

November 2012

CG25399

Alberta Transportation
2nd Floor, 803 Manning Road NE
Calgary, AB T2E 7M8

Attention: Mr. Ross Dickson

Dear Ross:

**Re: Southern Region Geohazard Assessment
2012 Annual Inspection Report
Site S31: Highway 762:02, Mystery Culvert**

This report documents the 2012 annual site inspection of Site S31 – “Mystery Culvert” 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.

AMEC Environment and Infrastructure (AMEC), a division of AMEC Americas Limited, performed this inspection in partial fulfilment of the scope of work for the supply of geotechnical services for Alberta Transportation’s (AT’s) Southern Region (AT contract CON0013506).

The site inspection was performed by Georgina Griffin, P.Eng., Bryan Bale, P.Eng., and Tyler Clay, E.I.T., of AMEC; and Roger Skirrow, P.Eng., Ross Dickson, and Nathan Madigan, E.I.T., of AT during the 2012 Annual Tour.

1.0 BACKGROUND

The S31 – Mystery Culvert site was added to the Southern Region Geohazard Assessment Program in 2008 after AT personnel noted ongoing settlement and cracking of the road surface. 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 2011 inspection report¹ for more details on the site history.

AMEC installed a Slope Inclinator (SI) 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

¹ AMEC report “Southern Region Geohazard Assessment Program, Site S31 – “Mystery Culvert”, Highway 762:02, 2011 Annual Inspection Report”, AMEC project number CG25352.200, submitted to AT October 28, 2011.

excessive deformation. Movement was detected in the organic/clay till soil at 3.8 m below the road surface.

2.0 SITE OBSERVATIONS

Key observations from the June 2012 inspection were as follows:

- A repair has been performed at the site by the maintenance contractor since the June 2011 site inspection. According to AT personnel and visual observations, the southbound lane had failed and the road was repaired by excavating the failed portion of the road and rebuilding with clayey granular fill. A drainage pipe was also installed within the fill following a similar orientation to the previous installed culvert outlet that runs below the highway. This pipe likely drains a trench drain installed in the upslope ditch. The upslope ditch was also lined with cobbles and geotextile fabric (refer to Photos S31-1 and S31-2). It is understood that the failure followed the extent of the previously identified cracks in the road surface. Refer to Figure S31-1.
- No water was observed discharging from the old culvert outlet on the slope face to the west of the road. The new drainage pipe was flowing at approximately 10 L/min at the outlet. The outlet of the new drainage pipe extended several meters out of the west embankment (refer to Photo S31-3). The inlet of the new drainage pipe was buried in the upslope east ditch beneath cobbles.
- Subtle settlement was observed within the paved surface at the previously failed area.

3.0 ASSESSMENT

The landslide was attributed to low quality fill material 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.

Without details of the constructed repair, it is not possible to determine if the risk has been mitigated. The water discharge from the new outlet pipe indicates that the trench drain is functioning, and that the site is likely better drained. However, the ditch grade is still too shallow and does not have an impermeable liner, and it is not known if the excavation of the road surface was deep enough to remove the slide surface. It is judged that the risk of landsliding has been reduced slightly.

The new drainage pipe extends horizontally out from the slope by several meters at the west side of the embankment. The exposed pipe should be covered or reduced in length to reduce the chance that a vehicle could leave the road and strike the pipe.

4.0 RISK LEVEL

The recommended Risk Level for this site, based on AT's general geohazard risk matrix, is as follows:

- Probability Factor of 7 based on inactive slide movement but with high uncertainty regarding future reactivation.
- Consequence Factor of 3 to reflect that the slide damage will likely be manageable as a maintenance issue, but may require a partial road closure.

Therefore, the recommended Risk Level is 21, which is reduced from the 2011 inspection level of 22.

5.0 RECOMMENDATIONS

5.1 Maintenance and Short Term Measures

- AT's maintenance contractor should continue to crack-seal and apply patches/overlays as required to maintain a trafficable running surface.
- The new drainage pipe extends out from the west embankment and creates a hazard that should be addressed by cutting the pipe back. Erosion control measures may need to be incorporated at the outlet.

5.2 Long Term Measures

The annual site inspections by AT and AMEC personnel should be continued in 2013. The decision on whether or not further annual inspections are necessary can be based on observations from the 2013 site inspection.

6.0 CLOSURE

This report has been prepared for the exclusive use of Alberta Transportation for the specific project described herein. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it are the responsibility of such third parties. AMEC Environment & Infrastructure, a division of AMEC Americas Limited, cannot accept responsibility for such damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This report has been prepared in accordance with accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

We trust that this meets your needs at this time. Please contact the undersigned if you have any questions or require any further information.

Respectfully Submitted,

**AMEC Environment & Infrastructure,
a division of AMEC Americas Limited**

ORIGINAL SIGNED AND STAMPED NOVEMBER 20, 2012

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Reviewed by:

APEGA Permit to Practice No. P-04546

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