



November 2013

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  
2013 Annual Inspection Report  
Site S30: Highway 742:02, Gabion Wall**

This letter documents the 2013 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 Bryan Bale, P.Eng., Tyler Clay, E.I.T. and Clinton Chan, E.I.T., of AMEC; and Roger Skirrow, P.Eng., of AT during the 2013 Annual Tour.

## **1.0 SUMMARY**

The site condition was similar to the 2012 inspection, with continued erosion of the gabion wall and the road surface. The risk level has decreased since the previous inspection. The road surface will likely be destabilized in the future, perhaps in the next 5 to 10 years, if mitigation is not performed. Mitigation options include a shotcrete panel wall or a high-tensile mesh and geotextile facing anchored with soil nails. The site should be inspected in 2014.

## **2.0 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 degrees (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 southwest 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 west end of the wall and causing surface erosion and gulying 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 west end of the fill embankment was recommended.

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>.

### 3.0 SITE OBSERVATIONS

Key observations from the May 2013 inspection were as follows:

- For comparison, Photos S30-1 and S30-2 show the site area in 2008 and 2013, respectively.
- Several additional gabions either collapsed or were removed at the southwest side of the site since 2008.
- Erosion of the gravel under the base of the wall appears to have continued. The undermined area at the northwest end of the site was approximately 2.0 m long and the undermining was 0.4 m deep beneath the wall. The soil in this area was wet. Refer to Photo S30-3.
- The granular backfill had continued to ravel out from behind the geogrid layers exposed by the collapsed segment of the gabion wall. This, in combination with surface runoff flowing off the road, had led to erosion and gulying along the downslope edge of the

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<sup>1</sup> AMEC Earth & Environmental, 2007, *Call-Out Request, Highway 742 Gabion Wall, Near Canmore, AB*, Project Number CG25263, submitted to AT August 28, 2007.

<sup>2</sup> AMEC Earth & Environmental, 2008, *Southern Region Geohazard Assessment Program, Site S30 – Gabion Wall, Highway 742:02, 2008 Annual Inspection Report*, Project Number CG25277 B, submitted to AT September 8, 2008.

road extending 200 mm past the guard rail posts into the road surface. Refer to Photo S30-4.

#### **4.0 ASSESSMENT**

The condition of the site has worsened slightly since the first inspection in 2007, with continued erosion of gravel from the geogrid supported embankment, collapse of gabion baskets, erosion of the road surface and undermining of the gabion basket foundation. The road surface will likely be destabilized at some point in the future, perhaps in the next 5 to 10 years, if mitigation work is not performed.

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

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

#### **5.0 RISK LEVEL**

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

- Probability Factor of 9 based on the active erosion occurring at a moderate but steady or decreasing rate.
- 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 72, which is reduced from the 2012 Risk Level of 88 due to the decrease of erosion activity.

#### **6.0 RECOMMENDATIONS**

##### **6.1 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 erosion in those areas.

## 6.2 Long Term Measures

Perform a suitable repair to stabilize the wall facing and prevent erosion from undermining the wall. AMEC previously proposed a shotcrete panel wall, potentially with an anchored waler. Possible alternatives could include full removal of the gabion baskets; replacing them with shotcrete/high-tensile mesh, or geotextile facing anchored with percussively driven soil nails. 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.

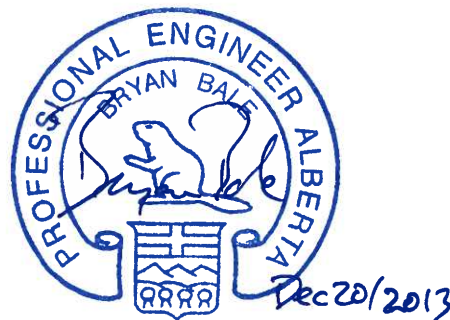
## 7.0 CLOSURE

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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**



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