

SITE C27: H11:08 SLIDE

LEGAL LOCATION: NW32-40-11-W5

REFERENCE LOCATION
ALONG HIGHWAY: km 9.8

UTM COORDINATES (NAD83): N5816691 E598230

AT FILE: H11:08

AT PLAN & PROFILE: H11, E. of Jackfish Creek – E. of Saunders (Sheet 11 of 25)

Date of Initial Observation: 2002

Dates of Previous Inspections: March 10, 2003 (JR Paine and Associates Ltd.)
(Inspected by) May 23, 2003 (KCCL)
May 12, 2004 (KCCL)

Instruments Installed: 2 standpipe piezometers

Instruments Operational: 2 standpipe piezometers

Reading Dates: March 2003 (J.R. Paine & Associates Ltd.)
(Read by)

Risk Assessment: PF(9) * CF(2) = 18

Last Updated by: Klohn Crippen Consultants Ltd. (KCCL)
Date: May 2004

Location

About 45 km west of Rocky Mountain House, Highway 11:08 crosses a wide valley with Jackfish Lake to the northwest. In 1972, a new alignment for Highway 11 was designed that involved the relocation of the highway about 200 m south of the original location. It is assumed that the highway and embankment was constructed shortly thereafter based on this design.

The embankment is about 10 m to 15 m high with the deepest section about 300 m long. The side slopes are approximately 3H:1V and are grass covered. The valley contains the outflow channel from Jackfish Lake and a 1.5 m diameter culvert was installed at the north end of the embankment at chainage 1528 + 50. A review of air photographs from 1986 and 1997 indicated that a significant area of ponded water is located at the northwest end of the embankment.

The observed scarp on the slope was about 300 mm high with an estimated length of about 150 m. A crack was also observed on the south side of the highway pavement. It is unknown when the instability became apparent. No reports of further movements at the site have been received.

General Description of Site Conditions

Very narrow frost heave area on pavement (<2 m wide). Road patch about 20 m wide.

Erosion on-going in ditches on both sides of the highway. The area about 80 m long to the southwest of the frost heave was considered a site for remediation.

Geotechnical Conditions

A site investigation was conducted by J.R. Paine & Associates Ltd. on March 10 and 11, 2003. The investigation comprised two test holes of 19.1 m and 14.5 m deep from the highway and four test pits up to 5.5 m deep on the side slope. The report is attached for reference in Appendix I.

The test holes indicated subsurface conditions comprising medium plasticity clay fill with some sand and occasional rock fragments to a depth of 9.9 m and 15.2 m. The fill was underlain by a thin organic layer overlying sandstone bedrock. These observations are consistent with the site investigation results indicated on the 1972 realignment design drawing for the embankment foundation.

Standpipes installed in the test holes indicated water levels of about 9.5 m to 12.5 m below the crest of the embankment.

The test pits generally indicated clay fill with occasional gravel zones. No seepage was observed in any of the test pits at the time of the investigation. Some instability was encountered in the granular zones of the fill.

Laboratory testing indicated the following moisture content profiles for the test holes:

Hole	Depth (m)	Average Moisture Content (%)
03-01 (Observed water level = 12.5 m)	0 - 4	10
	4 - 8	15
	8 - 14	25
03-02 (Observed water level = 9.5 m)	0 - 5	10
	5 - 10	20

An Atterberg limit test indicated that the clay fill had a liquid limit of 37% and a corresponding plastic limit of 16%.

The embankment would appear to be constructed of compacted medium plasticity clay fill founded on competent sandstone bedrock. It would appear that the organic materials in the valley bottom were not removed prior to construction, however, these are relatively thin (typically less than about 1.5 m). In addition, it would appear that the embankment has performed well for the last 30 years.

At the time of the initial inspection by Klohn Crippen in May 2003, there was significant water ponding upstream of the culvert, however, this water level is well below the elevation of the observed slide. However, some groundwater was observed on the north side of the highway directly opposite the slide area.

It is considered that the observed movement is a local instability driven by groundwater saturation of the fill originating from the north and flowing through granular zones in the fill. Although the installed standpipes indicated a water level close to the base of the embankment, the trend in moisture content would imply large seasonal variations in water level up to about 5 m below the crest of the embankment. The variation of water levels within the fill are likely driven by groundwater variations on the north side of the embankment. The observed instability may have occurred during a very wet period with a combination of rainfall infiltration and groundwater saturation. No movements appear to have occurred recently.

Chronology (Refer to Section G for Further Information)

1972
Highway realigned and embankment constructed.

2002
Instability on embankment slope observed.

2003
Site investigation undertaken.

Reports and Documents

May 2003 Site Inspection Form (KCCL)
May 2004 Site Inspection Form (KCCL)

Limited Slope Investigation H11:08 km 9.8 Near Rocky Mt. House, JR Pain &
Associates Ltd., June 30, 2003
March 22, 2004 (KCCL) Geotechnical Summary
Airphotos (1957, 1986, 1997)