

Report

SEAGIRT IMPROVEMENT DISTRICT

Engineering / Takeover Study

Submitted to:

Capital Regional District
479 Island Highway
Victoria, BC V9B 1H7

Submitted by:

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Contents

1.	INTRODUCTION	1-1
2.	SYSTEM DESCRIPTION.....	2-1
2.1	General	2-1
2.2	Existing System Evaluation	2-2
3.	PROPOSED WORK.....	3-1
3.1	Connections to CRD	3-1
3.2	Distribution Main	3-1
3.3	Services.....	3-2
3.4	Other System Components	3-2
3.5	Summary	3-2
3.6	Procedure.....	3-3
4.	COST ESTIMATE.....	4-1
5.	REPORT SUBMISSION	5-1

Figures

Figure 2-1: SID Water System	2-1
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Appendices

Appendix A: Seagirt Waterworks District Drawing

Appendix B: Cost Estimate

1. INTRODUCTION

The Seagirt Improvement District (SID) was established in 1961 to provide potable drinking water to properties on, and adjacent to, Seagirt Road located in East Sooke. The water system was originally serviced by a 50 mm underwater pipeline across Sooke Basin. Subsequently the Capital Regional District (CRD) has provided water service to East Sooke including a 200 mm watermain along East Sooke Road at either end of Seagirt Road, as part of the Juan de Fuca (JDF) distribution system.

The SID water system currently is connected to the CRD system at a bulk meter connection at East Sooke Road and Cornelius Road. The SID is responsible for distribution of this water to properties in the SID, including operation, maintenance and administration for all components of the water system on public property. The SID is now considering dissolving and having the water supply system taken over by the CRD.

The primary purposes of this study are as follows:

- Review the exiting water system and determine what works are required to facilitate takeover by the CRD, and;
- Estimate the costs for the design and construction of the proposed works.

In preparation of this report, we have reviewed background information, completed a field review including discussions with SID trustees, and completed the analysis necessary for determining the required works and estimate the capital costs.

2. SYSTEM DESCRIPTION

2.1 General

The SID encompasses the area shown on Figure 2-1 below.

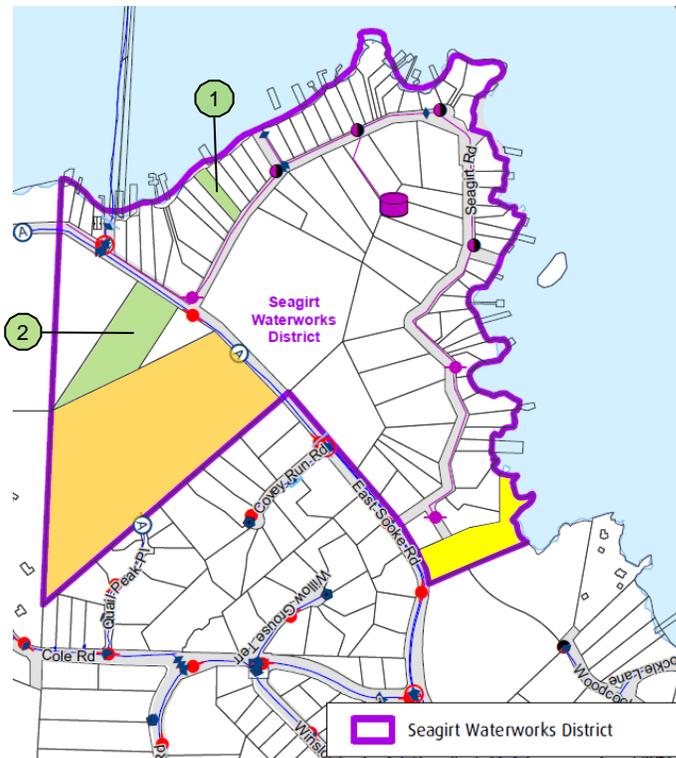


Figure 2-1: SID Water System

(Source – CRD provided map)

In reviewing the drawing *Seagirt Waterworks District, Community Water Supply Systems, February 1981*, (see Appendix A) we note that the SID used to, but no longer includes the properties which are now off of Covey Run Road, Quail Peak Place, and Willow Grouse Terrace. Additionally, the property immediately to the west of Covey Run Road and Quail Peak Place (highlighted in orange on Figure 2-1), was removed from the SID in 2020.

It should be noted that the property highlighted in yellow on Figure 2-1 was not included in the SID. This property currently is not developed and for the purpose of this study, we have assumed that this property is excluded from the study area.

The SID trustees provided us with a list of the 83 properties that are currently billed for water. A count of the properties within the SID boundary is 85. The difference is the following two properties (highlighted in green on Figure 2-1), which we understand are not currently serviced:

1. The property between 107 Seagirt Road and 111 Seagirt Road.
2. 6433 East Sooke Road.

For the purpose of this study, we have assumed all 85 lots will be serviced.

The primary components of the existing SID water system components are as follows:

- Connection (including meter) to the CRD water system at East Sooke Road and Cornelius Road.
- A 100 mm asbestos cement (AC) distribution main. The trustees indicated that there are sections of this main which have been replaced with PVC pipe as repairs have been made over the years.
- Water services to each property, likely 13 mm copper, completed with concrete meter box and meter (not “touch read” meters).
- Isolation valves and stand-pipes.

It should be noted that the SID trustees indicated that the reservoir which was part of the original water system, no longer exists.

2.2 Existing System Evaluation

In evaluating the suitability of the existing system components to be taken over by the CRD, conformity with the CRD’s standards and capacity have been considered.

The existing watermain is AC which is a substandard material type. The CRD is actively replacing AC mains within the JDF distribution system as these mains are nearing the end of their service life, and are subject to breaks and leakage as they age. The existing main is 100 mm in diameter, and does not have adequate capacity for single-family residential fire flow demands.

The existing services are likely 13 mm copper. The modern standard is for services to be a minimum of 19 mm in diameter. The existing meters do not have the CRD standard “touch read”. The existing concrete meter boxes do not match the current standard which calls for a polymer meter box and lid.

The existing stand-pipes do not meet the current standards for fire hydrants.

Based on our evaluation of the existing system, to allow the SID to be taken over and incorporated into the CRD’s JDF distribution system, the entire water system on public property should be replaced. The details for this replacement are described below.

3. PROPOSED WORK

The recommended scope of work that will allow for the SID water system to be taken over by the CRD, is outlined below. The proposed work has been developed taking into consideration the CRD's *Engineering Specifications and Standard Drawings*, and good engineering practice. This scope of work covers the physical works only, and does not include any of the administrative and legal costs involved in the takeover.

3.1 Connections to CRD

It is proposed that there will be two connections to the CRD main on East Sooke Road, at either end of Seagirt Road. This will provide a looped water system, which is beneficial from a fire flow capacity and operations and maintenance perspective.

3.2 Distribution Main

The proposed distribution main will be along the entire length of Seagirt Road, from each of the two connections at the East Sooke Road intersections. The CRD water system on East Sooke Road has a static hydraulic grade line (HGL) of El. 91 m.

The watermain size is determined based on the following pressure criteria, as per the CRD's engineering specifications:

- Minimum of 276 kPa during the peak hour demand scenario (PHD)
- Minimum of 140 kPa during the max day demand plus fire flow scenario (MDD+FF)

For the proposed Seagirt Road water system, the MDD+FF criteria governs. The water demands used in the analysis, calculated as per the CRD's engineering specifications, are as follows:

- MDD of 3.6 L/s calculated based on 73 properties off of Seagirt Road (excludes lots off of East Sooke Road), 3.2 people/property, a per capita demand of 545 L/capita/day, and a peaking factor (MDD versus average day demand) of 2.5.
- FF of 80 L/s (equal to 4800 L/min), which is appropriate for the single-family residential land-use.

To facilitate calculating the required watermain size, the CRD provided flow versus residual pressure curves for the water system near either end of Seagirt Road.

The analysis indicates that the required pipe size is 150 mm in diameter. The resulting minimum watermain pressure is estimated at 480 kPa for this MDD+FF demand scenario (therefore exceeding the minimum pressure requirement of 140 kPa). As per CRD specifications and standards, this proposed watermain will be PVC (DR18) to the AWWA C900 standard. The total length of the proposed watermain is estimated to be 1,490 m.

Soil mapping in the area (*Soils of Southern Vancouver Island, MoE Technical Report 17*) indicates that bedrock is often found at or near the surface. This is consistent with observations during our field review. For this reason, consideration has been given to installing the proposed main in the same trench as the existing main, and therefore minimizing the rock blasting required. This option has been ruled out for the following reasons:

- The limited isolation valves and access points on the existing, and therefore difficulty in providing temporary water services to properties during construction.

- The cost to handle and dispose of the existing AC watermain (as opposed to abandoning it in place).
- The existing watermain alignment appears to be well off the road in places, and constructing the proposed watermain will result in conflicts with trees and other surface features.

For these reasons, the proposed watermain alignment will likely (to be confirmed during detailed design) along the west side of Seagirt Road, the opposite side from the existing watermain.

The connections to the existing 200 mm watermain on East Sooke Road will be tee connections, with isolation valves on each leg.

The existing 100 mm watermain will be abandoned after construction. This includes the existing SID watermain on East Sooke Road from Cornelius Road to Seagirt Road. The existing meter at Cornelius Road will also be abandoned.

3.3 Services

The properties within the SID which have frontages on East Sooke Road will have new services directly off of the existing CRD 200 mm watermain on East Sooke Road. The remaining services will be from the proposed watermain on Seagirt Road.

The proposed water services will be 19 mm in diameter as per CRD standards. Once the newly constructed water system is connected to the CRD's system, new water meter boxes and meters will be installed and the connections to the existing water services at the property line will be made.

3.4 Other System Components

Hydrants

Hydrant(s) are required and are to be provided in accordance with the CRD's specifications. The maximum allowable hydrant spacing in single-family residential areas is 150 m. For the 1,490 m long proposed watermain, we estimate that 12 hydrants will be required. These hydrants can also be used to flush the watermain. Additional flush-outs are not anticipated.

Air Valves

Air valves are typically required at significant high-points in a water system. We anticipated that air valves will be required at the East Sooke Road and Seagirt Road east intersection, and adjacent to 40 Seagirt Road.

Isolation Valves

Isolation valves will be required at the tee connections to the watermain on East Sooke Road (three valves per connection). Additional isolation valves will be located at some of the hydrant tees along the watermain route for unidirectional flushing and for isolation of sections of main in the event a repair is required. We anticipate that there will be six isolation valves on the Seagirt Road watermain, providing isolation valves at every other hydrant.

3.5 Summary

In summary, the proposed scope of work required that will allow for the CRD to takeover the SID water system is as follows:

1. Approximately 1,490 m of 150 mm diameter distribution watermain along Seagirt Road connecting to the CRD watermain on East Sooke Road (two connections);
2. 85 water 19 mm water services complete with meter and meter boxes. 73 of these services will be off of the proposed watermain, and 12 off of the existing watermain on East Sooke Road.
3. Twelve fire hydrants.
4. Two air valves.
5. Six isolation line valves on the proposed Seagirt Road watermain and three live valves on each of the connections to the East Sooke Road watermain.

3.6 Procedure

The following outlines the potential process for completion of the work following an agreement from the CRD to proceed with the dissolution of the SID:

1. SID retains the services of a civil engineering consultant to prepare the detailed design and tender documents, obtain Island Health and CRD approvals, and provide construction inspection and contract administration services.
2. Following completion of the detailed design and approval of the design from CRD and Island Health, tender the works for construction.
3. Tender the design and select a contractor to construct the waterworks.
4. The selected contractor constructs the 150 mm Seagirt Road watermain, 73 water services off of the Seagirt Road watermain, fire hydrants, air valve and isolation valves.
5. Pressure testing and bacteriological testing of the new 150 mm watermain.
6. The CRD makes the connections from the 150 mm Seagirt Road watermain to the existing watermain on East Sooke Road, and install the 12 services off of the existing East Sooke Road watermain.
7. The contractor installs service meter boxes and meters, and makes the final connections to the existing services at the property line.

4. COST ESTIMATE

A capital cost estimate for the works as described above is included in Appendix B.

This cost estimate is defined as a “Class C” estimate as described in the *Budget Guidelines for Consulting Engineering Services, 2009, Consulting Engineers of British Columbia and the Association of Professional Engineers and Geoscientists of BC*.

Some notes regarding the cost estimate are as follows:

- The cost estimate is the capital cost for the design and construction of the water works as described above. This estimate does not include any CRD or SID administrative costs.
- An allowance for the archaeology is not included. We contact the Archaeology Branch and they advised, “The Archaeology Branch does not identify a need for archaeological study or Provincial heritage permit(s) at the time of this information request.”.
- It is assumed that 10% of all trench excavation is in bedrock.
- It is assumed that 75% of the trench Seagirt Road watermain is in asphalt.

5. REPORT SUBMISSION

We trust that this report provides meets your requirements at this time. If clarification or further information is required, please contact the undersigned.

Prepared by:

COLQUITZ ENGINEERING LTD.



Jeff Howard, P.Eng.
Water Resources Engineer

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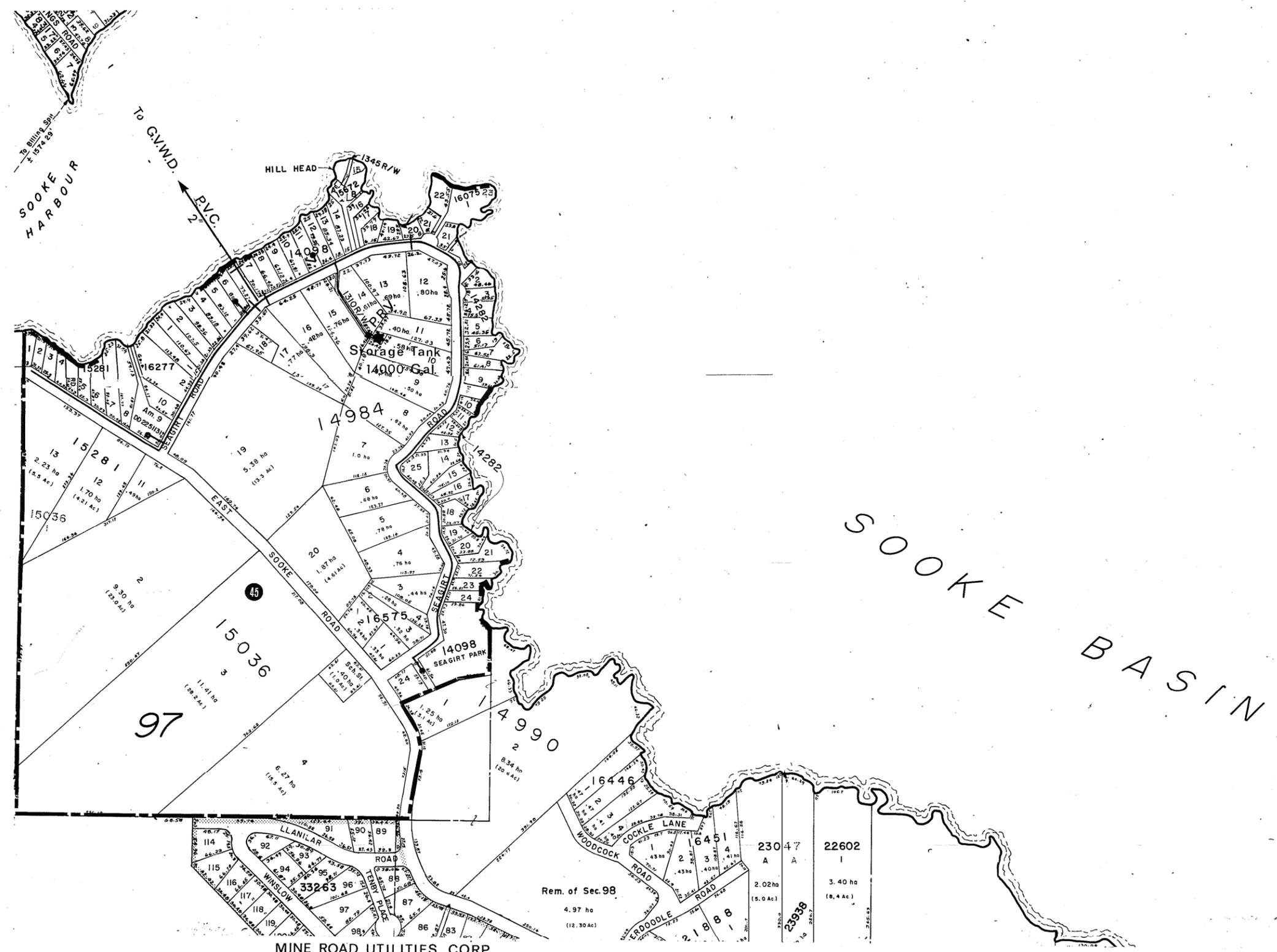
Revision History

Revision #	Date	Status	Revisions	Author
0	January 8, 2021	DRAFT	Submitted for CRD review and comments	J. Howard
1	January 22, 2021	FINAL	Submitted for acceptance	J. Howard



Appendix A

SEAGIRT WATERWORKS DISTRICT DRAWING



Sooke Land District

Pipe is 4 AC. CI. 150
Unless Noted Otherwise

The information provided on this drawing has been obtained from the water distribution authority and/or other agencies. No representation is made as to the accuracy or otherwise of the data shown.

SEAGIRT WATERWORKS DIST.				COMMUNITY WATER SUPPLY SYSTEMS			
SYSTEM INFORMATION FROM		REVISIONS		SURVEYED		BRITISH COLUMBIA MINISTRY OF ENVIRONMENT COMMUNITY WATER SUPPLY SECTION WATER MANAGEMENT BRANCH	
DESCRIPTION	DATE	No.	DESCRIPTION	DATE	DATE	FILE No. 0235293	
Imp. Dist.	9/2/81				DESIGNED	VANCOUVER ISLAND REGION	
					DRAWN	(From C.P.C.N.)	
					TRACED	LEGEND	
					CHECKED	Service Area	Pipeline - Const.
					DATE	Munic. Bdy.	- Prop.
					FEB. 1981	Imp. Dist. Bdy.	Valve + Hydrant +
						Pumphouse	Air Valve Standpipe
						Intake	Reservoir Well
							INDEX No. 1



Appendix B

COST ESTIMATE

CAPITAL REGIONAL DISTRICT
 102.012

Class 'C' Opinion of Probable Construction Costs

 Works as outlined on the report: *SEAGIRT IMPROVEMENT DISTRICT Engineering / Takeover Study, January 22, 2021*

Item	Description	Unit	Estimated Quantity	Unit Rate	TOTAL PRICE \$	Comment
1	Engineering					
1.01	Topographic survey	L.S.	1	\$15,000	\$15,000	
1.02	Engineering Design	L.S.	1	\$60,000	\$60,000	10 plan/profile drawings, 2 plan drawings for service on East Sooke Road, PRV chamber.
1.03	Tender Documents and Tendering	L.S.	1	\$5,000	\$5,000	
1.04	Layout of the works	L.S.	1	\$15,000	\$15,000	
1.05	Contract administration and inspection	L.S.	1	\$100,000	\$100,000	Assume half-time inspection (20 hours per week), and 26 week construction duration.
	Subtotal				\$195,000	
2	Waterworks - Contractor					
2.01	Administration	L.S.	1	1%	\$13,110	
2.02	Mobilization/demobilization	L.S.	1	2%	\$26,220	
2.03	Traffic Control	L.S.	1	\$20,000	\$20,000	
2.04	Arborist Services	L.S.	1	\$5,000	\$5,000	
2.05	150 mm PVC DR18 Watermain	m	1490	\$450	\$670,500	
2.06	19 mm Short Side Service	each	36	\$2,000	\$72,000	
2.07	19 mm Long Side Service	each	37	\$4,000	\$148,000	
2.08	Hydrant	each	12	\$7,500	\$90,000	
2.09	Air Valves	each	2	\$3,000	\$6,000	
2.10	Water System Flushing/Testing	L.S.	1	\$5,000	\$5,000	
2.11	50 mm Asphalt Pavement	m2	1600	\$50	\$80,000	
2.12	Boulevard Restoration	L.S.	1	\$25,000	\$25,000	
2.13	Rock Removal	m3	250	\$300	\$75,000	
2.14	Remove Existing Flushout	L.S.	1	\$2,500	\$2,500	
2.15	Remove Existing Valves	L.S.	1	\$2,500	\$2,500	
2.16	Meter, Meter Box, Connect to Existing	each	73	\$1,500	\$109,500	
	Subtotal				\$1,240,830	
3	Waterworks - CRD					
3.01	19 mm Service off existing	each	12	\$5,200	\$62,400	
3.02	Connect to existing main (200x150 tee, 3 gate valves)	each	2	\$10,000	\$20,000	
	Subtotal				\$82,400	
SUBTOTAL ITEMS 1 TO 3					\$1,518,230	
Contingency				25%	\$379,558	
TOTAL AMOUNT (excl. GST)					\$1,897,800	

This opinion of probable cost has been based on items shown on the current drawings set and reflects an estimate of the expected low tender price for use in evaluation of tenders. As such, a suitable contingency should be added for use for other purposes. The unit prices, production rates and crew rates reflect Colquitz Engineering's recent experience with similar work, and therefore represent the best prediction of actual costs as of the date prepared. Actual tendered costs will depend on such things as market conditions generally, competitiveness of the tendering process, the time of year, contractors' work loads, any perceived risk exposure associated with the work, and unknown conditions.

COLQUITZ ENGINEERING LTD.