THURBER ENGINEERING LTD.
GEOTECHNICAL ▪ ENVIRONMENTAL ▪ MATERIALS

October 1, 2008 15-16-213

Alberta Transportation
Room 301, Provincial Building
Bag 900, Box 29
9621 – 96 Avenue
Peace River, Alberta
T8S 1T4

Attention: Mr. Ed Szmata

PEACE REGION (PEACE RIVER – HIGH LEVEL AREA)
GEOHAZARD ASSESSMENT
HWY 690:02, PH47 DEADWOOD SLIDE
2008 ANNUAL INSPECTION REPORT

Dear Sir:

This letter documents the 2008 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 (CE105/2008) with Alberta Transportation. The inspection was undertaken on May 22, 2008 by Mr. Don Proudfoot, P. Eng., and Mr. Gustavo Padros, P. Eng., of Thurber along with Mr. Ed Szmata of Alberta Transportation.

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).

Underground utilities from Telus are located in the right of way south of the highway. A gas pipeline from North Peace Gas Co-op crosses perpendicular to the road, below the main scarp. 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 slide scarp and cracks, creek alignment, patched highway section, and the existing culvert is provided on Figure PH47-1, along with a cross-section through the slide.

Creep movements within the slide mass have continued. New cracks have developed extending through the ACP patch, and the diagonal cracks that started to reopen in 2007 after the highway was patched in 2005 have increased in size and width. The width of the main tension crack that extends from the southwest towards the northeast and crosses the highway diagonally has increased from the previous 10 mm to 30 mm in 2007 to 40 mm to 50 mm in 2008, and has also increased its length, reaching the north shoulder of the road and turning towards the east, penetrating again into the westbound lane. The main tension crack has a drop of about 30 mm, reaching 90 mm at the highway shoulders. The two small dip zones previously noticed on the highway, as illustrated in Figure PH47-1, appear to have increased slightly in size. A subdued scarp is located approximately 34 m south-east 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

The slope failure appears to be the result of toe erosion caused by the creek located immediately south of the highway leading to overstepping of the slope. It is expected that, if left untreated, the slope movements will continue and require ongoing patching of the highway.

4. RISK LEVEL

In the short term there is some risk that the ongoing creep movements could result in additional cracking and deformations of the roadway surface, which could impact traffic safety if left untreated.

Based on Alberta Transportation'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 near a culvert structure, where partial closure of the road could be 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.

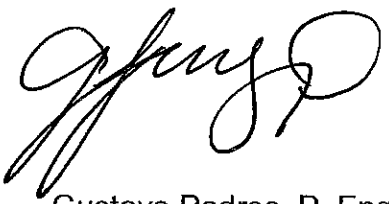
The ball park cost of the proposed repairs excluding land and engineering costs would range from about $550,000 for the culvert option to about $1,250,000 for the pile wall option.

A topographic survey, geotechnical investigation, detailed design and tender package will be required prior to carrying out the remedial measures. The proposed geotechnical program consists of drilling 3 test holes in which 2 slope inclinometers and 3 piezometers would be installed at the appropriate locations shown on Figure PH47-1.

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, P. Eng.
Project Coordinator
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Attachments