



January 17, 2008

File: 15-85-73

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)
2007 ANNUAL INSPECTION REPORT**

Dear Sir:

This letter documents the 2007 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 (INFTRA).

Mr. Barry Meays, P.Eng and Mr. Gurpreet Bala, M.Sc. of Thurber undertook the inspection on June 14, 2007 in the presence of Mr. Ed Szmata and Mr. Rocky Wang of INFTRA.

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.

An asphalt overlay was placed in the highway through the site last year and none of the earlier cracks were observed on it.

The erosion under the soil-covering layer in the D/S ditch appeared to have increased in size and depth a bit (Photo 2) and there was still some silt accumulating in the outlet ditch.

Some seepage was observed emanating through an erosion hole in the grout of the old culvert at the south end of the site. The new 750 mm diameter CSP was 1/3 full of sediment and there are still subtle signs of a small, shallow slump above the outlet of the culvert.

3. ASSESSMENT

The site appears to be in a stable condition since the 2001 remedial measures were undertaken.

The erosion along the west drainage ditch might have been caused by previous high flows through the culverts further upstream to the south. The seepage from the south old culvert is a result of insufficient grouting.

The backscarp of the shallow slump above the new north culvert is due to settlement of the new fill, which was likely poorly compacted or not compacted at all. As no riprap was observed to be present at the outlets of the new culverts, there erosion could develop at the outlets following a period of high flows.

4. RISK LEVEL

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

$PF(4) * CF(4) = 16$ (16 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 site conditions worsen.

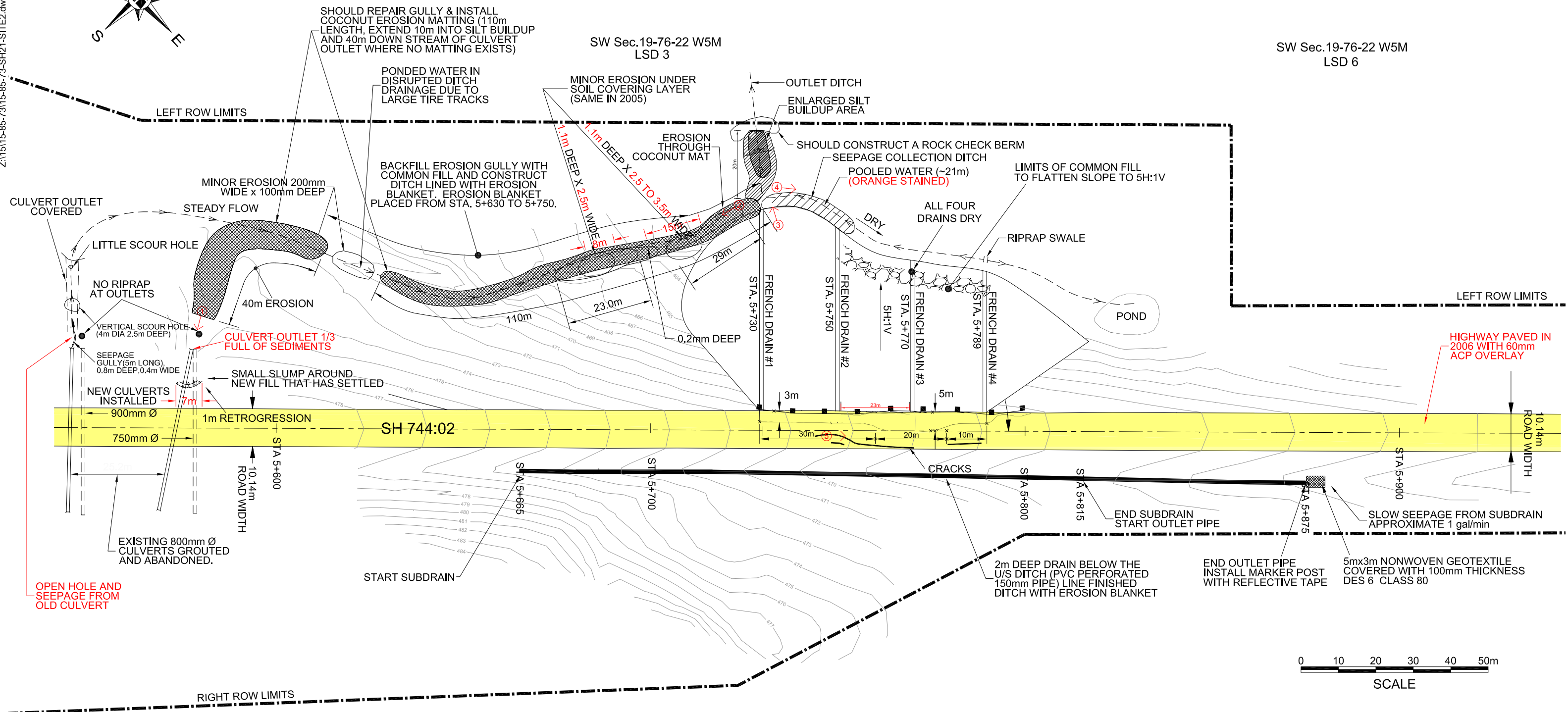
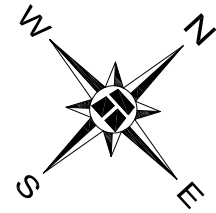
Yours very truly,
Thurber Engineering Ltd.
Don Proudfoot, P.Eng.
Review Principal

Barry Meays, P.Eng.
Project Engineer

Gurpreet Bala, M.Sc.
Project Coordinator
/dw

Attachments

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



SHOULD REPAIR GULLY & INSTALL 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

CULVERT OUTLET COVERED

LEFT ROW LIMITS

MINOR EROSION 200mm WIDE x 100mm DEEP

PONDED WATER IN DISRUPTED DITCH DRAINAGE DUE TO LARGE TIRE TRACKS

MINOR EROSION UNDER SOIL COVERING LAYER (SAME IN 2005)

OUTLET DITCH ENLARGED SILT BUILDUP AREA

BACKFILL EROSION GULLY WITH COMMON FILL AND CONSTRUCT DITCH LINED WITH EROSION BLANKET. EROSION BLANKET PLACED FROM STA. 5+630 TO 5+750.

SHOULD CONSTRUCT A ROCK CHECK BERM SEEPAGE COLLECTION DITCH

POOLED WATER (~21m) (ORANGE STAINED)

LIMITS OF COMMON FILL TO FLATTEN SLOPE TO 5H:1V

LITTLE SCOUR HOLE

STEADY FLOW

40m EROSION

1.1m DEEP X 2.5 TO 3.5m WIDE

EROSION THROUGH COCONUT MAT

DRY

ALL FOUR DRAINS DRY

RIPRAP SWALE

POND

NO RIPRAP AT OUTLETS

VERTICAL SCOUR HOLE (4m DIA 2.5m DEEP)

SEEPAGE GULLY (5m LONG), 0.8m DEEP, 0.4m WIDE

CULVERT OUTLET 1/3 FULL OF SEDIMENTS

SMALL SLUMP AROUND NEW FILL THAT HAS SETTLED

NEW CULVERTS INSTALLED

900mm Ø

750mm Ø

1m RETROGRESSION

SH 744:02

EXISTING 800mm Ø CULVERTS GROUTED AND ABANDONED.

OPEN HOLE AND SEEPAGE FROM OLD CULVERT

STA 5+600

ROAD WIDTH 10.14m

START SUBDRAIN

STA 5+665

STA 5+700

STA 5+730

STA 5+750

STA 5+770

STA 5+789

STA 5+800

STA 5+815

STA 5+875

STA 5+900

CRACKS

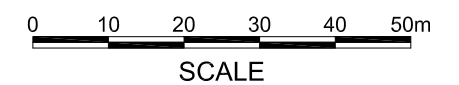
END SUBDRAIN START OUTLET PIPE

SLOW SEEPAGE FROM SUBDRAIN APPROXIMATE 1 gal/min

2m DEEP DRAIN BELOW THE U/S DITCH (PVC PERFORATED 150mm PIPE) LINE FINISHED DITCH WITH EROSION BLANKET

END OUTLET PIPE INSTALL MARKER POST WITH REFLECTIVE TAPE

5m x 3m NONWOVEN GEOTEXTILE COVERED WITH 100mm THICKNESS DES 6 CLASS 80



LEGEND

CHANGE IN CONDITIONS IN JUNE 14, 2007 SHOWN IN RED

SILT BUILDUP AREA

EROSION REPAIR AREA

PHOTO AND DIRECTION

ACP OVERLAY IN 2006

FIGURE SH21-1 SITE #2 PLAN
 HWY 744:02 LITTLE SMOKY RIVER VALLEY
 SCALE 1:1000
 JUNE 14, 2007
 THURBER PROJECT #15-85-73
THURBER ENGINEERING LTD.
 GEOTECHNICAL • ENVIRONMENTAL • MATERIALS



Photo 1 - Looking southeast at a small slump above the new 750 mm diameter culvert outlet area, June 14, 2007.



Photo 2 - Looking southwest at erosion gully.



Photo 3 - Looking northwest at discharge area, June 14, 2007.



Photo 4 - Looking northeast along seepage collection ditch, June 14, 2007.



Photo 5 - Northeast view along highway at Site # 2.