

Date: April 22, 2021 **FILE:** SCL 20-1524

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Cc: Ms. Della Peterson, R.F.T.
Woodlands Supervisor
British Columbia Timber Sales – Kootenay Lake Field Team

Mr. Gary Shannon
Contract Road Foreman
British Columbia Timber Sales – Kootenay Lake Field Team

From: Mr. Tedd Robertson, P.Geo., P.L.Eng.
Sitkum Consulting Ltd.

Subject: Kokanee 8510 road
November 5, 2020 Mid-construction Field Review

References:

- Terrain Stability Assessment, Proposed Kokanee 8500 and 8510 (SCL#19-1524 report prepared by Sitkum Consulting Ltd. for British Columbia Timber Sales – Kootenay Lake Field Team, dated June 16, 2020)
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1.0 INTRODUCTION

At the request of Mr. Gordon Heetebrij, R.F.T., Engineering Technologist for British Columbia Timber Sales – Kootenay Lake Field Team (BCTS), Sitkum Consulting Ltd. (SCL) completed a mid construction field review for Kokanee 8510 road. The road is located in the Kokanee Creek drainage, approximately 23 km northeast of Nelson, B.C. The scope of the field review was to observe road construction of Kokanee 8510 road completed to date, confirm subsurface conditions encountered, and confirm appropriate construction methods for the switchback at the junction with Kokanee 8500. Kokanee 8500 road was also under construction at the time of the field review, but a detailed field review was not conducted. As a result, Kokanee 8500 is not included in this memo and will be addressed during a final construction field review in 2021.

2.0 METHODS

The field review was carried out by Tedd Robertson, P.Geo. P.L.Eng. of SCL on November 5, 2020 in the company of Gary Shannon, contract road foreman for BCTS, and a construction representative for the prime contractor. The weather at the time was overcast with scattered showers and temperatures near 12°C, and the ground was entirely snow free. The previous week was generally similar, with minor precipitation (<10 mm).

Field locations were identified using georeferenced LiDAR based maps (1:5000 scale TSA map, 5 m contour topographic, bare earth model, and slope themed mapping) on an iPad mini with a BadElf Surveyor GPS as well as survey stakes in the field.

The recommendations presented in this memo were communicated to Mr. Gary Shannon and the prime contractor at the time of the field review.

3.0 KOKANEE 8510 ROAD

3.1 Stage of Completion

Mid-construction

3.2 Drainage Inventory

Culverts not yet installed. All drainage is expected to be installed as recommended in TSA.

3.3 Cut Slopes, Fill Slopes, and Construction Methods

In general, materials encountered are generally as expected, and cut and fill slope angles were being constructed as recommended. No bedrock was encountered in the large cut at the switchback where rock was designed below a 5 m blanket of thick till. As a result, to maintain a 1H:1V cut the alignment and/or cut location requires adjustment. This appears possible by maintaining the original top of cut location and pushing the alignment outwards. There is room to adjust the alignment as required in the middle and on the bottom of the switchback with additional cut or fill to ensure sufficient tracking radius and width is achieved for expected traffic. Refer to Section 3.5.

3.4 Erosion and Sediment Control

Armouring and sediment control measures were not yet required or installed on Kokanee 8510. Abundant boulders suitable for armouring are available for use as required during final construction.

3.5 Additional Observations and Recommendations

- 1) Angular boulders along Kokanee 8500 road near the junction of Kokanee 8510 road are suitable for use as armouring material or in keyed or placed rock fill construction. Rounded boulders are generally not suitable for keyed or placed rock fill construction, and should be moved to a suitable spoil site where they can be stored without risk of rolling downhill.
- 2) Hub 1 to Hub 8: The amount of cutting required along the switchback was expected to be significant. Rock was not intercepted in the cut slope of the switchback and surficial material consists of a generally compact to dense till, further increasing the excavation volume required. Minor seepage was observed along the cut slope. Two additional recommendations have been made:
 - a. **Hub 1 to Hub 8: Recommendation – maintain 1H:1V cut slope angle** and do not over-steepen cut angle in order to manage cut slope sloughing and raveling.
 - b. **Hub 8: Recommendation – Ditch runoff from switchback to armoured takeoff ditch** into adjacent gully to south.

4.0 CONCLUSION

Based on the visual inspection by SCL of Kokanee 8510 road on November 5, 2020, construction can meet the intent of the recommendations presented in the TSA, following implementation of the additional recommendations presented above. A final construction field review by SCL is considered necessary to confirm conditions encountered during further excavation, and to confirm appropriate construction methods based on those conditions.

5.0 CLOSURE

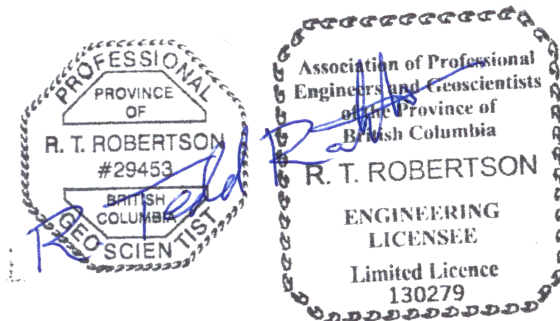
The discussions and recommendations presented above are based on a visual site inspection and available background information. Shallow soil pits and road cuts were examined; no further subsurface investigation was carried out as part of this assessment. Subsurface conditions are inferred from observations and interpretations of surface characteristics, and conditions encountered during excavation may vary. This report has been prepared for use by BCTS, which includes distribution as required for purposes for which it was commissioned. The assessment has been carried out in accordance with generally accepted geotechnical practice. Geotechnical judgement has been applied in developing the recommendations in this report. No other warranty is made, either expressed or implied.

We trust that the information above meets your current requirements. If you have any questions, or require further information, please do not hesitate to contact the undersigned.

Respectfully submitted,
Sitkum Consulting Ltd.

Prepared by:

Prepared and reviewed by:



Caitlin Tatham, G.I.T.
Project Geoscientist

2021-04-22
Tedd Robertson, P.Geo. P.L.Eng.
Engineering Geologist – Principal

Road Construction Drainage Documentation Form

Road Construction Project: EN21TFDOOS KOKANEE 8500

Road Contractor: BAD VENTURES CONTRACTING LTD

Road Inspector: GARY SHANNON.

Design Culvert Location (I-line chainage)		Installed? Y/N - Date	Comment / Change or Additions
A-1	0+000	600 X 18	Y replaced hwy's culvert @ junction
A-9	0+110	450	N not installed (high point)
A-13	0+149	450 X 9	Y
A-18	0+202	600 X 9	Y
A-26	0+301	450 X 9	Y installed @ 0+290
A-30	0+344	1200 X 16	Y requires reinstall spring 2021
A-35	0+391	450 X 9	Y additional installed @ low point
A-40	0+464	450 X 12	Y
A-48	0+567	600 X 12	Y
A-51	0+595	450 X 9	Y
A-60	0+720	600 X 11	Y
A-70	0+799	600 X 9	Y
A-80	0+911	450 X 9	Y
A-83	0+937	600 X 9	Y
A-93	1+064	600 X 12	Y
A-102	1+161	1200 X 15	Y
A-107	1+211	450 X 9	Y additional installed @ seep (low pt)
A-112	1+258	600 X 9	Y
A-115	1+294	450 X 9	Y
A-118	1+323	600 X 9	Y
A-123	1+375	450	N not installed (x ditch installed)
KOKANEI GLACIER MIL			
Pm 1	0+082	450 X 9	Y
Pm 7	0+572	450 X 12	Y
Pm 8	0+599	450 X 9	Y
TOTAL			
450mm	105m		
600mm	98m		
1200mm	31m		