

<b>SITE NUMBER AND NAME:</b> C003 Burma Park Slide		<b>HIGHWAY &amp; KM:</b> 872:06, 0.278	<b>PREVIOUS INSPECTION DATE:</b> June 29, 2021	<b>INSPECTION DATE:</b> <b>June 17, 2024</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: 11 CF: 5 TOTAL: 55	
<b>AVERAGE ANNUAL DAILY TRAFFIC (AADT):</b> 240 (south) & 380 (north) (Ref No. 126340 & 126330)			<b>CONTRACT MAINTENANCE AREA (CMA):</b> 513	

<b>SUMMARY OF SITE INSTRUMENTATION:</b>  Operational: Two standpipes installed in 1992 and three standpipes installed in 2007.  Inoperable: All slope inclinometers installed between 1992 and 2007 (14 total), all pneumatic piezometers installed in 1992 (4 total), and some standpipes installed in 1992 and 2007 (7 total).  LAST READING DATE: May 14, 2024	<b>INSPECTED BY:</b> Chris Gräpel (KCB) James Lyons (KCB) Tony Penney (TEC) Rocky Wang (TEC)
<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 impacting 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 (head scarp, tension cracks, etc.) are not well defined. Slide is impacting 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. Regular pavement patching (1-2 times per year) has been completed at the site between 2019 and 2024.	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Pavement cracking, settlement, and dips in both lanes.	X	
Slope Movement	X		Ground cracking and guardrail deflection.	X	
Erosion	X		Erosion in the west (southbound) ditch.		X
Seepage		X	N/A – none observed during 2024 inspection.		X
Culvert Distress		X	N/A – none observed during 2024 inspection.		X

<b>COMMENTS</b>
In 2024, there were traffic accommodations on site, indicating the TEC was completing bridge maintenance (bridge south of the site crossing the Battle River).
Drone flights were completed by KCB during the 2021 and 2024 site inspections (Photo 1 and 2). The UAV video indicates that the horizontal deflection in the guardrails appears to be caused by buckling under compression caused by slide movement impacting the highway embankment. The drone video indicates the slide area appears

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.

There is a dugout pond built east of the slide and upslope of the gully bottom that indicates there may be a high groundwater table in the north valley slope (Photo 1). The upper part of the dugout appears to be an old road that leads to the old bridge downslope. There is also a treed in gully located between the highway embankment and the dugout. In 2021, ground cracking was observed above the east gully slope. A possible graben feature was also observed. The east gully slope 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.

Pavement distress (cracking and settlement) in both lanes were observed in two locations along the site.

- Near the north extent of the site, pavement cracks (up to 25 mm wide) across both lanes are already showing through a new pavement patch completed in late-2023 or early-2024 (Photo 4). Pavement settlement was observed just south of the pavement cracks.
- A transverse pavement crack across both lanes was observed further south near the south extent of the site (Photos 3, 5, and 7). Settlement up to 25 mm to 50 mm was observed north (uphill) of the transverse pavement crack and lengths of new guardrails had been recently installed on both sides of the highway.
  - At the location of the transverse pavement crack and settlement (Photo 3), due to the movement occurring at the site, the highway alignment is being impacted (i.e., pavement upslope/north of the pavement crack is being shifted east due to sliding).

Since 2021, the guardrails on both sides of the highway (east and west) show horizontal deflection (i.e., buckling under compression) (Photos 3, 5, and 7). Due to movement at the side, the west guardrail has been shifted further west, as shown in Photo 7.

Where the guardrail was replaced along the east side of the highway (Photo 6) there appears to have been approximately 200 mm of movement (shifting of the highway alignment, as indicated by previous guardrail post locations).

In 2024, a large ground crack was observed in the east highway embankment slope beginning within 1.5 m of the edge of pavement (Photo 8). The ground crack was at least 75 mm to 100 m wide, 10 m long, and approximately parallel to the highway alignment (skew angle of approximately 20°).

In 2021, 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 slopes adjacent to and below the highway embankment may be contributing to the dips and depressions observed in the pavement.

Bedrock is exposed upslope of the highway with a scarp extending laterally to the east. In 2021, slide blocks and other slide features including a horst and graben were observed downslope of the main scarp. In 2024, there was evidence of additional movement between the 2021 and 2024 inspection (scarps more defined, graben blocks dropping, and new ground cracks (Photo 9 and 10)).

Maintenance/Repair/Monitoring Recommendations:

General:

- The site should continue to be regularly inspected by TEC's Maintenance Contract Inspector (MCI).
- The site should continue to be inspected annually as part of the Central Region GRMP Section B Inspections.

C003 Slide:

- The full extent of the slide should be assessed with review of bare-earth LiDAR data.
- 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.

- 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.

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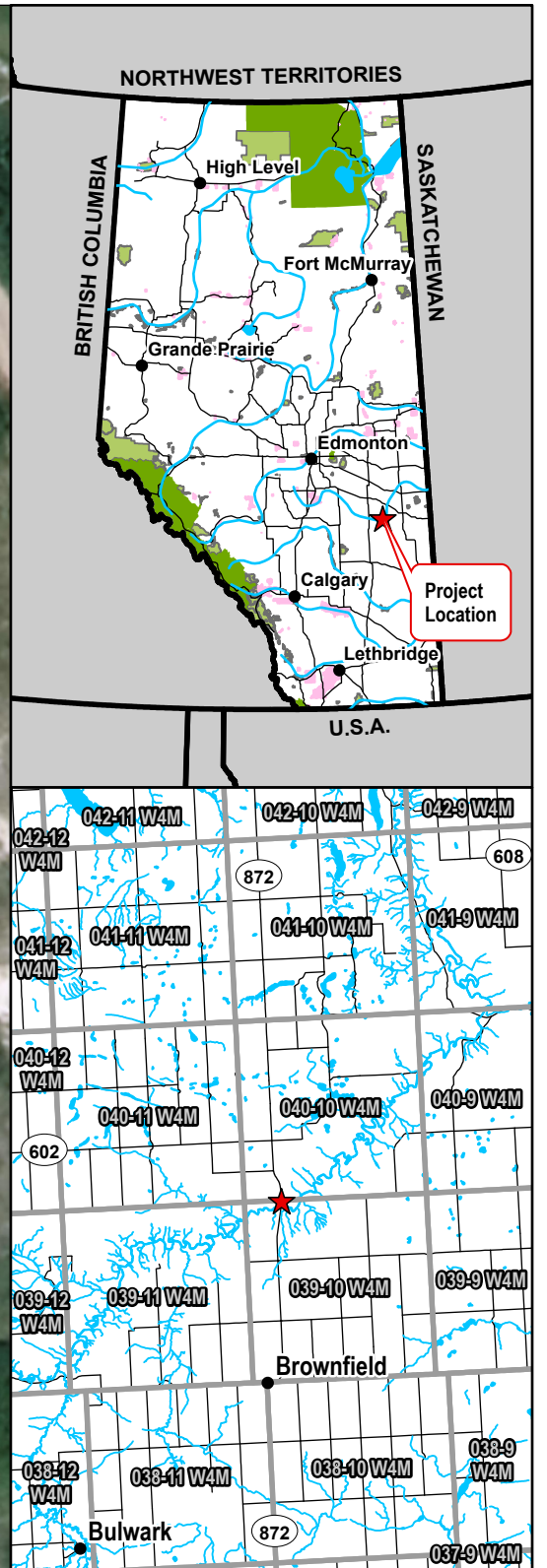
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James Lyons, P.Eng.  
Civil Engineer





- Legend**
- Culvert
  - Fence
  - Guardrail



NOTES:  
 1. HORIZONTAL DATUM: NAD83  
 2. GRID ZONE: UTM ZONE 12N  
 3. IMAGE SOURCE: ESRI,  
 PAINTEARTH COUNTY No. 18

CLIENT

PROJECT CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM		
TITLE Site Plan C003 - Burma Park Slide Hwy 872:06, km 0.278		
SCALE 1:1,000	PROJECT No. A05116A02	FIG No. 1



**Photo 1** Oblique aerial photo of the C003 site (approximate area of pavement patching indicated by red rectangle and area of pavement patching with recent cracking, settlement, and guardrail buckling indicated by rectangle with red dashed line). Photo taken June 17, 2024, facing northwest.



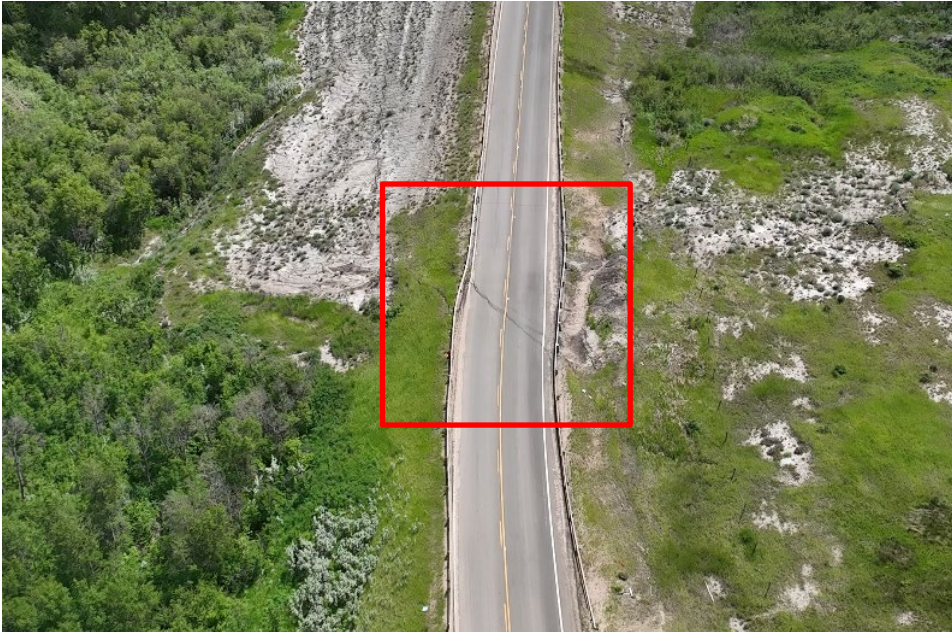


**Photo 2**      **Oblique aerial photo of the C003 site (approximate area of pavement patching indicated by red rectangle and area of pavement patching with recent cracking, settlement, and guardrail buckling indicated by rectangle with red dashed line). Photo taken June 17, 2024 facing east.**





**Photo 3** Aerial photo showing transverse pavement crack, settlement, and guardrail deflection near the midpoint of the site (located within red rectangle). The highway alignment is being shifted due to sliding occurring at the site. Photo taken June 17, 2024, facing south.



**Photo 4** Pavement cracks and settlement observed near the north extent of the site are already showing through a recent pavement patch completed in late-2023 or early-2024. Photo taken June 17, 2024 facing east.





**Photo 5** Transverse pavement crack and settlement observed where the guardrails were recently replaced. Photo taken June 17, 2024, facing south.



**Photo 6** New guardrail posts offset approximately 200 mm from previous location. Photo taken June 17, 2024, facing north.





**Photo 7** Transverse pavement crack and settlement observed where the guardrails were recently replaced. Due to movement at the site, the west guardrail has been shifted west (indicated by red arrow). Photo taken June 17, 2024, facing south.



**Photo 8** Large ground crack (indicated by red arrow) observed in the east highway embankment slope. Photo taken June 17, 2024, facing east.





**Photo 9** Ground cracking (indicated by red arrow) observed west of the highway embankment. Photo taken June 17, 2024, facing west.



**Photo 10** Ground cracking (indicated by red arrow) observed west of the highway embankment. Photo taken June 17, 2024, facing northeast.

