~Km 3.75 Cut Slope

Site Observations

- This cut slope is located immediately southbound of the ~Km 3.7 Fill Embankment site. It is in the order of 100 m long along the road, and extends southbound to approximately Km 3.8. Photo 742-8 shows the cut slope.

- The cut slope is approximately 12 to 14 m high.

    - The upper portion, roughly the upper half, exposes silt till soil at roughly 45° inclination. The exposed soil includes up to cobble-sized rocks. There is widespread shallow gullying and runnelling in the exposed soil. The runnelling suggests that the silt till may be slightly cemented.

    - The lower portion, roughly the lower half, of the cut slope is at approximately 36° inclination and consists of eroded material (slope wash) from the upper portion of the slope.

- The ditch along the toe of the slope is typically around 2 m wide and 0.5 m or less in depth. At the time of the October 2008 inspection, there was a narrow channel eroded into the ditch base from previous ditch flow. Photo 742-5, attached after the subsection on the ~Km 3.7 Embankment Fill, shows the ditch along the toe of the ~Km 3.75 Cut Slope.

- There were no rocks or other slope debris on the road surface below this cut slope at the time of the October 2008 site inspection.

Assessment

The upslope ditch at this site appears to be undersized with respect to the volumes of ditch flow carried at times (as evidenced by the channel erosion incised into the base of the ditch, shown in Photo 742-5) and also with respect to being able to contain a cobble-sized rock eroding out from the upper portion of the cut slope and rolling downslope. There were no rocks on the road at the time of the October 2008 site inspection, however it is possible that rocks do roll onto the road at times and are cleared by the maintenance contractor.

The rockfall catch ditch design chart attached as Figure C1 in Appendix C suggests a ditch in the order of 4.6 m wide and 1.7 m deep for a rock cut slope of this height. Even if these suggested ditch dimensions are reduced somewhat because the cut slope exposes soil rather than rock with a rockfall hazard, the existing ditch width and particularly depth are judged to be too small.

Risk Level

It is judged that the general geohazard risk matrix is applicable to this site, because the primary hazard to the highway is from ditch flow exceeding the capacity of the existing ditch as well as rocks eroding out of the upper portion of the cut slope and rolling or sliding downslope, rather than rockfall.

The recommended Risk Level for this site, based on AT's general geohazard risk matrix, is as follows:

- Probability Factor of 9 to reflect the apparently steady erosion of material from the cut slope.

- Consequence Factor of 2 to account for a possibility of small volumes of eroded material from the cut slope spilling out from the ditch and onto the road surface and/or material filling the ditch and causing ditch flow to spill onto the road.

Therefore, the current recommended Risk Level for this site is 18.

The recommended Consequence Factor of 2 is possibly slightly conservative. However, a lower Consequence Factor of 1 (and corresponding Risk Level of 9) cannot be confirmed based solely on the October 2008 observations.

Recommendations

No action is recommended beyond the current maintenance as required to clear any rocks from the road surface.

This site should be re-inspected after the recommended repairs to the ditch upstream of the Km 3.7 culvert inlet in order to check the ditch condition.

~Km 3.75 Cut Slope

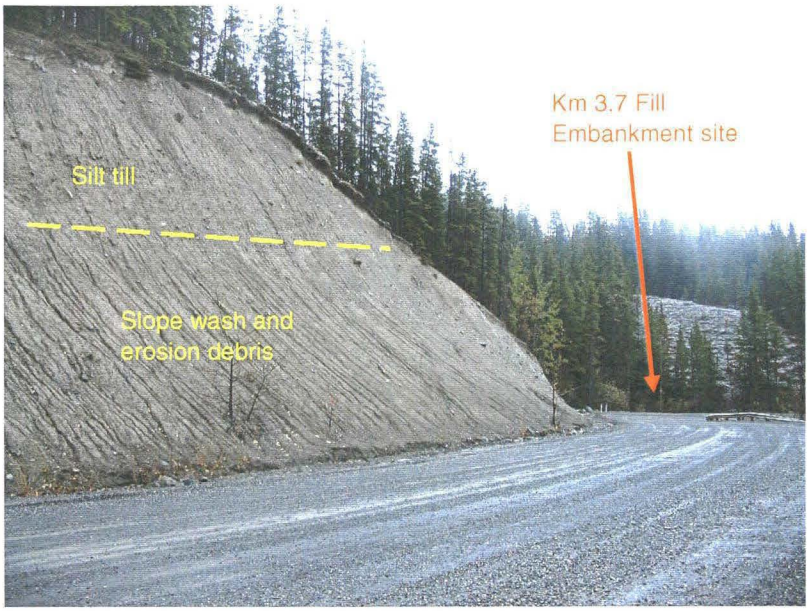

Photo 742-8 – Facing southbound across the ~Km 3.75 Cut Slope site. The upper portion of the cut slope exposes silt till that appears to be slightly cemented. The lower portion of the slope is covered with slope wash/eroded material that encroaches into the ditch along the toe of the slope. Please refer to Photo 742-5 for a closer view of the ditch along the toe of the slope.