GEOHAZARD RISK MANAGEMENT PROGRAM
North Central Region – Edson / Stony Plain Area

2019 Inspection Report

Site Number	Site Name		Hwy	km
NC33	South of Tomahawk		759:02	15.17
Legal Land Description	SE 26-50-6-W5M			
NAD 83 Coordinates	3TM 114	5912013 N	-50618 E	
Operational Site Instrumentation	**Slope Inclinometers**		1	
	Pneumatic Piezometers		2	
	Vibrating Wire Piezometers		0	
	Standpipe Piezometers		0	
Date of Last Instrumentation Readings	May 6, 2019			

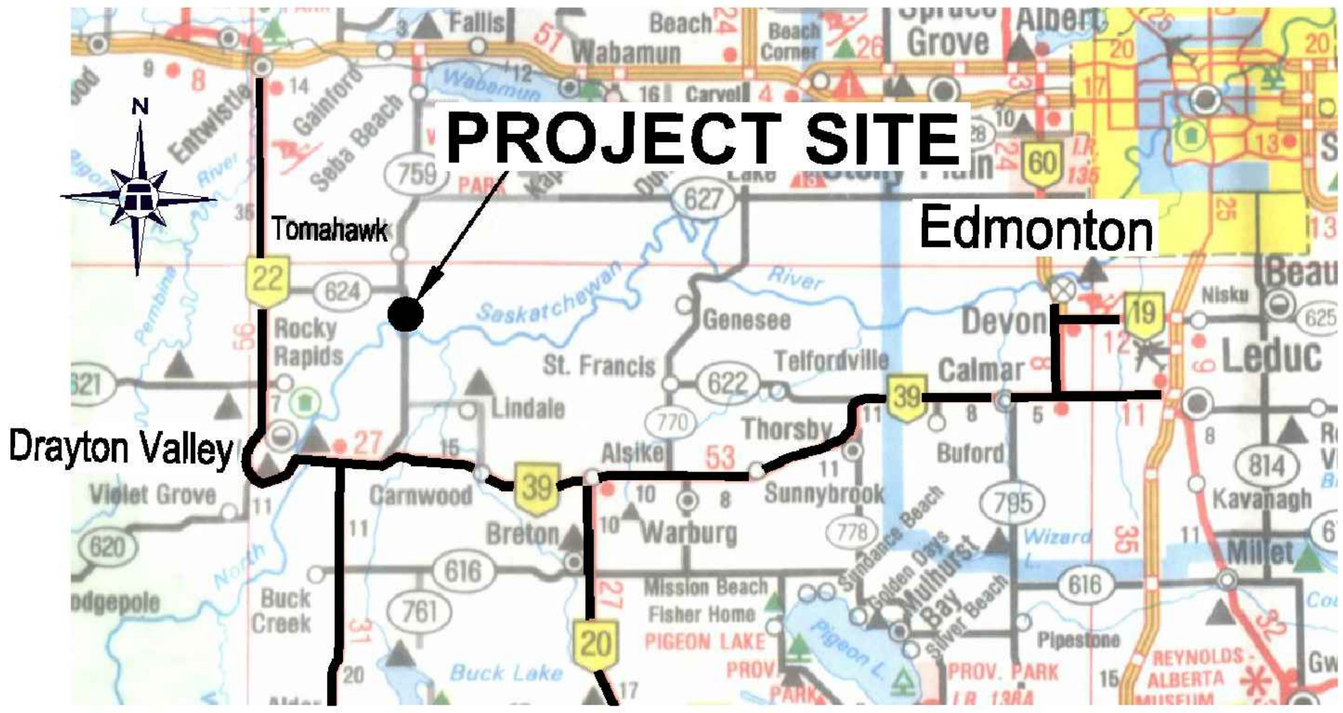
Risk Assessment	Date	PF	CF	Risk Ranking
Current Inspection	May 14, 2019	7	3	21
Previous Inspection	May 25, 2017	7	3	21
Report Attachments	☒ Photographs (6 photos)	☒ Site Plan (1 page)		

	Stantec	Alberta Transportation
Inspected By	Leslie Cho, Junwen Yang, and Xiteng Liu	Kristen Tappenden Brennan Evans, Wilf Cousineau
Date of Remediation	1980s – removal and replacement of muskeg 2012 – toe berm constructed on west side	

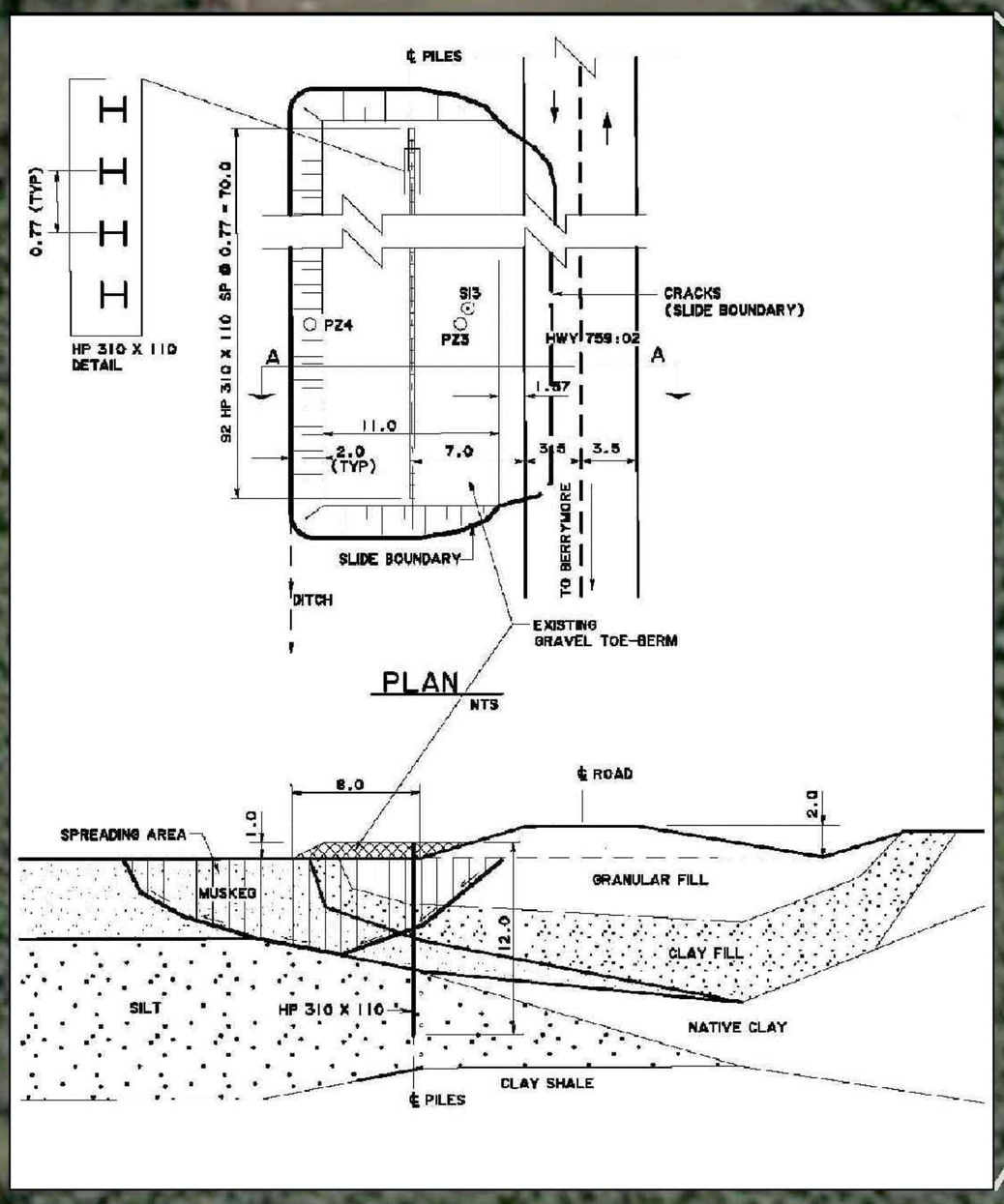
	of highway during the summer 2013 – Pile wall constructed through toe berm on the west side		
Recent Maintenance	Spring 2013 – pavement overlay Summer 2016 – milled and paved		
Primary Site Issue	Lateral spreading and slope failure due to underlying muskeg		
Observations	**Description and Location**	**Change from Previous Inspection**	
☒ Pavement Distress	Slight dip in pavement at south end of pile wall on northbound lane.	☐ Yes	☒ No
☐ Culvert Distress		☐ Yes	☐ No
☐ Bridge Distress		☐ Yes	☐ No
☒ Slope Movement	Separation in pavement joint between NBL and SBL appeared wider.	☒ Yes	☐ No
☐ Erosion		☐ Yes	☐ No
☐ Seepage		☐ Yes	☐ No
☒ Other	Exposed H-piles along the length of the pile wall. Ponded water in excavated west ditch	☐ Yes	☒ No

Discussion	The pavement was milled and paved in the summer of 2016. New cracks in the pavement were not observed. However, the separation of the pavement joints between the northbound lane (NBL) and southbound lane (SBL) appeared wider as shown in Photos 1 and 2. Like previous inspections, the excavated west ditch contained slowly flowing water as shown in Photo 3. The top of most of the piles were visible along its alignment. As much as 200 mm stickup as shown in Photo 4. Voids were also observed between the flanges of some piles, likely due to soil plug during pile driving. No signs of visual distress were observed on the west or east sides of the highway as shown in Photos 5 and 6.

Assessment	Piezometers PN-1 and PN3 showed an increase in pore pressures of 1.0 m and 1.9 m respectively. In PN-1, pore pressures are the highest it has been since 2009. Site drainage appears to be poor as suggested by the standing water in the west ditch since the site's inception into the monitoring program, however drainage is being promoted since the peat in the ditch was excavated in 2013. There are no remaining operational slope inclinometers on the west slope. Prior to being non-operational in Fall 2015, SI2 recorded approximately 2 mm of movement since 2007 suggesting that the east embankment slope is relatively stable. Previous slope movements appear to be limited to the SBL which may be due to less muskeg and thicker layers of granular fill underlying the NBL. After construction of the pile wall in 2013, pavement cracking along the SBL centerline continued to be observed indicating that the slope was still moving. The highway was milled and paved in 2016 with no pavement cracks observed in the southbound lane since which suggests that the slope may have stabilized. The movements observed after construction of the pile wall may be due to the piles deflecting to mobilize the resistance against slope movements. Furthermore, AT mentioned that increased heavy traffic volume was observed at the site between 2013 and 2015 which caused additional pavement damage. During the current inspection, the NBL and SBL joint appears to be larger and suggests deflection of the pile wall may still be on-going.
Recommendations	Consideration should be given to seal the joints along the median to limit surface water infiltration and frost action. Re-grading and/or removal of vegetation in the west ditch may be considered to promote surface water drainage. Any voids between the H-pile flanges should be filled to reduce water infiltration. A survey of the H-piles should also be completed to measure the lateral deflection of the pile wall. Slope inclinometers may be installed near the pile wall to monitor its performance. Instrumentation monitoring should continue to be completed semi-annually. During the site inspection, AT and Stantec discussed reducing the frequency of site inspections at NC33 to every two years (i.e. next visit in 2020).



KEY PLAN
N.T.S



TOE BERM/PILE DETAIL
N.T.S

NORTH BOUND LANE
SLUMPING (2017, 2018)

EXCAVATED PEAT TO PROMOTE
DRAINAGE IN 2013 (2016)
WET & SLOW FLOWING 2018)
NO FLOW TO SLOW FLOWING
(2019)

NORTH BOUND LANE
SLUMPING (2016)
SLIGHTLY VISIBLE (2017, 2018)

CULVERT

DIPPING AND SETTLEMENT (2016)
PAVED OVER (2017)
NO CHANGE (2018, 2019)

HWY 759:02

PN-2
SI-2
SI-3
SI-4
PN-4
PN-3
SI-1
PN-1

EXPOSED H PILES
(2016, 2018, 2019)

0 100m

LEGEND

SI	SLOPE INCLINOMETER
PN	PNEUMATIC PIEZOMETER
◉	**INSTRUMENT LOCATION**
✖	**DESTROYED INSTRUMENT**

NOTES

1. FEATURE LOCATIONS ARE APPROXIMATE.
2. INSTRUMENTS ARE SHOWN IN RED.
3. TOE BERM/PILE DETAIL AS PER A.T. DESIGN SKETCH (2012)

NOTES

1. **PREVIOUS OBSERVATIONS SHOWN IN YELLOW**
2. **2019 OBSERVATIONS SHOWN IN ORANGE**

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ALBERTA TRANSPORTATION
GEOHAZARD MONITORING PROGRAM
NC33 SOUTH OF TOMAHAWK
HWY 759:02 - SITE PLAN

DRAWN	WW	CHECK	XL	APPROVE	LC
DATE	16 JUL 2019	SCALE	AS SHOWN	PROJECT #	123312435

FIGURE -1 -

Reference: 2019 Annual Inspection Photographs at NC33 – South of Tomahawk
File Number: 123312435

Photo 1: Highway recently paved with no observable cracks. Looking south.

Photo 2: Highway recently paved with no observable cracks. Looking north.

Photo 3: Standing water in the excavated west ditch flowing slowly. Looking north.

Photo 4: Exposed H-piles at the surface of the toe berm.

Photo 5: View of the west slope. Looking south.

Photo 6: View of the east slope. Looking south.