

SITE NUMBER AND NAME: S055 East of Gleichen		HIGHWAY & KM: 901X, 9.2 km east of 547	PREVIOUS INSPECTION DATE: May 8, 2019	INSPECTION DATE: July 8, 2020
LEGAL DESCRIPTION: 02-12-022-22 W4M	NAD 83 COORDINATES: UTM Northing Easting 12 5634864 364825		RISK ASSESMENT Slide: PF: 11 CF: 4 TOTAL: 44 Erosion: PF: 6 CF: 2 TOTAL: 12	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 360 (west), (Ref. No. 109170)			CONTRACTOR MAINTENANCE AREA (CMA): 30	

SUMMARY OF SITE INSTRUMENTATION: None LAST READING DATE: N/A	INSPECTED BY: Chris Morgan (KCB) Margot Lederman (KCB) Kristen Tappenden (AT) Alex Frotten (AT)
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PRIMARY SITE ISSUE: A runoff erosion gully on the north side of the highway and slope instability on the south side. Repair activities were completed in 2018, however the slope drain became blocked in spring 2019 due to grass buildup on the fine mesh screen (aperture size of 15 mm) fitted to the pipe inlet, leading to overtopping of the ditch block and erosion of the repaired surfaces. The erosion gully and slope drain on the north side were repaired in late 2019, including replacement of the inlet trash rack.

In 2020, instability was observed in the slope reconstruction on the south side of the highway. Sloughing was visible at the toe of the repaired zone.

APPROXIMATE DIMENSIONS: Highway embankment constructed on south flowing creek, approximately 15 m high. The embankment side slope on the north side is approximately 2H:1V. The southern side slope is steeper than the north side.

DATE OF ANY REMEDIAL ACTION: Repair to the slope failure on south side was completed in November 2018 by excavating the slide mass and replacing it with compacted gravel fill. Repair of the erosion gully on the north side was completed in December 2018 using a slope drain, and the functionality of the slope drain was restored in spring 2019.

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress		X	Gravel road. No signs of cracking or distress on the highway surface.		X
Slope Movement	X		Slide repairs completed in 2018 south of highway. The repair has partially failed.	X	
Erosion	X		Runoff erosion gullies on south side up to 50 mm deep where slope not vegetated.	X	
Seepage	X		Some seepage noted on south side of embankment.	X	
Culvert Distress	X		Slope drain washout north of highway led to sediment build-up at the inlet to the 900 mm diameter highways culvert downstream of the slope drain, and restriction of flow through the culvert under the CP Rail line.		X

COMMENTS

Construction was carried out in winter 2018 to repair an erosion gully and slope instability. The slope drain installed north of the highway became obstructed in spring 2019 leading to erosion and undermining of the HDPE pipe. Reinstatement of the slope drain was carried out on behalf of the MCI in late 2019.

During the 2020 site visit, the flow in the HDPE pipe on the north side was estimated as less than flow in the ditch, possibly due to runoff bypassing under the slope drain.

The v-ditch from the slope drain outlet has been partially eroded but is still functional. A steel culvert beneath the highway at the toe of the embankment remains infilled with sediment as a result of the spring 2019 ditch block overtopping. The sediment plug restricts flows to the south, which also impedes flow from the CSP culvert under the CP Rail line.

When compared to 2019, vegetation was well established across large portions of the repair. The lower portion of the slope drain is covered with straw matting to promote vegetation growth, and the outlet is covered with riprap (150 mm minus) to minimize deflection during outflows. Erosion rills 5 to 50 mm deep were noted where vegetation coverage is poor.

On the south side of the highway, the 2018 granular repair is starting to slough. It appears that surface runoff is contributing to ground saturation, and that the granular fill is acting as a preferential flow pathway. Granular backfill has failed at the toe of the repaired zone, near to the fence line. The head scarp of the sloughing is located 2.8 m upslope from the fence line and is approximately 2 m wide by 1 m high.

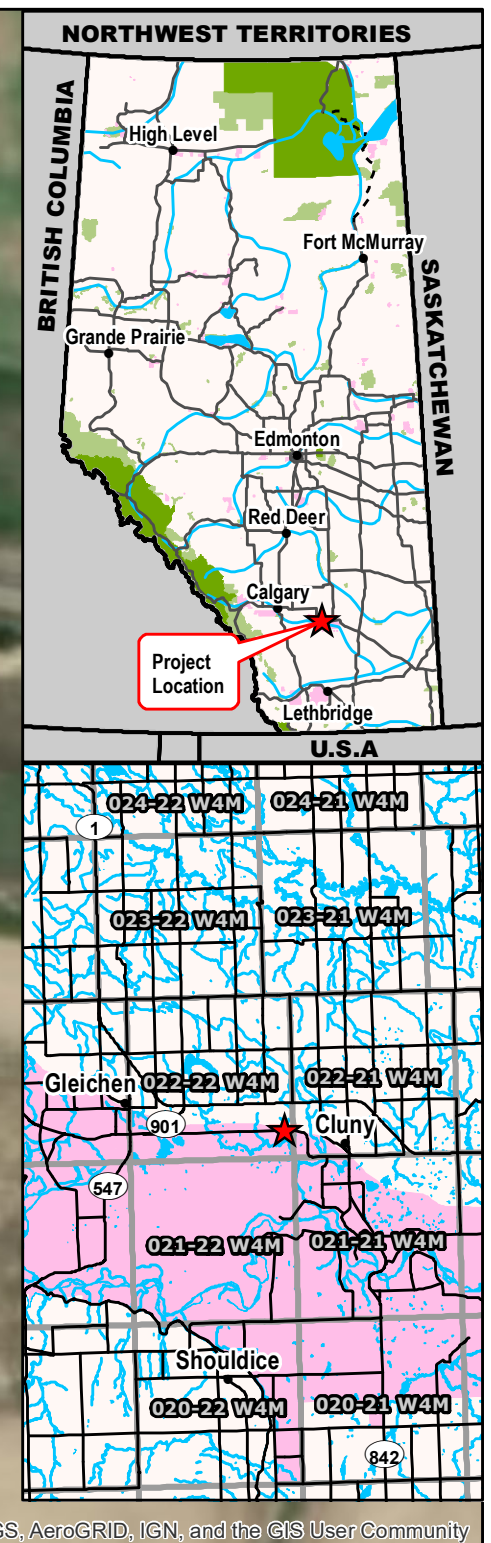
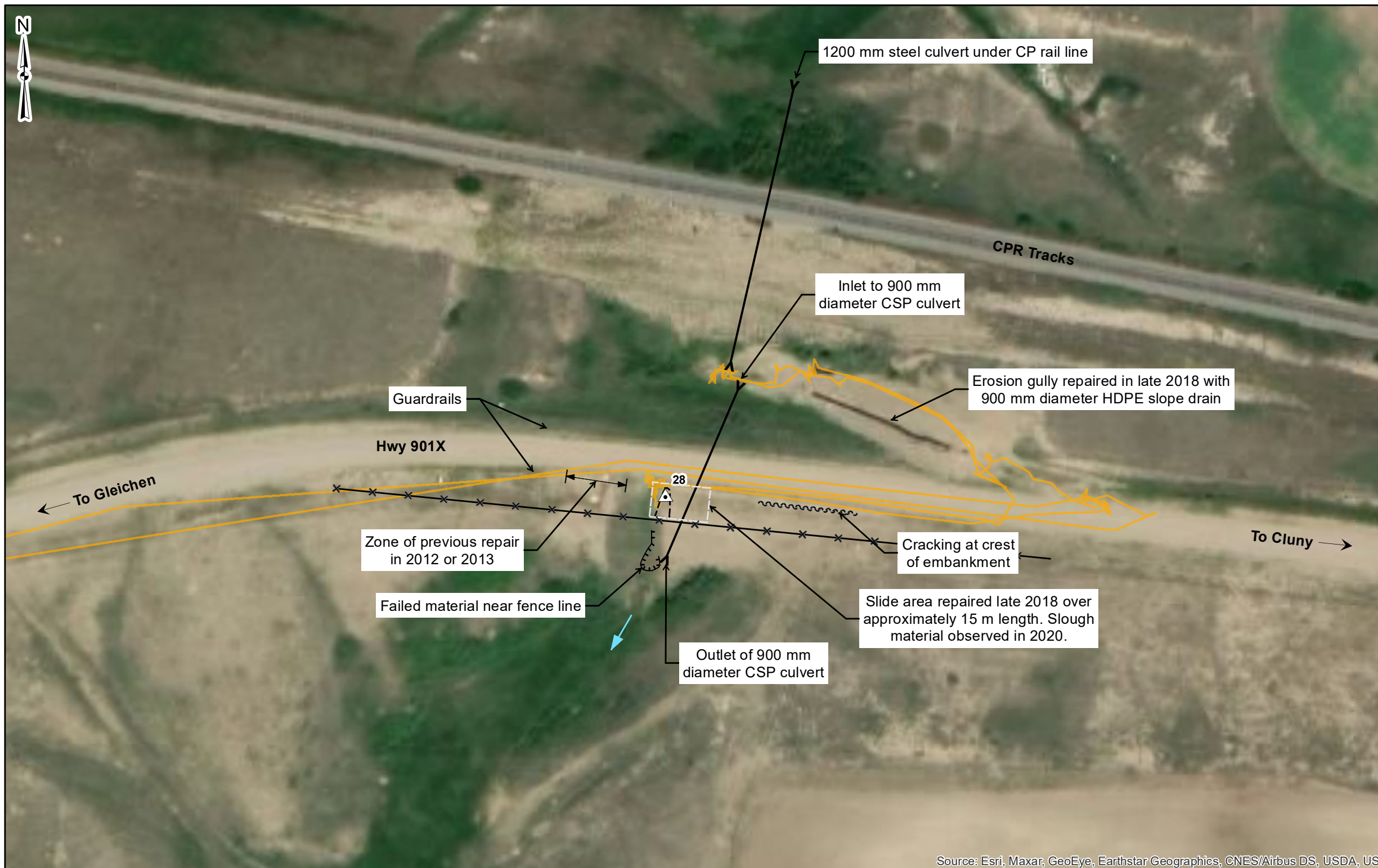
Tension cracking was noted midslope on the east and west sides of the repaired area, and ongoing retrogression of the failure is likely over time. The recently failed material is displacing the fence downslope. Vegetation growth on the slide repair has improved when compared to 2019 observations.

The two CSP culverts at the toe of the north slope should be cleaned out and restored to full functionality to provide highway drainage, and to permit drainage from agricultural land north of the CP Rail line.

It is anticipated that the sloughing on the south side of the highway will retrogress over time, however due to the steepness of the embankment side slope and the height, non-anchored solutions are unlikely to be effective in the long-term.

Recommendations include:

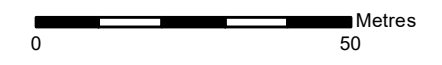
- Improve highway drainage on the south side, construct a berm, or regrade the highway surface to avoid runoff concentrating at the granular repair location (which represents a low point on the south side of the highway).
- Install HDPE geofabric at the inlet to the slope drain to direct all ditch flow into the HDPE pipe. A custom "boot" is recommended around the HDPE pipe to provide a full seal around the pipe.



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

Legend

- GPS Waypoint (July 8, 2020) Main Scarp
- GPS Track (July 8, 2020) Flow Direction
- Failure Material
- Tension Crack
- Fence
- Culvert



NOTES: 1. HORIZONTAL DATUM: NAD83 2. GRID ZONE: UTM Zone 12N 3. IMAGE SOURCE: World Imagery, ESRI ArcGIS Online Source date July 12, 2019	CLIENT 	PROJECT SOUTHERN REGION GEOHAZARD RISK MANAGEMENT PROGRAM
		TITLE Site Plan S055 - East of Gleichen Hwy 901X
SCALE 1:1,200	PROJECT No. A05115A03	FIG No. 1

Time: 22:16:25 PM
 Date: December 03, 2020
 File: Z:\AEDM\A05115A03\ABT Southern Region GRMP\400 Drawings\2020\2. Section BIM\XDS\055_201203.mxd

Photo 1 North side of highway – Reinstated ditch block at slope drain inlet. Small amount of standing water in the highway ditch. Photo taken facing west on July 8, 2020.



Photo 2 Flow in the HDPE pipe. The volume of flow in the slope drain appeared to be lower than the volume of flow in the ditch. Photo taken on July 8, 2020.



Photo 3 North side of highway – View looking upslope from slope drain outlet. Photo taken facing east on July 8, 2020.



Photo 4 North side of highway – Culvert under highway remains blocked with sediment due to 2019 ditch block overtopping. Photo taken facing south on July 8, 2020.



Photo 5 South side of highway – Recent failure at the toe of the repaired section (previously repaired in 2018). Photo taken facing north on July 8, 2020.



Photo 6 South side of highway – Recent failure at the toe of the repaired section (previously repaired in 2018). Photo taken facing south on July 8, 2020.



Photo 7 South side of highway – Failure of 2018 granular embankment repair adjacent to the fence line. Photo was taken facing west on July 8, 2020.

