

4.7 S8 – FISHER CREEK

Background

The Fisher Creek site is located on Secondary Highway 762:02, approximately 2 km north of the junction with SH 549 and approximately 900 m north of the Fisher Creek bridge.

The highway runs north-south on a cross-slope down to the west in this area. Settlement and cracking of the road surface was first noted at this site in 1988. Several geotechnical investigations have been performed by the Municipal District, AIT and consultants working for AIT since that time. These investigations generally concluded that the settlement and cracking of the road surface was the result of surface drainage percolating into poor-quality fill and remnant organic matter underlying the road alignment. Remedial measures including lime/gravel columns and the installation of a drainage blanket are understood to have been installed, however the available records of this work are incomplete. Please refer to Section A of the site binder for further discussion.

A geotechnical investigation was performed at this site by AMEC in 2001 and 2002 in response to continued settlement and cracking at the north end of the site and the observation of additional cracking at a previously undisturbed area at the south end of the site. AMEC submitted a design to AIT in the fall of 2004 for two shear keys to repair the damage to the road at the north and south ends of the site and prevent future settlement and cracking. This repair has not been implemented to date because relatively little settlement and cracking of the road surface has occurred since 2004/2005.

A number of additional boreholes were drilled at this site by AMEC in March 2007 in order to install additional geotechnical instruments (SI's and piezometers) to check if the previously-noted movement at the north and south ends of the site actually represents a single, continuous area of instability. The boreholes were also used to gather further information on the road fill composition that may be useful in optimizing the design slopes of temporary excavations for the installation of a shear key at this site.

Site Assessment

The site assessment was performed on June 18, 2007. The weather at the time of the site assessment was partly cloudy with recent rain showers in the area.

Please refer to Appendix S8 for a site plan illustrating the layout of the site. The assessment covered the highway surface through the settlement and cracking areas as well as the slope face below (west of) the highway.

Observations

The following points summarize the observations made during the site assessment. Please also refer to Appendix S8 for a site plan and annotated photographs illustrating key observations.

- An overlay had recently been applied across the entire road surface at the north end of the site. The southern limit of the overlay was around SI 2007-3 and the northern limit of the overlay was approximately 125 m north of SI 2007-1 (please refer to the site plan in Appendix S8 for an illustration of these SI locations). The thickness of the overlay appeared to vary up to a maximum of approximately 50 mm. It is likely that the overlay was applied in response to cracking and settlement of the road surface since the 2006 inspection. However, it is not clear why the overlay was extended so far to the north. Photos S8-3 to S8-7 show views of the overlay in this area.
- The accumulated thickness of overlays in recent years has created a very steep drop-off along the west side of the road at the north end of the site. Photos S8-5 and S8-6 show the drop-off in this area.
- As shown in Photos S8-1 and S8-2, there was no new cracking or deformation of the road surface noted in the central and southern ends of the site. There was similarly no new damage visible across the northern end of the site, but the recent overlay would have obscured any such damage over the north end of the site.

Discussion

Based on the recent overlay across the north end of the site, it is inferred that there had been further cracking and settlement of the road surface in that area since the 2006 inspection. There did not appear to have been any significant damage to the road surface across the south end of the site in the past year.

The Spring 2007 instrument readings at this site showed that there has been ongoing movement in both the north and south ends of the site, summarized as follows (from north to south):

- The most significant movement was measured at SI 2007-1 at the north end of the site where approximately 8 mm of movement was measured at 2 m depth between when the SI was installed in March 2007 and the first follow-up reading in May 2007. This depth of movement is consistent with the data from the 2001 SI that had been installed at roughly the same location but was later paved over.
- SI's 2007-2 and 2007-3 in the central portion of the site showed minor and no movement, respectively, since installation in March 2007.

- The SI's around the south end of the site (2002-1, 2002-4, 2007-4) showed detectable but relatively minor movements which for the 2002-series SI's is consistent with data over the last few years.
- SI 2007-6 at the far south end of the site showed no movement since installation in March 2007.

Overall, this data does not show that the previously noted northern and southern movement areas at this site are actually a single, continuous area of instability. However, readings of the SI's that were installed earlier in 2007 throughout an entire annual cycle will be required to confirm this.

Assessment and Risk Level

The fact that there was a recent, relatively thick overlay placed across the north end of the site suggests that there has been ongoing and significant damage to the road surface in that area over the past year. This suggests that the previously recommended Probability Factor for this site should be increased or at least maintained. However, the recent overlay across this area prevented any observations of the damage and to date there is only limited data from the newly-installed SI's in the north end of the site. Therefore, it is not possible to definitively update the recommended Probability Factor for this site. On this basis, AMEC recommends the same Risk Level for this site as last year:

- The Probability Factor should be set at 8 to reflect the recent SI data and the likely recent cracking and settlement at the north end of the site that is consistent with previously observed patterns and rates.
- The Consequence Factor should be set at 3 to reflect the magnitude and extent of the cracking and settlement of the road in recent years which has affected the road surface but not required partial closure of the road. This is a reduction from the value of 4 recommended after the 2006 inspection.

Therefore, the current recommended overall Risk Level for this site is equal to 24, which is a reduction from the value of 32 calculated after the 2006 inspection.

Recommendations

The following recommendations from the 2005 and 2006 assessments are still valid:

A “Sharp Shoulder” sign or a guardrail should be installed along the west shoulder of the road in the north end of the site. The accumulated thickness of overlays applied in this area in recent years has created a sharp drop-off along the west shoulder of the road in this area.

The semi-annual readings of the instrumentation should be continued.

Further data from the instrumentation will help to confirm that the previously-noted northern and southern movement areas at this site are in fact two separate areas. This in turn will confirm if the current design for two separate shear keys is valid or if it would need to be updated.

Remedial measures should only be implemented if significant damage occurs to the road surface. Notwithstanding the recent overlay applied to the north end of the site, the amount of damage to the road surface in recent years has not been very significant. After the future instrument data confirms whether or not the previously-noted northern and southern movement areas are connected, the previous shear key design can be validated or revised, and then the estimated cost for the repair updated. AIT can then determine if it would be cost-effective to perform the repair vs. treating future damage to the road surface at this site as a maintenance issue.

The paved-over SI in Borehole 2002-3 should be recovered and read. This recommendation from the previous annual assessments remains outstanding. The previously-surveyed location of this SI was marked on the pavement in April 2007 to assist with locating it.

The annual assessments should be continued.