

**PEACE REGION – GRANDE PRAIRIE  
GEOHAZARD RISK ASSESSMENT  
SITE INSPECTION FORM**

SITE NUMBER GP-24	SITE NAME Hamelin Creek Slide BF-76987	HIGHWAY & KM Hwy 725:02	PREVIOUS INSPECTION DATE May 22, 2013	INSPECTION DATE May 28, 2014
LEGAL DESCRIPTION LSD 11-5-81-8-W6M	NAD 83 COORDINATES N 6,207,569 E 361,702	Previous Risk Assessment PF: 2                      CF: 4                      TOTAL: 8		
		<b>CURRENT 2012 RISK ASSESSMENT</b> <b>PF: 2                      CF: 4                      TOTAL: 8</b>		

<p>SUMMARY OF SITE INSTRUMENTATION:</p> <p><b><i>Totals Operational instruments Operational</i></b> Slope Indicators (8 pcs) Piezometers (8 pcs)</p> <p><b>LAST READING DATE:</b> LAST READING DATE:     May, 2014 For details, refer to 2014 Cycle 1 Instrumentation Report</p>	<p>INSPECTED BY:</p> <p><u>Inspection Group:</u></p> <p>(i)KarlEng: Karl Li, Justin Kei (ii) AT: Ed Szmata, Ted Prue, Ken Misik, Rocky Wang</p>
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INSTRUMENTATION Monitoring Results/Updates:  
(reiterated from previous report)

A) At upstream face of fill embankment, lateral spreading and creep movement of fill monitored at a 5m zone between depths of 9m to 14m. This movement has drastically slowed down at several months after installation (2003) of stone columns and reconstruction of top portion of fills. Current movement rate is apparently slow.

B) Shear movement of NW valley slope was monitored (about 14m to 17m depth range from surface of upstream slope) and was likely buttressed at completion of reconstruction (2003) of fills. Movement rate (5-7mm/yr from 2007 to 2012) is currently considered slow and decreasing.

C) For current maintenance stage (starting Fall 2011), a review of the instrumentation monitoring results indicate that no drastic movements or change of groundwater regime is apparent. It is apparent that substantial stabilization of site has been effective.

Note:    a) Refer to 2014 Cycle 1 Instrumentation Report for details  
          b) Refer to earlier Slide Tour Report(s) for other detailed comments

**PRIMARY SITE ISSUE:**  
This site will be discontinued (2015) for future inspection. The site has been quiet for past 3 years (2011-2014) and assessed as adequately stabilized.  
*(Reiterated from previous reports)*  
The following salient points are provided. (Refer to details in the 2008 and earlier Slide Tour Reports)

A) New Arch Concrete Culvert Construction Stage (2002).  
- Sliding Failure of a 30m high fills (constructed of frozen soils) occurred and caused structural

deformation to new arch culvert beneath. Sliding movement of adjacent valley slopes was likely triggered as their toe area were off-loaded by excavation for deepening of upstream river channel.

- The design of new arch culvert has included a channel realignment design which entailed a deepening (about 5m) of channel gradeline and a convergent confluence of 2 watercourses (Hamelin Creek and a tributary creek) to inflow the new culvert via a 90 degree flow entry
- The sliding failure of frozen fill was investigated and a remedy repair was designed by Thurber Consultants. The remedy design entails (i) installation of stone columns to stabilize the frozen fills left-in-place at/below culvert level and (ii) removal of frozen fill and reconstruction new fills above culvert level so that the installed precast culvert (already inplace) can be preserved without reconstruction.
- As result of channel deepening and its realignment, bank slumping(s) and movement of valley slope resulted along new excavated channel along inlet stretch

B) After 2002/2003 Stabilization of Slide and Reconstruction of Fills, it was recognized that the following remaining site distresses once prevailed (but was repaired in Spring 2013):

- Continual settlement of fill as a portion of frozen fill (at and below culvert level) was left in place. Lateral spreading of fill apparently was continuing. With time it was apparent that the distress was decreasing.
- Slumping failure (**Slump 4**) of banks along the upstream stretch of newly excavated Hamelin Creek channel
- Sliding movement of fills at inlet and outlet ends of arch culvert. At south toe (**Slump 3**) of inlet wing-wall and at south toe (**Slump 2**) at outlet of culvert of Hamelin Creek
- A fillet of fill slumping (**Slump 1**) at NW corner of road (junction of an north access) at verge of north end of approach fill.
- Structural deformation of arch culvert was surveyed.
- Two backslope failures at cut slopes (west and east) at south approach
- In 2010, remediation work for the above Slump 1-4 zones was carried out by a contractor and considered substantially completed. The remediation work was designed by Thurbers.
- Since a remediation design for above site distress areas (Slumps 1,2,3 &4) was constructed and the site thus ended its remediation stage (Fall 2011). Thus in Fall 2011, AT bridge engineer transferred the site custodianship to AT Regional and Geotechnical Offices for site maintenance. Thereafter, the site is categorized in its maintenance stage (Fall 2011) with responsibility of its instrumentation monitoring under the regional geotechnical consultant (KarlEng)

**Note:**

**Refer to previous Slide Tour and earlier reports for details.**

**APPROXIMATE DIMENSIONS:**

(Reiterated from previous report)

Items of Distress:

- (i) Approx. 0.3km length of high fills (30m in height) (previous frozen fill failure) undergoing continual settlement distress. Future rate of settlement can be expected to decrease.
- (ii) Backslope failures at both sides (east side and west side) of south approach Each backslope slide can measured about 40m x 40m each. Backslope heights can be estimated at 30m. The west backslope slide is longer (along roadway direction) in length. The east backslope slide is more active and may toe roll to block the ditch.

Prior to 2010 repair, the following site distress were noted. They were subsequently repaired in 2010.

- (iii) The central portion of the of concrete arch (200m in length) can be under structural distress
- (iv) Approx. 100m stretch of bank slumping at upstream Hamelin Creek
- (v) Approx. 30m x 30m area of sliding of fill at culvert inlet toe at top of south wing-wall as well as a toe slide at culvert outlet.

**DATE OF ANY REMEDIAL ACTION:**

Items of remediation

- (i) 2002/2003 has completed remediation and reconstruction of (previously failed frozen fill)
- (ii) 2009 (Approx). Two pairs of strap beams were installed at mid section of crown of arch culvert. (1 pair at 2+3 o'clock and 1 pair at 9+10 o'clock positions) for stiffening of any structural deformation of culvert.
- (iii) 2010 Spring – Repairs to Slumps 1,2,3,4 were carried out by contract.
  - Slump 1 (NW corner+access) – A repair by granular fill and subdrainage
  - Slump 2 (toe of fill at culvert outlet) - A repair by granular fill and subdrainage
  - Slump 3 (toe of fill at culvert inlet wingwall) - A repair by soil nails.
  - Slump 4 (Bank slumping at upstream channel) - A repair by soil nails and riprap armor of bank.

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
PAVEMENT DISTRESS	x		Settlement of fill at top of arch culvert has slowed down. Pavement contortion not as serious due to improved patching and milling workmanship		x
SLOPE MOVEMENT		x (recent **2010 repairs)	a) Lateral spreading of fill has substantial slowed down with lengthy dissipation of pore pressure with gradually thawing of frozen fills (stone columns) with time <u>Other slide movement has been arrested with</u> b) **Soil nails installed at upstream toe inlet wingwall area (Slump 3) and at upstream bank area (Slump 4) c/w riprap bank protection c) **Granular fill replacement and subdrains installed at NW road corner (Slump 1) and culvert outlet toe (Slump 2)		x
EROSION	b)	a) (recent **2010 repairs	a) Hamelin Creek - Bank erosion (Slump 4) **repaired along about 100m upstream stretch b) Tributary Channel - Shifting of channel bed out of intended		x

			riprap lined channel upstream of culvert inlet		
SEEPAGE	n/a		n/a		
CULVERT DISTRESS	?	x (recent **2010 repairs	Two pairs of strapped beam installed at mid section to stiffen culvert crown at 2+3 and 9+10 o'clock positions.		x
Settlement of Fill	x		<p>a) Only top portion of fill (frozen) embankment was replaced and reconstructed. Slow settlement of fill will still continue due to bottom frozen fills un-replaced.</p> <p>b) Bottom portion of frozen fill was left in place and fills was stabilized with stone columns which allow thawing of frozen fill and dissipation of pore pressure with long term settlement expected to decrease with time.**</p> <p>c) Settlement will be long term due to gradual consolidation of slowly thawing fills in response to rate of dissipation of excess pore pressure with time.</p>	**	x
<p><b>COMMENTS:</b>                  In current 2014 site visit, it was reviewed that                  1) No obvious deterioration of site has occurred over previous year (2013/2014). The site seemed to have stabilized and that no major geotechnical concerns can be observed. AT has instructed to discontinue annual inspection of this site.                  2) Annual inspection of this site will be discontinued.</p> <p>Important Note:                  This form assessment is an update for current year only. Please refer to the detailed assessment provided as in the earlier Slide Tour Reports for background understanding of this site.                  END</p>					



**Photo 1**

**Looking north (away from Hwy 49) and east shoulder**

- Fill embankment in good condition
- Pavement is rough and undulating due to previous settlement which seemed stabilised



**Photo 1a**

**Another view of pavement along west shoulder**

- Another view of fill embankment and pavement



**Photo 1b**

**Looking east at downstream of Hamelin Creek**

- Fill embankment looked OK

**Note: Photos taken on May, 2014**