PEACE REGION – GRANDE PRAIRIE
GEOHAZARD RISK ASSESSMENT
SITE INSPECTION FORM

SITE NUMBER	SITE NAME	HIGHWAY & KM	PREVIOUS INSPECTION DATE	INSPECTION DATE
GP-5	Cutbank North Slide	Hwy 40:40	June 2, 2011	July 12, 2012

LEGAL DESCRIPTION	NAD 83 COORDINATES	PREVIOUS RISK ASSESSMENT
LSD 9-21-65-5-W6M	N 6,056,268 E 391,516	PF: 7 CF: 6 TOTAL: 42
		CURRENT 2012 RISK ASSESSMENT
		PF: 3 CF: 6 TOTAL: 18

SUMMARY OF SITE INSTRUMENTATION:	INSPECTED BY:
<u>Operational</u> Slope Indicators 2 SI's <u>Piezometers</u> Nil piezo LAST READING DATE: May, 2012 For details, refer to 2012 Cycle 1 Instrumentation Report	(i)KarlEng: Karl Li, John Heilman (ii) AT: Ed Szmata, Mark Hoseasson, Roger Skirrow, Rocky Wang

INSTRUMENTATION Monitoring Results/Updates:
(Reiterated from previous report)

(i) At head of slide (sideslope of highway) and upper slope, movement was previously monitored at 17m depths at adjacent to highway shoulder area.

(ii) At mid and lower slope, SI (15m and 17m depths) was not deep enough to intercept slide movements. It is anticipated that movement can be deeper than 15-17m depths.

PRIMARY SITE ISSUE:
(Reiterated from previous report)
Sliding and subsidence movement of approach fill has been slowly ongoing since time of original grading construction in early 1980's.

- Subsidence occurring at fill juncture with natural ground of valley wall despite construction of a toe berm (in original 1980's grading construction). The slide headscarp has encircled the roadway.
- Subsidence of ground estimated at about 20mm per year (or smaller) and can be maintained by pavement patching

Note:
Refer to previous 2011 Slide Tour and earlier reports for details.

APPROXIMATE DIMENSIONS:
(Reiterated from previous report)

-Along roadway, the headcarp of slide (width @70m) has caused road contortion and cracking at cut/fill interface of the approach fill. Length of slope (slide) about 150m (from roadway to edge of toe berm).- About 4H:1V average slope can be estimated.

- This site is an approach fill construction up the Cutbank River valley. Top of fill is at 40m to 50m height above toe. A toe berm (about 3-5m in height) was constructed along Cutbank River flood plain at the original fill construction (early 1980's). Flood plain depositions likely prevalent of soft alluvial deposits with buried channel deposition (and abandoned ox-bow channel) environment.

DATE OF ANY REMEDIAL ACTION:
None.

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
PAVEMENT DISTRESS	x	x	Pavement cracking and settlement distress due to headscarp movement (at fill junction with natural valley slope) • Such minor pavement distress can be resolved by efficient milling and patching workmanship		x
SLOPE MOVEMENT	x	x	Movement of approach fills likely originated at basal and toe berm footprint area where soft alluvial deposits prevailed despite toe berm construction. -Movement rate is slow over past 30 years since original grading construction in early 1980's -Minor creep rate can be active		x
EROSION		x	Erosion of backslope ditch has been stabilized with riprap lining upgrades (2006/2012) and is performing well.		x
SEEPAGE		x	n/a		x
CULVERT DISTRESS		x			x

COMMENTS:
In current 2012 site visit, it was reviewed that

1) This site can be classified as INACTIVE, requiring no annual inspection review because:
2) No new deterioration has become obvious
   - Previous erosion along backslope ditch (soft sandstone material) (with a previous broken downdrain culvert located at top of backslope) has not deteriorated. Local MCI (Mark

Hoseasson) had been regrading this ditch with riprap stone linings from time to time as maintenance measure. No obvious concern.

- No significant subsidence movement across roadway pavement (at headscarp) was observed over past few years. It can be estimated that a prevalent magnitude 1-2 inch of settlement was observed over previous 3-5 years. Such minor subsidence concern can be resolved by maintenance operations of efficient milling and patching workmanship.
    - It is likely that consolidation settlement of this high approach fill can be at completion after over 30 years since original grading construction (early 1980's). It is believed that a large portion of previous settlement (and/or slide movements) can be related to toe relaxation.
    - It is likely active sliding movement (relaxation) from toe berm area has slowed down after over 30 years since toe berm installation. This likely resulted a lower rate of sliding movement to proliferate upslope (of this 30m high approach fills) to affect the highway pavement. The amount of subsidence from sliding movement has obviously decreased after over 30 years.
    - The level of probability of movement is downgraded to 6 from 7. Thus the new risk factor is downgraded to 18 (previously 42). The site is re-classified as INACTIVE as of 2012.
    - It is encouraging that the current milling (with use efficient milling equipment) workmanship has been improved to provide smooth riding surface across previous escarpment crossing area. With such improved milling and patching practices, the roadway serviceability and maintenance should not be a major issue.

However, in line with existing GMRP requirement, the following works should still be continued:

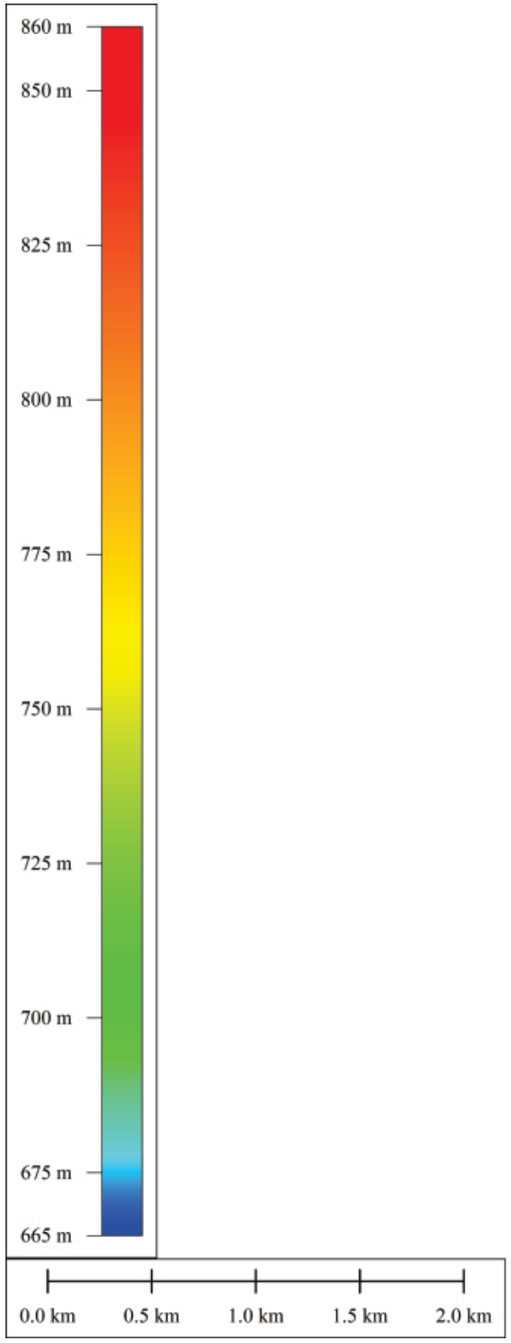
3) Pavement patching should be carried out as appropriate when significant subsidence movement and cracking of pavement occurs.
4) Monitoring of remaining instrumentation should be continued.

Important Note:
This form assessment is an update for current year only. Please refer to the detailed assessment provided as in the 2011 Annual Assessment Report and earlier Reports for background understanding of this site.

END

GP 5
Hwy 40 - Cutbank River North

UTM (NAD 83)	**E 391 471**	**N 6 056 223**



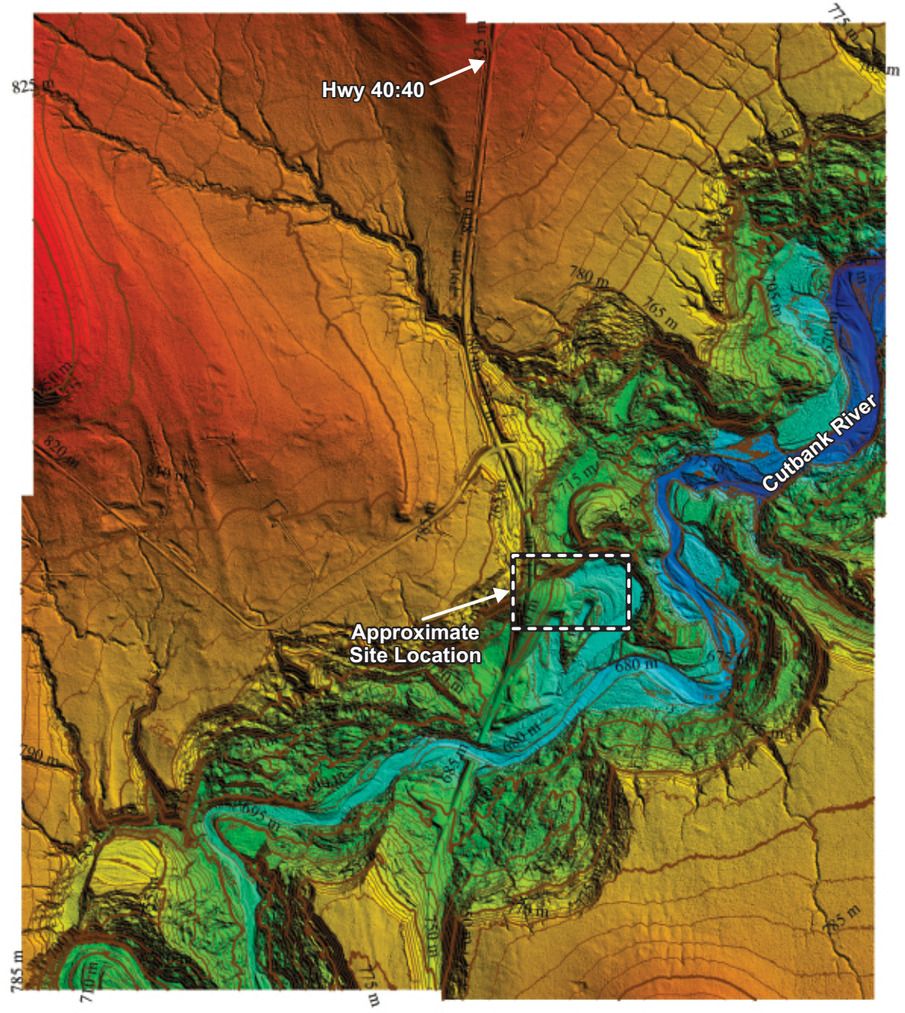


Figure 1
GP-5, Hwy 40:40

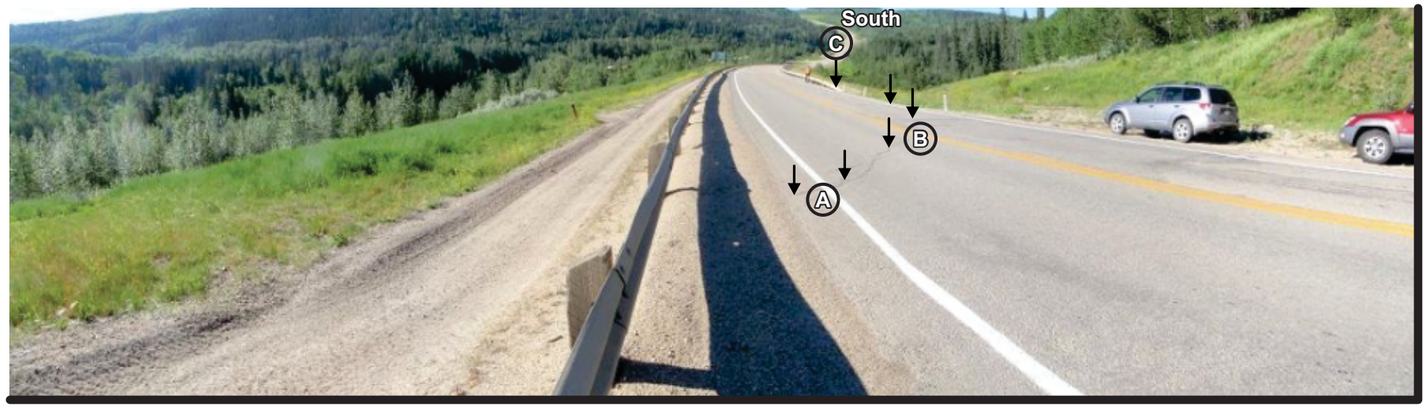


Photo 1

Looking south downgrade (towards Cutbank River and bridge) at headcarp of slide

- Headscarp cracking has encircled both lanes and backslope ditch (see Photo 2 for downgrade side of headscarp crack).
- Shape of headscarp (width of slide)(A-B-C) (to upgrade side) remained same for last 5-10 years
- Scarp subsidence of ditch is evident in recent years (see photo 1d)
- Slide movement (right to left) down this approach fill. Most movement can be attributed to relaxation of toe berm area and consolidation settlement of high approach fill
- Further movement (drop at headscarp) not as significant in recent 3-5 years and after over 30 years since construction (early 1980's)

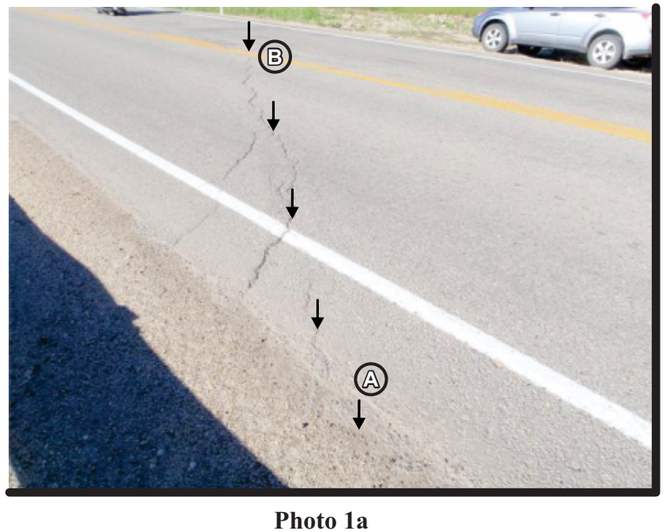


Photo 1a

Propagation of headscarp crack

- Close up of crack propagating from A (sideslope shoulder) to B (centreline) to C (guardrail along backslope ditch).
- Recent workmanship in milling and patching has improved significantly to smooth off the headscarp cracking unevenness. This has improved roadway serviceability.

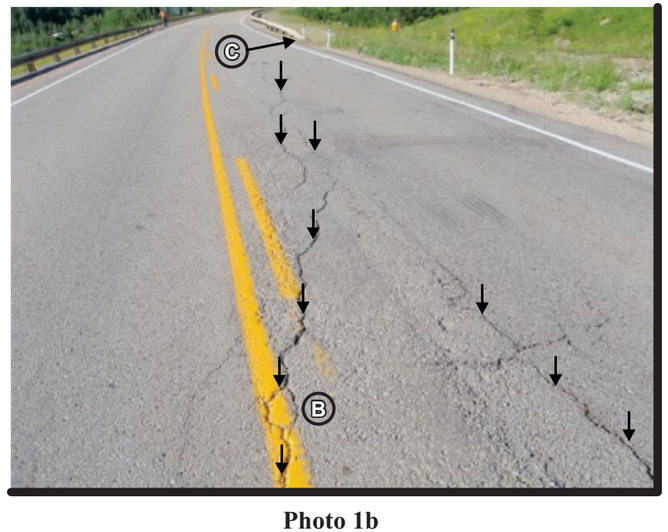


Photo 1b

Propagation of headscarp crack

- Close up of crack propagating from A (sideslope shoulder) to B (centreline) to C (guardrail along backslope ditch).
- Recent workmanship in milling and patching has improved significantly to smooth off the headscarp cracking unevenness. This has improved roadway serviceability.

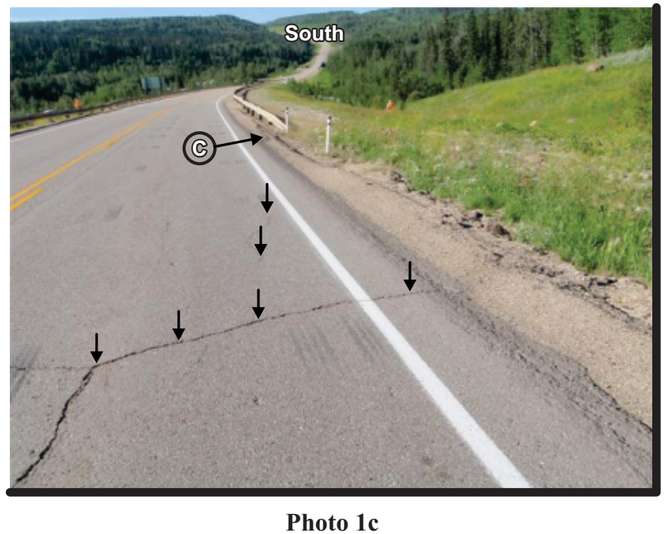


Photo 1c

Propagation of headscarp crack

- Close up of crack propagating from A (sideslope shoulder) to B (centreline) to C (guardrail along backslope ditch).
- Recent workmanship in milling and patching has improved significantly to smooth off the headscarp cracking unevenness. This has improved roadway serviceability.

Note: Photos taken on July 2012

Photo 1d
Propagation of headscarp crack
• Headscarp crack has imprinted onto backslope ditch area

Photo 1e
Patched area of headscarp crack
(Looking south towards Cutbank River and bridge)
• at downgrade side

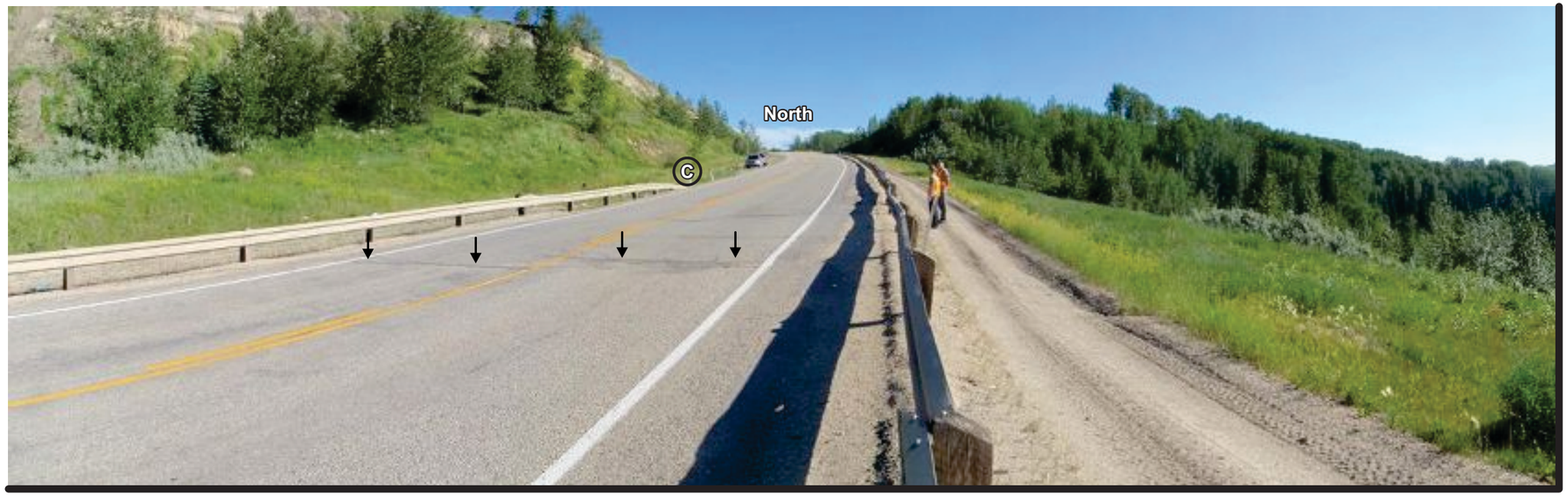


Photo 1f
Closed-up of headscarp crack (Looking north toward Grand Prairie)
• at downgrade side

Note: Photos taken on July 2012