



**THURBER ENGINEERING LTD.**

GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

December 11, 2006

File: 15-85-38

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

Attention: Mr. Ed Szmata

**PEACE REGION (SWAN HILLS AREA) GEOHAZARD ASSESSMENT  
HWY 2A:54 (SH 17, SITES #1 & #1A, WEST OF GUNN'S CREEK)  
2006 ANNUAL INSPECTION REPORT**

Dear Sir:

This letter documents the 2006 annual site inspection of areas of erosion located along Hwy 2A:54 on both sides of the highway about 8.5 km east of Hwy 49 just west of Gunn's Creek, west of High Prairie, Alberta. Thurber Engineering Ltd. (Thurber) undertook this inspection in partial fulfillment of our Geotechnical Services for Geohazard Assessment, Instrumentation Monitoring and Related Work contract (CE047/2004) with Alberta Infrastructure and Transportation (AIT).

Mr. Barry Meays, P.Eng and Mr. Gurpreet Bala, M.Sc. of Thurber undertook the inspection on May 25, 2006 in the presence of Mr. Roger Skirrow, P. Eng. and Mr. Ed Szmata of AIT.

## **1. BACKGROUND**

The previous assessments covered two areas of erosion located about 400 m west of the former Gunn's Creek Slide area. The erosion for Site #1 was located at the base of the south facing sideslope of a 4 m high embankment fill, at the outlet of a 1200 mm diameter centerline culvert. High spring runoff flows in 2003 had created a scour hole and eroded a channel downstream of the culvert.

Site #1A was located in the ditch on the north side of the highway, directly opposite Site #1. It is understood that an abandoned 600 mm diameter culvert was covered with geotextile and buried below the north ditch in 1996. During the heavy spring runoff period in 2003 the ditch bottom was subject to erosion partially

exposing the abandoned culvert. The inlet of the 1200 mm diameter culvert on the north side of the highway at Site #1A was badly rusted and perforated.

A call-out was required on April 21, 2005, due to the continued degradation of Site #1 on the south side of the highway. Observations at that time indicated that piping beneath the base of the culvert may have occurred and contributed to debased conditions, due to water bubbling up inside the pipe just past the inlet and to the upward tilted detached culvert outlet. The backscarp above the detached culvert at that time was almost vertical with the top edge the scarp measured to be only 3.5 m from the edge of the pavement, and embankment stability on the south side of the highway was threatened. This call-out report was dated May 24, 2005 and is included in the Site Binder.

The erosion sites were repaired under Contract No. 7172/05 and Job No. Y967S from January 21 to February 11, 2006. However the seeding and grouting of the culvert liner was undertaken in May 2006. The work at Site 1A involved the removal of the damaged section of existing 600 mm CSP, installing the new 500 mm CSP and its extension, and construction of a surface swale. At Site 1, the work involved excavation of the upper part of the slide, installing a SWSP culvert liner and its extension, grouting of the liner, rebuilding of the upper slope with compacted clay/gravel fill, construction of a surface swale, placement of riprap armour at the culvert inlet and outlet, and top-soiling and seeding the finished slope and disturbed areas. A copy of the construction drawings is attached for inclusion in Section G of the binder.

## **2. SITE OBSERVATIONS**

The reconstructed slope and erosion control work undertaken at both Sites #1 and #1A are shown on the attached as built site sketch plan and cross-sections which was recently surveyed by EXH Engineering Services Ltd. as part of the construction repair work. Selected photographs taken during the visit are also attached.

During the visit, the final inspection for the construction work was conducted. The reconstructed slope was performing to satisfaction. The grouting of the culvert liner was done a couple of weeks prior to this visit. The grouting pipes were sticking out of the ground and had not been trimmed. The silt fences were sitting loose at couple of spots and were torn at other spots. The grass was sprouting through the spread topsoil. The site had been reseeded prior to the visit but the amount of seed visible at the ground surface was scarce. Harrowing was not apparent at the site. The backfilled soil at the spots of the removed guardrails had settled and left voids at the locations. A memo was forwarded to the Contractor to rectify these deficiencies before the final completion certificate would be issued.

Slight seepage was observed to be coming out of the beaver dam on the north side of the highway. There was trace amount of flow from the sub-drain installed at Site 1A. The drainage bowl at the culvert outlet had ponded water and was performing as anticipated. No significant flow was however observed along the swale.

### **3. ASSESSMENT**

The reconstructed slope and erosion repairs appeared to be working satisfactorily where the riprap has been placed to check erosion.

### **4. RISK LEVEL**

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

$$PF(1) * CF(3) = 3 \text{ (Was } 13 \times 3 = 39 \text{ last year prior to repairs)}$$

A Probability Factor of 1 is considered appropriate since the slide is inactive with a low probability of remobilization. A Consequence Factor of 3 is still considered appropriate since the embankment fill is fairly high and at a culvert crossing but the repaired failure is currently not affecting the pavement and the risk of total closure of both highway lanes is relatively small.

### **5. RECOMMENDATIONS**

Since repairs have been only recently carried out it is recommended that periodic visual inspections of the site be carried out by AIT's Maintenance Contract Inspector to gauge how well they are working and to quickly identify if any further maintenance items arise.



## 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 slide condition worsens.

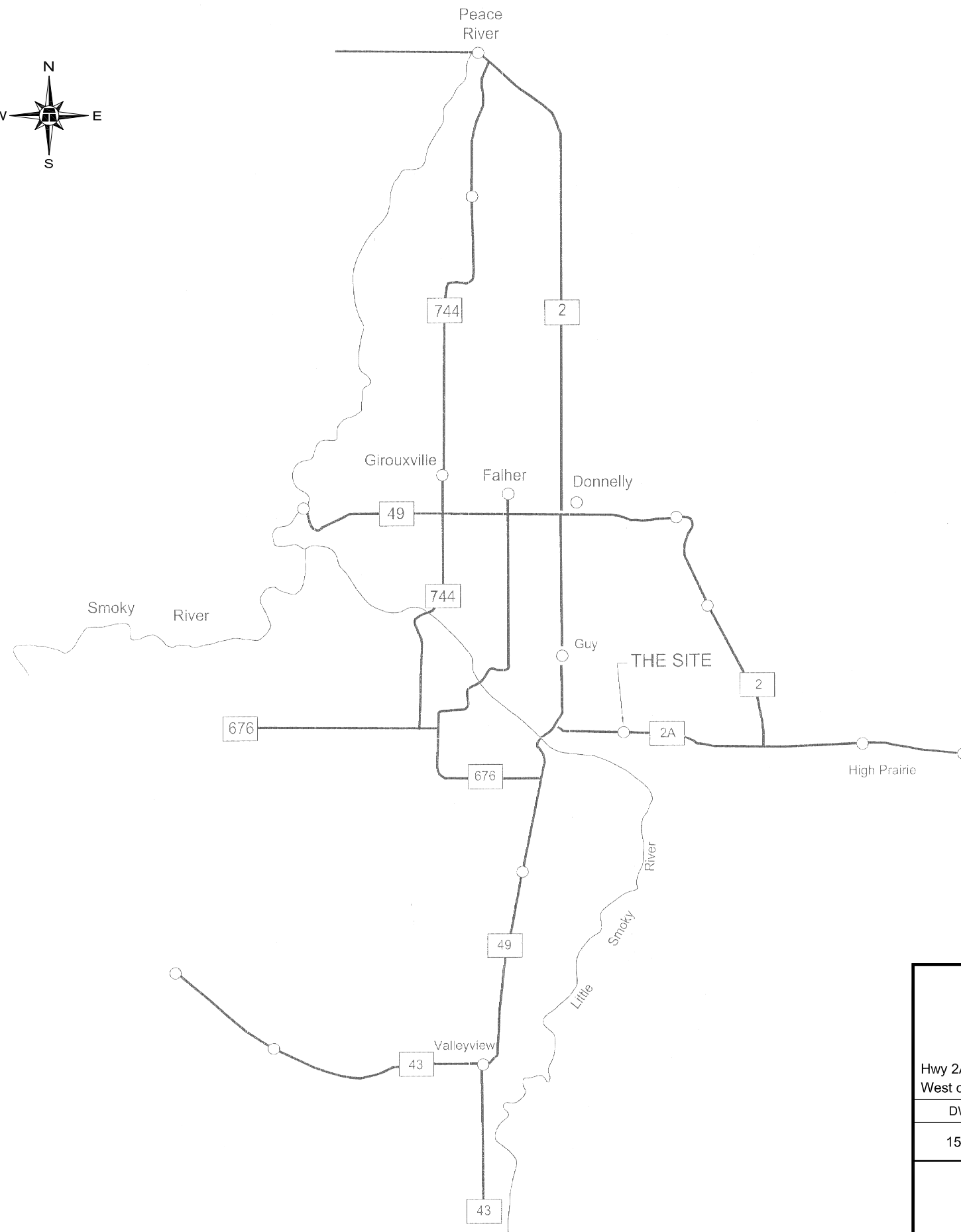
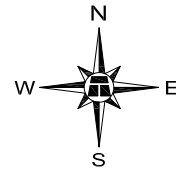
Yours very truly,  
Thurber Engineering Ltd.  
Don Proudfoot, P.Eng.  
Review Principal

Barry Meays, P.Eng.  
Project Engineer

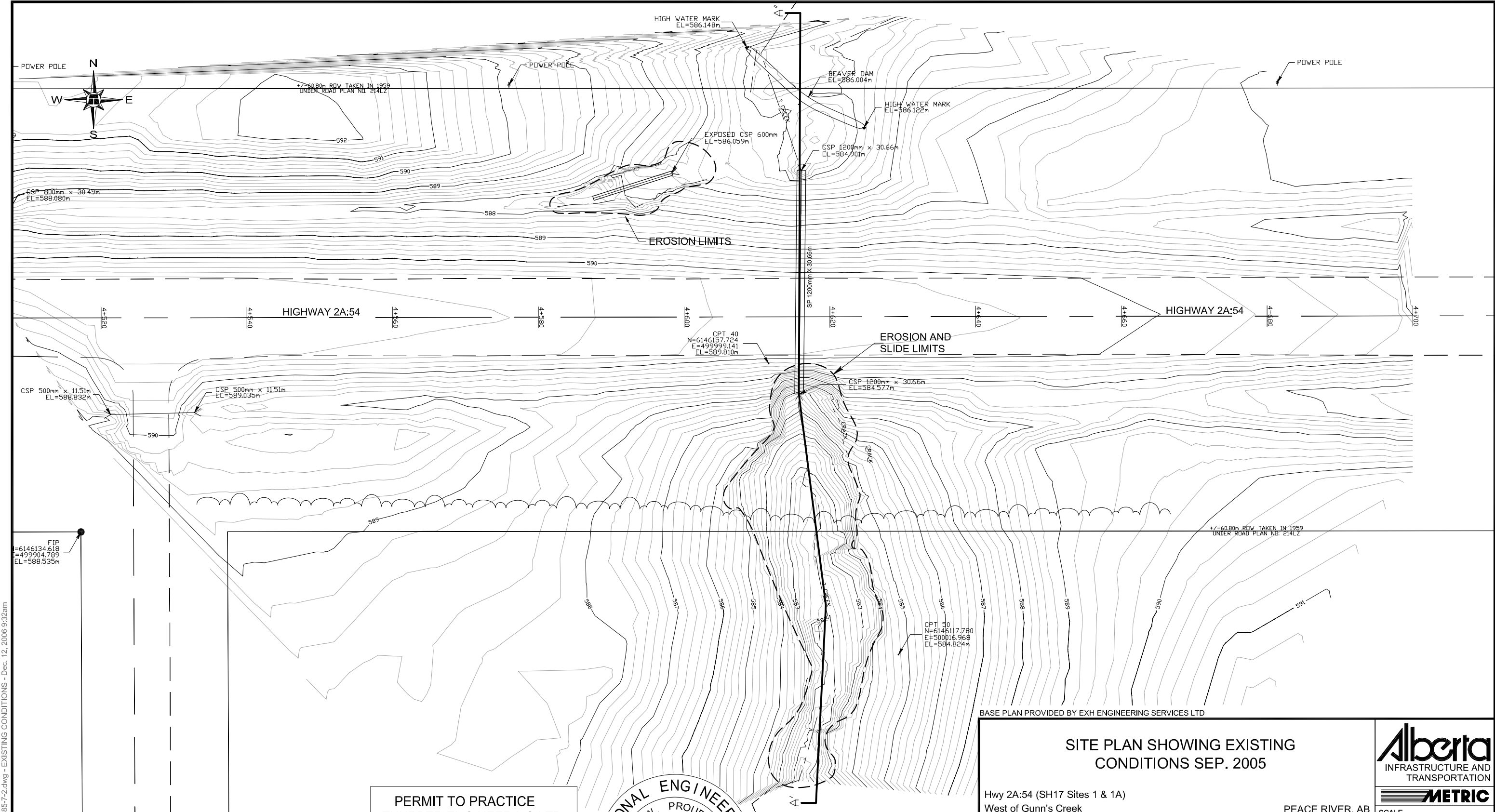
Gurpreet Bala, M.Sc.  
Project Coordinator  
/dw

### Attachments

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



<b>SITE LOCATION PLAN</b>			 <b>METRIC</b>
Hwy 2A:54 (SH17 Sites 1 & 1A) West of Gunn's Creek			
8.5 km EAST OF HWY 49			SCALE
DWG. NO.	SHEET	DISTRICT	CONTRACT NO.
15-85-7-1C	1 OF 8	PEACE REGION	7172/05
			N.T.S.
<b>THURBER ENGINEERING LTD.</b> GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS			

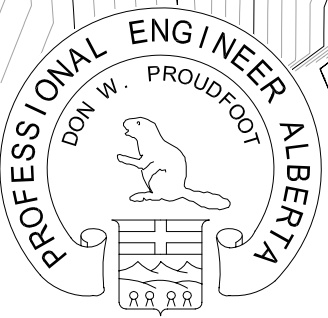


BASE PLAN PROVIDED BY EXH ENGINEERING SERVICES LTD

**LEGEND**

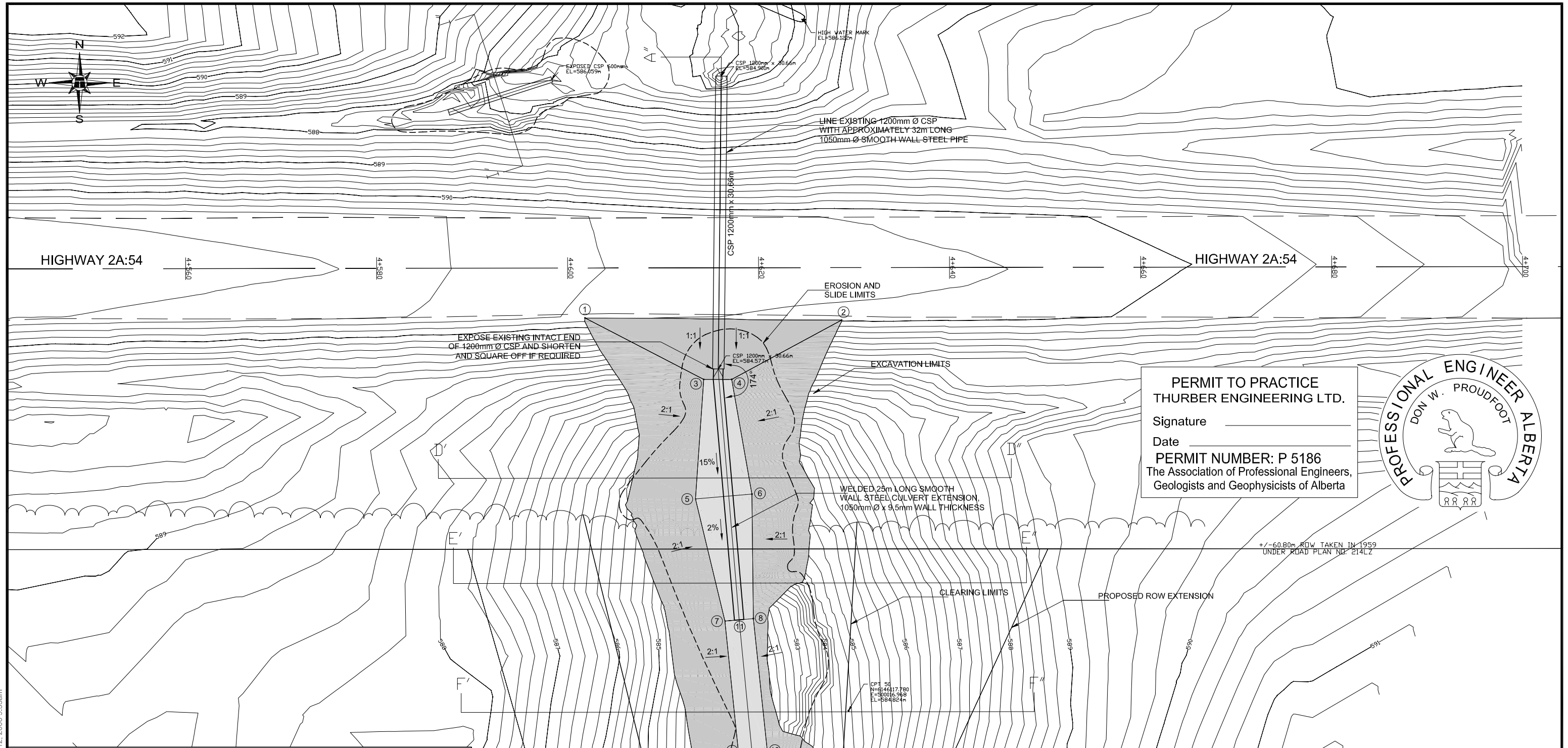
BUSH LINE  
 SLIDE AND EROSION LIMIT

**PERMIT TO PRACTICE**  
**THURBER ENGINEERING LTD.**  
 Signature \_\_\_\_\_  
 Date \_\_\_\_\_  
**PERMIT NUMBER: P 5186**  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

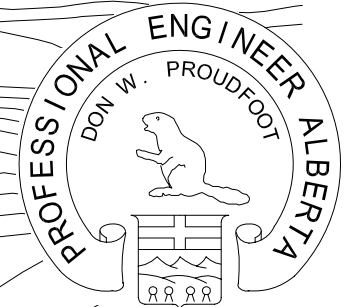


<b>SITE PLAN SHOWING EXISTING CONDITIONS SEP. 2005</b>				 <b>METRIC</b> SCALE 1:500
Hwy 2A:54 (SH17 Sites 1 & 1A) West of Gunn's Creek PEACE RIVER, AB				
DWG. NO.	SHEET	DISTRICT	CONTRACT NO.	
15-85-7-2C	2 OF 8	PEACE REGION	7172/05	
 <b>THURBER ENGINEERING LTD.</b> GEOTECHNICAL • ENVIRONMENTAL • MATERIALS				

Z:\15-85-7\Tender Drawings\15-85-7-2.dwg - EXISTING CONDITIONS - Dec. 12, 2006 9:32am



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 Signature \_\_\_\_\_  
 Date \_\_\_\_\_  
**PERMIT NUMBER: P 5186**  
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DESIGN CONTROL POINTS

	NORTHING	EASTING	ELEV.	COMMENTS
1	6146158.885	499989.359	590.20	TOP OF BACKSLOPE
2	6146158.666	500015.235	590.00	TOP OF BACKSLOPE
3	6146152.457	500001.800	583.80	TOE OF 1:1 SLOPE
4	6146152.457	500004.723	583.80	TOE OF 1:1 SLOPE
5	6146139.944	500000.935	582.00	15% TO 2% SLOPE TRANSITION
6	6146140.457	500006.848	582.00	15% TO 2% SLOPE TRANSITION
7	6146127.160	500004.007	581.75	CULVERT OUTLET
8	6146127.422	500006.995	581.75	CULVERT OUTLET
9	6146112.913	500005.479	581.60	END OF RIPRAP
10	6146112.936	500008.512	581.60	END OF RIPRAP
11	6146127.291	500005.501	582.35	CULVERT OUTLET INVERT

**SITE PLAN SHOWING DESIGN LIMITS FOR SLOPE EXCAVATION AND CULVERT EXTENSION PIPE**

Hwy 2A:54 (SH17 Sites 1 & 1A)  
West of Gunn's Creek

PEACE RIVER, AB

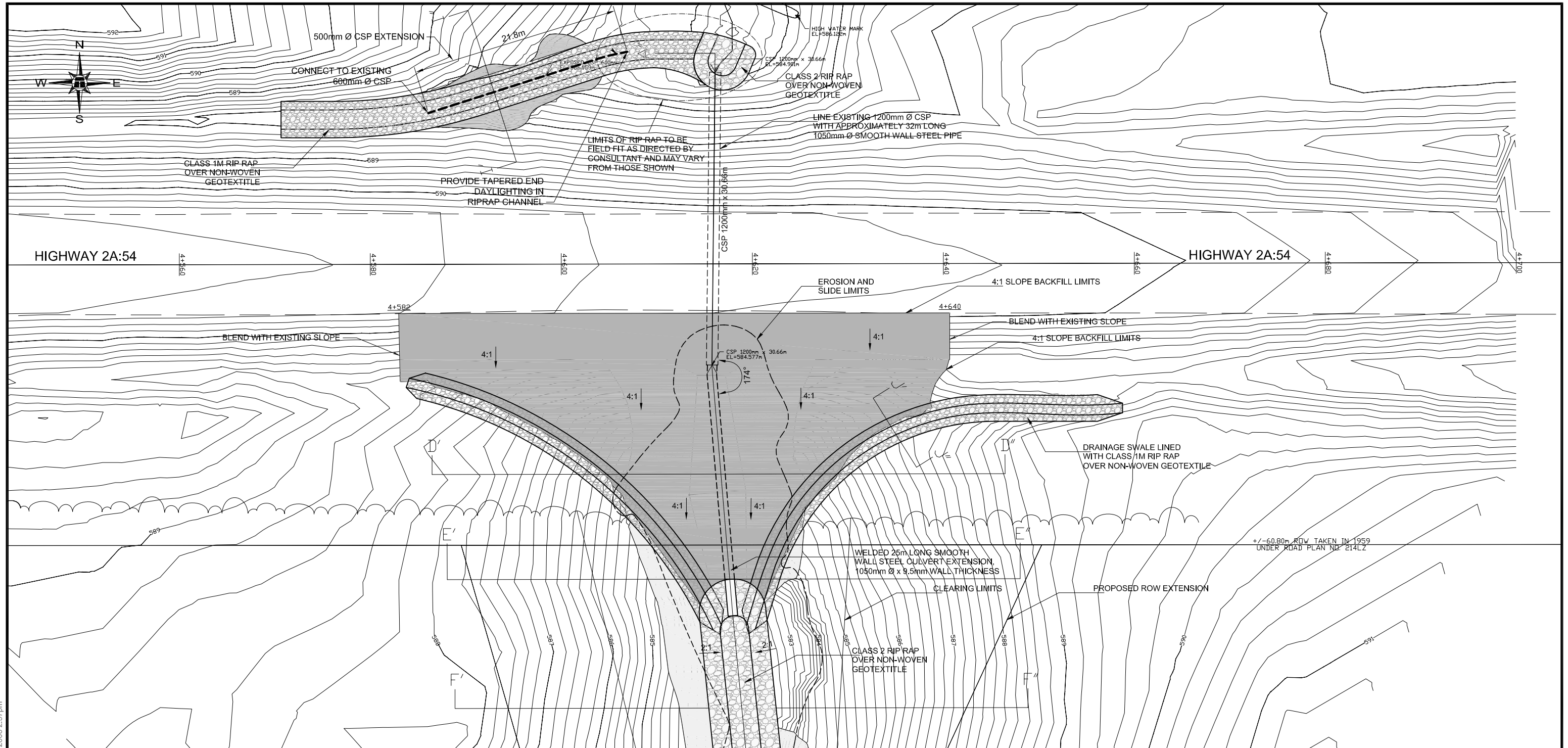
DWG. NO.	SHEET	DISTRICT	CONTRACT NO.
15-85-7-3C	3 OF 8	PEACE REGION	7172/05

**Alberta**  
 INFRASTRUCTURE AND TRANSPORTATION  
**METRIC**  
 SCALE  
 1:400

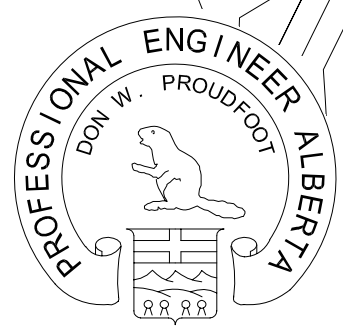


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 Signature \_\_\_\_\_  
 Date \_\_\_\_\_  
 PERMIT NUMBER: P 5186  
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SITE PLAN SHOWING DESIGN LIMITS OF SLOPE BACKFILL AND RIP RAP			
Hwy 2A:54 (SH17 Sites 1 & 1A)		PEACE RIVER, AB	
West of Gunn's Creek		CONTRACT NO.	
DWG. NO.	SHEET	DISTRICT	CONTRACT NO.
15-85-7-4C	4 OF 8	PEACE REGION	7172/05



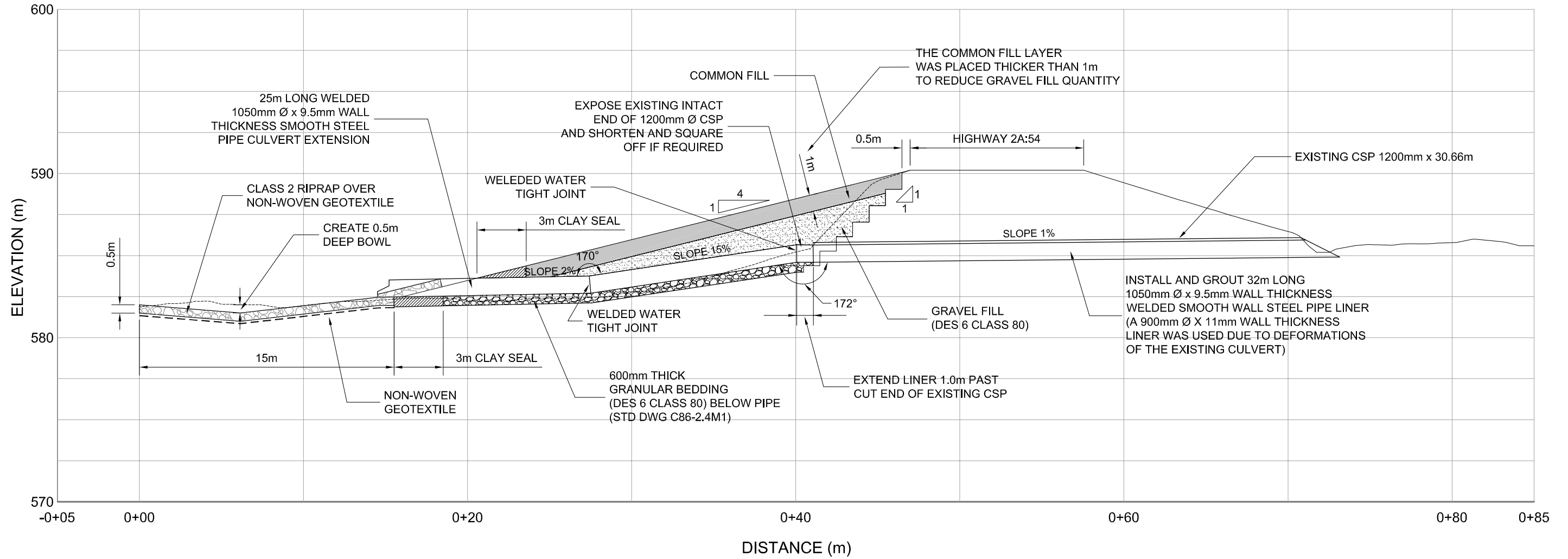
SCALE  
1:400



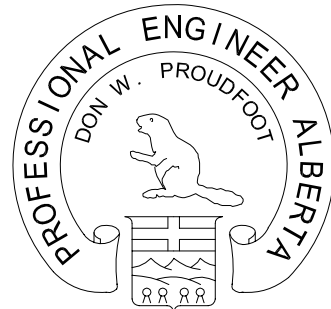
Z:\15\15-85-7\Tender Drawings\15-85-7-4.dwg - PLAN - Dec. 11, 2006 2:57pm



### PIPE LONGITUDINAL PROFILE A'-A"



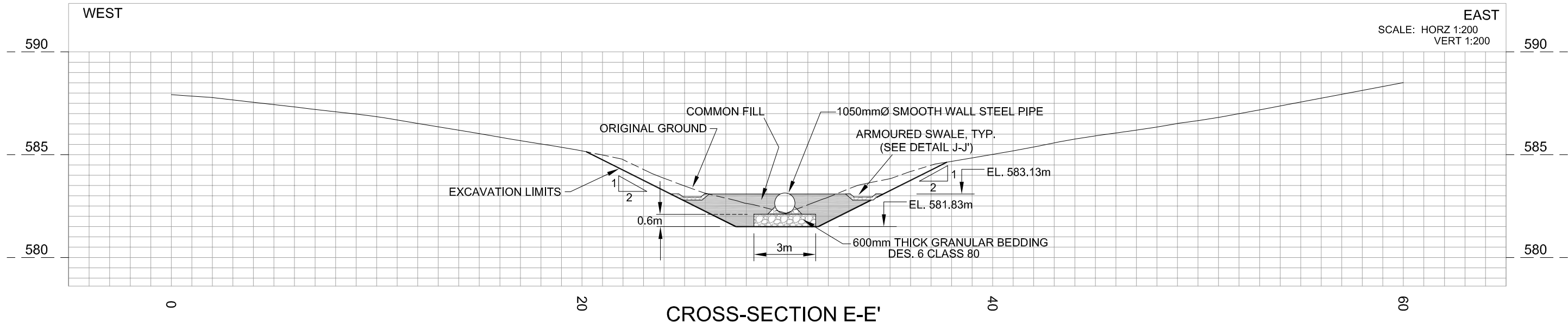
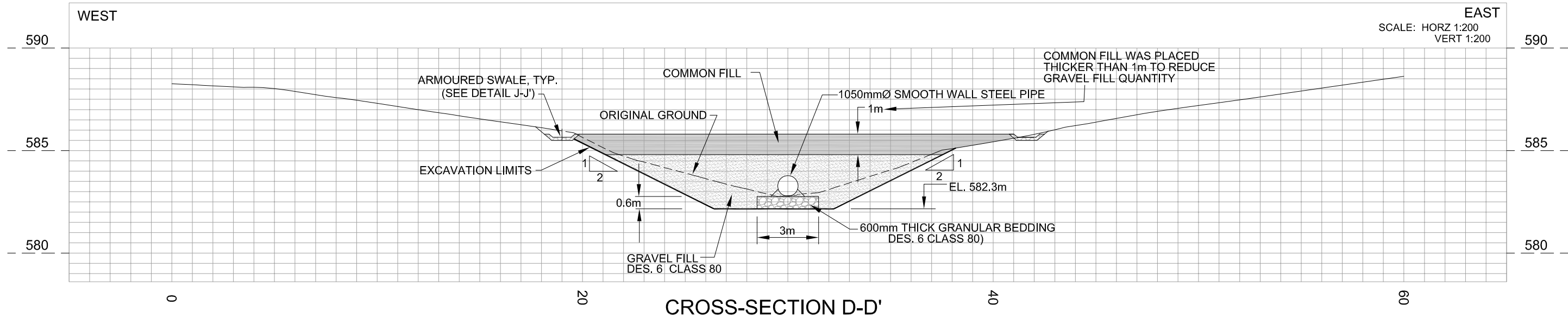
PERMIT TO PRACTICE  
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 Date \_\_\_\_\_  
 PERMIT NUMBER: P 5186  
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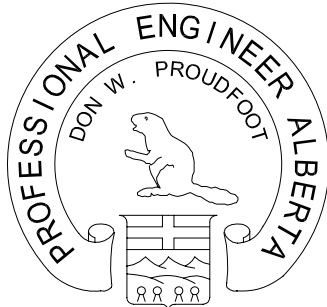
<b>DESIGN CROSS-SECTION A'-A"</b>				 <b>METRIC</b> SCALE 1:250
Hwy 2A:54 (SH17 Sites 1 & 1A) West of Gunn's Creek PEACE RIVER, AB				
DWG. NO.	SHEET	DISTRICT	CONTRACT NO.	
15-85-7-5C	5 OF 8	PEACE REGION	7172/05	



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 Date \_\_\_\_\_  
 PERMIT NUMBER: P 5186  
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**DESIGN CROSS-SECTIONS  
 D-D' AND E-E'**

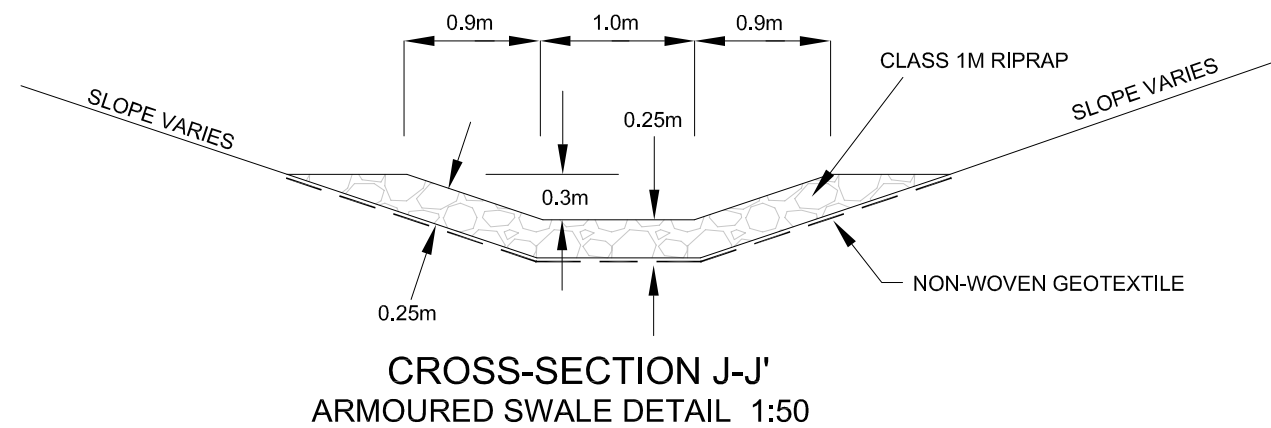
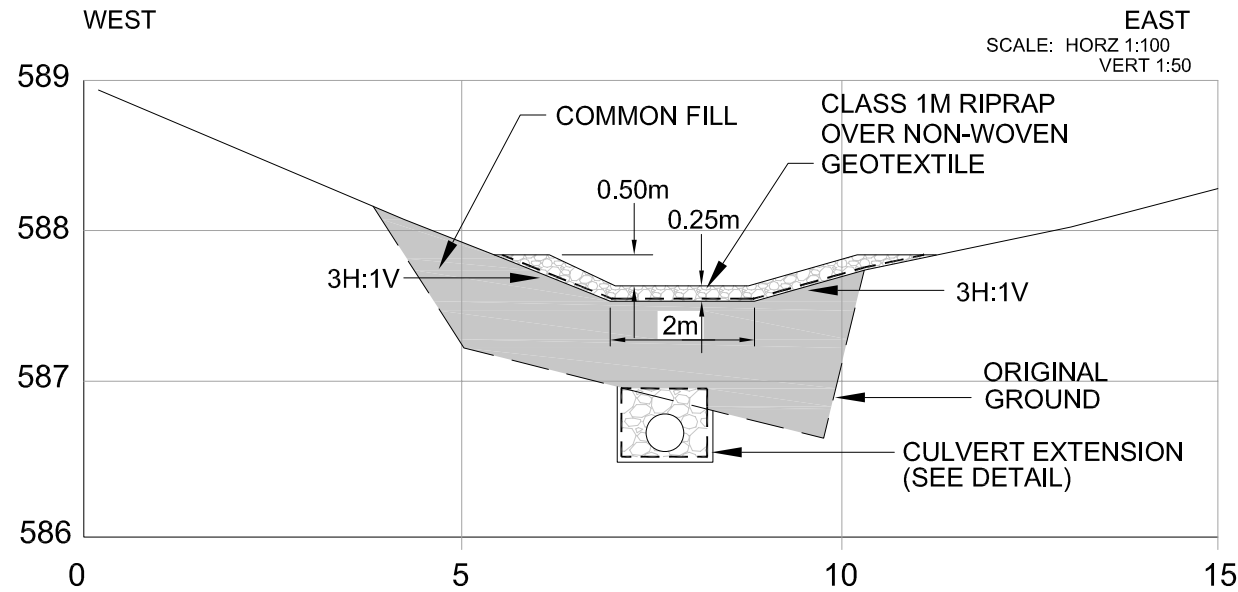
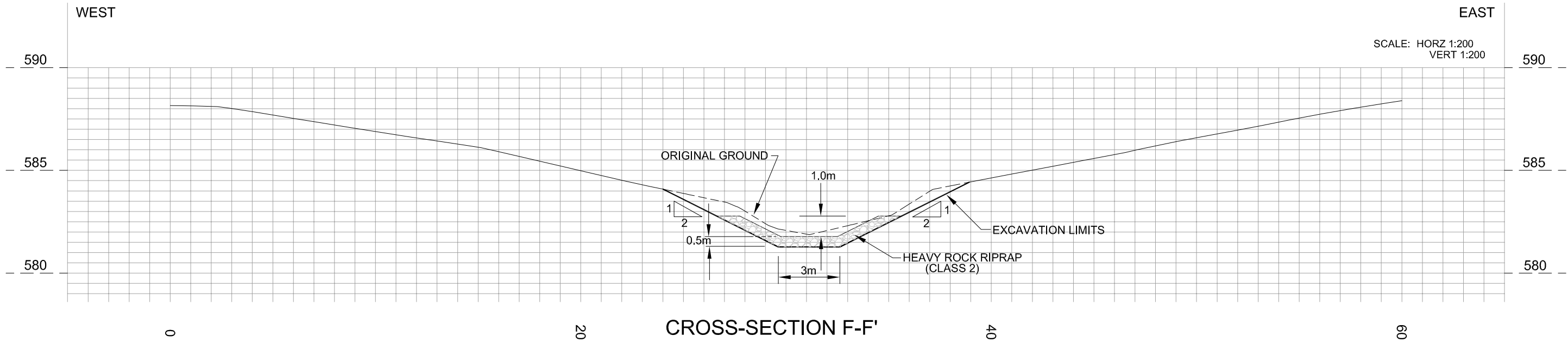
Hwy 2A:54 (SH17 Sites 1 & 1A)  
 West of Gunn's Creek PEACE RIVER, AB

DWG. NO.	SHEET	DISTRICT	CONTRACT NO.
15-85-7-6C	6 OF 8	PEACE REGION	7172/05

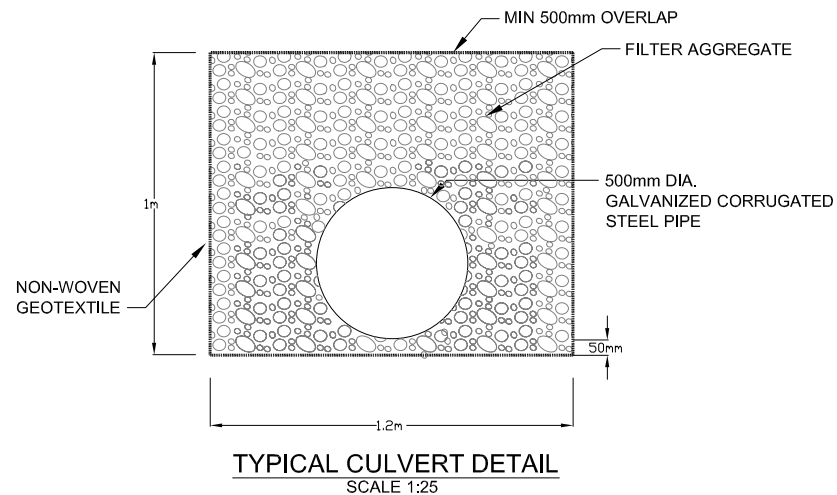
**THURBER ENGINEERING LTD.**  
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SCALE  
AS SHOWN

Z:\15\15-85-7\Tender Drawings\15-85-7-6(28AUG2006).dwg



NOTE: CUT AND/OR FILL INFLECTION POINT OF FILL SLOPE AND NATURAL SLOPE TO PROVIDE 1m WIDE ARMOURED SWALE WITH 3H:1V SIDE SLOPES AS SHOWN.

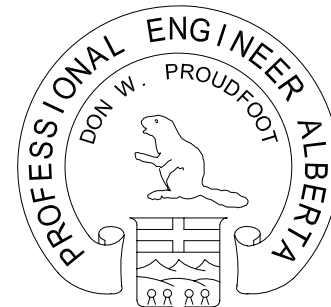


PERMIT TO PRACTICE  
THURBER ENGINEERING LTD.

Signature \_\_\_\_\_

Date \_\_\_\_\_

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DESIGN CROSS-SECTIONS  
F-F', I-I' AND J-J'

Hwy 2A:54 (SH17 Sites 1 & 1A)  
West of Gunn's Creek

PEACE RIVER, AB

DWG. NO.	SHEET	DISTRICT	CONTRACT NO.
15-85-7-7C	7 OF 8	PEACE REGION	7172/05

**Alberta**  
INFRASTRUCTURE AND  
TRANSPORTATION

**METRIC**

SCALE  
AS SHOWN



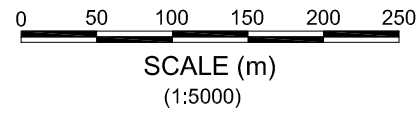
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**LEGEND**

 AREA OF R.O.W. REQUESTED

**NOTE**

AERIAL PHOTO PROVIDED BY MAPS ALBERTA  
(DATED 92-08-05 WITH SCALE 1:10 000)



**PRELIMINARY DESIGN  
RIGHT OF WAY REQUEST #1**

HWY 2A:54 (Sites 1 & 1A)  
WEST OF GUNN'S CREEK

~ 27 KM WEST OF HIGH PRAIRIE, AB

DWG. NO.	SHEET	DISTRICT	CONTRACT NO.
15-85-7-8C	8 OF 8	PEACE REGION	7172/05

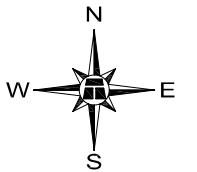


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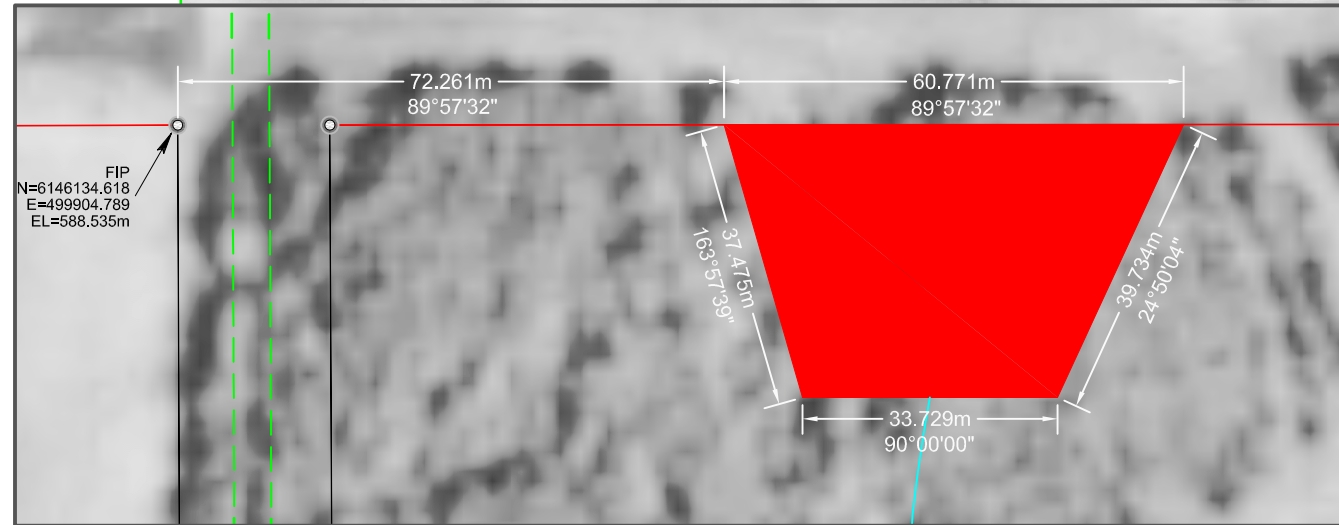


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TITLE SEARCH PERFORMED MARCH 1, 2005



**NOTE**  
ALL ANGLES SHOWN ARE  
CLOCKWISE FROM NORTH



**SE3 75-20-5**  
RENE BOURGEOIS  
GUY, ALBERTA

**SW2 75-20-5**  
NON-PATENT  
M.D. OF SMOKY RIVER NO. 130, ALBERTA

HWY 2A:54 (TWP RD 750)

+/-60.80m ROW TAKEN IN 1959  
UNDER ROAD PLAN NO. 214LZ

+/-60.80m ROW TAKEN IN 1959  
UNDER ROAD PLAN NO. 214LZ

**NE33 74-20-5**  
RENE BOURGEOIS  
GUY, ALBERTA

**NW34 74-20-5**  
NON-PATENT  
M.D. OF SMOKY RIVER NO. 130, ALBERTA  
AREA REQUIRED = 0.20 ha. (0.48 acres)

FIP  
N=6146195.396  
E=499864.703  
EL=590.067m

FIP  
N=6146195.686  
E=500800.307  
EL=587.492m

FIP  
N=6146195.765  
E=500303.675  
EL=587.497m

FIP  
N=6146134.618  
E=499904.789  
EL=588.535m

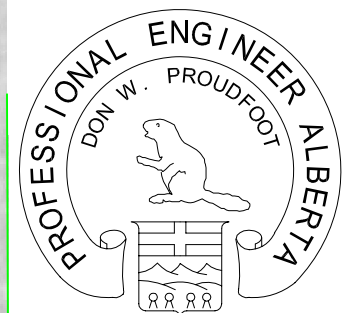
FIP  
N=6146134.876  
E=500264.727  
EL=585.610m

PERMIT TO PRACTICE  
THURBER ENGINEERING LTD.

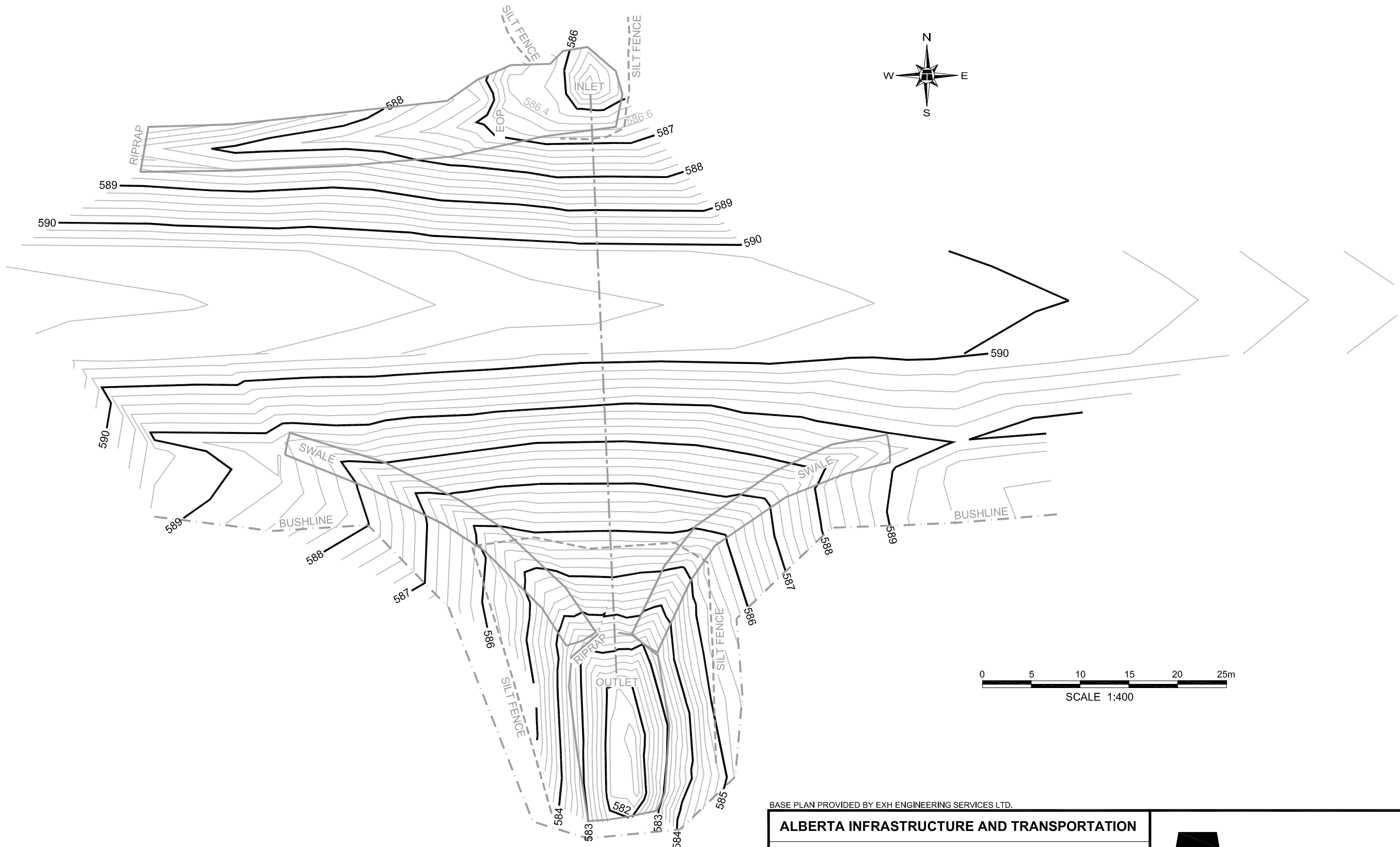
Signature \_\_\_\_\_

Date \_\_\_\_\_

PERMIT NUMBER: P 5186  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta



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BASE PLAN PROVIDED BY EXH ENGINEERING SERVICES LTD.

THURBER PROJECT #15-85-7

ALBERTA INFRASTRUCTURE AND TRANSPORTATION

AS-BUILT SITE PLAN SHOWING VARIOUS CONSTRUCTED FEATURES

Highway 2A:54 West of Gunn's Creek

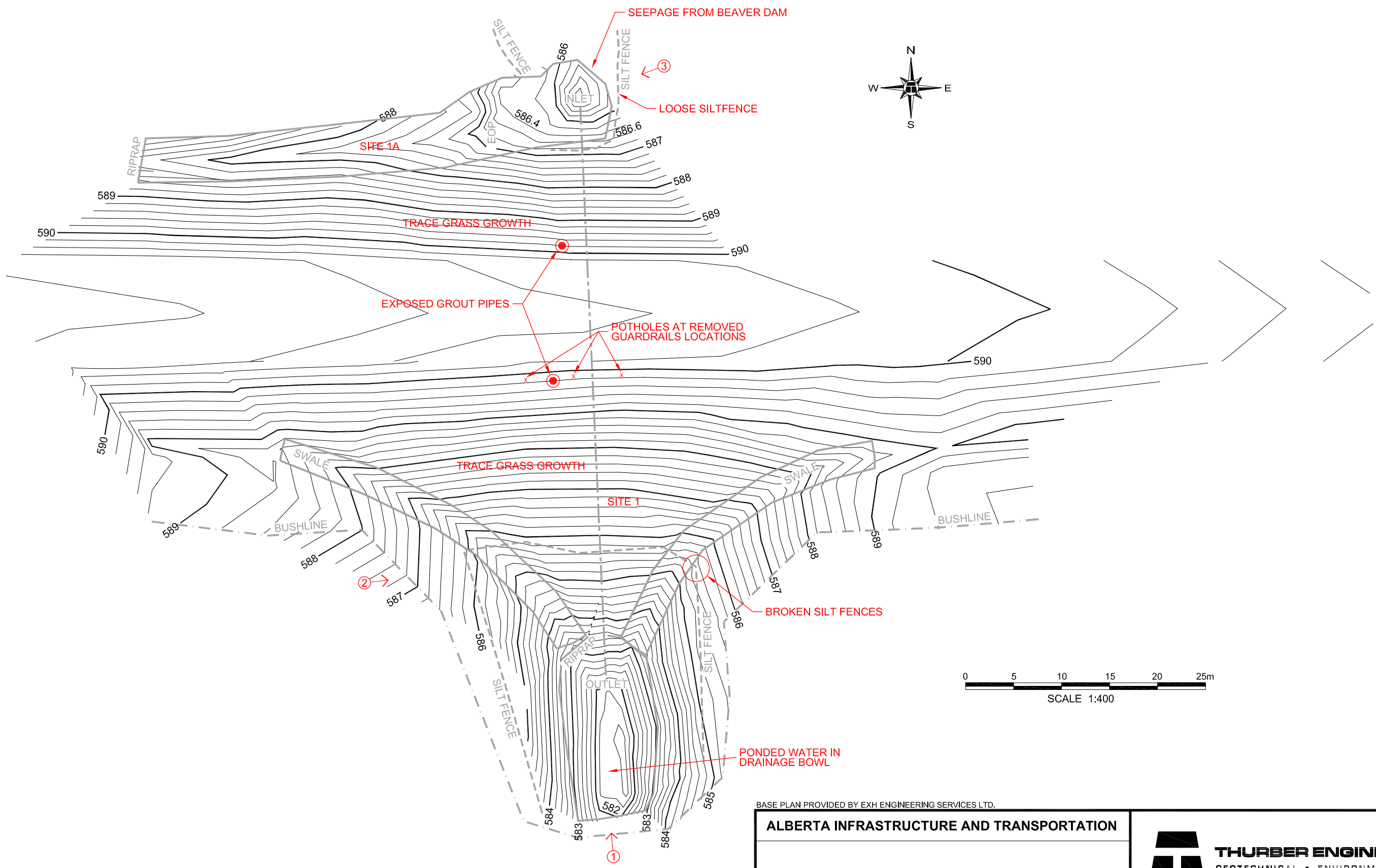
HIGH PRAIRIE, AB



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ENGINEER: GSB/BHM	DRAWN: HH	APPROVED:
DATE: DECEMBER 2006	SCALE: 1:400	DRAWING No. 15-85-7-AS-BUILT

Z:\15-85-38\SH17-1\15-85-38-SH17-1.dwg - Layout1 - Dec. 7. 2006 11:59 AM



**LEGEND**  
 ① → PHOTO AND DIRECTION

**NOTE**  
 2006 OBSERVATIONS ARE SHOWN IN RED

BASE PLAN PROVIDED BY EXH ENGINEERING SERVICES LTD.

THURBER PROJECT #15-85-38

**ALBERTA INFRASTRUCTURE AND TRANSPORTATION**

**AS-BUILT SITE PLAN SHOWING VARIOUS CONSTRUCTED FEATURES**



Highway 2A:54 West of Gunn's Creek WEST OF HIGH PRAIRIE, AB

ENGINEER: GSB/BHM	DRAWN: HH	APPROVED:
DATE: DECEMBER 2006	SCALE: 1:400	DRAWING No. <b>15-85-38-SH17-1</b>





Photo 1 - Looking north at the culvert outlet, swale and reconstructed slope, May 25, 2006.





Photo 2 - Looking east at the highway embankment and swale, May 25, 2006.



Photo 3 - Looking southwest towards culvert inlet, sub-drain outlet and swale riprap of Site #1A, May 25, 2006.