

SITE NUMBER AND NAME: S032 Crowfoot Ferry		HIGHWAY & KM: 1:14, 60.855	PREVIOUS INSPECTION DATE: July 15, 2020	INSPECTION DATE: May 18, 2022
LEGAL DESCRIPTION: 10-24-21-20 W4M 14-24-21-20 W4M 15-24-21-20 W4M	NAD 83 COORDINATES: UTM Northing Easting 12 5629086 383958		RISK ASSESMENT: PF: 9 CF: 3 TOTAL: 27	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 60 (south) (Reference No. 110170)			CONTRACTOR MAINTENANCE AREA (CMA): 30	

SUMMARY OF SITE INSTRUMENTATION: There is no instrumentation at the S032 site. LAST READING DATE: N/A	INSPECTED BY: Chris Morgan (KCB) Laura Assaad (KCB) Roger Skirrow (AT) Alex Frotten (AT)
PRIMARY SITE ISSUE: River erosion and slope instability along east bank of the Bow River is retrogressing towards the north side of the access road to Crowfoot Ferry (BF 13129). The south extent of the riverbank erosion and slope instability is approximately 90 m to 100 m from the Crowfoot Ferry access road.	
APPROXIMATE DIMENSIONS: Landslide approximately 350 m long. The slope height is approximately 15 m and overall slope is approximately 5H:1V to 6H:1V.	
DATE OF ANY REMEDIAL ACTION: Unknown – ferry infrastructure was replaced to make the ferry operational, but no repairs to the slide were carried out.	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress		X	No evidence of distress was observed in the gravel surface.		X
Slope Movement	X		New block failures and cracking at the head of the slide.		X
Erosion	X		Riverbank erosion at the toe of the slope and erosion at the head of the slide.		X
Seepage		X	N/A – none observed		X
Culvert Distress		X	N/A – none observed		X

COMMENTS
A flood event in June 2013 caused retrogression of the riverbank failure on the outside bend of the Bow River. Retrogression continues due to toe erosion and ongoing deformation.
Continued bank erosion has the potential to impact the ferry by eroding behind the upstream riprap protecting the east-bank ferry landing. The current south extent of riverbank erosion and slope instability is 90 m to 100 m from the Crowfoot Ferry access road.
The slide appears to be a translational slide with graben blocks, which indicates sliding on near-horizontal weak layer, which appears to be below river level. There is backward rotation of blocks which suggests there is some rotational component to the slide movement. The exposed soils in the landslide blocks are coarse gravel (Photo 4) with some sand bars, with glacial till at the base of the cut face.
No seepage was observed at the site but access to the lower portion of the slide is difficult due to uneven terrain.
The slide surface is vegetated with trees and shrubs.

Several concrete lock blocks have been placed adjacent to the highway to keep pedestrians and horseback riders away from the tension cracks (Photo 2).

The head scarp of the slide is approximately 3 m to 4 m from the west edge of the highway (Photo 3). The head scarp has not retrogressed significantly between the 2020 and 2022 inspections.

Tension cracks up to 1 m in depth have been observed at the head of the slide.

The slide is approximately 350 m long and is impacting approximately 75 m of a private fence. There was a large increase in the number of hanging fence posts between the 2020 and 2022 inspection (increase from six to seventeen) (Photo 1 and 3).

Maintenance/Repair/Monitoring Recommendations:

- Redirecting the flow away from the ferry-landing-area with a sheet pile wall or rock spurs should be considered.
- Alberta Transportation to advise the ferry operators about the potential for continued bank erosion and the impact to ferry operations. The scope of work for the designers of the ferry repairs did not include stabilization of the slope, only repair of the ferry facilities.
- Highway realignment to the east away from the slide zone appears to be the most practical option in the short-term to keep the road open. It is understood that realignment will require land acquisition from the Siksika First Nation. Discussions with the Siksika First Nation are ongoing to obtain the necessary land and permissions to relocate the road. Multiple power poles will also need to be moved to facilitate highway realignment.

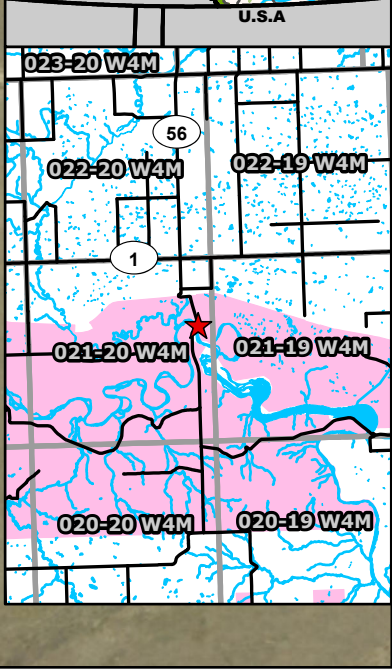
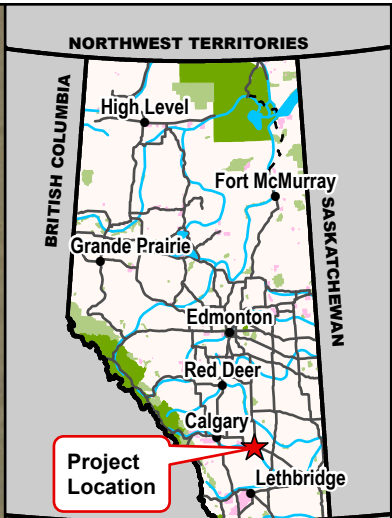
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<p>Chris Gräpel, M.Eng., P.Eng. Senior Civil Engineer, Associate</p>	
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Legend
 x-x Fence
 || Scarp

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 S032 - Crowfoot Ferry (BF 13129) Hwy 1:14, km 60.855		
SCALE 1:4,500	PROJECT No. A05116A03	FIG No. 1

Inspection Photographs

- Photo 1** The head of the slide is retrogressing towards the highway and is approximately 350 m in length. The head scarp is actively eroding, and material has fallen between the 2020 and 2022 inspections. Photo taken May 18, 2022, facing north.



- Photo 2** Several concrete lock blocks have been placed along the length of the slide between the head scarp and the highway. Photo taken May 18, 2022, facing north.



Photo 3 The head scarp has retrogressed towards the highway and has impacted the fence west of the highway (17 fence posts are hanging along the slide). Photo was taken May 18, 2022, facing south.



Photo 4 A layer of rounded granular material is exposed at the head of the slide and is approximately 1.0 m to 1.5 m thick. Photo taken on May 18, 2022.

