THURBER ENGINEERING LTD.
GEOTECHNICAL ▪ ENVIRONMENTAL ▪ MATERIALS

January 18, 2008 File: 15-85-72

Alberta Infrastructure and Transportation
Room 301, Provincial Building
9621 - 96 Avenue
Peace River, Alberta
T8S 1T4

Attention: Mr. Ed Szmata

PEACE RIVER (HIGH LEVEL) REGION GEOHAZARD ASSESSMENT
HWY 743:02, SITE PH 11, WHITEMUD RIVER
(STATION 42+600 BF 77270 AND 43+200 SHALE SLOPE SITE)
2007 ANNUAL INSPECTION REPORT

Dear Sir:

This report documents the 2007 annual site inspection of areas of slope instability at Stations 42+600 and 43+200 (Shale Slope Site) along Hwy 743:02 at the Whitemud River Valley crossing. Thurber Engineering Ltd. (Thurber) undertook the inspection in partial fulfillment of our Geotechnical Services for Geohazard Assessment, Instrumentation Monitoring and Related Work contract (CE049/2004) with Alberta Infrastructure and Transportation (INFTRA). The inspection was undertaken on May 18, 2007 by Mr. Don Proudfoot P. Eng., and Mr. Gustavo Padros, M.Sc. of Thurber along with Mr. Ed Szmata, Mr. Roger Skirrow, P.Eng. and Mr. Rocky Wang, of INFTRA.

1. GENERAL

Hwy 743:02 crosses the approximately 140 m deep Whitemud River valley in a southeast to northwest direction following tributary valleys of the river. Through much of the river crossing the alignment is in a sidehill cut/fill arrangement.

The approximate locations of the above sites are shown on Drawings No. PH11-1 and PH11-2 in Section A of the binder. The available background information for the two sites is also described in the Geotechnical File Review in Section A of the site binder. More site specific and recent information is summarized in Thurber's 2006 inspection report included in Section B.

2. STATION 42+600

2.1 Background

The site consists of a 20 m high embankment fill east of the highway, located at a Whitemud River tributary creek crossing. At this location the creek is channeled into a 1.57 m diameter CMP (BF 77270) that crosses under the highway at a skew. There is also a 1.12 m diameter CMP overflow pipe located 4 m higher up the embankment.

The east slope of the embankment failed some time prior to 1987. Slope reconstruction was implemented in 2002 that consisted of excavating the slide mass in a benched cut, placing gravel along the backslope and base of the cut, and rebuilding the slope with clay backfill containing geogrid and drainage gravel layers. A 610 mm diameter HDPE drop pipe c/w concrete headwall was also installed down the repaired slope to drain water from the southeast highway ditch down to the creek. Erosion protection measures were also implemented consisting of armouring the creek bed with gabions and riprap. Copies of the design drawings are attached for inclusion in Section G of the site binder.

2.2 Site Observations

During the site reconnaissance the roadway section and sideslopes were inspected. Selected photographs of the site were taken and are attached. A sketch plan of the site is attached as Figure PH11-1.

The size of the shallow slope failure located on the west slope of the highway embankment does not appear to have increased since the 2006 site assessment. At the time of the site visit both the west sideslope and the east sideslope repaired in 2002 appeared stable and there were no major signs of instability. However, a slope failure was noted in the backslope cut on the west side of the highway, across from the repaired slope, where creep and shallow sliding were first observed in the 2006 site visit. The backslope failure is about 115 m wide and 15 m long and the slip plane appears to be shallow. The main scarp is located at about mid height of the cut, running parallel to the highway. The toe of the slide appears to intersect the west ditch of the highway.

The slide noted in 2006 on the west side of the highway, north of the culvert, remains active, and has slightly deepened its graben and increased its length to the north. However, the slide is not impacting the present highway alignment.

The extent of the erosion noted along the sides of the gabion baskets at the outlet of the centerline pipe does not appear to have increased since our 2005 site visit.

A sinkhole about 0.3 m diameter was noted close to the culvert alignment, located between the highway and the culvert outlet.

2.3 Assessment

The repaired slope appears stable and drainage is good based on the performance of the existing culverts.

The shallow slides above the culvert on the west side of the highway are unlikely to impact the road, but should continue to be monitored.

The new shallow slides located in the west backslope of the highway, south of the culvert, are also not presently affecting the highway but may block the drainage of the ditch.

The active slide area located further north on the west side of the highway is likely deep-seated extending all the way down to the creek beyond the outlet of the culvert.

2.4 Risk Level

The risk level for this site has been assessed as follows:

PF(9) * CF(2) = 18

A Probability Factor of 9 is considered appropriate since the backslope slides on the southwest side of the highway are active with perceived moderate steady movement. A Consequence Factor of 2 was selected since the slides should not the affect the use of the current alignment for some time.

2.5 Recommendations

The proposed shifting of the highway to the west to smooth out the alignment, which has been proposed by others in a recent functional planning study, is not recommended as this could load the west active slide area and fail the new embankment.

MPA Engineering Ltd. has been retained to assess options for increasing the capacity of the centerline culvert. It is understood that they are proposing to grout off the existing culverts and install a new longer culvert which will allow highway sideslopes to be flattened to 4H:1V on the west side, while maintaining 3H:1V on the east side with a more gently sloping fill near the base of the present slope. The new culvert will consist of an auger bored (or tunneled) 1829 mm diameter smooth wall steel central piece and 2120 mm diameter SPCSP extensions on each and

installed by trenching method. Full concrete end treatments will be constructed at each end of the new culver. It is understood that the new culver might be constructed in 2009.

In the mean time, the slopes in this area should continue to be monitored.

3. STATION 43+200 (SHALE SLOPE SITE)

3.1 Background

It is understood that the roadway has been realigned into a cut slope, which consists of clay shale. The slope is too steep to support vegetation growth and as the surface of the shale weathers, surface layers become unstable and slide down the slope into the road ditch. The accumulation the shale debris is removed from the roadway ditch as required and placed in a designated area.

3.2 Site Observations

Selected photographs of the site are attached. A sketch plan of the site is attached as Figure PH11-1.

The site conditions are similar to the previous assessment and there was shale debris in the ditch at the time of the site visit. It is understood that shale debris collected by the maintenance contractor has typically been placed in a berm on the west side of the highway, north of the shale slope. The west roadway side slope is showing good vegetative growth. As mentioned in our 2006 site visit, a subdued scarp about 0.3 m high, located about 3 m downslope of the guardrail was noted as well. At the time of the site visit there were no noticeable signs of movement in the roadway.

3.3 Assessment

The shale slope appears to have sufficient global stability and the spalling is considered to be more of a maintenance issue. There are no signs of movement in the roadway. The subdued scarp with a good vegetative cover indicates that the sideslope is currently stable.

3.4 Risk Level

The risk level for this site has been assessed as follows:

PF(5) * CF(2) = 10

A Probability Factor of 5 is considered appropriate since there are shallow sloughing conditions but no global stability movements. A Consequence Factor of 2 is considered appropriate since the site is an area with a potential rock fall hazard.

This is unchanged from the previous assessment.

3.5 Recommendations

No immediate action is required at this site. It is recommended to continue to monitor the slope and clean the ditches of shale debris as required.

If minor highway re-alignment is carried out at this location, the backslope should be flattened, topsoiled, seeded and covered with a Rolled Erosion Control Product (RECP) to try to mitigate the sloughing condition.

4. CLOSURE

We trust this assessment and recommendations meet with your needs at this time. Please contact the undersigned should questions arise or if the slide conditions worsen.

Yours very truly,
Thurber Engineering Ltd.
Don Proudfoot, P.Eng.
Review Principal

Gustavo Padros, M. Sc.
Project Coordinator
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Attachments