

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: July 19, 2021	INSPECTION DATE: June 16, 2022
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: 3 TOTAL: 27 Sinkholes & Erosion PF: 9 CF: 4 TOTAL: 36	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 6230 (west) (Reference No. 30720, 2021) 6790 (east) (Reference No. 7000114, 2021)			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 at WP076 to monitor retrogression. 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)
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PRIMARY SITE ISSUE: Slope failure at WP079 and sinkhole between WP077 and WP078 in median backslope above southbound lanes of Hwy 43:04 first observed in 2015 and 2017, respectively. Two erosion gullies (approximately 160 m apart) on east side of southbound lanes at WP076 and WP227 where two culvert outlets are located. New sinkhole observed this year at WP226 next to inlet of CSP drainage gallery in median backslope. 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.

Erosion gullies on east side of southbound lanes are approximately 10 m wide and 15 m to 20 m long.

Sinkhole next to manhole in median backslope is approximately 2.0 m wide and 2.5 m deep.

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	Some alligator cracking previously observed by others prior to 2016 patch.		X
Slope Movement	X		Slope failure at WP079 in median backslope has well developed backscarp (extents similar to last year) and toe roll in east ditch of southbound lanes (has squeezed in further since last year).	X	
Erosion	X		Gullies at WP076 and WP227 around culvert outlets have retrogressed and expanded. Sinkhole between WP077 WP078 in median backslope similar to last year. New sinkhole at WP226 next to inlet of CSP drainage gallery in median backslope.	X	

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Seepage	X		Seepage expected where culverts are separated.	X	
Culvert Distress	X		1.2-m diameter CSP culvert outlet is corroded with holes, and partially blocked by debris. Connection detail of CSP drainage gallery in median backslope at WP226 maybe separated resulting in the 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.

Slope failure at WP079

- Review of unmanned-aerial-vehicle (UAV) flight imagery from 2021 and the shape of the headscarp appears to indicate that the slide has expanded with additional sliding at the flank(s).

Sinkhole between WP077 and WP078

- The sinkhole in the median appears to be related to the decommissioned CSP culvert, which was replaced with a SWSP culvert.
 - AT 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 3 years ago), which showed a “lip” where the CSP and SWSP pipe pieces do not meet. AT 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 observed in the sinkhole. 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.

North erosion gully at outlet of 0.9-m diameter smooth-walled-steep-pipe (SWSP) culvert outlet at WP076

- Erosion gully 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 suspended in air 2 m to 3 m.
- Steady trickle of water from culvert outlet.

South erosion gully at outlet of 1.2-m diameter corrugated-steel-pipe (CSP) culvert outlet at WP227

- Erosion gully is large, approximately 10 m wide by 20 m long.
- The culvert is partially sleeved with green plastic pipe at the outlet.
- Orange and black utility cables exposed along backslope of gully.

Sinkhole next to inlet of 3.0-m diameter CSP drainage gallery at WP226.

- A sinkhole is approximately 2.0 m wide by 2.5 m deep.
- 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.

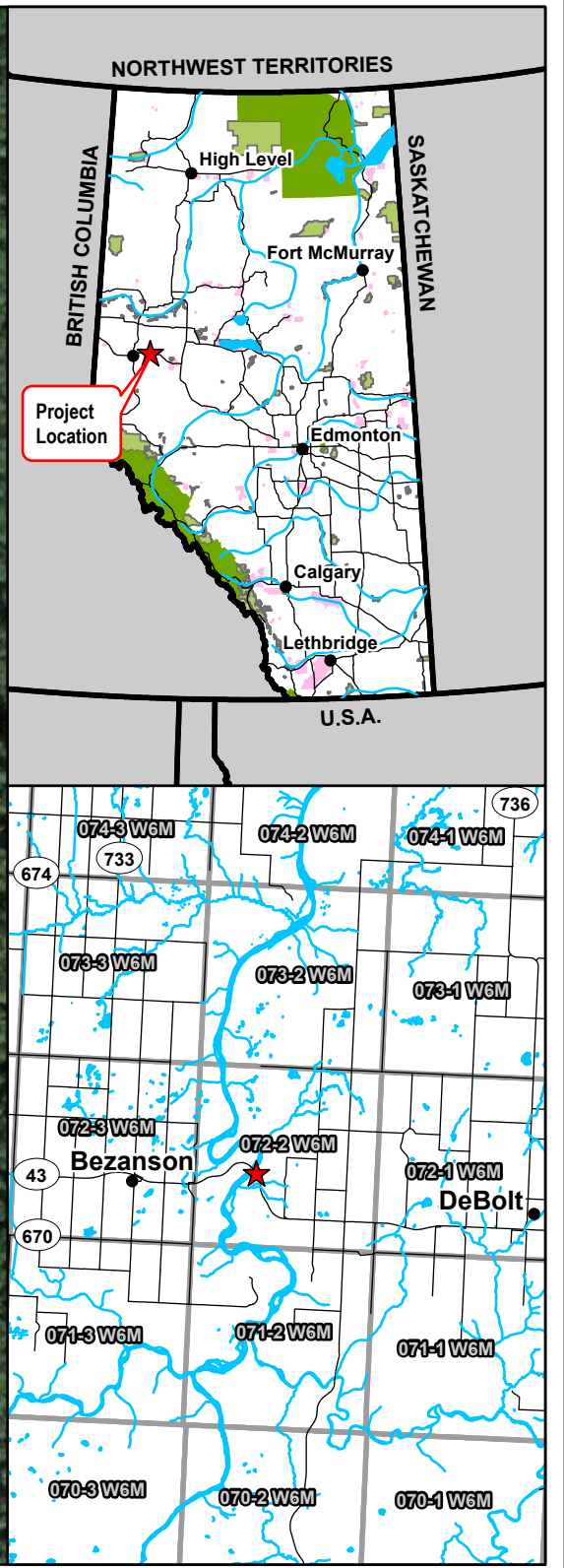
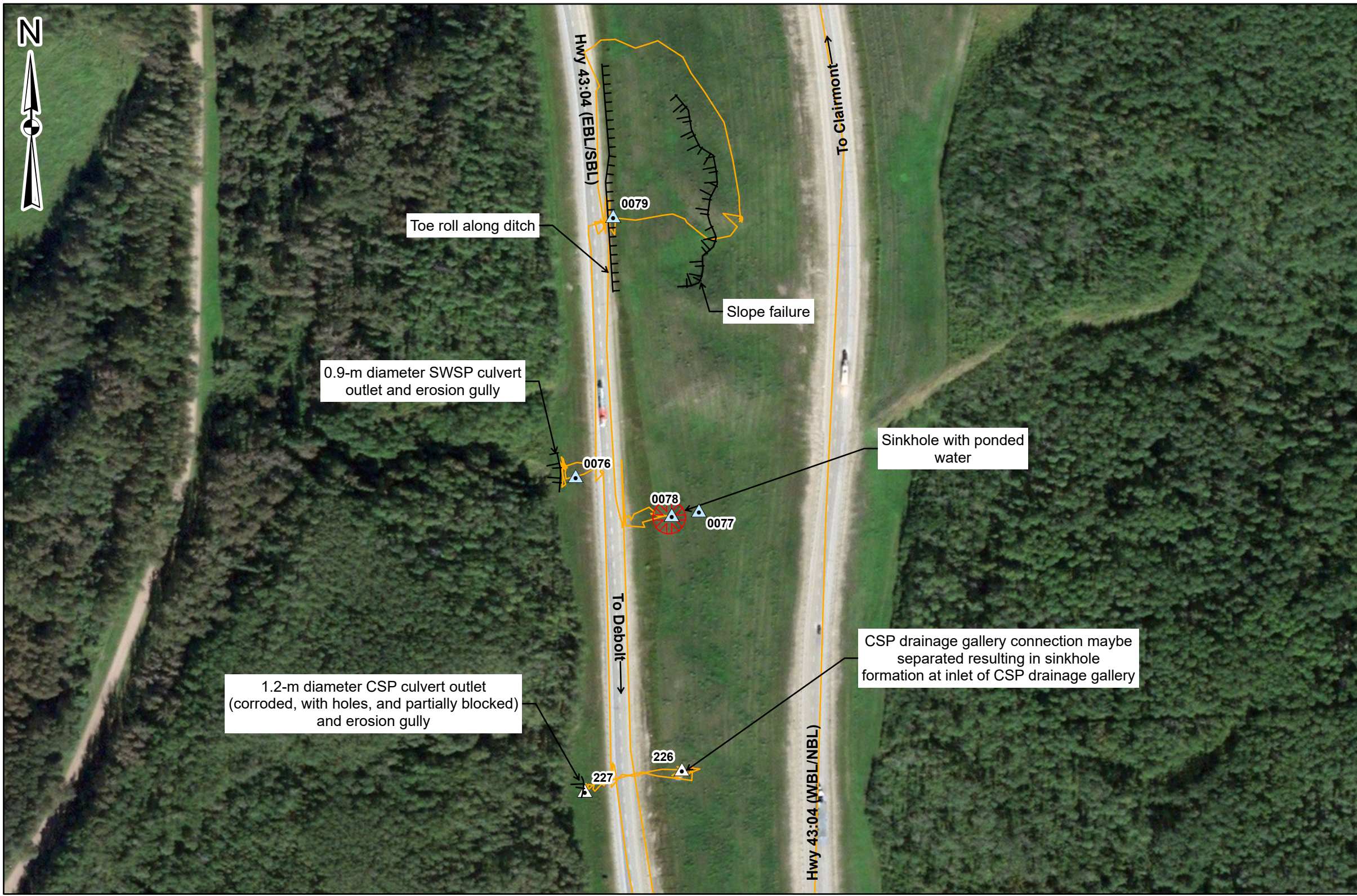
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Chris Gräpel, M.Eng., P.Eng.
Senior Civil Engineer, Associate



Legend

- Sinkhole
- GPS Waypoint (June 16, 2022)
- GPS Waypoint (August 11, 2021)
- GPS Track (June 16, 2022)
- Scarp
- Toe Roll



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 GP045 - Smoky River East Valley Slope Slide and Sinkhole Hwy 43:04, km 35.691	
SCALE	PROJECT No.	FIG No.
1:2,250	A05116A01	1

Inspection Photographs

Photo 1 Slope failure at WP079 in median backslope above southbound lanes of Hwy 43:04. Photo taken June 16, 2022, facing southwest.



Photo 2 Toe roll at WP079 along/in east ditch of southbound lanes of Hwy 43:04. Photo taken June 16, 2022, facing southeast.



Photo 3 Toe roll in east ditch of southbound lanes of Hwy 43:04. Photo taken June 16, 2022, facing south.



Photo 4 Sinkhole between WP077 and WP078 in median backslope above of southbound lanes of Hwy 43:04. Photo taken June 16, 2022, facing northwest.



Photo 5 Ponded water in sinkhole between WP077 and WP078 in median backslope above of southbound lanes of Hwy 43:04. Photo taken June 16, 2022, facing west.



Photo 6 Crest of erosion gully at 0.9-m diameter SWSP culvert outlet at WP076. Note reference/survey stakes with flagging (circled in white) placed 2.0 m upslope of erosion gully to monitor retrogression. Photo taken June 16, 2022, facing south.

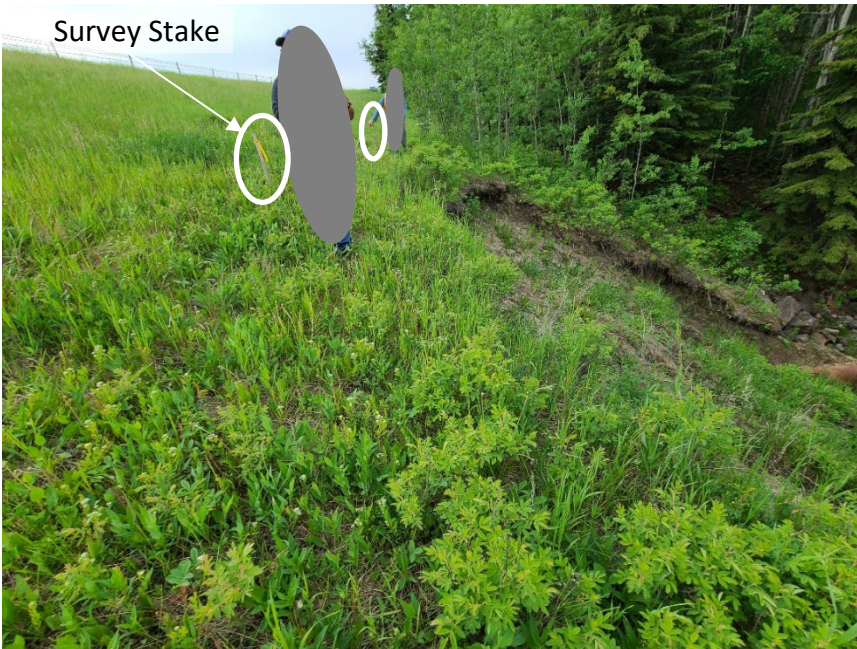


Photo 7 Erosion gully at 0.9-m diameter SWSP culvert outlet at WP076. Photo taken June 16, 2022, facing southwest.



Photo 8 Erosion gully at 1.2-m diameter CSP culvert outlet at WP227. Photo taken June 16, 2022, facing west.



Photo 9 Erosion fully at 1.2-m diameter CSP culvert outlet at WP227. Note red utility cable exposed along gully backslope. Photo taken June 16, 2022, facing southeast.



Photo 10 Outlet of 1.2-m diameter culvert corroded with holes at WP227. Photo taken June 16, 2022, facing south.



Photo 11 Outlet of 1.2-m diameter culvert partially blocked at WP227. Note green plastic culvert sleeve (circled in white) that was partially inserted into the original CSP culvert (circled in yellow). Photo taken June 16, 2022, facing west.



Photo 12 Sinkhole at WP226 next to inlet of CSP drainage gallery in median backslope above of southbound lanes of Hwy 43:04. Photo taken June 16, 2022, facing west.

