

<b>SITE NUMBER AND NAME:</b> C003 Burma Park Slide		<b>HIGHWAY &amp; KM:</b> 872:06, 0.278	<b>PREVIOUS INSPECTION DATE:</b> July 12, 2019	<b>INSPECTION DATE:</b> <b>June 29, 2021</b>
<b>LEGAL DESCRIPTION:</b> 05-40-10-W4M & 32-39-10-W4M	<b>NAD 83 COORDINATES:</b> UTM Northing Easting 12 5806345 471780		<b>RISK ASSESSMENT:</b> PF: 9 CF: 5 TOTAL: 45	
<b>AVERAGE ANNUAL DAILY TRAFFIC (AADT):</b> 240 (south) & 360 (north) (Ref No. 126340 & 126330)			<b>CONTRACT MAINTENANCE AREA (CMA):</b> 21	

<b>SUMMARY OF SITE INSTRUMENTATION:</b>  Operational: Two standpipes installed in 1992 and four standpipes installed in 2007.  Inoperable: All slope inclinometers installed between 1992 and 2007 (14 total).  LAST READING DATE: June 11, 2021	<b>INSPECTED BY:</b> Chris Gräpel (KCB) Roger Skirrow (AT) Tony Penney (AT)
<b>PRIMARY SITE ISSUE:</b> Deep-seated slide (depth to failure plane generally between 6 m and 13 m) located along the Battle River Valley that crosses H872:06 at a skew angle from northwest to southeast. Slide movement is affecting the northbound and southbound lanes as indicated by transverse pavement cracks and guardrail deflection. Erosion in the west (southbound) ditch.	
<b>APPROXIMATE DIMENSIONS:</b> Slide features (i.e., head scarp, tension cracks, etc.) are not well defined. Slide is affecting a section of the highway approximately 200 m long.	
<b>DATE OF ANY REMEDIAL ACTION:</b> 1998 – pavement removed in slide-affected areas and replaced with dust abatement coating. 150 mm perforated drainage pipes installed below the road and along the west ditch to intercept groundwater flows. 2003 – Highway was repaved, and subgrade was improved. 2000 & 2007 – KCB installed replacement instrumentation. Between 2019 & 2021 – Asphalt patching was completed at the site. Asphalt patching had been completed within a day of KCB's 2021 site visit.	






ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Pavement cracking, depressions, and dips in southbound and northbound lanes.	X	
Slope Movement	X				X
Erosion	X		Erosion channel/gully in the west (southbound ditch).		X
Seepage		X	None observed.		X
Culvert Distress		X	None observed.		X

<b>COMMENTS</b>
The northbound and southbound lanes are affected by multiple dips and depressions and in some areas the pavement has settled approximately 25 mm to 50 mm. Skid marks from vehicles braking were observed near most pavement cracks and depressions.
Bedrock is exposed upslope of the highway (shown on Figure 1) with a scarp extending laterally to the east. Slide blocks and other slide features including a horst and graben were observed downslope of the main scarp.
An erosion gully was observed in the west (southbound ditch) where the highway embankment meets the river valley slope indicating the presence of highly erodible or dispersive soils. Groundwater flow within the river valley

<p>slopes adjacent to and below the highway embankment may be contributing to the dips and depressions observed in the pavement.</p>	
<p>Asphalt cracking was observed, beginning at the edge of the asphalt and extending into the driving lane. The cracking was observed in a recent asphalt patch, near the north end of the site. The asphalt cracks may not be the flanks of the slide, but rather the secondary and primary cracking associated with the flanks of a larger slide.</p>	
<p>The guardrails on both sides of the highway (east and west) show horizontal deflection particularly near a new asphalt patch near the south extent of the site.</p>	
<p>A drone flight was completed by KCB during the June 29, 2021 site inspection. The aerial imagery will be reviewed to better define/estimate the extents of the slide. The UAV video indicates that the horizontal deflection does not appear to be due to vehicle collisions, but rather buckling of the guardrails under compression caused by slide movement affecting the embankment. The drone video indicates the slide area appears is very large and the cracks across the road appear to be secondary cracks that could be perpendicular to the direction of movement, not flanks of the slide area.</p>	
<p>There is a dugout pond built downslope of the slide and upslope of the gully bottom (east of Waypoint 0061) that indicates there may be a high water table in the slope. The upper part of the dugout appears to be an old road that leads to the old bridge downslope. Ground cracking was observed above the east gully slope. A possible graben feature was also observed. The east gully is very steep (i.e., steeper than 1H:1V). A wet spot that was well vegetated with lush vegetation was observed upslope of the gully.</p>	
<p>Discussed remedial actions:</p> <ul style="list-style-type: none"> <li>• The full extent of the slide should be assessed with review of bare-earth LiDAR data.</li> <li>• Change detection of the more active areas of the slide should be conducted to improve our understanding of slide mechanics and extent and to assess if highway drainage could be responsible for movement affecting the road. Improved drainage may be a relatively low-cost option for limiting slide movements.</li> <li>• The depth of the slide is such that stabilization of movement will be difficult to accomplish without significant earthworks and pile walls. The size and depth of the slide and relatively low traffic counts tend to support a maintenance approach, not a full repair.</li> </ul>	
<p>This report is an instrument of service of Klohn Crippen Berger Ltd. (KCB). The report has been prepared for the exclusive use of Alberta Transportation (Client) for the specific application to the Central Region Geohazard Risk Management Program (Contract No. CON0022160) and it may not be relied upon by any other party without KCB's written consent.</p> <p>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.</p> <p>Use of or reliance upon this instrument of service by the Client is subject to the following conditions:</p> <ol style="list-style-type: none"> <li>(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.</li> <li>(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.</li> <li>(iii) KCB should be consulted regarding the interpretation or application of the findings and recommendations in the report.</li> </ol>	
<p>Chris Gräpel, M.Eng., P.Eng. Civil Engineer, Associate</p>	



**Legend**

-  GPS Waypoint (July 2, 2021)
-  GPS Track (July 2, 2021)
-  Culvert
-  Fence
-  Guardrail



NOTES:  
 1. HORIZONTAL DATUM: NAD83  
 2. GRID ZONE: UTM Zone 12N  
 3. IMAGE SOURCE: World Imagery, ESRI ArcGIS Online  
 Source date: January 2018 (Paintearth County No. 18)

CLIENT




PROJECT	CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM	
TITLE	Site Plan C003 - North of Battle River Hwy 872:06	
SCALE	PROJECT No.	FIG No.
1:1,000	A05116A02	1

Time: 14:08:56 PM  
 Date: November 08, 2021  
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## Inspection Photographs

**Photo 1** Oblique air photo of a portion of the C003 site, showing the guardrail deflection and two asphalt patches. Photo taken June 29, 2021 facing northwest.



**Photo 2** North extent of the C003 site. Photo taken June 29, 2021 looking south.



**Photo 3** Transverse pavement cracking observed in a recent asphalt patch, on the north flank of slide. Photo taken July 12, 2019 looking south.



**Photo 4** Existing instruments (SIs and standpipes, indicated by black arrows) along west (southbound) ditch. Photo taken June 29, 2021 facing north.



**Photo 5** Guardrail deflection and a recent asphalt patch near the north extent of the site. The guardrail deflection is more severe in the west (southbound) guardrail. Photo taken June 29, 2021 looking south.



**Photo 6** Exposed bedrock backscarp. Photo taken June 29, 2021 facing north.



**Photo 7** Ground cracking observed east of the eastern highway embankment (indicated by black arrow) and above the east gully slope. Photo taken June 29, 2021 facing southwest.



**Photo 8** Dugout pond built downslope of the highway embankment and upslope of the gully bottom (WP060). Photo taken June 29, 2021 facing northwest.



**Photo 9** A wet area with lush vegetation was observed upslope of the gully. Photo taken June 29, 2021 facing southeast.

