GEOHAZARD ASSESSMENT PROGRAM

NORTH CENTRAL REGION – ATHABASCA

2010 INSPECTION

Government of Alberta ■ Transportation

THURBER ENGINEERING LTD.
GEOTECHNICAL ▪ ENVIRONMENTAL ▪ MATERIALS

Site Number	Location	Name	Hwy	km
NC 58	6.5 km west of the junction between Hwy 881 and 858 to the north of Lac La Biche	**NORTH OF LAC LA BICHE**	858:02	45.85
Legal Description		**UTM Co-ordinates (NAD 83)**		
SW- 30-68-13-W4M		12 N 6085029 E 436771		

	Date	PF	CF	Total
Previous Inspection:	June 22, 2009	10	3	30
Current Inspection:	May 28, 2010	13	4	52
Road AADT:	230		**Year:**	2009
Inspected By:	Tarek Abdelaziz, Don Proudfoot (Thurber) Roger Skirrow, Neil Kjelland, Arthur Kavulok, Calvin Kissel (TRANS)			
Report Attachments:	☑ Photographs ☑ Plans ☐ Maintenance Items			

Primary Site Issue:	An active landslide occurred after a heavy rainfall event, causing severe pavement distress on the eastbound lane of the highway	
Dimensions:	About 100 m along the highway and 26 m perpendicular to the highway centerline	
Date of any remediation:	None	
Maintenance:	Highway patched in Fall 2006, Fall 2007, May 2008, September 2008, September 2009, and October 2009 (after June, 2009 site visit). Gravel placed in late 2009 to flatten/smooth out the side slope at the edge of the asphalt patch	
Observations:	**Description**	**Worse?**
☑ Pavement Distress	Up to 100 mm depression in the highway EBL bounded by the slide cracks	☑
☑ Slope Movement	Distortion of the fence on the south side of the highway since 2008; titling trees by the fence; up to 50 mm wide cracks with 150 mm differential heights in the eastbound lane surface	☑
☐ Erosion		☐
☐ Seepage		☐
☐ Bridge/Culvert Distress		☐
☑ Other	Sharp drop on the edge of the eastbound lane due to placement of multiple pavement overlays in the past; The area bounded by the distorted fence and the tree line has a hummocky terrain landform; areas outside this area are much flatter	☑
Instrumentation: (2 SIs, 3 PNs) SI10-1 and SI10-2 started to show drastic increases in the rates of movement in May 2010.		

The rates of movement increased from about 30 mm/ yr between April 14 and May 7, 2010 to 220 mm/yr between May 7 and 26, 2010 and further increased to 550 mm/yr between May 26 and June 16, 2010.

Water levels in PN10-1, PN10-2, and PN10-3 are 2m, 0.7m, and 0.6 m BGS, respectively.

Assessment (Refer to attached Figure)**:**

The slide is a translational landslide situated in the native soft to firm organic clay underlying the peat layer below the clay fill. It appears that the presence of compressible soft soils and high ground water levels in the clay fill are the main triggers of existing slide movement and continued settlement of the highway surface. Although the toe of the slide is not well defined, the slide is probably toeing at somewhere between the distorted fence and the tree line.

The slide moved at higher rates since last year and caused significant deterioration to the highway eastbound lane surface since the 2008 site inspection visit. This is evidenced from the widening of cracks, the dip along highway EBL surface, and the instrument readings.

The movement rates increased in the slope inclinometers by about 185 mm/yr between April and May 2010. The increase in the movement rates is consistent with the 0.5 m increase in water levels occurred on the south side of the highway between April and May 2010.

If the slide continues to move at the current rates, closure of the highway eastbound lane may be required at some point in the near future.

Recommendations:

In the short term, the MCI should seal any open cracks on the highway surface. A new ACP patch is not recommended at this point as it will increase the slide driving forces and accelerate the slide movement, unless some of the existing asphalt is first milled off to compensate for the patch. Additional gravel should be delivered to the site to smooth out the sharp drop off along the edge of the highway EBL. Slide warning signs/ reduced driving speed and bump signs may be used on the boundaries of the slide area to warn motorists and ensure their safety.

Thurber is currently preparing a design and tender package to remediate this site using a 15 m deep driven steel piles, which will be installed along the south sideslope to buttress the highway. The estimated cost for the work is expected to be in the order of $600,000 to $700,000.