THURBER ENGINEERING LTD.
GEOTECHNICAL ▪ ENVIRONMENTAL ▪ MATERIALS

August 11, 2006 File: 15-85-37

Alberta Infrastructure and Transportation
Room 301, Provincial Building
Bag 900, Box 29
9621 – 96 Avenue
Peace River, Alberta
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Attention: Mr. Ed Szmata

PEACE REGION (PEACE RIVER – HIGH LEVEL AREA)
GEOHAZARD ASSESSMENT
HWY 690:02, PH 47 DEADWOOD SLIDE
2006 ANNUAL INSPECTION REPORT

Dear Sir:

This letter documents the 2006 annual site inspection of a slope instability area on Hwy 690:02 approximately 2.2 km east of the intersection with Highway 35, and about 8.8 km west of the town of Deadwood. The inspection was undertaken by Thurber Engineering Ltd. (Thurber) 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 May 10, 2006 by Mr. Don Proudfoot P. Eng., and Mr. Gustavo Padros, M. Sc., of Thurber along with Mr. Ed Szmata and Mr. Roger Skirrow, P.Eng of AIT.

1. BACKGROUND

Embankment instability was originally observed near the existing 1500 mm diameter culvert prior to the paving of the Highway during the mid 1990's. In the fall of 2004, significant slide movement was noted west of the culvert location (BF 73271).

Telus pedestals and highway crossing signs for the North Peace Gas Co-op line are present at the site. In addition, there is an overhead power line running in the east-west direction along the north highway backslope.

2. OBSERVATIONS

The roadway surface, back slope ditch and side slope areas south-southeast of the highway alignment were inspected during the reconnaissance. Selected photographs taken during the site reconnaissance are attached. A sketch plan showing the locations of the 2005 scarp, creek alignment, patched highway section, and the existing culvert is provided on Figure PH47-1, along with a cross-section through the slide.

The tension crack outlining an active slide scarp on the roadway surface that was observed in last year's assessment crossing the highway diagonally has been patched and the 50 mm vertical drop in the pavement surface has been levelled. However, signs of ongoing creep movements within the slide mass were noticed as cracks have reappeared through the recent ACP patch and old cracks previously patched located east and west of the main scarp have extended further. Two small dip zones were noticed on the highway, as illustrated in Figure PH47-1. A subdued scarp is located approximately 34 m south-east of the highway shoulder along cross-section A-A'. The creek bed was realigned by the slide movement as shown on the above mentioned figure.

3. ASSESSMENT

Based on the observations made during the site reconnaissance the highway sideslope is prone to ongoing movements due to active creek erosion of the toe areas. It is expected that, if left untreated, the slope movements will continue and require ongoing patching of the highway. If a period of prolonged wet weather occurs a sudden large slide movement could require a road closure and the need for a detour.

4. RISK LEVEL

In the short term there is some risk that the ongoing creep movements would result in additional cracking and deformations of the roadway surface, which could impact traffic safety if left untreated. However, in case of a catastrophic side slope failure the risk of total closure of both highway lanes is high.

Based on the AIT's Risk level rating system, the risk level for this site has been assessed as follows:

$$\text{Risk (39)} = \text{PF (13)} \times \text{CF (3)} \qquad \text{[Eq. 1]}$$

This risk level was based on a Probability Factor (PF) of 13 (active with high rate of movement, steady or increasing) and a Consequence Factor (CF) of 3

(site having a shallow fill at a culvert structure, where partial closure of the road or a detour is a direct result of the slide movement).

5. RECOMMENDATIONS

Based on the objective to re-establish embankment stability below the highway three options have been identified as possible long term solutions.

The first option would involve the installation of a 1500 mm diameter CSP culvert along the toe of the slide, which would prevent further creek erosion of the toe of the slope. In addition to the culvert installation, a toe berm would be constructed and the slide mass regraded to a uniform slope in order to re-establish slope stability. A DFO authorization would be required to carry out this option. The second solution would be based on the use of a pile wall to stabilize the highway side slope. The third option would include either partial or full excavation of the slide mass, construction of a deep shear key, and reconstruction of the highway sideslope. This option would also involve the lining of the creek bed with rip rap in order to prevent further toe erosion.

The ball park cost of the proposed repairs excluding land and engineering costs, would range from about $450,000 for the culvert option to about $1,000,000 for the pile wall option.

A topographic survey, detailed design and tender package will be required prior to carrying out the remedial measures.

6. CLOSURE

We trust that the above information is sufficient for your present requirements. However, if you have any questions or require any additional input please do not hesitate to call us.

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

Gustavo Padros, M.Sc.,
Assistant Project Engineer
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Attachments