

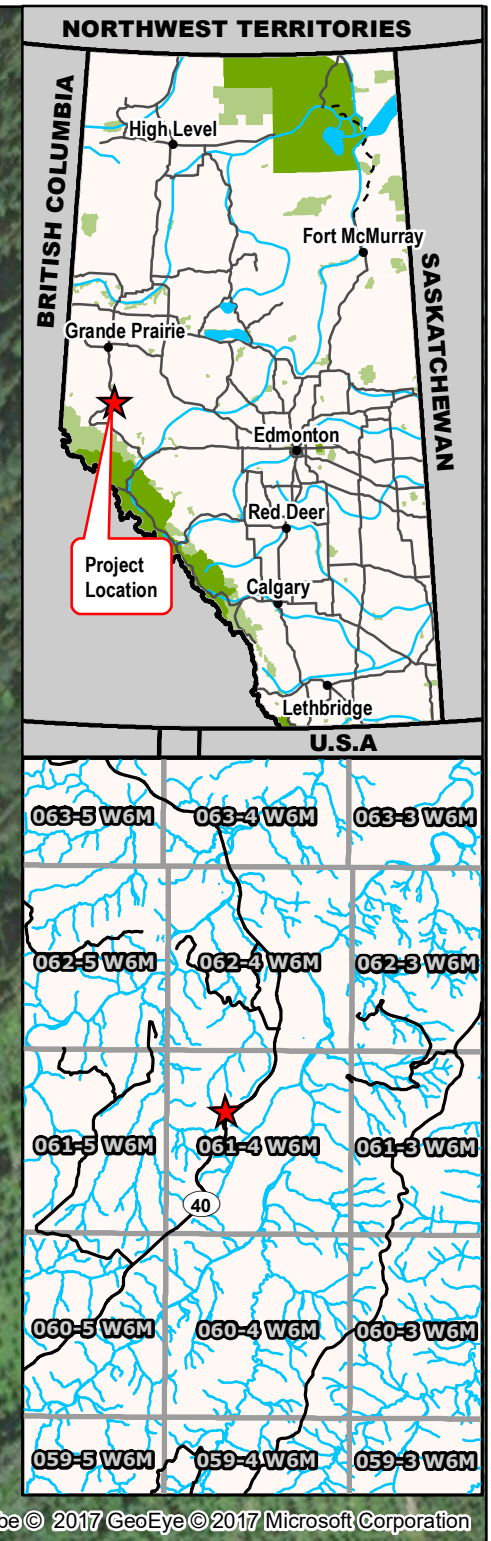
SITE NUMBER AND NAME: GP002 Candle Road Slide		HIGHWAY & KM: 40:38, 7.439	PREVIOUS INSPECTION DATE: December 2006	INSPECTION DATE: July 20, 2021
LEGAL DESCRIPTION: NE 20-61-4-W6M	NAD 83 COORDINATES: UTM Northing Easting 11 6017091 398840		RISK ASSESSMENT: PF: 9 CF: 1 TOTAL: 9	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 780 (north) & 780 (south) (Reference No.: 70000673)			CONTRACT MAINTENANCE AREA (CMA): 504	

SUMMARY OF SITE INSTRUMENTATION: There is no instrumentation at the GP002 site. LAST READING DATE: N/A	INSPECTED BY: Chris Gräpel James Lyons Roger Skirrow (AT) Rocky Wang (AT) Ed Szmata (AT) Max Shannon (AT) Chase Milligan (AT) Dwayne Lowen (AT MCI)
PRIMARY SITE ISSUE: Slide in embankment fill and foundation due to high groundwater table. Site is a repeat failure at a previous repair site.	
APPROXIMATE DIMENSIONS: 30 m wide, 25 m high	
DATE OF ANY REMEDIAL ACTION: Repaired in 2004	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress		X			X
Slope Movement	X		Slope movement of approximately 25% to 30% embankment slope extends from 2.9 m behind guardrail down slope to approximately 25 m vertically below the highway		X
Erosion	X				X
Seepage	X		Seepage observed in lower slide area at WP095, 096, and 097		
Culvert Distress		X			

COMMENTS
<ul style="list-style-type: none"> - Slide is on an embankment side-hill fill with a shear key excavated into a subsurface bedrock ledge that was previously repaired in 2004 with granular fill and subsurface drains (perforated pipe). AT recalls that the bedrock ledge was at same elevation below the slope as it was below the road (based on borehole logs). The last inspection report (Karl 2006) indicated the slide repair was performing satisfactorily. Two drain outlets were provided (upper and lower) in case lower drain became blocked with sediment which was happening in 2004. Google Earth imagery dated 2012 does not show the extent of sliding observed on site during the 2021 inspection. - Silt fence observed at WP039 (mid-slope) and WP094 (near tree line at toe of slide area, likely extent of previous repairs).

<ul style="list-style-type: none"> - Seems to be more rounded gravel and cobbles visible at upper part of slide than lower part of slide, seems like lower part may have been graded with native material and upper part was reconstructed with gravel. WP098 is at the lower limit of rounded gravel and cobbles. 	
<ul style="list-style-type: none"> - Slope appears to have failed again due to plugged drains resulting in rising water level and saturation of repair fill and/or, shearing through the bedrock ledge 	
<ul style="list-style-type: none"> - WP095, water in cracks about 0.5 m depth in cracks, near zone where cracking is perpendicular to crest of slope, a more active zone where water is located (WP096) 	
<ul style="list-style-type: none"> - WP097, water at surface in a low area 	
<ul style="list-style-type: none"> - Slide repair will likely involve re-excavating the previous repair, assessing if the shear key is intact, re-establishing drainage, with redundant outlets at multiple elevations, and reconstructing the slope with free-draining gravel reinforced with geogrid. Drainage should include filtering so that sediments do not enter the drainage pipes. The work could be done in panels to avoid destabilizing the unsupported steep backscarp, but construction access would have to be considered when assessing panel widths. Estimated cost of repair is in the order of \$600,000 to \$800,000. 	
<p>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 Central Region Geohazard Risk Management Program (Contract No. CON0022166) and it may not be relied upon by any other party without KCB's written consent.</p> <p>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.</p> <p>Use of or reliance upon this instrument of service by the Client is subject to the following conditions:</p> <ul style="list-style-type: none"> (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) KCB should be consulted regarding the interpretation or application of the findings and recommendations in the report. 	
<p>Chris Gräpel, M.Eng., P.Eng. Senior Civil Engineer, Associate</p>	



- Legend**
- GPS Waypoint (July 20, 2021)
 - GPS Track (July 20, 2021)
 - Slide Extent



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NOTES: 1. HORIZONTAL DATUM: NAD83 2. GRID ZONE: UTM Zone 11N 3. IMAGE SOURCE: Microsoft BING Maps	CLIENT 	PROJECT GRANDE PRAIRIE SOUTH REGION GEOHAZARD RISK MANAGEMENT PROGRAM
		TITLE Site Plan GP002 Candle Road Slide Hwy 40:38 km, 7.439
	SCALE 1:2,000	PROJECT No. A05116A01
		FIG No. 1

Time: 14:36:17 PM
 Date: October 05, 2021
 File: Z:\AEDM\A05116A01\ABT - Grande Prairie South GRMP\400 Drawings\GIS\MXD\2021\Section B\GP002_211005.mxd

Photo 1 Overview of the GP002 site, indicating Hwy 40, Candle Road. Photo taken July 20, 2021 facing south.



Photo 2 Material exposed at the backscarp of the slide appears more granular (cobbles and gravel) than the material near the toe of the slide area. The lower limit of the more granular material is indicated by Waypoint 98. Photo taken July 20, 2021 facing west.



Photo 3 Exposed silt fencing near the toe of the slide (Waypoint 94). Photo taken July 20, 2021 facing north.



Photo 4 Silt fencing observed near the lower portion of the slide, near the north (left) flank (Waypoint 93). Photo taken July 20, 2021 facing north.



Photo 5 Cracking observed near the toe of the slide. Cracks were up to 0.5 m deep and filled with water (Waypoint 95 and 96). The slide appears more active at this area. Photo taken July 20, 2021 facing northwest.

