



September 29, 2008

CG25277.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
2008 Annual Inspection Report**

This letter documents the 2008 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 25, 2008 by Mr. Andrew Bidwell, P.Eng. and Mr. Bryan Bale of AMEC in the company of Mr. Ross Dickson and Mr. Roger Skirrow 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 previous annual inspection report¹ and are summarized as follows:

- There is a rockfall hazard at this site that was first documented during the 2005 geohazards review of the Highway 40/541 corridor.
- Based on the "Ritchie ditch chart" 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.

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

- In previous site inspections starting in 2005, the effective ditch depth has been noted to have been 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

The site conditions had not changed significantly since the 2007 site inspection.

- There continued to be an accumulation of rockfall debris in the east ditch resulting in a reduction in the effective catchment capacity of the ditch. Photos S17-1 to S17-3 show typical views of the rock cut slope and debris in the adjacent ditch, including a 1.7 m x 1.2 m x 0.9 m boulder that had landed within 1 m of the east edge of the pavement.
- The rocky soil exposed above the crest of the rock cut continued to appear to be generating a significant proportion of the rockfall at this site.
- The groundwater discharge that was noted at a location on the lower portion of the cut slope during the 2007 inspection was not present at the time of the June 2008 inspection. This indicates that the groundwater discharge is seasonal and/or intermittent.

ASSESSMENT

There remains a risk that rockfall debris at this site will bounce or roll onto the road surface. 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 several site inspections.

RISK LEVEL

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

- 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 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 those recommended in the 2005 geohazard review for this highway corridor.

RECOMMENDATIONS

Maintenance and Short Term Measures

- AT's maintenance contractor should clean out the rockfall debris from the highway ditch as often as practical in order to keep the ditch reasonably clear and near its maximum capacity. If this can be done consistently, it may be possible to reduce the Consequence Factor for this site.

Long Term Measures

- 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.
- The annual site inspections by AT and geotechnical consultant personnel could be discontinued. Future inspections can be performed if required to assess specific rockfall events if the highway is impacted.

Investigation

No further investigation work for this site is recommended at this time.



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: Cross-Section
Photos