October 28, 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
Highway 22:08 – Road Crack Sites Near Km 13 to 16
2010 Annual Inspection Report

This letter documents the 2010 annual site inspection of two sites on Highway 22:08 near Km 13 to 16, north of Lundbreck, AB. One site is near Km 13.8 and the other is at approximately Km 15.8. Both sites are exhibiting cracking across the road surface.

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 22, 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

The 2010 inspection of this site was the first as part of the Geohazard Monitoring Program. AMEC understands that these sites were brought to AT's attention in the spring of 2010 by the maintenance contractor, and that there has been no previous geotechnical work done at these sites. The cracking of the road surface has been managed as a maintenance issue.

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SITE OBSERVATIONS

The two sites are close to each other and are similar in nature. Key observations of the site conditions are summarized as follows:

Km 15.8 Site

- The site is located just north of the "Waldron Ranch North Buildings" gate. Refer to Photograph 1.

- The road at the site traverses near the base of a creek valley slope, with rolling hills to the west and a broad valley with a small stream to the east. The slope above (to the west) of the road has marshy areas and signs of seasonal water discharge.

- The road surface in the area has numerous cracks perpendicular to the road, and along the centreline. The cracks were likely sealed in the last year, and have no vertical displacement between opposite sides. There is a "bump" warning sign at one of the perpendicular cracks, however there was no significant bump noted at the time. Refer to Photograph 2 and 3.

- The ditches on both sides of the road are wet and marshy, with areas of ponding water. The outlets of two perforated drainage pipes were noted in the east ditch, and apparently run under the road to allow water from the upslope (west) ditch to reach the downslope ditch. The drains were wet at the time of the inspection, and the areas around the outlets were marshy. Refer to Photograph 4.

- The creek in the valley bottom is meandering and does not show evidence of landsliding beyond localized bank instability. The creek channel is located well away from the highway.

- Some minor slide topography was noted on the lower slope but it does not appear to be related to the road surface cracking.

Km 13.8 Site

- This site is very similar to the Km 15.8 Site, with recently sealed cracks in the road surface and wet ditches. No drainage pipes were observed at this area.

- Three diagonal cracks cross the road, and are shown on Photograph 5.

ASSESSMENT

Based on the cracks in the road surface, and the provision of a "bump" warning sign, it appears that the sites have vertical deflections at some point in the year. There was no notable vertical deflection of the road surface at the sites at the time of the June 2010 inspection. Based on the wet ditches, it is expected that the road base is wet and the cracking may be due to frost heave that occurs in the winter causing the road surface cracking and creating vertical deformation.

The perforated drain pipe installed at the Km 15.8 Site indicates that the poor road drainage at the site has been a problem for some time, and there is some history of a repair at the site. The drain pipes are likely largely ineffective because the ditches are poorly graded and allow water to pond.

RISK LEVEL

Based on AT's general geohazard risk matrix, AMEC recommends the following risk level for the sites:

- Probability Factor of 5 based on the interpretation that the road damage is due to frost heave rather than landsliding, but moderate uncertainty.

- Consequence Factor of 1, indicating that the road surface will experience only minor damage that is treatable as a maintenance issue.

Therefore, the recommended Risk Level for the sites is 5 (i.e. 5 x 1).

RECOMMENDATIONS

Maintenance and Short Term Measures

- AT's maintenance contractor personnel should continue to seal the cracks and repair the road surface as required.

- The sites should be inspected again in the winter to check for cracking/vertical deflection due to frost heave.

Long Term Measures

- The ditches at both sites should be regraded to provide positive drainage from the sites.

- If it is confirmed that the damage is due to frost heave, then improved subsurface drainage from the road base could be considered as a more effective mitigative option,

or the frost-heave susceptible segment of the road base could be excavated and reconstructed with free-draining material.

- The annual site inspections should be discontinued.

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 28, 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 Geological Engineer

Attachments: Site Plan
Photos 1 to 5