SITE C21: H576:02 Internal Erosion and Settlement

LEGAL LOCATION:	15-29-17-W4
REFERENCE LOCATION ALONG HIGHWAY:	
UTM COORDINATES (NAD 83):	**N 5,703,395 E 408,280**
AT FILE:	H576:02
AT PLAN & PROFILE:	
Date of Initial Observation:	2001
Date of Previous Inspection: (Inspected by)	May 16, 2002 (KCCL) May 21, 2003 (KCCL) May 18, 2004 (KCCL)
Instruments Installed:	1 Slope Inclinometer (2001) 3 Pneumatic Piezometers (2001)
Instruments Operational:	None
Reading Dates: (Read by)	May 15, 2003 (KCCL)
Risk Assessment:	PF(9) * CF(4) = **36** (Prior to Remedial Work)
Last Updated by:	Klohn Crippen Consultants Ltd. (KCCL)
Date:	June 2004

Location

The intersection of H851 and H576 is located approximately 28 km east of Drumheller. About 150 m east of the intersection, an approx. 70 m length of highway was experiencing cracking, internal erosion, and significant settlement.

General Description of Site Conditions

The area of cracking and settlement of the highway extended for a length of about 70 m. The cracks were showing signs of internal erosion and were up to 200 mm wide by 500 mm deep. It was considered that internal erosion was occurring under the approx. 3 m high embankment leading to collapse and settlement.

AMEC's review of the airphotos as part of the 2001 site investigation indicated that the construction of H576 blocked the natural north to south drainage pattern of the area. The outcome of this is that a ponded water area about 15 m wide by 150 m long is present to the north of the highway creating a seepage gradient through the fill. The highway surface is about 1 m higher than the water level. To the south of the highway, the vegetation denotes a seepage area.

The instrumentation was indicating that the highway fill was saturating as a result of the ponded water to the north. Due to the general nature of high plasticity fills of this type and based on the SPT N values observed, it is estimated that the fill was not compacted to an adequate density. It is assumed that the material is highly dispersive as evidenced by several sinkholes and collapse features observed along the shoulder of the highway. The dispersion and internal erosion is resulting in voids that are subsequently collapsing.

Geotechnical Conditions

A site investigation program at the site was conducted in June 2001 by AMEC Earth and Environmental and is reported in the document "Geotechnical Slope Assessment, Secondary Highway 576 Near Drumheller, Alberta", dated September 2001.

The stratigraphy at the slide location comprises 3.1 m of high plasticity clay fill over 4.8 m of high plasticity clay till overlying sandstone bedrock at 7.9 m depth. The fill and till are both described as silty clay with trace of sand with a soft to firm consistency. The material is generally of high plasticity with liquid limits in the range of 50% to 60%. Below about 2 m, the natural moisture content is very consistent at about 25%. SPT N values range from 5 to 14, with an average of about 10. Three pneumatic piezometers and one slope inclinometer were installed at the site in 2002. These were destroyed as part of the remedial work in 2003.

Chronology (Refer to Section G for Further Information)

June 2001
Site investigation by AMEC Earth and Environmental in an area of cracking along the shoulder on the south side of the highway.

2003
Severe settlement of the highway is observed. Pond to the north is drained via a new culvert and highway is re-graded to remove dip. The approximate cost of the work was $30,000 for the new culvert and about $15,000 for the re-grading work.

Reports and Documents

May 2004 Inspection Form (KCCL)
May 2003 Inspection Report (KCCL)
May 2002 Inspection Report (KCCL)
November 2002 Instrumentation Report (KCCL)
June 2002 Instrumentation Report (KCCL)
Geotechnical Slope Assessment (AMEC), September 2001