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THURBER

February 18, 2003 File: 15-76-11

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

Attention: Mr. Rob Lonson, P.Eng.

NORTH CENTRAL REGION LANDSLIDE ASSESSMENT
HWY 43:16 WHITECOURT EAST HILL (NC1)
2002 ANNUAL INSPECTION REPORT

Dear Sir:

This letter documents the 2002 annual site inspection of the Hwy 43:16 Whitecourt East Hill site 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) under CE Agreement 144/2000.

The site reconnaissance was undertaken on June 11, 2002 by Mr. Don Law, P.Eng of Thurber. The reconnaissance was carried out in the presence of Mr. Roger Skirrow, P.Eng., Mr. Kip Hritzuk, P.Eng. and Mr. Mike Baik of AT. In addition, Mr. Darryl Yagos of AT (MCI, Whitecourt) attended during the site visit.

1. BACKGROUND

The Whitecourt East Hill has been experiencing distress over many years. High ground water levels within the hill have been identified in the past by AT as a significant destabilizing factor. The highway was twinned in 1995 at which time approximately 3000 m of subdrain piping was installed in the back slope and side slope over a 700 m length of the hill to alleviate ground water pressures.

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In addition, a toe berm was placed on the north (down slope) side of the highway alignment in the upper portion of the hill, and a bin wall was constructed near the bottom of the hill on the south (up slope) side of the highway adjacent to the McConnell property. The design layout and profile are shown on Figure NC1-1 provided in Section F. A contour plan of the upper hill area showing site features is provided on Figure NC1-1A, Section F. Further details of the history of the slide and chronology of events are provided in the Geotechnical File Review, Section A of the site binder.

2. RESULTS OF THE 2002 INSPECTION

2.1 Roadway

The roadway surface was inspected during the reconnaissance along the full length of the hill. As in previous years, no distress to the pavement surface was noted except for some cracking noted in the vicinity of Station 1+800 to 1+900. This pavement distress was first observed in 1998.

The crack pattern is shown on the site plan, Figure NC1-2 (Section F), which has been updated with the information from the 2002 site visit. The crack pattern is also shown in photographs taken of the area (Section F). The development of the cracking over the past year consisted of extension of the existing cracks such that a more continuous pattern is evident this year. No significant differential height was noted across the cracks, other than on the west crack where 3 to 5 mm of differential height was observed in the west bound (travelling) lane. This location of differential height across the crack was similar to that noted during the 2001 site visit.

Small ongoing movement has been measured in SI01-2A, located down slope of the roadway in the vicinity of the cracking. A movement rate of about 1 to 2 mm per year has been recorded in this SI at a depth of about 8.5 m below ground surface. Movements further down slope (SI #12, located approximately 75 m down slope of SI01-2A) have stopped since the spring of 2001. Historical movements at a depth of about 4.5 m have been recorded in this instrument. No indication of a toe to the slide feature was noted at the site.

No other significant cracking was noted in the asphalt surface along the length of the hill. The guardrails appeared straight at the time of the site visit, indicating that no gross slope movement is occurring at the guardrail locations.

2.2 Toe Berm and Backslopes

The toe berm area below (i.e. north of) the highway at Station 1+700 to 1+800 was inspected. The back slope and side slope areas above and below the highway (Station 1+750 to Station 2+100) near the top of the east hill were also inspected.

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No visual evidence of slope movement (i.e. cracking, slumping, seepage) was noted at these locations.

Ongoing movements have been measured since the Fall of 1999 within Slope Inclinometer (SI) #5 located on the southwestern corner of the toe berm. A movement rate of about 10 mm per year was measured at a depth of 13 m in the SI over the period from May to September, 2001. This movement rate has since declined to essentially zero over the last measurement period (fall of 2002). All other inclinometers monitored in this area of the site have shown negligible slope movement since the Fall of 1999.

SI01-1A located on the back slope above the area of roadway cracking shows no definitive movement, however there is indication of possible movement at a depth of 13 m based on readings undertaken since May 2001. Additional readings are required to confirm movement at this depth, however the rate of movement if any appears to be very slow.

Local erosion (gullying) was noted in the side slope west of the toe berm, located approximately 20 m north of the highway as shown on the site plan. A photograph of the gullying is included in Section F.

2.3 Culverts at Station 1+650

Inspection was undertaken of the two culverts at this location; an upper culvert directing surface water from above the walking path to the ditch on the south side of the highway, and a lower centerline culvert which transmits the water across the highway right of way to the base of the toe berm fill located north of the highway. A half-round culvert connects the outlet of the upper culvert to the inlet of the lower culvert. The outlets of two subdrain pipes discharge into the half-round culvert, and the ditch flow from upslope areas flows onto a concrete spillway and over the lip of the half-round culvert.

Maintenance of the concrete spillway was recommended after the 2001 site visit. Upon inspection in 2002, the maintenance work had been undertaken in an effective manner. A photograph of the area from the 2002 site visit (after repair) is included in Section F.

2.4 Bin Wall Area (Station 1+200)

The bin wall and backslope area above the bin wall near the bottom of the east hill were inspected. The bin wall is located between the access road to the McConnell property and the highway, near Station 1+200 at the bottom of the hill. The bin wall profile appears relatively uniform; no significant bulging or deformation was observed (see photos in Section F).

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The slopes above the wall appear intact with no signs of instability observed. Movements in SI's #30 and #31 located in the backslope above the bin wall have been negligible since the Fall of 1999.

3. ASSESSMENT

The observations made during the site reconnaissance and the recent slope inclinometer readings indicate that slope movements at this site remain relatively minor to negligible.

The ongoing development of the roadway surface cracking in the vicinity of Station 1+800 to 1+900 appears to have accelerated somewhat since that observed between the 2000 and 2001 site visits, however differential movement across the crack has not increased. In addition, slope movement rates measured in the inclinometers in the area have reduced since the last site reconnaissance. The crack development is not affecting the trafficability of the roadway surface at the present time. Ongoing movements in this area may however be expected, and may coincide with heavy or prolonged precipitation events. Continued visual monitoring of this area is recommended.

There is no visible indication of slope movement in the vicinity of the bin wall near the bottom of the slope. In addition, movement was not observed in SI#30 and #31.

4. RISK LEVEL

A risk level of 18 is considered applicable to the area of distress on the roadway in the upper portion of the hill (Stations 1+800 to 1+900), based on a Probability Factor of 6 (active but slow, indeterminate movement pattern) and a Consequence Factor of 3. This risk level is the same as that applied for the 2001 site visit. Other areas of the site are considered to have a lower risk rating.

5. RECOMMENDATIONS

It is recommended to continue with future monitoring at this site as presently programmed.

A separate study is currently underway to assess potential remedial measures should the slope movements in the vicinity of Station 1+800 to 1+900 develop such that they impact the roadway surface. Field work including test holes and standpipe piezometers is recommended to determine the soil and groundwater conditions in the vicinity of the slide, which will allow for design of potential dewatering measures if appropriate. Additional slope inclinometers are also recommended to better delineate the slide zone.

Continued…

Infilling of the erosion gully located west of existing toe berm is recommended to help stabilize the erosion. All organics and loose soil should be removed prior to infilling the gully with large size pit run or rip rap. These recommendations were provided verbally to Darryl Yagos (AT MCI) during the 2002 site visit, and were outlined in a memorandum to Mr. Mike Baik and forwarded to Mr. Terry Carter, P.Eng. of AT (Edson).

As noted in previous annual reports, it is expected that frost action will continue to have a negative effect on the concrete and half round culvert in the vicinity of Station 1+680. Ongoing maintenance will be required to maintain water flow into the lower culvert in a controlled manner at this location.

6. CLOSURE

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

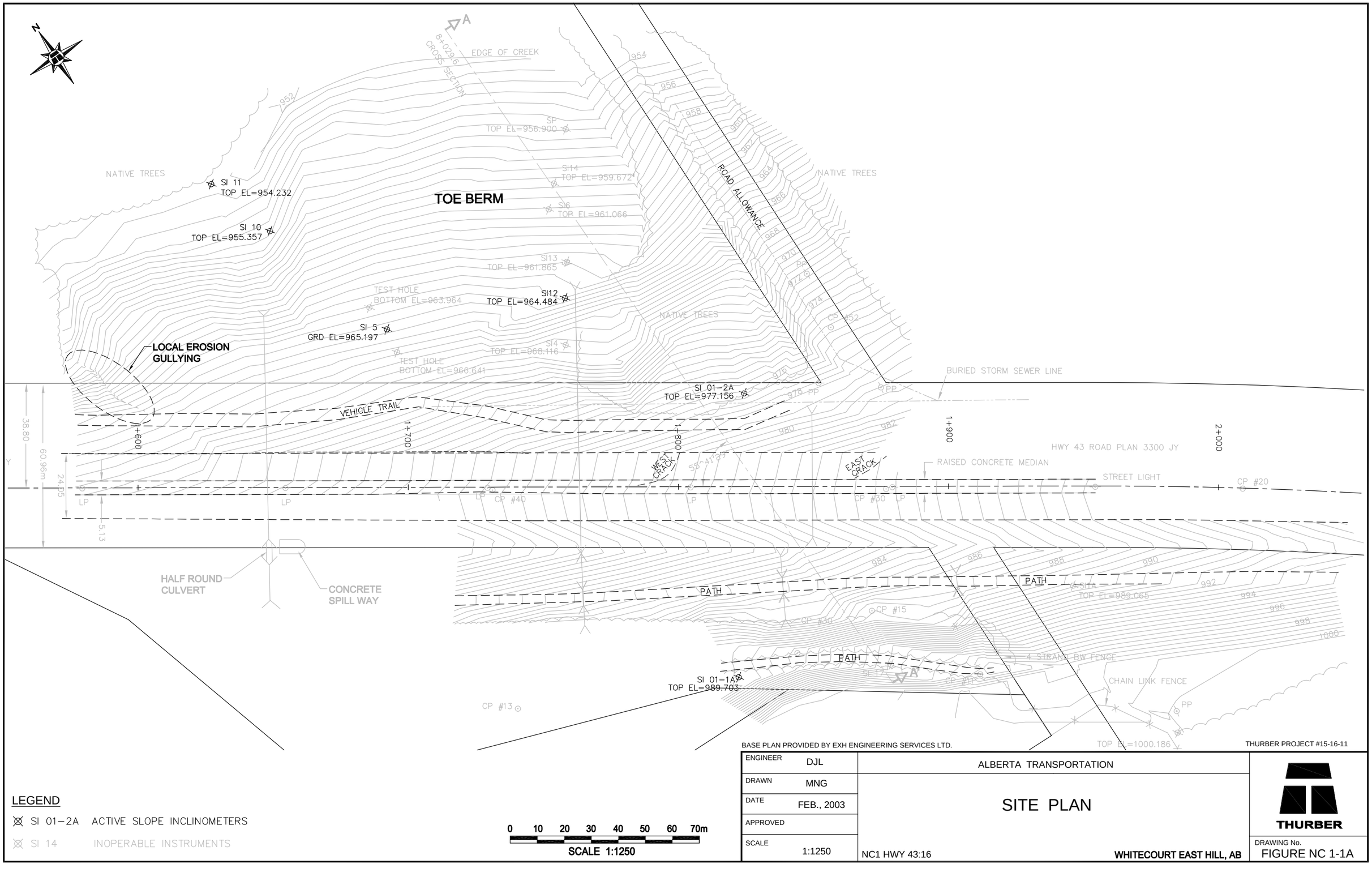
Yours very truly,
Thurber Engineering Ltd.
D.J. Law, P.Eng.
Review Principal

original signed by:

R.V. Clementino, E.I.T.
Project Engineer

Attachments

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



BASE PLAN PROVIDED BY EXH ENGINEERING SERVICES LTD.

THURBER PROJECT #15-16-11

LEGEND

SI 01-2A ACTIVE SLOPE INCLINOMETERS

SI 14 INOPERABLE INSTRUMENTS

0 10 20 30 40 50 60 70m

SCALE 1:1250

ENGINEER	DJL
DRAWN	MNG
DATE	FEB., 2003
APPROVED	
SCALE	1:1250

ALBERTA TRANSPORTATION

SITE PLAN

NC1 HWY 43:16

WHITECOURT EAST HILL, AB

THURBER

DRAWING No.

FIGURE NC 1-1A

SI01-2A (LOCATION APPROX.)

GRAVEL ACCESS ROAD

WEST CRACKS

EAST CRACKS

GUARDRAIL

EDGE OF PAVEMENT

WESTBOUND

PREVIOUS SLIGHT DEPRESSION (2000)

①

LIGHT STANDARD
(1+804)

ASPHALT MEDIAN

CONCRETE CURB

LIGHT STANDARD

EASTBOUND

EDGE OF PAVEMENT

1+780 1+800 1+820 1+840 1+860 1+880

LEGEND

① 3-5mm DIFFERENTIAL DOWN TO THE NORTH (SAME AS NOTED IN 2001)

⊕ SLOPE INCLINOMETER

NEW CRACKS IN 2002

LOCATIONS OF FEATURES ARE APPROXIMATE
WIDTH OF ROADWAY EXAGGERATED
SCALE 1:500 ALONG ROADWAY ALIGNMENT

THURBER PROJECT #15-76-11A

ENGINEER	DJL	ALBERTA TRANSPORTATION	THURBER
DRAWN	ZD	CRACK PATTERN IN PAVEMENT STATIONS 1+780 TO 1+880	
DATE	FEB., 2003		
APPROVED			
SCALE	AS SHOWN	NORTH CENTRAL LANDSLIDE ASSESSMENT NC1 WHITECOURT EAST HILL	DRAWING No. FIGURE NC1-2