



**NORTH CENTRAL REGION GRMP
EDSON / STONY PLAIN
SITE INSPECTION FORM**



SITE NUMBER AND NAME: NC050 – Gregg River Slide	HIGHWAY AND KM: 40:28, km 11.752	PREVIOUS INSPECTION: May 16, 2019	CURRENT INSPECTION: July 15, 2021
LEGAL DESCRIPTION: NW-33-47-24-W5	NAD83 COORDINATES: UTM11U 5883282N, 469320E		RISK ASSESSMENT: PF: 3 CF: 4 Total: 12
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 180 (2020)		CONTRACTOR MAINTENANCE AREA (CMA): 508	

SUMMARY OF INSTRUMENTATION: Four slope inclinometers and three pneumatic piezometers functional	INSPECTED BY: Stantec: Leslie Cho and Carrie Murray AT: Bernard Ching, Rishi Adhikari, Kathleen Davis, Howard Hawley, and Dave Farr
LAST READING DATE: July 3, 2021	
PRIMARY SITE ISSUE: Rotational slide with backscarp in westbound lane (WBL) at pile wall site. Retrogressive surficial skin slides at culvert site.	
APPROXIMATE DIMENSIONS: 80 m wide by 6 m deep. Unclear where toe of slide is located.	
DATE OF ANY REMEDIAL ACTION: Pile wall (1800 mm dia.) installed in 2010. Repaired separation of half-round culvert at culvert site in 2015. Cleaned backslope slump material in south ditch in summer 2016. Ditch blocks removed from south ditch in 2017.	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICEABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress		X			
Slope Movement	X		Ground crack about 40 m west of retrogressive scarp. Several skin slides on highway backslope. Retrogressive skin slides on both sides of the half-round culverts.		X
Erosion	X		Concrete piles more exposed along pile wall. Erosion at skin slides near half-round culverts. Erosion along highway shoulder from pile wall site to culvert site.		X
Seepage	X		Seepage along north ditch between pile wall site and culvert site. Seepage previously observed east of half-round culvert within skin slides.		X
Bridge/Culvert Distress	X		Slight sag in centerline (C/L) culvert near Station 1+150 at pile wall site. Twisting of braces/supports at the two half-round culverts at culvert site. Sag in both 1000 mm diameter (dia.) corrugated steel pipe (CSP) culverts at culvert site.	X	

COMMENTS
<ul style="list-style-type: none"> The <u>pile wall site</u> generally remained unchanged from the previous site visit in 2019 (Figure 1). Observations include: <ul style="list-style-type: none"> An old retrogressive scarp downslope from the pile wall, about 1.5 m high. Ground crack about 40 m west of the retrogressive scarp. Several seepage locations with oxide staining in the north ditch between the culvert site and the pile wall site. The north ditch was also wet.

- The north ditch shoulder had numerous erosion rills between the culvert site and the pile wall site.
- The skin slides on the highway backslope were well vegetated.
- The C/L culvert at the pile wall site had a slight sag near the outlet approximately in line with the pile wall location. The first and second segment at the inlet was also separated with water possibly ponding or infiltrating the ground at the separation
- New transverse pavement cracking was observed several meters west of the C/L culvert at pile wall site.
- Increased erosion was observed as evidenced by more concrete piles being exposed along the downslope side.
- SI10-11 to SI10-13 were installed in the concrete piles and monitoring results suggests the pile wall is performing well with little to no deflection in the piles. Total cumulative movement ranges from 0 mm to 7 mm since 2010.
- The culvert site had little to no change since the previous inspection (Figure 2).
 - There was no apparent change to pavement cracking upslope from the skin slides.
 - The skin slides on both sides of the culverts appeared unchanged. Seepage at the skin slides was not observed this year.
 - The bracings along the half-round culverts appeared twisted and distressed.
 - Slumping continues to occur east of the skin slides within the treed area. Leaning mature coniferous trees were observed during this inspection. The scarp at this slump was about 4 m wide and 1 m deep and appeared fresh.
 - The old scarp south of PN09-10 appeared unchanged.
- Water was slowly trickling out of the two old (non-functional) culverts near the toe of the slope adjacent to the river. The location of the inlet of these two culverts are unknown.
- A sag was observed in both 1000 mm dia. culverts approximately at the highway location. Culvert flow is also undermining both culverts at the transition from full-round to half-round culvert.

RECOMMENDATIONS

- All culverts should be inspected to reduce the risk of water seeping into the slope.
- The separation of the C/L culvert at the pile wall site should be repaired by resetting the beveled inlet and securing it to the rest of the culvert with anchor rods.
- Survey data is not available for the culvert site. At a minimum, historical LiDAR should be purchased to inform potential long-term remedial designs. Repeat LiDAR data sets or InSAR satellite monitoring can be used to estimate the rate of slope movement or slide retrogression towards the highway.
- Should the landslide movement retrogress further towards the highway, or increased distress to the highway be observed, a concrete pile wall could be used to remediate the culvert site. The high-level cost estimate for a 140 m long x 20 m deep concrete pile wall is \$3.5 million, excluding engineering.
- No long-term remediation is required at the pile wall site.
- The site should continue to be inspected every two years with the next visit in 2023. Future inspections should place more focus on the culvert site and less on the pile wall site.
- Instrumentation monitoring should continue annually in the spring.

PREPARED BY: Leslie Cho, M.Eng., P.Eng.

REVIEWED BY: Carrie Murray, M.Eng., P.Eng.

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2021 Site Inspection Photos at NC050

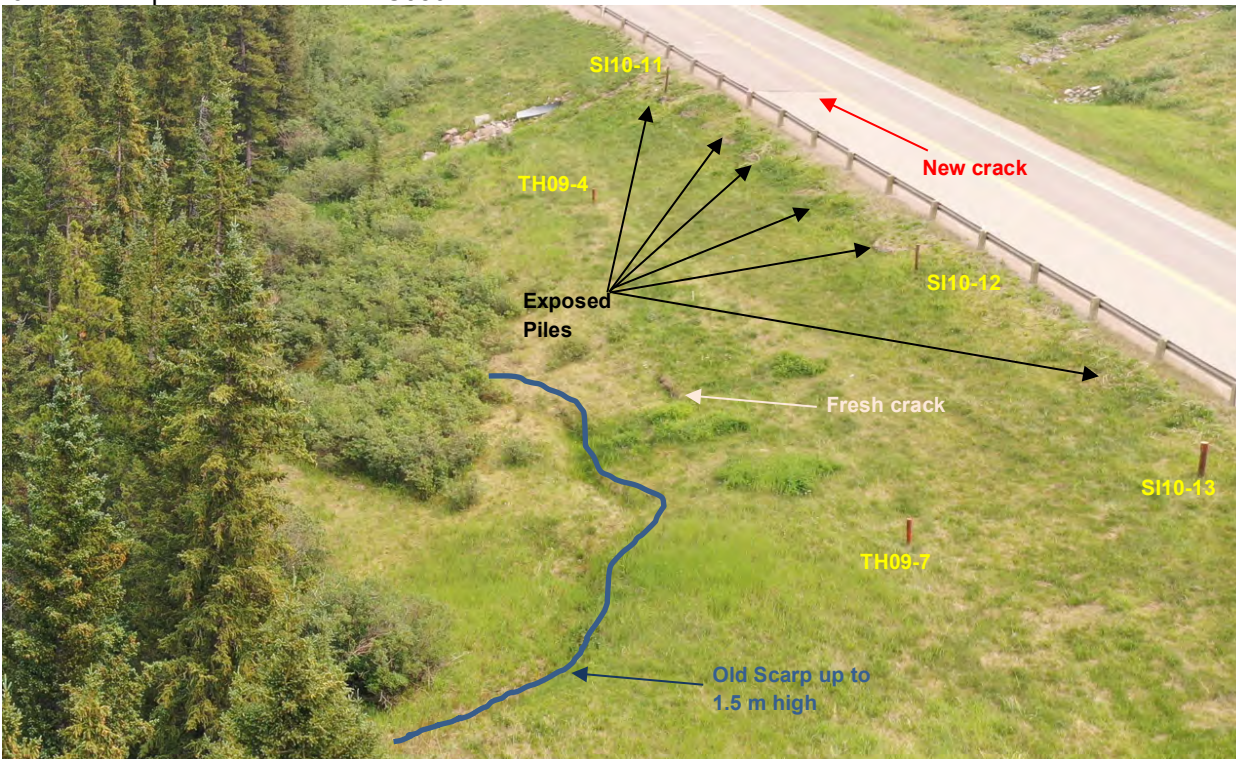


Photo 1: Taken with a drone looking southeast.



Photo 2: Separation between first and second segment of C/L culvert at inlet. Looking north.

2021 Site Inspection Photos at NC050



Photo 3: New pavement crack west of C/L culvert at pile wall site. Looking north.



Photo 4: Exposed tops of concrete piles. Looking southeast.

2021 Site Inspection Photos at NC050



Photo 5: Seepage along north ditch between pile wall site and culvert site. Multiple erosion rills along shoulder visible. Taken with drone looking east.

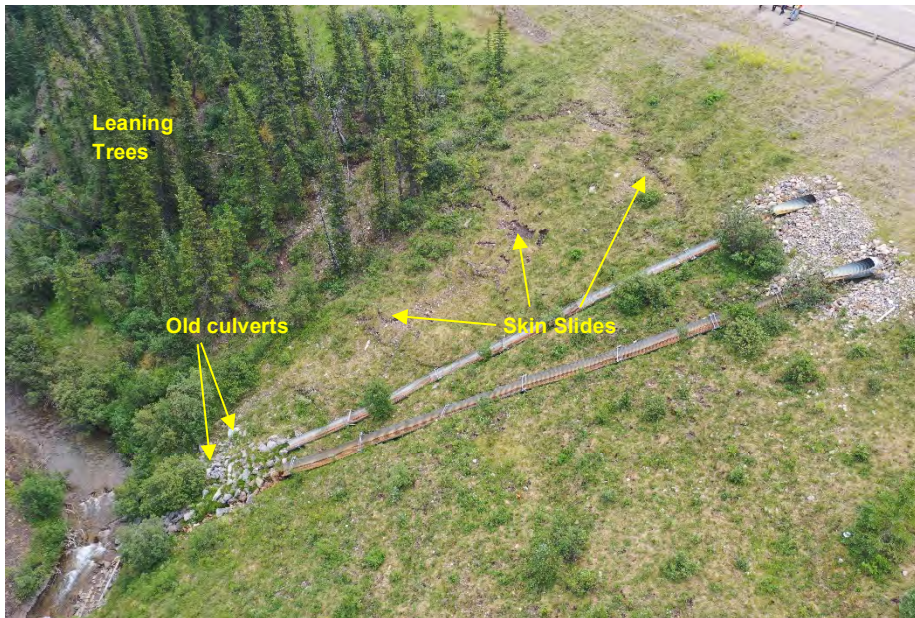


Photo 6: Culvert site. Note twisted culvert bracing and skin slides. Taken with drone looking east.

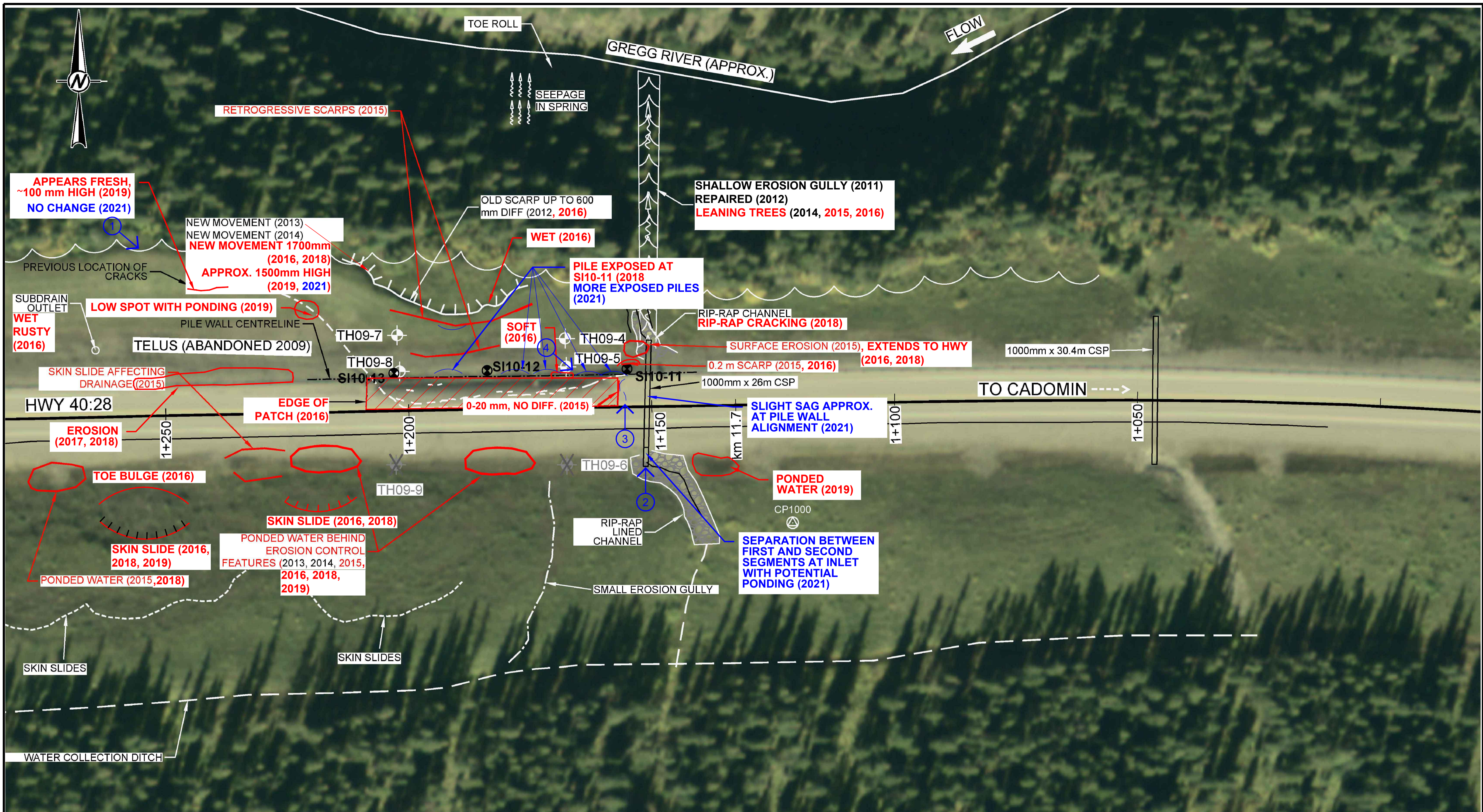
2021 Site Inspection Photos at NC050



Photo 7: Water undermining culvert. Looking east.



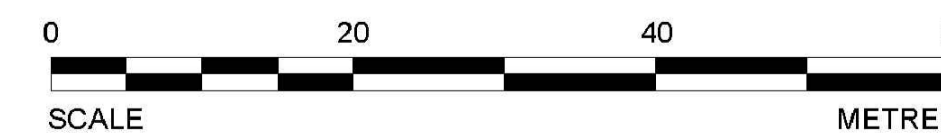
Photo 8: Twisted bracing along half-round culverts. Looking southwest.



- LEGEND**
- APPROXIMATE LOCATION OF 2010 SLOPE INCLINOMETER
 - APPROXIMATE LOCATION OF PREVIOUS TEST HOLES
 - DESTROYED SLOPE INCLINOMETER OR STANDPIPE PIEZOMETER
 - PHOTO NUMBER AND DIRECTION**

- NOTES**
1. FEATURE LOCATIONS ARE APPROXIMATE
 2. PREVIOUS OBSERVATIONS SHOWN IN BLACK
 3. 2015-19 OBSERVATIONS SHOWN IN RED
 4. 2021 OBSERVATIONS SHOWN IN BLUE

REFERENCE
 THURBER ENGINEERING LTD, PROJECT #15-16-258,
 ORIGINAL SCALE 1:1,000, DATE AUGUST 2011.



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ALBERTA TRANSPORTATION
 GEOHAZARD MONITORING PROGRAM
 NC50 GREGG RIVER SLIDE
 PILE WALL SITE PLAN

DRAWN WW / MK	CHECK CM	APPROVE LC
DATE 03 SEPT. 2021	SCALE AS SHOWN	PROJECT # 123315222

FIGURE 1

