

SITE NUMBER AND NAME: NC080 – Fickle Creek Slide	HIGHWAY AND KM: 47:06, km 39.608	PREVIOUS INSPECTION: July 15, 2021	CURRENT INSPECTION: June 17, 2022
LEGAL DESCRIPTION: SE-24-51-19-W5	NAD83 COORDINATES: UTM11U 5918635N, 522484E		RISK ASSESSMENT: PF: 7 CF: 7 Total: 49
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 1,060 (2021)		CONTRACTOR MAINTENANCE AREA (CMA): 508	

SUMMARY OF INSTRUMENTATION: One slope inclinometer and two pneumatic piezometers functional	INSPECTED BY: Stantec: Leslie Cho, Sonja Pharand AT: Rocky Wang, Amy Driessen, Dave Farr, Howard Hawley
LAST READING DATE: July 3, 2021	
PRIMARY SITE ISSUE: Embankment failure likely associated with precipitation and erosion around culvert.	
APPROXIMATE DIMENSIONS: 60 m wide x 30 m long	
DATE OF ANY REMEDIAL ACTION: Driven steel pile wall constructed in Fall 2013. Side slope regraded and tension cracks filled in Fall 2014. 1200 mm diameter culvert relined in winter 2014. Milled and paved in September 2015.	


ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICEABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Cracks reflecting through overlay on northbound lane (NBL). Dip on NBL more apparent.	X	
Slope Movement	X		Cracks reflecting through pavement overlay. Dip in pavement towards southeast more apparent. Slope movement below pile wall.	X	
Erosion	X		Deeper scour hole above 750 mm dia. culvert outlet. Creek bank erosion/slump at 1200 mm dia. culvert outlet. Erosion northeast of 1200 mm dia. culvert inlet. Erosion below 400 mm diameter down drain outlet. Erosion channel forming on west slope north of 1200 mm dia. culvert inlet.	X	
Seepage		X			X
Bridge/Culvert Distress	X		Inlet of 750 mm dia. culvert lifted above ground. Water flowing under culvert and entering culvert at the next segment.		X

COMMENTS
<ul style="list-style-type: none"> • The pavement cracking (Photos 1 and 2) appeared to be similar to the 2021 inspection and generally consisted of: <ul style="list-style-type: none"> – Approximately 40 m long curvilinear crack along NBL. – Approximately 25 mm dip to the southeast in the south third of the curvilinear crack. The dip was more apparent than during the previous inspection. • During the inspection, multiple trucks drove into oncoming traffic to avoid the dip in the pavement. • The MCI noted that the pavement surface will be seal coated and crack sealing this year. The MCI also informed Stantec that frost heaving was previously observed at the site.

- Potential hairline cracks observed in 2021 on the outside of the guardrail of the NBL near the south limit of the overlay were not observed during this visit.
- SI13-01 showed less than 1 mm of incremental movement corresponding to a movement rate of less than 1 mm/year since the Spring 2021 readings. This SI is installed downslope of the pile wall and may not be indicative of movement upslope of the wall.
- The scour hole above the 760 mm diameter culvert remains 1.2 m wide. A void was observed below the ground in the scour hole 1 m deep bringing the total depth of scour to 2.2 m (Photo 3).
- The erosion near the outlet of the 1200 mm dia. culvert worsened. The scarp has receded to 3.3 m behind the edge of creek and is about 2.2 m wide and 1.2 m deep (Photo 4). Additional erosion was observed to the south of this feature, with minor slumping.
- An erosion gully was observed on the slope between the 400 mm downdrain and the 760 mm diameter culvert outlet. The channel is well vegetated and may not be new (Photo 7).
- A smaller erosion gully upslope from the erosion gully north of the 1200 mm dia. culvert inlet was observed. The smaller erosion gully was about 500 mm wide and 450 mm deep and extended to about 2 m short of the north tree line (Photos 5 and 6).
- A 1.2 m deep scour hole exists at the 400 mm diameter down drain and appears unchanged from the 2021 inspection.
- The 760 mm diameter culvert inlet was lifted with water flowing under the culvert. Very slow flow of water was observed at the outlet.

RECOMMENDATIONS

- All pavement cracks should be sealed to reduce surface water infiltration into the slide mass. Mill and fill may also be completed to improve the rideability of the highway (i.e. smoothen dips and repair cracks) and to avoid additional loading on the ground surface.
- Since there are no functional instruments above the pile wall, two lines of survey control points can be installed to monitor movement of the embankment above the pile wall. Alternatively, replacement inclinometers can be considered to monitor pile wall performance.
- Riprap or gravel can be placed at the downdrain to reduce scouring. If left unchecked, the erosional scour may remove additional material and trigger a slope failure on the west side of the highway.
- Riprap can be placed along the creek at the outlet of the 1200 mm dia. culvert to reduce toe erosion of the slump. This slump should be backfilled and reseeded.
- The scour hole above the 760 mm diameter culvert outlet should be backfilled and reseeded.
- The 760 mm diameter culvert should be inspected using CCTV to determine if the pipe is broken. A replacement culvert may be required to facilitate creek flow.
- A french drain could be considered on the shoulder of the highway to help with frost heave. The estimated cost of construction for a 60 m long, 3 m deep French drain is \$85,000 to \$100,000 excluding the cost of engineering.
- The site should continue to be inspected every two years with the next visit in 2024.
- Instrumentation monitoring should continue 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 NC080



Photo 1: Arched crack near SI13-02. Looking southwest.



Photo 2: Pavement dip near south end of overlay. Looking southwest.

2022 Site Inspection Photos at NC080



Photo 3: Scour hole above 760 mm diameter culvert. Looking west.



Photo 4: Slump/erosion at outlet of 1200 mm diameter culvert. Looking east.

2022 Site Inspection Photos at NC080



Photo 5: Erosion gully north of 1200 mm diameter culvert inlet. Looking southwest.



Photo 6: New erosion gully leading to old gully shown in Photo 5. Looking southwest.

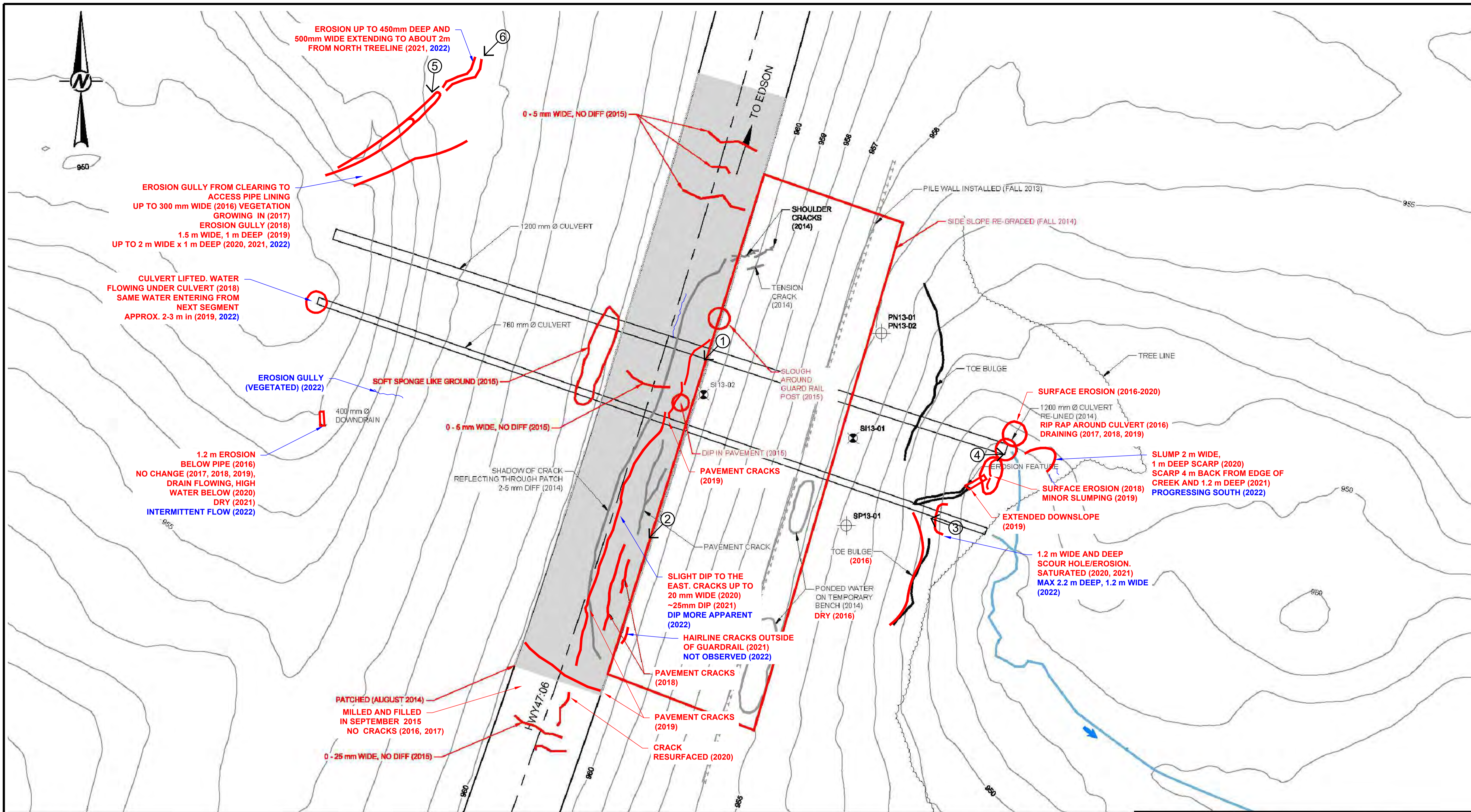
2022 Site Inspection Photos at NC080



Photo 6: Water flowing under 780 mm diameter culvert. Looking southeast.



Photo 7: Vegetated erosion gully on southwest side of highway. Looking east.



- LEGEND**
- FLOW ARROW
 - CONTOUR (5 m INTERVAL)
 - WATER COURSE
 - ⊕ PIEZOMETER LOCATIONS
 - ⊗ SLOPE INCLINOMETER LOCATIONS
 - ⊙ DRIVEN STEEL PILE
 - ①→ PHOTO NUMBER AND DIRECTION

- NOTES**
1. FEATURE LOCATIONS ARE APPROXIMATE.
 2. PREVIOUS OBSERVATIONS SHOWN IN BLACK.
 3. 2015-2021 OBSERVATIONS SHOWN IN RED
 4. 2022 OBSERVATIONS SHOWN IN BLUE

REFERENCE
 LIDAR CONTOURS OBTAINED FROM CLIENT.





STANTEC CONSULTING
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 EDMONTON, ALBERTA, CANADA
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ALBERTA TRANSPORTATION
 GEOHAZARD MONITORING PROGRAM
 NC80 FICKLE CREEK SLIDE
 SITE PLAN

DRAWN WW / MK	CHECK XL	APPROVE LC	
DATE 04 OCT. 2022	SCALE AS SHOWN	PROJECT # 123315222	

FIGURE - 1