Comox Valley REGIONAL DISTRICT

Staff report

DATE: November 5, 2014

FILE: 7200-20/HI

TO: Chair and Directors
Regional District Board

FROM: Debra Oakman, CMA
Chief Administrative Officer

RE: Hornby Island fire hall, Community Works Fund

Purpose
The purpose of this report is to request additional community works funds (CWF) for the Hornby Island fire hall project and to support the passive house building system. Further, to replace a previous motion regarding the project's estimated final cost.

Policy analysis
Bylaw No. 2011 being the "Hornby Island Fire Protection Local Service Establishment Bylaw No. 2011, 1998" was adopted for the purpose of converting the "Hornby Island Fire Protection Specified Area" within Electoral Area "A" (Hornby Island) to a "Local Service Area" and to provide for the first responder program.

At its regular meeting of August 2008, the board established a select committee and terms of reference for the purpose of the Hornby Island fire hall renewal project.

At its regular meeting of September 2009, the board endorsed the option of building a new fire hall on Hornby Island.

At its regular meeting of October 2011, the board endorsed a community works fund (gas tax) contribution of $100,000 to the Hornby Island fire hall project from the Electoral Area "A" Hornby Island allocation.

The planning, design and public consultation regarding the construction of a new Hornby Island fire hall is identified as an operational priority for the community services branch on the board's strategic plan.

At its regular meeting of October 21, 2014 the board endorsed seeking elector assent by way of alternate approval process regarding Bylaw No. 350, being "Hornby Island Fire Protection Service (Fire Hall Construction) Loan Authorization Bylaw No. 350, 2014"

The recommendations of this report are consistent with these board policies.

At its regular meeting of September 30, 2014, the board endorsed the following:

> THAT the Hornby Island fire hall construction cost estimate be confirmed at $1,800,000 or less including a contingency of five to six percent as described in the staff report dated September 30, 2014.

Executive summary
The current design of the fire hall may be built using the standard hand-frame construction system or by using the passive house-construction system that is noted for its extremely low energy consumption and lower operating costs. The estimated final cost of the passive house system is approximately $100,000 more than hand-frame.

This report seeks to incorporate an additional $100,000 of CWF funding to facilitate the construction of the Hornby Island fire hall utilizing the passive house system.

Recommendations from the chief administrative officer:

1) THAT: an additional $100,000 of community works funds from the Electoral Area "A" Hornby Island allocation be committed to the Hornby Island fire hall construction project for energy efficient components.

   AND FURTHER THAT: the passive house building system be used for the construction of the new Hornby Island fire hall

2) THAT: the September 30, 2014 motion of the board:

   THAT the Hornby Island fire hall construction cost estimate be confirmed at $1,800,000 or less including a contingency of five to six percent as described in the staff report dated September 30, 2014.

Be replaced with:

   THAT the Hornby Island fire hall construction cost estimate be confirmed at $1,900,000 to incorporate the Community Works Fund program funding.

Respectfully:

D. Oakman

Debra Oakman, CMA
Chief Administrative Officer

History/background factors

Community Works Fund
Throughout the various stages of design of the fire hall the architect has provided the select committee with two streams of estimated final costs, those being the standard "hand-frame" building system (Appendix "A") and the more energy efficient "passive-house" building system (Appendix "B"). At each stage of the design the passive house building system had an estimated construction cost which was higher than that of the standard hand-frame building system.

The passive house building system is highly energy efficient and would facilitate a number of long-term and short-term efficiencies for the project. The architect has provided a report regarding the passive house system which is attached as appendix "C".

On November 4, 2014 the architect provided a final cost estimate of $1,892,749 for the prefabricated passive house system of construction for the current fire hall design.

In October 2011 the CVRD board endorsed a contribution of $100,000 from the electoral area A Hornby Island CWF toward energy efficient components of the Hornby Island fire hall project.

Based on the final construction cost estimate for the passive house building system, and in consideration of the long-term and short-term efficiencies available, additional funds would be required.

At its regular meeting of November 7, 2014 the Hornby Island fire hall renewal select committee endorsed a recommendation that staff seek additional CWF funding from the Electoral Area "A" Hornby Island allocation to facilitate the use of the passive house building system.

Board motion

At its regular meeting of September 30, 2014, and on select committee recommendation, the board endorsed a resolution which confirmed the final estimated cost of construction at $1,800,000. This estimate was based on the hand-frame construction system.

If the board were to endorse the additional CWF funding for the project, the estimated final cost, based on the passive-house construction system, would be $1,892,749.

To provide clarity and transparency to the process, it is recommended that the September 30 motion of the board be replaced to reflect the estimated final cost of construction based on passive-house construction.

Options

The board may choose to:

1) Endorse the commitment of the additional $100,000 CWF funding to the project, or
2) Not endorse the commitment of additional CWF funding to the project.

This report provides information in support of option 1.

Financial factors

The approved 2014-2018 financial plan for the Hornby Island fire protection service includes $1,800,000 for the construction of a new fire hall in 2015 to be funded by long term debt, a transfer from capital reserve funds and $100,000 in CWF funding.

Should the board endorse the commitment of additional CWF funding to the project, the 2015-2019 financial plan for the service, which is currently in development, will identify the same funding sources with $200,000 being funded by electoral area A, Hornby Island CWF.

Should the loan authorization bylaw be approved and electoral assent be affirmed, the 2015 financial plan will include funding for the construction cost of $1,892,749 as follows:

Funding Source	Amount
Net proceeds, Municipal Finance Authority (MFA)	$1,600,000
Community Works Fund funding (previously committed)	$100,000
Community Works Fund funding (additional requested)	$100,000
Transfer from reserve	$100,000
Total funds available for construction	$1,900,000

Bylaw No. 350 being the "Hornby Island Fire Protection Service (Fire Hall Construction) Loan Authorization Bylaw No. 350, 2014", as endorsed at the board's October 21, 2014 meeting, is not affected by this request for additional CWF funding. That is, electoral assent will continue to be based on the long-term financing of $1,600,000 for the project.

The architect's report (Appendix "C") indicates that, based on the passive house building system, an estimated annual energy cost savings of between $6,700 and $10,600 may be achieved.

Legal factors
The CWF is a federal funding program that is administered by the Union of British Columbia Municipalities (UBCM). The regional district has a funding agreement with UBCM that sets out the terms and conditions by which the funds may be spent. Further, the regional district must report annually on CWF expenditures.

Within the funding agreement, eligible projects include investments in infrastructure for its construction, renewal, or material enhancement in a number of categories. In accordance with the funding agreement, CWF funding for energy efficient components regarding the construction of an energy efficient fire hall on Hornby Island would be within the category: Community Energy Systems - infrastructure that generates or increases the efficient usage of energy.

Sustainability implications
The Comox Valley Sustainability Strategy (CVSS) includes objective 2.2.1: New local government buildings and facilities over 500 sq.m. meet advanced levels of sustainability.

The fire hall construction will be to LEED silver standards and is consistent with the CVSS objective. The LEED scorecard defines the silver standard as achieving a score total of between 50 and 59 points, with 60 to 69 points as LEED gold standard. The current design of the fire hall, if constructed as a "hand-frame" building system, is estimated to achieve a scorecard point total of 51.

If the "passive house" building system is used in the construction, the LEED scorecard point total is estimated at between 58 and 60.

Intergovernmental factors
The CWF is a federal funding program that is administered by the Union of British Columbia Municipalities (UBCM). The regional district must report annually on CWF expenditures.

In accordance with the funding agreement, a joint communications approach will allow clarity and consistency in public messaging regarding the CWF aspect of the project. This communications plan will be shared with the funding partner and include:

- Project information released to the public, including: news releases, advertisements, project signage, media photo opportunities and events, will acknowledge the funding partner support.
- A reporting process to the funding partner will be established and implemented with up-to-date information on communications activities that relate to the project status.

- Media/public events marking milestones will take place at a mutually agreed upon date with opportunities for funding partners to participate.
- All joint communications material will be approved by all parties.

Interdepartmental involvement
Community services staff have completed the internal project request for CWF funding with assistance from financial services and communications staff. The corporate financial officer has reviewed the project request in consideration of the CWF agreement with UBCM and is supportive of the funding commitment.

Citizen/public relations
If additional CWF funding is granted, and electoral assent is affirmed, the citizens of Hornby Island should realize the benefit of having a very energy efficient fire hall with lower long-term operational energy costs.

To provide the residents and property owners of Hornby Island with the information required to help them make an informed decision during the electoral assent process, a community open house is planned for November 22. This open house will include the architect introducing the final design and the 95% refinement of construction cost estimates. Further to the public open house, the pre-construction coordinator will provide a direct mail-out to all on and off island property owners that describes the process to date and captures the information provided at the open house event.

Prepared by:	Concurrence:
J. Bast	***I. Smith***
James Bast Manager of Fire Services	T. Ian Smith, MCE General Manager of Community Services Branch

Attachments: Appendix A – "Estimated construction cost; Hand-Frame build system"

Appendix B – "Estimated construction cost; Passive-House build system"

Appendix C – "Architect's report; A Case for prefabrication and Passive House"

Project: HIFH cost saving @ reduced size - Hand Frame
Owner: CVRD
Architect:
Location: Hornby Island

AFC Construction Budget

Section	Description	Control Budget	NOTES
	DIVISION 1 - General Requirements		
00110	Overhead, Bonds & Insurances	$25,000	
01000	Staff Overhead	$155,000	
01100	Monthly Site Costs	$21,800	
01200	Fixed Site Costs	$5,800	
01300	Temporary Services	$2,000	
01500	Equipment	$5,000	
01700	Subsistence/Travel	$43,000	
01899	Miscellaneous General Requirements	$89,000	CONTINGENCY
	TOTAL DIVISION 1	**$346,600**	
	DIVISION 2 - Site work		
02200	Earthwork	$67,000	
02990	Miscellaneous Division 2	$133,200	
	TOTAL DIVISION 2	**$200,200**	
	DIVISION 3 - Concrete		
03010	Concrete Supply	$69,496	
03100	Concrete Formwork	$40,694	
03200	Concrete Reinforcing	$20,825	
03300	Concrete Placing	$25,183	
03400	Concrete Finishing	$1,300	
03600	Concrete Accessories	$3,090	
03700	Grout	$675	
03990	Miscellaneous Concrete	$0	
	TOTAL DIVISION 3	**$161,263**	
	DIVISION 5 - Metals		
05100	Structural Steel & Metal Joists	$122,000	
05990	"Miscellaneous" Metals		
	TOTAL DIVISION 5	**$133,200**	
	DIVISION 6 - Wood & Plastics		
06010	Wood and Plastics	$61,358	
06200	Rough Carpentry	$60,600	
06300	Prefab. Struct. Wood & Timber	$0	
06400	Finish Carpentry	$23,700	
06600	Architectural Woodwork	$30,000	
06990	Miscellaneous Wood & Plastics	$0	
	TOTAL DIVISION 6	**$175,658**	
	DIVISION 7 - Thermal & Moisture Protection		
07100	Waterproofing	$3,750	
07200	Insulation	$24,586	
07400	Preformed Roofing & Siding	$125,600	
07500	Membrane Roofing & Flashings	$92,800	
07700	Roof Specialties & Accessories	$2,000	
07900	Caulking & Sealants	$520	
07990	Misc.Moisture & Thermal	$0	
	TOTAL DIVISION 7	**$249,256**	

08000	**DIVISION 8 - Doors & Windows**		
08100	Metal Doors & Frames	$14,000	
08200	Wood Doors & Frames	$3,000	
08300	Special Doors	$32,095	
08400	Entrances and Storefronts	$0	
08500	Metal Windows	$0	
08600	Wood and Plastic Windows	$6,624	
08990	Miscellaneous Doors & Windows	$0	
	TOTAL DIVISION 8	**$55,719**	
09000	**DIVISION 9 - Finishes**		
09200	Steel stud and Drywall	$58,824	
09300	Tile	$0	
09600	Interior Flooring	$38,000	
09900	Painting/Wall Covering	$38,550	
09990	Miscellaneous Finishes	$0	
	TOTAL DIVISION 9	**$135,374**	
10000	**DIVISION 10 - Specialties**		
10500	Lockers	$8,000	
10800	Toilet and Bath Accessories	$1,700	
10990	Miscellaneous Specialties	$0	
	TOTAL DIVISION 10	**$9,700**	
15000	**DIVISION 15 - Mechanical**		
15400	Plumbing	$84,000	
15500	H.V.A.C (curb)	$77,500	
15990	Misc.Div15 Items	$0	
	TOTAL DIVISION 15	**$161,500**	
16000	**DIVISION 16 - Electrical**		
16100	Electrical System	$65,000	
16800	Communications	$0	
16900	Controls/Instrumentation	$0	
16990	Misc.Div16 Items	$0	
	TOTAL DIVISION 16	**$65,000**	
17000	**DIVISION 17 - Contractors Fee**		
17110	Contractors Fee	$93,141	5.5%
	TOTAL DIVISION 17	**$93,141**	
	TOTAL	**$1,786,611**	

Project: HIFH Nov. 4 ver. 2.1 @ reduced size- Passive House }
Owner: CVRD
Architect:
Location: Hornby Island

AFC Construction Budget

Section	Description	Control Budget	NOTES
	DIVISION 1 - General Requirements		
00110	Overhead, Bonds & Insurances	$25,000	
01000	Staff Overhead	$155,000	
01100	Monthly Site Costs	$21,800	
01200	Fixed Site Costs	$5,800	
01300	Temporary Services	$2,000	
01500	Equipment	$5,000	
01700	Subsistence/Travel	$43,000	
01899	Miscellaneous General Requirements	$101,000	CONTINGENCY
	TOTAL DIVISION 1	**$358,600**	
	DIVISION 2 - Site work		
02200	Earthwork	$67,000	
02990	Miscellaneous Division 2	$70,000	
	TOTAL DIVISION 2	**$174,200**	
	DIVISION 3 - Concrete		
03010	Concrete Supply	$69,496	
03100	Concrete Formwork	$40,694	
03200	Concrete Reinforcing	$20,825	
03300	Concrete Placing	$25,183	
03400	Concrete Finishing	$1,300	
03600	Concrete Accessories	$3,090	
03700	Grout	$675	
03990	Miscellaneous Concrete	$0	
	TOTAL DIVISION 3	**$161,263**	
	DIVISION 5 - Metals		
05100	Structural Steel & Metal Joists	$0	
05990	"Miscellaneous" Metals	$0	
	TOTAL DIVISION 5	**$11,200**	
	DIVISION 6 - Wood & Plastics		
06010	Wood and Plastics	$13,425	
06200	Rough Carpentry	$23,850	
06300	Prefab. Struct. Wood & Timber	$339,725	
06400	Finish Carpentry	$29,340	
06600	Architectural Woodwork	$23,000	
06990	Miscellaneous Wood & Plastics	$0	
	TOTAL DIVISION 6	**$429,340**	
	DIVISION 7 - Thermal & Moisture Protection		
07100	Waterproofing	$3,750	
07200	Insulation	$13,621	
07400	Preformed Roofing & Siding	$107,400	
07500	Membrane Roofing & Flashings	$58,000	
07700	Roof Specialties & Accessories	$2,000	
07900	Caulking & Sealants	$520	
07990	Misc.Moisture & Thermal	$0	
	TOTAL DIVISION 7	**$185,291**	
08000	**DIVISION 8 - Doors & Windows**		

08100	Metal Doors & Frames	$9,839	
08200	Wood Doors & Frames	$0	
08300	Special Doors	$32,095	
08400	Entrances and Storefronts	$0	
08500	Metal Windows	$0	
08600	Wood and Plastic Windows	$76,933	
08990	Miscellaneous Doors & Windows	$0	
	TOTAL DIVISION 8	**$118,867**	
09000	**DIVISION 9 - Finishes**		
09200	Steel stud and Drywall	$48,074	
09300	Tile	$0	
09600	Interior Flooring	$38,000	
09700	Special Flooring	$0	
09900	Painting/Wall Covering	$38,550	
09990	Miscellaneous Finishes	$0	
	TOTAL DIVISION 9	**$124,624**	
10000	**DIVISION 10 - Specialties**		
10500	Lockers	$11,000	
10800	Toilet and Bath Accessories	$1,700	
10990	Miscellaneous Specialties	$0	
	TOTAL DIVISION 10	**$12,700**	
15000	**DIVISION 15 - Mechanical**		
15400	Plumbing	$84,000	
15500	H.V.A.C (curb)	$77,500	
15990	Misc.Div15 Items	$0	
	TOTAL DIVISION 15	**$161,500**	
16000	**DIVISION 16 - Electrical**		
16100	Electrical System	$65,000	
16800	Communications	$0	
16900	Controls/Instrumentation	$0	
16990	Misc.Div16 Items	$0	
	TOTAL DIVISION 16	**$65,000**	
17000	**DIVISION 17 - Contractors Fee**		
17110	Contractors Fee	$90,129	5%
	TOTAL DIVISION 17	**$90,129**	
	TOTAL	**$1,892,714**	

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The Case for Prefabrication and Passive House for the Hornby Island Firehall

What is Passive House?

Passive House (from the German "Passivhaus") is a standard for buildings with extremely low energy consumption. The term is a bit of a misnomer since this standard can be applied to any building type, not just houses. The primary objective of Passive House design is to drastically reduce the energy required to heat and cool buildings while maintaining comfortable temperatures and high indoor air quality. This is achieved by greatly improving building insulation and airtightness, along with some common sense design guidelines.

A Passive House building contains some active systems, but its heating and cooling systems are much smaller than those of a conventional building, thanks to the superior thermal performance of the building envelope. Emphasis is placed on improving the performance of the passive components (walls, roof, windows, floors) since they will outlive any active systems and they have the potential to significantly reduce energy consumption over the lifetime of the building.

For the Hornby Island Firehall we propose to design the building based on Passive House guidelines and principles, without pursuing certification to minimize costs.

What is prefabrication?

Although prefabrication is not a prerequisite for Passive House buildings, it is frequently used for this type of high-performance building since the factory environment provides improved quality control.

For the Hornby Island Firehall the walls, roof and intermediary floor will be constructed off-site as panels approximately 8' to 10' wide and up to 22' long. These panels will be shipped to Hornby Island and positioned in a few days using a crane and a small crew. All interior joints between panels will be sealed using specialized tapes that are durable and easy to use. Exterior membranes and cladding will be applied once all building panels are in place, and will conceal panel joints so that upon completion the building will look the same as its site-built equivalent.

We have found three different prefabrication companies who are interested in bidding on the Hornby Island Firehall.

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The Advantages of Passive House

1. Increased LEED points

Due to budgetary constraints the current design risks not achieving enough LEED points to meet Silver certification level. Improving the thermal performance of the building envelope will reduce energy consumption, allowing us to achieve more points in the Energy & Atmosphere section of LEED.

2. Reduced mechanical capital costs

By improving the building envelope's airtightness and insulation, we can decrease the size and complexity of the mechanical system required to heat the space.

3. Decreased operating costs over the life of the project.

Reducing energy consumption will lower operating costs and minimize the financial uncertainty related to rising energy costs. A smaller HVAC system means that maintenance and equipment replacement costs will be lower.

4. Increased comfort

Thanks to the high-performance building envelope the building will maintain a more steady and comfortable internal temperature, even when the mechanical system is turned off. This can also be beneficial in a post-disaster situation, since the building would remain more comfortable during a prolonged power outage than a conventional building constructed to minimum code standards. This also means that the firehall won't be as cold when it has been unoccupied for some time, requiring less energy to heat it up when occupied.

5. Improved indoor air quality

The building envelope is designed to be much more airtight than conventional construction, This significantly improves thermal performance and allows for the controlled delivery of fresh air by the building's ventilation system, instead of air filtering through walls and picking up particulates or mold along the way. Waterproof but breathable outer membranes allow the envelope to dry towards the outside to prevent deterioration and mold growth. The heat recovery ventilation system (HRV) can be calibrated to have different modes based on whether the firehall is partially or fully-occupied.

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The Advantages of Prefabrication

1. Quality control

Using a panelized system that is factory-assembled makes each piece of the building more readily accessible for quality-control inspections. Quick on-site assembly reduces the amount of time that building components are exposed to weather before protective membranes are in place.

2. Reduced escalation exposure

Prefabricating wall, roof and floor panels off site reduces reliance on local trades who will also be vying for work on the new Comox Valley Hospital. This will reduce our exposure to potential price escalation resulting from a shortage of local labour.

3. Reduced length of construction schedule

Off-site framing work can take place concurrently with on-site foundation work, reducing the overall duration of construction.

4. Minimized on-site construction waste

Pre-assembling large pieces of the building off-site will reduce the amount of construction waste on site and strain on the island's waste disposal facilities.

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Energy Consumption Comparisons & Estimates

Here are the annual energy consumption values for some comparable buildings:

Project	Annual energy demand per m2
Energy Star US National median for firehalls	276 kWh/m2
Maple Ridge Fire Hall No. 1 (LEED Gold), Maple Ridge, BC	314 kWh/m2
Spring Creek Fire Hall (LEED Silver), Whistler, BC	279 kWh/m2
Lost Lake Passivhaus*, Whistler, BC	74 kWh/m2

** This building is not a firehall, but it is the only post-occupancy energy consumption data that we were able to find locally for a Passive House certified project.*

We have done some basic energy modeling of the Hornby Island Firehall to assess the relative impact of higher insulation values similar to Passive House and improved airtightness resulting from the quality control in a prefab factory environment.

Hornby Island Firehall Energy Modeling Assessment Criteria

Floor area: 691 m2

Airtightness: 0.6 air changes per hour (maximum allowable by PH standards)

Insulation: as shown in construction drawings, a bit lower than Passive House, but significantly higher than the minimum code requirements.

Estimated energy consumption savings: 35 to 55% reduction relative to a baseline code building.

Baseline estimated annual consumption (based on the Energy Star median value):

276 kWh/m2 x 691 m2 = 190,716 kWh

190,716 kWh x 35% = 66,750 kWh

66,750 kWh x $0.1012/kWh = $6,755

190,716 kWh x 55% = 104,894 kWh

104,894 kWh x $0.1012/kWh = $10,615

Estimated annual cost savings ranging from approx. $6,755 to $10,615 based on BC Hydro's current Small General Service billing rate ($0.1012/kWh). Since BC Hydro's rates will continue to rise, these savings will increase over time.