

| | | | | |
|--|--|-------------------------------|---|---|
| SITE NUMBER AND NAME: S043 Pine Ridge | | HIGHWAY & KM: 6:04, 10.000 | PREVIOUS INSPECTION DATE: May 10, 2019 | INSPECTION DATE: May 10, 2023 |
| LEGAL DESCRIPTION: 02-09-003-29 W4M | NAD 83 COORDINATES: UTM Northing Easting 12 5452673 292619 | | RISK ASSESMENT: PF: 9 CF: 4 TOTAL: 36 | |
| AVERAGE ANNUAL DAILY TRAFFIC (AADT): 321 (north), 302 (south), (Ref No. 60060410) | | | CONTRACTOR MAINTENANCE AREA (CMA): 26 | |

| | |
|--|---|
| SUMMARY OF SITE INSTRUMENTATION: None | INSPECTED BY: Chris Gräpel (KCB) Peter Roy (KCB) Alex Frotten (AT) Roger Skirrow (AT) |
| LAST READING DATE: N/A | |

PRIMARY SITE ISSUE: Embankment sliding and/or settlement causing cracks in pavement extending across the southbound lane.

APPROXIMATE DIMENSIONS: Approximately 30 m to 35 m wide, extending 3 m into the southbound lane. Embankment fill and natural slope at approximately 1.5H:1V. Fill is approximately 8 m high with natural slope approximately 20 m high below the fill.

DATE OF ANY REMEDIAL ACTION: No recent remedial measures have been undertaken. Patching has occurred since the previous inspection in 2019.

| ITEM | CONDITION EXISTS | | DESCRIPTION AND LOCATION | NOTICABLE CHANGE FROM LAST INSPECTION | |
|-------------------|------------------|----|--|---------------------------------------|----|
| | YES | NO | | YES | NO |
| Pavement Distress | X | | Cracking of the pavement extends to the middle of the southbound lane and near centreline. Patching has been completed since last inspection. Minor cracking showing through patching. | X | |
| Slope Movement | X | | Slope below the highway is exhibiting signs of movement. | | X |
| Erosion | | X | | | X |
| Seepage | | X | | | X |
| Culvert Distress | | X | | | X |

COMMENTS

Ongoing slope movement. Patching has been completed since the previous inspection, minor cracking showing through the patching.

Cracking on the shoulder south of the patching up to 30 mm wide, near the guard rail. Appears to be little change since the previous inspection in 2019.

There appears to be persistent ponding of water in the upslope ditch opposite the slide zone, with probable infiltration into the slide mass. The ditch was dry at the time of the inspection.

There is an existing draw feature to the northeast and southwest of the site, that was likely filled in as part of the highway construction works.

The guard rail above the failure zone on the highway has dropped and a dip is apparent. It is recommended that the guardrail be raised to standard height.

Up 1.2 m thickness of asphalt was observed at various points along the highway shoulder on the crest of the downslope embankment. However, this could be overspill from the last overlay.

Vegetation was observed at the fill-natural soil contact at the toe of the embankment downslope of the highway. The density of vegetation could indicate seepage at the fill-foundation contact.

The embankment failure appears to be due to groundwater seepage and seepage from the adjacent drainage ditch leading to instability downslope. Pondered water in the drainage ditch is infiltrating into the adjacent highway embankment. It may also be possible that organic material present beneath the embankment was left in-situ during the embankment construction, or that sub-drainage was not included to drain springs, as was a common highway construction practice in the past.

Short-Term:

- The drainage ditch should be regraded to allow water to pass through this area without ponding, to see whether slope movements cease. If not, the ditch should be lined with a geomembrane to limit infiltration into the embankment fill. Additional stabilization measures such as a pile wall may be required if current rates of movement accelerate significantly.
- If drainage improvements don't reduce slide activity, the highway should be relocated 1.5 lanes northeast with buried highway drainage.

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 Southern Region Geohazard Risk Management Program (Contract No. CON0022161) and it may not be relied upon by any other party without KCB's written consent.

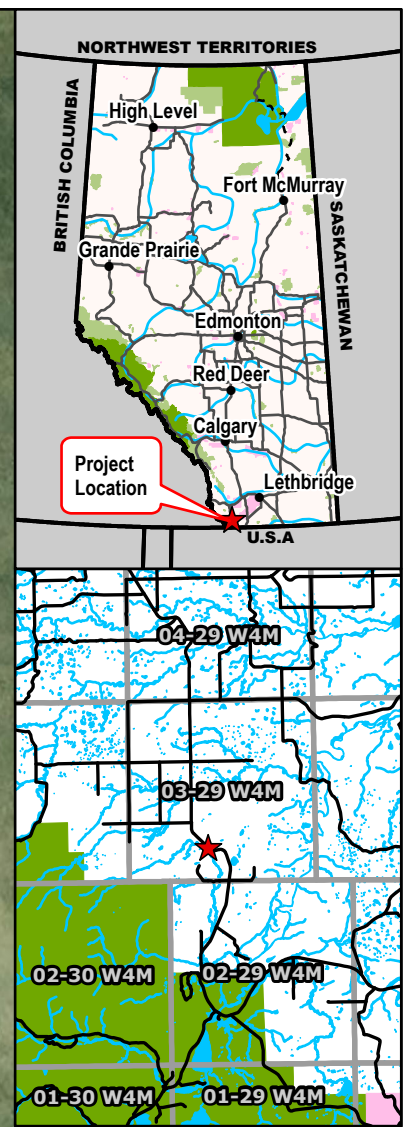
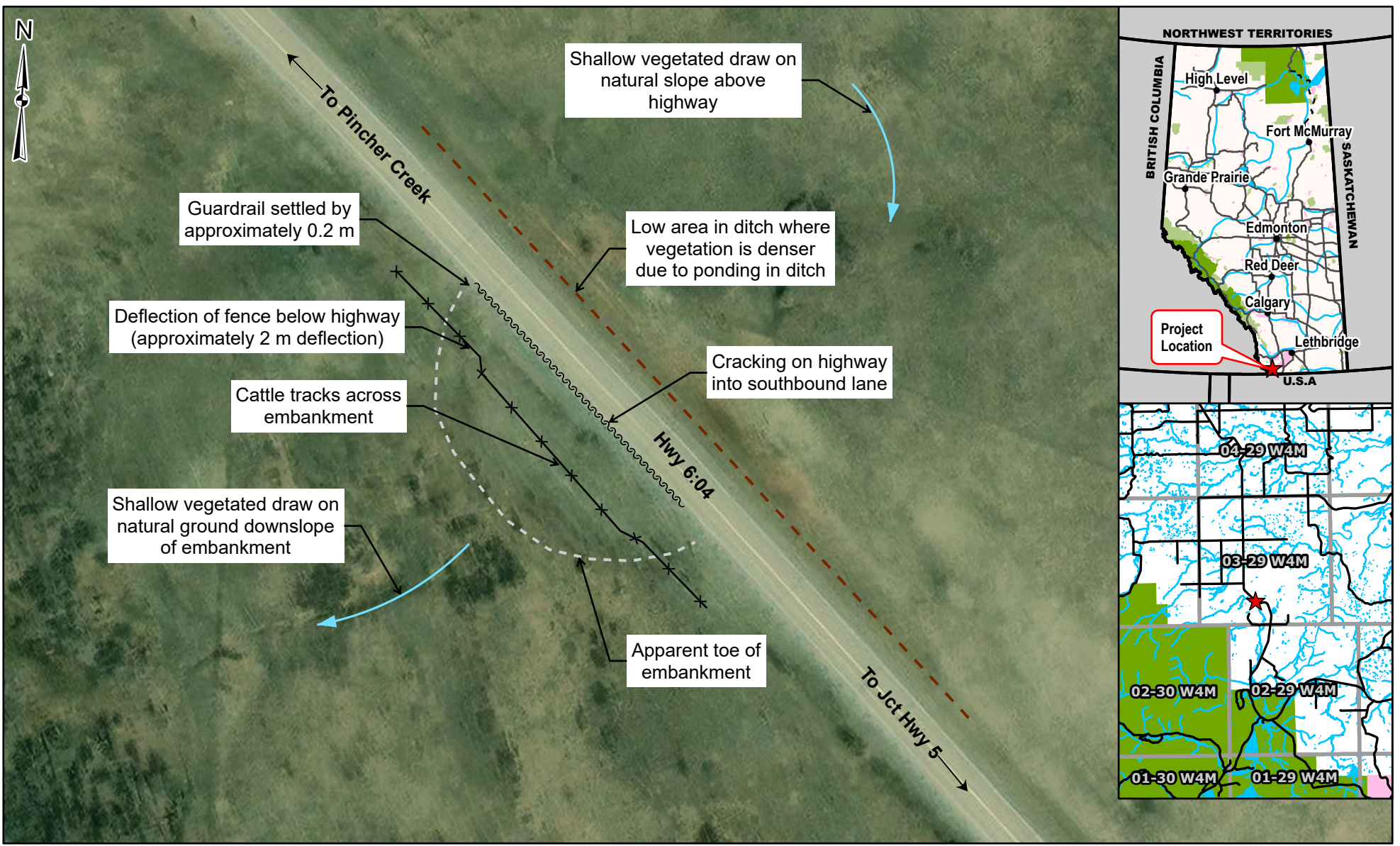
KCB has prepared this report in a manner consistent with the level of care, skill and diligence ordinarily provided by members of the same profession for projects of a similar nature at the time and place the services were rendered. KCB makes no warranty, express or implied.

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

- (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 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.
- (iv) KCB should be consulted regarding the interpretation or application of the findings and recommendations in the report.
- (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.

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

File: Z:\A\CGY\Alberta\A05116A03\ABT Southern Region GRMP\400 Drawings\2023\01_Profile\Section.B\ABT_Southern_SectionB_230717.aprx. Date: Time: Creator: : aharrison



Legend

- Ditch
- ~~~~~ Crack
- x--- Fence
- Site Extent
- ▶ Flow Direction

NOTES:
 1. HORIZONTAL DATUM: NAD83
 2. GRID ZONE: UTM ZONE 12N
 3. IMAGE SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS AND THE GIS USER COMMUNITY.

CLIENT

Alberta

Klohn Crippen Berger

| | | |
|---|--------------------------|--------------|
| PROJECT SOUTHERN REGION GEOHAZARD RISK MANAGEMENT PROGRAM | | |
| TITLE Site Plan S043 - Pine Ridge Hwy 6:04, km 10.00 | | |
| SCALE 1:1,000 | PROJECT No. A05116A03 | FIG No. 1 |



Photo 1 **Embankment slope. Red circle below shows movement area on the highway. Photo taken facing northeast on May 10, 2023.**



Photo 2 **Embankment slope. Patch shown at red circle below. Photo taken facing north on May 10, 2023.**



Photo 3 Patching completed since last inspection. Minor cracking showing through. Photo taken facing southeast on May 10, 2023.



Photo 4 Cracking on the west shoulder of the highway outside of patched area. Photo taken facing southeast on May 10, 2023.



Photo 5 Up to 1.2 m of asphalt on west shoulder. Photo taken facing southeast on May 10, 2023.

