

October 14, 2010

CG25332.200

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

Attn: Mr. Ross Dickson

**Re: Southern Region Geohazard Assessment Program
Site S22 – “S” Curve Slide, Highway 762:02
2010 Annual Inspection Report**

This letter documents the 2010 annual site inspection of Site S22 – “S” Curve Slide along Highway 762:02, south of Bragg Creek, AB and approximately 14 km southbound from the junction between Highway 22 and Highway 762. The site location is shown on Figure S22-1.

AMEC Earth & Environmental (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 21, 2010 by Mr. Bryan Bale, P.Eng., and Mr. Andrew Bidwell, P.Eng. of AMEC in the company of Mr. Ross Dickson, Mr. Neil Kjelland, P.Eng., and Mr. Roger Skirrow, 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 and monitoring work were provided in the 2007 annual inspection report¹ and are summarized as follows:

- The highway is constructed on an approximately 4 m thick fill embankment on the south/southeast facing slope above the west bank of a small creek.
- Ongoing landslide movement in the native soils underlying the embankment has been causing cracking and settlement of the road surface that has been inspected and monitored by AT and AMEC since 2006.

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

- Geotechnical borehole drilling, instrument installations and readings from the spring of 2007 onwards have shown that the landslide movement is occurring at or slightly below the elevation of the creek channel at the toe of the slope. The attached cross-section on Figure S22-2 shows the stratigraphy interpreted from the borehole logs and the depth of landslide movement measured by the instruments. The primary cause of the landslide movement is judged to be the piezometric pressures in the native clay/silt underlying the embankment in conjunction with the load of the embankment which is resulting in sliding occurring at the contact with the harder, underlying clay till soils. A number of repair options were evaluated in the site investigation and monitoring report and it was judged that drainage trenches to attempt to lower the piezometric pressures in the landslide area would be the most effective option to try to reduce the rate and magnitude of future landslide movement.
- AMEC has submitted a report² presenting the design of drainage trenches to attempt to lower the piezometric pressures in the landslide area and reduce the rate and magnitude of future landslide movement, and can proceed with a draft tender package upon AT's approval.

SITE OBSERVATIONS

Key observations from the June 2010 inspection were as follows:

- The asphalt road surface had been recently milled at the time of the inspection; therefore it was difficult to compare the condition of the cracks in the road surface to past observations. Minor cracking had developed since the road surface was milled, or the milling had exposed old cracks that had been covered by asphalt overlays. The pattern and extent of the cracking appeared similar to the condition observed during the 2009 inspection. Photos S22-1 to S22-3 show the condition of the road surface at the site at the time of the inspection.

In general, the condition of the site has not changed in recent years, with ongoing slope movement causing continued damage to the road surface. The pattern and extent of damage to the road surface has remained the same, and the characterization and assessment of repair options presented in the March 2008 report³ remains valid. The 2008 report concluded that a drainage trench was the most suitable repair option. Following this report, AT requested that AMEC proceed with the design of a drainage trench repair, which was described in a

² AMEC report “S22 – Highway 762 “S” Curve Site, Preliminary Design of Drainage Trenches”, CG25313, February 17, 2010.

³ AMEC report “S22 – Highway 762 “S” Curve Site, Assessment Of Landslide Conditions And Repair Options”, CG25260, March 25, 2008.

subsequent report. This repair option was discussed on site, and the logistics of such a repair, as well as the pros and cons of the repair were noted.

ASSESSMENT

The assessment of the hazard at this site has not changed since the 2008 inspection. The ongoing ground movement continues to cause cracking and settlement of the road surface. This has been treated as a maintenance issue since roughly 2005, with several overlays having been placed at the site to maintain the road surface.

AMEC has submitted a repair design for drainage trenches at the site and can provide a draft tender package if AT chooses to proceed with a repair.

RISK LEVEL

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

- Probability Factor of 10 to reflect the active slope movement.
- Consequence Factor of 2 to reflect the impacts upon the road to date and the expected future damage to the road, i.e. annual to semi-annual repaving required to maintain a serviceable running surface.

Therefore, the recommended Risk Level for this site is 20, which is unchanged from the recommendations after previous inspections.

RECOMMENDATIONS

Maintenance and Short Term Measures

AT's maintenance contractor should continue to place overlays as required to maintain the road surface.

Long Term Measures

The recommended drainage trenches should be installed, or AT should advise if an alternate repair method is to be pursued.

The semi-annual readings of the functioning piezometer should be discontinued. The design report for the drainage trenches includes recommendations for instrument installations for post-construction monitoring of the effectiveness of the drainage trenches. Therefore, the installation

of any instruments to replace the non-functioning instruments should be deferred until the repair construction work.

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.



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 Earth & Environmental,
a division of AMEC Americas Limited**

ORIGINAL SIGNED
OCTOBER 14, 2010

Bryan Bale, M.Sc., P.Eng.
Geotechnical Engineer

APEGGA Permit to Practice No. P-04546

Reviewed by:

Andrew Bidwell, M.Eng., P.Eng.
Associate Geotechnical Engineer

Attachments: Figures S22-1 and S22-2
Photos S22-1 to S22-3