Alberta Transportation

SOUTHERN REGION GRMP
SITE INSPECTION FORM

Klohn Crippen Berger

SITE NUMBER AND NAME: **S014 Bellevue Mine Sinkholes**	HIGHWAY & KM: 3:02, 27.203	PREVIOUS INSPECTION DATE: June 15, 2016	INSPECTION DATE: **June 1, 2017**
LEGAL DESCRIPTION: 04-21-007-03 W5M and 13-16-007-03 W5M	NAD 83 COORDINATES: UTM 11 Northing 5659724 Easting 614296	RISK ASSESMENT: PF: 1 CF: 1 TOTAL: 1 PF: 2 CF: 3 TOTAL: 6	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 8020 (west), 6320 (east) (Ref. No. 70000008)		CONTRACTOR MAINTENANCE AREA (CMA): 26	

SUMMARY OF SITE INSTRUMENTATION: None LAST READING DATE: n/a	INSPECTED BY: Chris Gräpel (KCB) Peter Roy (KCB) Ross Dickson (AT) Roger Skirrow (AT) Ammar Zaidi (AT)

PRIMARY SITE ISSUE: Sinkholes formed after heavy rainfall in 2002 due to collapse of old coal mine workings.

APPROXIMATE DIMENSIONS: Sinkholes formed in a line approximately 280 m long along highway and were located between 5 and 35 m from west edge of pavement. Sinkholes varied in depth from 9 to 25 m.

DATE OF ANY REMEDIAL ACTION: Sinkholes were excavated to 9 m depth and backfilled with rock fill in 2002, a few days after the sinkholes developed.

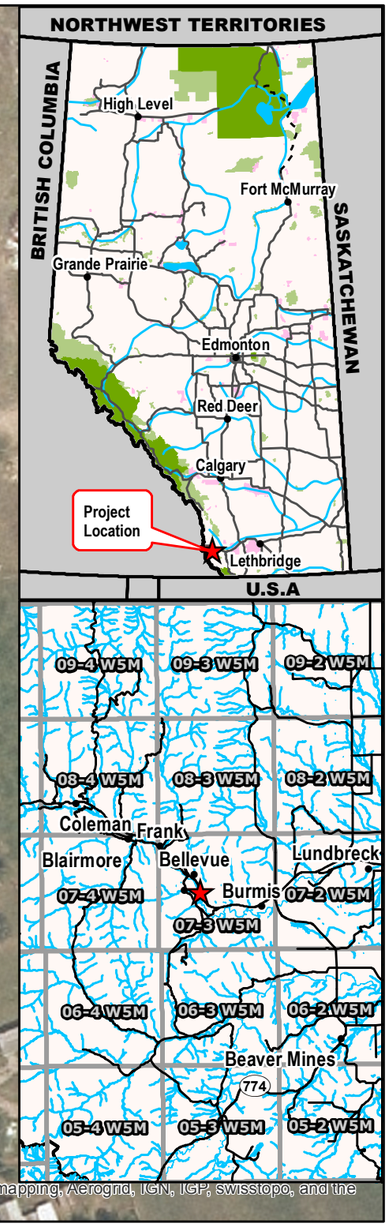
ITEM	**CONDITION EXISTS**		**DESCRIPTION AND LOCATION**	**NOTICABLE CHANGE FROM LAST INSPECTION**	
	YES	NO		YES	NO
Pavement Distress		X			
Slope Movement		X			
Erosion		X			
Seepage		X			
Culvert Distress		X			

COMMENTS

Previous review of site geology indicates that bedrock and coal seams are steeply dipping which indicates coal mining voids are also steeply dipping. Coal mine maps are unavailable and rogue mining (unlicensed and/or unreported mining) may have resulted in workings extending beyond the limits of mines shown on maps.

Rockfill backfilled sinkholes were observed between waypoints 340 and 341. The area at the toe of the escarpment was viewed from the CPR tracks. Two coal-mine portals were observed at waypoints 341 and 342. A dip in the asphalt Hwy 3 at the edge of the eastbound lane appears to be present near waypoint 344. The dip was observed by watching traffic on Hwy 3.

AT pavement LiDAR data over several years should be reviewed to assess if ongoing deflection of the pavement surface can be noted and, if so, at what rate of deflection. Additionally, a coupled Ground Penetrating Radar and Resistivity geophysical survey should be conducted over the highway surface and area of the 2002 sinkholes to assess if voids can be detected.



Legend

- GPS Track (June 1, 2017)
- GPS Waypoints (June 1, 2017)
- Edge of Rock Slope
- Fence

0 100 Metres

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM Zone 11N
3. IMAGE SOURCE: World Imagery from ESRI ArcGIS Online. Image dated July 15, 2012

CLIENT: Alberta Transportation

Klohn Crippen Berger

PROJECT: SOUTHERN REGION GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE: Site Plan
S014 - Bellevue Sinkholes
Hwy 3:02, km 27.203

SCALE	PROJECT No.	FIG No.
1:1,500	A05115A03	1

Time: 18:00:17 PM
Date: June 20, 2017
File: Z:\AIEDM\A05115A03 ABT Southern Region GRMP\400 Drawings\2017\Section B\MXD\S014_170620.mxd

Photo 1 **Area of 2002 sinkhole formation after intense rainfall event. Sinkholes were filled with rock fill and are now grown over and obscured. Photo taken facing east on June 1, 2017.**

Photo 2 **Sinkhole filled in due to collapse of old coal mine workings with old coal mining building in background. Photo taken facing west on June 1, 2017.**

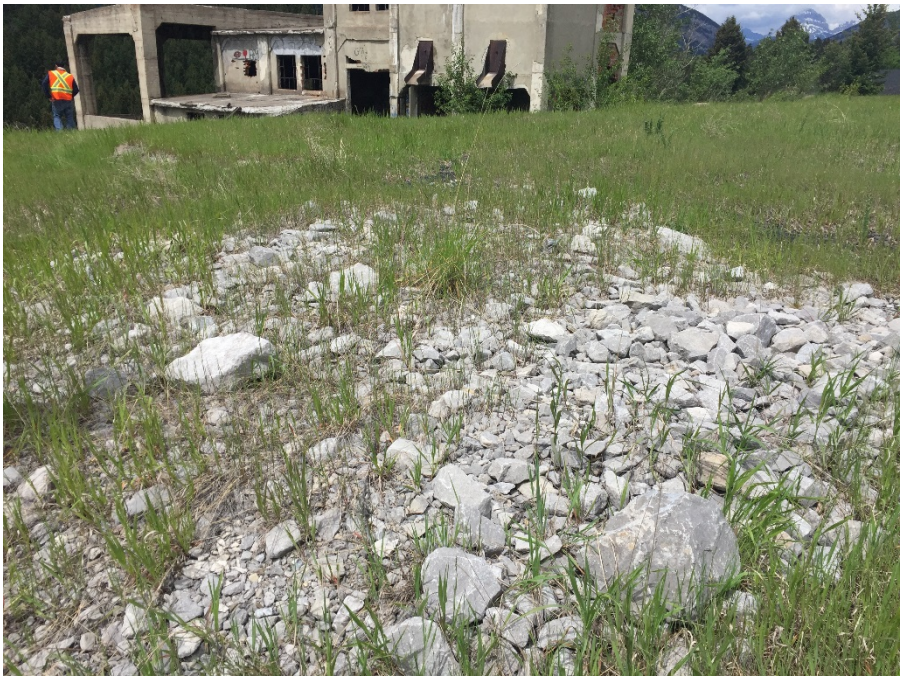


Photo 3 **Coal-mine portal to west old mine building, above train tracks at waypoint 341. Initial formation of sinkholes in 2002 was accompanied by discharge of water and soil/rock debris onto tracks from the shaft. Photo taken facing north on June 1, 2017.**

Photo 4 **Mine-collapse debris inside old mine shaft. Ground water seepage exiting shaft. Photo taken facing north on June 1, 2017.**