

SITE NUMBER AND NAME: C042 Water Valley Slide		HIGHWAY & KM: 579:02, 36.540	PREVIOUS INSPECTION DATE: June 11, 2018	INSPECTION DATE: July 10, 2019
LEGAL DESCRIPTION: 06/07-29-029-05 W5M	NAD 83 COORDINATES: UTM Northing Easting 11 5709031 661849		RISK ASSESSMENT: PF: 8 CF: 4 TOTAL: 32	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 1250 (west) and 240 (east) (Ref No. 997242 & 70000145)			CONTRACT MAINTENANCE AREA (CMA): 28	

SUMMARY OF SITE INSTRUMENTATION: Operational: One standpipe (SP) and two slope inclinometers (SIs) installed in 2005. Inoperable: Four standpipe piezometers (SP) and one pneumatic piezometer (PN) installed in 2005. LAST READING DATE: May 13, 2019		INSPECTED BY: Chris Gräpel (KCB) Ryan Gazley (KCB) Rishi Adhikari (AT) Tony Penney (AT)
PRIMARY SITE ISSUE: A series of valley slope and embankment fill slides that are exacerbated by creek erosion at the toe of the slope and a seasonally high groundwater table. The slides are located on both sides of Hwy 579, but predominantly on the south side (eastbound lane).		
APPROXIMATE DIMENSIONS: The site is approximately 400 m long, and the slopes are up to 20 m high sloped at approximately 2H:1V to 4H:1V.		
DATE OF ANY REMEDIAL ACTION: 2011 – highway realigned north (upslope) towards backslope		

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Pavement subsided and cracked in various locations		X
Slope Movement	X		Minor recent slope movement and ground cracking on slope below highway	X	
Erosion	X		Creek erosion at toe of slope; two erosion gullies present below highway		X
Seepage		X	None observed		X
Culvert Distress	X		Slope steeply graded downstream of culvert outlet		X

COMMENTS On the south side (eastbound lane) of the highway: <u>Slide area #1</u> <ul style="list-style-type: none"> A pavement crack approximately 56 m long was observed at the halfway point of the westbound lane during the 2018 inspection. Crack has not expanded since 2018 inspection. The toes of the slides extend to the creek at the toe of the slope. The toes of the slides are being eroded by the creek, creating steep and high erosion slopes that are 4 m to 5 m high. Pavement runoff is discharging onto the slope failure. At this site and all others on the south side of the highway.

Slide area #2 (instrument location)

- Seepage observed in erosion gully approximately 8 m below edge of highway in 2018 (waypoint 678). Embankment slope not inspected during 2019 inspection.
- Slide appears to be inactive but could reactivate following heavy rainfall events for a prolonged period of wet weather.

Slide area #3

- There is a steep drop off at the edge of pavement (photo 3).
- Upslope of the slide area, an arc-shaped crack extends across the centerline into the westbound lane.

Slide area #4

- The slide area appears to have moved somewhat since 2018. Vegetation on the slope obscures the condition of the slope.
- CSP slope drain below "Curve in Road" sign is corroded, sinkhole has formed at the fence line (waypoint 677) indicating that the culvert has either partially collapsed, or has a separated joint
- Erosion gullies continue to form in the gravel at the crest of the embankment, likely due to surface flows and seepage.
- Minimal deterioration of slide since 2018. Valley slopes north and south of the creek are failing.
- The slide area extends past fence line and is within 10 m of the edge of pavement.

On the north side (westbound lane) of the highway, there appears to be some minor movement in the backslope where movement has occurred in previous years.

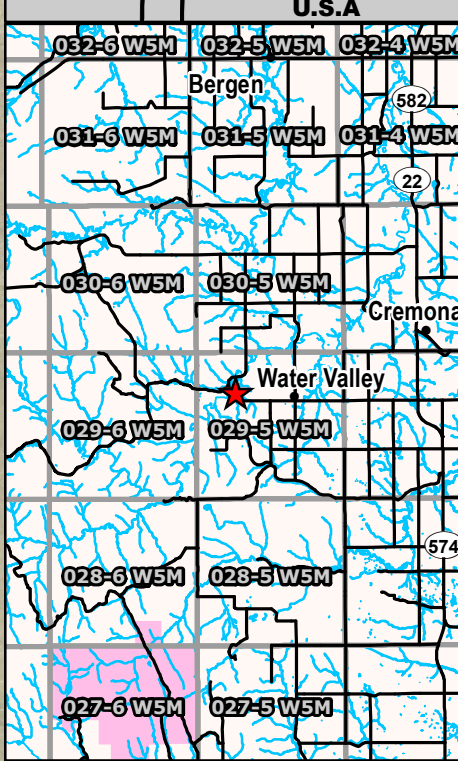
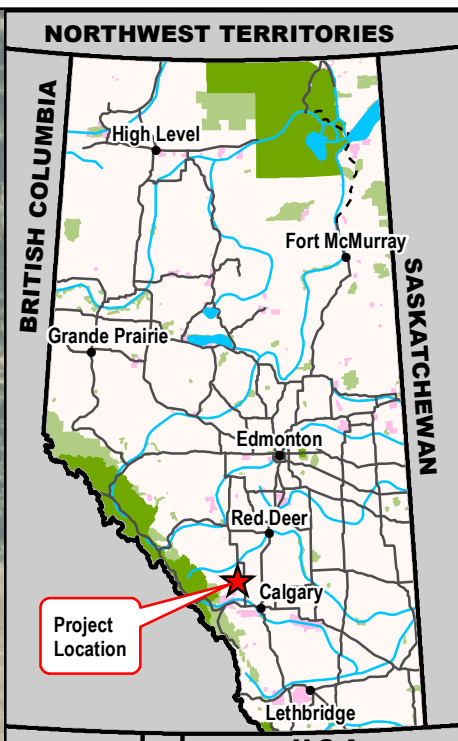
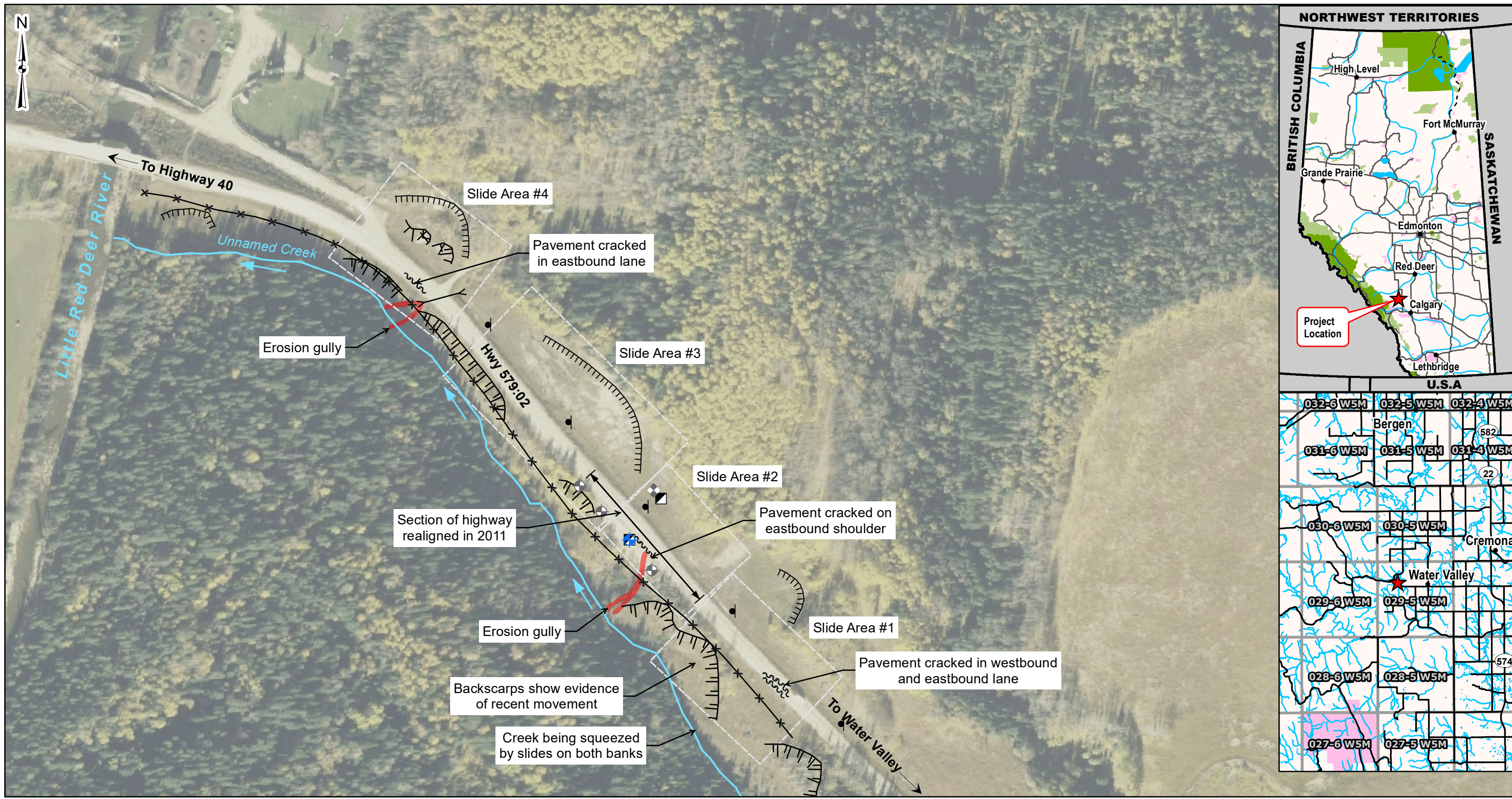
A geotechnical site investigation should be conducted to investigate the subsurface conditions that includes installing additional slope inclinometers to assess the extent and depth of sliding, and piezometers to monitor groundwater conditions. The active piezometer should be continuously logged to assess for short-term changes in groundwater level in response to freshet and heavy rainfall events.

Short-term repair could include installing short length drainage swales upslope of the slope failures to intercept pavement surface runoff and divert it into vegetated areas away from the slope failures that extend to the pavement surface. This may exacerbate slope movements in other areas but will reduce the potential for exacerbating existing slope failures that are already impacting the highway.

Long-term repair options include:

- Realign the highway further to the north; possibly with backslope flattening and drainage to lower the groundwater table (e.g., horizontal drains, or gravel columns with pumps). The impact of dewatering on nearby wells and dugouts will need to be assessed.
- Pile-wall repair is not a preferred option due to the potential length of pile wall that could be required.
- Armouring the toe of the slope to reduce toe erosion is not preferred due to access and environmental considerations.

Time: 16:17:19 PM
 Date: September 10, 2019
 File: Z:\A\EDM\A05115A02\Drawings\2019\2. Section B12. 2019 Site Inspections\MXD\C042_190910.mxd



Legend

- ◆ Pneumatic Piezometer (PN) (inoperable)
- ⊕ Standpipe Piezometer (SP) (inoperable)
- ⊕ Standpipe Piezometer (SP)
- ▣ Slope Inclinometer (SI)
- Power Pole
- ✕✕✕ Fence
- ⌒ Culvert
- TTTTT Crest of Slope
- TTT Scarp
- ~~~~~ Crack
- Creek
- Flow Direction
- ☄ Erosion



NOTES:
 1. HORIZONTAL DATUM: NAD83
 2. GRID ZONE: UTM Zone 11N
 3. IMAGE SOURCE: Abacus Datagraphics Ltd.
 Image dated July 30, 2013 to October 14, 2013
 4. Location of instruments is approximate (not surveyed)

CLIENT

Alberta

Klohn Crippen Berger

PROJECT CENTRAL REGION GEOHAZARD RISK MANAGEMENT PROGRAM		
TITLE Site Plan C042 - West of Water Valley Slide H579:02, km 36.540		
SCALE 1:2,500	PROJECT No. A05115A02	FIG No. 1

Photo 1 **Severity of pavement cracking above slide area #1 appears unchanged from 2018 inspection. Photo taken July 10, 2019 looking southeast.**



Photo 2 **Erosion gullies continue to form in gravel fill below slide area # 2. Photo taken July 10, 2019 looking southwest.**



Photo 3 Photo showing steep drop off below edge of pavement in slide area #3. Photo taken July 10, 2019 looking southeast.



Photo 4 Pavement cracking in eastbound lane in slide area #4. Photo taken July 10, 2019 looking southeast.



Photo 5 Scarp near fence line in slide area #4 (indicated by red line). Photo taken July 10, 2019 looking southeast.

