

SITE NUMBER AND NAME: S039-I Brocket Slides		HIGHWAY & KM: 3:06, 12.952	PREVIOUS INSPECTION DATE: July 8, 2021	INSPECTION DATE: May 19, 2021
LEGAL DESCRIPTION: 09/10-07-007-28 W4M	NAD 83 COORDINATES: UTM Northing Easting 12 5491976 298990		RISK ASSESSMENT: PF: 11 CF: 3 TOTAL: 33	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 4,700 (west) & 4,780 (east) (Reference No. 84050)			CONTRACTOR MAINTENANCE AREA (CMA): 26	

SUMMARY OF SITE INSTRUMENTATION: Operable: Two slope inclinometers and 2 vibrating wire piezometers Inoperable: One slope inclinometer and 2 vibrating wire piezometers LAST READING DATE: July 6, 2022	INSPECTED BY: Chris Morgan (KCB) Laura Assaad (KCB) Alex Frotten (AT) Roger Skirrow (AT)
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PRIMARY SITE ISSUE: Natural slope landslide encroaching on west lane of highway.

APPROXIMATE DIMENSIONS: S039-I: Landslide approximately 45 m wide at edge of westbound lane (undermining edge of pavement). The overall width of slide zone is approximately 135 m. Landslide slope sloped at 1H:1V to 1.5H:1V for upper 3 m below edge of pavement, flattens to 2H:1V to a mid-slope bench. Overall slope of 2H:1V from crest to toe. The overall slope height is approximately 50 m.

DATE OF ANY REMEDIAL ACTION: 2015 – pavement patching, crack filling, and installation of a curb to limit pavement runoff from flowing onto the slide surface; 2016 – geotechnical investigation was completed by KCB and instruments were installed; 2017 – additional pavement patching and asphalt curb repaired; Unknown – gravel has been dumped over the guard rail onto the head of the slide to reduce the height of the head scarp.

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Pavement cracks extending approximately 4 m from guardrail into north (westbound) lane over a 20 m length.	X	
Slope Movement	X		Ongoing movement, cracks opening at crest of slide, in slide mass, and along west flank. Slide extends downslope, failure block/bench at midslope height.		X
Erosion		X	Runoff from highway is causing erosion near head of slide and on unvegetated surfaces.		X
Seepage		X	Seepage previously noted on left (west) flank of slide, but not visible during 2022 inspection.		X
Culvert Distress		X	N/A – none observed		X

COMMENTS

S039-I (main slide):

- There were no significant changes observed in the slide zone during the 2022 inspection.
- A previously observed transverse pavement crack across both lanes is located east of the slide and doesn't appear to have changed since the 2021 inspection (Photo 1).
- Between the 2021 and 2022 inspections, the pavement cracking increased in width from approximately 10 mm to 20 mm (Photo 2). The pavement cracks were up to 10 mm deep.

- Between 2017 and 2022, the pavement has settled appropriately 50 mm (Photo 3 and 4).
- Cracking of highway surface indicates that retrogression of head scarp will continue into the highway.
- Surface water flow from the highway surface is eroding the gravel placed by the HMC near the top of the slope.
- There is dense vegetation (grass, shrubs) on the east (right) flank of the slide, and it is an assumed area of seepage. Pondered water has also been observed downslope on the access road built for the 2016 geotechnical investigation.
- The failure plane is assumed to be just above the location of the access road (approximately midslope) above the bedrock outcrops near the base of the slope. The slide mass is failing to the toe of the natural slope.
- Numerous tension cracks and scarps are present on the slide mass. The access roads constructed for drilling have revegetated. Cattle trails on slide are obscuring some of the tension cracks.

S039-II (east slide) (not inspected in 2022):

- The slide is located to the east of the main slide and was inspected during the 2020 inspection,
- The slide is located in the upper slope and extends into the ditch, causing runoff to flow onto the slide area, undermining one fence post.

Maintenance/Repair/Monitoring Recommendations:

- KCB completed a repair design in 2021 for the S039-I site (consisting of grading the slope, soil nailing the upper portion of the slope, and installing a mesh on the repaired slope surface). The project was tendered and award in early-2022 (Contract No. 19630). Construction is anticipated to begin in fall 2022.

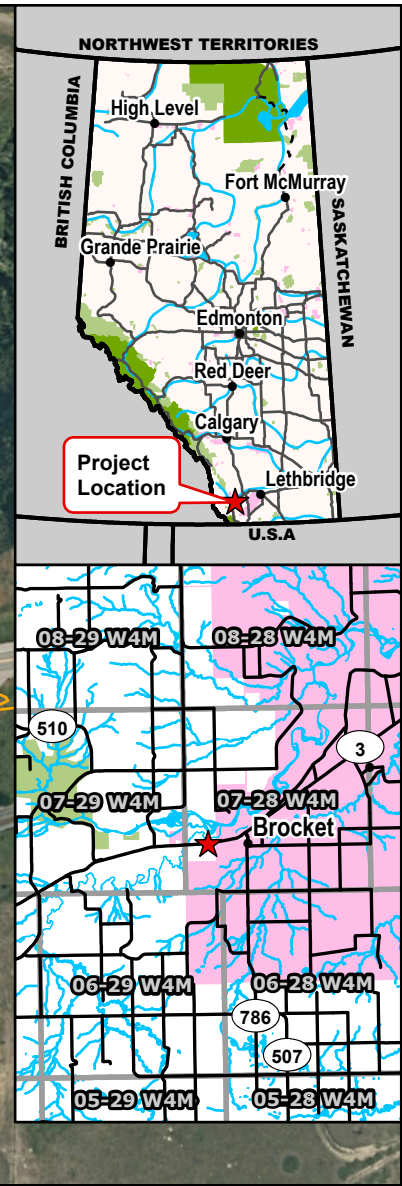
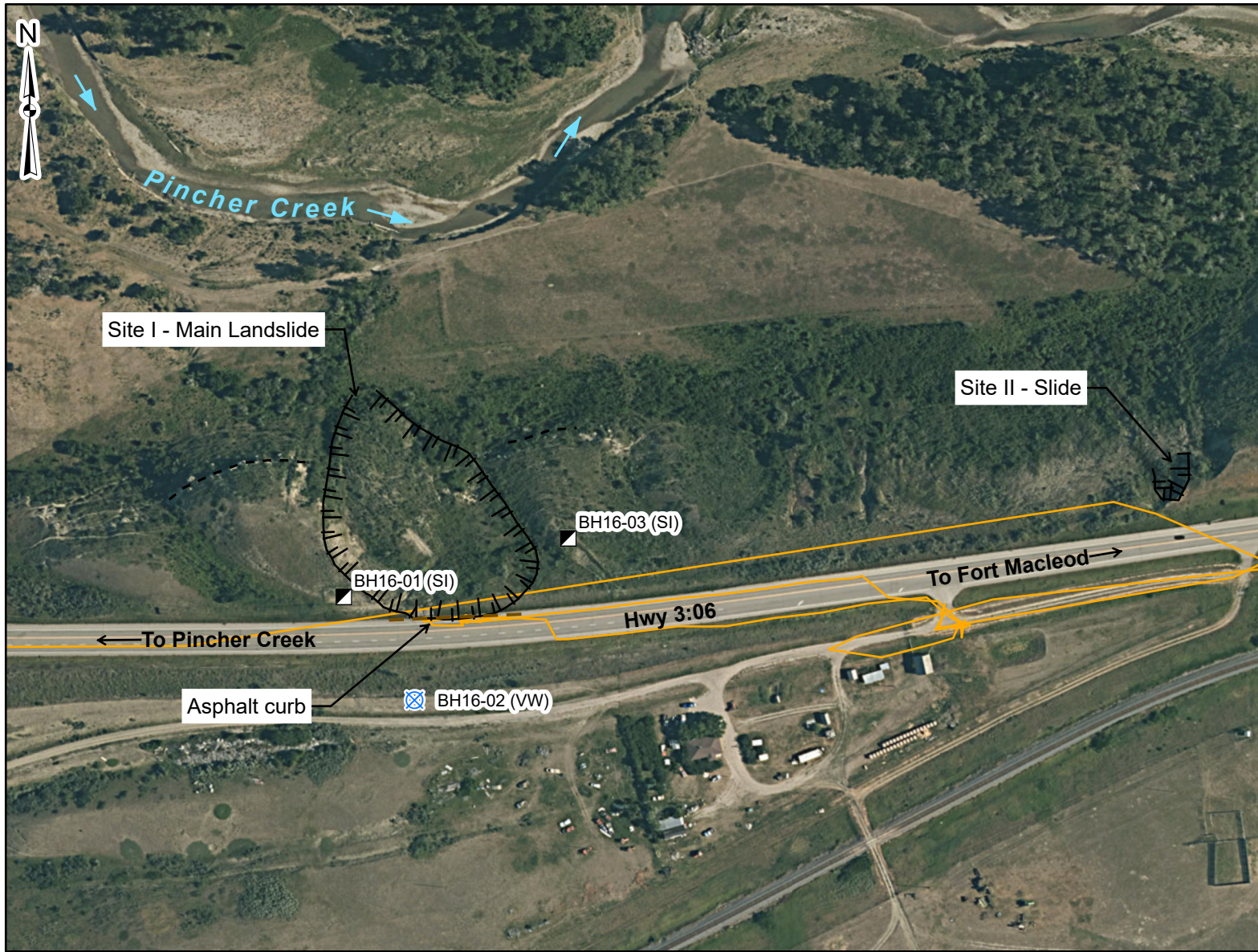
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

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<p>Chris Gräpel, M.Eng., P.Eng. Senior Civil Engineer, Associate</p>	
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Legend

-  Slope Inclinometer
-  Vibrating Wire Piezometer
-  GPS Track (May 19, 2022)
-  Flow Direction
-  Asphalt Curb
-  Bedrock Outcrop
-  Scarp

NOTES:
 1. HORIZONTAL DATUM: NAD83
 2. GRID ZONE: UTM ZONE 12N
 3. IMAGE SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS AND THE GIS USER COMMUNITY.

CLIENT




PROJECT SOUTHERN REGION GEOHAZARD RISK MANAGEMENT PROGRAM		
TITLE Site Plan S039 - Brocket Slides Hwy 3:06, km 12.952		
SCALE 1:3,000	PROJECT No. A05116A03	FIG No. 1



Inspection Photographs

Photo 1 Transverse pavement cracking across both lanes east of the slide. Photo taken May 19, 2022, facing south.



Photo 2 Slide movement is impacting the highway surface and has deformed (cracked and settled) the 2017 pavement patch. Photo taken May 19, 2022 facing east.



Photo 3 The pavement in the north (westbound) shoulder has settled up to 50 mm due to ongoing slope movement. Photo taken May 19, 2022, facing east.



Photo 4 Pavement cracking and settlement in the 2017 pavement patch. Photo taken May 19, 2022, facing west.

