

SITE NUMBER AND NAME: NC095 – Cloverbar Road at Highway 16 EB	HIGHWAY AND KM: 16:18, km 7.48	PREVIOUS INSPECTION: N/A	CURRENT INSPECTION: June 1, 2023
LEGAL DESCRIPTION: NE 12-53-23-W4M	NAD83 COORDINATES: UTM12U 59638031N, 350446E		RISK ASSESSMENT: PF: 9 CF: 3 Total: 27
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 35,130 (2022)		CONTRACTOR MAINTENANCE AREA (CMA): 510	

SUMMARY OF INSTRUMENTATION: No instruments.	INSPECTED BY: Stantec: Leslie Cho and Sonja Pharand TEC: Rocky Wang, Amy Driessen, Dean Kokotyn and Pramaya Kannel
PRIMARY SITE ISSUE: Shallow slope failure on eastbound lane backslope	
APPROXIMATE DIMENSIONS: 50 m wide x 25 m long	
DATE OF ANY REMEDIAL ACTION: No remedial action to date.	


ITEM	CONDITIONS EXIST		DESCRIPTION AND LOCATION	NOTICEABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress		X			N/A (no previous inspection)
Slope Movement	X		Two scarps approximately 20 m long observed on the upper slope. Another slump observed further downslope. Tension cracks up to 75 mm deep and 25 mm wide.		
Erosion	X		Erosion gully on the west side of the mid-slope slump.		
Seepage		X			
Bridge/Culvert Distress		X			

COMMENTS
<ul style="list-style-type: none"> The pavement on Highway 16 does not appear to show any distress related to the slope movement. Two scarps, 0.3 to 0.4 m high and approximately 20 m long, were observed approximately 5 m downslope from the crest (Photos 1 and 2). The toe of the slump block was observed further downslope, above the wet ditch. A depression in the ground, approximately 1.5 m in diameter, was observed on the east side below the lower scarp. Multiple tension cracks were observed on the slope below the two scarps. Cracks were up to 1.8 m long, 25 mm wide, and 75 mm deep. A well-vegetated slump was observed to the west of the two scarps, beginning mid-slope with the toe located just above the wet ditch. Landslide activity can be observed as early as 2012 from Google Earth imagery. The main scarp does not appear to have retrogressed since 2012, although periodic widening of the landslide and localized failures downslope of the main scarp can be seen.

- A vegetated erosion gully exists to the west of the well-vegetated slump, beginning at the upper slope near the unpaved service road at the crest.
- The south ditch of Highway 16 had ponded water and wetland vegetation such as reeds. This wet ditch extended from a few metres west of the lower slope slump to the highway sign located in the south ditch to the east of the light standard.
- A high spot in the ditch was observed to the east of the highway sign, blocking ditch flow.
- An underground power utility was marked with red flags on the north side of the south ditch, near the edge of the highway. The powerline is likely powering the light standards along eastbound Highway 16.
- Water was observed to be ponding on the unpaved service road at the crest of the slope.
- The landslide appears to be active with indeterminant rates of movement. Landslide activity will likely be driven by precipitation events. As such, a Probability Factor of 9 was assessed for this site. A Consequence Factor of 3 was assessed since the landslide could slide onto the highway. In addition, further landslide retrogression southwards would impact private land.

RECOMMENDATIONS

- In the short-term, the slope should be regraded and revegetated to seal the ground cracks and protect the ground from water infiltration and erosion.
- Long-term remediation may include the following:
 - Improve drainage: Install a centerline culvert to redirect surface water to the median ditch. The high-level cost for the culvert installation is \$300,000 to \$450,000, excluding engineering costs.
 - Improve drainage: Regrade the south ditch to drain water further east (minimum 100 m) beyond the slope failures. The high-level cost for regrading is \$5,000 to \$10,000, excluding engineering costs.
 - Remove and replace: The slide mass could be excavated, and the embankment slope rebuilt with granular fill. The high-level cost for removal and replacement is \$250,000 to \$350,000, excluding engineering costs.
- Site inspections should continue to be completed once per contract cycle.

PREPARED BY: Sonja Pharand, P.Eng.	PREPARED BY: Leslie Cho, M.Eng., P.Eng.
	
REVIEWED BY: Xiteng Liu, M.Sc., P.Eng., PMP	PERMIT TO PRACTICE

2023 Site Inspection Photos at NC095



Photo 1: Overall view of scarps on upper slope. Looking south.



Photo 2: Scarps and surrounding vegetation. Looking west.

2023 Site Inspection Photos at NC095



Photo 3: Ground crack downslope from scarps. Looking south.



Photo 4: Ground crack (1.8 m long) running vertically across the slope, downslope from scarps. Looking west.

2023 Site Inspection Photos at NC095

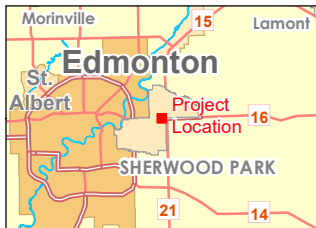
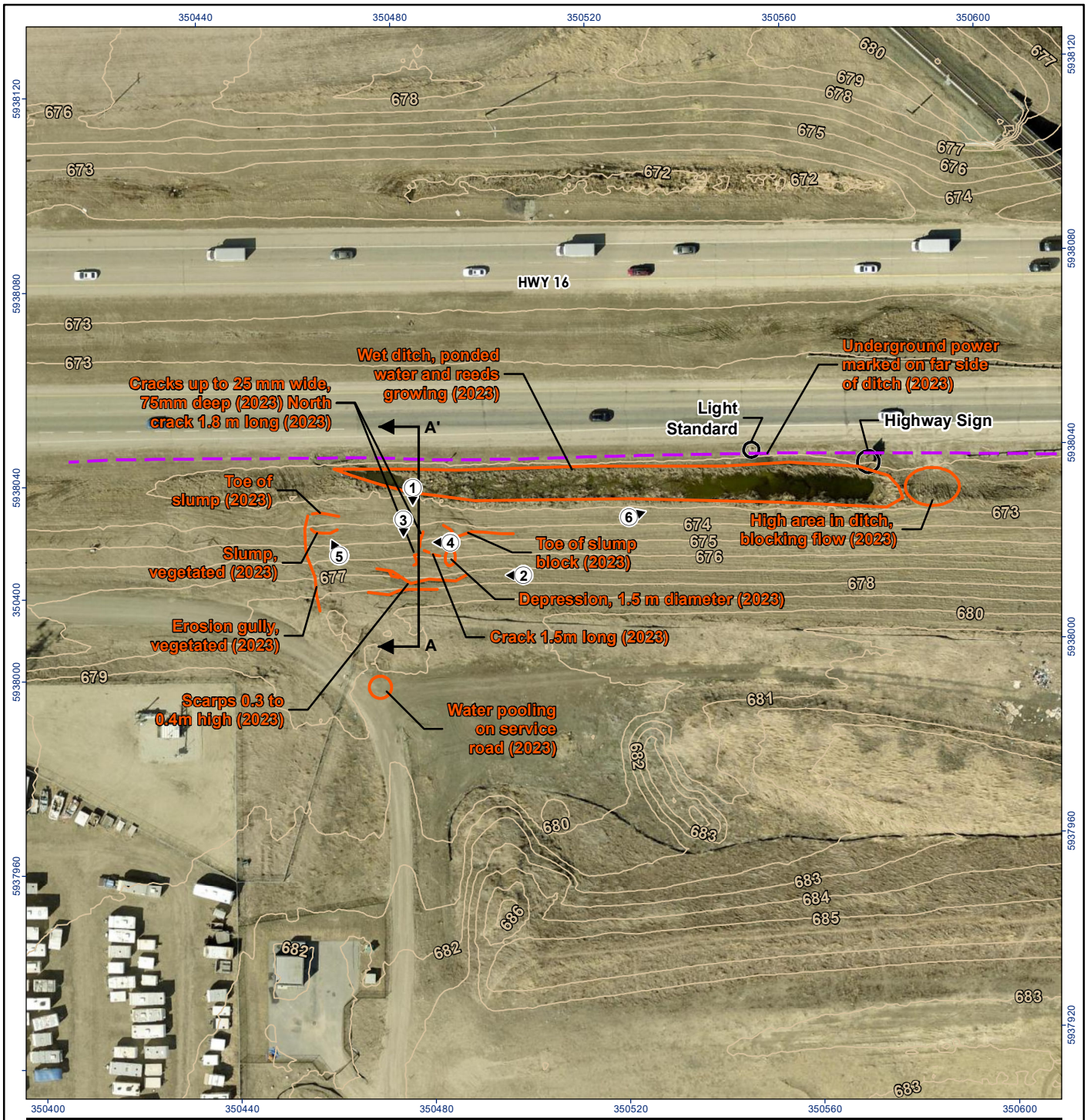


Photo 5: View of west extent of slump looking downslope. Facing northwest.

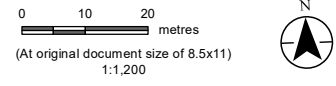


Photo 6: Water ponding in ditch with long grasses and reeds. Looking northeast.

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- Photo Number and Direction
 - U/G Power
 - 2023 Observation
 - Site Feature (Approximate Location)
 - Ground Elevation Contours (m AMSL, LiDAR April-May 2018)
 - Cross Section
- m AMSL metres above mean sea level



Project Location Prepared by AY on 2023-09-05
 NE-12-053-23 W4M TR by LC on 2023-08-28
 Sherwood Park, Alberta IR by XL on 2023-08-28

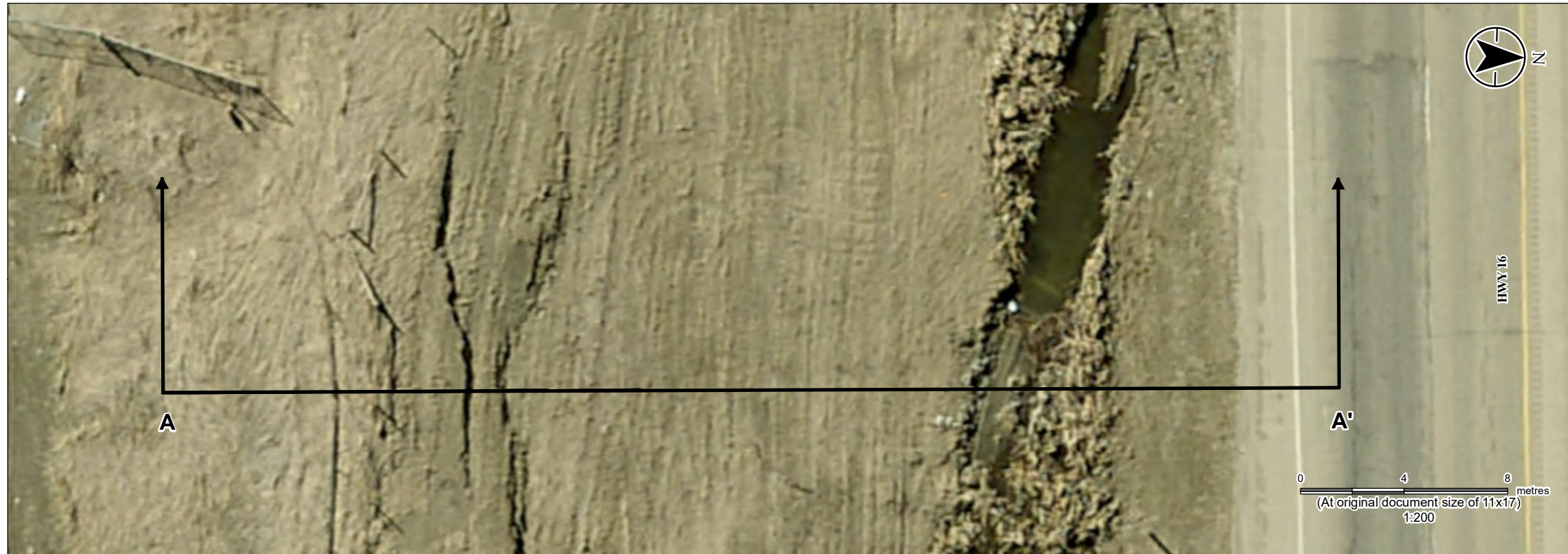
Client/Project Transportation and Economic Corridors 123315222
 Geohazard Monitoring Program
 NC95 - Cloverbar Road at Hwy 16 EB

Figure No.
 1
Title
 Site Plan

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 12N
 2. Data Sources: Geogratis, ©Department of Natural Resources Canada, All rights reserved.
 3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.
 4. Contours created from LiDAR (April-May 2018).

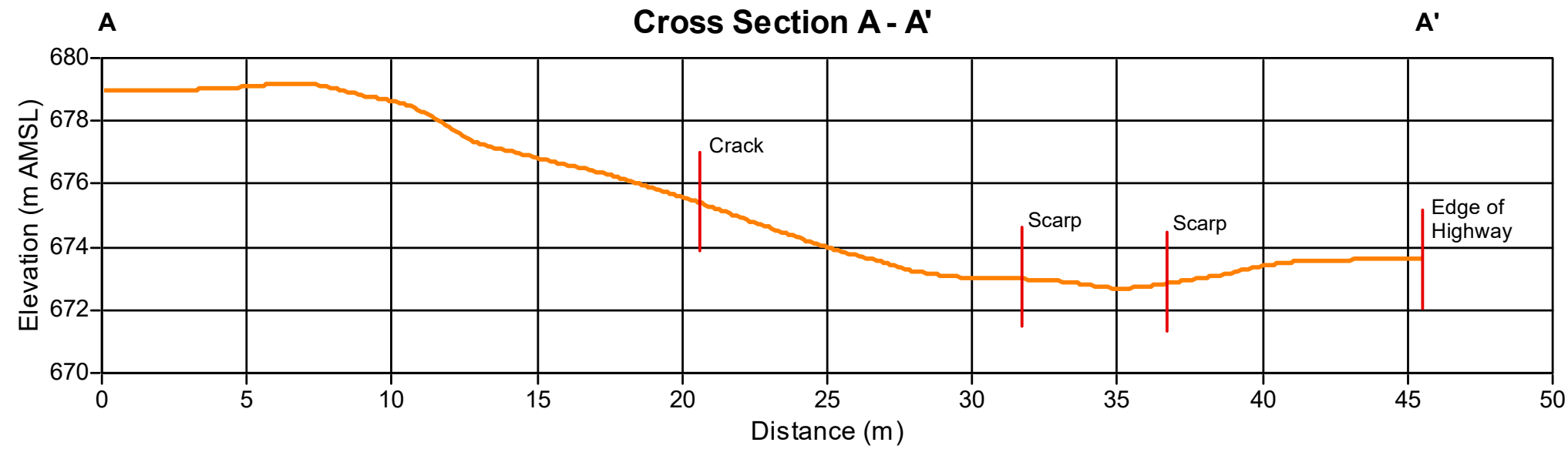
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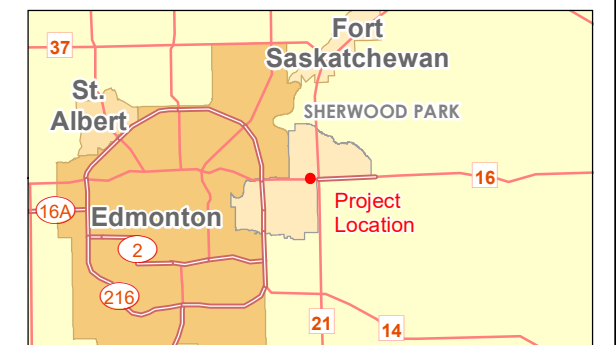


↕ Cross Section

— Approximate Ground Surface
m AMSL (above mean sea level)



- Notes**
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 3. Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.



Project Location
NE-12-053-23 W4M
Sherwood Park, Alberta

Prepared by AY on 2023-09-06
QR by LC on 2023-09-06
IR by XL on 2023-09-06

Client/Project
Transportation and Economic Corridors
Geohazard Monitoring Program
NC95 - Cloverbar Road at Hwy 16 EB

123315222

Figure No.
2

Title
Ground Profile of Section A-A'