

bullock baur

File: 1364-01
April 24, 2003

Ministry of Transportation
South Island District
240 - 4460 Chatterton Way
Victoria BC
V8X 5J2
Via courier

April 25/03
Report Approved
RDB

Apr 28/03
600mm culvert "A"
installed. RDB

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**civil engineering
community infrastructure
project management**

Attention: Ross Deveau
**Re: Coleman Road Subdivision – Phase II
Shawnigan Lake BC**

Dear Sir:

We have undertaken a drainage study for the second phase of development for this project, involving seven lots on the western boundary of Coleman Road. Site reviews and ground survey were performed on the subject site, forming the basis for the following report.

1.0 background

The subject property is located on the west side of Coleman Road in Shawnigan Lake BC. The Phase II portion of this project involves the development for single-family use of seven lots, all 1.0 hectares in area. The attached sketch shows the boundaries of the subdivided lots.

The property was recently cleared. It is characterized by gravely sandy soils with percolation testing in many areas showing adequate percolation for sewage disposal purposes. A drainage course from upland areas to the west traverses through the property. Drainage culminates in low lying areas where surface waters collect. These swampy areas are shown on the attached sketch. Drainage from the property enters one of two culverts across Coleman Road. Both culverts are 500 mm diameter CSP. These culverts in turn direct storm drainage to the east of Coleman Road and enter a drainage system that was the subject of a previous drainage study performed by Bullock Baur. That study was submitted to Lakweb Ventures on November 22, 2002.



A proposed road to intersect with Coleman Road divides the north and south catchment areas. The road is generally at the height of land; catchments to the north drains northward, and catchments to the south drains southward. These two catchments are served by Culverts A and B to the north and south, respectively. Drainage from Culverts A and B flow to a culvert crossing of the CPR railway downstream to the east. Downstream of the CPR culvert is Shawnigan Creek, the receiving waters for this drainage system.

2.0 study criteria

Criteria used for drainage calculations were taken from the BC Ministry of Transportation's supplement to the *TAC Geometric Design Guide*, and include:

Road classification	Low volume
Return period for culverts	50 years
Runoff coefficients:	
Suburban areas	$C = 0.40$
Return period 50 years	$+20\%$
	$C = 0.48$
Time of concentration	Hathaway formula for small interior basins with light forest
Rainfall curves	Municipality of North Cowichan rainfall IDF curve interpolated for 50-year storm event

3.0 drainage review

Referring to the attached sketches, Culverts A and B must be sized to handle the expected increase in stormwater flows generated by the new subdivision.

Using the criteria listed and culvert nomographs to determine flow conditions at the two culverts crossing Coleman Road, it is found that:

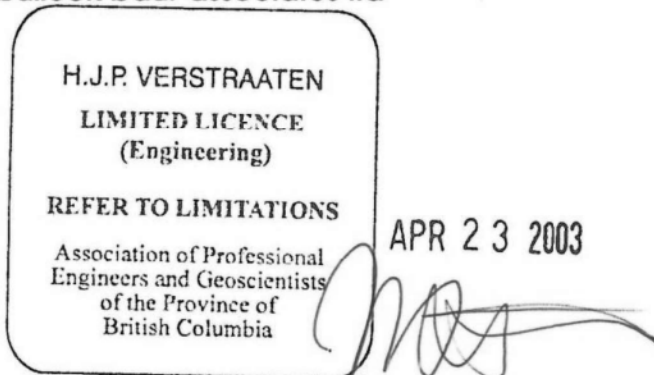
- Culvert A must be replaced with a 600 mm diameter culvert with a sandbag headwall.
- Culvert B has approximately 0.21 m³/sec spare capacity, and therefore does not require replacement.

The CNR culvert crossing collects drainage from Catchment Areas 1, 2, and 3 west of Coleman Road, plus the areas determined in the previous Phase I report on the east side of Coleman Road. Together, these drainage areas contribute a total of $0.24 \text{ m}^3/\text{sec}$ to the railway culvert, which has a total capacity of $0.9 \text{ m}^3/\text{sec}$. Therefore, the railway culvert has sufficient capacity to convey upland stormwater flows.

In conclusion, Culvert A identified on the attached sketch must be replaced with a minimum 600 mm diameter CSP culvert, complete with sandbag headwalls. All other culverts downstream of the proposed subdivision are of adequate size to handle stormwater flows.

This report entitled *Coleman Road Subdivision – Phase II, Shawnigan Lake BC* is respectfully submitted by,

bullock baur associates ltd



per H.J. Verstraaten, A.Sc.T.,
Limited Licensee (Engineering)

HJV/jo/l:\1364-01\apr2303.ho1.ltrrpt
encl.

cc: Ralph Cleasby- Lakweb Ventures (via mail)

The Limited Licence is certified by the Association of Professional Engineers and Geoscientists of British Columbia and contains the following limitations:

1. The detailed design of urban and rural roads, potable water distribution systems, sanitary sewer collection systems, and stormwater management systems, all in accordance with standard design criteria commonly prescribed in typical municipal subdivision control bylaws, in accordance with standard municipal requirements for on-site development, or similar standard design requirements for on-site development, or similar standard design requirements issued by the approving authority.
2. Conceptual design and performance requirements for sanitary pumpstations, and small (less than 5,000 gpd) on-site package type treatment facilities, as necessary for the provision of detailed design drawings and specifications typically provided by the appropriate equipment suppliers, all in accordance with standard municipal requirements.
3. Issuance of technical specifications and contract documents as necessary for the tendering and construction of the above described infrastructure.
4. Administration of construction contracts for the above described infrastructure, including monitoring of construction for adherence to the contract documents, certification and payment for the work performed, and certification of the Record Drawings.
5. All work undertaken shall be strictly within the civil municipal discipline and shall be limited to the provision of municipal type infrastructure designed and constructed in accordance with standard municipal requirements.

**Lakweb Ventures
Coleman Road Subdivision – Phase II****1. standard of care**

This Report has been prepared in accordance with generally accepted engineering consulting practices in this area. No other warranty, expressed or implied, is made.

2. complete report

In order to understand the suggestions, recommendations, and opinions expressed herein, reference must be made to the whole of the report. Bullock Baur Associates Ltd. is not responsible for use by any party of portions of the report without reference to the whole report.

3. basis of the report

The Report has been prepared for the specific site, development, design objectives, and purpose that were described by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document are only valid to the extent that there has been no material alteration to, or variation from, any of the said descriptions provided unless specifically requested by the Client to review and revise the Report in light of such alteration or variation.

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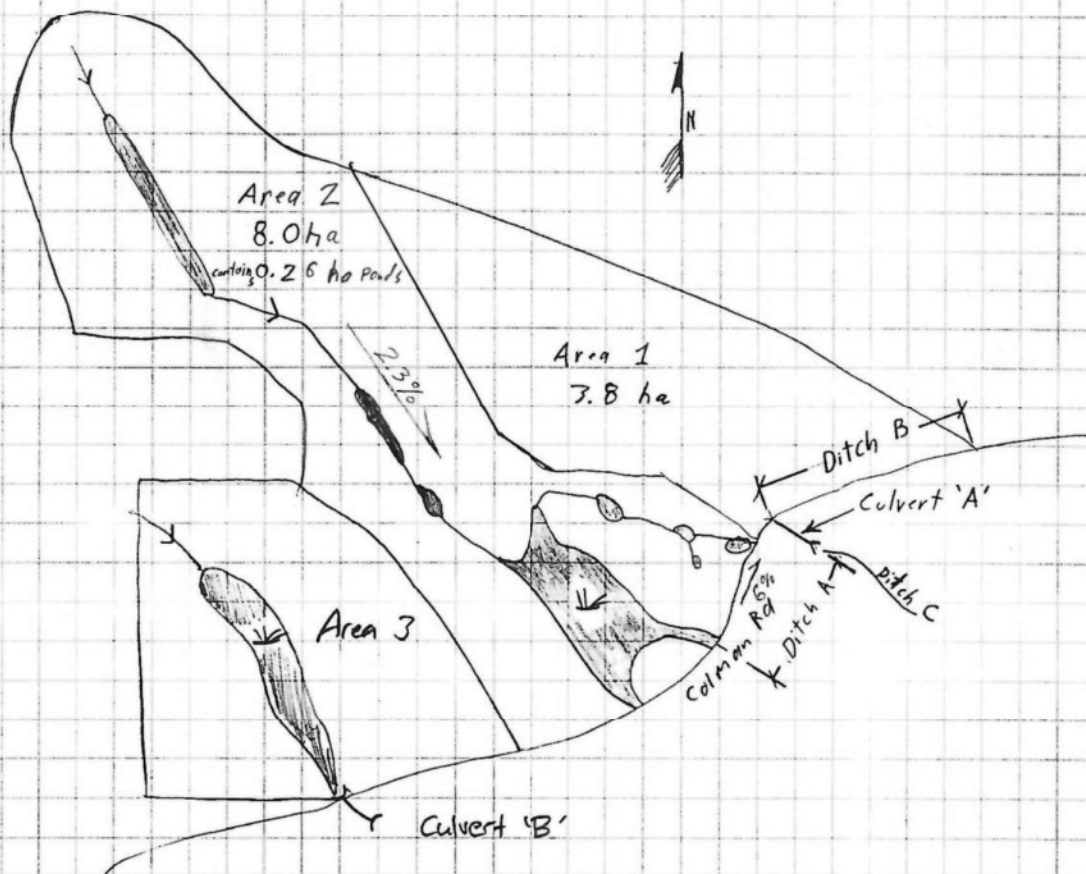
The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided by others. Bullock Baur has relied in good faith upon representations, information, and instructions provided by the Client and others. Bullock Baur does not accept responsibility for any deficiency, misstatement, or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of persons providing information.

6. Independent judgements of client

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$C = 0.4$

IDF = 50yr



Time of Concentration

Hathaway Formula
(From BC Supplement to TAC)

$$T_c = \frac{(rL)^{0.467}}{1.65 S^{0.234}} = 0.68 = 40 \text{ min}$$

$r = 0.40$ For The Hathaway Formula

$L = 0.55 \text{ km}$

$S = 0.03 \text{ m/m}$

intensity = 28 mm/hour

From District of North Cowichan
50yr return Storm

For 50yr return

$$Q = \frac{CiA}{360} = \frac{(0.4 \times 120\%) 28 \cdot 12}{360} = 0.45 \text{ m}^3/\text{s}$$

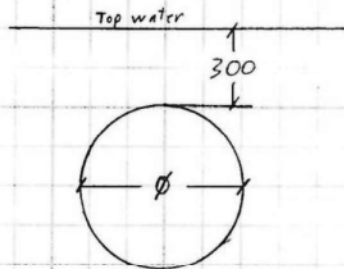
From RTAC Drainage Manual

Required Q is $0.45 \text{ m}^3/\text{s}$

From Nomograph

- Inlet controls
- headwall entrance
- CMP

ϕ	Hw/D	Q	
600	1.5	$0.44 \text{ m}^3/\text{s}$	Mitered
600	1.5	$0.55 \text{ m}^3/\text{s}$	Headwall
700	1.4	$0.61 \text{ m}^3/\text{s}$	Mitered
700	1.4	$0.56 \text{ m}^3/\text{s}$	Projecting



AREA 3

A_c (Hathaway)

$$= \frac{(rL)^{0.467}}{1.65 S^{0.234}}$$

$$= 0.42 \text{ hr}$$

$$= 25 \text{ minutes}$$

$$r = 0.40$$

$$L = 0.20 \text{ km}$$

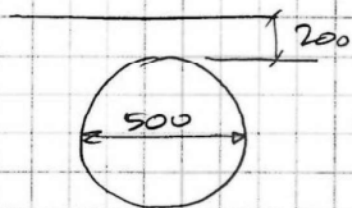
$$S = 0.03 \text{ m/m}$$

$$\text{Intensity (50 yrs)} = 32 \text{ mm/hr}$$

$$Q = \frac{CiA}{360}$$

$$= \frac{0.4(32)(3.6 \text{ ha})}{360}$$

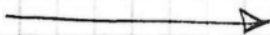
$$= 0.13 \text{ m}^3/\text{s}$$



Existing CMP 'B'

Capacity for Hw/O = 1.4:

$$= 0.34 \text{ m}^3/\text{s}$$



$$> 0.13$$

OK

CNR Culvert

Ac (Hathaway)

West of Coleman, to Culvert 'A' = 40 min.

Culvert 'A' to CNR crossing
(see Phase I Report, Nov '02) = 36 min

TOTAL to 76 min.

AREA: West of Coleman $\therefore i = 33 \text{ mm/hr}$

= Areas 1+2 = 6.4 ha

East (Ph I) = 2.8

9.2 ha

$$Q = \frac{C_i A}{360} = \frac{0.4(23)(9.2)}{360}$$

$$= 0.24 \text{ m}^3/\text{s}$$

CNR culvert capacity = 0.9 m³/s



> 0.24 OK