the culvert outlet is approximately 10%.</li> </ul>

- The erosion upslope (west) the CSP culvert outlet has retrogressed towards the highway since the 2021 inspection and requires repair (Photo 5). The erosion is within approximately 2 m to 3 m from the edge of the north (westbound) lane.
- Erosion on the north side of the highway at the toe of the bedrock backslope (appears to be similar bedrock as seen in the badlands) extends upslope (west) approximately 200 m and ends in a wet spot of the ditch (Photo 6). The wet spot is believed to be at the top of the bedrock outcrop, based on the exposed bedrock outcrop on the cut slope.

South (eastbound) ditch erosion:

- A soft and wet area was observed in the ditch upstream of the culvert inlet (Photo 4).
- Ditch erosion was observed in two locations but is not as severe as the west ditch erosion.
- There is an exposed fibre-optic line (first observed during the 2020 call-out inspection) near the west extent of the site.
- A fence is being impacted by the ditch erosion.

During the site inspection, KCB and AT also visited the expired C054 site (now referred to as C075-II, southeast of C075, on Hwy 56:16).

- There is erosion in the east (northbound) ditch that has likely been ongoing for a long time but is now just reaching the highway.
- In March 2021, the CSP culvert underlying Hwy 56:16 (oriented east to west) was sleeved with a steel smooth walled culvert and riprap aprons were built at the culvert inlet and outlet (Photo 7 and 8). AT informed KCB the work was completed by Inline Group Inc
- A potential sinkhole (approximately 0.5 m wide and 0.75 m long) was observed above the culvert, on the east side of the highway near the culvert outlet (Photo 8).

Maintenance/Repair/Monitoring Recommendations:

C075-I North (westbound) ditch erosion:

- Repair options for the ditch erosion could include backfilling the ditch erosion with gravel or local fine-grained material next to the highway. Local fine-grained material (e.g., clay till) could be used to backfill the erosion gullies downstream of the culvert outlet, located on private land. Approximately 40 mm of topsoil should be placed along the repaired ditch and hydro-seeded with a seed mix suitable for the Alberta Badlands.
- Riprap should be placed in the gully erosion at the culvert outlet and downstream of the culvert outlet.
- KCB provided AT a design memo and Request for Quotation (RFQ) in fall 2021. However, due to budget constraints AT decided to not proceed with a repair in 2021. In July 2022, KCB provided AT an updated design memo and RFQ to submit to selected contractors, with a reduced scope of work, outlining the private-land-gully repair and ditch repair). However, the costs received in late-July were much higher than expected and more than the available funding for the repair. Any repairs completed in 2022 will have to be a reduced scope of work (i.e., only repairing the ditch erosion upstream of the culvert outlet) or be completed to reduced design standards (i.e., only backfilling and not armouring the ditch erosion).

C075-I South (eastbound) ditch erosion:

- The fibre-optic line needs to be relocated.
- Where the fence has fallen, the ditch needs to be graded and the fence needs to be reinstated.
- The ditch erosion should be backfilled with fine-grained material and the ditch graded for positive drainage.

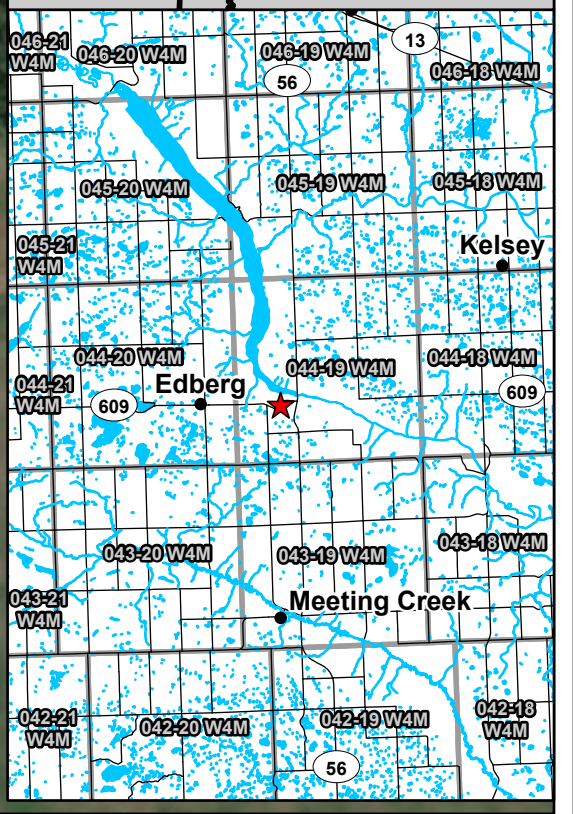
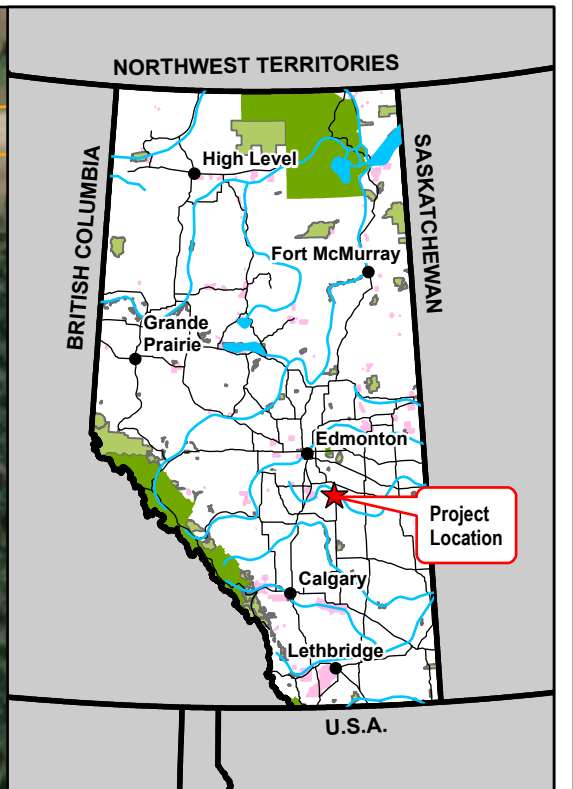
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Chris Gräpel, M.Eng., P.Eng.  
Senior Civil Engineer, Associate



- Legend**
- GPS Track (May 11, 2022)
  - Flow Direction
  - Erosion
  - Culvert
  - Site Feature



NOTES:  
 1. HORIZONTAL DATUM: NAD83  
 2. GRID ZONE: UTM ZONE 12N  
 3. IMAGE SOURCE: 2022 MICROSOFT CORPORATION, 2022 MAXAR CNES, DISTRIBUTION AIRBUS DS  
 4. THE LOCATIONS OF FEATURES WERE ESTIMATED BASED ON SITE OBSERVATIONS

CLIENT

PROJECT  
CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE  
Site Plan  
C075 - Hwy 609 Ditch Erosion  
Hwy 609:02, km 16.420

SCALE 1:2,500 PROJECT No. A05116A02 FIG No. 1

File: Z:\A\EDM\A05116A02\ABT Central Region GRMP\400 Drawings\GIS\MXD\2022\C075\_220616.aprx Date: Time: Creator: aharrison

## Inspection Photographs

- Photo 1** The CSP culvert underlying Hwy 609:02 (oriented southeast to northwest) was sleeved with a smooth wall steel pipe in March 2021 and riprap aprons were built at the inlet and outlet (outlet shown). Photo taken May 31, 2022, facing north.



- Photo 2** Ditch erosion on the north side of Hwy 609:02 upstream and downstream of the culvert outlet. The extent and depth of the erosion appears to have increased since the 2021 inspection. Photo taken May 31, 2022, facing northwest.



**Photo 3** The inlet of the culvert underlying Hwy 609:02. Photo taken May 31, 2022, facing northeast.



**Photo 4** A soft and wet area was observed in the south (eastbound) ditch upstream of the culvert inlet (indicated by red circle). Photo taken May 21, 2022, facing east-southeast.



**Photo 5** The ditch erosion along the north (westbound) ditch upstream of the culvert outlet appears to have retrogressed further towards the highway since the 2021 inspection. Photo taken May 31, 2022, facing northeast.



**Photo 6** Ditch erosion in the north (westbound) ditch along bedrock outcrop (toe of the cutslope). Photo taken May 31, 2022, facing northeast.



**Photo 7** The CSP culvert underlying Hwy 56:16 was sleeved in March 2021 with a smooth wall steel pipe culvert and riprap aprons were built and the culvert inlet and outlet (inlet shown). Photo taken May 31, 2022, facing east.



**Photo 8** The outlet of the culvert underlying Hwy 56:16. A possible sinkhole was observed near the east (northbound) pavement (indicated by red arrow). Photo taken May 31, 2022, facing south-southwest.

