



BRIEF SITE SUMMARY
AND
RISK ASSESSMENT

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| 1. Site (GP#35) | Hwy 733:04 Bad Heart River – North side |
| 2. Reference Location along Highway | Hwy 733:04 Bad Heart River – North side |
| 3. Legal Description | Section 33, Twp 75, Rge 3, W6M |
| 4. UTM Coordinate | N 6,155,233 E 412,158 |
| 5. AT File | |
| 6. Alberta Transportation Plan and Profile | |
| 7. General Description of Instability | |

Hwy 733:04 was constructed as a sidehill alignment to traverse the Bad Heart River valley and unstable valley slopes caused slide movement of highway alignment. Cracking and settlement of pavement occurred as a result. It was observed that the highway was upgraded from a winding local roadway to achieve higher geometric standards with sidehill cut/fill. It is apparent that the local soil strength cannot support fill slope of height of 8m to 10m along sidehills of the valley. Toe berming was constructed at one distress area (Upper slide) of this site.

For this site at north side of river, there are two slides.

- (i) upper slide at its northerly portion at the upper $\frac{3}{4}$ elevation of valley slope
- (ii) lower slide at its southerly portion at the lower $\frac{1}{3}$ elevation of valley slope

- Upper slide has its north flank of headscarp crack (at close to top of valley) reflected back repeatedly through the pavement patching. The slide headscarp already transgressed across roadway to the backslope. A subdrain was once installed along the backslope ditch around early 1990's to attempt to intercept seepage groundwater flow.
- Lower slide has substantially deteriorated within recent years (2004/2007) showing manifestation of pavement cracking and settlement. Contortion and undulation of roadway was obvious. The slide headscarp already transgressed across roadway to the backslope.
 - Pavement settlement in the range of 80 to 100mm was noted to occur over previous year 2006/2007
- It is likely that the lower slide will coalesce with upper slide into one big slide system.
- The total slide (Lower + Upper) can be about 300 m in length along the highway.

Previous instrumentation records indicated that shear movements were monitored generally at 7m to 12m depths along the sideslope and mid valley slope areas. The previous instruments were installed and the slide was investigated by MD/ID forces in the late 1990's when secondary highway operation was under their jurisdiction. It is understood that the investigation results were provided by Thurber Consultants (Report Ref. 19-2363-8 dated Feb 16, 1999). The previous instruments are not operational and cannot be monitored.

This site (especially the lower slide) has deteriorated significantly in recent 3-4 years (2005/2008). Pragmatic pavement patching was conducted to smooth off previous pavement contortion and to cover up pavement cracks. However, the pavement crack reflected back and contortion reappeared.

The possibility of realigning the highway to a new crossing location was raised as a long term planning strategy.

8. Date of Initial Observation

June 2000 (Slide Tour 2000)

9. Date of Recent Observation

June 2008 (Slide Tour 2008)

10. Instrumentation Installed

Previous installations by MD (Thurber Consultants Report Ref. 19-2363-8 dated Feb 16, 1999)

Hwy	Site	Instrument				Remarks
		SI #:	Length(m)	Piezometer (P) Standpipe Piezometer (PZ)	Depth (m)	
733:04	Bad Heart River					* SI sheared (2001) **malfunction
	North Slide	Non-Operational:				
	Slide 1 (upper slide)	SI-98-01*	21m			
		SI-98-02*	21m	PZ98-1**	15.2	
	Slide 2 (lower slide)	SI-98-03*	23m	PZ98-2**	10.3	
		SI-98-04*	21m	PZ98-3**	15.3	
SI-98-05*		22m				

11. Instrumentation Operational

None

12. Risk Assessment

$$PF (11) * CF (4) = 44$$

$$PF = 11$$

- Active slide and increasing rate of movement.

$$CF = 4$$

- Closure (to partial closure) of roadway may be required in case of slide deterioration.
- Detour route of about 50km would be required (via SH677 to north and SH 674 to the south).
- Roadway serves mainly local farm and homestead traffic.
- Consider the planning of realignment of highway towards the backslope to by-pass this slide affected area **OR**, a totally new alignment be strategized to cross this river valley because the south valley slope (GP-14) is under sliding distress as well.

Note:

The risk assessment is provided based on a categorization of Hazard Probability Factor (PF) and Consequence Factor (CF) as provided by AIT's RFP 2000.

PF 1 to 20 scale

CF 1 to 10 scale

13. Geotechnical Conditions

This site is located within the general Peace River area and Bad Heart River is a tributary to the Smoky River which flows to the Peace River. The upland topography above the Bad Heart River valley is gentle rolling terrain. Surficial deposits are generally glacial till and lacustrine clay deposits from past glaciations erosion and deposition as well as glacial lake deposition environments. Thickness of surficial deposits can vary from a few meters to 100 meter range and generally at increasing thickness at river valley areas.

Bedrock comprises of Cretaceous sandstone and shale. Sequences of bedrock formation (top down) can generally be 1) Wapiti Formation, 2) Smoky River Formation, 3) Bad Heart Formation, 4) Dunvegan Formation, 5) St. Johns Formation, and 6) Peace River Formations.

14. Chronology

1996 to 1999	Instrumentation and Investigation by MD when under their jurisdiction Refer to Thurber Consultants Report Ref. 19-2363-8 dated Feb 16, 1999
2000	Roadway jurisdiction was given back AT by MD.
2003-2008	Annual Inspection of site (Slide Tours 2003 to 2008)

END