

SITE INSPECTION FORM

SITE NUMBER AND NAME: GP045 Smoky River East Valley Slope Slide and Sinkhole		HIGHWAY & KM: 43:04, 35.691	PREVIOUS INSPECTION DATE: June 16, 2022	INSPECTION DATE: June 3, 2025
LEGAL DESCRIPTION: SW 16-72-02-W6M NW 09-72-02-W6M	NAD 83 COORDINATES: UTM Northing Easting 11 6121247 420280 11 6121035 420289		RISK ASSESSMENT: Slide PF: 9 CF: 4 TOTAL: 36 Sinkholes & Erosion PF: 10 CF: 3 TOTAL: 30	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 8,120 (east) & 8,320 (west) (Reference No. 70001011, 2024)			CONTRACT MAINTENANCE AREA (CMA): 504	

SUMMARY OF SITE INSTRUMENTATION: There is no instrumentation at the GP045 site. In 2021, two reference/survey stakes with flagging tape were placed 2.0 m upslope of the erosion gully around the 0.9-m diameter culvert to monitor retrogression. LAST READING DATE: N/A	INSPECTED BY: Chris Gräpel (KCB) Courtney Mulhall (KCB) Babatunde Awokunle (TEC) Rocky Wang (TEC)
PRIMARY SITE ISSUE: Slope failure and sinkhole in median backslope above southbound lanes of Hwy 43:04 first observed in 2015 and 2017, respectively. Erosion north of slope failure and sinkhole next to inlet of CSP drainage gallery in median backslope. Two erosion gullies on east side of southbound lanes where two culvert outlets are located. The site is located on the east/south valley slope of the Smoky River approximately 600 m to 1,000 m south of the Smoky River Bridge.	
APPROXIMATE DIMENSIONS: Slope failure approximately 150-m wide extending up median backslope to an approximate height of 15 m to 20 m above southbound lanes. Sinkhole approximately 10 m to 15 m in diameter and 3 m to 4 m deep. An erosion gully with several scour holes extends approximately 260 m from the sinkhole to the east ditch of the southbound lanes. Sinkhole next to manhole in median backslope is approximately 2.0 m wide and 2.5 m deep. Erosion gullies on east side of southbound lanes are approximately 10 m wide and 15 m to 20 m long.	
DATE OF ANY REMEDIAL ACTION: 2016 to 2018 - downstream segment of corrugated-steel-pipe (CSP) culvert decommissioned, grouted, and replaced with a smooth-walled-steel-pipe (SWSP) culvert.	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress		X	None observed at time of 2025 inspection, but some alligator cracking previously observed by others prior to 2016 patch.		X
Slope Movement	X		Slope failure in median backslope has well developed backscarp and toe roll in east ditch of southbound lanes. Slide extents appear similar to 2022, but toe roll continues to move towards edge of pavement and is blocking the highway ditch.	X	
Erosion	X		Compared to 2022 inspection: gullies around culvert outlets have retrogressed and expanded, sinkhole in median backslope has similar extents, and sinkhole next to CSP drainage gallery is slightly larger. Both gullies and sinkholes are not impacting pavement surface.	X	
Seepage	X		Seepage expected where culverts are separated.	X	X

SITE INSPECTION FORM

Culvert Distress	X	1.2-m diameter CSP culvert outlet is corroded with holes, and partially blocked by debris. 0.9-m diameter culvert outlet hanging. Connection detail of CSP drainage gallery in median backslope maybe separated resulting in sinkhole at ground surface.	X
COMMENTS			
In 1999/2000, the highway was twinned with the construction of a new southbound lanes while the original highway became the new northbound lanes.			
<u>Slope failure in median backslope (Photos 3 and 6):</u>			
<ul style="list-style-type: none"> Review of unmanned-aerial-vehicle (UAV) flight imagery from 2022 and the shape of the headscarp appears to indicate that the slide extents have remained relatively unchanged since the 2022 inspection, but the toe roll has continued to progress towards edge of pavement and is blocking the ditch. 			
<u>Sinkhole in median backslope (Photos 4 and 7):</u>			
<ul style="list-style-type: none"> The sinkhole in the median appears to be related to the decommissioned CSP culvert, which was replaced with a SWSP culvert. <ul style="list-style-type: none"> TEC has previously mentioned reports the SWSP and the original CSP are not properly connected, which could allow material above the connection to enter the culvert and block it. This was confirmed with a camera survey (completed approximately 6 years ago), which showed a “lip” where the CSP and SWSP pipe pieces do not meet. TEC has the video footage from the camera survey. The method/type of SWSP culvert construction is unknown but appears to have been done with trenchless methods. The sinkhole could also be the location of a push pit if the culvert was drilled in placed. Ponded water previously observed in the sinkhole, but the sinkhole was dry at the time of the 2025 inspection. Since the 0.9-m diameter SWSP culvert outlet downstream is trickling this could indicate either the culvert is full of water and blocked, or the sinkhole is sealed off and can hold water at surface. The alignment of the culvert also includes bends, which could also promote blockage with debris. During large runoff events, water appears to flow up from or overflow the sinkhole and flow into the east ditch of the southbound lanes. 			
<u>North erosion gully at outlet of 0.9-m diameter smooth-walled-steep-pipe (SWSP) culvert outlet (Photos 4 and 8):</u>			
<ul style="list-style-type: none"> Erosion gully has retrogressed since the 2022 inspection and is large, approximately 10 m wide by 15 m long. A plunge pool below culvert outlet has exposed natural soil, including gravel, cobbles, and boulders (there is a gravel pit nearby). Culvert outlet overhands in air approximately 2 m to 3 m. 			
<u>South erosion gully at outlet of 1.2-m diameter corrugated-steel-pipe (CSP) culvert outlet (Photos 5 and 9):</u>			
<ul style="list-style-type: none"> Erosion gully has retrogressed since the 2022 inspection and is large, approximately 10 m wide by 20 m long. Culvert is partially sleeved with a green plastic pipe at the outlet. Orange and black utility cables exposed along the backslope of the gully. 			
<u>Sinkhole in median backslope next to inlet of 3.0-m diameter CSP drainage gallery (Photos 5 and 10):</u>			
<ul style="list-style-type: none"> Sinkhole is approximately 2.0 m to 3.0 m wide by 2.5 m deep. Sinkhole extents appear to have expanded slightly since the 2022 inspection due to further erosion / collapse, but vegetation has started to grow inside the sinkhole. It is suspected that the connection detail on the south/downstream end is separated, and material is being washed into the pipe resulting in the sinkhole observed at ground surface. 			

Maintenance/Repair/Monitoring Recommendations:

- The repair of the sinkhole and sliding are being conducted under a separate contract.
- End of the high tension cable barrier (HTCB) along the west shoulder of the southbound lanes near the south end of the site is damaged (Photos 11 and 12) and should be repaired.

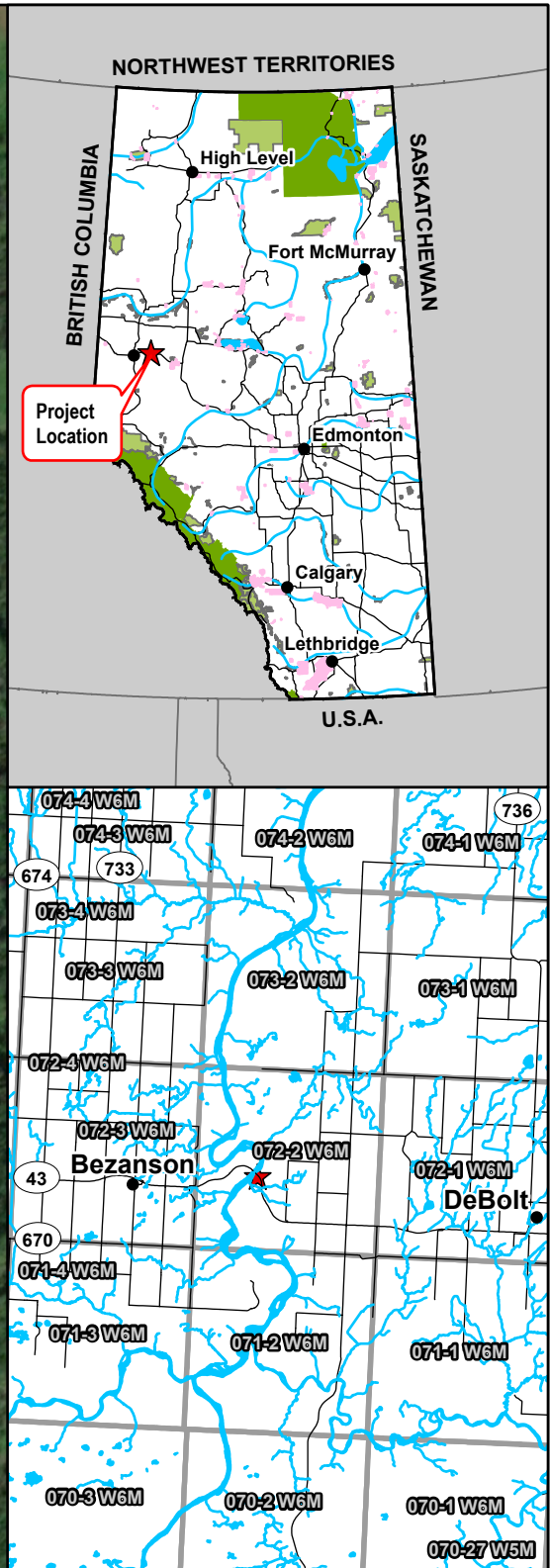
This report is an instrument of service of Klohn Crippen Berger (KCB). The report has been prepared for the exclusive use of Alberta Transportation and Economic Corridors (Client) (Client) for the specific application to the Peace Region (Grande Prairie District – South) Geohazard Risk Management Program (Contract No. CON0022166), and it may not be relied upon by any other party without KCB's written consent.

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.




Use of or reliance upon this instrument of service by the Client is subject to the following conditions:

1. The report is to be read in full, with sections or parts of the report relied upon in the context of the whole report.
2. 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.
3. 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 information and makes no representations regarding its correctness or accuracy. KCB shall not be responsible to the Client for the consequences of any error or omission contained in Client-supplied information.
4. KCB should be consulted regarding the interpretation or application of the findings and recommendations in the report.
5. 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.

Courtney Mulhall, M.Sc., P.Eng.
Geotechnical Engineer



Legend

-  Sinkhole
-  Scarp
-  Toe Roll



NOTES: 1. HORIZONTAL DATUM: NAD83 2. GRID ZONE: UTM ZONE 11N 3. IMAGE SOURCE: 2025 MICROSOFT CORPORATION, 2025 MAXAR CNES, DISTRIBUTION AIRBUS DS	CLIENT 		PROJECT PEACE REGION (GRANDE PRAIRIE DISTRICT-SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM	
			TITLE Site Plan GP045 - Smoky River East Valley Slope Slide and Sinkhole Hwy 43:04, km 35.691	
SCALE 1:3,000		PROJECT No. A05116A01		FIG No. 1

Inspection Photographs

Photo 1 Overview of GP045 site. Photo taken June 3, 2025, facing northeast.



Photo 2 Overview of GP045 site. Photo taken June 3, 2025, facing southeast.



Photo 3 Erosion features and slope failure in median backslope of Hwy 43:04. Note toe roll of slope failure in highway ditch. Photo taken June 3, 2025, facing southeast.

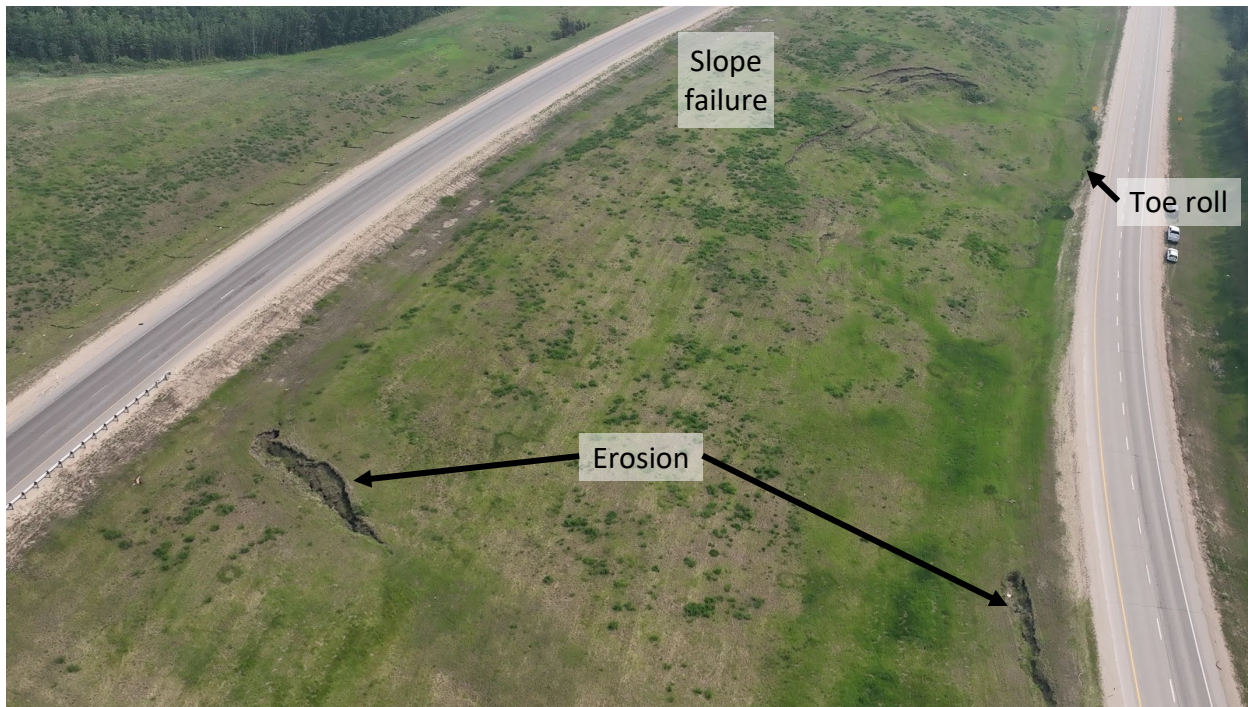


Photo 4 Sinkhole in median backslope and erosion gully on west slope of Hwy 43:04. Photo taken June 3, 2025.



Photo 5 Sinkhole next to inlet of drainage gallery in median backslope and erosion gully on west slope of Hwy 43:04. Photo taken June 3, 2025.



Photo 6 Erosion features in median backslope of Hwy 43:04. Photo taken June 3, 2025, facing southwest.



Photo 7 Sinkhole in median backslope of Hwy 43:04. Photo taken June 3, 2025, facing west.



Photo 8 Erosion gully at 0.9-m diameter SWSP culvert outlet on west slope of Hwy 43:04. Note overhang of culvert outlet. Photo taken June 3, 2025, facing southwest.



Photo 9 Erosion gully at 1.2-m diameter CSP culvert outlet on west slope of Hwy 43:04. Note red cable exposed along gully backslope. Photo taken June 3, 2025, facing west.



Photo 10 Sinkhole next to inlet of drainage gallery in median backslope of Hwy 43:04. Photo taken June 3, 2025, facing south.



Photo 11 Guardrail damaged along west side of southbound lanes of Hwy 43:04. Photo taken June 3, 2025, facing south.



Photo 12 Damaged high-tension cable barrier (HTCB) along west side of southbound lanes of Hwy 43:04. Photo taken June 3, 2025, facing east.

