SOUTHERN REGION GRMP
SITE INSPECTION FORM

SITE NUMBER AND NAME: **S020 Highwood House Rockfall Hazard**	HIGHWAY & KM: 541:02, 0.817	PREVIOUS INSPECTION DATE: July 7, 2020	INSPECTION DATE: **July 9, 2021**
LEGAL DESCRIPTION: 04-33-016-05 W5M	NAD 83 COORDINATES: UTM 11 Northing 5584038 Easting 667795	RISK ASSESMENT: PF: 14 CF: 5 TOTAL: 70	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 280 (west), 290 (east), (Ref. No. 59130)		CONTRACTOR MAINTENANCE AREA (CMA): 27	

SUMMARY OF SITE INSTRUMENTATION: None LAST READING DATE: N/A	INSPECTED BY: Chris Morgan (KCB) Chris Grapel (KCB) Renato Macciotta (KCB) Roger Skirrow (AT) Alex Frotten (AT)
PRIMARY SITE ISSUE: Rockfall from the rock cutting, large rock block potentially unstable (west end), and soil debris flows due to surface water runoff erosion (gullying) from the brow of the slope.	
APPROXIMATE DIMENSIONS: Approximately 150 m length and over 20 m high.	
DATE OF ANY REMEDIAL ACTION: Ditches cleaned periodically. Ditch appears to have been cleaned out recently.	

ITEM	**CONDITION EXISTS**		**DESCRIPTION AND LOCATION**	**NOTICABLE CHANGE FROM LAST INSPECTION**	
	YES	NO		YES	NO
Pavement Distress	X		Rock strike marks on pavement indicates rockfall of 0.1 - 0.3 m diameter (estimate), track marks from heavy equipment on pavement from rockfall removal.		X
Slope Movement	X		Rockfall debris is accumulating in the ditch. Ditch has been cleaned recently.		X
Erosion	X		Weathering coal and shale sub-vertical beds interlayers with less weathered mudstone and sandstone, runoff erosion from brow (gullying).		X
Seepage		X			X
Culvert Distress		X			X

COMMENTS

Overall, no significant changes to the site when compared to 2020. Ongoing rockfalls at the site, the majority of which are retained in the ditch, but some rocks are falling onto and across the highway.

Small amount of rockfall debris observed in the ditch during the 2021 inspection as ditch had recently been cleaned out. MCI reports that ditch needs cleaning out at least once per year. The MCI noted that during 2021, ten tabular blocks of approximately 0.3 m x 0.3 m, and a boulder (approximately 1 m x 1 m x 1 m) had fallen into the ditch.

Loose blocks and boulders up to 0.5 m x 0.5 m x 0.5 m present along the top of the rock slope. Some blocks of rock are within the soil at the brow of slope and are being eroded out and will eventually fall. One large boulder at the brow of western end of the slope, and one smaller boulder midslope are both perched at the crest of the exposed bedrock.

No significant change in extent of soil erosion at brow of hill since 2020. Surface runoff down the slope is leading to erosion and washout of material, which is being deposited in fans at the base of the slope.

Pine trees are present above the rock slope and adjacent to the slope. The trees appear to be Limber Pine or Whitebark Pine.

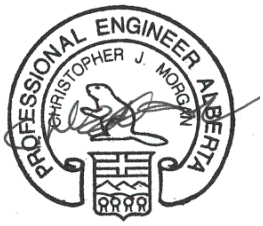
Recommended Mitigation Measures:

Short-Term

- Continue to monitor site and clean out ditch regularly to maintain storage capacity for future rockfalls;
- Carry out drone survey including photogrammetric survey and 3D surface model of slope to assess failure modes and volumes. A proposal to complete a photogrammetry survey and rock slope assessment was submitted to AT by KCB in 2019.

Long-Term

- Rock face scaling, including check scaling of loose blocks (for safety), clearance of trees and loose debris from the brow of the slope, and removal of the large potentially unstable rock blocks on the upper portion of the rock slope (possibly requiring drilling and blasting);
- Place rock slope mesh in critical areas to protect road users, leaving gaps for sheep passage; and
- Increase the ditch depth/width and evaluate the addition of HTCB or possible barrier wall at the toe of the rock slope (between rock slope and highway).
- Jersey barriers could be installed as an alternative to HTCB or rockfall barrier.



2021-11-24

Chris Morgan, M.Sc., P.Eng.
Senior Geotechnical Engineer

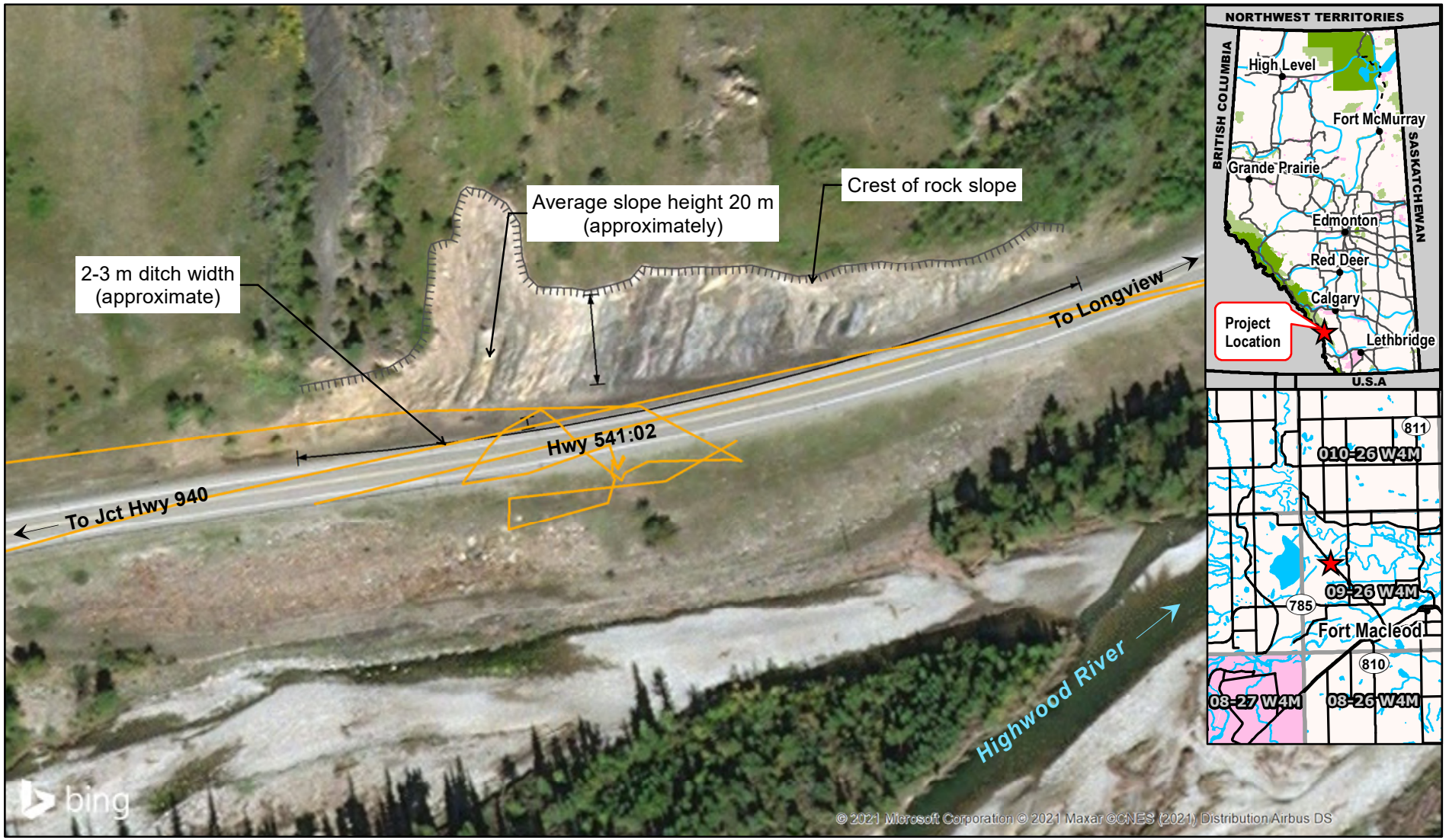
PERMIT TO PRACTICE
KLOHN CRIPPEN BERGER LTD.

RM SIGNATURE: Pamela Jones

RM APEGA ID #: 187607

DATE: 25 Nov. 2021

PERMIT NUMBER: P009196
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)



Legend

- GPS Track (2021)
- Top of Slope
- Flow Direction

Metres
0 100

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM Zone 11N
3. IMAGE SOURCE: Bing Maps 2020. Microsoft Corporation. Source date September 2013

CLIENT
Alberta Government
Klohn Crippen Berger

PROJECT
SOUTHERN REGION GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE
Site Plan
S020 - Highwood House Rockfall Hazard
Hwy 541.05; km 0.817

SCALE	PROJECT No.	FIG No.
1:1,500	A05116A03	1

Time: 11:10:07 AM
Date: October 12, 2021
File: Z:\AICGY\Alberta\A05116A03 ABT Southern Region GRMP\400 Drawings\2021\Section B figures\MXD\S020_211012.mxd Date: October 12, 2021 Time: 11:10:07 AM Creator: aharrison

Photo 1 **Rock slope has a maximum height of approximately 20 m, with continuous joints in an adverse orientation. Photo was taken facing northeast on July 9, 2021.**

Photo 2 **Loose blocks and boulders up to 0.5 m x 0.5 m x 0.5 m present along the length of the rock slope. Note large boulder at crest of slope. Photo was taken facing west on July 8, 2021.**

Photo 3 **Active rockfall - debris fans and large rocks in ditch. The ditch should be regularly cleaned of debris. Photo taken facing northeast on July 8, 2021.**

Photo 4 **Erosion of soil at brow of slope leading to rockfalls and debris fans in the ditch.**