



March 7, 2003

File: 15-76-11

Alberta Transportation  
Room 223, Provincial Building  
4709 – 44 Avenue  
Stony Plain, AB T7Z 1N4

Attention: Mr. Rob Lonson, P.Eng.

**NORTH CENTRAL REGION LANDSLIDE ASSESSMENT  
H39:06 – SLIDE NEAR GREENWOOD LAKE ROAD (NC23)  
2002 ANNUAL INSPECTION REPORT**

Dear Sir;

This letter documents the 2002 annual site inspection of a portion of Highway 39:02 located at km 12.6. The work was undertaken by Thurber Engineering Ltd. (Thurber) in partial fulfillment of our Geotechnical Services, Monitoring and Assessment of Instrumentation and Landslides contract with Alberta Transportation (AT).

The inspection was undertaken on June 12, 2002 by Messrs. Don Law, P.Eng and Renato Clementino, E.I.T. of Thurber. The site visit was carried out in the presence of Messrs. Roger Skirrow, P.Eng. and Kip Hritzuk of AT Geotechnical Branch, Messrs. Rob Lonson, P.Eng. and Michael Baik of AT Stony Plain, and Messrs. Brian Swan and Wilf Cousineau.

**1. BACKGROUND**

There was no relevant information available in AT's geotechnical files for this site. Based on personal communication with Mr. Brian Swan, the previous MCI for the area, a history of the distress at the site is as follows:

- First distress on the roadway surface was noted around 1978-79. The distressed area was patched until the early 1980's at an average rate of about two times a year.
- In 1982-84 remediation measurements were undertaken. A trench drain about 100 m long and 2 m deep was constructed within the south ditch, adjacent to the distressed section. A French drain was also installed crossing the highway between the main tension crack in the roadway and the east culvert (currently abandoned).

- After construction, the patching rate reduced to about once every other year. With time, the rate increased again to every year.
- In 2001, a total of five slope inclinometers (SI01-1 through SI01-5), nine pneumatic piezometers (PN01-1 through PN01-7, PN01-1A and PN01-2A), one standpipe piezometer (SP01-2) and two groundwater monitoring wells (GW01-1 and GW01-2) were installed at this site. The SI readings have shown the development of a shear plane at depths of 20 m to 26 m except SI01-1 located north of the highway. Current (spring to fall 2002) rates of movement are between 4 and 8 mm/year, which is a reduction from 7 to 35 mm/year measured in 2001. Water levels above or near the ground surface were measured in most of the piezometers.

## 2. SITE OBSERVATIONS

The highway roadway surface, back slopes, and side slopes in the vicinity of the slide and the abandoned culvert outlet area were inspected. The bottom of the slope adjacent to Modeste Creek and the access trail was also inspected during this site visit.

The following points summarize the observations made during the reconnaissance. Site features are shown on the site plan, Figure NC23-1 in Section F. Selected photographs taken during the site reconnaissance are also included in Section F.

- Tension cracking within the pavement surface was noted in three locations along the highway, located as shown on the site plan between the west culvert and the center (abandoned) culvert. The two easternmost cracks were present during the first site visit in 2001 and have some sections with crack widths of up to 25 mm and differential heights of up to 20 mm. The western most crack was new (i.e. not observed in 2001) and had no significant differential height across it.
- No signs of slope movement were observed on the back slope (south of the highway). A low area fed by an intermittent creek located south of the abandoned culvert inlet was filled with water at the time of the site reconnaissance. Drainage via the east ditch from the culvert inlet area is not effective at removing the water from this area. A sink hole exists above the abandoned culvert adjacent to the south pavement edge, with a diameter of about 0.6 m and a depth of approximately 0.4 m.
- A scour located below the west culvert outlet is slowly progressing towards the north-east along the tree line. This scour crosses a fibre optic line.
- No signs of slope instability were observed along the side slope north of the highway. An old scour feature was observed in the treed area north of the abandoned culvert outlet, resulting from previous water flow through the culvert.

### **3. ASSESSMENT AND RECOMMENDATIONS**

Based on the observation of a new pavement crack made during the reconnaissance and the results of the slope inclinometer readings, slope movements are continuing to occur at this site. The slope movement is likely sustained by high pore water pressures on the failure plane from within fractured bedrock layers that are fed over the local watershed. These pressures and hence movement rates may rise higher with additional precipitation. A supplementary source of water to the slope is the ponded water at the abandoned culvert inlet.

Design work and tender preparation has been completed for this site, which includes regrading of the ponded water area south of the abandoned culvert, installation of a new culvert adjacent to the abandoned culvert, and installation of horizontal wells into the bedrock to relieve pore water pressures on the failure plane. Construction is recommended in 2003 to reduce further movements.

### **4. RISK LEVEL**

A risk level of 40 is considered applicable to this site, based on a Probability Factor of 10 (active but moderate, steady movement) and a Consequence Factor of 4.

### **5. CLOSURE**

We trust this assessment meets with your needs at this time. Please contact the undersigned should questions or concerns arise.

Yours very truly,  
Thurber Engineering Ltd.  
D.J. Law, P.Eng.  
Review Principal

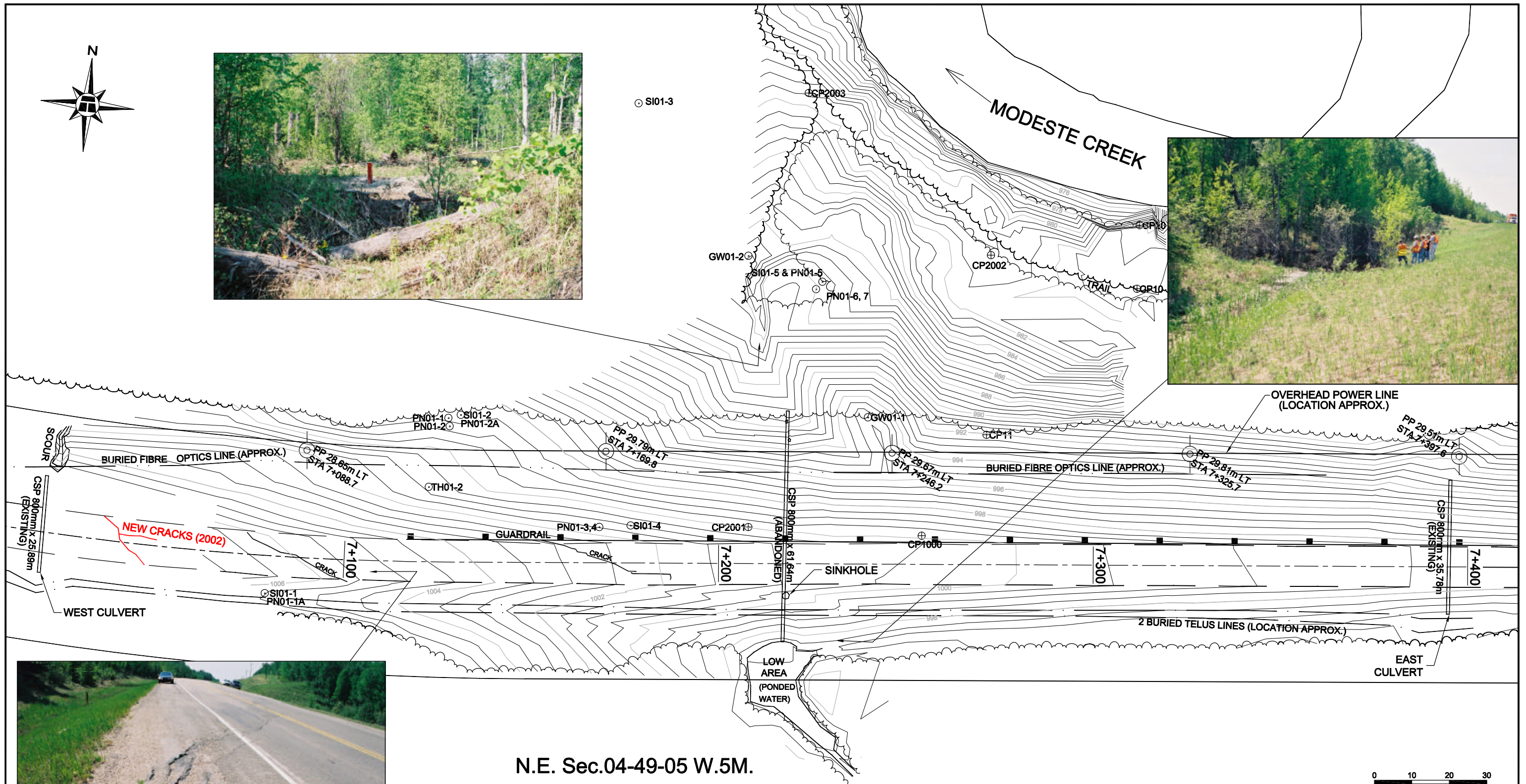
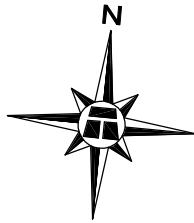
original signed by:

Renato Clementino, E.I.T.  
Project Engineer

Attachments

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





N.E. Sec.04-49-05 W.5M.



LEGEND

⊙ INSTRUMENTATION LOCATION  
SI SLOPE INCLINOMETER  
PN PNEUMATIC PIEZOMETER  
SP STANDPIPE PIEZOMETER  
GW GROUNDWATER MONITORING WELL  
CONTOUR INTERVAL 0.5m

ENGINEER	DJL
DRAWN	ZD
DATE	MARCH, 2003
APPROVED	
SCALE	1:1000

ALBERTA TRANSPORTATION

SITE PLAN

HWY 39:06 KM 12.6

NC23, GREENWOOD, AB

THURBER PROJECT #15-76-11



DRAWING No.  
FIGURE NC23-1 (2002)

