

Highway 940 – Km 15 Cut Slope

This site is located approximately 15 km northbound along Highway 940 from the intersection between Highway 940 and Highway 3, in Coleman, AB. The site location is shown on Figures B1 and B3 in Appendix B. The site coordinates are listed in Table B1 in Appendix B. This site is approximately 100 m northbound from the Km 15 Embankment Slide site.

The site inspection was performed on September 27, 2008 by Mr. Andrew Bidwell, P.Eng. of AMEC.

Background

AMEC is not aware of any previously reported problems or repair work at this site. The September 2008 site inspection was performed as part of the Highway 940 geohazard corridor review.

A general description of the geological and climatic conditions in this area is presented in Section 5.2 of this report.

Site Observations

- The segment of the highway at this site is a northwest/southeast oriented two lane, gravel surface road.
- There is a rock cut slope along the west side of the road.
 - Photos 940-9 and 940-10 show general views of the cut slope. The maximum cut slope height is in the order of 12 to 14 m.
 - The upper portion of the slope has some bedrock exposures at 45 to 60° inclination, consisting of dark grey shale and siltstone with a dip direction roughly parallel to the road alignment. The remainder of the upper portion of the slope is covered with gravel-sized debris from the bedrock exposures.
 - The lower portion of the slope is covered with an apron of the same gravel-sized debris at a 36° slope.
- As shown in Photos 940-11 and 940-12, the toe of the debris apron has encroached into the base of the west road ditch. The remaining ditch width varies down to a minimum of approximately 1 m. The ditch depth relative to the road surface is less than 0.5 m.

- The debris was consistently gravel-sized. There were only a few cobble-sized pieces visible across the entire debris apron. At the time of the inspection, there were only a few pieces of the debris from the cut slope that had rolled out beyond the toe of the debris apron and onto the road surface.

Assessment

The existing ditch width and depth does not meet the ditch sizing guidelines shown on the rockfall catch ditch design chart on Figure C1 in Appendix C. However, it does not appear that there is a significant rockfall hazard risk to the road at this site because the debris from the bedrock exposures in the upper portion of the cut slope accumulates at the angle of repose across the lower portion of the slope and only a very small number of gravel-sized pieces of debris roll as far as the road. Furthermore, the road at this site is gravel surfaced and the minor amounts of gravel-sized debris that reach the road do not change the conditions on the road significantly.

Risk Level

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

- Probability Factor of 12 because of the ongoing erosion of the bedrock exposures in the upper portion of the cut slope appears to be generating a relatively steady supply of gravel-sized debris.
- Consequence Factor of 1 based on the negligible impact of the cut slope erosion on the road surface.

Therefore, the current recommended Risk Level for this site is 12.

Recommendations

No work is recommended for this site. The ongoing erosion of the cut slope does not appear to be impacting the road surface. The width and/or depth of the existing, undersized ditch could be increased to meet the sizing criteria shown on the chart in Figure C1 in Appendix C, however it is judged that this would not significantly reduce the already low Risk Level for this site.

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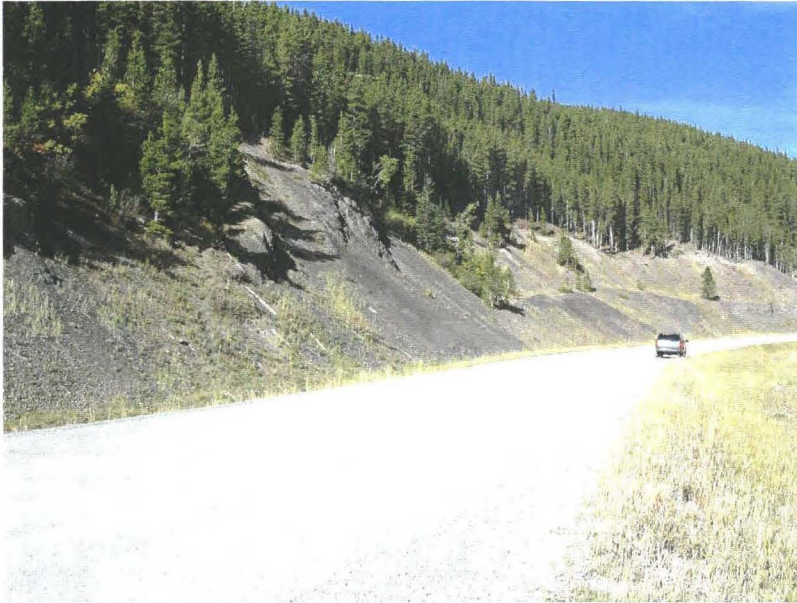


Photo 940-9 (top) – Facing northbound across the Km 15 Cut Slope site.



Photo 940-10 (bottom) – Closer view of the Km 15 Cut Slope site. Note the bedrock exposed in the upper portion of the cut slope, and the apron of debris covering the lower portion of the cut slope.

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Photo 940-11 (top) – Facing northbound along the ditch, with debris encroaching into the ditch base visible.



Photo 940-12 (bottom) – Facing southbound along the ditch, with debris encroaching into the ditch base visible. At the time of the inspection, only a few of the gravel-sized pieces of debris had rolled beyond the ditch and onto the road surface.