THURBER ENGINEERING LTD.
GEOTECHNICAL ▪ ENVIRONMENTAL ▪ MATERIALS

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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 35:08, SITE PH11, WHITEMUD RIVER**
**(STATION 42+600 AND 43+200 SHALE SLOPE SITE)**
**2006 ANNUAL INSPECTION REPORT**

Dear Sir:

This report documents the 2006 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 (AIT). The inspection was undertaken on June 16 2006 by Mr. Chris Workman, P.Eng., and Mr. Don Proudfoot P. Eng of Thurber along with Mr. Ed Szmata, and Mr. Roger Skirrow, P.Eng of AIT.

## 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 2005 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 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 slope were inspected. Selected photographs of the site were taken and are attached. A sketch plan of the site is attached as Figure PH11-1.

At the time of the site visit the repaired slope appeared stable and there were no signs of instability. See Photo 1 and Photo 2.

The cut slope on the west side of the highway, across from the repaired slope, is showing signs of creep and shallow sliding. See Photo 3. Similarly, the fill slopes above the culvert outlet have shallow active slides. Photo 5.

There is a significant active slide on the west side of the highway north of the culvert, as evidenced by recent tension cracks and a graben formation. The slide is not impacting the present highway alignment. See Photo 6 and Photo 7.

The extent of the erosion noted along the sides of the gabion baskets at the outlet of the centerline pipe was similar to what was noted during our 2005 visit (Photo 4).

## 2.3 Assessment

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

The shallow slide in the cut slopes are not affecting the road at his time, however, if they continue to move, clearing of the road ditch may be required.

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

This area is part of a highway realignment study being conducted by others. We understand that this study will consider the larger slide area noted to the north of this site.

## 2.4 Risk Level

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

PF(9) * CF(2) = 18

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

## 2.5 Recommendations

The slopes in this area should continue to be monitored.

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. Proposed measures to remediate the erosion at the outlet of the existing centerline culvert were provided in our 2005 report. If grading work is carried out at this site consideration should be given to cutting the southwest approach cut slope to a greater inclination to mitigate the backslope slumping condition.

## 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 located northwest of the shale slope. The west roadway side slope is showing good vegetative growth. An approximately 0.3 m high subdued scarp, 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

Chris Workman, P.Eng.
Project Engineer

Attachments

cc: Mr. Roger Skirrow, P.Eng.
Director of Geotechnical Services, AIT