HIGHWAY 549:02 – THREEPOINT CREEK
CALL-OUT REPORT

Submitted to:

Alberta Transportation
Calgary, Alberta

Submitted by:

AMEC Environment & Infrastructure,
a division of AMEC Americas Limited
Calgary, Alberta

August 2012

CG25399.400

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1.0 INTRODUCTION

AMEC Environment & Infrastructure, a division of AMEC Americas Limited (AMEC), attended a call-out request to two creek encroachment sites along Highway 549:02, west of Millarville, Alberta on 19 June 2012. The call-out request was made by Mr. Ross Dickson of Alberta Transportation (AT). The site inspection was performed by Georgina Griffin M.Eng., P.Eng., Bryan Bale M.Sc., P.Eng., and Tyler Clay, E.I.T., of AMEC; and Roger Skirrow, Ross Dickson, and Nathan Madigan of AT during the 2012 Annual Tour.

The purpose of the site inspection was to:

- Provide a preliminary assessment of the hazard conditions and associated risk to the highway due to an encroaching creek and ongoing erosion.
- Provide preliminary recommendations for mitigative measures, along with recommendations for further investigation.

The call-out site inspection was authorized under AT Consulting Services Agreement CON0013506.

2.0 SITE LOCATION AND BACKGROUND

Both sites are located in 05-021-03 W5M, approximately 6.2 km west of Millarville, Alberta, along Highway 549:02, 6 km from the junction of Highway 549 and Highway 22. The sites are approximately 1.5 km apart and will be referred to as the East and West sites. This segment of Highway 549 is a paved, two-lane undivided roadway along a bearing of approximately 090 (east/west). A meandering creek (Threepoint Creek) runs to the south of the highway. Figures 1 and 2, attached, show the overall site layouts and the relative location of the highway to the creek erosion.

These sites are new to AT's Southern Region GeoHazard database and have not been previously inspected.

3.0 19 JUNE 2012 SITE OBSERVATIONS

A site plan created from air photos for the East and West sites are attached as Figures 1 and 2 respectively. Key observations from the site inspection are outlined below and shown in the attached photographs:

East Site (Figure 1, Photos 1 to 3)

- The creek flowing south of the road was approximately 300 mm deep during the inspection but appeared to have a 1 to 2 m deep flood flow previously this year.
- The east-flowing creek bends toward the northwest forming a bank exposure on the south side of the road for approximately 60 to 80 m.

- The bank is up to 6 m high, nearly vertical from the base with the upper 1 to 2 m at a 15-20° angle, and has a minimum offset of 8 m from the road edge.
- The bank had seepage 2 m from the base and was made up of erodible silt, sand and cobbles (likely of fluvial origin) and clay.

West Site (Figure 2, Photos 4 and 5)

- A very similar condition to what was observed to be occurring at the East Site.
- The upstream creek flow appeared to more constricted, flow energy was higher and the angle of attack towards the bank was higher relative to the East Site.
- The bank exposure here is approximately 40 to 50 m long.
- The bank is vertical for 2 m at the top and then slopes to approximately 50°, with a total bank height of 5 to 6 m.
- The bank edge has a minimum offset of 5 m from the south road shoulder.

4.0 DISCUSSION AND ASSESSMENT

The East and West Sites both share similar conditions and hazards. The hazard to the highway at both these sites is ongoing as bank erosion continues; however, based on current observations, immediate bank failure and encroachment into the road surface is not currently apparent. The rate at which this hazard develops is dependent on the number of flood events and channel migration. Evaluation of these criteria could be improved by performing a hydrotechnical assessment and looking at historic channel movements. If it is determined following a hydrotechnical assessment and ongoing visual inspection that the risk to the highway will continue to increase then mitigation involving bank armouring or channel diversion should be considered.

5.0 RISK LEVEL

AMEC recommends the following Risk Levels for these sites, based on AT's general geohazard risk matrix:

East Site

- Probability Factor of 11, based on the ongoing movement and that the scarp of the bank is expected to continually retrogress and cause settlement or damage to a portion of the road. Erosion and retrogression rates will likely increase during years of high precipitation.
- Consequence Factor of 2, reflecting the fact that a large sudden failure is unlikely and only one lane of the highway is currently affected. To date the remaining highway lane appears unaffected by the erosion and bank encroachment.

Therefore, the recommended Risk Level is 22 (i.e. 11 x 2).

West Site

- Probability Factor of 12, based on the ongoing movement and current offset between the road and bank edge. The bank scarp is expected to continually retrogress and cause settlement or damage to a portion of the road. Erosion and retrogression rates will likely increase during years of high precipitation.
- Consequence Factor of 2, reflecting the fact that a large sudden failure is unlikely and only one lane of the highway is currently affected. To date the remaining highway lane appears unaffected by the erosion and encroachment.

Therefore, the recommended Risk Level is 24 (i.e. 12 x 2).

6.0 RECOMMENDATIONS

Short Term and Ongoing Maintenance

- A hydrotechnical assessment should be performed to better understand channel conditions, occurrence of flood events and to potentially aid in the design for any future mitigation.
- The site should be added to the AT annual tour every other year to check for changing channel conditions and to measure the minimum bank offset from the road edge.
- The MCI should provide notification if significant cracking in the ditch or road surface is observed.

Long Term

- To slow erosion and encroachment towards the highway, mitigation could involve armouring the exposed bank via gabion basket or cobble placement. Alternatively options involving the feasibility of channel re-alignment could be evaluated.

7.0 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 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 Environment & Infrastructure,
a division of AMEC Americas Limited

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Attachments: Figures 1 to 2
Photos 1 to 5

SCALE
1: 1500
0 10 20 30 m

amec

CLIENT:
ALBERTA TRANSPORTATION

PROJECT: **HWY 549:02 - THREEPOINT CREEK CALL-OUT INSPECTION**

TITLE:
EAST SITE PLAN

DATE:	JOB No.:	CAD FILE:	FIGURE No.:	REV.
AUGUST 2012	CG25399	25399B01.dwg	FIGURE 1	A

SCALE
1:1500
0 10 20 30 m

amec

CLIENT:
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TITLE:
WEST SITE PLAN

DATE:	JOB No.:	CAD FILE:	FIGURE No.:	REV.
AUGUST 2012	CG25399	25399B01.dwg	FIGURE 2	A

Photo 1 – At the East Site standing on the south bank of Threepoint Creek, looking towards the highway at the main section of the north bank exposure.

Photo 2 (above) – At the west end of the East Site, looking downstream (east) Threepoint Creek.

Photo 3 (above) – At the west end of the East Site, looking towards the east along the road shoulder where the minimum offset was measured.

Photo 4 (above) – At the West Site, looking downstream towards the northeast at the highway and main section of the north bank exposure.

Photo 5 (above) – At the West Site, looking upstream (west) along the south road ditch where the minimum offset between the bank crest and road shoulder was measured.