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 S5 – Chin Coulee, Highway 36:02
2008 Annual Inspection Report

This letter documents the 2008 annual site inspection of Site S5 – Chin Coulee on Highway 36:02, approximately 20 km south of Taber, AB and on the north approach slope to the highway bridge across the Chin Coulee Reservoir. This site is located on the upper portion of the north slope above the Chin Coulee Reservoir, where the highway is oriented cross-slope as it descends to the bridge across the reservoir.

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 20, 2008 by Mr. Andrew Bidwell, P.Eng. in the company of 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 Geotechnical File Review (Section A of binder) and summarized in previous annual inspection reports[1].

Landslide movement undermining the downslope shoulder of the highway was first noted by AT in the fall of 1978 and was reported to have occurred again in the spring of 1997. The landsliding consists of deep-seated instability (apparently inactive to intermittently active) in the north valley slope along with relatively shallower movements in the fill embankment immediately downslope of the affected segment of the highway. Geotechnical instrumentation was installed

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

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at this site in 1998 and the site has been monitored by AT and consultant personnel since that time.

Launched soil nails and a small retaining wall ("GCS wall" – supplier's product name of Geosythetically Confined Soils) were installed in May 2008 in order to reinforce the headscarp of the shallower, fill embankment landsliding where it had undermined a segment of the guardrail.

SITE OBSERVATIONS

Key observations regarding changes in the site conditions since the 2007 inspection are summarized as follows:

- The segment of the guardrail that had been undermined by the shallow slope movement adjacent to the downslope edge of the highway was supported by the retaining wall that was constructed in the spring of 2008. Photos S5-1 to S5-5 show various views of the retaining wall. The approximate location of the soil nailing and retaining wall construction are shown on the attached site plan.

- The retaining wall appeared to be in good condition. A possible, very slight downslope tilt of the uppermost 4 rows of wall blocks was noted, along with a very slight overall backtilt of the overall wall, as shown in Photo S5-2. At face value, either of these apparent tilts could indicate that the wall has been rotated in cross-section by underlying slope movement, however given the brief amount of time between construction and the June 2008 site inspection it is more likely that the wall was constructed with these minor misalignments (with negligible effect on its ability to support the guardrail).

- The regraded soil slope around and below the wall was typically around 20 to 22° inclination and had not been seeded or revegetated at the time of the site inspection. There was some minor tension cracking visible in the backfill on the upper portion of the regraded slope (Photo S5-5) to the west of the wall, but this is expected to be of little consequence to the regraded slope over time.

- Several wall backfill drain outlets were visible at the base of the wall (as shown in Photo S5-3). It did not appear that the drains had discharged any significant amounts of water prior to the site inspection.

- The guardrail appeared to be fully supported after the spring 2008 repairs and the road surface did not show any cracking or other damage due to landslide movement at the time of the site inspection.

The May 2008 instrument readings at this site did not show any confirmed slope movement, which continues the trend of no significant slope movement since 2000 and 2002. Based on the locations of the functioning slope inclinometers GA98-2 and 2002-1 (illustrated on the site plan), this indicates that the previous landslide movement delineated by the visible scarp just below the south shoulder of the highway has not expanded laterally or retrogressed upslope and below the highway, nor has there been any recent reactivation of the deeper-seated landslide movement extending below the highway.

ASSESSMENT

The risk to the road surface from the shallower, fill embankment movements that were undermining the guardrail in recent years has been reduced since the 2007 inspection by the spring 2008 soil nailing and retaining wall construction to support the headscarp area and guardrail.

The spring 2008 repair work was targeted to address the shallower, fill embankment movements and does not have any affect on the risk to the road from a potential reactivation of the overall deep-seated landsliding at this site. The risk to the highway from deep-seated landsliding has been managed by the planning and preliminary design for an upslope shift of the highway alignment as part of the 2004 Functional Planning Study. This repair design could be finalized promptly if required in the future due to a reactivation of the deep-seated landsliding with significant damage to the existing highway.

RISK LEVEL

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

Shallow Landsliding (Fill Embankment Along Downslope Side Of Road, Undermining The Guardrail)

- Probability Factor of 10 based on the assumed moderate rate of ongoing shallow movement in the slope below and adjacent to the highway. The existing instrumentation at this site does not penetrate into this slide area, therefore the movement has been conservatively assumed to be ongoing.

- Consequence Factor of 1 based on the estimated negligible potential damage to the highway (at least in the short term, i.e. a few years) resulting from the assumed ongoing shallow slope movement downslope of the highway. This is a reduction from the value of 2 recommended after the 2007 inspection, based on the spring 2008 repairs to support the guardrail area.

Therefore, the current recommended Risk Level with respect to the shallow landsliding is 10, which is a reduction of the value of 20 recommended after the 2007 inspection.

Potential Deep-Seated Landsliding

- Probability Factor of 3 since instrument data shows that the deep-seated movement below the road alignment has been inactive for several years and the probability of remobilization is judged to be low. This is a reduction from the value of 4 recommended in previous years, based on the spring 2008 instrument data continuing to show no deep-seated movement.

- Consequence Factor of 5 on the basis that a large portion of the highway could be significantly damaged by a reactivation of the deep-seated failure mode.

Therefore, the current recommended Risk Level with respect to the potential deep-seated landsliding is 15, which is a reduction from the value of 20 recommended after the 2007 inspection.

RECOMMENDATIONS

Maintenance and Short Term Measures

- The maintenance contractor should scarify and roughen up the exposed soil on the regraded slope face around and below the retaining wall and hydroseed it, or use equivalent revegetation measures in order to promote vegetation growth and reduce the potential for surface erosion of the exposed soils.

- Depending on the volume of water discharging from the wall backfill drain outlets along the base of the wall, it may become necessary to construct lined flumes to convey this water further downslope and minimize gullying of the slope face immediately downslope of the wall.

Long Term Measures

- Continue the semi-annual instrument readings, including a cursory visual inspection of the condition of the wall and adjacent slope face.

- Discontinue the annual site inspections by AT and the regional geotechnical consultant unless the above-noted visual inspection during the semi-annual instrument readings identifies something of concern.

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

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APEGGA Permit to Practice No. P-04546

Reviewed by:

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Attachments: Site Plan
Photos