

PART A: FILE REVIEW
LANDSLIDE RISK ASSESSMENT
PEACE REGION (PEACE RIVER VALLEY/HIGH LEVEL)

a) ^{PH36}
SITE PH1: DUNVEGAN HILL, SOUTH

LEGAL LOCATION: 36-79-5 W6M, 1-80-5 W6M

Location along Highway: Between Station 0+000 (South Bridge Pier) and 4+000

AI FILE: H2:68

Date of Initial Observation: 1958

Date of Last Inspection: June 1999

Instruments Installed: 36 (1991), 16 (1992) 4(1998)

Instruments Operational: 22 slope inclinometers, 4 piezometers

Risk Assessment: $PF(11) * CF(5) = 55$

Last Updated: AMEC Earth & Environmental Limited
November 2000

To date the file does not contain a description of the instabilities by station. As a consequence, it is difficult to assess the level of risk on a site by site basis.

CHRONOLOGY

Table A1 provides the chronological background of the slides.

DESCRIPTION OF INDIVIDUAL SITES

In the following, the individual sites are described. In the file, information does not generally refer to the specific sites, such that it is difficult to determine which of the sites the information refers to. In 1991 36 slope inclinometers were installed along the Dunvegan Hill, followed by 16 in 1992. It appears that this monitoring program was initiated after a number of sideslope slides occurred. However, these slides are not documented in the file.

In a report of April 1999, GAEA reports that progressive deterioration was occurring in several areas downslope of the road and that headscarps were getting closer to the roadway. However, it is not clear where these areas are located. GAEA recommended that the alignment of the highway be shifted towards the uphill side.

Station 2+000, Large Slide

Description of Instability

At Station 2+000, the road is approximately halfway up the valley wall. During construction of the road, a large volume of fill was placed in this area, which triggered a large deep-seated slide. Typically the rupture surface was at 20 m depth. The slide extended from the road to Dunvegan Creek (500 m), the elevation drop between the road and the creek was approximately 100 m.

During construction of the road, the slide was stabilized by channelling the creek in a 1.8 m diameter steel culvert and placing a large toe berm in the creek bed. The road was shifted into a cut.

In 1999, GAEA reported that deep-seated movement was occurring at this location.

Past Investigations

In 1959, at least 12 deep boreholes were drilled in the slide mass. Only one of the borehole logs is in the file.

In 1992, six slope inclinometers (27, 27A, 28, 29, 30, 30A) were installed in the slide or its vicinity.

In 1998, four slope inclinometers (27B, 28A, 29A and 30B) were installed in the slide or its vicinity.

Station 3+300

Description of Instability

At Station 3+300, the highway is constructed in fill. The height from the toe of the fill to the road was approximately 25 m. In 1983, a slide was triggered during excavation of a culvert. It appears that this culvert channelled water from the uphill ditch down the slope. The slide appears to have retrogressed upslope to near the highway. Over the years, further erosion and extensive slumping appears to have occurred.

By 1991, the slide was 120 m long and 20 m wide. The joints of the culvert had pulled apart. After remedial measures installed in 1991, cracks were noted in the pavement.

Past Investigations

In 1986, four boreholes were drilled at the site. Borehole logs from this investigation are not in the file. Apparently slope inclinometers (1 and 2) were installed. There are no records of these slope inclinometers.

Remedial Measures

A roadside curb appears to have been installed to channel runoff from the road surface away from the slide area.

In 1991, the slope was reconstructed, the culvert was repaired, a splash pad was constructed at the outfall of the culvert and the roadside curb was repaired.

Monitoring Results

No monitoring has been undertaken in this area.

Assessment

It appears that after the 1991 repairs, this area has performed satisfactory.

- 1990, 03 Letter by V. Diyaljee to R Callioux. Frost heave investigation. One borehole was drilled at two frost heave sites at 1.5 km and 2.5 km from the bridge. Ice lenses were observed at both sites.
- 1991, 05 Note to file by K.Li. Site 3.3 km from Dunvegan Bridge. Erosion had occurred after a downdrain had become disconnected. The width of the erosion feature was 20 m, the length was 120 m. It was recommended that the slope be reconstructed.
- 1991, 05 Memorandum from J. Cooper to K.Li. Photographs of couplers in the culvert being pulled apart.
- 1991, 07 Letter by J. Cooper to R. Penny. Repairs at erosion feature were completed. A gravel drain that had been installed 10 years earlier was uncovered during the repairs. Water was issuing from the drain.
- 1991, 09 Note to file by K.Li. Extensive slope monitoring program was to be initiated. District has reported further cracking of new pavement had occurred at 3.9 km from the bridge.
- 1991, 09 Note to file by V. Diyaljee. A slow slope movement was occurring between 4+000 and 4+500, observed as a semi-circular crack in the pavement. At Station 2+000, a large slide had occurred at the location of a culvert. The slope failure was retrogressing towards the road. The culvert was blocked and runoff was directed to another culvert. A number of other slide areas have been identified along the road alignment. A re-alignment of the highway was proposed. The southeastern corner of the south abutment of the Dunvegan Bridge has experienced slumping activity. Movement appears surficial.
- 1991, 10 Note to file by R. Jurgens. Study of re-alignment is initiated.
- 1991, 10 Note to file by F. Cheng. The highway from the bridge to 3.5 km was in good condition, except at 3.3 km. At 3.3 km, a number of cracks had formed in the highway. Road had been patched. A slide at 3.0 km was also mentioned. Various shallow slides on east side of road had been dressed.
- 1992, 02 Note to file by K. Li. Discussion of proposed re-alignment away from the slide area. The alignment entailed 1.5 km of new roadway between 3+500 and 5+000.
- 1992, 06 Photograph indicating that headscarp has cut into climbing lane.
- 1992, 07 Letter by V. Diyaljee to R. Jurgens. Review of proposed re-alignment. New alignment will result in maximum 7 m fill and 9m cut.
- 1995, 02 Memorandum by P. Luchka to V. Diyaljee. Re-alignment south of Dunvegan Bridge. The existing bridge is in the best location and the bridge will be kept in service till 2045. Re-alignment alternatives result in