

**ALBERTA TRANSPORTATION
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION – HIGH LEVEL
2018 INSPECTION**



Site Number	Location	Name	Hwy	km
PH047-1	West of Deadwood, AB	Deadwood Slide	690:02	2.4
Legal Description		UTM Co-ordinates		
SW28-89-23-W5M		11U E 462,972	N	6,288,759

	Date	PF	CF	Total
Previous Inspection:	21-June-2017	3	3	9
Current Inspection:	21-June-2018	4	3	12
Road AADT:	230		Year:	2017
Inspected By:	Roger Skirrow, TRANS Ed Szmata, TRANS		Ken Froese, Thurber	
Report Attachments:	<input checked="" type="checkbox"/> Photographs	<input checked="" type="checkbox"/> Plans	<input type="checkbox"/> Maintenance Items	

Primary Site Issue:	Slow slope movement into shallow valley affecting highway	
Dimensions:	50 m length of highway, 80 m overall length	
Date of Remediation:	2015: Constructed toe berm with French drains and routed creek through culvert; adjacent BF culvert replaced 2016: Paving and HTSCB installed	
Maintenance:	2008: 40mm overlay 2011: ACP Patch 2013: ACP Patch 2015: 341 tonne ACP patch placed for winter shutdown 2017: Small patch at guardrail near BF73271 outlet	
Observations:	Description	Worsened?
<input checked="" type="checkbox"/> Pavement Distress	Vertical drop removed with repaving; minor crack noted at west end of site grew slightly New cracks appearing on north side of highway over BF culvert which have been patched	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	Slow creep movement significantly reduced with placement of toe berm	<input type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	Minor erosion in ditch at west end and near culvert outlets	<input checked="" type="checkbox"/>
<input type="checkbox"/> Seepage		<input type="checkbox"/>
<input type="checkbox"/> Bridge/Culvert Distress	New 1800 mm dia. culvert below toe berm (BF86237) New 2200 mm dia. culvert at km 2.534 (BF73271)	<input type="checkbox"/>
<input checked="" type="checkbox"/> Other	Voids in ACP around HTSC Barrier posts	<input checked="" type="checkbox"/>
Instrumentation (as of Fall 2018):		
Destroyed	SP10-2, 3, and -5 and VW10-1 and -2 were destroyed before or during construction in 2015.	
Inclinometers	SI15-01 and -02 were installed during construction and initialized in October 14, 2015, about 3 weeks after significant movement occurred at the site. Cumulative deflections are 49 mm and 59 mm at rates of 4.2 mm and 2.2 mm, respectively. These rates are slightly above the average movement rates (since Spring 2016 after the repair) of 2.6 mm/yr and 1.3 mm/yr, respectively. During construction, the rates were 600 mm/yr to 800 mm/yr.	

Assessment:

The original failure appeared to be the result of toe erosion by the creek. Movement was relatively slow (creep) requiring patching every two to three years. The groundwater table through the highway embankment was also relatively high which may have been a contributing factor. In September 2015, the BF culvert to the east of the slide was replaced and the Contractor hauled through the slide area and stockpiled excavated material on the west edge of the slide. This resulted in immediate and significant movements with between 200 mm and 400 mm of height differential across the cracks in the highway surface. The movements continued even after the stockpiles were removed. Construction of the toe berm was completed in November 2015 and consisted of: installing a new 1800 mm diameter CSP culvert for the creek, installing French drains in the slope, placing a toe berm from the highway across the creek valley, and lining the overflow channel located at the south end of the berm. At the same time, BF72371 was replaced with a 2200 mm diameter CSP and the channels on either side realigned. The toe berm culvert (BF86237) was shifted slightly to the east during construction to accommodate a shallow gas line located near the inlet.

In 2016, the highway was overlaid and high-tension steel cable barriers (HTSCB) installed through portions of the site. The toe berm appears to be performing well although the one crack that was noted in the old slide area in 2017 increased slightly in length in 2018 and a second crack was observed at the shoulder. Seepage was observed from the subdrain outlet. Minor erosion was noted in the ditch above and at the culvert inlet riprap (west side of site). Some erosion was observed on the banks beyond each culvert outlet likely as a result of the high flows experienced in Spring 2018. Two patches have been placed at the west end of the north HTSCB which may be associated with poorly-compacted fill in the post holes.

Recommendations:

Short-Term:

- Remove or clean the grate at the subdrain outlet to improve flow.
- Consider placing additional seed and temporary erosion control blanket over erosion on south sideslope just east of the toe berm culvert outlet.
- Backfill voids around HTSCB posts.

Ongoing Investigation:

- It is suggested that the GeoHazard inspection could be discontinued for this site and that bi-annual instrumentation readings should continue as scheduled for the duration of the current contract.