Site 40 – East of Eyrie Gap Rock Cut II

This site consists of a soil and rock cut slope along the north side of the highway and approximately 4.5 km east of the junction between Highways 40, 541 and 940 at Highwood House.

The upper portion of the cut slope transitions into the natural slope face. The crest of the cut is not well-defined but may roughly correspond to the vegetation line as shown in Photo 1. Assuming this to be the case, the total vertical height of the slope is approximately 20 m at an overall angle of approximately 40°. The lowermost quarter (approximately) of the slope exposes fractured bedrock and the upper portion of the cut slope exposes rocky soil. Photos 1 and 2 show the appearance of the cut slope.

At the time of the inspection in September 2005 there was an accumulation of rockfall debris in the ditch, including an approximately 0.6 m diameter boulder that was 2 m from the edge of the pavement. There were also numerous cobble sized rocks on the sideslope of the ditch and within 1 m of the edge of the road. Three large boulders were noted in the grassed area on the opposite (downslope) side of the road. It does not appear that the boulders rolled across the road but perhaps they were cleared off the road and left on the downslope side.

The width of the ditch is approximately 6 m. The depth of the ditch is approximately 1.25 m. It is difficult to apply the ditch sizing criteria shown on Figure B1 in Appendix B to this slope due to the composite slope profile and because the slope angle is near the lower limit of the range covered by the criteria. However, for a continuous slope of 40° and 20 m height, the criteria specify a minimum ditch width of 4.6 m and a minimum ditch depth of 1.8 m. The existing ditch exceeds the width criteria but does not meet the depth criteria. The distribution of rockfall debris in the ditch suggests that the existing ditch is of sufficient size but without a significant safety margin against some rocks rolling onto the road.

Photo 3 shows a view facing downslope from near the crest of the cut slope and shows the distribution of rockfall debris in the ditch. In order to roughly check the effectiveness of the ditch for containing rocks that roll down from near the crest of the cut slope, a small boulder was rolled from this location (marked on Photo 1). However, the boulder did not reach the ditch and instead came to rest at the crest of the approximately 3 m high, near-vertical rock cut at the base of the slope. Notwithstanding this rough check, the debris in the ditch indicates that some rocks do roll into the ditch and come to within 1 m of the edge of the road.

AMEC recommends the following Risk Level factors for this site using the rock fall frequency-severity matrix:

- Probability Factor of 13 based on observations of debris from several rockfalls judged to have occurred in the past year.

- Consequence Factor of 2 based on the possibility for rocks to be deposited on the road and causing minor damage to vehicles, but not bouncing with a trajectory that would pass through a window or windshield of a moving vehicle.

Therefore, the recommended Risk Level for this site is 26.

The following work is recommended in order to manage the risk at this site:

1. The accumulated debris from the ditch should be cleaned out to restore its full capacity.

2. The site should be inspected by a geotechnical engineer in conjunction with other recommended site inspections along the Highway 40/541 corridor during 2006 in order to estimate the rate of debris accumulation in the ditch after it had been cleaned (and therefore re-set to full capacity) and determine if additional measures could cost effectively reduce the Risk Level at this site.

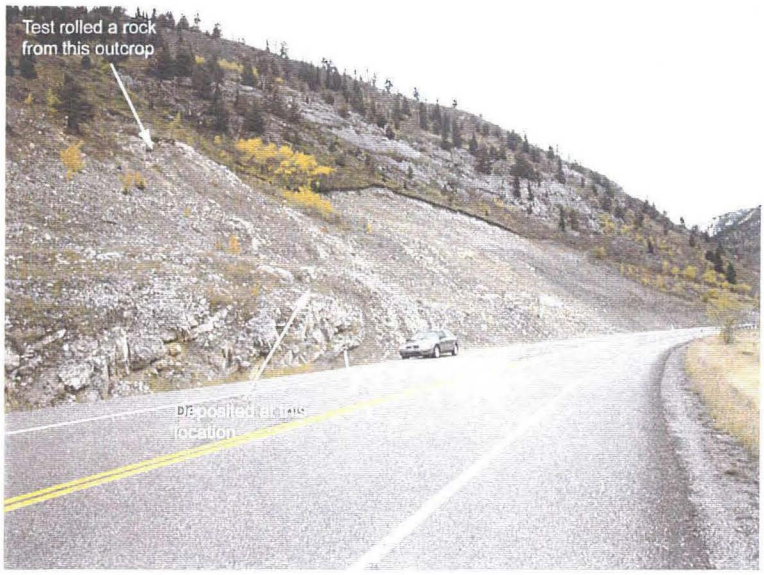

Photo 1 (top) – Soil and rock cut slope above the highway. The majority of the rockfall debris was judged to be due to rocks rolling down the slope. A rock was rolled from the location marked in the upper left corner of the photo in order to check the effectiveness of the ditch for containing rolling rocks. The rock did not reach the ditch, and instead came to rest at the location marked.

Photo 2 (middle) – Facing west along the ditch. Note the distribution of rockfall debris within the ditch, including boulder-sized rocks within 2 m of the edge of the pavement.

Photo 3 (bottom) – Facing downslope from the upper portion of the cut slope. The distribution of rockfall debris in the ditch is visible, with some rocks within 1 m of the edge of the road.