



**PEACE REGION
(GRANDE PRAIRIE DISTRICT – SOUTH) GRMP**



SITE INSPECTION FORM

SITE NUMBER AND NAME: GP036 Rockfall 2.0 km South of McIntyre Mine		HIGHWAY & KM: 40:36, 12.061	PREVIOUS INSPECTION DATE: July 21, 2021	INSPECTION DATE: June 14, 2022
LEGAL DESCRIPTION: NW 04-58-08-W6M	NAD 83 COORDINATES: UTM Northing Easting 11 5984469 359856		RISK ASSESSMENT: PF: 14 CF: 4 TOTAL: 56	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 820 (north) & 1020 (south) (Reference No. 25592, 2021)			CONTRACT MAINTENANCE AREA (CMA): 504	

SUMMARY OF SITE INSTRUMENTATION: There is no instrumentation at the GP036 site. LAST READING DATE: N/A	INSPECTED BY: Chris Gräpel (KCB) Courtney Mulhall (KCB) Ed Szmata (AT) Kristen Tappenden (AT) Max Shannon (AT) Dwayne Lowen (AT MCI) Mike Schiffer (Ledcor HMC)
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PRIMARY SITE ISSUE: Rockfall hazards from rock cut slope along west side of Hwy 40:36. Talus deposits and rockfall particles from rock cut slope constrict upslope/west highway ditch and falling rocks are a traffic hazard. The site is located along the west valley slope of the Smoky River. In 2022, debris flow component of this site made into a separate site (GP054) for debris flows only.

APPROXIMATE DIMENSIONS: Rock cut slope near vertical, and approximately 250 m long and 30 m high above pavement surface.

DATE OF ANY REMEDIAL ACTION: Around 2010 – Lock blocks placed adjacent to guardrail. Ongoing highway ditch cleaning and removal of rockfall particles from pavement surface.

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress		X	None observed at time of 2022 inspection.		X
Slope Movement	X		Previously fallen rockfall particles (up to 1.5 m x 1.0 m x 0.8 m) and talus materials between toe of slope and lock blocks.	X	
Erosion	X		Differential weathering, freeze thaw, ice jacking, and seepage eroding rock mass.	X	
Seepage	X		Seepage previously observed by others coming out of coal seam approximately 1 m above ditch.		X
Culvert Distress	X		Culvert inlet on west side of highway partially blocked with debris. Some rockfall particles removed by AT at time of 2022 inspection by hand.		X

COMMENTS

Brow of rock slope is treed with a relatively thin layer of overburden.

Rock mass consists of sedimentary rocks with beds that are near vertical to sub-vertical and inclined to the north.

Faster weathering of the coal (and other less competent materials) results in the undermining of more competent rocks, which results in overhanging blocks and particles with little support that eventually fall, and the deposition of talus cones/slopes at the toe of the slope. Cubical shaped rockfall particles appear to be rolling and bouncing down the talus cones bringing them closer to the highway (i.e., the talus cones act like chutes for rockfall particles). Whereas flat platy shaped rockfall particles appear to get hung up in the talus.

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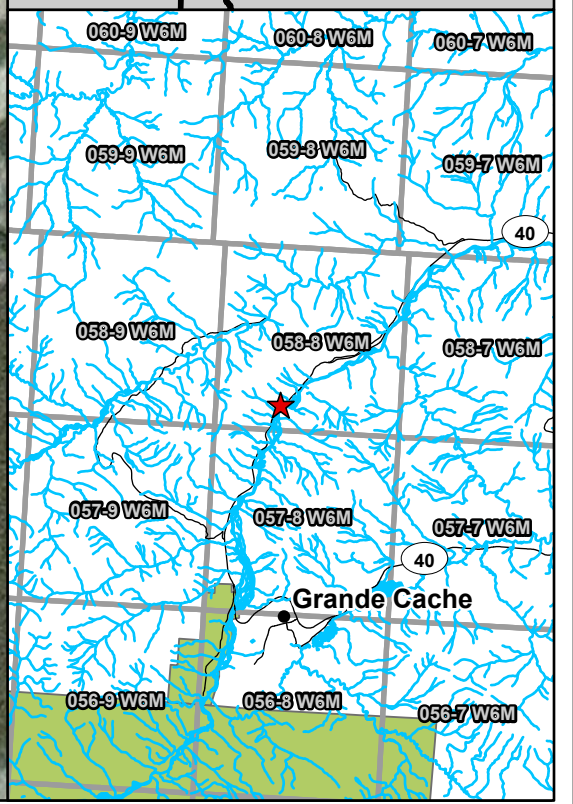
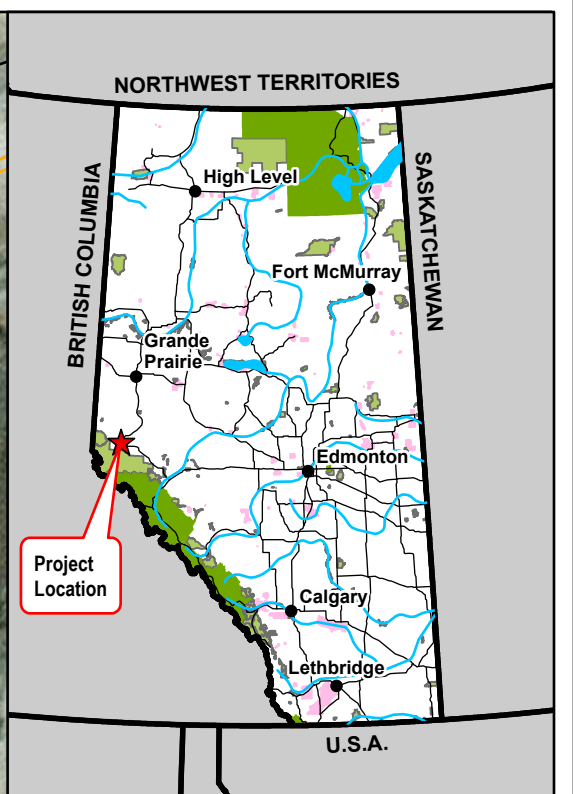
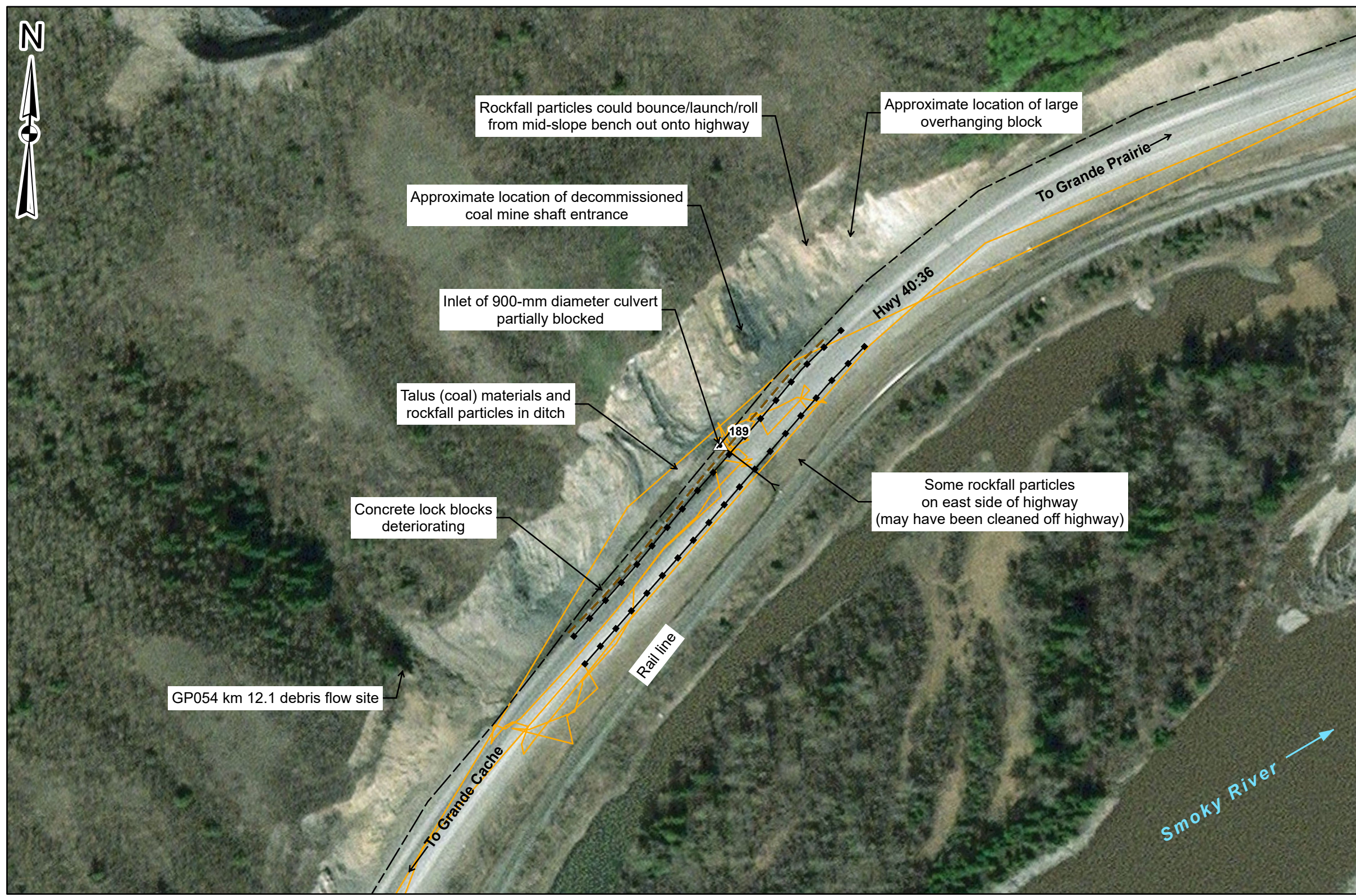
Several hanging rock blocks close to falling.
Mid-slope bench and talus cones/slope could potentially bounce/launch/roll rockfall particles out onto highway.
AT says that some rock particles make it to the highway, and some are large enough to require a front-end loader to remove. AT reported in the spring of Spring 2022, a large event occurred where rockfall particles made it across the highway. A few rockfall particles were observed on the opposite side of the highway between the guardrail and railway line.
Rockfall particles up to 1.5 m x 1.0 m x 0.8 m, estimated average particle size of 0.5 m x 0.5 m x 0.5 m.
Decommissioned coal mine shaft entrance approximately midway up rock cut slope.
Ponded water in ditch at toe of rock slope, which could be due to seepage and/or poor ditch drainage.
Segment of guardrail deflected and pushed towards south/westbound traffic from rockfall strike.
“Watch for fallen rock” signs on either side of site, on east shoulder before site for northbound traffic and on west shoulder before site for southbound traffic. Also, no parking sign on east side of highway at northern site limit (end of guardrail) for northbound traffic.
<p><u>Maintenance/Repair/Monitoring Recommendations:</u></p> <ul style="list-style-type: none"> • Call out completed at the GP036, GP049, and GP053 sites on July 14, 2022 after increased rockfall activity was triggered by wet weather. As part of the call out a review will be completed to determine where scaling and an attenuating mesh is needed. <ul style="list-style-type: none"> ○ Short term – Rock slope should be scaled by a high-angle specialty contractor. Scaled materials and other rockfall materials should be cleaned out of the ditch. Estimated cost: \$100,000 to \$140,000 if entire rock face scaled. ○ Long term – Rock slope should be draped in an attenuating mesh that reduces the energy of falling rocks and limits their potential to reach the highway. Estimated cost: \$360,000 to \$490,000 if entire rock face draped with mesh. • Some of the concrete lock blocks are deteriorating and have been damaged by rock strikes. They will eventually need to be replaced. • Upslope/west ditch approximately 7 m wide. MCI reported ditch has been cleaned twice in the last six years. Continue to clean ditch 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. Buried gas line and fiber optics cable below ditch limits depth that ditch can be excavated or cleaned out. • Inlet of culvert should also be cleaned to maintain ditch flow.
<p>This report is an instrument of service of Klohn Crippen Berger (KCB). The report has been prepared for the exclusive use of Alberta Transportation (Client) for the specific application to the Peace Region (Grande Prairie District – South) Geohazard Risk Management Program (Contract No. CON0022166) and it may not be relied upon by any other party without KCB's written consent.</p> <p>KCB has prepared this report in a manner consistent with the level of care, skill and diligence ordinarily provided by members of the same profession for projects of a similar nature at the time and place the services were rendered. KCB makes no warranty, express or implied.</p> <p>Use of or reliance upon this instrument of service by the Client is subject to the following conditions:</p> <ul style="list-style-type: none"> (i) The report is to be read in full, with sections or parts of the report relied upon in the context of the whole report. (ii) The observations, findings and conclusions in this report are based on observed factual data and conditions that existed at the time of the work and should not be relied upon to precisely represent conditions at any other time. (iii) The report is based on information provided to KCB by the Client or by other parties on behalf of the client (Client-supplied information). KCB has not verified the correctness or accuracy of such

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- (v) This report is electronically signed and sealed and its electronic form is considered the original. A printed version of the original can be relied upon as a true copy when supplied by the author or when printed from its original electronic file.

Chris Gräpel, M.Eng., P.Eng.
Senior Civil Engineer, Associate



Legend

-  GPS Waypoint (June 14, 2022)
-  GPS Track (June 14, 2022)
-  Flow Direction
-  Concrete Lock Block
-  Guardrail
-  Culvert
-  Pipeline



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

CLIENT




PROJECT PEACE REGION (GRANDE PRAIRIE DISTRICT-SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM		
TITLE Site Plan GP036 - Rockfall 2.0 km South of McIntyre Mine Hwy 40:36, km 12.061		
SCALE 1:1,500	PROJECT No. A05116A01	FIG No. 1

Inspection Photographs

Photo 1 South extent of rock cut slope along west side of Hwy 40:36. Photo taken June 14, 2022, facing southwest.



Photo 2 Middle of rock cut slope along west side of Hwy 40:36. Note decommissioned coal mine shaft entrance on slope (circled in white). Photo taken June 14, 2022, facing northwest.

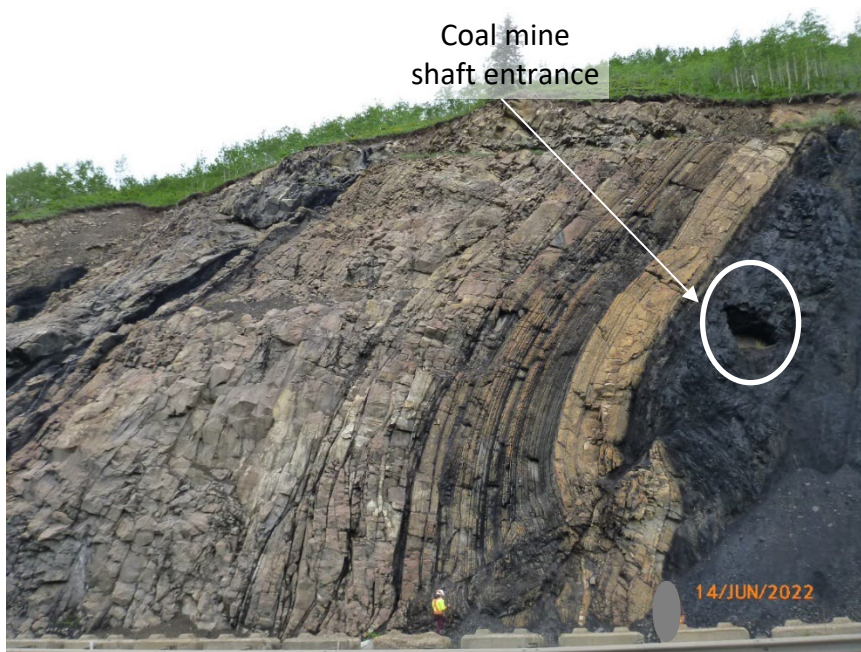


Photo 3 North extent of rock cut slope along west side of Hwy 40:36. Note decommissioned coal mine shaft entrance on slope (circled in white) and overhanging block (circled in red). Photo taken June 14, 2022, facing northwest.



Photo 4 Talus (coal) deposits and rockfall particles in upslope/west ditch of Hwy 40:36. Note lock blocks are deteriorating. Photo taken June 14, 2022, facing southwest.



Photo 5 Culvert inlet on west side of highway partially blocked with debris. Some rockfall particles removed from culvert inlet by AT by hand during the 2022 inspection. Photo taken June 14, 2022, facing southeast.



Photo 6 Segment of guardrail deflected and pushed towards southbound traffic from rockfall strike. Photo taken June 14, 2022, facing southwest.



Photo 7 **Pavement surface of Hwy 40:36. Photo taken June 14, 2022, facing south.**



Photo 8 **Some rockfall particles on east side of Hwy 40:36 between guardrail and railway tracks. These particles may have been cleaned off highway, but AT has reported rockfall particles making it across highway. Photo taken June 14, 2022, facing northeast.**



Photo 9 **Some rockfall particles on east side of Hwy 40:36 between guardrail and railway tracks. These particles may have been cleaned off highway, but AT has reported rockfall particles making it across highway. Photo taken June 14, 2022, facing southwest.**

