



August 23, 2011

File: 15-16-262

Alberta Transportation
Room 301, Provincial Building
9621 - 96 Avenue
Peace River, Alberta
T8S 1T4

Attention: Mr. Ed Szmata

**PEACE REGION (PEACE RIVER/HIGH LEVEL) GEOHAZARD ASSESSMENT
HWY 986:01 (PH 41), DAISHOWA SITE 5 – STATION 12+000
2011 ANNUAL INSPECTION REPORT**

This letter documents the 2011 annual site inspection of an area of slope instability located along Hwy 986:01, on the east side of the Peace River, north of the Town of Peace River, Alberta (Figure PH41-1). Thurber Engineering Ltd. (Thurber) undertook this inspection in partial fulfillment of our Geotechnical Services for Geohazard Assessment, Instrumentation Monitoring and Related Work contract (CE105/2008) with Alberta Transportation (TRANS).

Mr. R. Saunders, P.Eng. of Thurber undertook the inspection on May 25, 2011 in the company of Mr. Neil Kjelland, P.Eng. and Mr. Ed Szmata of TRANS and Mr. Don Proudfoot, P.Eng. of Thurber.

1. BACKGROUND

Thurber's last annual site inspection was in May 2010 and the site conditions at that time are described in our Part B assessment letter in the PH41 site binder. Additional information of the site is provided in the Geotechnical File Review in Section A of the PH41 binder.

Previously, this site was included in PH 7, which encompassed a 2 km length of this highway extending from the Peace River Bridge to the top of the east valley slope. However, the area has now been subdivided into 4 separate areas. This area is the site of an historic landslide where a gabion energy dissipation structure has been installed. It is located at about Station 11+800, where the bridge crossing the Peace River is at Station 11+000.

2. SITE OBSERVATIONS

The site location and observations noted during the 2011 inspection are shown in Figure PH41-1.

In general, conditions within this site are relatively unchanged since the 2010 inspection and are summarized as follows:

- No discernible changes were observed within the fill slope below the roadway since the 2010 site inspection (Photo 41-01).
- The armoured channel between the inlet and outlet structures is becoming vegetated with willows (Photo 41-02).
- The energy dissipation/outlet structure is in good overall condition (Photos 41-03 to 41-06). The steel plate weir at the inlet to this structure noted to be deformed downstream in 2008 was unchanged since 2009 (Photo 41-03). However, numerous gabion baskets have torn panels and need to be repaired (Photo 41-06).
- The erosion along the north bank of the natural channel at the outlet of the large gabion energy dissipation structure is relatively unchanged from 2010. This erosion is partially the result of shifting of large riprap in the discharge area (Photo 41-07) directing flow towards the natural bank (Photo 41-08).

3. ASSESSMENT

The riprap lined channel and gabion energy dissipation structure are performing satisfactorily and are reducing erosion/instability along the toe of the roadway.

Creep movement in slope inclinometer SI-1 is occurring at three depth intervals between 1.2 m and 9.8 m below grade. However, the rates of movement are very slow, being less than 2 mm/yr at each of the three levels. Very small creep was also measured (<1 mm/year) in SI-2 between 14 m and 15 m depth.

4. RISK LEVEL

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

$$PF(9) * CF(2) = 18$$

A Probability Factor of 9 is considered appropriate since slope movements are ongoing, but at a slow rate of movement. A Consequence Factor of 2 is considered appropriate as the embankment is moderately high and, if a failure were to occur, it potentially could extend to the edge of the roadway.

This risk level for this location is unchanged from 2010.

5. RECOMMENDATIONS

5.1 Short Term

In the short term, the riprap at the outlet of the energy dissipation structure should be readjusted so as not to direct flow towards the eroding natural bank just downstream of the discharge area. Alternately, consideration could be given to adding additional riprap to armour this area.

In addition, the effect of the willows growing in the upper portion of the armoured channel should be assessed by a hydraulic engineer. If it is determined that the hydraulic capacity of the channel is being adversely affected by their presence, they should be cut flush to the channel bottom with the roots left in place.

5.2 Long Term

The visual inspection and instrumentation monitoring programs should be continued at this site.

5.3 Investigation

Further investigations at this site are not considered necessary at this time.

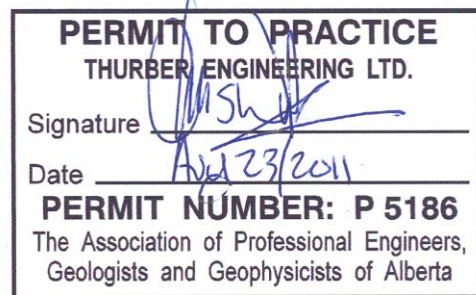
5.4 Maintenance

The gabion baskets within the energy dissipation structure and channel should be inspected every spring following break-up and repairs made as required to ensure the baskets do not open further and lose their integrity. Damaged baskets and torn panels noted since 2010 did not appear to have been repaired last year and should be undertaken as soon as possible.

6. CLOSURE

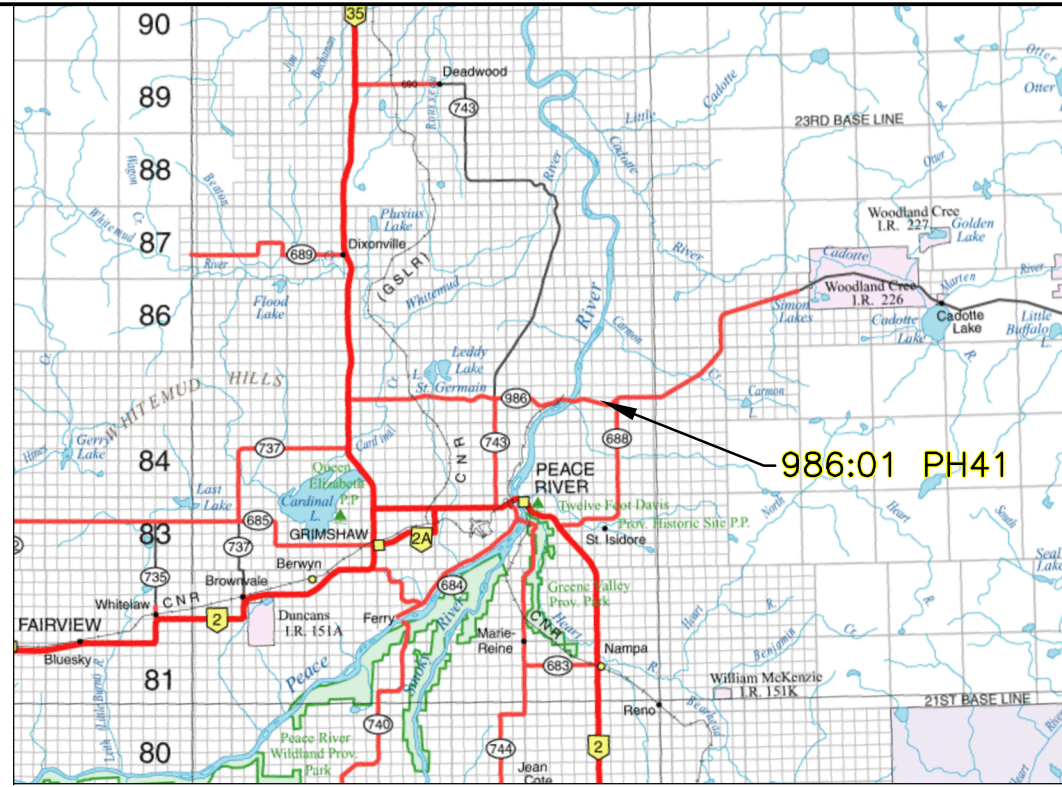
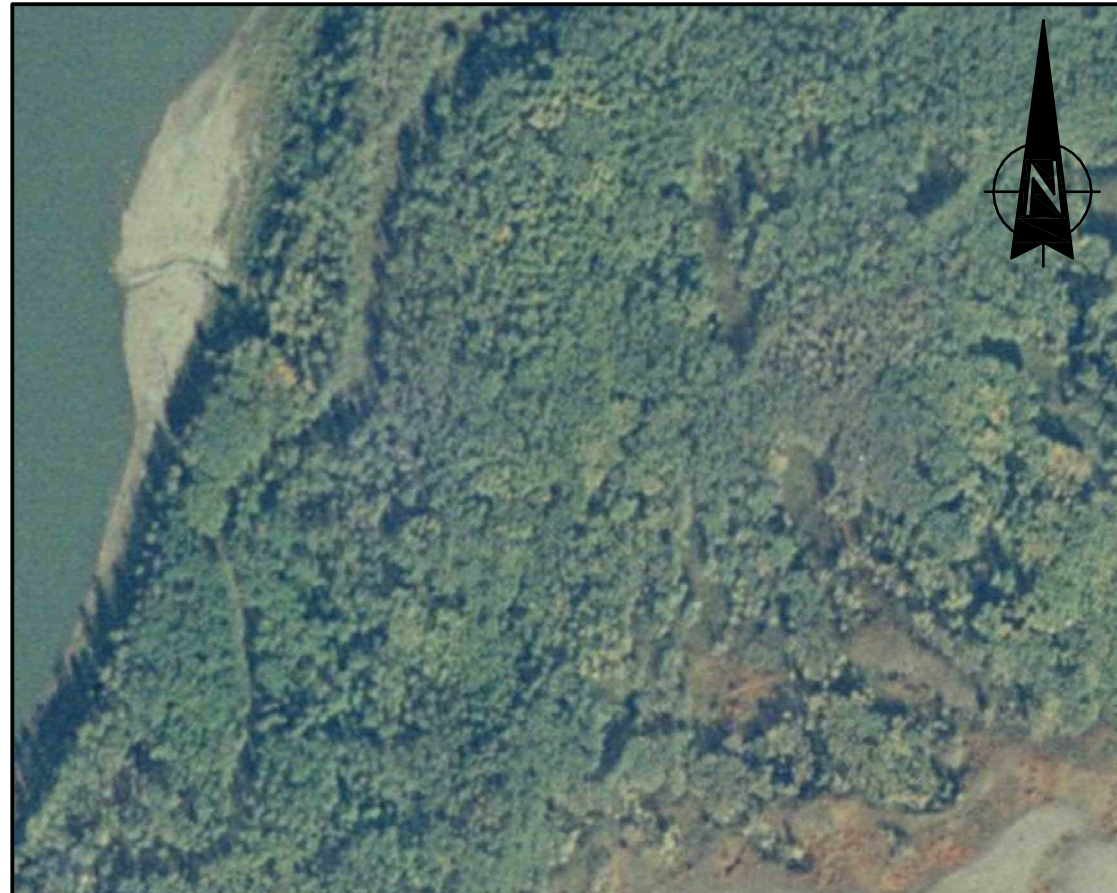
We trust this assessment and recommendations meet with your needs at this time. Please contact the undersigned should questions arise or if conditions at this site worsen.

Yours truly,
Thurber Engineering Ltd.
Chris Workman, M.Eng., P.Eng.
Review Principal



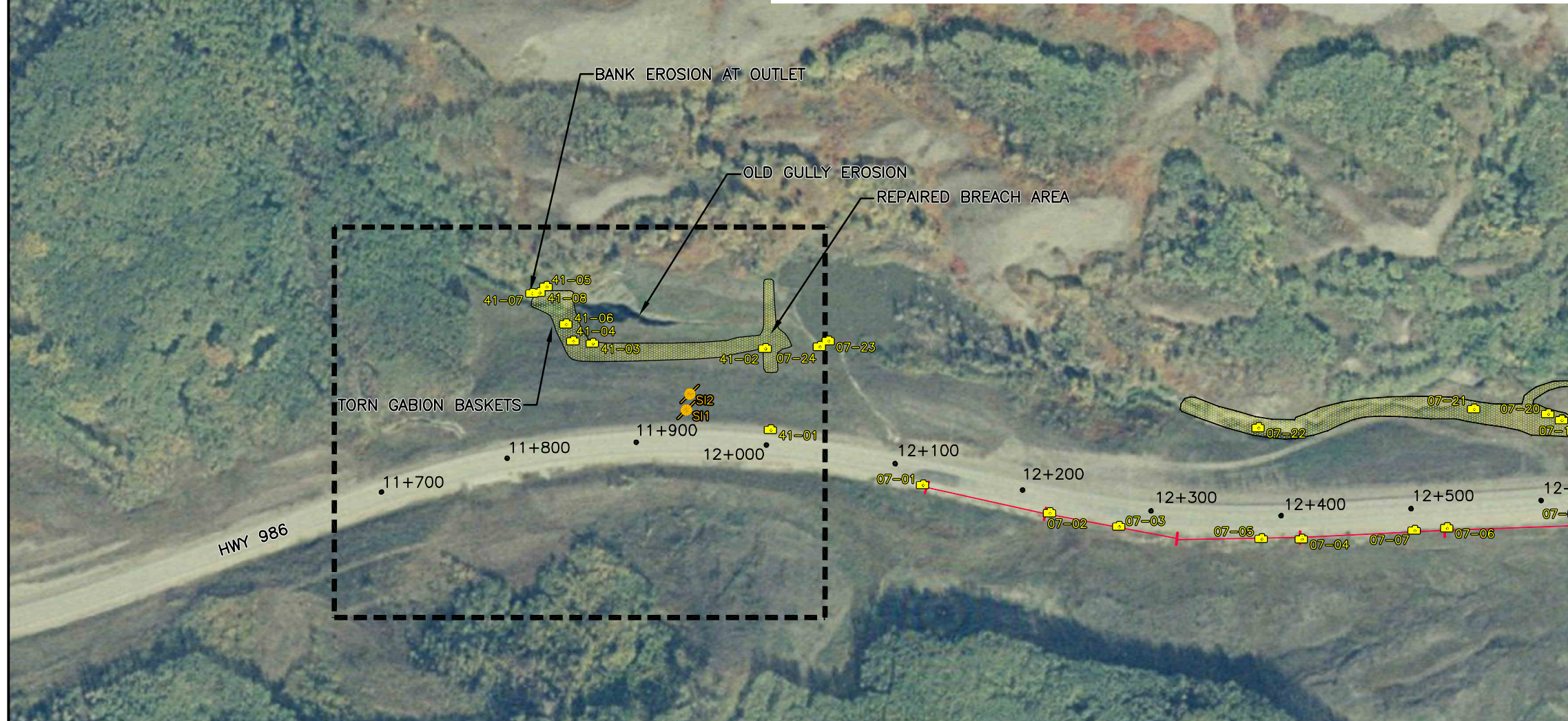
Robert Saunders, M.Eng., P.Eng
Senior Geotechnical Engineer

Attachments

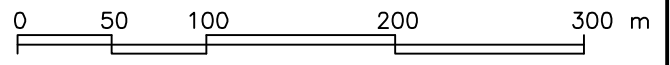


KEY MAP
SCALE 1:1 000 000

- LEGEND:
- HORIZONTAL CHAINAGE (11+000 DAISHOWA BRIDGE) ● 12+100
 - PHOTOGRAPH LOCATION 📷 41-01
 - SLOPE INCLINOMETER
 - NO MOVEMENT ● SI 64
 - CREEP 📏 SI 82
 - MEASURABLE MOVEMENT 📏 SI 82
 - PIEZOMETER ▲ PN 004
 - PH41 BOUNDARY - - - - -
 - ARMOURED CHANNEL 🟡



- NOTES:
- 1 AIRPHOTO BASE FROM TARIN RESOURCE SERVICES LIMITED (1 m/PIXEL) 1999.
 - 2 FEATURES/PHOTOGRAPH LOCATIONS SHOWN APPROXIMATE ONLY.
 - 3 DRAWINGS MUST BE USED IN CONJUNCTION WITH ATTACHED REPORT AND ARE SUBJECT TO THE STATEMENT OF GENERAL CONDITIONS.



DRAWN BY	ICB	DESIGNED BY	RJS	APPROVED BY	WCW
SCALE	1:4000	DATE	JULY 27, 2011	FILE No.	15-16-262-A3C

Government of Alberta
Transportation

PEACE REGION (PEACE RIVER/HIGH LEVEL)

**DAISHOWA
HWY 986:01 (PH41)
LOCATION PLAN**

FIGURE PH41-1





Photo 41-01

May 2011

Looking downslope at slope below roadway. Inlet to armoured channel in the distance.



Photo 41-02

May 2011

Looking west down armoured channel just below inlet. Note the willows and brush growing along edges of channel.



Photo 41-03

May 2011

Looking at steel weir at top of gabion energy dissipation structure. Steel plate noticeably deformed (bowed) downstream but similar to previous years.



Photo 41-04

May 2011

Looking upstream at upper portion of gabion energy dissipation structure.



Photo 41-05

May 2011

Looking upstream at lower portion of gabion energy dissipation structure.



Photo 41-06

May 2011

Close-up of one of several damaged gabion baskets.



Photo 41-07

May 2011

Looking upstream at old gully erosion (distance) that no longer receives flow since construction of new channel and energy dissipation structure.



Photo 41-08

May 2011

Looking downstream at bank erosion of native channel immediately downstream of armoured section.