


SITE NUMBER AND NAME: NC044 – Cattlepass East	HIGHWAY AND KM: 633:02, km 1.434	PREVIOUS INSPECTION: May 25, 2020	CURRENT INSPECTION: June 15, 2022
LEGAL DESCRIPTION: NW 29-53-6-W5M	NAD83 COORDINATES: UTM11U 5942545N, 642834E		RISK ASSESSMENT: PF: 9 CF: 4 Total: 36
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 410 (2021)		CONTRACTOR MAINTENANCE AREA (CMA): 509	

SUMMARY OF INSTRUMENTATION: Two slope inclinometers, one pneumatic piezometer and two vibrating wire piezometers are operational at this site. LAST READING DATE: N/A	INSPECTED BY: Stantec: Leslie Cho, Sonja Pharand AT: Rocky Wang, Amy Driessen, Kathleen Davis
PRIMARY SITE ISSUE: Slope instability due to relatively high embankment over soft ground with shallow groundwater level.	
APPROXIMATE DIMENSIONS: 170 m along the road by 75 m wide.	
DATE OF ANY REMEDIAL ACTION: Toe berm was constructed in 2011. Pavement overlaid in 2013, and the westbound lane was patched in 2014. The westbound lane and parts of the eastbound lane were patched in June 2017.	

ITEM	CONDITIONS EXIST		DESCRIPTION AND LOCATION	NOTICEABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Cracks reflecting through overlay and patches.	X	
Slope Movement	X		Pavement cracks are present along the highway, continued creep measured by slope inclinometers.	X	
Erosion	X		Erosion gully along the north ditch near west end of pavement patch.		X
Seepage		X			X
Culvert Distress	X		Ponded water at both ends of the culvert. Culvert inlet submerged in the north.		X
Other		X			X

COMMENTS
<ul style="list-style-type: none"> The cracking pattern on the highway appeared mostly similar to the previous inspection as shown in Photos 1 to 4. A new crack had developed upslope from BH17-01 and SI05-7 and is shown in Photo 3. Potential toe bulging was observed downslope from the new crack as shown in Photo 5. SI17-01 shows continued movement at a rate of about 2 mm/yr between 6 m and 10 m depth. SI17-02 shows creep between 12 and 16 m. Ongoing movement may be due to high pore pressures at the site. A possible source of water infiltration into the slope is through the erosion channel on the north ditch. The ponded water on both ends of the culvert may also be infiltrating into the slope. Groundwater levels in PN05-8 and VW17-02 are within 1 m of ground surface while VW17-01 is about 3 m below ground surface. Standing water was observed at both ends of the culvert as shown in Photos 6 and 7. Water appeared to be flowing through the culvert. There appears to be little grade for water to drain from the culvert outlet. The berm was grass covered with no visible signs of distress observed. Erosion is ongoing in the north ditch as shown in Photo 8.

RECOMMENDATIONS
<ul style="list-style-type: none"> • Short term recommendations include sealing of any cracks to reduce surface water infiltration into the slope and pavement structure. Additional pavement patches are not recommended since it is considered an additional driving force on the embankment. Mill and fill could also be completed such that the final pavement elevation is not higher than the existing elevation. • The MCI should continue to inspect the culverts on site on a regular basis to reduce the risk of pore pressures building up in the berm and slope and to maintain functionality. • Grading may be considered at the culvert inlet to reduce the amount of ponded water. However, grading works would likely occur outside of AT's right-of-way. • The erosion gully in the north ditch should be repaired to reduce seepage of water into the slope and under the highway. • Long-term remediation may consist of lowering the overall highway grade to reduce the driving force on the slope. The high-level cost of grade reduction is \$1.8 Million minus engineering costs. Alternatively, reconstruction of the highway using lightweight fill may also help reduce the driving force on the slope. The high-level cost for reconstruction using lightweight fill is \$6.0 Million. • Site inspections frequency should remain at every two years with instrumentation monitoring completed annually in the spring.

PREPARED BY: Sonja Pharand, E.I.T.	PREPARED BY: Leslie Cho, M.Eng., P.Eng.	REVIEWED BY: Xiteng Liu, M.Sc., P.Eng., PMP
		

2022 Site Inspection Photos at NC044



Photo 1: Pavement cracks at east limits of 2017 patch. Looking west.



Photo 2: Pavement cracks along Highway 633. Looking west.

2022 Site Inspection Photos at NC044



Photo 3: Pavement cracks along Highway 633. Looking west.



Photo 4: Pavement cracks at west limits of 2017 patch. Looking east.

2022 Site Inspection Photos at NC044



Photo 5: Potential bulging near SI05-7. Looking northwest.



Photo 6: Ponded water at culvert inlet in the north. Looking northeast.

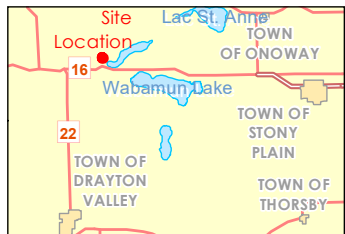
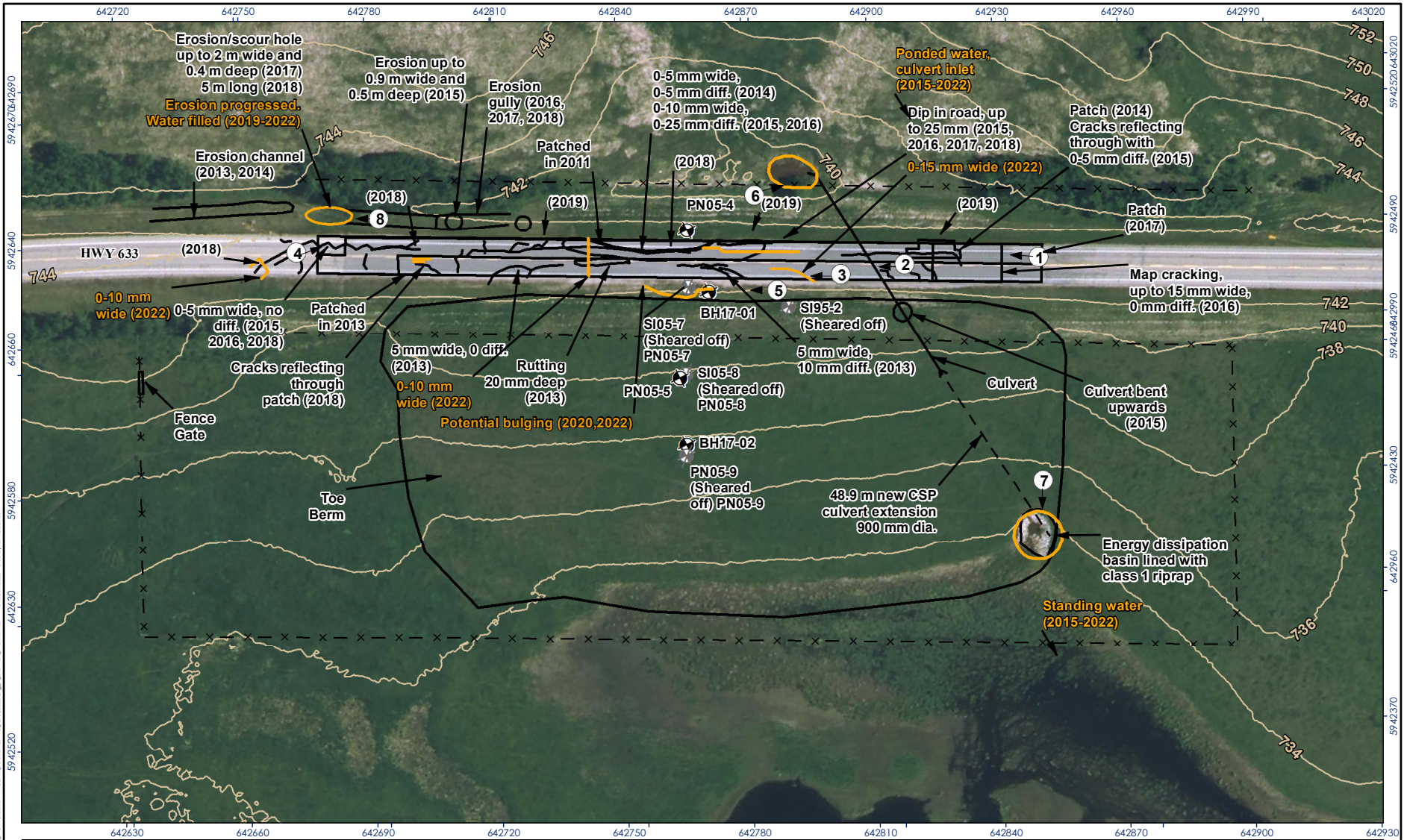
2022 Site Inspection Photos at NC044



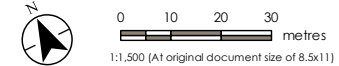
Photo 7: Ponded water at culvert inlet in the south. Looking south.



Photo 8: Erosion gully along north ditch of Highway 633. Looking southwest.



- Borehole Location
- Non-Operational Instrument
- Previous Observation
- 2020 Observation
- Fence
- Ground Elevation Contours (m AMSL, LiDAR May 2015)
- Approximate Photo Location and Direction



- Notes**
- Coordinate System: NAD 1983 UTM Zone 11N
 - Base features: Geogratis, ©Department of Natural Resources Canada. All rights reserved.
 - Imagery: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Project Location: Hwy 633, Parkland County, Alberta
 Prepared by SJ on 2022-09-23
 Quality Review by LC on 2022-09-27
 Independent Review by XL on 2022-09-28

Client/Project: Alberta Transportation
 Geohazard Monitoring Program
 NC44 Cattle Pass East

Figure No. 1
 Title: **Site Plan**