CENTRAL REGION GRMP
SITE INSPECTION FORM

SITE NUMBER AND NAME: **C067 Kneehill Creek Slide**	HIGHWAY & KM: 21:14, 12.988	PREVIOUS INSPECTION DATE: June 26, 2023	INSPECTION DATE: **June 10, 2025**
LEGAL DESCRIPTION: 19-29-23-W4M	NAD 83 COORDINATES: UTM 12 Northing 5707671 Easting 344892	RISK ASSESSMENT: Site A: PF: 4 CF: 3 TOTAL: 12 Site B: PF: 4 CF: 9 TOTAL: 36	
HIGHWAY CLASSIFICATION NUMBER: 2		CONTRACT MAINTENANCE AREA (CMA): 517	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 867 (south) and863 (north) (Ref No. 60211450)			

SUMMARY OF SITE INSTRUMENTATION:	INSPECTED BY:
Operational: One slope inclinometer (SI) and standpipe installed in 2016 and five SIs installed in April 2017. LAST READING DATE: May 20, 2025	Chris Gräpel (KCB) James Lyons (KCB) Tony Penney (TEC) Chris Newman (TEC) Imram Mehmood (TEC) Darcy Newton (TEC)

PRIMARY SITE ISSUE: Two previous embankment slope failures (repaired in 2017) along the west slope (southbound) lane of highway referred to as Site A and Site B.
APPROXIMATE DIMENSIONS: 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 approximately 4H:1V.
DATE OF ANY REMEDIAL ACTION: 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		Site A: No pavement distress was observed at Site A (north site). Site B: Minor pavement cracking and settlement has been at Site B (chip sealing completed in 2024 has obscured most of the pavement distress).	X	
Slope Movement	X		Site B: Pavement cracking and settlement indicate the slope is continuing to move as the H-pile wall is loaded.		X
Erosion	X		Minor rill erosion has been observed west (upslope) of the Site B H-pile wall.		X
Seepage		X	N/A – none observed during the 2025 inspection.		X
Culvert Distress		X	N/A – none observed during the 2025 inspection.		X

COMMENTS

In 2023, the two H-pile wall sites were separated as Site A and B, since Site A appears to be performing better than Site B. An individual risk ranking can be assigned to each subsite to reflect the different level of performance.

Site A:

- The west (southbound) highway embankment was well vegetated, and no new signs of slope deformation were observed during the 2025 inspection (Photos 1 through 4).
- No new pavement distress was observed upslope of the H-pile wall (Photo 4). Since 2017, there has been approximately 20 mm of movement in the Site A H-pile wall, with current movement rates (recorded in May 2025) less than approximately 1 mm/year. The relatively slow rate of movement, along with no new pavement distress being observed, indicates the H-pile wall is performing well.
- There was an erosion gully upslope (north) of the site that diverts flow from the west (southbound) ditch and a culvert underlying Hwy 21:14 to Kneehill Creek, located along the toe of the slope (Photos 1 and 2). The erosion gully was well vegetated and did not appear to be impacting the highway embankment stability.

Site B:

- Pavement cracking was observed in the west (southbound) and extended into the east (northbound) driving lane (Photo 7). Pavement cracks were up to 25 mm wide during the 2023 inspection but were partially obscured during the 2025 inspection due to highway resurfacing (chip sealing) completed in 2024 (Photos 7 and 8).
- In 2023, pavement settlement was observed in west (southbound) lane. The settlement was between approximately 15 mm to 40 mm and was near the center of the lane, not beneath the wheel path. This may have been attributed to a soft spot or less likely, a void in the highway subgrade. Downstream of the pavement settlement, there was a relatively shallow depressed area on the highway embankment slope. The degree of settlement was less during the 2025 inspection (estimated to be approximately 25 mm) because of 2024 highway resurfacing (chip sealing). Vehicles were observed travelling through the site at highway speed without changing lanes.
- Since 2017, there has been approximately 32 mm of movement in the Site B H-pile wall, with current movement rates (recorded in May 2025) less than approximately 2 mm/year.
- The highway embankment slope was well vegetated and generally even. An area of dense vegetation was located in the bottom third of the slope, below the H-pile wall, which could indicate an area of seepage or elevated groundwater table (Photo 9).
- Two voids (approximately 150 mm in diameter) have been previously observed in the west (southbound) shoulder. TEC 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. Between 2023 and 2025, the voids appeared to be in similar condition.
- There were sinkholes located along the top of the H-pile wall (approximately 5 voids have been observed since 2021) (Photo 10). One sinkhole was located near a hazard sign near the west extent of the H-pile wall (Photo 9).
- Minor rill erosion has been observed on the upper portion of the highway embankment, northwest of the H-pile wall.
- The condition of the high-tension cable barrier (HTCB) was good. However, since 2021, some of the metal brackets holding the cables against the posts have been sheared off.

Maintenance/Repair/Monitoring Recommendations:

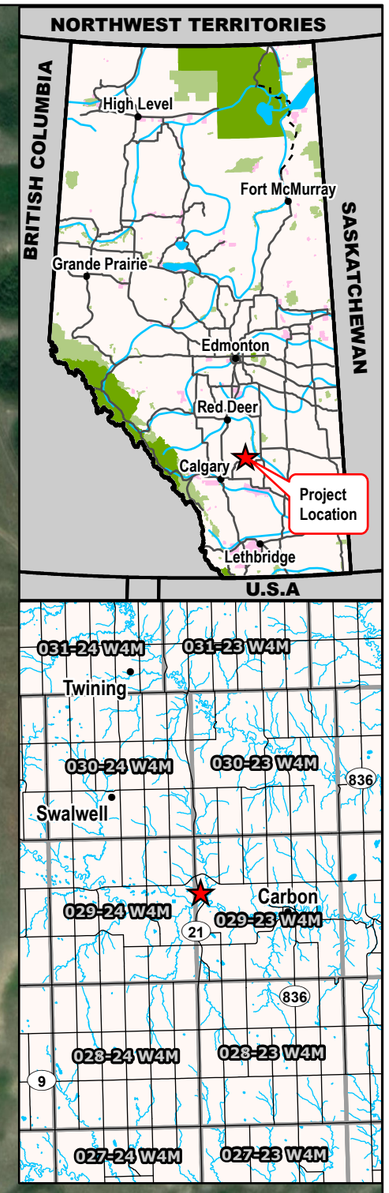
- The site should be regularly inspected by the Highway Maintenance Contractor (HMC).
- The sinkholes above the H-pile walls should be backfilled with sand and gravel.

- The site should continue to be inspected every two years as part of the Central Region GRMP Section B inspections.

PROFESSIONAL ENGINEER ALBERTA
JAMES LYONS
ID 247708
2025-08-22

James Lyons, P.Eng.
Civil Engineer

PERMIT TO PRACTICE
KLOHN CRIPPEN BERGER LTD.
RM SIGNATURE:
RM APEGA ID #: 58463
DATE: August 25 2025
PERMIT NUMBER: P009196
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)



Legend

- Standpipe Piezometer (SP)
- Slope Inclinometer (SI)
- H-Pile Wall

0 100 Metres

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM Zone 12N
3. IMAGE SOURCE: WORLD IMAGERY, ESRI ARCGIS ONLINE SOURCE DATE SEPTEMBER 7, 2024.
4. INSTRUMENT LOCATIONS ARE APPROXIMATE (NOT SURVEYED).
5. STRIKETHROUGH INDICATES THE INSTRUMENT IS INOPERABLE.

CLIENT: Alberta

Klohn Crippen Berger

PROJECT: CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE: Site Plan
C067 - Kneehill Creek Slide
Hwy 21:14, km 12.988

SCALE	PROJECT No.	FIG No.
1:3,000	A05116A02	1

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Inspection Photographs

Photo 1 **Aerial photo of the C067 Site A upslope (northwest) of Site B. The highway embankment slope is well vegetated, no pavement distress attributed to slide movement was observed, and an erosion gully is at the north extent of the site (indicated by red arrow). Photo taken June 10, 2025 facing north.**

Photo 2 **Aerial photo of the C067 Site A upslope (northwest) of Site B. The highway embankment slope is well vegetated, no pavement distress attributed to slide movement was observed, and an erosion gully is at the north extent of the site (indicated by red arrow). Photo taken June 10, 2025 facing southeast.**

Photo 3 **The west (southbound) highway embankment at Site A is well vegetated and appears to be in good condition. Photo taken June 10, 2025 facing south.**

Photo 4 **The pavement at Site A upslope of the H-pile wall appears to be in good condition. Photo taken June 10, 2025 facing north-northeast.**

Photo 5 **Aerial photo of C067 Site B located downslope (southeast) of Site A. The highway embankment slope is well vegetated and generally even, indicating the H-pile wall is performing well. Photo taken June 10, 2025 facing north-northwest.**

Photo 6 **Aerial photo of C067 Site B located downslope (southeast) of Site A. The highway embankment slope is well vegetated and generally even, indicating the H-pile wall is performing well. Photo taken June 10, 2025 facing east.**

Photo 7 **At Site B, a transverse pavement crack was observed in the west (southbound) lane, extending into the east (northbound) passing lane. The pavement crack has reflected through the 2024 chip sealing. Photo taken June 10, 2025 facing southeast.**

Photo 8 **Pavement along Site B was resurfaced (chip sealing) in summer 2024, generally obscuring pavement distress (settlement and cracking) observed during previous inspections. Photo taken June 10, 2025 facing northwest.**

Photo 9 **The west (southbound) highway embankment at Site B is well vegetated and appears to be in good condition. Dense vegetation (grass and small shrubs) observed in the lower third of the slope. Photo taken June 10, 2025 facing south-southeast.**

Photo 10 **Voids are located along the Site B above the 2017 H-pile wall. Photo taken June 10, 2025 facing west.**