

**STONY PLAIN REGION
GEOHAZARD RISK ASSESSMENT
SITE INSPECTION FORM**

SITE NUMBER AND NAME: NC 23 – Landslide near Greenwood Lake Road	HIGHWAY AND KM: Hwy 39:06, km 13.08	PREVIOUS INSPECTION DATE: June 17, 2008	INSPECTION DATE: June 2, 2009
LEGAL DESCRIPTION: NE 4-49-5-W5M	NAD 83 COORDINATES: -44710 E, 5896868 N	RISK ASSESSMENT: PF: 8 CF: 4 TOTAL: 32	

SUMMARY OF SITE INSTRUMENTATION: Slope Inclometers: 4 Pneumatic Piezometers: 7 Standpipe Piezometers: 1	INSPECTED BY: Adam Gmeinweser, P. Eng. (EBA) Chris Gräpel, P. Eng. (EBA) Roger Skirrow, P. Eng. (TRANS) Sabhago Oad, P. Eng. (TRANS) Neil Kjelland, P. Eng. (TRANS) Rocky Wang, P. Eng. (TRANS)
LAST READING DATE: May 19, 2009	
PRIMARY SITE ISSUE: Highway situated on a large historic landslide; lower west flank portion continues to move causing pavement distress	
APPROXIMATE DIMENSIONS: 350 m long extending to the crest of the valley slope	
DATE OF REMEDIAL ACTION: Westbound climbing lane constructed 2007, resulted in overlaying cracks in pavement. French drains installed during 2007 construction to prevent blocking seepage. Horizontal drainage galleries and gabion wall along Modeste Creek installed in 2005.	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Pavement dip and cracking located west flank of landslide area		X
Slope Movement	X		Lower portion of landslide experiencing movement		X
Erosion	X		Rill erosion present from rainwater drainage and culvert	X	
Seepage	X		Moisture observed from French drains.		X
Culvert Distress		X	Running water heard in west drainage gallery.		X

COMMENTS:

North slope filled and re-graded in 2007 during construction of the new passing lane.
Location and site plan shown on Figure 1.
Site conditions shown in Photos 1 to 4.
Risk level unchanged from 2008.

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SITE OBSERVATIONS:

- The north slope was filled and re-graded during the construction of the new passing lane in 2007. This slope did not have any vegetation growing on it as it was not topsoiled or seeded after construction.
- The highway is super-elevated slightly to the south towards this slope. As such, rainwater falling on the highway slope is draining onto the unvegetated slope face and is causing rill erosion.
- A culvert located at approximate km 13.1 discharges onto a small armoured splash pad on the slope face. However, the water drains over un-vegetated fill to the toe of the embankment. A shallow gully is beginning to form in the place of the rill erosion observed in 2008.
- One wet and dark fill area was noted and may be the location of a buried drain. Weeping tile was observed at one of the French drain locations along the base of the embankment.
- The east drainage gallery for the horizontal drains was opened and inspected. This gallery did not have any flow entering it. The west gallery could not be opened but the sound of running water could be heard.
- The gabion basket structure that supports and armours the drainage gallery discharge was in good condition. Some minor erosion was noted on the west flank.
- The side slope in the vicinity of the culvert extension at km 13.1 was observed to be locally steeper than the surrounding side slopes, a condition noted in previous inspections.

RECOMMENDATIONS:

- The existing landslide should be continuously monitored through instrumentation and annual inspection to assess the response to the newly constructed passing lane.
- Install a slope inclinometer and piezometers through the asphalt surface of the passing lane to monitor the new fill slope
- All toe drains beneath the passing lane fill should be exposed to ensure drainage is not reduced by the fill; they should be extended and backfilled with free drainage gravel to ensure proper drainage.
- The side slope near the culvert at km 12.9 should be flattened to minimize reactivation of the historic movements. The culvert should be extended.
- The upper portion of the south embankment should be hydroseeded to improve vegetation to help reduce rill erosion.
- The rip rap splash pad on the outfall side of the culvert should be extended to the base of the embankment to reduce erosion occurring on the slope.
- Effects of erosion should be repaired at the west flank of the gabion structure adjacent to the drainage galleries; additional fill and grading should be implemented to direct surface water drainage to reduce the potential for reoccurrence.