

May 10, 2012

British Columbia Timber Sales
Okanagan-Columbia Division
Revelstoke Field Office
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Attention: Peter Gribbon, RPF

Re: TSL A84538 Access Roads, Bigmouth Creek - Review of road designs with regards to Terrain Stability Assessment

The purpose of this letter is to indicate that the author of the Terrain Stability Assessment (TSA) for the above noted roads has completed a review of the geometric road designs to determine if measures to reduce the likelihood of a landslide have been addressed in a satisfactory manner.

The letter addresses the following documents:

- The geometric road design titled: "Branch 17.6, 17.6A, 17.6D, 17.6E, 17.6F & 19, Level 2 Geometric Road Design" dated October 16, 2009 and completed by Forsite Engineering & Geoscience for BCTS Okanagan-Columbia.
- The terrain stability assessment titled: "Terrain Stability Assessment, Revelstoke Forest District, Bigmouth Creek, TSL:A84538 - Cutblocks K670, K671, K672, K68Q and Associated Access Roads" dated April 22, 2009 and completed by Forsite Engineering & Geoscience for BCTS Okanagan-Columbia.

The TSA provides recommendations for road construction, including specific construction techniques that are expected to result in a low likelihood of landslide initiation. Upon review of the geometric road design, it was found that several sections of the road design do not fully adhere to the TSA recommendations.

- The cross section at 0+597.3 on the 17-6D road indicates a $\frac{3}{4}$ Fill prism. This cross section should be pulled into the slope to $\frac{3}{4}$ Bench cut to meet the recommendations in the TSA report.
- The cross sections from 0+745 to 0+765 on the 17-6D road indicates up to a $\frac{3}{4}$ Fill prism. This section should be pulled into the slope to $\frac{3}{4}$ Bench cut to meet the recommendations in the TSA report.

All other recommendations of the TSA were found to be sufficiently incorporated into the design, and the remainder of the design meets the intent of the TSA. The user of the design should be aware that both the TSA report and the road design documents should be referred to during construction to ensure all recommendations are understood and implemented.

During a review the review of the road designs for this development the following geotechnical concerns were noted. Although not specifically in contradiction to the recommendations in the TSA we feel BCTS should be aware of these potential concerns:

- The design road template for the 17-6A road does not have a ditch of adequate size in some locations where a bedrock cut is anticipated. It can be expected that excavation of

a ditch of adequate size will increase the excavation volumes on this road. However, it is likely that the cutslopes can be excavated steeper than 70% and up to 100% in the native surficial materials. If the cutslope angles are marginally increased during construction it will significantly reduce the volumes and likely more than account for excess as a result of ditch excavation.

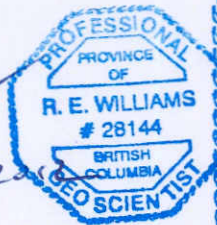
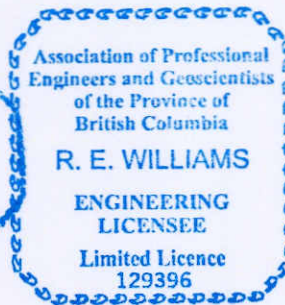
- Several switchbacks on the 17.6 Road have been designed with very large rock fills up to 12m high with fillslope angles of 100%. These large fills will be difficult to construct and will require large angular competent rock that can be keyed into a sound bench. This material may not be available locally and may need to be imported. The large fills are required due to vertical alignment and the overall steep favorable grade of the road. Where downslope sideslopes permit, consideration should be given to amending the design fill angle to 70% so that the fills may be constructed with compacted granular material and not coarse rock. Where sideslopes are steeper the grade at the bottom of the switchback should be lowered so that less fill height is required.

We trust this letter meets your needs at this time.

Sincerely,

Onsite Engineering Ltd.

R. Williams
May 10, 2010



Rod Williams, P. Geo, Eng. L.
Project Geoscientist