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 REGION (PEACE RIVER – HIGH LEVEL AREA)
GEOHAZARD ASSESSMENT
HWY 690:02, SITE PH 47, DEADWOOD SLIDE
2007 ANNUAL INSPECTION REPORT

Dear Sir:

This letter documents the 2007 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 (INFTRA). The inspection was undertaken on May 10, 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. 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, backslope ditch and sideslope 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.

Ongoing creep movements within the slide mass have continued, causing the previously patched main tension crack that crossed the highway diagonally to open again. The main tension crack width ranges from 10 to 30 mm. Cracks related to the main tension crack are re-appearing through the 2005 ACP patch. The two small dip zones previously noticed on the highway, as illustrated in Figure PH47-1, do not appear to have increased in size. A subdued scarp is located approximately 34 m southeast of the highway shoulder and is shown along cross-section A-A' in Figure PH47-1. The creek bed was realigned by the slide movement as shown on the above mentioned figure and its depth appears to have increased since last year's geohazard assessment.

3. ASSESSMENT

Active creek erosion at the toe of the embankment is causing continued movements of the highway sideslope. 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 sideslope failure the risk of total closure of both highway lanes is high.

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

Risk (39) = PF (13) x CF (3) [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 sideslope. 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 $550,000 for the culvert option to about $1,250,000 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 very truly,
Thurber Engineering Ltd.
Don Proudfoot, P.Eng.
Review Principal

Gustavo Padros, M. Sc.
Project Coordinator
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Attachments