

<b>SITE NUMBER AND NAME:</b> C067 Kneehill Creek Slide		<b>HIGHWAY &amp; KM:</b> 21:14, 12.988	<b>PREVIOUS INSPECTION DATE:</b> July 11, 2019	<b>INSPECTION DATE:</b> <b>June 23, 2021</b>
<b>LEGAL DESCRIPTION:</b> 19-29-23-W4M	<b>NAD 83 COORDINATES:</b> UTM Northing Easting 12 5707671 344892		<b>RISK ASSESSMENT:</b> PF: 8 CF: 5 TOTAL: 40	
<b>AVERAGE ANNUAL DAILY TRAFFIC (AADT):</b> 689 (southbound) and 654 (northbound) (Ref No. 60211450)			<b>CONTRACT MAINTENANCE AREA (CMA):</b> 517	

<b>SUMMARY OF SITE INSTRUMENTATION:</b>  Operational: One slope inclinometer (SI) installed in 2016, five SIs installed in April 2017 and one standpipe installed in 2016.  LAST READING DATE: June 11, 2021	<b>INSPECTED BY:</b> Chris Gräpel (KCB) James Lyons (KCB) Roger Skirrow (AT) Tony Penney (AT)
<b>PRIMARY SITE ISSUE:</b> Two embankment slope failures along the west slope (southbound) lane of highway referred to as Site A and Site B.	
<b>APPROXIMATE DIMENSIONS:</b> Site A is approximately 80 m wide, and Site B is approximately 40 m wide. The slopes at both sites are approximately 15 m high and sloped at 4H:1V.	
<b>DATE OF ANY REMEDIAL ACTION:</b> In April 2017, a 15-m deep, 80-m long H-pile was installed at Site A and a 16-m deep, 42.5 m long H-pile wall was installed at Site B.	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress		X	No new cracking or deformations observed in pavement surface at Site A and B.	X	
Slope Movement		X	No signs of slope movement at Site A and B.	X	
Erosion		X	None observed.		X
Seepage		X	None observed.		X
Culvert Distress		X	None observed.		X

<b>COMMENTS</b>
No new pavement cracking, deformations, or slope movement was observed during the inspection. The pavement cracks that appeared following construction of the pile wall have been sealed, and do not appear to have gotten worse since 2019. The condition of the high-tension cable barrier (HTCB) is good; however, some of the metal brackets holding the cables against the posts have been sheared off.
The operable SIs have been recording decreasing rates of movement in the pile wall at Site A and B since installation. The current maximum rate of movement in the pile-wall SIs is 2.1 mm/year. The previous maximum recorded rate of movement in the pile-wall SIs was 345.1 mm/year. In total, the pile walls have deflected up to a maximum of 23 mm. Based on KCB's 2017 design report, the pile walls were expected to deflect up to 200 mm in the three to four years following construction.
Two voids (approximately 150 mm in diameter) were observed in the west (southbound) shoulder. AT and KCB suspect they formed due to guardrail removal during construction. If the voids increase in size, they should be backfilled, as they could impact the shoulder of the highway and become a hazard to highway traffic.

KCB recommends that the SIs should continue to be read until movement attenuates, after which the site can be removed from the Central Region GRMP and to only be inspected by AT operations on an as-needed basis (i.e., if deformations are observed).

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- (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



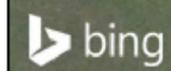
- Legend**
- GPS Waypoint (June 23, 2021)
  - Slope Inclinator (SI)
  - Slope Inclinator (SI) (inoperable)
  - Standpipe Piezometer (SP)
  - Standpipe Piezometer (SP) (inoperable)
  - GPS Track (June 23, 2021)
  - H-Pile Wall

**NOTES:**  
 1. HORIZONTAL DATUM: NAD83  
 2. GRID ZONE: UTM Zone 12N  
 3. IMAGE SOURCE: World Imagery, ESRI ArcGIS Online  
 Source date July 22, 2019  
 4. Location of instruments is approximate (not surveyed)

CLIENT

PROJECT CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM		
TITLE Site Plan C067 - Kneehill Creek Slide Hwy 21:14, km 12.988		
SCALE 1:3,000	PROJECT No. A05116A02	FIG No. 1

Time: 15:15:09 PM  
 Date: November 08, 2021  
 File: Z:\AEDM\A05116A02\ABT\_Central Region\_GRI\IP\400 Drawings\GIS\MXD\2021\Section\B\C067\_B\_211108.mxd



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## Inspection Photographs

**Photo 1** Highway embankment and instrumentation downslope of Hwy 21. Photo taken June 23, 2021 facing south.



**Photo 2** Two voids were observed on the west (southbound) shoulder of Hwy 21. KCB and AT believe they were caused by removing guardrail posts during construction. Photo taken June 23, 2021.

