

SITE INSPECTION FORM

SITE NUMBER AND NAME: GP057 Rockfall Slope near McIntyre Mine		HIGHWAY & KM: 40:36, 13.8	PREVIOUS INSPECTION DATE: June 14, 2023	INSPECTION DATE: June 2, 2025
LEGAL DESCRIPTION: NE 09-58-08-W6M	NAD 83 COORDINATES: UTM Northing Easting 11 5985700 361059		RISK ASSESSMENT: PF: 6 CF: 4 TOTAL: 24	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 760 (north) & 960 (south) (Reference No. 25592, 2024)			CONTRACT MAINTENANCE AREA (CMA): 504	

SUMMARY OF SITE INSTRUMENTATION: There is no instrumentation at the GP057 site. LAST READING DATE: N/A	INSPECTED BY: Chris Gräpel (KCB) Courtney Mulhall (KCB) Babatunde Awokunle (TEC) Rocky Wang (TEC)
PRIMARY SITE ISSUE: Rock slope along/above west (southbound) side of Hwy 40:36 produces rockfall that can reach the highway. This site is located along the west valley slope of the Smoky River and adjacent to the GP054 debris flow site.	
APPROXIMATE DIMENSIONS: Rock slope is approximately 96 m long and 40 m to 50 m high above pavement surface with an approximate slope angle varying from 0.7H:1V to 0.9H:1V. Highway ditch is approximately 9 m to 12 m wide from edge of pavement to toe of rock slope and up to approximately 0.3 m deep.	
DATE OF ANY REMEDIAL ACTION: Ongoing ditch cleaning and removal of rockfall particles from pavement surface. Mine installed two rockfall mesh barriers on either side of site in upper section of slope to intercept rockfalls generated upslope of site from reaching highway (Photos 1 and 2).	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		None from rock hazards observed at time of 2025 inspection.		X
Slope Movement	X		Rockfall particles and talus materials continues to accumulate at toe of slope and in west highway ditch.	X	
Erosion	X		Differential weathering, freeze thaw, ice jacking, and seepage eroding rock mass. Some erosion along crest of slope.	X	
Seepage		X	None observed at time of 2025 inspection.		X
Culvert Distress		X	Culvert at GP056 site. No distress observed at time of 2025 inspection.		X

COMMENTS

In 1998, gradeline improvements were made along this section of highway which resulted in some of the original rock slopes being excavated further with drill-and-blast methods while other sections were not.

Site is downslope of the former McIntyre Mine (now CST Canada Coal Ltd.). We understand from previous discussions with TEC that rockfall fences were previously installed by the mine adjacent to this rockfall site in 2011 or 2012 to protect the public using the highway from fly rock during blasting and rockfall from waste-dump construction.

Bedrock structure is non-planar with evidence of folding on the eastern section of the slope. Towards the west side of the site, the rock cut is fractured from a closely jointed structure (Photo 1), and on the east, the rock becomes more massive (Photo 2). Also, the sedimentary bedrock consists of oblique and near-vertical layered bedding of varying thicknesses (ranging from centimetres to meters). The slope dips to the Southeast while the bedding layers dip Southeast to Southwest.

Some overhanging rock blocks at mid slope are close to falling, including one potentially large rock block located approximately 23 m above the highway. This large rock block with an approximate volume of 230 m³ appears to be underlined by the intersection of two non-planar joints.

On the west side of the highway, previously fallen rockfall particles have accumulated into debris fans and discrete rockfall blocks have rolled close to the highway (Photo 2). One rock block observed during the 2025 inspection was approximately 0.5 m in diameter (Photo 3). Some rockfall particles, including one particle over 3 m in diameter, observed on east side of highway, but they may have been cleaned off the highway or pre-date the highway or mine.

Conducted as part of rockfall mitigation work completed by KCB in 2024:

- Kinematic analysis indicated that wedge failures are the most likely mode of failure for large blocks. The estimated factors of safety for large wedge failure were above 1.5; however, large block failures can still occur due to deterioration of the resisting forces at the joint surface forming the blocks.
- Rockfall trajectory analysis showed that the existing conditions, including the talus fan (see Photo 2), permit rocks to roll onto the highway, with approximately 22% of rocks reaching it.

Mountain sheep have been previously observed climbing and dislodging rocks from the slope, which they then knock into the highway ditch.

Maintenance/Repair/Monitoring Recommendations:

- Clean the west highway ditch regularly to maintain rockfall storage volume (i.e., keep ditch as wide and deep as possible to retain material within the ditch) and reduce the potential for material reaching the highway. A buried gas line and fiber optics cable along the ditch limits the depth the ditch can be excavated or cleaned out. Estimated cost: approximately \$10,000 to \$20,000.
- Complete a pipeline survey along the west highway ditch. A crossing agreement is needed between TEC and the pipeline owner to complete the survey with hydrovac excavation. It is noted that the crossing agreement limits the access of heavy equipment within 1.5 m of the pipeline along the ditch, which would be needed to clean the accumulated debris.
- Tender package for rockfall hazard mitigations:
 - KCB is preparing a tender package for rockfall hazard mitigations at four sites along Hwy 40:36 between km 8.395 and km 17.161, including this site. The mitigation actions for the site are based on a preliminary engineering report (PER) and technical memorandum submitted by KCB in August 2024 and April 2025, respectively and include:
 - A maintenance program that includes rock scaling of loose blocks and cleaning highway ditch of accumulated debris every two years. Estimated cost: approximately \$50,000 to \$70,000.

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- A 90% rockfall catchment, which includes: installation of an F-Shape concrete barrier to prevent rock blocks from reaching the highway. Estimated cost: approximately \$50,000 to \$60,000.
- The environmental considerations for the proposed mitigation work were included an Environmental Evaluation (EE) and Environmental Risk Assessment (ERA) submitted by KCB in May 2025 and June 2025, respectively.

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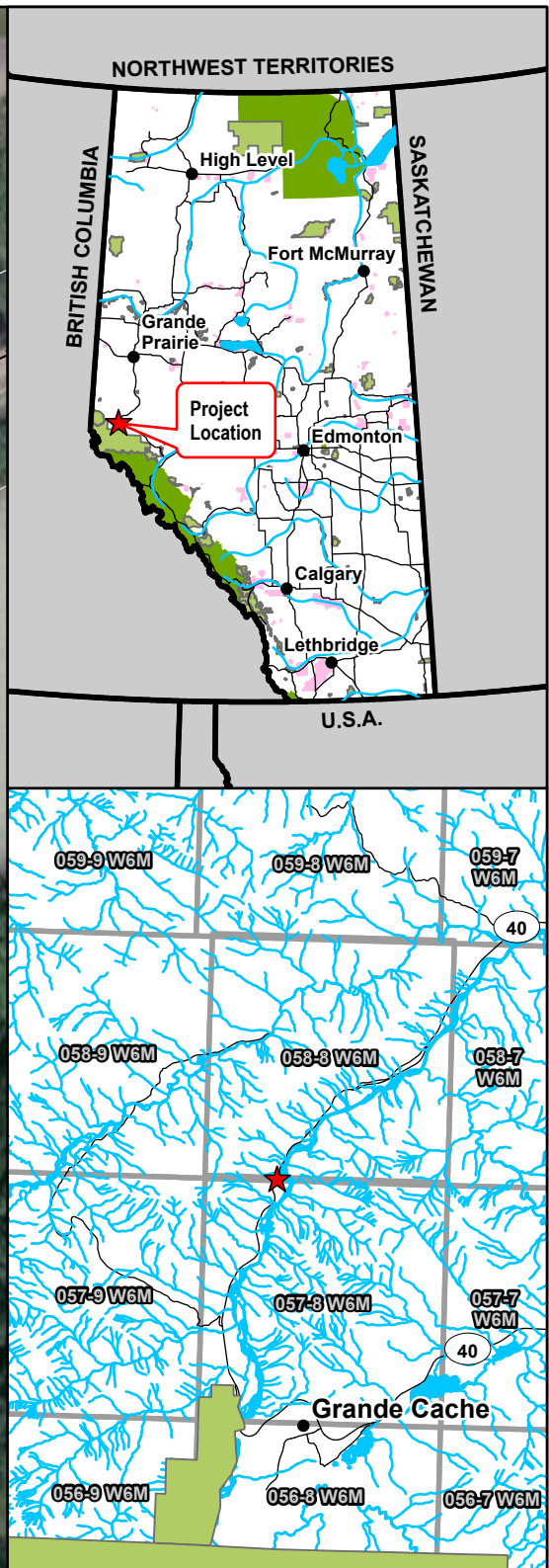
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Geotechnical Engineer

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Legend

- Flow Direction
- Rail Line
- Rockfall Fence
- Culvert
- Guardrail
- Right-of-way

0 50 Metres

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM ZONE 11N
3. IMAGE SOURCE: 2022 MICROSOFT CORPORATION,
2022 MAXAR CNES, DISTRIBUTION AIRBUS DS

CLIENT

Alberta

Klohn Crippen Berger

PROJECT
PEACE REGION (GRANDE PRAIRIE DISTRICT-SOUTH)
GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE
Site Plan
GP057 - Rock Slope Near McIntyre Mine
Hwy 40:36, km 13.8

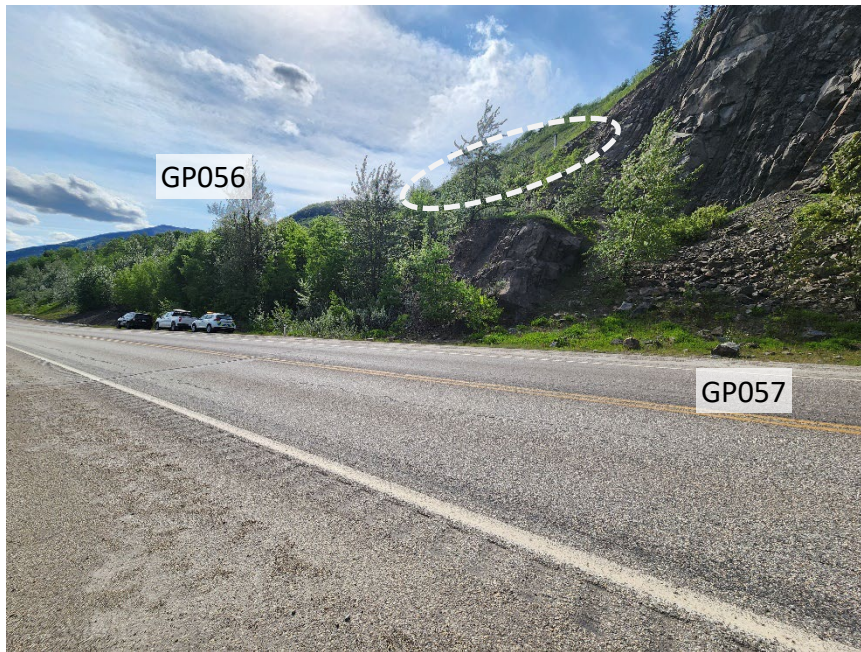
SCALE
1:1,700

PROJECT No.
A05116A01

FIG No.
1

Inspection Photographs

- Photo 1** **West side of Hwy 40:36, including GP054 debris flow site and south end of GP057. Note rockfall barrier installed by mine south of site (circled in white). Photo taken June 2, 2025, facing north.**



- Photo 2** **Rock slope along west side of Hwy 40:36. Note talus material and rockfall particles in highway ditch, and rockfall barrier installed by mine south of site (circled in white). Photo taken June 2, 2025, facing north.**

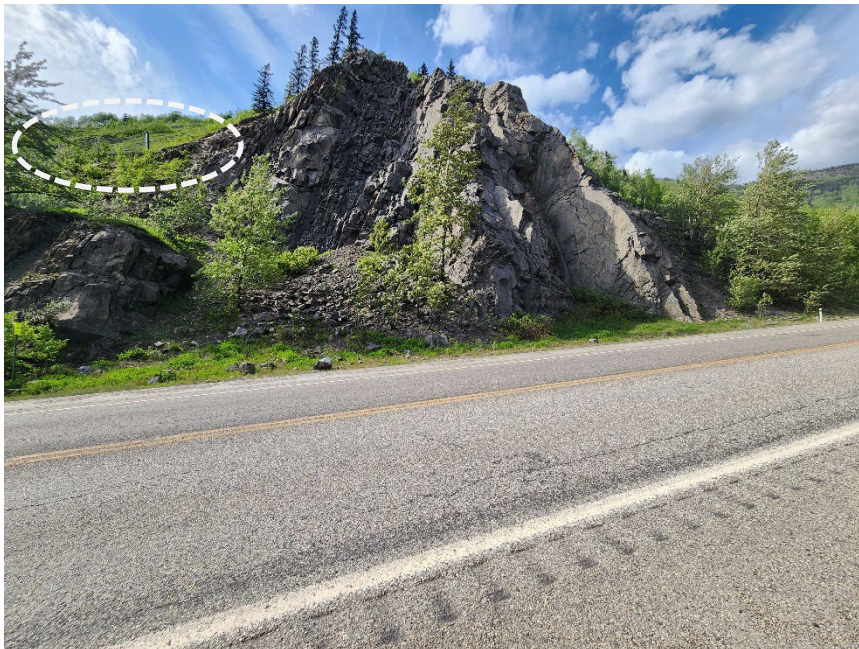


Photo 3 **Rock block approximately 0.5 m in diameter observed in west ditch of Hwy 40:36.
Photo taken June 2, 2025.**



Photo 4 **East side of Hwy 40:36 across from GP057 site. Photo taken June 02, 2025, facing
northeast.**

