

June 25, 2001

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

Mr. Melvin Mayfield, P.Eng.
Construction Services Coordinator

Dear Mr. Mayfield:

Central Region Landslide Assessment Site C7
H16:30 Kenilworth Lake Slide
2001 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 June 19, 2001 by Mr. Darren Ratcliffe, P.Eng., of Klohn Crippen Consultants Ltd. Mr. Ratcliffe was accompanied by Mr. Roger Skirrow, P.Eng., Mr. Fred Cheng, P.Eng., and Mr. Melvin Mayfield, 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

The slide is located south of Highway 16 about 2 km East of Islay Junction (about Sta. 804+12) along the north shore of the now dry Kenilworth Lake. The shoreline is located about 60 m from the highway and has a vertical elevation difference of about 15 m (about 4H:1V slope). The slide was first observed in 1977 and had no effect on the highway except for some cracks along the shoulder.

Remedial works constructed in 1980 included a dumped pit run gravel toe berm about 25 m wide and 50 m long. Twinning of the Yellowhead Highway past Kenilworth Lake was completed in 1990 or 1991 and followed the original highway alignment. In 1998, Highway 16 was re-paved, which included a nominal amount of additional fill at the crest of the slope to accommodate an increase in highway width. Patching on the shoulder was required in the fall of 1999, indicating that the slide is still active.

The slope is generally grass covered with the exception of a band of vegetation (willow trees, wild roses) on the lower portion of the slope, south of the fence line. The soil conditions were observed to be a 1.5 m thick layer of highly saturated organic material (peat) underlying the highway fill. This is underlain by a 3 m thick layer of soft saturated silty clay (till) followed by a 9 m thick layer of medium plasticity sandy clay (till). The clay deposits are underlain by a very dense uniform sand or sandstone.

The slide location, site plan, instrument locations and cross-section are illustrated on Figures 1 and 2. The site features are also illustrated in the attached photographs.

2. SITE OBSERVATIONS

Instrumentation was installed at this site in 1985 - 1986. A summary of the instrumentation at the site is provided in Table 1.

Table 1 Kenilworth Lake Slide Instrumentation (June 2001)

ID	Old ID	Ground Elevation (m)	Tip Depth/ Response Zone (m)	Stick-up (m)	Date Installed	Current Piezometric Elevation (m)	Comments
Slope Inclinerometers							
Ken01	1A	614.62	24 (?)	0.9	25-Apr-85	-	Sheared @ 4.9 m
Ken02	2	617.52	24.4	0.9	17-Oct-85	-	Destroyed
Ken03	3	611.88	20.7	1.0	18-Oct-85	-	Sheared @ 3.0 m
Ken04	1	607.40	15.2	0.8	24-Apr-86	-	Blocked @ 2.4 m
Ken05	2	609.18	15.2	0.8	25-Apr-86	-	Blocked @ 2.7 m
Ken06	3	612.61	21.3	1.0	28-Apr-86	-	Blocked @ 3.4 m
Pneumatic Piezometers							
P1		607.40	10.7	-	24-Apr-86	604.15	
P2		607.40	4.6	-	24-Apr-86	604.28	
P3		608.84	10.3	-	25-Apr-86	605.22	
P4		608.84	3.4	-	25-Apr-86	-	No return
P4A	P4	612.06	16.8	-	28-Apr-86	601.94	
P5		612.06	6.1	-	28-Apr-86	-	No return
P6		612.06	3.1	-	28-Apr-86	610.15	
Standpipe Piezometers							
SP 1A		614.65	19.8	1.13	26-Apr-85	610.92	
SP 2		617.59	1.5 - 21.6	0.31	17-Oct-85	-	Blocked @ 6.6 m
SP 3		612.08	0.5 - 16.8	1.40	18-Oct-85	609.38	

As noted, all of the inclinometers have either sheared or have become blocked since 1988.

The observed significant features of this site include:

- A 30 m long patched section of the highway containing 2 distinct longitudinal cracks.
- A 25 m longitudinal crack in the centre of the shoulder about 20 m east of the patched area. To the south of this crack, cracks are also present in the slope adjacent to the guardrail and extend some distance down the slope.
- A slight deflection of the guardrail was observed.
- The horizontal drains daylighting at the toe of the slope were located and were observed to be dry.

3. SITE ASSESSMENT

There is a potential slope instability that could jeopardize the highway at this site. The observed movements have been continuing for a long period of time and have required frequent remedial maintenance. It is possible that a crack with significant vertical displacement or loss of ground could occur, which would become a hazard to traffic on this busy highway.

It is conjectured that the movements are related to the high plasticity clay layers observed in the foundation soils. The observed water levels recorded at the site are very similar to the values obtained in August 2000 (refer to attached table). It is considered that these values represent the current conditions of the site and the piezometric assumptions adopted in the remedial design are valid.

Based on the risk level criteria provided by Alberta Infrastructure, a risk rating of 36 has been assigned to this site. This is based on a probability factor of 9 for an active slide and a consequence factor of 4 as partial closure of the highway could occur.

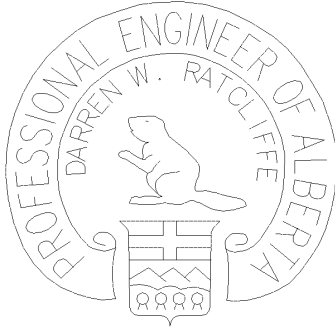
4. RECOMMENDATIONS

It is recommended that the remedial works outlined in our report "H16:30 Kenilworth Lake Slide Proposed Remediation Design" dated February 2001 be implemented in the summer of 2001. The proposed remedial works include the provision of a granular shear key and toe berm, and the overall flattening of the slope to 6H:1V.

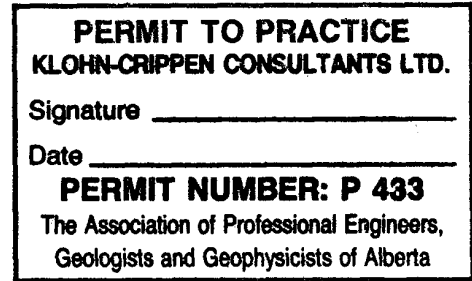
Please contact the undersigned if you have any questions regarding this report.

Yours truly,

KLOHN CRIPPEN CONSULTANTS LTD.



Darren Ratcliffe, P.Eng.
Senior Geotechnical Engineer



Brian Rogers, P.Eng.
Manager, Alberta









Standing at horizontal drain pipe location







No flow from drains