



August 23, 2006

File: 15-85-32

Alberta Infrastructure and Transportation
Room 223, Provincial Building
4709-44 Avenue
Stony Plain, Alberta
T7Z 1N4

Attention: Mr. Randy Shaul

**NORTH CENTRAL REGION GEOHAZARD ASSESSMENT
HWY39:06 – SLIDE NEAR GREENWOOD LAKE ROAD (NC23)
2006 ANNUAL INSPECTION REPORT**

Dear Sir:

This letter documents the 2006 annual site inspection of a portion of Highway 39:06 located at km 12.6 (refer to Figure NC23-1 and -2 attached for inclusion in Section F of the binder). Thurber Engineering Ltd. (Thurber) undertook this inspection in partial fulfillment of our Geotechnical Services for Geohazard Assessment, Instrumentation Monitoring and Related Work contract CE142/2006 with Alberta Infrastructure and Transportation (AIT).

Mr. Renato Clementino, P.Eng of Thurber undertook the inspection on May 18, 2006 in the presence of Messrs. Roger Skirrow, P. Eng. and Randy Shaul of AIT.

1. BACKGROUND

Thurber last visited the site in May 2005 and the site condition at that time is described in our Part B assessment letter included in the site binder.

After the 2005 assessment, construction activities were undertaken on this site for the installation of subhorizontal drains and replacement of a non-functioning culvert with a new smooth wall steel culvert (SWSC). In addition, grading of the surrounding area was also performed to provide positive drainage of surface water and avoid ponding of water on the slope. The remedial construction work was completed at the end of October 2005.

Detailed information regarding the design and construction are provided in two construction completion reports from Thurber Engineering Ltd. submitted to AIT titled "Drainage Improvement and Other Work Contract 6585/04" (August 18, 2005) and "Culvert Replacement, Grading and Other Work Contract 6979/05 (February 6, 2006).

2. SITE OBSERVATIONS

The changes in condition since last year are shown on the attached site sketch plan, Figure NC23-1. A profile and cross section is provided in Figure NC23-2 in Section F. Selected photographs taken during the visit are also attached. Figure NC23-1 also shows the site changes resulting from the construction work.

In comparison with last year, the pavement distress has somewhat worsened. Some of the cracks have increased in length and some new ones have appeared.

At the time of this site inspection, all the previous locations where water was pooling were dry. Site drainage has improved considerably after the grading work performed last year.

At the west end of the north side slope there is a new dip section adjacent to the highway shoulder that is relatively deep. This could be a traffic hazard if a driver needs to pull just off the shoulder of the road.

The west man access (drainage collection) point had two subhorizontal drains producing water. Two other drains in the same man access point were rust stained, indicating that at some time these drains were also producing water. No flow or evidence of flow was observed from the drains in the east man access point.

The gabion outfall is performing well and no significant erosion was observed around it. The vegetation is catching well in the gabion mat installed along the base of the gabion wall, however the planted willow stakes did not catch.

A section (west end) of the silt fence located at the top of the gabion wall was knocked down.

3. ASSESSMENT

The site was not patched last year, and the appearance of new cracking on the pavement may be related with the relatively high movement rates as recorded in the spring 2005 slope inclinometer readings (i.e. prior to construction) which varied from 4.2 mm/y to 20.2 mm/y. However, the SI readings from Spring 2006 (after

remediation construction) show almost no movement in all the SIs. This is likely a reflection of the drop in groundwater level, as shown in the piezometer readings (see plots in Section D of the binder), due to the installation of the subhorizontal drains and the drainage of the ponded water on the top of the slope.

It is expected that as the drainage of the groundwater continues, the site stability will improve which will thereby reduce the pavement distress observed in the future.

4. RISK LEVEL

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

$$PF(6) * CF(4) = 24$$

A Probability Factor of 6 is considered appropriate since the instrumentation shows the slide is inactive; however there is a possibility of remobilization until a longer monitoring period has taken place. A Consequence Factor of 4 is considered appropriate since the embankment in a relatively long, high side slope and a partial closure of the road would be a direct result of an aggressive slide movement.

5. RECOMMENDATIONS

5.1 General

Continued monitoring of the slope and instrumentation is recommended as programmed to evaluate the performance of the remediation measures undertaken at the site.

5.2 Maintenance

The section of the silt fence at the top of the gabion wall which is currently knocked down should be re-installed.

The dip section at the west end of the area should be back filled with topsoil to re-establish a gentle side slope.

Crack sealing should be undertaken to reduce surface water infiltration into the slide mass from the roadway surface.



6. 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 condition worsens.

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

Renato Clementino, P.Eng.
Project Engineer
/dw

Attachments

cc Mr. Roger Skirrow, P.Eng. (Geotechnical Director, AIT)