NORTH CENTRAL REGION GRMP
EDSON / STONY PLAIN
SITE INSPECTION FORM

SITE NUMBER AND NAME:	HIGHWAY AND KM:	PREVIOUS INSPECTION:	CURRENT INSPECTION:
NC059 – Little Paddle River Slide	43:16, km 41.439	May 14, 2019	June 16, 2022
LEGAL DESCRIPTION:	**NAD83 COORDINATES:**		**RISK ASSESSMENT:**
SW 31-57-8-W5M	UTM11U 5981523N, 619300E		PF: 3 CF: 4 Total: 12
AVERAGE ANNUAL DAILY TRAFFIC (AADT):		**CONTRACTOR MAINTENANCE AREA (CMA):**	
7,330 (2021)		509	

SUMMARY OF INSTRUMENTATION:	INSPECTED BY:
Four slope inclinometers and four pneumatic piezometers functional. **LAST READING DATE:** May 4, 2022	Stantec: Leslie Cho, Sonja Pharand AT: Rocky Wang, Amy Driessen, Kathleen Davis, and Tim Germyn

PRIMARY SITE ISSUE:

Main Slide Site: Movement in the high plastic clay layer above the high plastic clay-clay till interface and high pore water pressures.

Bridge Abutment Site: Fill settlement of headslope, surface water drainage and bank erosion.

APPROXIMATE DIMENSIONS:

Main Slide Site: 180 m long (along highway) x 70 m wide x 8 m deep

DATE OF ANY REMEDIAL ACTION:

In 2006, the slide mass was partially excavated and rebuilt with a 3 m high berm, wick drains, and stone columns. The westbound lane was patched in Summer 2013.

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICEABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Pavement cracking on Highway 43, both eastbound and westbound lanes.		X
Slope Movement	X		Creep movement observed in slope inclinometer readings		X
Erosion	X		Erosion on both banks of the Little Paddle River. Erosion/ scouring at culvert outlet southeast of SI14-27		X
Seepage		X			
Bridge/Culvert Distress	X		Top of culvert outlet slightly deformed.		X

COMMENTS

- Both the main slide site and bridge abutment sites were visited during this investigation. The bridge site was last inspected in 2018 after which the focus was directed at the main slide site as per AT's direction. Stantec recently completed a InSAR change detection study along Highway 43 which includes Site NC059. This inspection allowed for Stantec to field verify the InSAR observations. The observations include:
  - Ongoing bank erosion east of the westbound bridge (Photo 2). This feature was reflected in the InSAR study.
  - Well vegetated erosion gully southeast of the bridge at the centerline of the culvert outlet. This feature was reflected in the InSAR study.
  - Exposed H-piles were observed under the westbound bridge at the southeast abutment (Photo 3).
  - Transverse cracks were observed across both bridges at the southeast abutment locations (Photos 4 and 5). These are likely unrelated to geohazards.

- Pavement cracking was observed on both the eastbound and westbound lanes of Highway 43. No obviously new cracks were observed (Photo 6).
- A 10 m long by 1.8 m wide by 1.1 m deep erosion gully was observed in 2018 at the outlet of the 600 mm diameter culvert southeast of SI05-20. During the current inspection, the gully was found to be full of water and slow flowing. The water depth was 0.9 m. No water could be seen flowing into the outlet, but water is flowing out of the outlet which could mean that there is damage to the culvert and water is entering from elsewhere (Photo 7).
- There appears to be continual riverbank erosion with new scarps and ongoing slumping along the Little Paddle River (Photos 8 to 10).
- The slide is moving within the high plastic clay layer just above the interface with the underlying clay till. This slide is likely driven by high pore water pressures as well as erosion of the embankment toe by the Little Paddle River. The slope inclinometers continue to show creep movement, with the highest rate of movement being observed at SI05-20 and SI14-28, with an annualized rate of movement of approximately 1 to 3 mm/yr.
- Piezometric levels at the site remain elevated. At the last reading (Spring 2022), the water levels ranged between 1.8 m below ground surface and 0.2 m above ground surface.
- Given the standing water and wet ground conditions observed at site, surface drainage continues to be an issue.

RECOMMENDATIONS

- All pavement cracks should be sealed to reduce surface water infiltration into the slope and pavement structure.
- The erosion gully at the 600 mm diameter culvert should be regraded to discourage water ponding.
- Stantec has completed a remediation design and tender package consisting of installing a pile wall. The tender package is currently with AT.
- The site should continue to be inspected once per contract cycle with focus on the main slide site.
- Instrumentation readings should continue to be collected 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
	PROFESSIONAL ENGINEER ALBERTA LESLIE CHO 2022-10-13 ID# 139079	

PERMIT TO PRACTICE
STANTEC CONSULTING LTD.
Signature _____ ID 78675
Date 2022-10-13
PERMIT NUMBER: P 0258
The Association of Professional Engineers and Geoscientists of Alberta

2022 Site Inspection Photos at NC059

Photo 1: Highway 43 bridges and river embankments. Looking west.

Photo 2: Bank erosion progressing east from westbound bridge. Looking north.

2022 Site Inspection Photos at NC059

Photo 3: Corrosion on exposed H-piles under south abutment of westbound bridge. Looking east.

Photo 4: Pavement surface of the westbound bridge on Highway 43. Looking northwest.

2022 Site Inspection Photos at NC059

Photo 5: Pavement surface of the eastbound bridge on Highway 43. Looking northwest.

Photo 6: Pavement cracks, southwest of SI14-26. Looking southeast.

2022 Site Inspection Photos at NC059

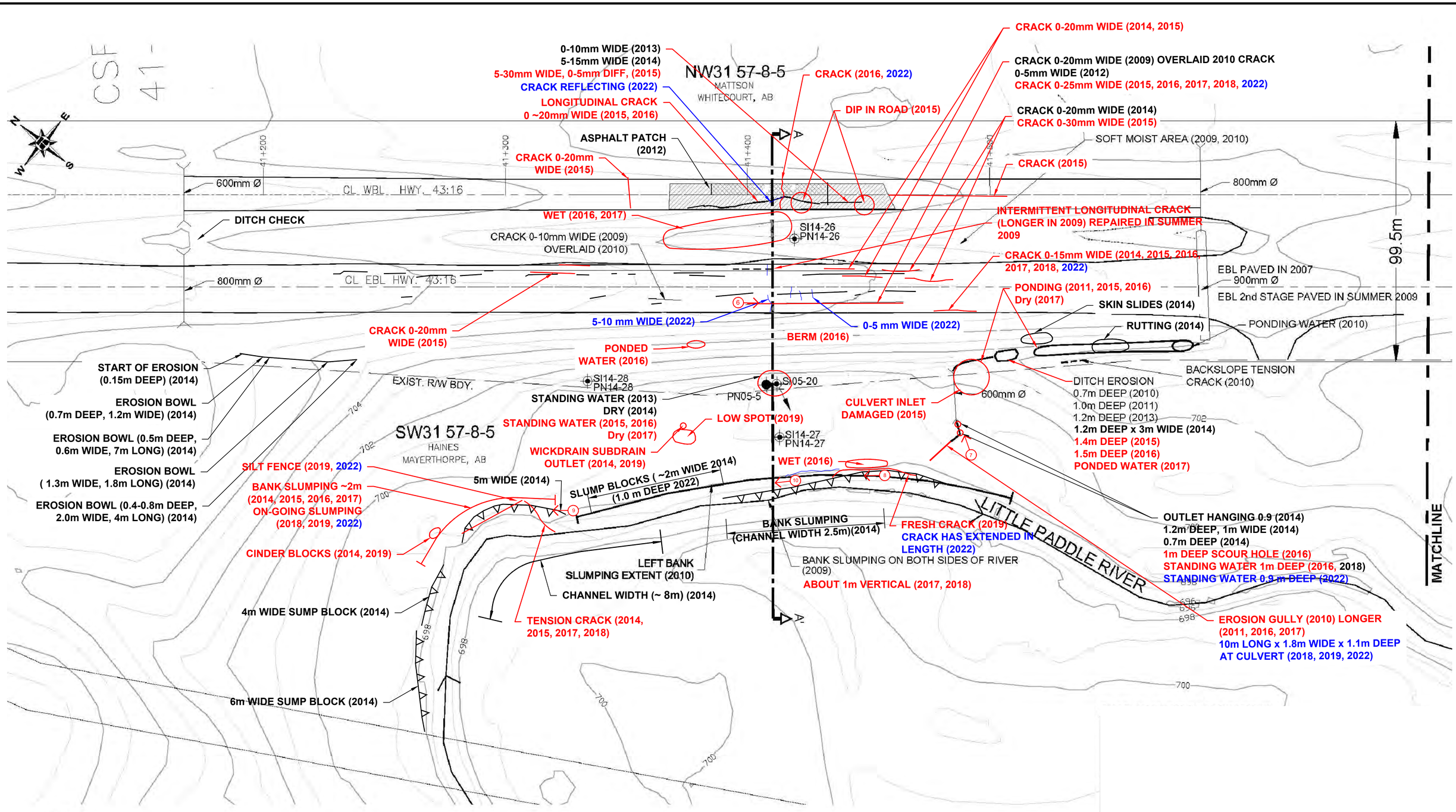
Photo 7: Eroded channel at culvert outlet southeast of SI14-27 filled with water. Looking northeast.

Photo 8: Slumping of crack noticed during last inspection south from SI14-27. Looking northwest.

2022 Site Inspection Photos at NC059

Photo 9: Slumping of slopes at the northwest bend in the river. Looking northwest.

Photo 10: Well vegetated banks and slopes along the river. Looking northwest.



NOTES :

1. FEATURE LOCATIONS ARE APPROXIMATE
2. 2012 TO 2013 OBSERVATIONS FROM GOLDER ASSOCIATES FIGURE 1 (DATE SEPTEMBER 6, 2013) SHOWN IN BLACK
3. SEPTEMBER 3, 2014 OBSERVATIONS SHOWN IN BLACK
4. 2015 TO 2019 OBSERVATIONS SHOWN IN RED
5. 2022 OBSERVATIONS SHOWN IN BLUE

LEGEND

- PNEUMATIC PIEZOMETER (PN)
- SLOPE INCLINOMETER (SI)
- DIRECTION OF MOVEMENT IN SLOPE INCLINOMETER
- CULVERT SUBDRAIN INLET/OUTLET
- DIRECTION AND NUMBER OF PHOTO

REFERENCE

THURBER ENGINEERING LTD. PROJECT#15-16-326
ORIGINAL SCALE 1:1000 DATE AUGUST 2011.
1m CONTOURS FROM LIDAR PROVIDED BY ALBERTA TRANSPORTATION.

0 20 40 60 80 m

Stantec
STANTEC CONSULTING
400-10220 103 AVENUE NW
EDMONTON, ALBERTA, CANADA
T5J 0K4

ALBERTA TRANSPORTATION
GEOHAZARD MONITORING PROGRAM
NC59 LITTLE PADDLE RIVER
MAIN SLIDE SITE PLAN

DRAWN	KE	CHECK	XL	APPROVE	LC
DATE	04 OCT 2022	SCALE	AS SHOWN	PROJECT #	123315222

FIGURE - 1 -

VERTICAL MEASUREMENT FROM BOTTOM OF CONCRETE TO TOP OF ABUTMENT FILL				
	a		b	
	ABUTMENT FACE	AT H-PILES	ABUTMENT FACE	AT H-PILES
SEPT 2014	200mm	450mm	200mm	450mm

42

42+000

EXIST. R/W BDY.

CL WBL HWY. 43:16

CL EBL HWY. 43:16

EXIST. R/W BDY.

MATCHLINE

LITTLE PADDLE RIVER

SETTLEMENT OF HEADSLOPE FILL UNDER ABUTMENT
(2009, 2010, 2014, 2015)
SLIGHTLY WORSE (2011)
UP TO 120mm (2016)
UP TO 200mm (2017, 2018)
UP TO 250 mm UNDER SE ABUTMENT OF WBL (2022)

PONDED WATER
NOT OBSERVED IN 2008/2009
MINOR AMOUNT IN 2010
NOT OBSERVED (2011)
PONDED WATER SATURATED GROUND (2012)
DRY (2014)
PONDED WATER AND SATURATED GROUND (2015, 2016)
SATURATED (2017)

BANK EROSION PROGRESSING (2015)
NO CHANGE (2017)
LEANING TREE FELL OVER (2018)
EROSION PROGRESSING (2022)
EROSION GULLY UP TO 500mm (2016, 2018)

CRACK (2016)

800mm Ø

SURFACE EROSION (2015, 2016)

ADDITIONAL RIPRAP PLACED AGAINST ABUTMENT TO COVER EXPOSED H-PILES (2022)

PAVEMENT PATCH (2022)

TENSION CRACK (2015)

2mm SEPARATION BETWEEN BRIDGE ABUTMENT AND CONCRETE DRAINAGE SWALE (2015)

CRACK BETWEEN BRIDGE DECK AND ASPHALT APRON (2009) GROUTED IN LATE JUNE 2009

CORROSION ON EXPOSED H-PILES (2013)

CORROSION ON EXPOSED H-PILES (2013, 2014, 2015, 2017, 2018)
H-PILES NO LONGER EXPOSED UNDER EBL, CORROSION ON WBL H-PILES (2022)

60-70 m

800mm Ø

SCARP (NOT OBSERVED SINCE 2007)

SCARP (2010, 2011)

CRACKS (2018, 2022)

EROSION ON BOTH SIDES OF RIPRAP APRON (2009)
UP TO 0.6m DEEP (2010)
1.0m (2011)
1.5m DEEP (NW) AND 1.0m DEEP (SE) (2013)
1.5m DEEP, 2.5-3m WIDE AND 1.1m DEEP, 1.5m WIDE, 4m LONG (2014)
1.5m DEEP ON WEST SIDE AND 1.0m ON DEEP EAST SIDE (2014, 2015, 2016, 2017)
2 m DEEP x 10 m LONG x 10 m WIDE (2018)
2 m DEEP, 4.5 m WIDE (WEST) AND 1 m DEEP, 2 m WIDE (EAST) 7.5 m LONG (2022)

DIVERSION CHANNEL

THREE RIVERS GAS CO-OP 26.67mm N.G. PIPELINE

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6. ①→ PHOTO NUMBER AND DIRERCTION

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0 20 40 60 80 m
SCALE METERS

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ALBERTA TRANSPORTATION
GEOHAZARD MONITORING PROGRAM
NC59 LITTLE PADDLE RIVER
BRIDGE SITE PLAN

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

FIGURE - 2 -