



**THURBER ENGINEERING LTD.**

GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

December 11, 2006

File: 15-85-38

Alberta Infrastructure and Transportation  
Room 301, Provincial Building  
9621 - 96 Avenue  
Peace River, Alberta  
T8S 1T4

Attention: Mr. Ed Szmata

**PEACE REGION (SWAN HILLS AREA) GEOHAZARD ASSESSMENT  
HWY 744:02 LITTLE SMOKY RIVER SOUTH OF BRIDGE (SH 21, SITE #2)  
2006 ANNUAL INSPECTION REPORT**

Dear Sir:

This letter documents the 2006 annual site inspection of areas of erosion and a slide repair located on Hwy 744:02 about 1.1 km south of the bridge over the Little Smoky River about 25 km south of Girouxville, Alberta. Thurber Engineering Ltd. (Thurber) undertook this inspection in partial fulfillment of our Geotechnical Services for Geohazard Assessment, Instrumentation Monitoring and Related Work contract (CE047/2004) with Alberta Infrastructure and Transportation (AIT).

Mr. Barry Meays, P.Eng and Mr. Gurpreet Bala, M.Sc. of Thurber undertook the inspection on May 24, 2006 in the presence of Mr. Roger Skirrow, P. Eng., Mr. Ed Szmata, Ms. Adele Powell, P.Eng., and Mr. Bruce Henderson, all of AIT.

**1. BACKGROUND**

A summary of the background for Hwy 744:02 Little Smoky River Valley crossing up to 2003 which includes this site is included in Part A of the SH10 binder. Remedial measures to address the slide were carried out in the fall of 2001.

**2. SITE OBSERVATIONS**

The changes in condition since last year are shown on the attached site plan. Selected photographs taken during the visit are also attached.

The remedial slide measures appear to be working well to date. The grass growth on the slopes is well established. A construction joint crack was observed running all along the asphalt patch while another 23 m long crack was measured close to the north shoulder of the highway. There was also good grass cover in the upstream (east) ditch with no erosion evident. Some slow, steady seepage from the U/S subdrain in the north ditch was noted, estimated to be about 1 gal/min.

The erosion under the soil-covering layer in the D/S ditch appeared to be about the same as observed last year, as shown on the site plan. The segment near the south end, which had large tire tracks last year, had vegetation cover over it (Photo 3). The silt build-up in the outlet ditch noted last year has enlarged somewhat this year, as shown on the site plan and measures about 20 m long and 3 m wide. A 21 m long pooled water zone was present close to the silt build up area.

The two 800 mm diameter centreline culverts near the south end of this site that had been grouted and abandoned since last year, and replaced with new 750 mm diameter (north) and 900 mm diameter (south) culverts were inspected. Some seepage was observed emanating from the outlet of the old culvert to the south. An erosion gully had formed from the seepage coming out of the abandoned culvert and measured 5 m long x 0.8 m deep x 0.4 m wide. A small, shallow slump was observed above the outlet of the new culvert to the north in the highway embankment, coincident with the new fill that may have settled or was not compacted properly and had retrogressed back by 1 m since last year.

### **3. ASSESSMENT**

The site appears to be in a stable condition since the 2001 remedial measures were undertaken. However a fresh crack was observed close to the north shoulder of the highway and should be closely monitored next year.

The erosion along the west drainage ditch was caused by previous high flows through the culverts further upstream to the south where previous scour holes had been created at the outlet, and associated slumping along the channel sideslopes a significant distance downstream within the bush/trees.

The seepage from the south old culvert is a result of insufficient grouting.

The backscarp of the shallow slump above the north culvert is due to settlement of the new fill, which was likely poorly compacted or not compacted at all. It will tend to degrade even more with time due to surface erosion of the backscarp face and loss of cohesion in the clay fill embankment material. At some point in time it could eventually begin to encroach into the paved shoulder. As no riprap was observed

to be present at the culvert outlets, there would be more erosion associated to high flow periods.

#### **4. RISK LEVEL**

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

$$PF(4) * CF(4) = \mathbf{16} \text{ (20 Last year)}$$

This risk level was based on a Probability Factor (PF) of 4 (inactive with a moderate probability of reactivation and moderate uncertainty level) and a Consequence Factor (CF) of 4 (site having a moderate to high fill associated with culverts, and where a significant detour or partial road closure would be the result of a slide movement).

#### **5. RECOMMENDATIONS**

##### **5.1 Short Term/ Maintenance Measures**

Cover all ditch sections of >4% gradient with 300 mm of Class 1 riprap, filling the eroded voids in the base of the ditch with granular pitrun, over non-woven geotextile. During pitrun placement, pull up the ends of the existing non-woven geotextile at 2 m intervals to act as filters, and fill the gully to ditch level taking care not to mound the fill. Use low pressure wheel load equipment (such as a bobcat to transport the materials and an articulated backhoe to remotely place the granular materials. Cover the remaining sections with high flow soil covering. The total length was estimated to be about 150 m with about 55 m where more advanced erosion is present.

A rock check berm should be built at the downstream end of the ditch to reduce silt migration into the bog area.

RegROUT the south culvert where active seepage was observed emanating from the outlet. Place Class 1 riprap for up to 20 m length and 5 m width at the outlet of both culverts, over a non-woven geotextile membrane.

Excavate the small, shallow slumped area as required, and recompact the existing fill around the outlet of the north culvert.

The above maintenance measures would have an approximate cost of \$30,000.

Continue to visually monitor the former slide area on a yearly basis to assess the continued effectiveness of the 2001 remedial measures.

## 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 Proudfoot, P.Eng.  
Review Principal

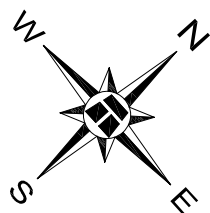


Barry Meays, P.Eng.  
Project Engineer

Gurpreet Bala, M.Sc.  
Project Coordinator  
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### Attachments

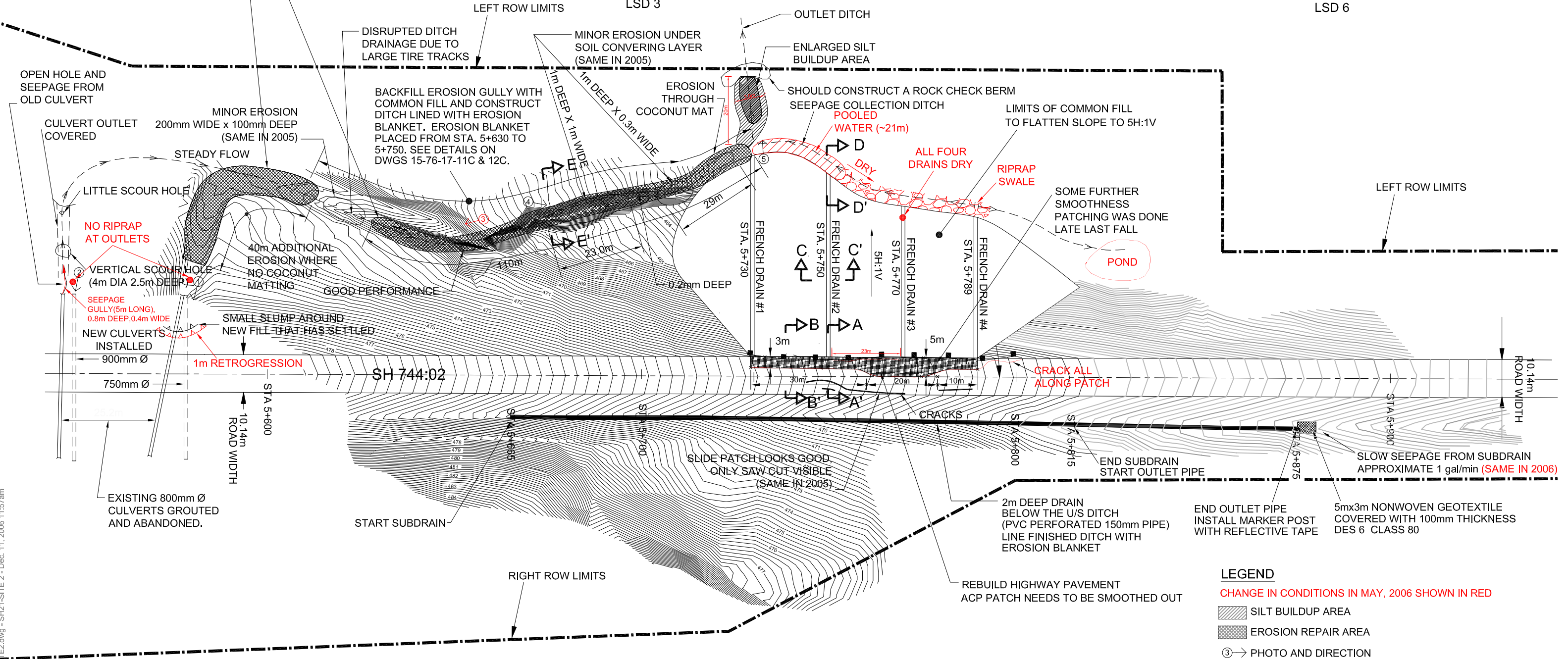
cc: Mr. Roger Skirrow, P. Eng.  
Director of Geotechnical Services, AIT



SHOULD REPAIR GULLY & COCONUT EROSION MATTING (110m LENGTH, EXTEND 10m INTO SILT BUILDUP AND 40m DOWN STREAM OF CULVERT OUTLET WHERE NO MATTING EXISTS)

SW Sec.19-76-22 W5M  
LSD 3

SW Sec.19-76-22 W5M  
LSD 6



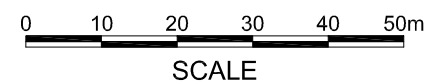
**LEGEND**

CHANGE IN CONDITIONS IN MAY, 2006 SHOWN IN RED

SILT BUILDUP AREA

EROSION REPAIR AREA

PHOTO AND DIRECTION



**FIGURE SH21-1 SITE #2 PLAN**  
HWY 744:02 LITTLE SMOKY RIVER VALLEY

SCALE 1:1000

MAY 2, 2006

THURBER PROJECT #15-85-38



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Photo 1 - Looking east at a small slump above the new 750 mm diameter culvert outlet area and minor erosion in unvegetated area further downslope, May 24, 2006.



Photo 2 - Looking east at minor erosion in downslope of the new 900 mm dia. culvert outlet area. Note the open hole to right of culvert that marks improperly grouted old culvert (seepage emanating from open hole), May 24, 2006.



Photo 3 - Looking southwest at rutted ditch area with ponded water, May 24, 2006.





Photo 4 - Looking northeast along eroded channel, May 24, 2006.



Photo 5 - Looking west at enlarged silt buildup area, May 24, 2006.