

GEOHAZARD ASSESSMENT PROGRAM
NORTH CENTRAL REGION – ATHABASCA
2009 INSPECTION



Site Number	Location	Name	Hwy	km
NC 25	16 km east of Hwy 41:22 near the Town of Lindbergh	WEST LINDBERGH HILL	646:04	16
Legal Description		UTM Co-ordinates (NAD 83)		
NW-27-56-5-W4M		12 N 5969352.8	E 522398.9	

	Date	PF	CF	Total
Previous Inspection:	June 6, 2008	9	2	18
Current Inspection:	June 22, 2009	9	2	18
Road AADT:	1280	Year:		2008
Inspected By:	Tarek Abdelaziz, Don Proudfoot (Thurber) Roger Skirrow, Calvin Kissel (TRANS)			
Report Attachments:	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input type="checkbox"/> Maintenance Items			

Primary Site Issue:	Active slide movement on the north side slope causing pavement distress of the highway roadway surface along the east and west bound lanes.	
Dimensions:	About 75 m along the highway and 80 m wide perpendicular to north edge of highway.	
Date of any remediation:	Construction of a tied-back concrete wall to retain slide mass along with minor earthwork (completed in July 2007). Highway was overlaid in late 2007.	
Maintenance:	None since construction completion in 2007	
Observations:	Description	Worse?
<input checked="" type="checkbox"/> Pavement Distress	Dip on the WBL by 5 mm along the western portion of the slide. 25 mm wide diagonal reflective crack at the west limit of the slide	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	Settlement of soil in contact with the wall at the downslope side by 150 mm	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	Erosion gullies developed downslope of the highway at the east side of the slide in 2008 were vegetated	<input type="checkbox"/>
<input type="checkbox"/> Seepage		<input type="checkbox"/>
<input type="checkbox"/> Bridge/Culvert Distress		<input type="checkbox"/>
<input checked="" type="checkbox"/> Other	North side slope was vegetated compared to the last site visit in 2008	<input type="checkbox"/>
Instrumentation: (4SIs, 2SPs, 6 VCs)		
SI02-1 and SI07-3 showed no discernible movement. The rate of movement ranged from 1.4 mm/yr to 7.4 mm/yr in SI07-1 and SI07-2. The load increased in the majority of the anchors by 1.90 kN to 6.10 kN.		
Water level decreased in SP02-4 by 0.80 m. SP02-1 showed no change in water level.		

Assessment (Refer to attached Figure):

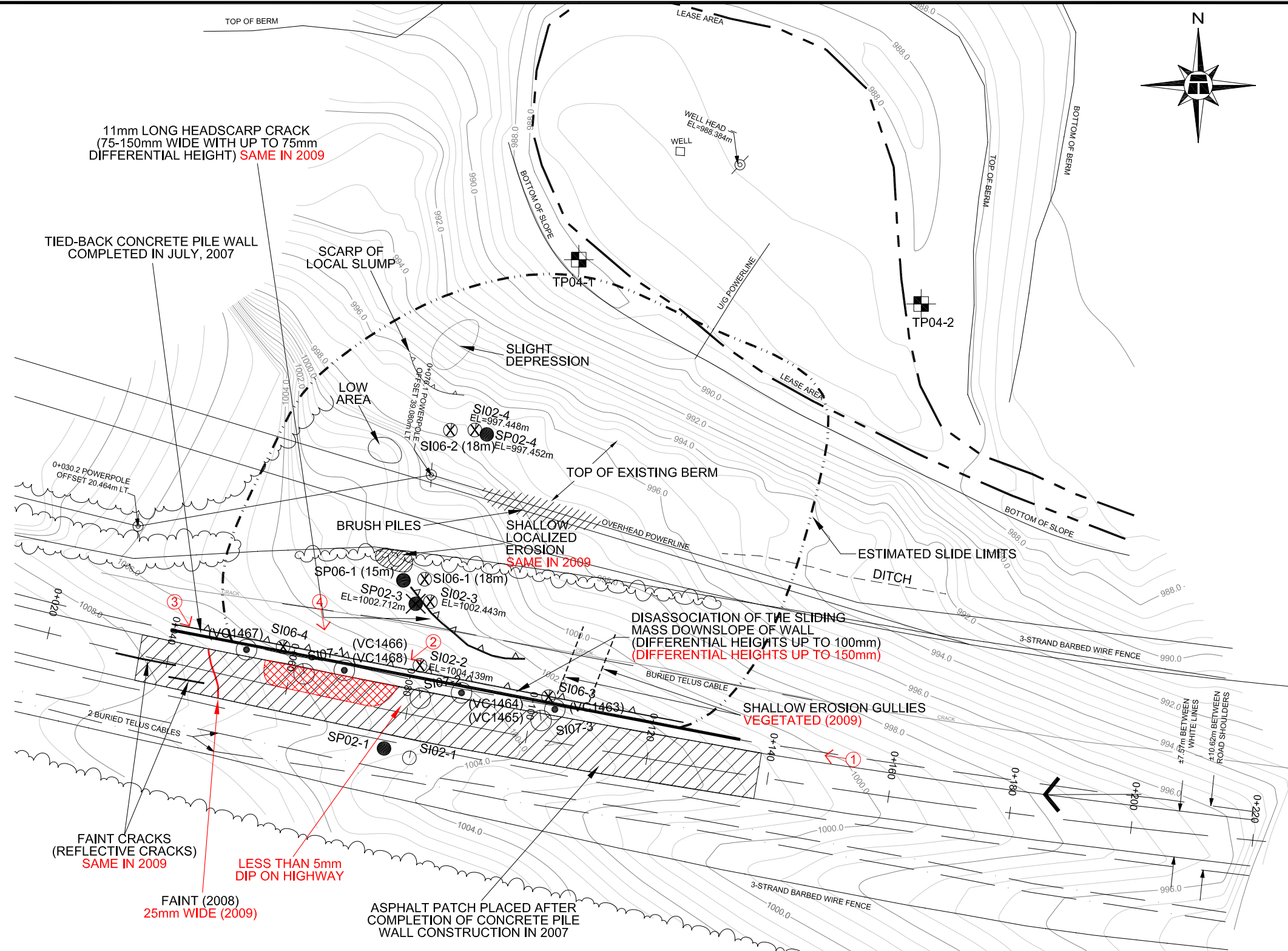
The site observations and the instrument readings indicated that the pile wall has been effective in retaining the portion of the slide mass along the highway. The slide mass has crept a bit above the wall and more noticeably along the west side of the old slide as revealed from the dip on the highway, the open diagonal crack, and the instrument readings. The lateral thrust of the slide mass on the wall resulted in slight downslope movement of the wall and accordingly an increase in the anchor loads.

The slide mass downslope of the wall has been very active and the scarp crack developed along the wall face dropped by 50 mm since last site visit in 2008.







Recommendations:

In the short term, open cracks on the highway surface should be sealed to prevent the built up of excess pore water pressure on the wall. The scarp cracks immediately downslope of the pile wall should be regraded and filled. Gravel may be temporarily used to smooth the side slope at the contact between the wall and the downslope slide mass to protect runaway cars from a sharp drop along the face of the wall. In the long term, it will be required to install a guardrail along the shoulder of the highway; otherwise a toe berm will be required to stabilize the downslope slide mass.

As discussed on site, this site will be removed from the Geohazard Assessment Program. However, semi-annual instrumentation monitoring will be continued to appraise the ongoing effectiveness of the remedial measure. The local MCI should continue to monitor and record the development of any new cracks/depression on the highway paved surface.



LEGEND

-  TEST PIT
-  SLOPE INCLINOMETER (OPERATIONAL)
-  DAMAGED
-  SLOPE INCLINOMETER (SHEARED OFF)
-  LOAD CELL
-  APPROXIMATE PHOTOGRAPH LOCATION AND DIRECTION (JUNE 22, 2009)

NOTE: JUNE, 2009 FEATURES SHOWN IN RED

BASE PLAN SURVEYED BY EXH ENGINEERING SCIENCES LTD.

THURBER PROJECT #15-16-224

ALBERTA TRANSPORTATION	
NC25 - HWY 646:04 km 16 WEST LINDBERGH HILL SLIDE INSTRUMENT LOCATIONS AND SITE FEATURES (JUNE, 2009)	
LINDBERGH, AB	NE 27-56-5-W4M


		THURBER ENGINEERING LTD.	
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS			
ENGINEER:	TSA	DRAWN:	HH
DATE:	DECEMBER 2009	SCALE:	1:750
		APPROVED:	
		DRAWING No.:	15-16-224-NC25



Photo #1 General view of highway surface at slide location, looking west



Photo #2 Looking southwest at the slight dip on the highway WBL, note the dip below the passing vehicle



Photo #3 Open arc-shaped crack at the western limit of the slide, looking east



Photo #4 Existing crack along the downslope face of the wall, looking south