

October 28, 2011

CG25352.200

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

Attn: Mr. Ross Dickson

**Re: Southern Region Geohazard Assessment Program
Site S8 – Fisher Creek, Highway 762:02
2011 Annual Inspection Report**

This letter documents the 2011 annual site inspection of Site S8 – Fisher Creek on Highway 762:02, approximately 2 km north of the junction with SH 549 and approximately 900 m north of the Highway 762 bridge over Fisher Creek.

AMEC Environment & Infrastructure (AMEC), a division of AMEC Americas Limited, performed this inspection in partial fulfillment of the scope of work for the supply of geotechnical services for Alberta Transportation's (AT's) Southern Region (AT contract CE061/08).

The site inspection was performed on June 20, 2011 by Mr. Bryan Bale, P.Eng., and Mr. Tyler Clay, E.I.T., of AMEC in the company of Mr. Ross Dickson, Mr. Neil Kjelland, P.Eng., of AT.

BACKGROUND

A general description of the geohazard conditions at this site along with the site geological setting and chronology of previous events, investigations, monitoring and repair work were provided in the Geotechnical File Review (Section A of the site binder) and summarized in the 2007 annual inspection report¹.

This site has been monitored by AT and their consultants since 1988 when a diagonal crack formed across the road surface with up to 100 mm of adjacent settlement. In late 1988 a series of lime/gravel columns was installed to stabilize and reinforce the road subgrade. There are limited records regarding the geotechnical issues at this site from 1991 to 2000.

The site has more recently been inspected and monitored by AT and AMEC personnel since 2000, including a geotechnical site investigation with instrument installations in 2001 and 2002

¹ AMEC report "Southern Region Geohazard Assessment, Annual Assessment Report, 2007", project number CG25263, submitted to AT on November 6, 2007.

and some additional and replacement instrument installations in 2007. The instruments have confirmed ongoing landslide movement below the road surface. However, since 2000 only the north end of the site has experienced significant road surface cracking and settlement. This damage has been treated as a maintenance issue.

SITE OBSERVATIONS

Key observations from the June 2011 inspection are listed below:

- The road surface at the site did not appear to have been milled or paved since the June 2010 inspection, and the cracks in the road surface followed the same pattern as observed in previous inspections. The condition of the road surface had worsened slightly since the 2010 inspection. The cracking at the site was most significant in the southbound lane at the north end, with vertical displacement of approximately 50 mm (refer to Photo S8-1 and S8-2).
- A sharp drop exists at the west/downslope shoulder at the north end of the site.

Overall, the site was in similar condition as was observed during the 2010 inspection. Please refer to the attached Figure S8-1 for a site plan.

ASSESSMENT

The assessment of the hazard to the highway at this site has not changed in recent years. In summary:

- The landsliding/road embankment slope instability at the north end of the site continues to result in significant cracking and settlement of the west shoulder and southbound lane and necessitates overlays, typically on an annual basis. The multiple overlays have resulted in a steep drop-off from the west edge of the pavement at the north end of the site. It is expected that continued movement at the north end will eventually lead to an increased rate of settlement and damage to the road surface as the weight of the asphalt increases.
- The relatively deeper-seated ground movement below the south end of the site is also continuing based on the instrument data, but with little to no concurrent damage to the road surface in that area.

AMEC understands that AT would like to proceed with a repair at this site. AMEC has submitted a repair design for a shear key at the site, and would be pleased to prepare a draft tender package if requested. It would also be beneficial to lower the road grade through the site area as part of any repair work in order to reduce the driving forces for the ground movement and to

widen the road to regain a proper shoulder. However, grade lowering would need to extend a few hundred metres northbound from the site in order to maintain a suitable road profile.

RISK LEVEL

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

- Probability Factor of 8 based on the ongoing movement being tracked in the SI's and the continued cracking and settlement at the north end of the site.
- Consequence Factor of 3 to reflect the magnitude and extent of the cracking and settlement of the road in recent years which has affected the road surface but not required partial closure of the road.

Therefore, the current recommended Risk Level for this site is 24, which is unchanged from the previous assessment.

RECOMMENDATIONS

Maintenance and Short Term Measures

- AT's maintenance contractor should continue to place overlays and patches at the north end of the site as required to maintain a smooth road surface.
- The steep drop-off along the west side of the road due to the multiple overlays requires a guardrail according to AT's November 2007 Roadside Design Guide.
- The location of the paved-over SI 2002-3 in the northbound lane at the south end of the site should be marked so that AT's maintenance contractor can uncover it and restore access for future monitoring. AMEC surveyed the location of this instrument in the summer of 2009; however the instrument was not recovered by the maintenance contractor. It would be beneficial to recover this SI since SI 2002-1 and 2002-4 are no longer in service. The cost of recovering the SI should be less than installing a new instrument.

Long Term Measures

- As discussed on site during the inspection, the current repair design is ready for draft tender package preparation. Other options such as lowering the road grade can be assessed if requested.

- The semi-annual readings of the functioning instruments should be continued.
- The annual inspections of this site should be discontinued. Future inspections should only be performed if a significant change in the site conditions is noted during the semi-annual instrument readings (either in the instrument data or in visual observations by the AMEC field personnel while taking the instrument readings). If the site is repaired, then it should be added back into the annual site inspection list for one to two years after repair in order to check the effectiveness of the repair work.

Investigation and Additional Work

No further field investigation work is recommended for this site. The installation of new instruments should be performed after repair work is completed, and SI 2002-3 should be recovered in the meantime as recommended above. The location of SI 2002-3 was marked on the road surface during survey work at the site in July, 2011.

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 Earth & Environmental, 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
OCTOBER 28, 2011

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Reviewed by:

APEGGA Permit to Practice No. P-04546

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Attachments: Figure S8-1
Photos S8-1 and S8-2