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| SITE NUMBER AND NAME: S031-II Mystery Culvert | | HIGHWAY & KM: 762:02, 17.660 | PREVIOUS INSPECTION DATE: May 9, 2023 | INSPECTION DATE: May 28, 2024 |
| LEGAL DESCRIPTION: 07-19-22-04-W5M | NAD 83 COORDINATES: UTM Northing Easting 11 5639613 672917 | | RISK ASSESMENT: PF: 8 CF: 4 TOTAL: 32 | |
| AVERAGE ANNUAL DAILY TRAFFIC (AADT): 1090 (north) & 1380 (south) (Reference No. 65170 & 60180) | | | CONTRACTOR MAINTENANCE AREA (CMA): 27 | |

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| SUMMARY OF SITE INSTRUMENTATION: There is no instrumentation at the S031-II site. LAST READING DATE: N/A | | INSPECTED BY: Chris Grapel (KCB) Peter Roy (KCB) Renato Macciotta (U of A) Kristen Tappenden (TEC) Alex Frotten (TEC) Maury Siddons (TEC) |
| PRIMARY SITE ISSUE: Embankment failure impacting the southbound lane. | | |
| APPROXIMATE DIMENSIONS: Slide approximately 40 m wide, up to 2 m into the highway. Most of the cracking was observed on the west shoulder. The height of the highway embankment is approximately 4 m to 5 m. | | |
| DATE OF ANY REMEDIAL ACTION: Previous pavement patches have been completed at the site. Patch placed after the 2022 inspection. | | |

| ITEM | CONDITION EXISTS | | DESCRIPTION AND LOCATION | NOTICABLE CHANGE FROM LAST INSPECTION | |
|-------------------|------------------|----|--|---------------------------------------|----|
| | YES | NO | | YES | NO |
| Pavement Distress | X | | Pavement patch placed in 2022 has settled, with cracking starting to come through at north and south ends. | X | |
| Slope Movement | X | | Slight bulge in slope and cracking at the head of the slide. | | X |
| Erosion | | X | N/A – none observed | | X |
| Seepage | | X | N/A – none observed. A wetland is located along the west side of the highway embankment. | | X |
| Culvert Distress | X | | The CSP culverts appear rusted and deformed | | X |

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| COMMENTS |
| <ul style="list-style-type: none"> • There appears to be ongoing settlement and/or slope movement at the site. The pavement patch placed in 2022 has settled with cracking noted on the north and south ends. • The MCI reported that the pavement had settled approximately 200 mm vertically and required patching in June 2020. During the 2020 inspection, mid-slope tension cracking was noted along the west embankment between the north and south culverts. There is a slight bulge in the slope but no discernible change between the 2021 and 2024 inspections. • The total length of the tension crack on the highway surface is approximately 40 m. Longitudinal cracks up to 10 mm wide were observed at the north end of the site close to the west shoulder (this area was not patched and appears unchanged since the previous inspection). • Two CSP culverts are present at S031-II site that are underlying the highway (oriented east-west). The south culvert was replaced as part of the 2017 repair work, and the north culvert is outside the site limits. Both culverts appeared deformed and bowed beneath the highway embankment. An asphalt apron is at |

the outlet of the north culvert.

The east (northbound) ditch appears poorly drained.

Maintenance/Repair/Monitoring Recommendations:

- Candidate repair options for the S031-II site include: (i) a driven steel H-pile wall (ii) excavate and replace the embankment fill with geogrid reinforced granular fill, including a shear key near the toe of the highway embankment. (iii) Reduce embankment loading using lightweight fill (e.g., cematrix or polystyrene) in the top third of the slope.
- One borehole could be drilled at the S031-II site to assess the ground conditions. A slope inclinometer should be installed in the borehole to assess the depth of movement at the site and to help determine the depth of a potential pile wall repair. A proposal for this work was submitted on December 15, 2022.
- The repair work at the S031-II site could be completed by Alberta Transportation's Highway Maintenance Contractor (HMC). A design memo (including repair sketches and quantity estimates) could be prepared by KCB to assist the HMC.

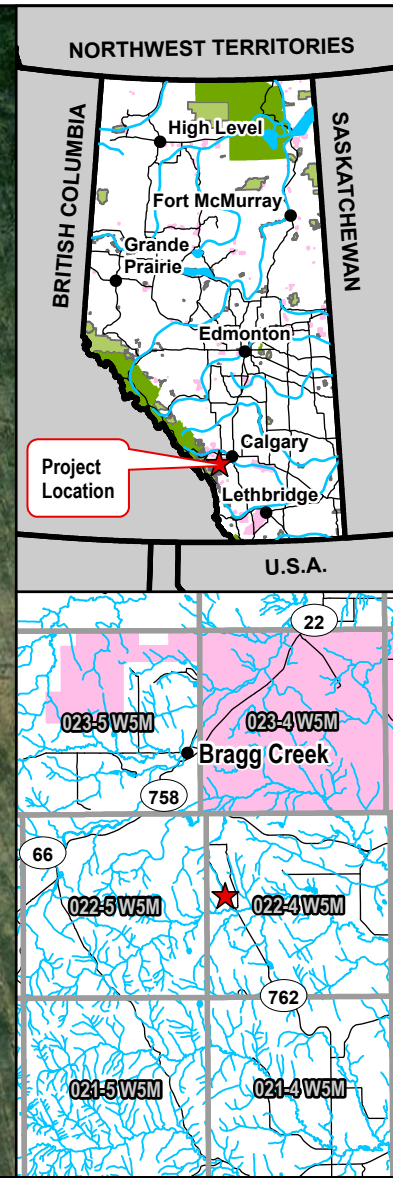
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



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| <p>Peter Roy, P.Eng. Civil Engineer</p> | |
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Legend

-  Scarp
-  Tension Crack
-  Fence
-  Culvert

NOTES:
 1. HORIZONTAL DATUM: NAD83
 2. GRID ZONE: UTM ZONE 11N
 3. IMAGE SOURCE: MAXAR 2024

CLIENT



PROJECT

SOUTHERN REGION GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE

Site Plan
 S031-2 - Mystery Culvert
 Hwy 762.02, km 97.660

SCALE

1:1,500

PROJECT No.

A05116A03

FIG No.

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Photo 1 West ditch, and a CSP culvert inlet. Photo taken facing south on May 28, 2024.



Photo 2 West slope. Photo taken facing north on May 28, 2024.



Photo 3 Cracking and settlement through patch placed in fall 2022 in the southbound lane. Photo taken facing south on May 28, 2024.



Photo 4 Cracking on the shoulder of the southbound lane. Photo on May 28, 2024

