

GEOHAZARD RISK ASSESSMENT
CENTRAL REGION

SITE C35: H590:04 DITCH EROSION

LEGAL LOCATION: **SE 29-35-21-W4**

REFERENCE LOCATION
ALONG HIGHWAY: **9+870**

UTM COORDINATES: **N 5766170** **E 366227** **(NAD83)**

AT FILE: **H590:04**

AT PLAN & PROFILE:

Date of Initial Observation: May 27, 2005

Date of Previous Inspection: May 17, 2011

Inspected By: Klohn Crippen Consultants Ltd.

Date of Current Inspection: **June 15, 2012**

Inspected By: Klohn Crippen Berger Ltd.

Instruments Installed: none

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

Last Updated by: Klohn Crippen Berger Ltd.
Date: July 15, 2012

Location and General Description of Instability

About 10 km west of Big Valley, Highway 590:04 crosses the Red Deer River valley. For about 2 km west of the river and 3 km east of the river there are numerous erosion features along both sides of the highway. Runoff generally flows from the higher terrain on both sides of the Red Deer River along the highway ditch towards the river.

Geotechnical Conditions

The stratigraphy of the area comprises silty clay and feldspathic sandstone of the Horseshoe Canyon Formation, which is highly susceptible to erosion

Chronology (Refer to Section G for Further Information)

May 2005

Numerous erosion features along highway on both sides of Red Deer River. It was recommended that the erosion features be mapped in detail to assess the extent of work required along the highway

June 2006

Eighteen erosion features were identified in a comprehensive survey. The erosion features are summarized in Table A1.

June 2009

No significant changes in the erosion features near the highway were noted.

June 2010

At the time of the July 2010 inspection, an increase in the size of several of the erosion features compared to 2009 was noted. It was raining at the time of the July 2010 inspection and the ditches were experiencing significant flow. It was evident that further erosion was occurring at the time of the inspection.

May 2011

Increase in the size of several of the erosion features was noted. It is recommended that the ditches be repaired with Geo-cells filled with gravel.

June 2012

Many erosion features beside highway. The erosion features have continued to increase in size since the last inspection.

Table A1 Summary of Erosion Features

Erosion Feature	Location	Category	Description
1	km 1.2 W	Minor	Erosion channel approximately 1.2 m wide, 0.7 m deep and is located about 5 m north of the road edge. The erosion channel begins 1.2 km west of the west abutment of the bridge over the Red Deer River and extends 400 m to the east. Minor erosion is also evident from 1.6 km to 1.2 km west of the west bridge abutment.
2	km 1.0 W	Minor	Erosion channel running parallel to the highway, about 10 m to the south. From 1.6 km to 0.9 km west of the west bridge abutment there is evidence of a small amount of erosion. Some rock has been placed in the channel. From 0.9 km to 0.6 km west of the west bridge abutment, the channel varies from 0.7 m to 1.5 m in width and from 0.4 m to 0.9 m in depth. Water flowing through this erosion channel feeds into erosion feature 4.
3	km 0.8 W	Major	Erosion channel extending from erosion feature 1 and is located on the north side of the highway. At 0.8 km west of the west bridge abutment, the erosion channel is approximately 2 m wide, 1.2 m deep and 10 m north of the highway. At 0.7 km west of the west bridge abutment, the erosion channel is approximately 3 m wide, 2.5 m deep and 25 m north of the highway. The erosion channel continues to widen and deepen as it extends east to the river valley. However, the highway curves south; therefore the distance between the highway and this particular erosion channel increases.
4	km 0.6 W	Major	Erosion channel located approximately 0.6 km west of the west bridge abutment on the south side of the highway. Beside the road, the erosion channel is about 2 m wide and 1.5 m deep. Approximately 10 m further south, the channel expands to about 4 m wide and 3.5 m deep. The erosion channel continues to expand as it progresses further south of the highway.
5	km 0.5 W	Minor	Erosion channel leading from the road, down the south bank of the highway to a culvert located approximately 0.5 km west of the west bridge abutment. The erosion channel varies from 0.9 m to 0.13 m wide and from 0.4 m to 0.9 m deep.
6	km 0.3 W	Minor	Erosion channel running parallel to the highway from 0.2 km to 0.5 km west of the west bridge abutment. The channel is about 5 m to 10 m south of the highway. The channel also varies from 0.7 m to 2 m in width and from 0.6 m to 0.13 m in depth. A culvert is located near the east end of the channel.
7	km 0.3 W	Minor – Major	Erosion channel located on the north side of the highway. The channel extends from 0.5 km west of the west bridge abutment to a culvert located at 0.2 km west of the west bridge abutment. The channel is approximately 2 m wide and about 0.5 m deep. It is located about 5 m from the highway near the culvert, but is within about 2 m of the highway from 0.4 km to 0.3 km west of the west bridge abutment. Soil has also been eroded from the crown and the east side of the culvert.
8	km 0.05 W	Minor	50 m long erosion channel that is approximately 10 m north of the highway. The channel begins about 50 m west of the west bridge abutment. The channel is roughly 2 m wide and 1.6 m deep.
9	km 0.0 W	Minor	Erosion channel begins about 20 m south of the west bridge abutment

Erosion Feature	Location	Category	Description
			and extends about 15 m to the south east. The channel ranges from 0.7 m wide and 0.6 m deep at the top to 0.3 m wide and 0.4 m deep at the bottom.
10	km 0.0 W	Minor	Located underneath of the west side of the bridge deck. An erosion channel of about 0.5 m in depth and 0.6 m in width runs from the bridge abutment down to the edge of the river bank.
11	km 0.0 E	Minor	Minor erosion channel located underneath the east side of the bridge deck. It runs from the bridge abutment to the edge of the river bank.
12	km 0.5 E	Minor	Erosion channel filled with riprap. It is located approximately 5 m south of the highway and 0.5 km east of the east bridge abutment. The rock filled channel extends for about 50 m and is roughly 1 m wide and 0.4 m deep.
13	km 0.5 E	Minor - Major	Rock-filled erosion channel located about 5 m north of the highway and 0.5 km east of the east bridge abutment. The rock filled portion of the erosion channel is approximately 50 m in length, 3 m in width, and 1.5 m in depth. The channel begins further east, but it is referred to as erosion feature 14 because the channel is unlined.
14	km 0.6 E	Minor - Major	Erosion channel draining into erosion feature 13. It begins about 0.7 km east of the east bridge abutment and extends about 150 m to the west. The erosion channel is located about 5 m north of the highway. The main portion of the channel is about 1.5 m wide and 0.8 m deep, with an erosion cavity about 2.5 m wide and 1.2 m deep at the east end of the channel.
15	km 0.8 E	Major	Erosion channel that begins about 0.9 km east of the east bridge abutment and 10 m south of the highway. Initially, the channel is about 1 m wide and 1 m deep running west along the fence line for about 100 m. The channel then turns south and enlarges to about 10 m wide and 2.5 m deep near a culvert located 0.8 km east of the east bridge abutment. The channel continues to increase in size as it extends away from the highway to the south.
16	km 0.9 E	Minor - Major	50 m long erosion channel that is located between 0.8 km and 0.9 km east of the east bridge abutment. The channel runs parallel to the highway about 10 m to the north. It is about 2 m wide and 1.2 m deep.
17	km 1.1 E	Minor	10 m long erosion channel that is located about 1.1 km east of the east bridge abutment and 10 m south of the highway. The channel is about 0.7 m wide and 0.4 m deep.
18	km 2.0 E	Minor	Erosion channel beginning about 2 km east of the east bridge abutment and 5 m north of the highway. The channel runs parallel to the highway for about 300 m to the west. It is roughly 0.7 m wide and 0.5 m deep.