

August 28, 2009

CG25309.B

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

Attn: Mr. Ross Dickson

**Re: Southern Region Geohazard Assessment Program
Site S17 – Mount Baldy Rock Cut, Highway 40:12
June 2009 Inspection Report**

This letter documents the 2009 annual site inspection of Site S17 – Mount Baldy Rock Cut, along the east side of Highway 40:12 and approximately 4.75 km southbound from the junction between Highway 40 and Highway 68.

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 10, 2009 by Mr. Andrew Bidwell, P.Eng. and Mr. Bryan Bale of AMEC in the company of Mr. Neil Kjelland, P.Eng. of AT.

BACKGROUND

The only previous assessment of this site under AT's Geohazard Risk Management Program (GRMP) was during 2005 as part of the Highway 40/Highway 541 corridor review. Please refer to the report on the corridor review¹ for further details. In summary:

- There is a rockfall hazard at this site from the cut slope along the east side of the highway.
- Based on the "Ritchie ditch" rockfall catchment ditch design chart, the existing east ditch along the highway is slightly undersized for the segments adjacent to the maximum cut slope heights. A typical slope cross-section at the maximum cut slope height is attached as Figure 1.

¹ AMEC report "Geohazards Review, Highway 40/Highway 541 Corridor, Southwestern Alberta", submitted to AT on April 10, 2006, AT contract number CE044/2004, AMEC project number CG25211.

- In previous site inspections starting in 2005, the effective ditch depth has been noted as significantly reduced by an accumulation of rockfall debris in the ditch. The rockfall debris included some boulder-sized rocks that had landed within 1 m of the edge of the pavement.
- It appears that the rockfall debris has been cleaned out from the ditch in the past, however the frequency of the cleaning and the volume/size of rocks removed is not known.

SITE OBSERVATIONS

Key observations from the June 2009 inspection were as follows:

- There was some accumulation of rockfall debris along the ditch, as shown in Photos 1 to 3. There were a few gravel to cobble sized pieces of debris along the east edge of the pavement but outside of the white line.
- The boulder-sized pieces of debris that were noted in the ditch during the 2008 inspection were no longer present. It appears that at least the largest pieces of rockfall debris were removed at some point after the 2008 inspection.
- The cut slope face was dry at the time of the inspection. The groundwater discharge that was noted at a location on the lower portion of the cut slope during the 2007 inspection has not been observed in either the 2008 or 2009 inspections. This indicates that the groundwater discharge is seasonal and/or intermittent.

ASSESSMENT

The assessment for this site remains unchanged from the previous inspections. In summary:

- There remains a risk that rockfall debris at this site will bounce or roll onto the road surface given the ditch dimensions and observations of rockfall debris along the edge of the highway.
- The east highway ditch at this site is slightly undersized relative to the recommended dimensions for a rock cut slope of this size from the Ritchie ditch chart, and the catchment capacity of the ditch is further reduced by the accumulation of rockfall debris between cleanings.
- Notwithstanding the above, it does not appear that significant amounts of rockfall debris are being deposited on the pavement. However, boulder-sized rocks have been noted

within 1 m of the east edge of the pavement during past site inspections and the possibility of future boulders onto the highway cannot be ruled out.

RISK LEVEL

AMEC recommends the following Risk Level for this site based on AT's rockfall risk matrix:

- Probability Factor of 15 based on the appearance of the cut slope (including the oversteepened rocky soil layer above the crest of the rock cut) and the volume of debris in the ditch that suggests that there are many rockfalls every year.
- Consequence Factor of 3. Although there were no rocks on the road at the time of the inspection, the volume of debris in the ditch and the presence of boulder-sized rocks within 1 m of the edge of the pavement during past inspections raises the possibility of rockfall debris rolling onto the road and causing minor damage to vehicles if struck.

Therefore, the recommended Risk Level for this site is 45. These values are unchanged from previous inspections.

RECOMMENDATIONS

This site should be included in the planned work package for scaling at several rock cut slope sites in the Southern Region that AT intends to put out to bid. Scaling at this site should reduce the Probability Factor at least for the short term.

Otherwise, no further work is recommended for this site aside from cleaning of accumulated rockfall debris from the ditch as required to keep the ditch reasonably close to maximum capacity.

The annual site inspections by AT and AMEC personnel as part of AT's GRMP should be discontinued unless AT or maintenance contractor personnel report increased volumes of rockfall debris in the ditch which may indicate a change in the rockfall conditions at this site.

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**

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

APEGGA Permit to Practice No. P-04546

Reviewed by:

Pete Barlow, M.Sc., P.Eng.
Principal Geotechnical Engineer

Attachments: Figure 1
Photos 1 to 3