



June 7, 2002

Alberta Transportation  
Central Region  
#401, 4902 – 51 Street  
Red Deer, Alberta  
T4N 6K8

**Mr. Melvin Mayfield, P.Eng.**  
**Project Engineer**

Dear Mr. Mayfield:

**Central Region Landslide Assessment Site C16**  
**H11:08 Frost Heave @ Ch 17.6**  
**2002 Annual Inspection Report**

Alberta Transportation has initiated a process of risk management at site-specific slope movement sites that includes a 3-ring binder document control system. This Annual Inspection report forms Section B of the document control system for the above site. The annual site inspection was undertaken on May 28, 2002 by Mr. Darren Ratcliffe, P.Eng., of Klohn Crippen Consultants Ltd. Mr. Ratcliffe was accompanied by Mr. Melvin Mayfield, P.Eng., and Mr. Roger Skirrow, P.Eng., of Alberta Transportation.

This report was prepared by Klohn Crippen Consultants Ltd. for Alberta Transportation Central Region under Contract No. CE053/2000.

## **1. PROJECT BACKGROUND**

Highway 11:08 was constructed in 1977. Seasonal frost heave problems have been noted at two sites along this stretch of highway: Ch 17.6 and Ch 40.5. The frost action typically caused humps, depressions and serious cracking problems resulting in speed restrictions being initiated. It is understood that springs were noted in the ditches at both of these sites.

At Ch 40.5, successful remedial work was undertaken in the summer of 1999 and involved 3 m deep longitudinal trench drains installed over a length of about 500 m in both highway ditches. It is understood that cross drains had been tried in previous years but with little success. The drains comprised a perforated pipe surrounded by gravel.

At Ch 17.6, remedial work was undertaken in 2001. The site plan for Ch 17.6 is shown on Figure 1 and illustrated in the attached photographs.

## **2. SITE OBSERVATIONS**

At Ch 17.6, the site is immediately east of a deep valley fill. Significant longitudinal and transverse cracks in the pavement extend over a length of highway of about 95 m and have necessitated a speed restriction with bump warning signs. There was one noticeable depression in the westbound lane of about 150 mm deep with radial cracks leading from it that has now been patched.

Since the last inspection in May 2001, both ditches have now had perforated pipe and gravel drains installed, however, no construction details are available.

Free-draining gravel filled french drains running in both ditches beside the highway were recommended in our last report. At the base of the drains, it was recommended that a filter fabric wrapped perforated PVC pipe (150 mm diameter) be provided to reduce the risk of the drain clogging with fines. The gravel drain should have been a minimum of 1 m wide by about 3 m deep below the ditch invert and should have also be wrapped in geotextile filter fabric. The gravel drain could have been covered with native soil backfill to reduce the backfill cost and to prevent frost penetration into the drain, but it would appear that gravel was used throughout. The perforated pipe should have been laid at a grade of about 2% to daylight in the valley slope.

The drains appear to have been installed at about 3 m depth and terminate on the valley slope with small riprap aprons. At the time of the inspection, the south drain was flowing.

## **3. SITE ASSESSMENT**

It is understood that there was typically significant vertical displacement in the distressed pavement areas in the winter with little or no displacement in the summer. This would support the conclusion that frost heaving rather than slope movements/fill settlement is causing the majority of the cracks. If the drains were installed in the recommended manner, the drains should prevent further pavement distress.

Based on the risk level criteria provided by Alberta Transportation, a risk rating of 1 has been assigned to this site. This is based on a probability factor of 1 for an inactive feature, and a consequence factor of 1 as closure of the highway is unlikely.

#### 4. RECOMMENDATIONS

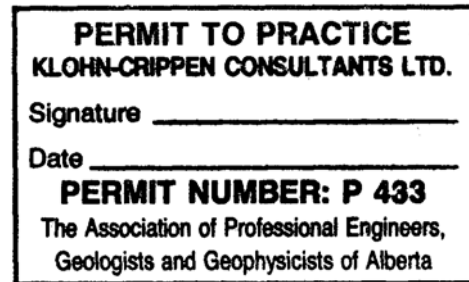
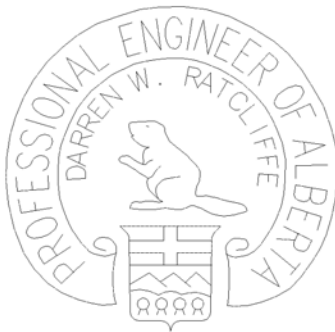
It is recommended that this site be deleted from the annual monitoring program. However, the regional staff could continue to monitor the area and report any evidence of continued pavement distress. The as-built details should be located and added to the site file.

The partially blocked culvert under the local road should be cleaned out.

Please contact the undersigned if you have any questions regarding this report.

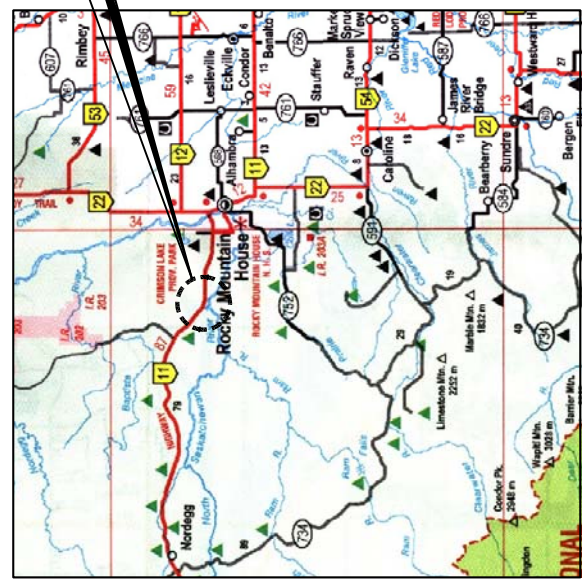
Yours truly,

**KLOHN CRIPPEN CONSULTANTS LTD.**



Darren Ratcliffe, P.Eng.  
Senior Geotechnical Engineer

## FIGURE



SITE "C16"



150  $\phi$  DRAIN INSTALLED IN 2001 (LENGTH UNKNOWN)

GUARDRAIL



CULVERT

AREA REGRADED

PERFORATED PIPE



150 $\phi$  CULVERT

END PARTIALLY BLOCKED



VALLEY



150  $\phi$  DRAIN INSTALLED IN 2001 (LENGTH UNKNOWN)

GUARDRAIL

~120m

~95m



AREA REGRADED



TYPICAL CRACKS IN PAVEMENT (SEE PHOTOS)

HOLE PATCHED

PLAN 1:500

LOOKING WEST

NOTES

- PHOTOS TAKEN MAY 28, 2002.

PERMIT	SEAL	DESIGNED BY S.A.T.	APPROVED BY D.W.R.	CONSULTANT	PROJECT	CENTRAL REGION
MARK	DESCRIPTION OF REVISIONS	DRAWN BY J.D.	CHECKED BY	KLOHN CRIPPEN	LANDSLIDE RISK ASSESSMENT	
(A)	MAY 2002 INSPECTION	SCALE 1:500		ALBERTA TRANSPORTATION	TITLE	
(B)	JUN 2001 INSPECTION	MAY 02 N.R.K. D.W.R.			SITE C16 : HIGHWAY 11:08	
(A)		JUN 01 E.N.L. D.W.R.			SITE PLAN	
		DATE	DWN. ENG.		DATE	MAY 2002
					SHEET	1 of 1
					DRAWING No.	FIGURE 1
					REV.	B



Looking west along north ditch

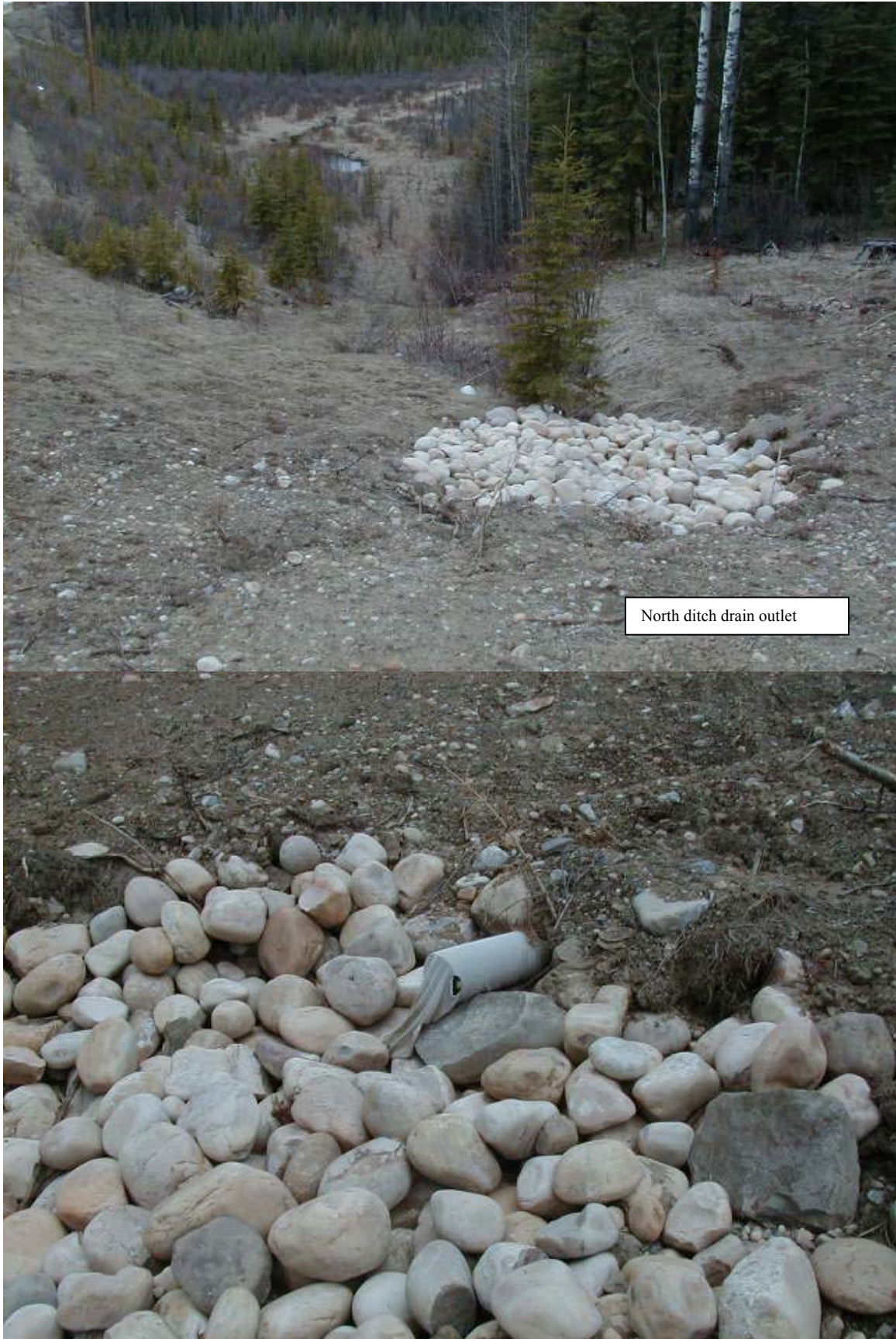


Looking west along south ditch

















Looking west along north ditch from east of access road.  
Note partial blockage of culvert.



East view of south ditch



East view of north ditch