



August 25, 2004

File: 15-16-192

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 16:06 EDSON 25TH STREET (NC20)
2004 ANNUAL INSPECTION REPORT**

Dear Sir:

This letter documents the 2004 annual site inspection of a portion of Highway 16:06 located on the south side of the eastbound lanes of Hwy 16, just west of RR171 (across from 25th Street) at the eastern edge of the Town of Edson. 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) under Contract No. CE046/2004 (Section B).

The site reconnaissance was undertaken on June 2, 2004 by Mr. Don Law, P.Eng. and Mr. Don Proudfoot, P.Eng. of Thurber. The reconnaissance was carried out in the presence of Mr. Roger Skirrow, P.Eng., Mr. Mike Baik, and Mr. Ron Coley (MCI) of AT.

1. BACKGROUND

A description and brief history of the slide area and movements at this site were provided in the 2002 report and are not repeated herein. Previous geotechnical assessment work undertaken at the site includes a preliminary assessment based on a site visit undertaken by Thurber in August 1999, a geotechnical investigation by Thurber undertaken in November 1999, test trench excavation and recommendations in April, 2000, an AT memorandum dated November 1, 2000, and an emergency call out conducted in August of 2001. This work is documented in correspondence and reports dated September 8, 1999, March 3, 2000, April 17, 2000, and August 17, 2001, respectively. Copies of these items were attached to the previously 2002 landslide assessment report for inclusion in Section G of the site binder.

The highway embankment at this location is approximately 6 m high, at a side slope angle of about 3H:1V. The embankment was constructed of silty sand material overlying native soft lacustrine clay at a depth of about 5 m.

Slide movement has been occurring since 1995. Some remedial measures were undertaken since that time, including screw anchors, slot gravel drains and a small toe berm consisting of boulders with some gravel. A pit run gravel fill bench approximately 150 m long, 6 m wide and from 0.75 to 1.7 m in height was placed in February of 2003 by AT Edson maintenance personnel to attempt to stabilize the slide, however, these measures were not sufficient to stop slope movements which have been more noticeable after heavy rain events.

Since the last site visit in June 2003, a larger toe berm has been constructed at the site by the Maintenance Contractor (LaPrairie Group). The work was supervised by AT personnel (Mr. Cliff Corner and Mr. Ron Coley). Based on information provided by Mr. Coley, the toe berm construction consisted of the following items, which are also shown in plan and cross section on Figures NC20-1 and NC20-2A in Appendix F:

- ?? Two lengths of subdrain (200 mm dia. perforated CSP with filter sock) were placed in the pit run toe berm located near the toe of the original slope at a depth of about 1.2 m. The subdrain pipes extend over much of the length of the pit run toe berm to outlet points located as shown on the site plan (Figure NC20-1).
- ?? Geotextile and pit run were placed over peat and stumps to a height of approximately 1 m over original ground surface. No stripping was undertaken. The pit run was sourced from Dandurand Pit (25 km haul).
- ?? Clay fill was placed on top of the pit run base, and the boulders existing on the site were relocated on front face of the berm (western portion only).

It is understood that this work was completed in late fall of 2003, and it is understood from Mr. Coley that the cost of the work was about \$55,000.

2. SITE OBSERVATIONS

The highway surface and side slope in the vicinity of the pavement distress were inspected on June 2, 2004. In addition, at the request of Mr. Terry Carter and Mr. Ron Coley, an area of soft ground west of the berm was also inspected, where ruts were created when walking a tracked hoe to the toe berm area during the 2003 construction.

The following points summarize the observations made during the reconnaissance. The locations of the site features are shown on Figure NC20-1 in

Section F. Selected photographs taken during the site reconnaissance are also included in Section F.

SLIDE AREA

- ?? Cracking was noted in the asphalt pavement over a length of about 30 m, impacting the shoulder and turning lane at this location. The cracking did not extend into the traveling lanes. The cracking continues west along the edge of the pavement for an additional 50 m. The crack within the pavement is coincident with the slide scarp observed during previous site visits and does not appear to have been active recently. However, unlike previous site visits, there was no evidence of the crack extension on the side slope during the June 2004 reconnaissance. The crack seal is still in place on the east end of the crack, however 10 mm of vertical displacement across the crack was noted in the central portion of the crack length (within the pavement section) in spite of milling operations in the area. Where the crack extends along the edge of pavement it is still open in places up to about 15 mm width. Overall the cracking pattern within the pavement surface is similar to that observed during the June 2003 site visit.
- ?? No signs of slope movement were noted on the side slope, new toe berm, or in the area beyond (i.e. south of) the current toe of the slope. Vegetation cover on the berm area consisted of very sparse grasses. No significant erosion was noted on the berm surface.
- ?? A trickle of flow was noted from the west subdrain outlet at the time of the site visit. The east subdrain outlet was dry.

RUTTED SOFT GROUND WEST OF SLIDE AREA

The area of rutted soft ground is located approximately 75 m west of the west end of the toe berm. The ruts extend over a length of about 55 m and are located in the right of way to the north of the existing fence line. There is some pooling of water within the ruts and in the nearby bush area located within the adjacent landowner's property. In addition, there are some trees that are leaning and a few that have blown down in this area.

Based on inspection of the ruts, the near surface soil conditions consist of grass cover over saturated clayey silt. No peat was observed in the rutted zone, however muskeg was noted within the treed area immediately adjacent to (i.e. south of) the rutted zone.

The embankment side slope is approximately 5.3 m high at this location, and is sloped at an angle of about 17° to the horizontal. No signs of slope instability were noted in the embankment or toe area at this location.

3. EVALUATION AND RECOMMENDATIONS

The slope instability previously observed at this site appears to have been slowed significantly as a result of the placement of the new toe berm. The granular fill and subdrain pipe installed in 2003 will allow water to drain from the slope, which should further augment the stability of the embankment in this area by reducing the likelihood of impeding drainage from the slope. Some additional minor movement may still be experienced in the future until the slope "settles in" completely over the next year or so. It is recommended to continue monitoring the pavement cracks and slope on annual basis to check for signs of slope instability. Since no erosion was noted at the time of the site visit, soil cover is not recommended at this time; the vegetation cover will likely develop on its own with time. However, if erosion becomes a problem in the future, silt fencing should be installed at the toe of the slope and the disturbed area should be revegetated as soon as practical. Vegetation may be encouraged at this location by hydroseeding or topsoil/seed placement, and should be undertaken if there is such an operation required for other work in the area.

The rutted zone located west of the site is located adjacent to an area of natural shallow muskeg terrain, which is normally wet and soft. Similar deposits are located elsewhere in the Edson region and are often associated with a high water table or ponded water at surface. The trees in such areas typically have shallow root penetration and hence are prone to blow-over. As stated previously, no signs of embankment slope instability were noted in this area. Based on these observations, the wet and soft muskeg conditions (including ponded water) and fallen trees within the bush areas adjacent to the rutted zone are expected to be a natural condition and are not related to slope instability or the formation of the ruts in the right of way. It is recommended to backfill the ruts with granular fill, smooth out the area and topsoil/seed to promote revegetation.

4. RISK LEVEL

A risk level of 10 is considered applicable to the site, based on a Probability Factor of 5 (active but very slow rate of movement) and a Consequence Factor of 2. This is a reduction from a risk level of 18 applied for this site during the previous (2003) site reconnaissance.

5. CLOSURE

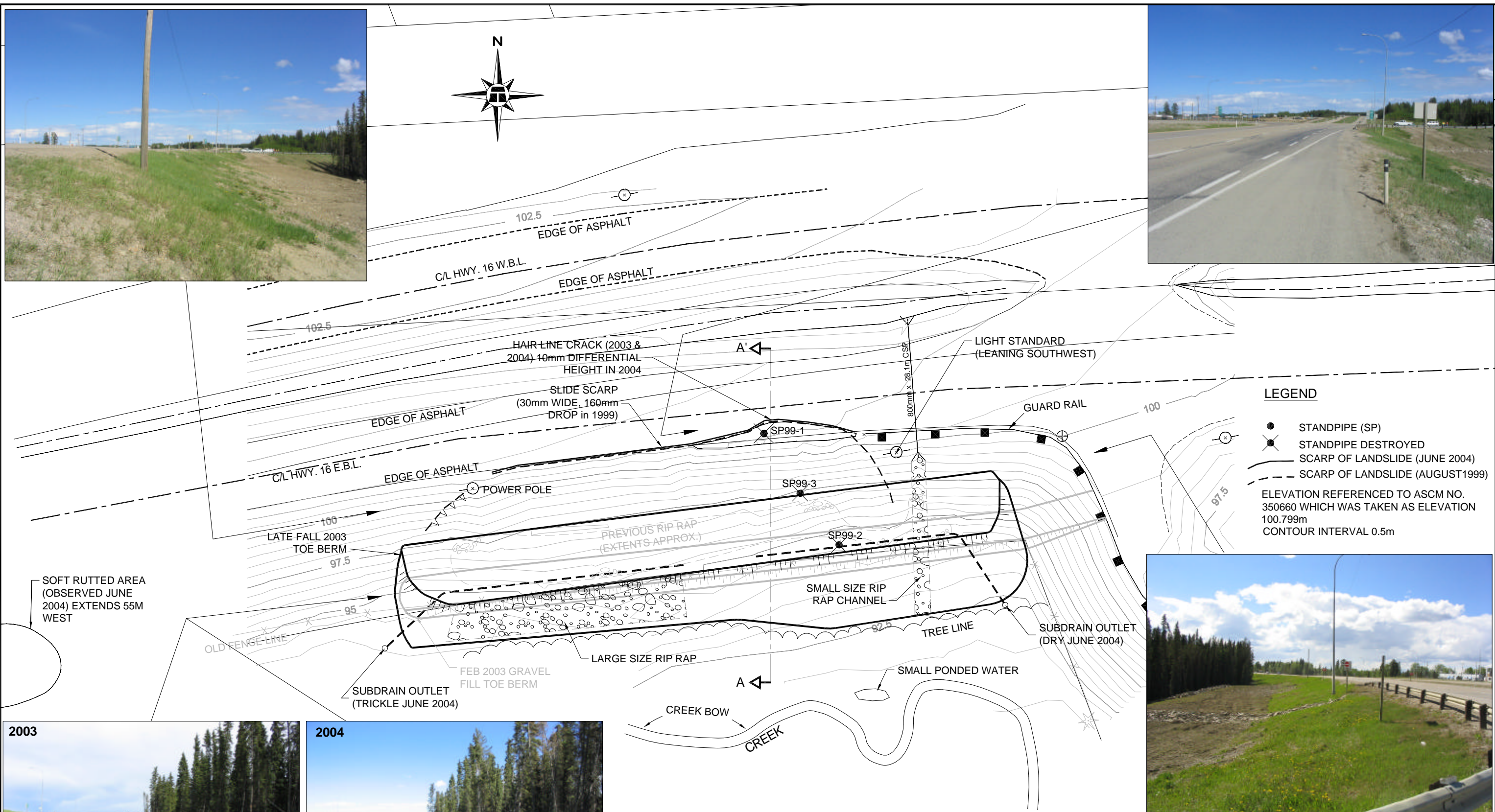
We trust this assessment meets with your needs at this time. Please contact the undersigned should questions or concerns arise.

Yours very truly,
Thurber Engineering Ltd.
Dimitri Papanicolas, P.Eng.
Review Principal

Don Law, P.Eng.
Project Engineer
slp

Attachments

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



- LEGEND**
- STANDPIPE (SP)
 - ⊗ STANDPIPE DESTROYED
 - SCARP OF LANDSLIDE (JUNE 2004)
 - - - SCARP OF LANDSLIDE (AUGUST 1999)
- ELEVATION REFERENCED TO ASCM NO. 350660 WHICH WAS TAKEN AS ELEVATION 100.799m
CONTOUR INTERVAL 0.5m

SOFT RUTTED AREA (OBSERVED JUNE 2004) EXTENDS 55M WEST

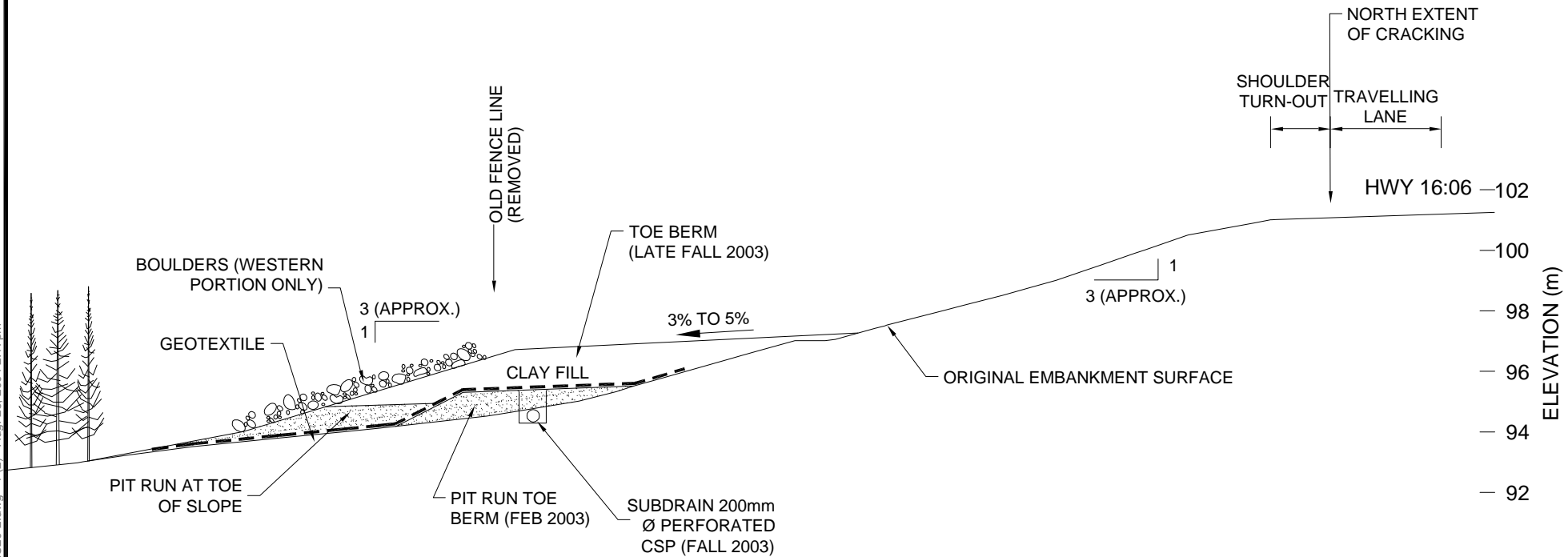


REF: EXH ENG. SERVICES LTD. DWG. NO. 991168-SITE, 11/99		ALBERTA TRANSPORTATION		<p>THURBER</p> <p>DRAWING No. FIGURE NC20-1</p>
ENGINEER	DJL	<p>SITE PLAN SHOWING INSTABILITY FEATURES</p> <p>HWY 16:06 AT 25 STREET</p> <p>EDSON, AB</p>		
DRAWN	ZD			
DATE	JUNE, 2004			
APPROVED				
SCALE	1:750			

G:\ACAD\FILE\15\15-16-192-2004-NORTH CENTRAL REGION\NC20 Edson 25th Street\NC20-1.dwg - NC20-1 (2) - Aug. 26, 2004 2:19pm

THURBER PROJECT #15-16-192

G:\ACAD\FILE\15-16-192-2004-NORTH CENTRAL REGION\NC20 Edson 25th Street\NC20-2.dwg - 1 (2) - Aug. 26, 2004 2:17pm



THURBER PROJECT #15-16-192

ENGINEER	DJL
DRAWN	ZD
DATE	JUNE 2004
APPROVED	
SCALE	1:200 (APPROX.)

ALBERTA TRANSPORTATION

CROSS-SECTION A-A'

HWY 16:06 AT 25 STREET (NC20)

THURBER

DRAWING No.
FIGURE NC20-2A

EDSON, AB



PHOTO 1 AREA OF CRACKS IN PAVEMENT (LOOKING EAST)

PHOTO 2 CRACK OUTLINING PREVIOUS SCARP LOCATION (LOOKING EAST)

**NORTH CENTRAL LANDSLIDE ASSESSMENT
HWY 16:06 AT 25 STREET, EDSON
SELECTED SITE PHOTOGRAPHS**

DATE: JUNE 2, 2004
THURBER PROJECT #15-16-102





PHOTO 3 LOOKING WEST AT UPPER SLOPE AND TOE BERM



PHOTO 4 LOOKING EAST AT UPPER SLOPE AND TOE BERM

**NORTH CENTRAL LANDSLIDE ASSESSMENT
HWY 16:06 AT 25 STREET, EDSON
SELECTED SITE PHOTOGRAPHS**

DATE: JUNE 2, 2004
THURBER PROJECT #15-16-192





PHOTO 5 LOOKING EAST AT LOWER SLOPE AND RIP RAP FACING



PHOTO 6 OUTFLOW FROM WEST SUBDRAIN OUTLET



PHOTO 7 RUTTED ZONE WEST OF SLIDE AREA (LOOKING EAST)



PHOTO 8 PONDED WATER IN RUTS

**NORTH CENTRAL LANDSLIDE ASSESSMENT
HWY 16:06 AT 25 STREET, EDSON
SELECTED SITE PHOTOGRAPHS**

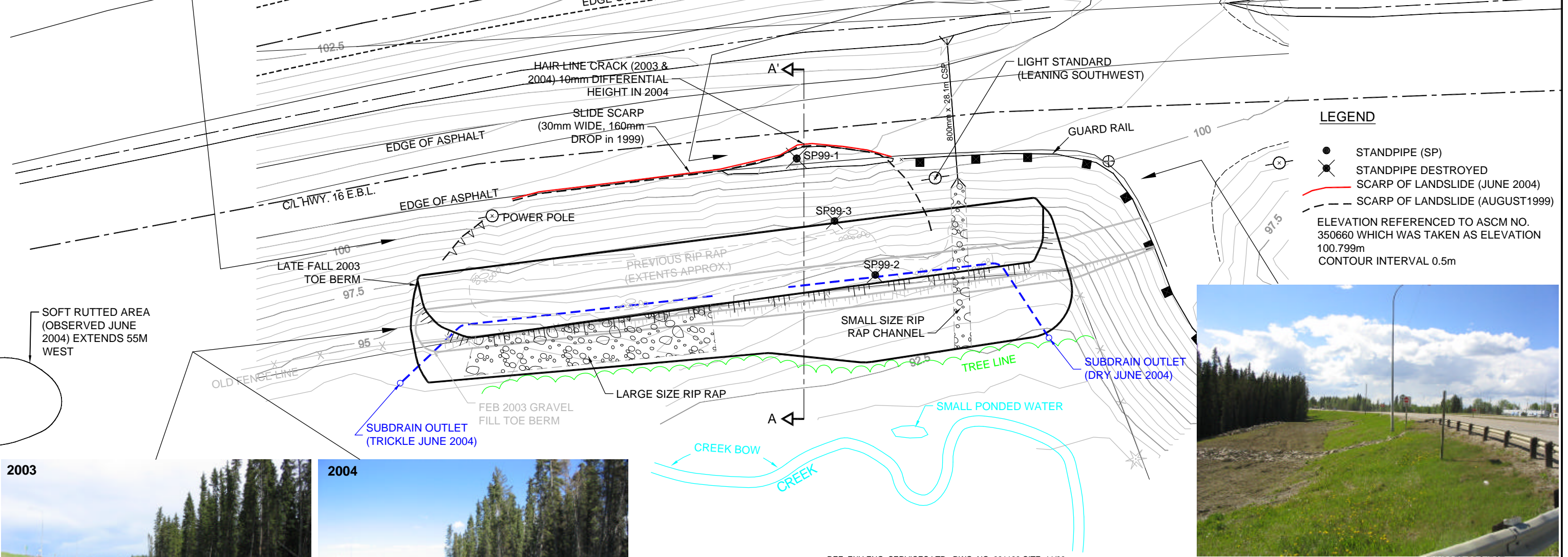
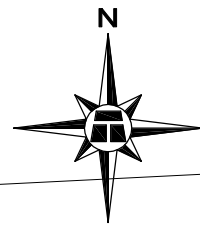
DATE: JUNE 2, 2004

THURBER PROJECT #15-16-192





PHOTO 9 MUSKEG AREA AND WIND BLOWN TREES ADJACENT TO RUTTED ZONE (LOOKING SOUTHEAST)



- LEGEND**
- STANDPIPE (SP)
 - ⊗ STANDPIPE DESTROYED
 - SCARP OF LANDSLIDE (JUNE 2004)
 - - - SCARP OF LANDSLIDE (AUGUST 1999)
- ELEVATION REFERENCED TO ASCM NO. 350660 WHICH WAS TAKEN AS ELEVATION 100.799m
CONTOUR INTERVAL 0.5m

SOFT RUTTED AREA (OBSERVED JUNE 2004) EXTENDS 55M WEST



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REF: EXH ENG. SERVICES LTD. DWG. NO. 991168-SITE, 11/99

THURBER PROJECT #15-16-192

ENGINEER	DJL
DRAWN	ZD
DATE	JUNE, 2004
APPROVED	
SCALE	1:750

ALBERTA TRANSPORTATION

SITE PLAN SHOWING INSTABILITY FEATURES

Km 13.6
HWY 16:06 AT 25 STREET

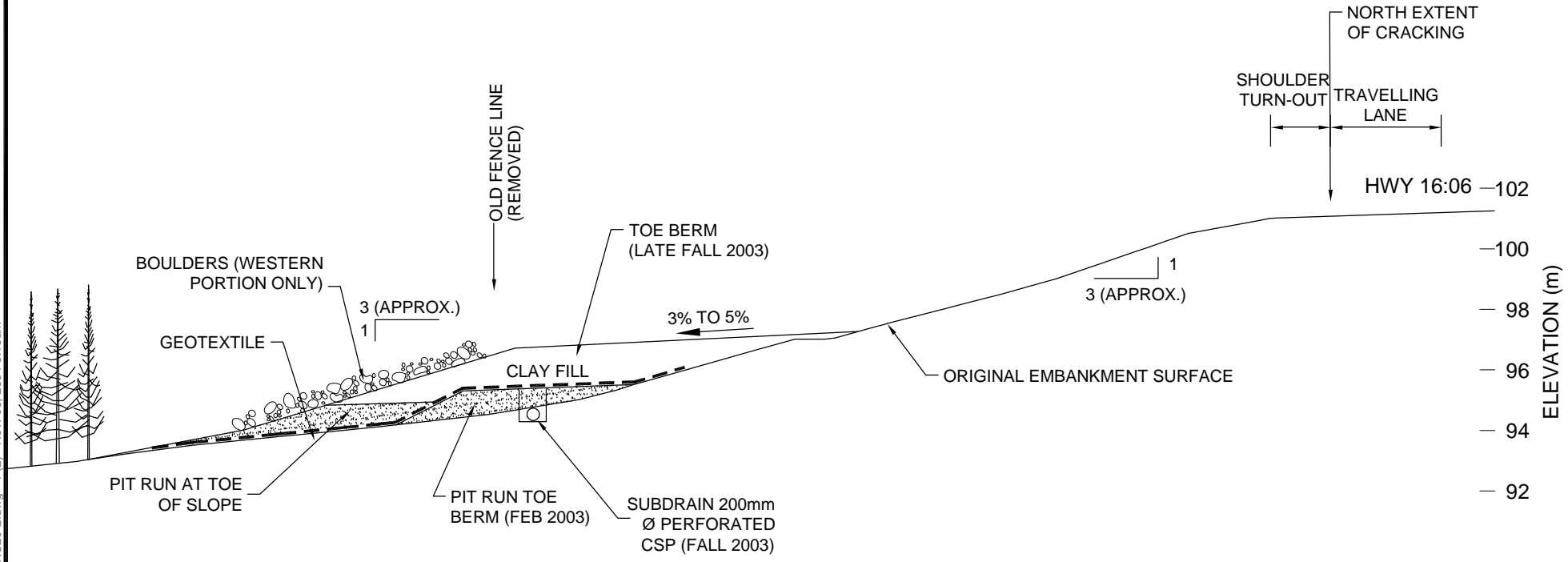
SE 23 - 53 - 17 - W5M
EDSON, AB



THURBER

DRAWING No.
FIGURE NC20-1

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THURBER PROJECT #15-16-192

ENGINEER	DJL
DRAWN	ZD
DATE	JUNE 2004
APPROVED	
SCALE	1:200 (APPROX.)

ALBERTA TRANSPORTATION

CROSS-SECTION A-A'

HWY 16:06 AT 25 STREET (NC20)

EDSON, AB

THURBER

DRAWING No.
FIGURE NC20-2A



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PHOTO 2 CRACK OUTLINING PREVIOUS SCARP LOCATION (LOOKING EAST)

**NORTH CENTRAL LANDSLIDE ASSESSMENT
HWY 16:06 AT 25 STREET, EDSON (NC20)
SELECTED SITE PHOTOGRAPHS**

DATE: JUNE 2, 2004
THURBER PROJECT #15-16-102





PHOTO 3 LOOKING WEST AT UPPER SLOPE AND TOE BERM



PHOTO 4 LOOKING EAST AT UPPER SLOPE AND TOE BERM

**NORTH CENTRAL LANDSLIDE ASSESSMENT
HWY 16:06 AT 25 STREET, EDSON (NC20)
SELECTED SITE PHOTOGRAPHS**

DATE: JUNE 2, 2004
THURBER PROJECT #15-16-192





PHOTO 5 LOOKING EAST AT LOWER SLOPE AND RIP RAP FACING



PHOTO 6 OUTFLOW FROM WEST SUBDRAIN OUTLET



PHOTO 7 RUTTED ZONE WEST OF SLIDE AREA (LOOKING EAST)



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**NORTH CENTRAL LANDSLIDE ASSESSMENT
HWY 16:06 AT 25 STREET, EDSON (NC20)
SELECTED SITE PHOTOGRAPHS**

DATE: JUNE 2, 2004

THURBER PROJECT #15-16-102





PHOTO 9 MUSKEG AREA AND WIND BLOWN TREES ADJACENT TO RUTTED ZONE (LOOKING SOUTHEAST)