



August 7, 2007

File: 15-85-68

Alberta Infrastructure and Transportation  
2nd Floor, Provincial Building  
111 – 54 Street  
Edson, Alberta  
T7E 1T2

Attention: Mr. Cliff Corner

**NORTH CENTRAL REGION GEOHAZARD ASSESSMENT  
HWY 32:10 km 23 to 24 Groat Creek (NC60)  
2007 ANNUAL INSPECTION REPORT**

Dear Sir:

This letter documents the 2007 annual site inspection of the Hwy 32:10 (km 23 to 24) Groat Creek site located south of Whitecourt at legal land description NE2 and SE11 of 59-13-W5M. Thurber Engineering Ltd. (Thurber) undertook this inspection in partial fulfillment of our Geotechnical Services for Geohazard Assessment, Instrumentation Monitoring and Related Work contract (CE046/2004) with Alberta Infrastructure and Transportation (AIT).

Mr. Don Law, P.Eng. and Mr. Ken Froese, P.Eng., of Thurber undertook the inspection on June 11, 2007, in the presence of Mr. Fred Cheng, P. Eng., Dr. Rocky Wang, Mr. Howard Hawley, and Mr. Cliff Corner of AIT.

**1. BACKGROUND AND RECENT WORK**

This is the first annual site inspection for this site. File information for the site is provided in the Geotechnical File Review in Section A of the binder as submitted on March 29, 2007.

Widening of the highway through this area was completed in 2004. It is understood that dips within the pavement surface were first noted the following year (2005).

## 2. SITE OBSERVATIONS

As per the original report, four main dips in the pavement were observed, located as follows based on Twp Rd 590 at km 22.08:

- Dip 1: km 23.88;
- Dip 2: km 23.63;
- Dip 3: km 23.15; and
- Dip 4: km 22.98.

At all locations, there was a noticeable dip. Patches from Spring of 2006 were noted at Dips 1 through 4. An additional dip, unpatched, was noted between Dips 1 and 2 at about km 23.70 and a few shallower dips between Dips 2 and 3.

At Dip 1, there was a 910 mm diameter culvert that was observed to be sagging and ponding water over its east half. The dip in the roadway is centered over the culvert.

Dip 2 also has a 910 mm diameter culvert centered under the dip; however, there is only a slight sag over its length. Although not flowing at the time of the site visit, it appears that water may bypass the culvert inlet and enter the soil beside the culvert.

Water was ponding in the upslope ditch between Dips 2 and 3. The 910 mm diameter culvert at Dip 3 had no apparent sagging but there was water ponding at the outlet end.

At Dip 4, the patching was limited to the downslope lane and there is no culvert installed at this location. Several shallow dips were observed in the pavement surface between Dips 3 and 4.

## 3. ASSESSMENT

This area of the highway was identified in the 2001 UMA report (Section G) as having soft clay soils and wet conditions during construction. During widening, this section was reconstructed with grade lowering in the range of 0.8 m to 1.6 m from km 23 to km 24 and lime was used to stabilize the clay. The subsidence of the highway observed in 1981 occurred at about km 23 which corresponds with Dip 4 observed in 2007. The two other affected areas at that time (1981) were between km 23.6 and km 23.67 (corresponding to Dip 2) and at km 23.77 (between Dips 1 and 2). All these locations had recent patching up to 2001. The dips viewed in 2007 occurred following the reconstruction and grade-widening.

The McLeod River valley is located to the east; however, it does not appear that slope instability is the cause of the pavement distress in this area. The road is located near the top of the valley wall and there are no signs of pavement cracking or toe bulging.

Since Dips 1 through 3 occur at culvert locations, insufficient compaction of culvert backfill is likely a contributing factor to larger dips at these locations. The cause of the observed distress at the smaller dips in the pavement surface may be softened subgrade, resulting from frost action on the wet subgrade, failing under traffic loading.

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

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

$$PF(8) * CF(1) = 8$$

A Probability Factor of 8 is considered appropriate since the road settlement is active but is limited to settlement of the roadway with no signs of sideslope instability. A Consequence Factor of 1 is applicable since the embankment is relatively low and the consequences are limited to pavement roughness. This is the initial risk level assessment for this site.

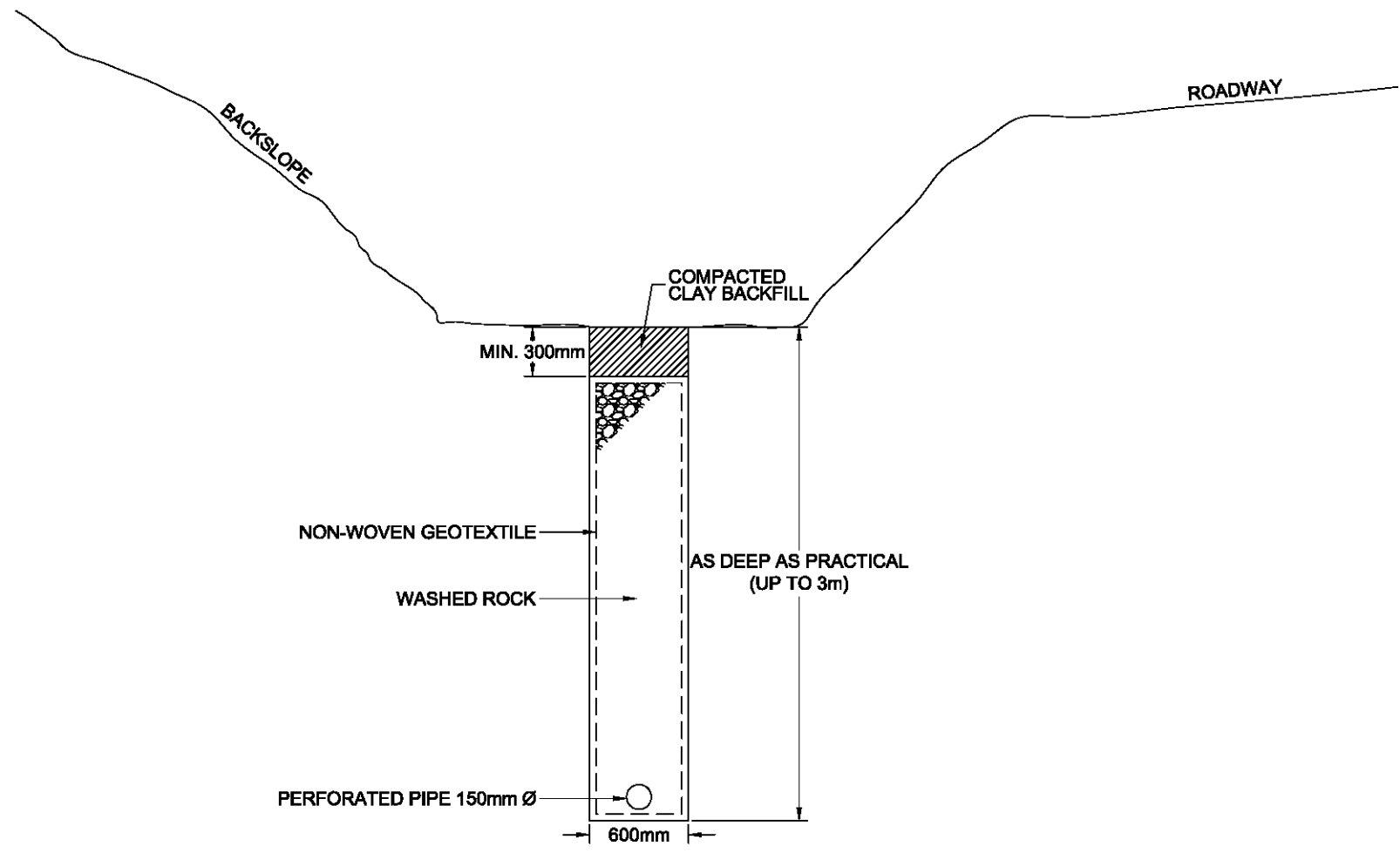
#### **5. RECOMMENDATIONS**

##### **5.1 Short Term**

Patching should be undertaken as required to maintain the ride quality of the highway.

##### **5.2 Long Term**

It is recommended that the west ditch be regraded to prevent ponding of water adjacent to the highway where it can infiltrate and lead to subgrade softening and frost action. Intercepting subsurface drainage may also reduce the recurrence of the dip features. A subdrain is recommended below the west ditch, located as shown on the site plan and should consist of a 150 mm-diameter perforated pipe surrounded by washed rock, enveloped in a non-woven geotextile for separation (see Figure 1). The drain should be about 700 m in length starting at the Dip 1 location continuing south, and should be approximately 3 m in depth or as deep as practical to intercept groundwater. A positive gradient should be maintained on the drain to transmit water away from the ditch.



TYPICAL SUBDRAIN DETAIL

**FIGURE 1**

The cost to implement these recommendations is estimated to be between \$50,000 and \$100,000.

### 5.3 Investigation

No additional investigation is recommended at this time.

### 5.4 Maintenance and Future Monitoring

This section of highway should continue to be monitored for the formation of additional or larger dips. When required, patching should be undertaken to improve the ride quality.

It is recommended to continue annual geotechnical inspections as currently programmed.

## 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 Law, P.Eng.  
Review Principal



Ken Froese, P.Eng.  
Project Engineer  
/dw

Attachments

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



**SE2 59-13-5**  
 BETTY-ANN  
 SYLVIA JOBER &  
 KAREN RUTH SPARGO

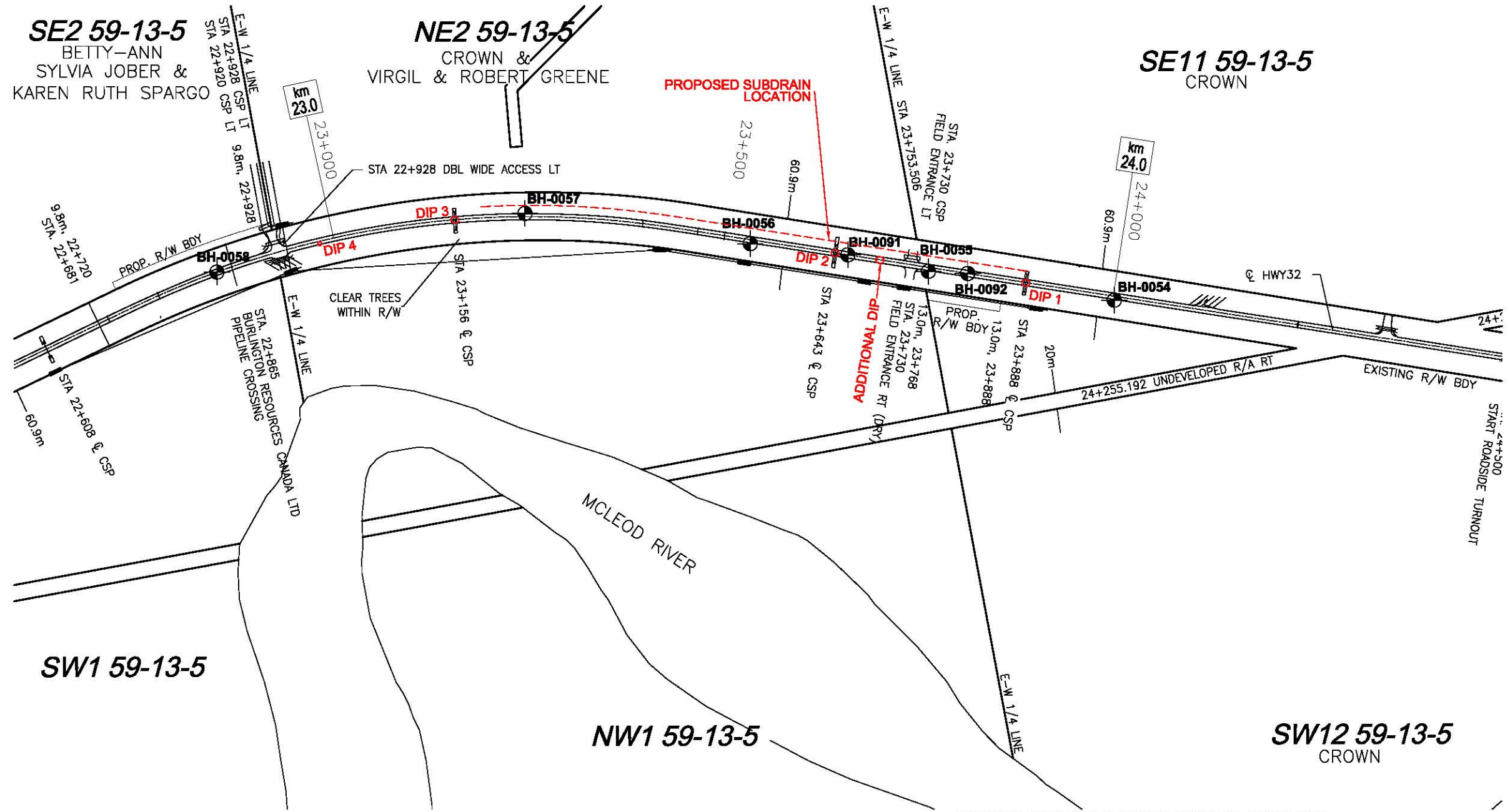
**NE2 59-13-5**  
 CROWN &  
 VIRGIL & ROBERT GREENE

**SE11 59-13-5**  
 CROWN

**SW1 59-13-5**

**NW1 59-13-5**

**SW12 59-13-5**  
 CROWN

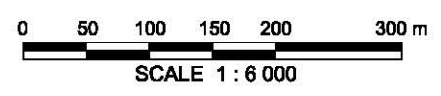


**LEGEND**

BORE HOLE LOCATIONS

**NOTES:**

- 2007 OBSERVATIONS SHOWN IN RED.



BASE PLAN PROVIDED BY: ALBERTA INFRASTRUCTURE & TRANSPORTATION

THURBER PROJECT #15-85-88

ALBERTA INFRASTRUCTURE & TRANSPORTATION



**THURBER ENGINEERING LTD.**  
 GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

**NC60 GOAT CREEK  
 SITE PLAN**

NORTH CENTRAL 2007  
 GEOHAZARDS ASSESSMENT

NE2-59-13-5  
 HWY 32:10, Km 23-24  
 SOUTH OF WHITECOURT, AB

ENGINEER:	DRAWN:	APPROVED:
KEF	PS	DJL
DATE:	SCALE:	DRAWING No.
JULY 2007	1:600	FIGURE NC60-1

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Photo 1 – Looking northeast at patch over Dip 1, June 11, 2007.



Photo 2 – Looking north at patch over Dip 2, June 11, 2007.



Photo 3 – Looking south at patch over Dip 3, June 11, 2007.



Photo 5 – Ponding water at outlet of culvert at Dip 3, June 11, 2007.





Photo 6 – Looking southeast at Dip 4, June 11, 2007.