

SECTION A – FILE REVIEW

Site Location

- This site is located along Highway 762:02, south of Bragg Creek, AB, approximately 4.1 km southbound from the junction between Highway 22 and Highway 762, and roughly 50 to 100 m southbound from the 184 Avenue West turnoff from Highway 762.
- NW-23-22-4-W5
- UTM coordinates: 679048E 5640254N (NAD 83, Zone 11)
- NTS mapsheet 82 J/16

Chronological Background

Table A1 provides a chronological background of this site.

Site Geology, Hydrogeologic and Geomorphologic Setting

The soil underlying the site has been characterized by drilling one borehole for installation of a slope inclinometer in 2009. The stratigraphy observed was as follows:

- Fill to a depth of 3.5 m - clay and silt, trace gravel, soft to firm, low to medium plastic, moist to wet. Organic material was encountered from 3.0 to 3.5 m depth.
- Clay till from 3.5 to 4.9 m - clay, some silt, trace gravel, stiff to very stiff, low to medium plastic, moist to wet.
- Bedrock from 4.9 m to end of borehole at 9.4 m – shale, extremely weak and completely weathered, increasing to very weak and highly weathered at depth.

No measurements or observations of the groundwater conditions are available. The upslope ditch is often wet indicating probable groundwater seepage at the site area.

The site is located near the toe of a large slope, with a backslope cut into the hillside towards the upslope, and a marshy plain and creek to the downslope. The highway embankment is composed of fill, likely from the backslope cut, and appears to be built on organic soils present in the marshy plain. Instability at the site appears to be limited to the road embankment. Creek erosion is not a factor.

Description of Past Site Problems

Ongoing settlement and cracking of the road surface since 2008, following an arc shaped pattern in the southbound lane that was attributed to landslide damage. AT's files refer to a repair conducted at the site in 1987, presumably to repair damage to the road surface similar to that noted since 2008.

It was reported by AT personnel that the southbound lane failed (vertical displacement of at least 100 mm) in early 2011. The failure followed the previously identified landslide extents.

The landslide has been attributed to poor quality road fill within the road embankment, a weak native organic/clay till layer that was not stripped prior to construction, and poor drainage along the upslope road ditch.

A backslope failure at the site area is also described in the AT file, but is not considered to have been an issue at the site since 2008.

Description of Past Investigations

AMEC installed a Slope Incliner along the downslope shoulder of the road at this site in late June 2009, as per AT's request after the increasing damage to the road surface was noted earlier in 2009. The soil conditions at the SI installation consisted of approximately 3.5 m of clayey fill atop an organic/clay till layer (native ground surface), underlain by extremely weathered shale bedrock. The SI was read last in Spring 2010 before it was destroyed by excessive deformation. Movement was detected in the organic/clay till soil at 3.8 m below the road surface. Refer to the attached 2009 Instrument Repair and Installations Report for details.

Description of Mitigative Measures Implemented

Documentation in AT's files refers to a failure in the road at this site in 1987, which was repaired by rebuilding the upper 1.5 m of the road embankment with compacted pit run and installing a trench drain in the upslope ditch. The trench drain was reportedly capped with clay. Please refer to the 2008 Annual Inspection Report for details (attached).

A second repair was performed in late 2011 or early 2012 by the maintenance contractor, reportedly consisting of rebuilding the road base with clayey granular fill and installing a new trench drain and outlet pipe. Specific details of the construction are not available. Without details of the constructed repair, it is not possible to determine if the risk has been mitigated.

Table A1 – S31 – “Mystery Culvert” – Chronological Background

Date	Description
June 1987	AT file refers to a repair at the site including rebuilding the upper 1.5 m of the road with pit run and installing a trench drain to 3.5 m depth in the upslope ditch. Damage to the road surface was attributed to water migrating into the subgrade through the fill to the organic strata interface. Thick peat and organic strata was found beneath the embankment fill. The file does not contain further details from this investigation.
2008	Site was added to the Southern Region Geohazard Program after AT personnel noted ongoing cracking and settlement of the road surface. Risk level = 5
June 2009	Geotechnical investigation and slope inclinometer installation. Refer to attached report. Risk level = 7
May 2010	Slope movement detected at 3.8 m depth, corresponding to the native ground surface beneath the road fill. Slope inclinometer excessively deformed and not read after Spring 2010.
June 2011	Annual inspection performed. Increased damage to road surface, apparently worsening in recent years. Risk level = 22 Recommended excavation of the road base to below the depth of slide movement (3.8 m), supervised by a geotechnical engineer, and rebuilt with granular fill.
Late 2011 or early 2012	Repair constructed by Maintenance Contractor. No record available. Repair reportedly consisted of excavation of the road to an unspecified depth, rebuilding with clayey granular fill, and reconstruction of the upslope ditch and trench drain.
June 2012	Annual inspection performed. Recent repair works appear in good condition. Risk level = 21 Recommended to continue the annual site inspections by AT and AMEC personnel in 2013. The decision on whether or not further annual inspections are necessary can be based on observations from the 2013 site inspection.