

SITE NUMBER AND NAME: C043 Soil-Nail Site		HIGHWAY & KM: 619:06, 12.206	PREVIOUS INSPECTION DATE: June 24, 2020	INSPECTION DATE: June 29, 2021
LEGAL DESCRIPTION: 03-29-48-05 W4M 14-20-48-05 W4M	NAD 83 COORDINATES: UTM Northing Easting 12 5890276 520018		RISK ASSESSMENT: PF: 1 CF: 5 TOTAL: 5	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 400 (west) & 430 (east) (Ref No. 134430 & 131430)			CONTRACT MAINTENANCE AREA (CMA): 512	

SUMMARY OF SITE INSTRUMENTATION: Operational: 2 vibrating wire piezometers and 2 slope inclinometers installed in 2017 and 2021, respectively. Inoperable: 1 slope inclinometer and 1 standpipe piezometer installed in June 2013. LAST READING DATE: June 11, 2021		INSPECTED BY: Chris Gräpel (KCB) Roger Skirrow (AT) Tony Penney (AT)
PRIMARY SITE ISSUE: Embankment fill and foundation slide affecting eastbound lane and some of westbound lane.		
APPROXIMATE DIMENSIONS: Approximately 40 m long semi-circular crack, slope approximately 10 m high at approximately 3H:1V.		
DATE OF ANY REMEDIAL ACTION: Summer 2006 – soil nails launched into embankment; 2010 to present – regular asphalt patching. No asphalt patching in the last two years. 2021 – H-Pile wall installed in the north (eastbound) embankment slope approximately 2 m offset from the edge of asphalt.		

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Tension cracks observed on westbound lane and shoulder. Width of cracks at edge of westbound lane slightly wider.	X	
Slope Movement	X		Shallow depression has formed on north slope below highway.	X	
Erosion		X			X
Seepage		X			X
Culvert Distress		X			X

COMMENTS Soil nails (installed in two construction phases) have slowed slide movements but the slide continued to move as indicated by widening pavement cracks and pavement settling that required patches to be placed to level the highway. The asphalt cracks extent to the east and west of the most recent asphalt patch (Photo 1 and 3). Prior to soil nail installation, the site was patched 2 to 3 times annually (AT). Now the site is usually patched annually (last patch completed in 2019). It is estimated that up to 1.5 m to 2.0 m of asphalt has been placed at the C043 site. The continued need for patching resulted in AT deciding to install a driven-steel-pile wall at this site. The backslope to the south of the slide area has failed and deflected the fence line. Eastbound ditch was densely vegetated with grass and appeared to be dry.
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A H-Pile wall was installed in the north embankment slope in March 2021 (Photos 1 and 2). The H-Pile wall was installed approximately 2 m north of the edge of asphalt. Two slope inclinometers (SIs) were installed in the pile wall to monitor pile wall deflection.

The site should be visited one more time during the duration of the contract, depending on the amount of deflected recorded by the pile wall SIs.

Discussed remedial actions:

- The Highway Maintenance Contractor should complete mill and fill work to patch and restore the pavement behind the pile wall. The north shoulder be raised to reduce the drop from the asphalt to the embankment slope. KCB will supply the HMC with a detail for this work.
- The two SIs installed in the pile wall should be extended if the shoulder is raised. KCB will be required to be on site to raise the SIs so the reading depths will align with the previous readings.

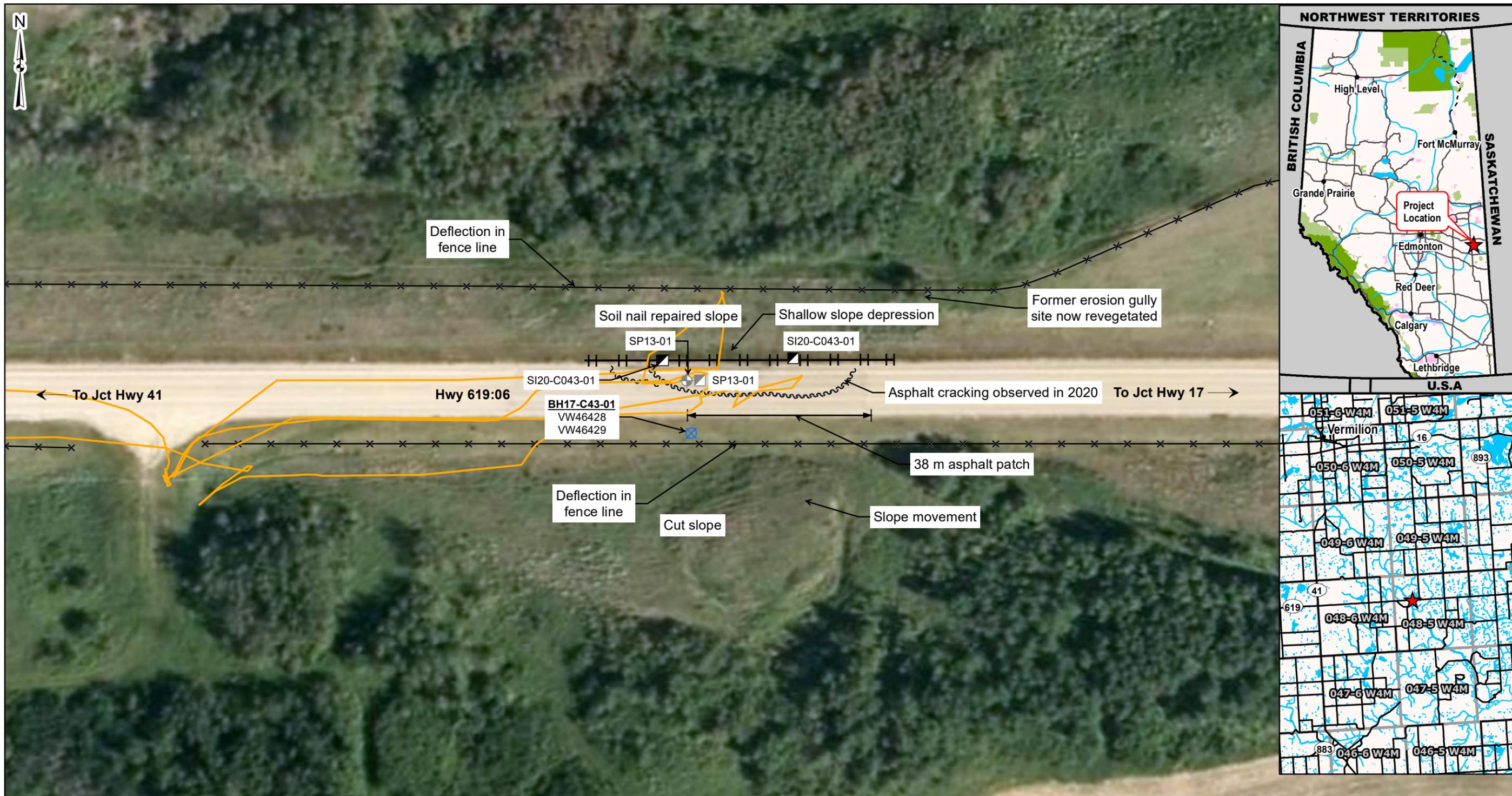
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KCB has prepared this report in a manner consistent with the level of care, skill, and diligence ordinarily provided by members of the same profession for projects of a similar nature at the time and place the services were rendered. KCB makes no warranty, express or implied.

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- (i) The report is to be read in full, with sections or parts of the report relied upon in the context of the whole report.
- (ii) The observations, findings, and conclusions in this report are based on observed factual data and conditions that existed at the time of the work, and should not be relied upon to precisely represent conditions at any other time.
- (iii) KCB should be consulted regarding the interpretation or application of the findings and recommendations in the report.

Chris Gräpel, M.Eng., P.Eng.
Civil Engineer, Associate



- Legend**
- GPS Waypoint (July 6, 2021)
 - Slope Inclinometer
 - Standpipe Piezometer (SP) (inoperable)
 - Slope Inclinometer (SI) (inoperable)
 - Vibrating Wire Piezometer (VW)
 - GPS Track (July 6, 2021)
 - H-Pile Wall
 - Fence
 - Crack



<p>NOTES:</p> <ol style="list-style-type: none"> 1. HORIZONTAL DATUM: NAD83 2. GRID ZONE: UTM Zone 12N 3. IMAGE SOURCE: World Imagery, ESRI ArcGIS Online Source date July 2020 (Vermilion River County 2020) 4. Instrument locations are approximate (not surveyed). 5. H-Pile Wall Installed in March 2021. 	<p>CLIENT</p>	<p>PROJECT</p> <p>CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM</p>
		<p>TITLE</p> <p style="text-align: center;">Site Plan C043 - Soil Nail Site Hwy 619:06, km 12.206</p>
<p>SCALE: 1:800</p>	<p>PROJECT No. A05116A02</p>	<p>FIG No. 1</p>

Time: 14:54:01 PM
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Inspection Photographs

Photo 1 Cracking and pavement depression in the westbound lane. Tensions cracks extend beyond previously patched area. The disturbed strip of ground is the location of the pile wall (red arrow). Photo taken June 29, 2021 looking east.

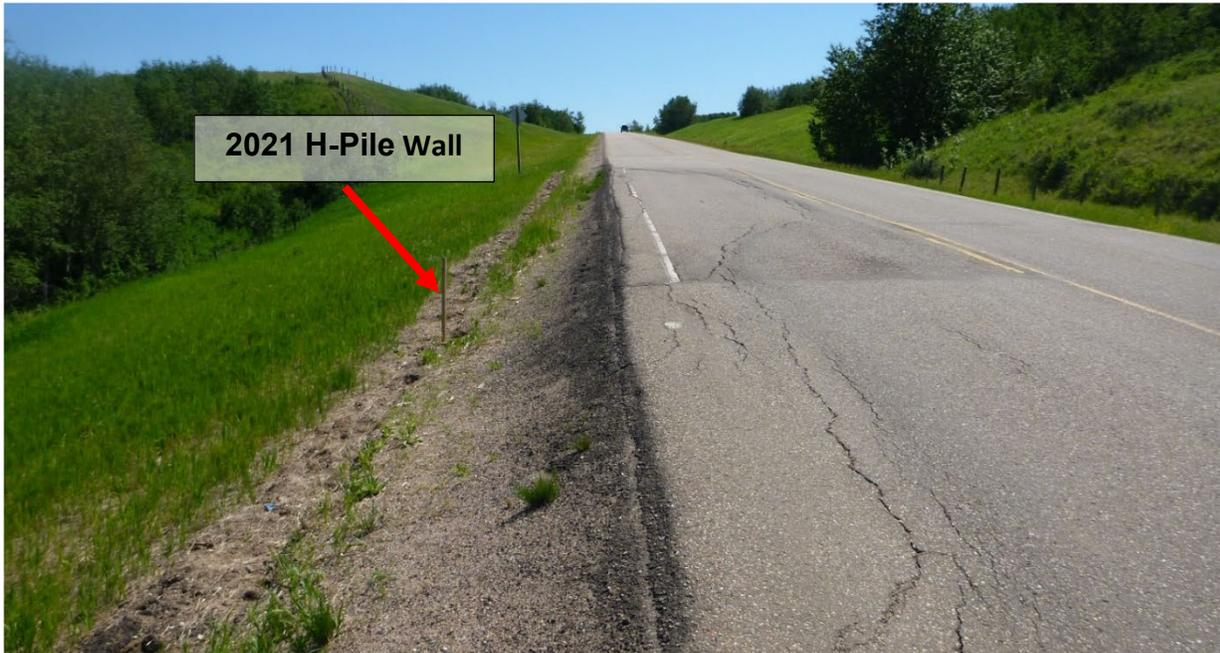


Photo 2 Asphalt patch in the westbound lane and 2021 H-Pile Wall location. Disturbed ground is location of pile wall (red arrow). Photo taken June 29, 2021 facing west.



Photo 3 Asphalt cracking extending past the most recent asphalt patch. Photo taken June 29, 2021 facing west.



Photo 4 Slope movement in the slope south of Hwy 619:06. Photo taken June 29, 2021 facing south.

