

November 2012

CG25399

Alberta Transportation  
2<sup>nd</sup> Floor, 803 Manning Road NE  
Calgary, AB T2E 7M8

**Attention: Mr. Ross Dickson**

Dear Ross:

**Re: Southern Region Geohazard Assessment  
2012 Annual Inspection Report  
Site S30: Highway 742:02, Gabion Wall**

This letter documents the 2012 annual site inspection of Site S30 – Gabion Wall, along Highway 742:02, south of Canmore, AB and approximately 3.8 km southbound along Highway 742 from the Canmore Nordic Centre turn-off.

AMEC Environment & Infrastructure (AMEC), a division of AMEC Americas Limited, performed this inspection in partial fulfilment of the scope of work for the supply of geotechnical services for Alberta Transportation's (AT's) Southern Region (AT contract CON0013506).

The site inspection was performed by Georgina Griffin, P.Eng., Bryan Bale, P.Eng., and Tyler Clay, E.I.T., of AMEC; and Roger Skirrow, P.Eng., Ross Dickson, and Nathan Madigan, E.I.T., of AT during the 2012 Annual Tour.

## **1.0 BACKGROUND**

This segment of Highway 742 is located on the northwest side of the upper portion of the Canmore Creek valley, immediately downstream of North Whiteman's Dam and upslope of the Grassi Lakes Provincial Recreation Area. The Upper Grassi Lakes Trail in the provincial recreation area is downslope of the highway at this site.

The highway is oriented along a bearing of 050/230 (i.e. northeast/southwest) along a bedrock slope on the lower portions of the east flank of Mount Rundle. The attached schematic site plan Figure S30-1, illustrates the site layout. The segment of the highway at the gabion wall site appears to be constructed on a fill embankment across a gully in the bedrock slope.

The highway is unpaved with a relatively narrow (10 m or less) gravel running surface. There are no ditches along either side of the road at the gabion wall site and there is a guardrail along the downslope side of the road.

It is understood that the highway was constructed around the late 1980's with layers of geogrid reinforcement in the granular fill embankment. The gabion wall appears to have been

constructed as an erosion prevention measure for the vertical embankment face. There does not appear to be a structural connection between the gabion wall and the embankment.

The western end of the gabion wall collapsed during July and August 2007. AMEC performed a call-out site inspection of the gabion wall in late August 2007<sup>1</sup>. The primary cause of the failure of the gabion wall was judged to be a concentration of groundwater flow daylighting around or slightly downslope of the toe of the western end of the wall and causing surface erosion and gullying that undermined the base of the wall. A repair consisting of removing the debris from the collapsed segment of the wall and applying a layer of reinforced shotcrete to restore the erosion protection for the western end of the fill embankment was recommended.

The June 2008 site inspection was the first annual inspection by AT and AMEC personnel. AT requested that AMEC proceed with the recommended shotcrete repair design for the collapsed segment of the wall after the June 2008 inspection<sup>2</sup>. This assignment was subsequently withdrawn, as AT decided to proceed with the design internally.

## 2.0 SITE OBSERVATIONS

Key observations from the June 2012 inspection were as follows:

- Photos S30-1 and S30-2 show the site area in 2008 and 2012, respectively for comparison.
- The collapsed gabion baskets have been removed, reportedly by a group responsible for the Grassi Lakes trail below the site area. Several additional gabions have either collapsed or have been removed at the east side of the collapsed area since 2008.
- Gravel has continued to erode from under the base of the wall. The extent of the erosion has expanded considerably. Refer to Photo S30-3.
- The granular backfill has continued to ravel out from behind the geo-grid layers exposed by the collapsed segment of the gabion wall. This, in combination with surface runoff flowing off the road, has led to surface erosion and gullying along the downslope edge of the road. Refer to Photo S30-4.
- No significant erosion or settlement damage was observed on the road surface upslope from the gabion wall.

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<sup>1</sup> AMEC report "Report on August 23, 2007 Call-Out Request, Highway 742 Gabion Wall, Near Canmore, AB", submitted to AT August 28, 2007, AMEC project no. CG25263.

<sup>2</sup> AMEC report "Southern Region Geohazard Assessment Program, Site S30 – Gabion Wall, Highway 742:02, 2008 Annual Inspection Report", submitted to AT September 8, 2008, AMEC project no. CG25277.B.

### **3.0 ASSESSMENT**

The condition of the gabion basket wall has worsened considerably since the 2008 inspection. Ravelling of gravel from the geogrid reinforcement at the west side of the wall will likely continue, and will eventually undermine the road surface. Ongoing erosion of gravel from beneath the gabion basket wall is also likely to continue, and will cause additional gabion basket segments to collapse. The road surface will be destabilized at some point in the future, perhaps in the next 5 to 10 years.

Runoff from the road surface and seepage discharge has likely caused the undermining of the gabion wall. Drainage control should be incorporated into any repair designs.

As discussed in the report on the August 2007 site inspection, it is judged that the collapse of the western end of the gabion wall has not significantly increased the pre-existing, natural rockfall risk to the areas downslope of the gabion wall site.

### **4.0 RISK LEVEL**

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

- Probability Factor of 11 based on the active erosion occurring at a moderate but increasing rate of movement.
- Consequence Factor of 8 to reflect the significant road closure that would be required if the gabion wall were to collapse, with no opportunity for a detour. In addition, there is a chance that the gabion baskets could fall down the slope onto the hiking trail below.

Therefore, the recommended Risk Level is 88, which is increased from the June 2008 Risk Level of 74.

### **5.0 RECOMMENDATIONS**

#### **5.1 Maintenance and Short Term Measures**

Regrade the road surface and establish an impermeable berm along the downslope edge of the road to prevent surface runoff from flowing below the guardrail and causing further surface erosion along the downslope edge of the road fill embankment. The surface runoff discharge onto the slope face below the highway on either side of the gabion wall area will need to be carefully managed to avoid harmful erosion in those areas.

#### **5.2 Long Term Measures**

Perform a suitable repair to stabilize the wall facing and prevent erosion from undermining the wall. AMEC has previously proposed a shotcrete panel wall, potentially with an anchored waler.

AMEC could provide repair strategies and a Level A cost estimate if required. The annual site inspections by AT and AMEC personnel should be continued.

## **6.0 CLOSURE**

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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 Environment & Infrastructure,  
a division of AMEC Americas Limited**

**ORIGINAL SIGNED AND STAMPED NOVEMBER 20, 2012**

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Staff Geotechnical Engineer

Reviewed by:

APEGA Permit to Practice No. P-04546

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