

Data File: C:\TEMP\wat-sena\sen-agri.WAT
 EPANET Extended Period, Hazen Williams, Specific Gravity= 1.000
 MDD res.+ agricultural demand

(sen-agri.wat)

Simulation 3

NODES

Node	Elevation	Northing	Easting	Demand	Fixed	Grade	Pressure	Pressure
	m	m	m	lps		m	Kpa	Psi
530	56.40	5382660.298	469260.866	84.43		108.40	509.92	73.96
528	51.00	5382432.930	469256.740	56.98		104.40	523.72	75.96
548	59.30	5382475.068	469077.965	27.63		104.34	441.68	64.06
546	61.00	5382560.540	468957.200	11.70		103.48	416.57	60.42
542	39.00	5382802.120	468444.280	3.24		100.55	603.64	87.55
188	36.60	5382831.461	468242.499	8.29		99.54	617.22	89.52
543	34.10	5382837.002	467471.962	84.80		96.04	607.40	88.10
1500	54.50	5382843.240	467228.656	8.48		95.75	404.57	58.68
1525	55.00	5382843.783	466801.087	32.33		95.35	395.73	57.40
1530	57.00	5382959.451	466349.084	1.96		95.22	374.77	54.36
1535	71.30	5382985.179	465995.413	26.98		95.04	232.76	33.76
1540	64.80	5383005.198	465653.628	2.33		94.32	289.52	41.99
1545	39.00	5382926.194	465222.281	5.60		93.84	537.77	78.00
1550	36.00	5382859.462	465221.167	.		93.84	567.19	82.26
1555	10.00	5382860.567	464623.933	0.13		93.84	822.16	119.24

Bedrock Probing investigation report

Thurber Engineering Ltd.

appendix c

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THURBER ENGINEERING LTD.
 GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

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October 27, 2006

File: 19-808-38

Bullock Baur Associates Ltd.
 202 – 4430 Chatterton Way
 Victoria, B.C. V8X 5J2

Attention: Elizabeth Lau, P. Eng.

CIRCULATION	
File No. 1594-01	

**DISTRICT OF CENTRAL SAANICH
 SENANUS WATERMAIN EXTENSION
 BEDROCK PROBING INVESTIGATION**

Dear Elizabeth:

This letter presents the results of a bedrock probing investigation carried out for the proposed Senanus water main extension. The scope of work was outlined in our proposal letter to you dated August 2, 2006. Authorization to proceed with the work was given verbally by Bullock Baur and Associates (BBA).

Use of this report is subject to the attached Statement of General Conditions. The reader's attention is specifically drawn to these conditions as it is considered essential that they be followed for the proper use and interpretation of this report.

1. PROJECT DESCRIPTION

The water main extension begins on Mt. Newton Cross Road near the intersection with Thomson Road (east of West Saanich Road) and extends westward across West Saanich Road, then turns south onto Senanus Drive.

We understand that the water main would be located along the shoulders of the roadway, and at a depth of less than 1.5 m below the ground surface.

2. BEDROCK PROBING

We reviewed the bedrock probing program with BBA prior to carrying out the field work. Due to the numerous bedrock exposures along the roadway to the west of West Saanich Road and the uncertainty associated with location of a private water line along Senanus Drive, the bedrock probing was limited to the section of the route along Mt. Newton Cross Road to the east of West Saanich Road.

Eighteen (18) probe holes were drilled along the proposed extension in the shoulder on the south side of the roadway with an air-track drill operated by



Western Grater Ltd. The results of the drilling are discussed in Section 3 of this report.

The air-track drilling method does not allow soil samples to be collected. The comments of the driller and the drill action are used to infer when bedrock is encountered. This method of drilling is used routinely in the Victoria area to delineate the bedrock surface with reasonable success. The accuracy of the inferred bedrock depths is usually within 0.15 m; however the results are occasionally in error, particularly if very dense till/soft bedrock, steeply sloping rock, or large boulders are encountered.

The bedrock surface in the Victoria area is very irregular due to glacial scouring. Therefore, caution must be exercised when interpreting the bedrock depth between probe hole locations.

3. BEDROCK PROBING RESULTS

The following table summarizes the results of the bedrock probing investigation:

SUMMARY OF BEDROCK PROBING ALONG MT. NEWTON CROSS ROAD

Station	Location	Depth to Inferred Bedrock (m)	Comments
0	Thomson Rd Intersection.	> 2.3	Exposed bedrock on north side of road
0+100	#1299 (in 2 nd driveway)	1.7	Hump in the road indicates possible shallow bedrock
0+124	West of 0+100	2.0	-
0+200	#1271 (in driveway)	> 2.4	-
0+285	Farm access road	> 2.7	-
0+370	24 m west of #1217 driveway	> 2.4	Occasional cobble encountered
0+474	#1171 (in driveway)	> 2.4	-
0+571	18 m east of #1133	> 2.4	-
0+671	Opposite #1124; 24 m west of driveway	> 2.4	-
0+762	12 m east of #1083 driveway	> 2.4	-
0+860	24 m east of St. Stephen Rd.	> 2.4	-
0+958	73 m west of St. Stephen Rd.	> 2.4	-
1+049	24 m west of #1010 driveway	> 2.4	-
1+137	#959	> 2.4	Boulder at 1.1 m depth
1+228	Opposite #936	> 2.4	-



1+313	#921	> 2.4	-
1+407	East side of gully at Raeleigh Place	> 2.4	-
1+514	#849 driveway	> 2.4	-

Based on the bedrock probing carried out along this section of Mt. Newton Cross Road, it appears that some limited rock removal could be required over a 200 m length west of Thomson Road.

Although no samples are recovered with this method of drilling, the drill action indicated that cobbles and boulders were encountered at some locations as noted in the table.

4. CLOSURE

If you have any questions concerning the bedrock probing program or if we may be of further assistance, please do not hesitate to contact us.

Yours truly,
Thurber Engineering Ltd.
Kevin Sterne, P.Eng.
Review Engineer

Andrew Chand, EIT
Project Engineer



detailed cost estimates

appendix d

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construction cost estimate

**Central Saanich
Seanaus Drive extension
residential demands**

File No.: 1594-01

Date: 22/11/2006

<i>Item</i>	<i>Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Rate</i>	<i>Amount</i>
1.0	general				
	Trench Rock	760	m ³	140	\$ 106,400
	Pavement Restoration	1,100	m ²	75	82,500
	Shoulder Restoration	900	m ²	25	22,500
Subtotal:					\$ 211,400
2.0	water system				
	200mm Class 150 PVC	1,850	lm	235	\$ 434,800
	150mm Class 150 PVC	1,120	lm	200	224,000
	200mm Gate Valves	6	ea	1,300	7,900
	150mm Gate Valves	5	ea	900	4,500
	Fittings	1	ls	66,000	66,000
	Fire Hydrant Complete	12	ea	5,000	60,000
	Pressure Reducing Valve	1	ea	40,000	40,000
	Air Relief - Valve	3	ea	2,500	7,500
	Connection to Exist. Watermain	1	ls	7,000	7,000
	Lot Service - 19mm	61	ea	600	36,600
Subtotal:					\$ 888,300

project cost summary

general		\$ 211,400
water system		888,300
Construction Total		\$ 1,099,700
Allowance for Inflation to 2007 Dollars	10%	110,000
Contingency		\$ 175,300
Engineering & Administration		145,000
Other Total		\$ 430,300
Total Project Costs		\$ 1,530,000

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construction cost estimate

**Central Saanich
Seanaus Drive extension
residential, agricultural, and fire flow demands**

File No.: 1594-01
Date: 21/11/2006

<i>Item</i>	<i>Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Rate</i>	<i>Amount</i>
1.0	general				
	Trench Rock	800	m ³	140	\$ 112,000
	Pavement Restoration	1,100	m ²	45	49,500
	Shoulder Restoration	4,010	m ²	25	100,300
Subtotal:					\$ 261,800
2.0	water system				
	400mm Class 150 DI	3,660	lm	400	\$ 1,464,000
	200mm Class 150 DI	1,450	lm	335	485,800
	400mm Valves	11	ea	6,500	71,500
	200mm Valves	6	ea	2,400	14,400
	Fittings	1	ls	195,000	195,000
	Fire Hydrant Complete	12	ea	5,000	60,000
	Pressure Reducing Valve	1	ea	40,000	40,000
	Air Relief Valve	3	ea	2,500	7,500
	Connection to Exist. PRV	1	ls	10,000	10,000
	Connection to Exist. Watermain	1	ls	30,000	30,000
	New Service - 19mm	61	ea	600	36,600
	Ex. Service Reconnection	50	ea	500	25,000
Subtotal:					\$ 2,439,800

project cost summary

general		\$ 261,800
water system		2,439,800
Construction Total		\$ 2,701,600
Allowance for Inflation to 2007 Dollars	10%	\$ 270,160
Contingency		451,640
Engineering & Administration		356,600
Other Total		\$ 1,078,400
Total Project Costs		\$ 3,780,000

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construction cost estimate

**Central Saanich
Seanaus Drive extension
residential demands and fire flow**

File No.: 1594-01
Date: 22/11/2006

<i>Item</i>	<i>Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Rate</i>	<i>Amount</i>
1.0	general				
	Trench Rock	800	m ³	140	\$ 112,000
	Pavement Restoration	1,100	m ²	45	49,500
	Shoulder Restoration	4,010	m ²	25	100,250
Subtotal:					\$ 261,750
2.0	water system				
	400mm Class 150 DI	360	lm	400	\$ 144,000
	350mm Class 150 DI	1,550	lm	345	534,750
	300mm Class 150 DI	1,500	lm	335	502,500
	250mm Class 150 DI	260	lm	265	68,900
	200mm Class 150 DI	1,450	lm	120	174,000
	400mm Valves	2	ea	6,500	13,000
	350mm Valves	6	ea	5,000	30,000
	300mm Valves	6	ea	2,400	14,400
	250mm Valves	1	ea	1,800	1,800
	200mm Valves	5	ea	1,300	6,500
	Tees & Fittings	1	ls	142,000	142,000
	Fire Hydrant Complete	12	ea	5,000	60,000
	Pressure Reducing Valve	1	ea	40,000	40,000
	Air Relief Valve	3	ea	2,500	7,500
	Connection to Exist. Watermain	1	ls	30,000	30,000
	Lot Service - 19mm	61	ea	600	36,600
	Lot Service - 19mm	50	ea	500	25,000
Subtotal:					\$ 1,830,950

project cost summary

general		\$ 261,750
water system		1,830,950
Construction Total		\$ 2,092,700
Allowance for Inflation to 2007 Dollars	10%	\$ 209,300
Contingency		\$ 341,800
Engineering & Administration		\$ 276,200
Other Total		\$ 827,300
Total Project Costs		\$ 2,920,000

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construction cost estimate

**Central Saanich
Seanaus Drive extension
residential and agricultural demands**

File No.: 1594-01
Date: 22/11/2006

Item	Description	Quantity	Unit	Rate	Amount
1.0	general				
	Trench Rock	800	m ³	140	\$ 112,000
	Pavement Restoration	1,100	m ²	45	49,500
	Shoulder Restoration	4,010	m ²	25	100,300
Subtotal:					\$ 261,800
2.0	water system				
	400mm Class 150 DI	3,050	lm	400	\$ 1,220,000
	350mm Class 150 DI	350	lm	345	120,750
	300mm Class 150,DI	260	lm	335	87,100
	150mm Class 150 PVC	1,450	lm	200	290,000
	400mm Valves	11	ea	6,500	71,500
	350mm Valves	1	ea	5,000	5,000
	300mm Valves	2	ea	2,400	4,800
	150mm Valves	5	ea	900	4,500
	Fittings	1	ls	172,000	172,000
	Fire Hydrant Complete	12	ea	5,000	60,000
	Pressure Reducing Valve	1	ea	40,000	40,000
	Air Relief Valve	3	ea	2,500	7,500
	Connection to Exist. PRV	1	ls	10,000	10,000
	Connection to Exist. Watermain	1	ls	30,000	30,000
	Lot Service - 19mm	61	ea	600	36,600
	Reconnect ex. Service	50	ea	500	25,000
Subtotal:					\$ 2,184,750

project cost summary

general		\$ 261,800
water system		2,184,750
Construction Total		\$ 2,446,550
Allowance for Inflation to 2007 Dollars	10%	\$ 245,000
Contingency		405,450
Engineering & Administration		323,000
Other Total		\$ 973,450
Total Project Costs		\$ 3,420,000