

S2 – PRIDDIS

Background

The Priddis site is located on Highway 22:14, approximately 11 km west of the Priddis turn-off and approximately 10 km southeast of Bragg Creek (as measured along Highway 22). At this site the highway is oriented east-west as it ascends out of the Priddis Creek valley. The highway is located on a sidehill, with the south side upslope and the north side downslope.

The slope instability at this site consists of a moderately deep-seated (in the order of up to 10 m below road surface elevation) rotational failure (possibly with a translational component) encompassing the north shoulder of the road and extending nearly to the toe of the slope face to the north of the road. This is combined with a translational/spreading movement extending approximately 150 m downslope (north) from the toe of the highway embankment. The translational/spreading slide appears to be seated in relatively shallow, soft, wet soils, but is likely causing a loss of foundation support below the embankment fill.

No details of the first occurrence of the slide were included in the site file previously reviewed by AMEC. It is not known if the original slide encompassed the road, although it appears likely based upon the oversteepened slope face immediately adjacent to the north shoulder of the road and the fact that a pile wall is understood to have been installed along the north shoulder of the highway above the slide area, presumably to arrest movement extending beneath the road surface. No design or as-built information on the existing pile wall along the north shoulder has been available during the previous information review for this site.

Site assessments, installation and monitoring of slope inclinometers has been conducted at this site since at least the early 1990's. Please refer to Section A of the site binder for a more detailed discussion of the site background.

Site Assessment

The site assessment was performed on May 25, 2004. The weather at the time of the site assessment was clear and calm.

Please refer to Appendix S2 for a site plan illustrating the layout of the site. The highway surface and the slope face below the road were inspected down to the toe thrust of the translational movement north of the fenceline. The ground traverse extended to just north of the small creek flowing along the toe of the overall slope, approximately 20 to 30 m north of the fenceline below the road.

Observations

The following points summarize the observations made during the site assessment. Please also refer to Appendix S2 for a site plan and annotated photographs illustrating key observations. Please note that the instruments at this site were read after the May 25, 2004 site assessment, therefore the current instrumentation data was not available at the time of the field assessment.

- No significant visible, overall changes to the site conditions since the 2003 assessment were noted. Photos S2-1 to S2-6 show general views of the site.
- The instrument readings taken after the site assessment indicated that slope movement is continuing around 6 m depth in SI BH2 near the toe of the slope.
- The toe lobe of the landslide near the small creek north of the fenceline appears to have undergone additional movement since the 2003 assessment, as shown in Photos S2-7 and S2-8.
- The segment of the road that was repaved in July 2003 was in good condition with no visual signs of excessive cracking or settlement noted along downslope edge of road. Photos S2-1 and S2-2 show general views of this area. A slight bend in the guardrail near the east end of the repaved area was visible. It is not known if the guardrail was re-leveled when the road was repaved in July 2003 and this bend has developed since that time, or if the guardrail has not been adjusted since the previous assessment and has not bent/deformed any further since that time.
- Cracking of the road surface was noted at the east end of the site, as shown in Photos S2-3 and S2-4. This cracking was also noted during the July 2003 site assessment and has not changed significantly since that time. This cracking may delineate the east extent of the segment of the road affected by the instability.

Based on discussions on site during the assessment, AMEC understands that:

- The segment of the highway across this site is scheduled for an overlay during 2004.
- It is possible that this highway may be twinned in the future.

Assessment and Risk Level

The slope stability conditions at this site do not appear to have worsened significantly since the previous assessment, however the continued slope movements measured in SI BH2 as well as the observed continued movement at the overall toe of the slope north of the fenceline are of concern. It is possible that the continuation of these movements will eventually directly destabilize the road embankment. The previously-installed pile wall along the downslope edge of the road may be effective in protecting against such destabilization, however without any as-built information (e.g. pile depths, spacing) on this pile wall it is not possible to meaningfully speculate on its effectiveness. In addition to the active slope movements downslope of the road, the northern/downslope shoulder of the road has continued to require patching and overlays in recent years.

Therefore, AMEC recommends the following Risk Level factors for this site:

- Probability Factor of 9 in order to reflect the ongoing slope movements measured in the instruments since the Spring 2000 readings, along with the continued settlement and cracking of the road surface and deformation of the guardrail since that time.
- Consequence Factor of 5 given that larger movements are possible and the degree of effectiveness of the pile wall is uncertain without additional information. It is possible that larger movements could occur and affect a significant portion of the highway surface.

Therefore, the current recommended Risk Level for this site is equal to 45. The recommended Risk Level is unchanged from the 2002 and 2003 assessments.

Recommendations

AMEC recommends the following future work for this site:

The monitoring programs currently in place should be continued. The maintenance contractor should be instructed to avoid paving over the existing instruments on the north shoulder of the road during the planned overlay in 2004.

Annual assessments at this site should be continued.

The surface conditions of the road at this location, as well as the guardrail alignment, should be carefully monitored by maintenance personnel. This would be in conjunction with the recommended instrumentation monitoring to provide as early detection of potential problems below the road as possible.

Significant additional mitigative works be considered for this site.

- As discussed on site, AT would like to give further consideration to the construction of a pile wall on the slope face below the road to provide support for the road embankment in the event that continued slope movement around SI BH2 and further downslope leads to destabilization of the road embankment that the existing pile wall along the north shoulder of the road may not be effective against. AMEC will submit a proposal and cost estimate for a recommended scope of work to proceed with design and analysis of a pile wall.
- The design of a pile wall should take into account the possibility of future twinning of Highway 22 at this site.
- AMEC has previously recommended the installation of new instrumentation along the toe of the slope if remedial measures at this site were to be deferred for several years. The new instruments would have replaced the sheared-off SI's 6, 7 and 8 and supplemented SI BH2 which is the only functioning instrument in that area of active slope movement. However, AMEC understands that AT is considering the implementation of mitigative measures at this site for 2005. If this is the case, then it would be reasonable to not install the new instrumentation in the near-future.