SIMCIC + UHRICH
ARCHITECTS

HORNBY ISLAND FIRE HALL
DESIGN BRIEF REPORT
(APPENDIX A FOR CVRD STAFF REPORT)

HORNBY ISLAND FIRE HALL

Prepared for:

Comox Valley Regional District
600 Comox Road
Courtenay, BC V9N 3P6

Developed by:
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Date:
July 14, 2014

1.0 Introduction

After extensive study, the Comox Valley Regional District in consultation with the Hornby Island community decided to replace an existing 45 year old fire hall serving the Hornby Island Volunteer Fire Department with a new post-disaster fire hall. The existing fire hall no longer met the needs of the community and the new facility will provide four full size drive through apparatus bays and one smaller ambulance apparatus bay. The goals for the project are to provide a highly functioning fire hall that meets the fire department call response and training requirements for a modest budget. The existing fire hall is located at this same location (across Central Road) but in order to accommodate the current functional requirements an adjacent one hectare property was acquired from the Ministry of Transportation for sole use of the fire hall.

2.0 Project Update

In preparation for public Open House in mid-July the consultant team has been working with the Hornby Island Fire Hall User Committee on the building program, building plan layouts and siting options. Progress on work to date is as follows:

Program:
The final program has been finalized and includes sizes and adjacency requirements for each room of the fire hall. The total area of the building is indicated in the attached Master List document as 8,100sf (750sm) Gross Floor Area. There is some flexibility in several rooms to adjust sizes as required as further budget information is made available. Room Data Sheets for each room have been developed to ensure that user requirements for architectural, electrical and mechanical items are incorporated in the final design of the fire hall.

Site Exploration:
The site survey has been completed with major site landmarks including contours at half meter intervals, driveway location and the location of major trees on site. The Ministry of Transportation has been consulted about site access and security issues. Lewkowich Geotechnical has been on site and conducted test pits and site evaluation for soil profile including depth to hard bearing and percolation rates. They will be submitting their soils report the week of July 14-19.

H2O Environmental has been on site and provided preliminary information on the well location and septic field location and size. They are currently indicating that the preferred well location is on the south side of the site towards Central Road while the septic field will located to the north of the building at least 30m from the well location. Please refer to the site plan for these locations.

Outlook Land Design (Civil Consultant) has conducted preliminary layouts of site grading and driveway slope profile to allow for a building location that minimizes cut and fill while still providing access to Central Road that is below an average of 5% gradient. The final building finished floor elevation will be confirmed once the geotechnical soils report has been submitted indicating firm bearing location at the proposed building location. For the purposes of evaluating access to Central road a midpoint building grade contour of 48.0m geodetic elevation was selected as a preliminary finished floor elevation. At this elevation, we have an average grade of 4.9% which allows for slopes of less than 2% at the apron and at the point of access to Central Road.

Consultants:

Structural:
Building on island locations requires careful consideration of structural systems for institutional projects that take into account budget, access to local trades and transportation logistics.

For this fire hall project, the structural consultant has provided a background report (attached in the Appendix) that outlines the design criteria for Post-Disaster requirements. The intention of the requirements is that the structural systems be robust enough to survive significant seismic and disaster events and still be able to function as required. For the fire hall, this assumes an Importance Factor of 1.5 for seismic and 1.25 for snow and wind and will be designed for snow and wind load 25% greater than normal buildings and earthquake loading 50% greater.

Dan Sundvick has also preformed an analysis on the relative merits and constraints of using wood and steel structural systems (Please refer to the appendix for drawings and report).

In general, steel structures offer advantages in simple long span structures (similar to the apparatus bays) due to its high strength and stiffness. There can also be advantages in terms of pre-fabrication and reduced site time. For the Hornby Island Fire Hall, these advantages are offset by the challenges of transporting by two ferries and having access to local trades for erection of the structures.

There are several types of wood structural systems possible for this project including post and beam, prefabricated wood panels (Passive House), prefabricated trusses and TJI's with wood framed walls. Wood is a more environmentally sustainable material and is commonly used for building institutional projects such as the fire hall and there are trades on the Island who have a great deal of experience with these systems. AFC Construction is providing costing on the steel, wood and hybrid (steel in the apparatus bays and wood in the fire hall) and will forward information the week of July 14-19.

Mechanical:
Integral Group has issued their schematic design report outlining their design assumptions and identifying potential design solutions (Attached in the appendix for reference). Their approach is based on keeping the mechanical systems operationally simple and aiming to keep energy and maintenance costs minimized. Integral is proposing collecting non-potable rainwater from the roof for use in the fire trucks and for training exercises.

In addition, they are recommending that a Passive House approach be followed in which highly insulated walls and energy efficient glazing systems be used along with the proper solar orientation to reduce temperature swings within the building and improve thermal comfort with reduced energy costs. Drawings have been submitted to three passive house subtrades for preliminary pricing.

Electrical:
Opal Engineering has also provided their schematic design report for review. Distribution requirements and preliminary specifications of equipment and light fixtures and controls have been included for review and comment. They are currently reviewing the existing emergency generator specifications for post disaster criteria and providing a preferred location for the generator.

Sustainability:
Michel Labrie Architect (Sustainability) has issued the preliminary LEED scorecard indicating that the project is on track for a minimum Silver equivalency based on the current design layout (Attached in the appendix). The consultant is focusing on strategies that minimize water use and energy consumption and are recommending that rough in for photovoltaic panels be provided for future panel installation.

MLA has considerable experience with green roof design and will be providing assembly specifications and listing of drought resistant plant species suitable for a low maintenance application. The consultant is currently performing energy modeling on the project to provide orientation and siting recommendations to the consultant team.

3.0 Design Process Update

Simcic + Uhrich Architects met with the Hornby Island Fire Hall User Committee on May 25th to review siting information and three options for the fire hall layout (Attached in the appendix). The options were created to evaluate overall area and adjacency relationships and were as follows:

- **Option 1** – Six full size apparatus bays (Total Area of 9,860sf (916sm))
- **Option 2 –** Five full size apparatus bays (Total Area of 8,840sf (821sm))
- **Option 3** – Four full size apparatus bays and one smaller ambulance apparatus bay (Total Area of 8,560sf (795sm))

The User Committee supported moving ahead with the lowest area Option 3 with some minor revisions to the layout. The most significant revision was to flip the building so that the apparatus bays are located to the north of the site. This revision allows for a longer run to reduce the average gradient for access to Central Road and allows for improved solar orientation for the regularly occupied spaces of the fire hall. The building also moved back on the site to allow for a landscape buffer between the building and Central Road.

Hornby Island local architecture is characterized by a strong relationship to the landscape and a focus on local craft and it is the intention of the design team to work with the Ad Hoc Committee to develop a place in front of the building that melds art, landscape, and sustainability in a manner that is in keeping with Hornby Island values.

Additional layout revisions included moving the Chief's Office to closer to the Entry Foyer and the deletion of the Gear Drying room in favour of a Hose Drying/Training Tower that also acts as a second exit (required) from the second floor of the building.

A preliminary code report has been produced and is attached in the appendix for reference.

The three options were forwarded to AFC Construction and Option 3 was the most cost efficient option at $1,818,323 which is on budget with a significant 15% contingency applied to the construction costs.

4.0 Next Steps

The consultant team is currently moving forward with the production of display panels for the Public Open House on Sunday July 20th and Monday July 21st at New Horizons on Hornby Island. The intention of the Open House is to obtain feedback from the community with regards to siting, building layout, structural systems, sustainability features and project cost. Drafts of the presentation panels will be forwarded to the CVRD and HIFH User Committee for review prior to the Open House. Site plan and two floor plans of the proposed layout have been attached in appendix for reference.

After comments have been obtained from the Open House, Simcic + Uhrich Architects will work with Tor Narwot (Pre-Construction Coordinator) to assess the comments and develop a summary of the comments for review of the Select Committee. The design team will work to evaluate and incorporate feedback from the Open House into the design development phase of the project.

5.0 Appendix Documents

Program Master Sheet
Structural Post Disaster Design Criteria
Structural Systems Design Report
Mechanical Schematic Design Report
Electrical Schematic Design Report
LEED Scorecard
Preliminary Code Report
Current Drawings
Schematic Design Presentation

Room Data Sheet

Master List

RM	Function	Dimensions			Net Area (sf)
	Public Areas				
1	Entry Foyer	10.00	x	15.00	150
2	Public WC	8.00	x	7.00	56
					subtotal 206
	Secure Areas (Offices)				
3	Chief's Office	10.00	x	8.00	80
4	Communications Room	8.50	x	8.00	68
					subtotal 148
	Operations Area				
5	4 x Apparatus Bay	18.50	x	40.00 x4	2960
6	Ambulance Bay	16.00	x	36.00	576
7	Training/Records	10.00	x	20.00	200
8	SCBA Room	8.00	x	7.00	56
9	Compressor Room	8.00	x	7.00	56
10	Equipment Maintenance	10.00	x	20.00	200
11	Turn Out Gear Room	10.00	x	25.00	250
					subtotal 4,298
	Support Areas				
12	Meeting Room	20.00	x	50.00	1000
13	Kitchen	20.00	x	10.00	200
14	Toilets/Showers	20.00	x	15.00	300
15	Exercise	20.00	x	11.00	220
16	Storage	15.00	x	10.00	150
17	Laundry Room	10.00	x	10.00	100
18	Janitor	6.50	x	6.00	39
19	Mechanical Room	12.00	x	10.00	120
20	Electrical Room	6.50	x	6.00	39
21	Washroom (upstairs)	6.00	x	10.00	60
22	Stair				150
					subtotal 2,378
	Training				
23	Hose/Training Tower				
24	Auto Extraction	40.00	x	40.00	1600

Building Area Totals	
Apparatus Bays Net Area	**3,536**
Apparatus Bays Gross Area (5% Gross Up Factor)	**3712.8**
Non-Apparatus Bay Net Area	**3,494**
Non-Apparatus Bay Gross Area (25% Gross Up Factor)	**4367.5**
Total Gross Area	**8080.3**

Post Disaster Buildings as relates to Structural Design

BCBC Table 4.1.2.1. Importance Categories for Buildings

Post-disaster buildings are *buildings* that are essential to the provision of services in the event of a disaster, and include:

- *buildings* of the following types, unless exempted from this designation by the *authority having jurisdiction*
    - fire, rescue and police stations, and housing for vehicles, aircraft, or boats used for such puposes

Buildings of the type are in the Importance Category; **Post –disaster**
This will have implications mainly in the applied load (force) used for the member (building) design.

4.1.4. Dead Loads

These are the permanent loads in a building, including structure, permanent materials etc.
The effect of these loads is calculated by including the individual weights in the design. The Ultimate Limit States (ULS) factor of safety used for dead loads is 1.25. This will be the same for post disaster buildings.

4.1.5. Live Load Due to Use and Occupancy

The live load will include the effect of the occupants and any non-fixed equipment and furnishings. The occupancy load I based on building use, in this building the load will vary between 2.4 kPa and 4.8 kPa. The ULS safety factor for live load is 1.5 for all Importance Categories.

Post disaster buildings are expected to remain functional in the event of a natural disaster. These disasters may be caused by snow and rain, wind or earthquake because of this the load effect due to these occurrences will be increased.

4.1.6. Loads Due to Snow and Rain

Specified snow load (S)

$S = I_s(S_s(C) + S_r)$

I_s = importance factor; for post disaster buildings, I_s = **1.25** (ULS); I_s = 1 (ULS) for normal buildings
S_s = ground snow load
C = factor based on load, roof shape, accumulation, slope
S_r = rain load

4.1.7. Wind Load

Specified wind load (p)

$P = I_w q C$

I_w = importance factor; post disaster, I_w = **1.25** (ULS); normal, $I_w = 1$
q = reference velocity pressure
C = factor based on exposure, gust, external pressure

4.1.8. Earthquake Load and Effects

4.1.8.5. Importance Factor (I_E); determined from Table 4.1.8.5.

Post-disaster; I_E = **1.5**

As shown above, a post disaster building will be designed for snow and wind load 25% greater than normal buildings and earthquake loading 50% greater.

HORNBY ISLAND FIRE HALL – Structural System Analysis

There is discussion on the material type to be used for the Hornby Island Fire Hall structural systems. Given it's remote location which requires two ferry trips from Vancouver Island the most preferred structural systems are wood, steel or combination of the two systems. Pre-engineered and pre-fabricated steel structures have been evaluated but found to be the least desirable system due to the difficulty of achieving a highly functioning five bay fire hall that meets post disaster seismic requirements and community objectives of a durable 50 year building.

We are in the process of investigating structure of each material and offer the following preliminary comments:

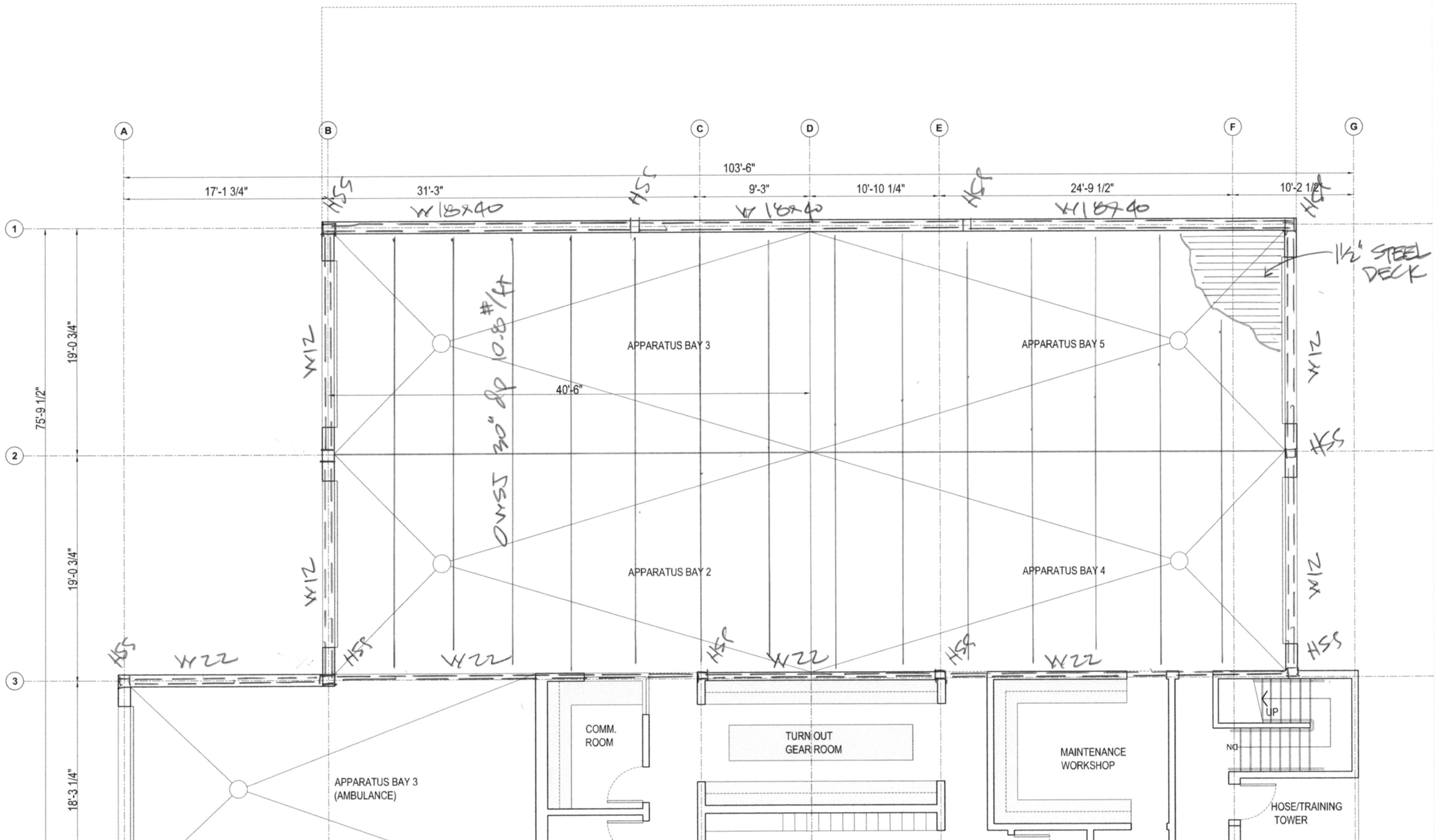
Steel

Steel structure is actually quite basic, consisting typically of decking, purlins, beams and joists. For this project, we are considering; steel decking (with concrete topping for living areas), open web steel joists, wide flange beams and columns. A steel structure will need to be prefabricated in an approved manufacturing facility and transported to the site for erection. The prefabrication will speed up site construction time. But it can lead to problems of transport, scheduling and proper fitting, particularly on a remote site such as Hornby Island. Steel as a construction material has the benefit of high strength and stiffness. This is a sustainability positive, as less material will be required. From the same view point, steel may be a poor choice because it has a high embodied energy and is not a renewable resource. We understand that low energy consumption is a consideration for this building. To achieve this all the steel structure will need to be well separated from the exterior as steel has high thermal conductivity which will increase gross area of the building.

Wood

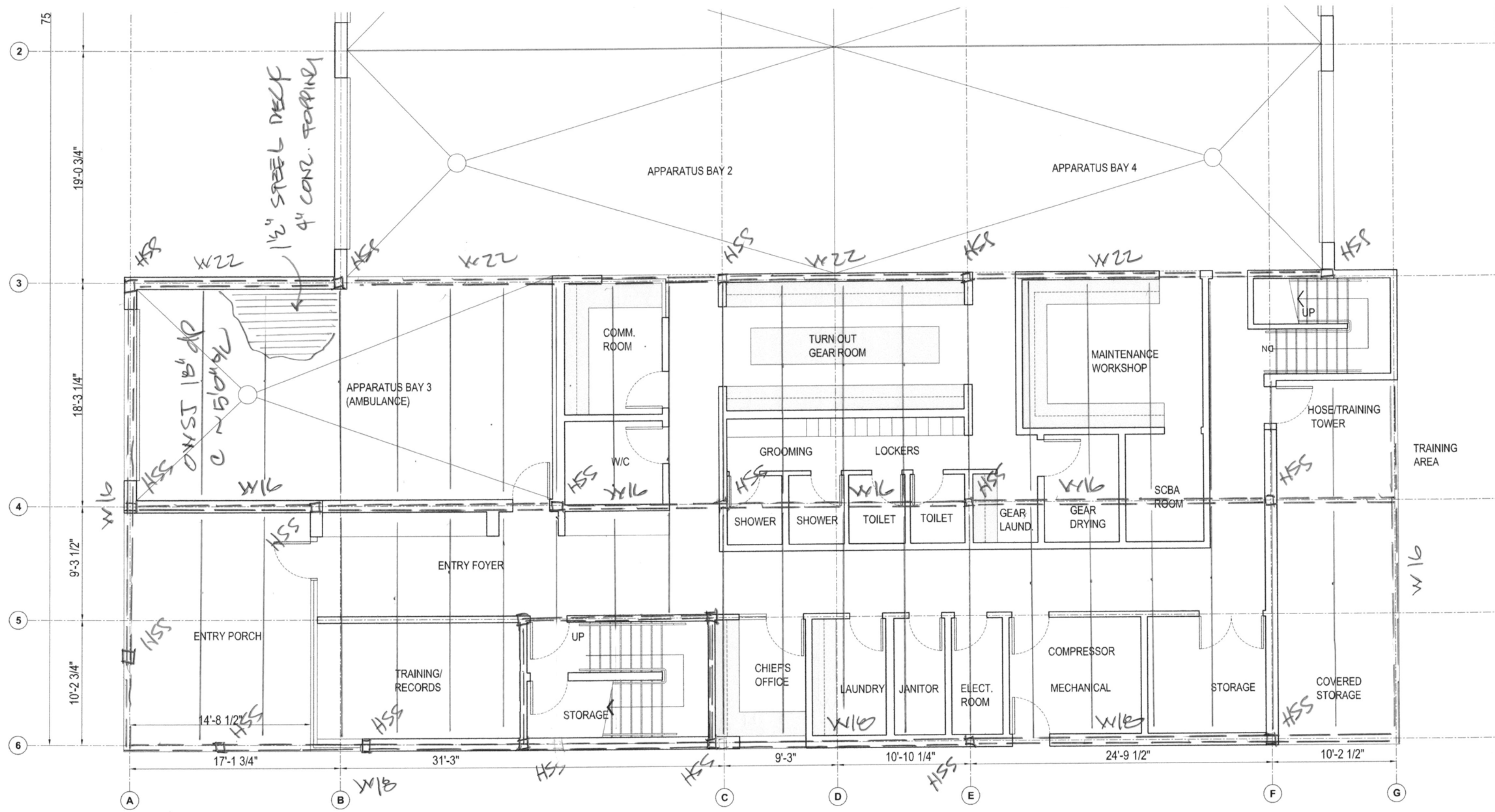
Wood can be used in many structural forms for this building. One option would be mass wood (very similar to steel structure) of decking, beams and columns. The common material choice for this system is Glulaminated Douglas Fir, a material native to the BC Coast. A better option for a building of this size location and scope is large scale light wood framing. This system is a combination of solid dimension lumber and engineered sections (I-joists, beams). We have investigated I-joists and engineered beams for the horizontal members with dimension lumber for the vertical bearing members. One benefit of this system, is that the walls are the vertical load bearing elements. For steel structure, beams carry the load and non-structural walls are included for environmental and spatial separation. This introduces a level of material and cost redundancy. We understand there is consideration being given to Passive roof and wall system. This system incorporates structure and a high degree of environmental separation into one system. Either of the wood systems are considered a sustainable material choice, as wood members require low energy to produce and wood is the only renewable resource. Another benefit of the engineered wood members is that small (often waste pieces) can be used to produce large members.

For the Hornby Island Fire Hall a hybrid wood and steel structure is potentially a good solution. The Apparatus Bays have large spans and a need for some flexibility for renovation and growth. A steel structure of decking, open web steel joists, wide flange beams and HSS columns could be suitable for this area. The rest of the building has smaller spaces, defined walls and more need for a higher level of insulation, very appropriate for a wood structure with I-joist / engineered wood beam roof and floor and dimension lumber walls (perhaps Passive).



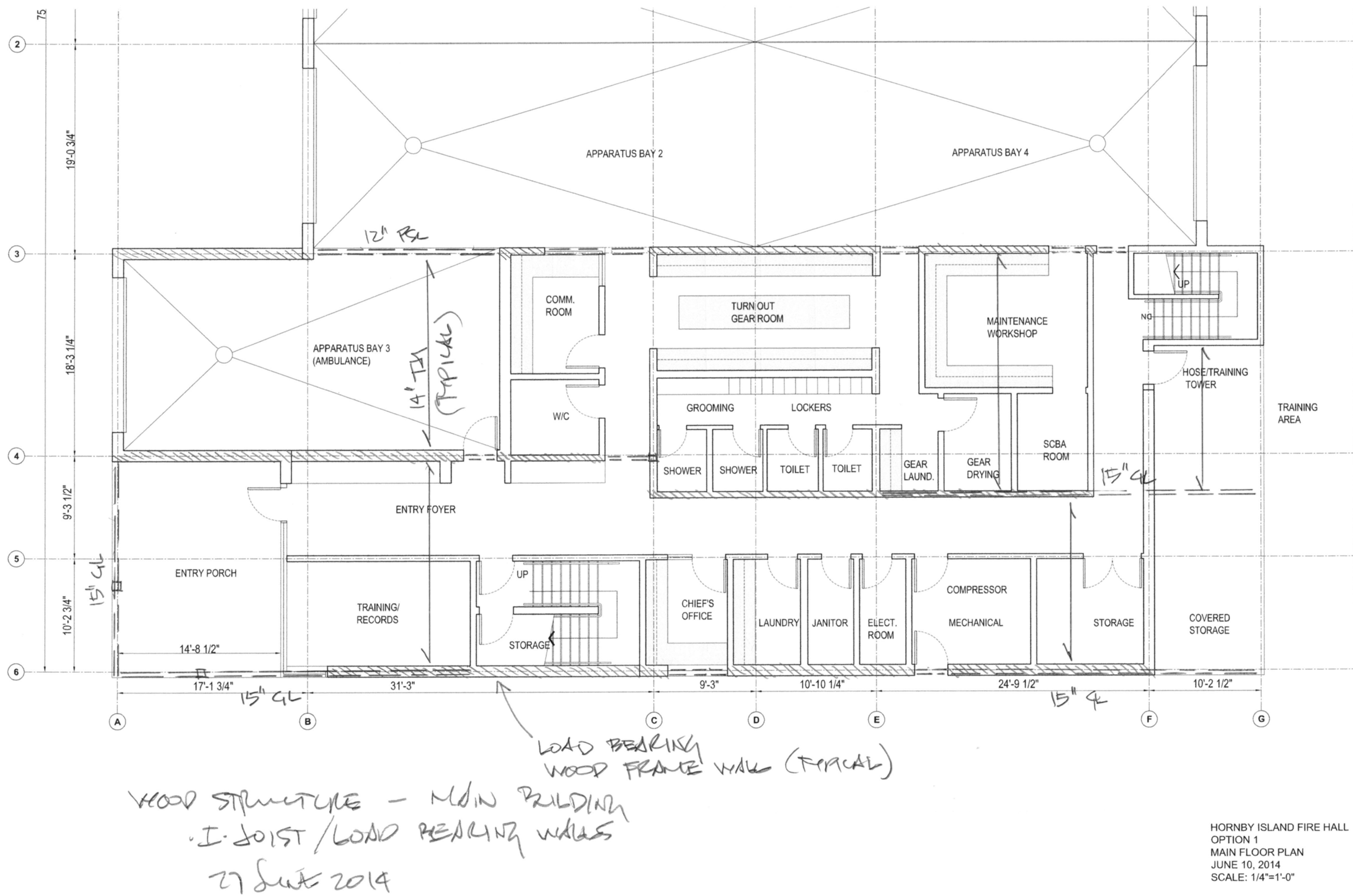
STEEL STRUCTURE – APPARATUS BAY
27 JUNE 2014

HORNBY ISLAND FIRE HALL
OPTION 1
MAIN FLOOR PLAN
JUNE 10, 2014
SCALE: 1/4"=1'-0"



STEEL STRUCTURE · MAIN BLDG
27 June 2014

HORNBY ISLAND FIRE HALL
OPTION 1
MAIN FLOOR PLAN
JUNE 10, 2014
SCALE: 1/4"=1'-0"



HORNBY ISLAND FIRE HALL
OPTION 1
MAIN FLOOR PLAN
JUNE 10, 2014
SCALE: 1/4"=1'-0"

Hornby Island Fire Hall
Mechanical Schematic Design Report

Hornby Island Fire Hall

Prepared for:

Simcic + Uhrich Architects
Suite 230 3 West 3rd Avenue
Vancouver, BC V5Y 3T8

Developed by:

Integral Group
Suite 180 - 200 Granville Street
Vancouver, BC   V6C 1S4

Project No: 14-2012-M01

June 12, 2014

1. INTRODUCTION

The new Hornby Island Fire Hall will be an 795 m^2 building, complete with four apparatus bays, an ambulance bay, and basic amenities for the volunteer staff that will serve the small community of Hornby Island. The purpose of the mechanical schematic design report is to outline the proposed mechanical systems for the fire hall, in addition to providing a recommended approach that will be cost-effective, low maintenance and meet the sustainability goals for the project.

2. EXECUTIVE SUMMARY

Due to limited resources available to the small community of Hornby Island, water and energy conservation are held paramount in the mechanical and plumbing systems recommended for the Hornby Island Fire Hall project. Due to fuel source limitations, considerations were not given to fuel oil, or propane gas due to high fuel and delivery costs. The following recommendations will provide a cost-effective approach that strives to maintain the sustainability goals for the project:

- **Plumbing**
    - 65mm incoming potable water connection from well water system
    - Utilizing low-flow and dual-flush plumbing fixtures, including waterless urinals
    - Electric hot water tank
    - Above-grade rainwater retention tank for non-potable water uses
    - Compressed air system serving the fire hall
    - Pre-sloped and modular trench drain systems in bay areas utilizing the same oil interceptor
    - Relocation of existing SCBA compressor and cylinder filling system, and integration into the new building

- **Fire Protection**

  Due to the size of the building, fire protection is not required for this project

- **HVAC**

  A number of options were considered, and are described in the body of the report. The following system was selected based on our interpretation of the requirements. There are however lower cost alternatives worthy of further discussion.

    - Utilizing three heat recovery ventilators for ventilation requirements:
        - Ground Floor (not including Turn Out Gear Room)
        - Second Floor
        - Turn Out Gear Room – sized for 6-8 ACH
    - Nederman Exhaust System for the Apparatus and Ambulance bays
        - MagnaRail exhaust extraction system for 4 Apparatus bays
        - MagnaTrack exhaust extraction system for the Ambulance bay
    - Ductless variable refrigerant split heat pump systems in the occupied areas
        - Chief's Office – wall mounted unit
        - Communications Office – wall mounted unit
        - Training and Records – ceiling mounted cassette
        - Meeting Room – ceiling mounted cassette
        - Exercise Room – ceiling mounted cassette
    - Ducted variable refrigerant split heat pump systems in the bays
        - Apparatus bays: 2 units – ducted either side
        - Ambulance Bay: 1 unit – ducted one side

3. PLUMBING

3.1 Domestic Water Systems

It is anticipated that a 65mm (198 FUs @ 4.1 L/S) incoming water will be required for the Hornby Island Fire Hall to serve the potable water requirements of the building, and to serve as a back-up to the rainwater retention tank serving the non-potable usages. Potable water will be extracted from a well which will be specified by the Civil Consultant. With the intent of holding water conservation paramount, low-flow fixtures will be used throughout the facilities washroom facilities, in addition to dual-flush tank-type toilets and waterless urinals. To remain cost effective, commercial grade, ceramic fixtures will be specified with manual operation. Lavatories in washrooms will utilize hands-free sensor type faucets. Domestic hot water will be generated from an electric hot water tank. While a solar hot water system was considered, it was not deemed appropriate due to the sporadic use of the hall. Instantaneous domestic hot water generation was also considered, however these devices require a very high electrical power draw and will result in an expensive electrical installation for heaters to serve the various plumbing fixtures.

3.2 Storm Water Systems

As a means to further reduce potable water usage, an above-grade rainwater retention tank and booster pump system will provide non-potable water for toilet flushing and truck washing requirements. The rainwater retention tank will accumulate storm water collected via roof drains. Rainwater will only be collected from non-green roof areas, to avoid discoloration of the water, and staining water closets. The non-potable system will be topped up by the potable water system during periods of low rainfall. A filtration system will be provided together with a booster pump set to feed the water closets and hose bibs. All non-potable will be in accordance with CSA-B128.1-06 standard.

3.3 Compressed Air System

A compressor, dryer and storage tank compressed air system will be provided to serve the four Apparatus bays, the Ambulance bay, and the Equipment Maintenance room. Pressure regulators and isolation valves will be provided at each point of connection. The compressor maybe relocated from the existing hall, if it is in good repair and adequately sized.

3.4 Sanitary Drainage Systems

The Apparatus bays will be served by ACO pre-sloped modular trench drain systems. The ACO trench drain systems offer a cost-effective approach versus using cast concrete due to the lower installation costs and lower maintenance requirements. Two trench drain systems will be running the lengths of the Apparatus bays, and an individual trench drain will be used for the Ambulance bays. These trench drain systems will be capable of handling the weight of the trucks serviced in the bays. The sanitary lines from these trench drains will be piped to the oil interceptor that will serve the Auto Extraction area on site and this will be specified by the Civil Consultant. The remainder of the building will be served by a 4” pipe.

4. FIRE PROTECTION

4.1 Due to the size of this project, no fire protection systems are required for the Hornby Island Fire Hall.

5. HVAC

5.1 Design Conditions

1. Outdoor Design Conditions

The design conditions for the project will be based on design data for Courtenay, BC due to its proximity and climatic data availability:

- Winter Ambient Temperature: -9°C
- Summer Ambient Temperature: 28°C (db), 18°C (wb)

2. Indoor Design Conditions

The following indoor design conditions have been set for the project:

- Maximum anticipated occupancy: 25 people
- Ground floor ventilation rate: 8.6 L/S per person based on Office Space
- Second floor ventilation rate: 2.8 L/S per person based on Meeting Space
- Indoor Design Temperatures:
    - Office, Admin, Meeting Rooms:
        - Heating: 21°C
        - Cooling (if pursued): 24°C
    - Apparatus and Ambulance Bays:
        - Heating: 10°C

5.2 Ventilation Systems

The Hornby Island Fire Hall's ventilation requirements will be met by utilizing heat recovery ventilators. Heat recovery ventilators offer the ability to capture waste heat from the exhaust air stream to preheat incoming outdoor air stream. Three separate Mitsubishi Lossnay or Reversomatic units are considered for this project: HRV-1 serving the Ground Floor, HRV-2 serving the Second Floor, and HRV-3 serving the Turn-Out Gear room. Consideration will be placed on combining HRV-1 and HRV-2 into a single unit, which will depend on size, cost and product availability. Having separate units will result in less energy consumption if for instance the Ground Floor is occupied more frequently than the Second Floor, allowing the Second Floor unit to remain off unless triggered by an occupancy sensor. Due to the nature of the Turn-Out Gear Room, a separate unit will be required to serve these areas which will be sized to provide 6 to 8 ACH based on previous experience. Fresh air will be ducted to low-level to utilize a more efficient means of distribution to dry the Turn-Out Gear room by blowing air up and through the gear. The kitchen will utilize a residential grade range hood exhaust fan.

The Apparatus and Ambulance bays will require a vehicular exhaust extraction system to meet WorkSafeBC requirements. The Nederman MagnaRail vehicular exhaust extraction system can handle up to 4 fire trucks to meet the requirements in the 4 Apparatus bays. The Nederman MagnaTrack vehicular exhaust extraction system will be able to handle the requirements for the Ambulance bay.

5.3 Heating & Cooling Systems

A few approaches are being considered for the Hornby Island Fire Hall while considering a number of factors including sustainability goals, cost effectiveness, maintenance requirements, and fuel source consideration. Outlined below are four approaches proposed for this project:

1. Electric Heating Systems

    The first option considers providing direct electric heating sources throughout the building, which would comprise of electric baseboard heaters in office and other occupied areas, electric force flows for the Mechanical room and Entry Foyer, and electric unit heaters in the Apparatus and Ambulance bays. This option offers a low capital, installation and maintenance costs, however in contrast offer higher operating costs. Consideration can be placed on providing a super-insulated building using PassivHaus principles to reduce the total amount of electrical demand due to heating, which in turn can reduce the operating costs. With this concept, all of the additional cost of the heating system can be invested into the building envelope.

2. Combination Ductless & Ducted Split Heat Pump Systems

   The second option explores utilizing heat pump technology as an efficient means to providing heating, and as a side benefit cooling, for the fire hall. Mitsubishi or Daikin variable refrigerant technology would offer the capability of a single condensing unit on the roof or on grade at the rear of the building, and a series of 8 different fan coils to serve the building. Ductless indoor units, ceiling and wall mounted, will be utilized in the office and other occupied areas. Ducted units would be considered for the Apparatus and Ambulance bays. This option offers a higher capital, installation and maintenance costs due to the use of refrigeration technology, however in contrast offers lower operating costs as the heat pump operates with a coefficient of performance of approximately 3.0; meaning that for every 1 kW of electrical energy consumption, 3 kW of heat energy are provided resulting in a third of the electrical energy use of Option 1.

3. Air-to-Water Heat Pump & Radiant Heating Systems

   The third option explores utilizing an air-to-water heat pump with radiant flooring throughout the fire hall. This option will require a more complex heating plant which will drive the capital, installation and maintenance costs for this project are higher. The operating costs of the system would remain lower than Option 1 stated above however will be higher than Option 2 due the slow response time and the need to continually maintain the building at temperature. This approach would also not suit the part-time and sporadic use of the building and would be more appropriate for a full-time fire hall.

4. Residential Furnace Units

   The forth option considers using residential grade, forced-air Lennox or Trane furnace systems utilizing a cooling/heating coil served by roof-mounted condensing units. This approach would require providing mechanical closet space for the floor-mounted units and a source of back-up direct electric heat for when temperatures fall below optimal condensing unit operation. Though the lower capital, installation, maintenance and operation costs associated to this system would seem feasible, thermal zoning issues, floor space requirements, and additional sheet metal ductwork would render this approach less attractive, than Option 1 or 2.

6. <u>CONCLUSION</u>

The small community of Hornby Island faces a couple of challenges when dealing with resource availability. As such, water conservation and energy efficiency are held vital long term goals set for the Hornby Island Fire Hall project. Alternative fuel sources other than electricity were not considered due to high fuel and delivery costs.

The plumbing systems recommended would look to conserve water through low-flow, dual flush and waterless fixtures. An above-grade rainwater retention tank will further reduce the amount of potable water use by serving flushing and truck washing purposes.

The ventilation systems will utilize heat recovery ventilators as an efficient way of pre-heating incoming outdoor air stream with waste heat from the outgoing exhaust air stream. As for the primary heating and cooling systems, the suggested approach would be to consider Option 2 as it offers an energy efficient and cost effective solution versus Option 1. Option 1 could be more attractive if the building is super-insulated. Option 2 has the ability to offer both heating and cooling to the fire hall, while lowering operating costs. Option 3 would not be recommended for this project primarily due to the high upfront costs of a hydronic mechanical plant, and the slow response time associated with radiant flooring technology. Though Option 4 offers lower upfront and operating costs, we do not recommend the use of residential grade furnaces as thermal zoning issues can create discomfort when various zones are tied to a singular unit, and the technology does not meet the sustainability goals set out to drive lower energy usage.

INTEGRAL GROUP

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Mechanical Designer

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Managing Principal

S. A. HOOD

June 12, 2014

SEALED

[SG/sg]

Encl. Mitsubishi Catalogue, Lossnay HRV, Nederman Vehicular Exhaust Extraction Systems, Jay R Smith Rainwater Harvesting Systems.

PUMY-P NHMU(-BS)

SPECIFICATIONS

Model			PUMY-P36NHMU(-BS)	PUMY-P48NHMU(-BS)
Power source			1-phase 208-230V 60Hz	
Cooling capacity (Nominal)	*1	BTU / h	36,000	48,000
	*1	kW	10.6	14.1
	Power input	kW	3.22	4.97
	Current input	A	14.23-15.74	24.0-21.7
Temp. range of cooling	Indoor	W.B.	59 ~ 75°F (15 ~ 24°C)	
	Outdoor	D.B.	23 ~ 115°F (-5 ~ 46°C) 50 ~ 115°F (10 ~ 46°C) : in case of connecting PKFY-P06 / P08 type indoor unit.	
Heating capacity (Nominal)	*2	BTU / h	40,000	54,000
	*2	kW	11.7	15.8
	Power input	kW	2.93	4.88
	Current input	A	12.88-14.24	23.6-21.3
Temp. range of heating	Indoor	D.B.	59 ~ 81°F (15 ~ 27°C)	
	Outdoor	W.B.	0 ~ 60°F (-18 ~ 15.5°C)	
Connectable indoor unit	Total capacity		50 ~ 130% of outdoor unit capacity	
	Model / Quantity		P06 ~ P36 / 1 ~ 6	P06 ~ P54 / 1 ~ 8
Sound pressure level (measured in anechoic room)		dB<A>	49 / 51	50 / 52
Diameter of refrigerant pipe	Liquid pipe	in.(mm)	ø3/8 (ø9.52) Flare (total length ≧ 393ft. (120m))	ø3/8 (ø9.52) Flare (total length ≧ 393ft. (120m))
	Gas pipe	in.(mm)	ø5/8 (ø15.88) Flare	ø5/8 (ø15.88) Flare
External finish			Galvanized sheets (+powder coating for -BS type) <MUNSELL 3Y 7.8/1.1>	
External dimension H x W x D		in.	53-5/32 x 37-13/32 x 13	53-5/32 x 37-13/32 x 13
		mm	1,350 x 950 x 330	1,350 x 950 x 330
Net weight		lbs (kg)	287 (130)	287 (130)
Heat exchanger			Salt-resistant cross fin & copper tube	
Compressor	Type		Inverter scroll hermetic compressor	
	Starting method		Inverter	
	Motor output	kW	2.4	2.4
	Case heater	kW	–	–
FAN	Airflow rate	m^3 / min	100	100
		L / s	1,667	1,667
		cfm	3,530	3,530
	External static press.	in.WG(Pa)	0 (0)	0 (0)
	Type x Quantity		Propeller fan x 2	Propeller fan x 2
	Control, Driving mechanism		DC-control, Direct-driven by motor	DC-control, Direct-driven by motor
	Motor output	kW	0.086 x 2	0.086 x 2
Protection	High pressure protection		High pressure sensor, High pressure switch at 4.15MPa (601 psi)	
	Inverter circuit (COMP.,FAN)		Over-current protection, Over-heat protection	
	Compressor		Discharge thermo protection, Over-current protection	
	Fan motor		Over-heat protection, Voltage protection	
Refrigerant	Type x Original charge		R410A x (18 lbs + 12 oz) (8.5kg)	R410A x (18 lbs + 12 oz) (8.5kg)
Optional parts			joint : CMY-Y62-G-E Header : CMY-Y64 / 68-G-E	

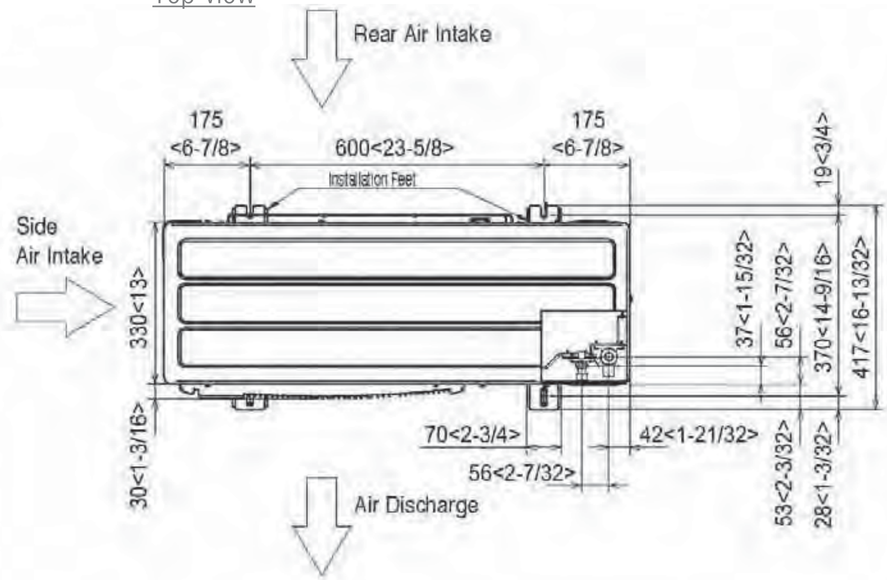
*1 Cooling conditions
Indoor 80°F (26.7°C) D.B. / 67°F (19.4°C) W.B., Outdoor 95°F (35°C) D.B.
Pipe length 25ft. (7.6m), Level difference 0ft. (0m)

*2 Heating conditions
Indoor 70°F (21.1°C) D.B., Outdoor 47°F (8.3°C) D.B. / 43°F (6.1°C) W.B.
Pipe length 25ft. (7.6m), Level difference 0ft. (0m)

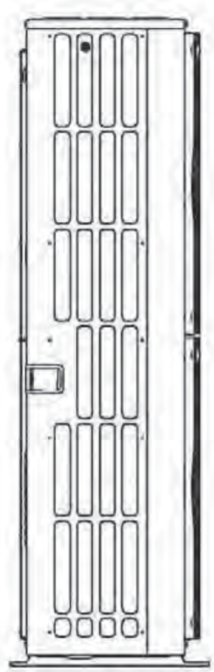
PUMY-P NHMU(-BS)

PUMY-P36/48NHMU(-BS)

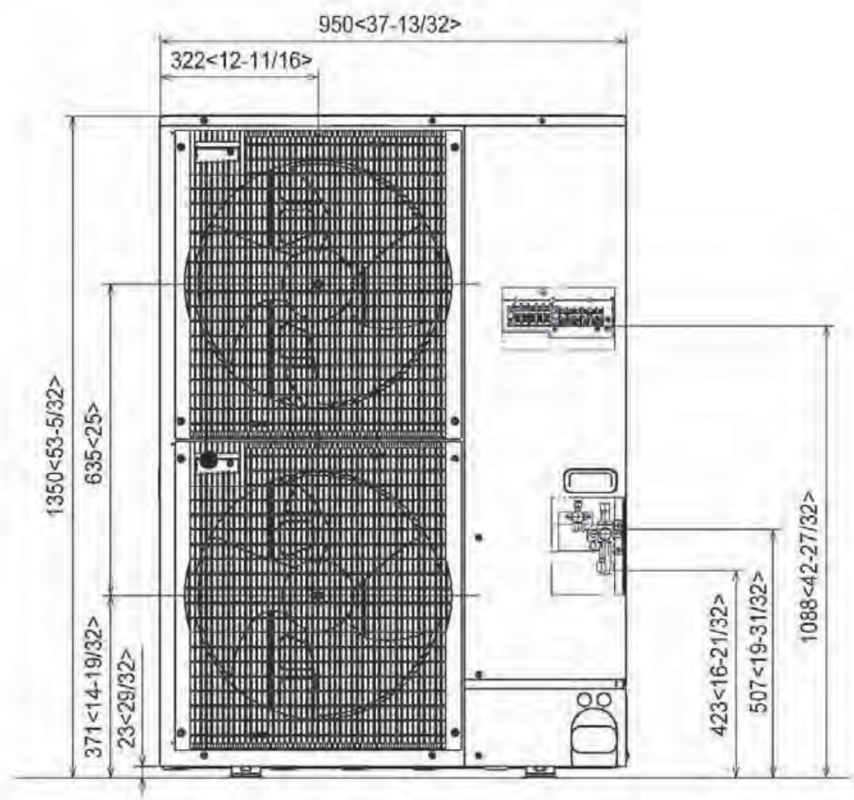
Top view



Side view



Front view



WIDE SELECTION OF INDOOR UNITS

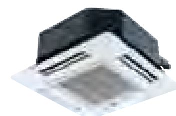
Model size		P06	P08	P12	P15	P18	P24	P27	P30	P36	P48	P54	P72	P96
TON		0.5	0.67	1.0	1.25	1.5	2.0	2.25	2.5	3.0	4.0	4.5	6.0	8.0
Nominal cooling capacity *1	BTU/h	6,000	8,000	12,000	15,000	18,000	24,000	27,000	30,000	36,000	48,000	54,000	72,000	96,000
	kW	1.8	2.3	3.5	4.4	5.3	7.0	7.9	8.8	10.6	14.1	15.8	21.1	28.1
Nominal heating capacity *2	BTU/h	6,700	9,000	13,500	17,000	20,000	27,000	30,000	34,000	40,000	54,000	60,000	80,000	108,000
	kW	2.0	2.6	4.0	5.0	5.9	7.9	8.8	10.0	11.7	15.8	17.6	23.4	31.7

Ceiling cassette

PLFY-P NBMU-E

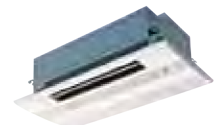
i-see Sensor

PLFY-P NCMU-E



PLFY-P NLMU-E

PMFY-P NBMU-E

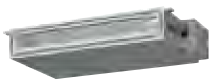


PAGES 133-140

Model size	P06	P08	P12	P15	P18	P24	P27	P30	P36	P48	P54	P72	P96
PLFY-P NBMU-E			●	●	●	●		●	●				
PLFY-P NCMU-E		●	●	●									
PLFY-P NLMU-E	●	●	●	●	●								
PMFY-P NBMU-E	●	●	●	●									

Ceiling-concealed

PEFY-P NMSU-E



NEW PEFY-P NMAU-E2

NEW PEFY-P NMH(S)U-E

PAGES 141-150

Model size	P06	P08	P12	P15	P18	P24	P27	P30	P36	P48	P54	P72	P96
PEFY-P NMSU-E	●	●	●	●	●	●							
PEFY-P NMAU-E2	●	●	●	●	●	●	●	●	●	●	●		
PEFY-P NMH(S)U-E				●	●	●	●	●	●	●	●	●	●

Ceiling-suspended

PCFY-P NKMU-E

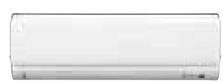
PAGES 151-152

Model size	P06	P08	P12	P15	P18	P24	P27	P30	P36	P48	P54	P72	P96
PCFY-P NKMU-E				●		●		●	●				

Wall-mounted

PKFY-P NBMU-E2

PKFY-P NHMU-E2



PKFY-P NKMU-E2

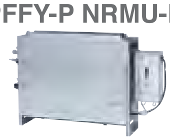
PAGES 153-156

Model size	P06	P08	P12	P15	P18	P24	P27	P30	P36	P48	P54	P72	P96
PKFY-P NBMU-E2	●												
PKFY-P NHMU-E2		●	●	●	●								
PKFY-P NKMU-E2						●		●					

Floor-standing
Floor-mounted concealed

PFFY-P NEMU-E

PFFY-P NRMU-E



PAGES 157-160

Model size	P06	P08	P12	P15	P18	P24	P27	P30	P36	P48	P54	P72	P96
PFFY-P NEMU-E	●	●	●	●	●	●							
PFFY-P NRMU-E	●	●	●	●	●	●							

Vertical-concealed
Hydra-Dan HEX
Hydra-Dan Booster

PVFY-P E00A

PWFY-P NMU-E-AU

PWFY-P NMU-E-BU

PAGES 169-178

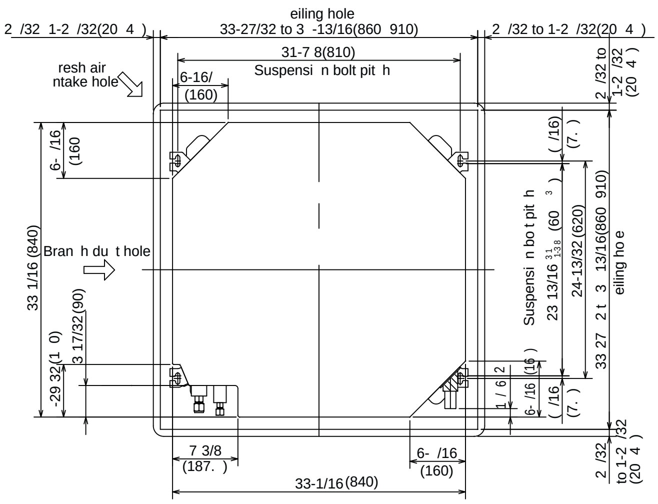
Model size	P06	P08	P12	P15	P18	P24	P27	P30	P36	P48	P54	P72	P96
PVFY-P E00A			●		●	●		●	●	●	●		
PWFY-P NMU-E-AU									●			●	
PWFY-P NMU-E-BU									●				

* Nominal conditions *1, *2 are referable at the Specification sheet.

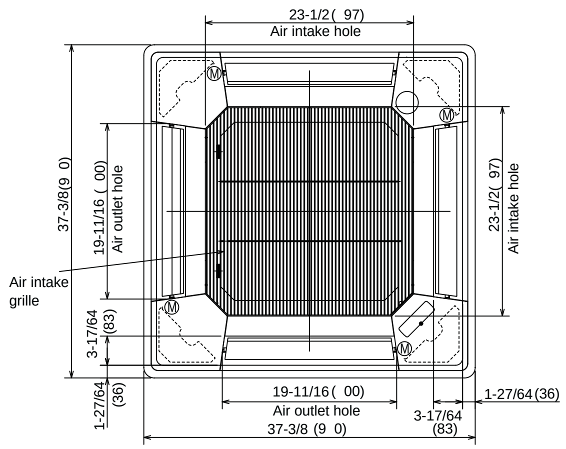
PLFY-P NBMU-E

PLFY-P12/15/18/24/30/36NBMU-E

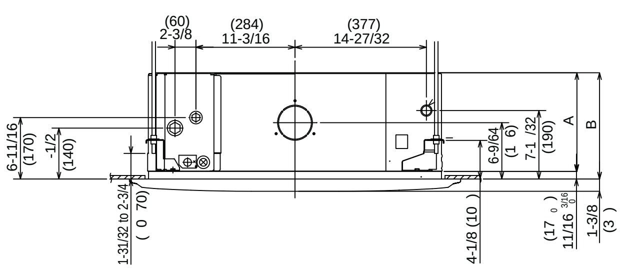
Upper view



Lower view



Side view

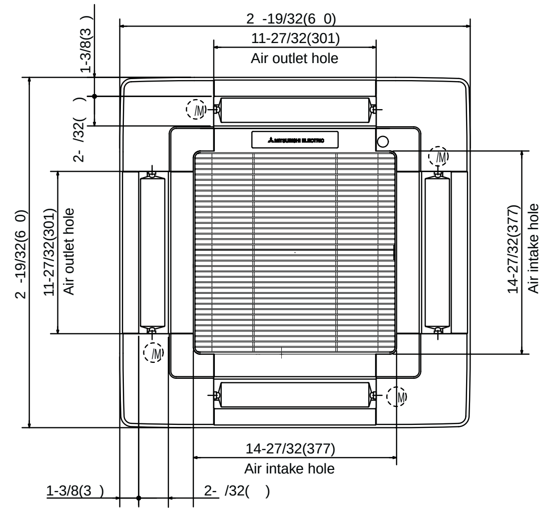


Models	A	B
PLFY P12•15•18•24•30NBMU E	9-1/2 (241)	10-3/16 (2 8)
P Y-P36NBMU-	11-1/16 (281)	11-3/4 (298)

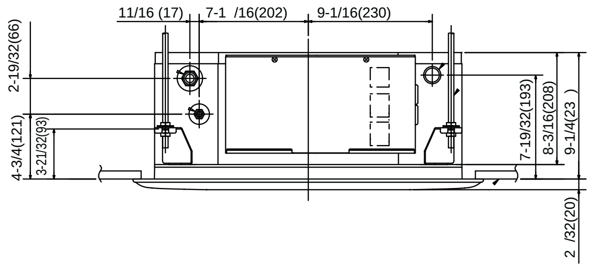
PLFY-P NCMU-E

PLFY-P08/12/15NCMU-E

Lower view

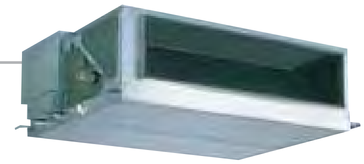


Side view



PEFY-P NMH(S)U-E

NEW



INCREASED DESIGN FLEXIBILITY FROM SUFFICIENT EXTERNAL STATIC PRESSURE ALLOWS AUTHENTIC DUCT AIR CONDITIONING WITH AN ELEGANT INTERIOR LAYOUT.

208V
Static Pressure
N/A~0.642in.WG
N/A~160Pa

230V
Static Pressure
0.401~0.803in.WG
100~200Pa

MAXIMUM EXTERNAL STATIC PRESSURE 0.803IN.WG [200PA], 1.00IN.WG [250PA]

The additional external static pressure capacity provides flexibility for duct extension, branching and air outlet configuration.

			P15	P18	P24	P27	P30	P36	P48	P54	P72	P96
External static pressure	208V	in.WG	N/A-0.201-0.642								0.20-0.40-0.60-0.80-1.00	
		Pa	N/A-50-160								50-100-150-200-250	
	230V	in.WG	0.401-0.602-0.803								0.20-0.40-0.60-0.80-1.00	
		Pa	100-150-200								50-100-150-200-250	

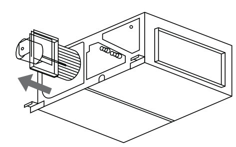
REDUCED SOUND PRESSURE LEVEL THANKS TO THE USE OF NEWLY DESIGNED CENTRIFUGAL FAN

Sound pressure level table (Standard static pressure 230V) dB(A)

	Capacity		P15	P18	P24	P27	P30	P36	P48	P54	P72	P96
Sound pressure level	Fan Speed	High	39	39	41	41	43	44	44	44	43	46
		Low	34	34	36	35	38	38	38	38	36	39

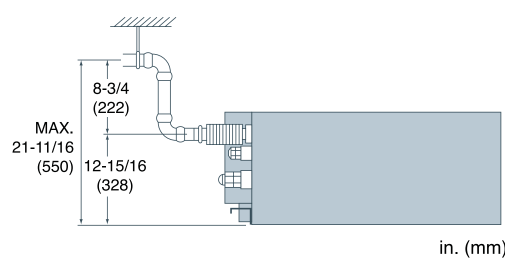
ONE-SIDE MAINTENANCE

All maintenance of the unit, including fan inspection and fan motor removal, can be conducted from the inspection opening on one side.



DRAIN PUMP (OPTION) ENSURES UP TO 21-11/16 in. (550 mm) OF LIFT

The introduction of an upper drain pump allows the drain connection to be raised as high as 21-11/16 in. (550 mm), allowing more freedom in piping layout design and reducing horizontal piping requirements.



SPECIFICATIONS

Model			PCFY-P15NKMU-E	PCFY-P24NKMU-E	PCFY-P30NKMU-E	PCFY-P36NKMU-E
Power source			1-phase 208/230 V 60Hz			
Cooling capacity (Nominal)	*1	BTU / h	15,000	24,000	30,000	36,000
	*1	kW	4.4	7.0	8.8	10.6
	Power input	kW	0.03	0.04	0.09	0.11
	Current input	A	0.35	0.41	0.83	0.97
Heating capacity (Nominal)	*1	BTU / h	17,000	27,000	34,000	40,000
	*1	kW	5.0	7.9	10.0	11.7
	Power input	kW	0.03	0.04	0.09	0.11
	Current input	A	0.35	0.41	0.83	0.97
External finish			MUNSELL (6.4Y 8.9/0.4)			
External dimension H x W x D		in.	9-1/16 x 37-13/16 x 26-3/4	9-1/16 x 50-3/8 x 26-3/4	9-1/16 x 63 x 26-3/4	9-1/16 x 63 x 26-3/4
		mm	230 x 960 x 680	230 x 1,280 x 680	230 x 1,600 x 680	230 x 1,600 x 680
Net weight		lbs (kg)	53 (24)	71 (32)	79 (36)	84 (38)
Heat exchanger			Cross fin (Aluminum fin and copper tube)			
FAN	Type x Quantity		Sirocco fan x 2	Sirocco fan x 3	Sirocco fan x 4	Sirocco fan x 4
	External static pressure	in. WG	0.000 (208V)	0.000 (208V)	0.000 (208V)	0.000 (208V)
		Pa	0	0	0	0
		in. WG	0.000 (230V)	0.000 (230V)	0.000 (230V)	0.000 (230V)
		Pa	0	0	0	0
	Motor type		DC motor			
	Motor output	kW	0.090	0.095	0.160	0.160
	Driving mechanism		Direct-driven			
	Airflow rate *2 (Low-Mid2-Mid1-High)	cfm	353-388-424-459	494-530-565-636	703-777-883-989	742-847-953-1,095
		m³ / min	10-11-12-13	14-15-16-18	20-22-25-28	21-24-27-31
		L / s	167-183-200-217	233-250-267-300	333-367-417-467	350-400-450-517
Sound pressure level *2 *3 (Low-Mid2-Mid1-High)		dB <A>	29-32-34-36 (208-230V)	31-33-35-37 (208-230V)	34-37-40-43 (208-230V)	36-39-42-44 (208-230V)
		dB <A>	–	–	–	–
		dB <A>	–	–	–	–
Air filter			PP honeycomb (anti-virus type)			
Diameter of refrigerant pipe(O.D.)	Liquid	in. (mm)	ø1/4 (ø6.35) Flare	ø3/8 (ø9.52) Flare	ø3/8 (ø9.52) Flare	ø3/8 (ø9.52) Flare
	Gas	in. (mm)	ø1/2 (ø12.7) Flare	ø5/8 (ø15.88) Flare	ø5/8 (ø15.88) Flare	ø5/8 (ø15.88) Flare
Field drain pipe diameter		in. (mm)	O.D. 1 (26)	O.D. 1 (26)	O.D. 1 (26)	O.D. 1 (26)

OPTIONAL PARTS

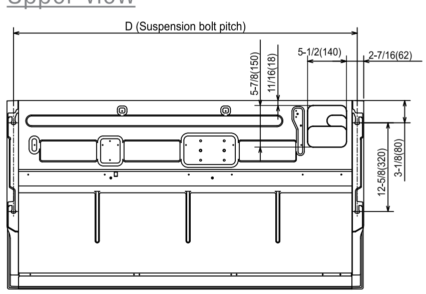
Description	Model	Applicable capacity
i-see sensor	PAC-SH91MK-E	P15, P24, P30, P36
i-see sensor & wireless remote controller kit	PAR-SA92MW-E	P15, P24, P30, P36
Wireless remote controller kit	PAR-SL93B-E	P15, P24, P30, P36
Drain pump	PAC-SH83DM-E	P15
	PAC-SH84DM-E	P24, P30, P36
High efficiency filter element	PAC-SH88KF-E	P15
	PAC-SH89KF-E	P24
	PAC-SH90KF-E	P30, P36
External heater adaptor	PAC-YU25HT	P15, P24, P30, P36

*1 Cooling / Heating capacity indicates the maximum value at operation under the following condition.
Cooling : Indoor 80°F (26.7°C) D.B. / 67°F (19.4°C) W.B., Outdoor 95°F (35°C) D.B.
Pipe length 25ft. (7.6m), Level difference 0ft. (0m)
Heating : Indoor 70°F (21.0°C) D.B., Outdoor 47°F (8.3°C) D.B. / 43°F (6.1°C) W.B.
Pipe length 25ft. (7.6m), Level difference 0ft. (0m)

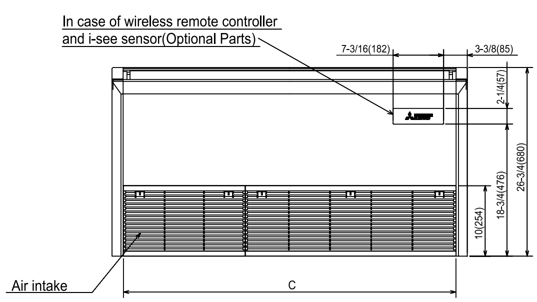
*2 Airflow rate / Sound pressure level are in (low-middle2-middle1-high).
*3 It is measured in anechoic room.

PCFY-P15/24/30/36NKMU-E

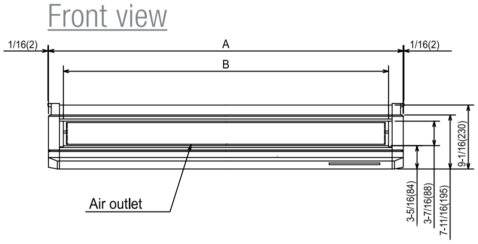
Upper view



Lower view



Front view



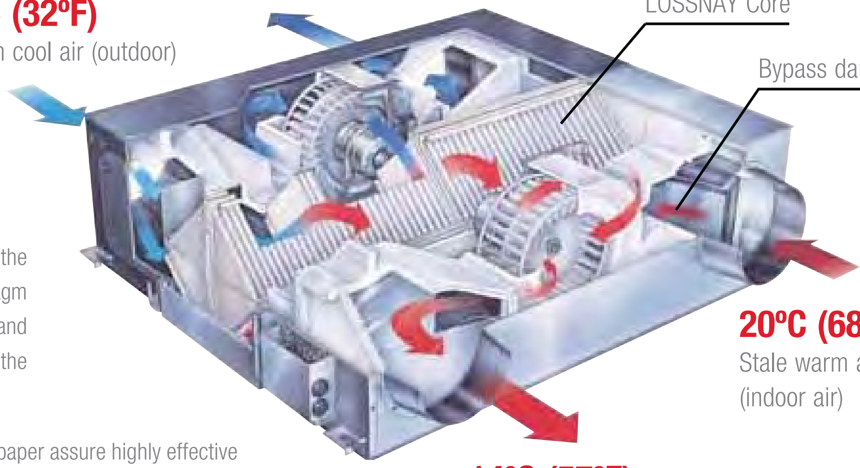
Model	A	B	C	D
PCFY-P15NKMU-E	37-13/16 (960)	33-9/16 (853)	34-9/16 (878)	36-1/16 (917)
PCFY-P24NKMU-E	50-3/8 (1280)	46-3/16 (1173)	47-3/16 (1198)	48-11/16 (1237)
PCFY-P30NKMU-E	63 (1600)	58-3/4 (1493)	59-3/4 (1518)	61-5/16 (1557)
PCFY-P36NKMU-E	63 (1600)	58-3/4 (1493)	59-3/4 (1518)	61-5/16 (1557)

Lossnay®

THE VENTILATION SYSTEM FOR ENHANCED AIR QUALITY - LOSSNAY

Combine with Lossnay Ventilation System to Enhance Air Quality. Unified Control System Allows Greater Design Freedom.

LGH-F300RX5-E (HIGH FAN SPEED)



HEAT-EXCHANGE EFFICIENCY OBTAINABLE ONLY WITH LOSSNAY.

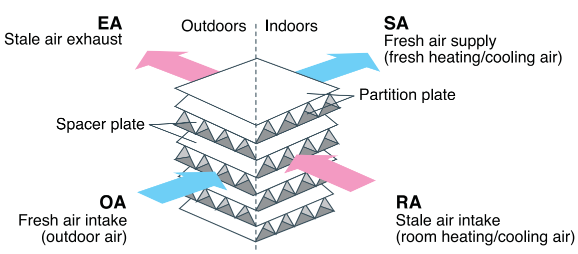
The secret to the unmatched comfort provided by Lossnay core is the cross-flow, plate-fin structure of the heat-exchange unit. A diaphragm made of a specially processed paper fully separates inducted and exhausted air supplies, ensuring that only fresh air is introduced to the indoor environment.

The superior heat-transfer and moisture permeability of the special paper assure highly effective total heat exchange (temperature and humidity) when inducted and exhausted air supplies cross in the Lossnay core.

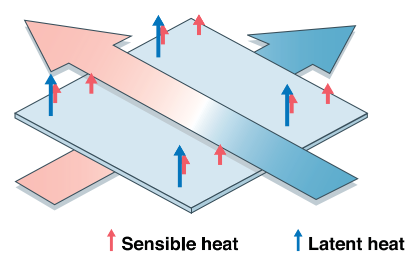
LOSSNAY TECHNOLOGY

- **TWO PATHS VENTILATION**
  LOSSNAY simultaneously intakes fresh air and exhausts stale air.
- **TOTAL ENERGY RECOVERY**
  LOSSNAY transfers BOTH sensible heat and latent heat.

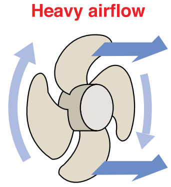
A. TWO PATHS VENTILATION



B. TOTAL ENERGY TRANSFER

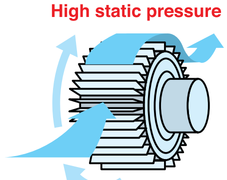


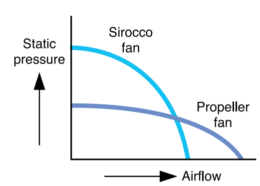
HIGH STATIC PRESSURE THAT FACILITATES DUCT DESIGN



As propeller fans feature low static pressure, they have a low ability to suck air and cannot provide sufficient ventilation in well-sealed buildings (and are particularly unsuitable for elongated ducts or ducts in which system members are mounted).

If Lossnay is used





As the sirocco fans used in Lossnay are capable of creating high static pressure and have a high ability to suck air, they provide sufficient ventilation even in well-sealed buildings (and are best suited to elongated ducts or ducts in which system members are mounted).

Nederman

AB Ph. Nederman & Co
Sydhamnsgatan 2, SE-252 28, Helsingborg, Sweden
Tel: +46 42 18 87 00, Fax: +46 42 14 79 71

MagnaTrack S

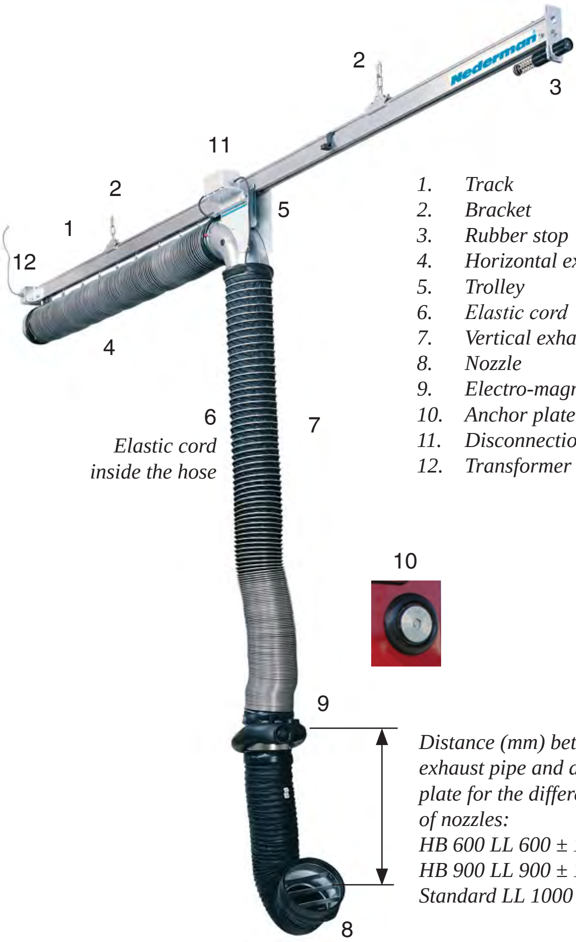
Exhaust extraction system for emergency stations with normal frequency / exit speed runs

The MagnaTrack S is an economical alternative to MagnaTrack HS designed for a normal frequency of runs and exit speeds. Magnatrack S has an elastic cord inside the exhaust hose (instead of a balancer) and a rubber stop (instead of a hydraulic trolley stop).

The track system serves one vehicle at a time.

MagnaTrack S is available in lengths from 3.5 m to 18 m; (10 ft. to 60 ft.) and it fits vehicles with low mounted exhaust pipes.

- Capacity: 1 vehicle per system
- Exhaust pipes: low level tail pipes
- Normal exit speed up to 15 km/h - 10 mph
- For reverse-in (or drive-through)
- Optional automatic start/stop device that offers:
  - -Practical control of fan start/stop
  - -Safe control of air quality (source ventilation automatically starts when vehicle engine starts)
  - -Simple programming
  - -Approval for radio equipment acc. to EC directives, FCC (USA) and IC (Canada)



1. *Track*
2. *Bracket*
3. *Rubber stop*
4. *Horizontal exhaust hose*
5. *Trolley*
6. *Elastic cord*
7. *Vertical exhaust hose*
8. *Nozzle*
9. *Electro-magnet assembly*
10. *Anchor plate*
11. *Disconnection box*
12. *Transformer*

10

Distance (mm) between exhaust pipe and anchor plate for the different types of nozzles:
HB 600 LL 600 ± 100
HB 900 LL 900 ± 100
Standard LL 1000 ± 200

MagnaTrack S Exhaust Unit

Including: Aluminum track (1), Mounting brackets for 2.4 m distance (2), Rubber stop (3), Horizontal hose (4), Extraction trolley (5), Elastic cord (6), Vertical hose (7), Electro-magnet assembly (9), Anchor plate (10), Disconnection box (11) and Transformer (12)

Track/hose length horizontal, m / ft	Hose Ø vertical, mm / inch	Hose length vertical, m / ft	Part no
5.9 / 19.4	160 / 6.3”	3 / 9.8	20812564
7 / 22.9	160 / 6.3”	3 / 9.8	20812664
9.5 / 31.2	160 / 6.3”	3 / 9.8	20812764
11.8 / 38.7	160 / 6.3”	3 / 9.8	20812864
5.9 / 19.4	160 / 6.3”	4 / 13.1	20812964
7 / 22.9	160 / 6.3”	4 / 13.1	20813064
9.5 / 31.2	160 / 6.3”	4 / 13.1	20813164
11.8 / 38.7	160 / 6.3”	4 / 13.1	20813264

Nozzles for low level (LL) exhaust pipes (8)

Type	Distance exhaust pipe – anchor plate	Hose Ø mm / inch	Hose length mm inch	Part no
HB 600 LL	Fixed	160 / 6.3”	600 ± 100 23.6 ± 4”	20802264
HB 900 LL	Fixed	160 / 6.3”	900 ± 100 35.4 ± 4”	20802464
Standard LL	Variable	160 / 6.3”	1000 ± 100 39.4 ± 4”	20802164

General Accessories
See other page

Technical specification

Track
Material	*Aluminum*

Exhaust hose, horizontal
Compressible, with integrated cables to the electro-magnet assembly

Temp. resistance	*–35 to +125°C cont., short term: +150°C*
Material	*Neoprene with steel clip*

Trolley
Material	*Aluminum*
Wheels	*High density polyeten*

Elastic cord
Lifting force	*75 N*
Material in cord	*Rubber*

Exhaust hose, vertical
Compressible, with integrated cables to the electro-magnet assembly

Temp. resistance	*-40 to +175° C cont, short term: +190° C*
Material	*Hypalon with aluminum clip*

Electro magnet
Voltage	*24 V DC*
Effect	*1.9 VA*
Material	*Nitro carburized treated steel*

Anchor plate
Material	*Nedox treated steel*

Disconnection box
Power indicator. Includes a deactivating electro-magnet

Transformer
Prim. voltage	*100-230 V 1-phase AC*
Sec. voltage	*26 V DC*
Effect	*5 VA*

IP Class
Internal Protection	*IP 67*

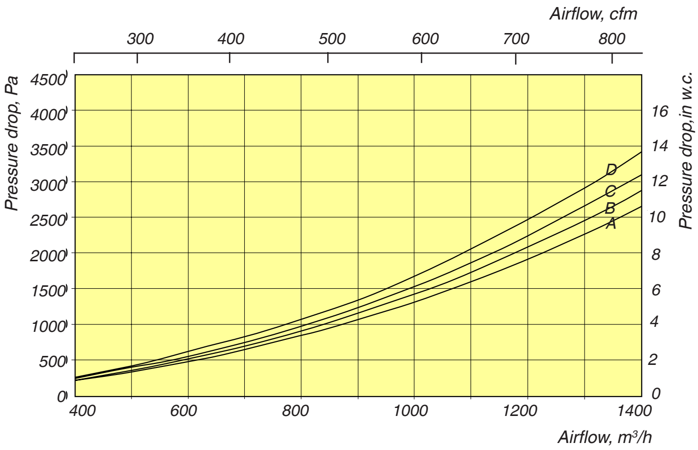
Total weight
Track incl horizontal hose (Pos 1, 2, 3, 4, 12)	*4.0 kg/m*
Complete extraction unit incl LL nozzle (Pos 5, 6, 7, 8, 9, 10, 11)	*10-12 kg*

Environmental information
Recycling level	*100 %*
Energy consumption	*4 W per extraction unit*

Accessories

General accessories	Part no.
Anchor plate standard	20372003
Anchor plate 2 parts	20371853
Anchor plate 3 parts	20371868
Auto start /stop radio transmitter for vehicle	20376723
Auto start /stop radio receiver with integrated antenna	20376724
Handheld radiotransmitter	20376725
Hydraulic shock absorber	20374391

Pressure drop



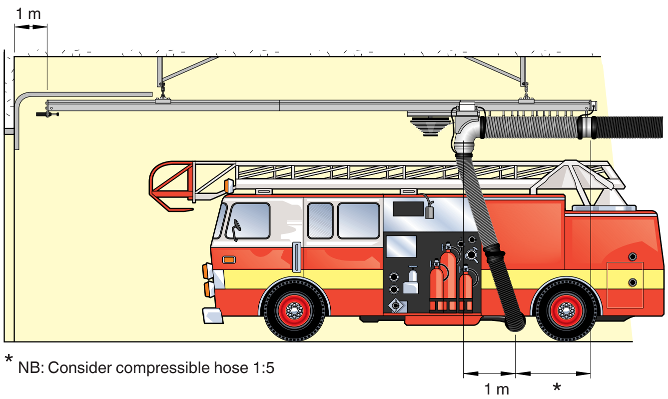
System pressure drop according to track length

Ø 160	Length m / ft
A	5.9 / 19.4
B	7 / 22.9
C	9.5 / 31.2
D	11.8 / 38.7

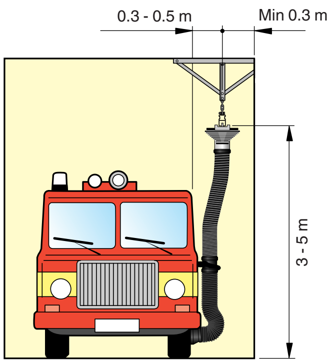
Airflow recommendation:
Heavy vehicles: 1000 - 1200 m^3/h (590 - 705 cfm)

Cars/Suvs: 400 - 600 m^3/h (235 - 355 cfm)

Installation/mounting



* NB: Consider compressible hose 1:5



Lenght of rail, m / ft	No. of brackets
5.9 / 19.4	3
7 / 22.9	4
9.5 / 31.2	4
11.8 / 38.7	5

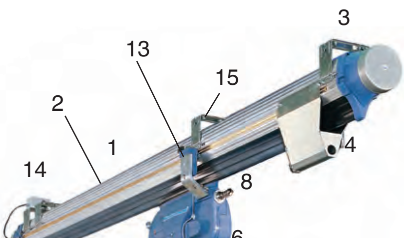
MagnaRail

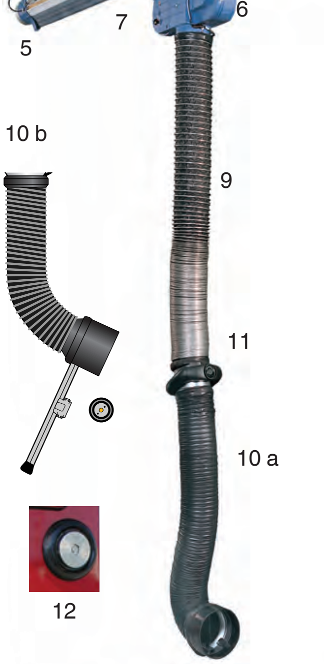
Exhaust extraction system for emergency stations with highest operational requirements

MagnaRail is a high capacity system designed to handle highest operational requirements. Up to four vehicles can be attached to the same rail each with a designated disconnection point. For a drivethrough application for vehicles with either high level or low level tail pipes. The suction rail is formed in a configuration such that the extrusion serves not only as an exhaust duct, but also as the guide rail that the extraction trolley travels in. The rail is available in up to 30 m.

The fan/duct work can be connected to the rail via either a end outlet or one/several top outlets (depending on length of rail).

- Capacity: up to 4 vehicles at a time
- Exhaust pipes: low level or high level
- High exit speed: up to 25 km/h - 15 mph
- For reverse-in or drive-through
- Optional automatic start/stop device that offers:
  - Practical control of fan start/stop
  - Safe control of air quality (source ventilation automatically starts when vehicle engine starts)
  - Simple programming
  - Approval for radio equipment acc. to EC directives, FCC (USA) and IC (Canada)





1. *Exhaust rail*
2. *Busbar*
3. *Bracket*
4. *Trolley stop*
5. *End connection*
6. *Trolley*
7. *Balancer*
8. *Shock absorber*
9. *Exhaust hose*

10 a Nozzle LL pipes

10 b Complete extraction unit for HL pipes

11. *Electro-magnet assembly*
12. *Anchor plate*
13. *Disconnection box*
14. *Transformer*
15. *Automatic return (option)*

16. Twist support prevents the nozzle from twisting and falling down.

17. Extension handle

MagnaRail track/exhaust rail (1)			
Including: Busbar (2), Brackets (3), Trolley stop (4), End connection (5), Transformer (14)			
Lenght, m / ft	**Part no**	**Lenght, m / ft**	**Part no**
2.5 / 8.2	20813864	17.5 / 57.4	20814464
5.0 /16.4	20813964	20.0 / 65.6	20814564
7.5 / 24.6	20814064	22.5 / 73.8	20814664
10.0 / 32.8	20814164	25.0 / 82.0	20814764
12.5 / 41.0	20814264	27.5 / 90.2	20814864
15.0 /49.2	20814364	30.0 / 98.4	20814964

MagnaRail Extraction Unit for low level pipes (LL)		
Including: Trolley (6), Balancer (7), Shock absorber (8), Exhaust hose (9), Electro-magnet assembly (11), Anchor plate (12), Disconnection box (13)		
Hose ∅, mm / inch	**Hose lenght, m / ft**	**Part no**
160 / 6.3”	4 / 13.1	20813364
160 / 6.3”	3 / 9.8	20813464
130 / 5.1”	4 / 13.1	20813564
130 / 5.1”	3 / 9.8	20813664

Nozzles for low level (LL) exhaust pipes (10 a)				
Type	**Distance exhaust pipe – anchor plate**	**Hose Ø mm / inch**	**Hose length mm / inch**	**Part no**
Standard LL	Variable	160 / 6.3”	1000 ± 100 39.4 ± 4”	20802164
HB 600 LL	Fixed	160 / 6.3”	600 ± 100 23.6 ± 4”	20802264
HB 600 LL	Fixed	130 / 5.1”	600 ± 100 23.6 ± 4”	20802364
HB 900 LL	Fixed	160 / 6.3”	900 ± 100 35.4 ± 4”	20802464

Complete extraction unit for high level (HL) exhaust pipes (10 b)		
Extraction trolley, Balancer, Disconnection box, Vertical hose, Electro-magnet assembly, HL nozzle and anchor plate		
Type	**Hose length, m / ft**	**Part no**
160 / 6.3”	2 / 6.6	20813764

Accessories for high level nozzles		
Type	**Description**	**Part no**
Twist support (16)	Prevents nozzle from twisting and falling down	20374364
Extension handle (17)	1.1 m long	20374359

***General Accessories:** See other page*

Technical specification

Exhaust rail
Material — Aluminum
Sealing lips — EPDM

Busbar
Material — Hardened brass with plastic insulation.

Trolley
Incl wheels with sealed bearings
Material in trolley body — PA +30 % Glass
Material in wheels — Hardened brass with plastic insulation

Balancer
Lifting force — 120 N
Material in cord — Polyester
Material drum — POM

Vertical exhaust hose
Compressible, with integrated cables to the electro-magnet assembly
Temp. resistance — –40 to +175°C cont, short term: +190°C
Material — Hypalon with aluminum clip

Electro magnet assembly
Voltage — 24 V DC
Effect — 1.9 VA
Material — Nitro carburized treated steel

Anchor plate
Material — Nedox treated steel

Disconnection box
Power indicator. 2 carbon brushes transmitting power from busbar

Transformer
Prim. voltage — 100-230 V 1-phase AC
Sec. voltage — 24 V DC
Effect — 8 VA

IP Class
Internal Protection — IP 67

Weight
Rail — 6.8 kg/m
Extraction unit — 13 kg

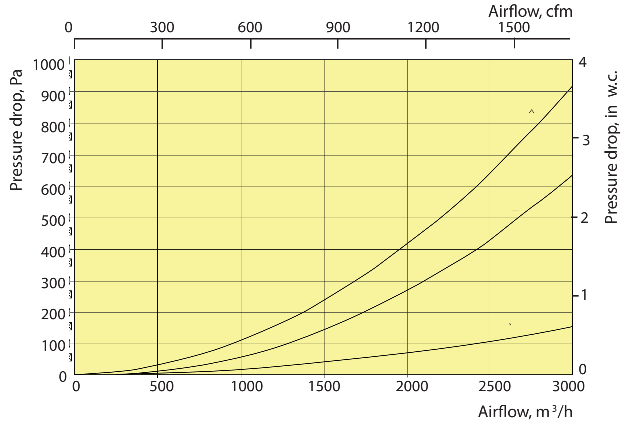
Environmental information
Recycling level — 100 %
Energy consumption — 4 W per extraction unit.

Accessories

General accessories	Part no.
Anchor plate standard	20372003
Anchor plate 2 parts	20371853
Anchor plate 3 parts	20371868
Auto start /stop radio transmitter for vehicle	20376723
Auto start /stop radio receiver with integrated antenna	20376724
Handheld radiotransmitter	20376725
Transformer 230/24 V 15VA for max 4 trolleys	20374242
Reducer for end connection, Ø 160 mm to Ø 150 mm	20373760
Connection cone top outlet Ø 200 mm	20374246
Motor operated wire return unit	20800844

Pressure drop

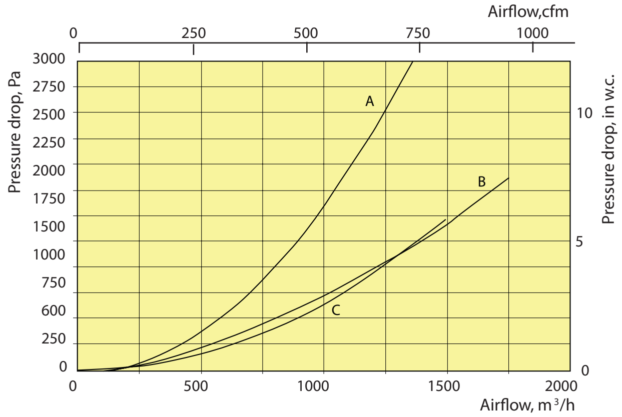
Exhaust rail and connections



A = Top connection angled, Ø 200 mm
B = End connection
C = Exhaust rail, per metre

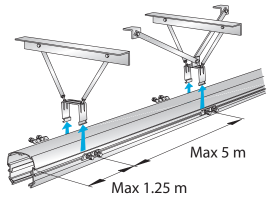
Airflow recommendation:
Heavy vehicles: 1000 -1200 m³/h (590 - 705 cfm)
Cars/Suvs: 400–600 m³/h (235 - 355 cfm)

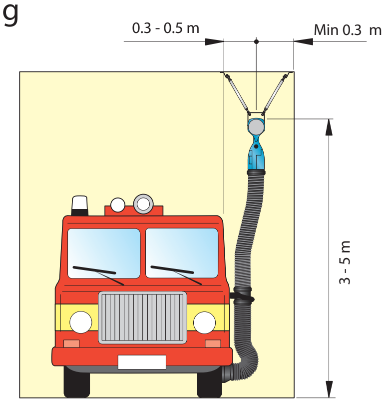
Extraction units



A = Extraction unit LL, hose 4 m, ø130 mm
B = Extraction unit LL, hose 4 m, ø160 mm
C = Extraction unit HL, hose 2 m, ø160 mm

Installation/mounting



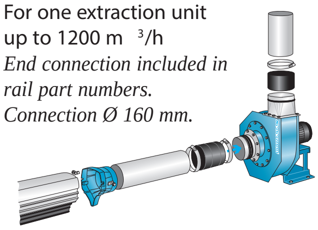


Lenght of rail, m	No. of brackets
2.5 - 5	2
7.5 - 10	3
12.5 - 15	4
17.5 - 20	5
22.5 - 25	6
27.5 - 30	7

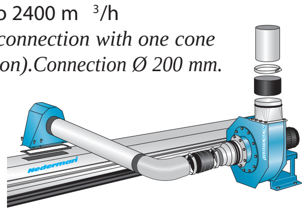
N.B.The nozzle for high level (HL) exhaust pipes must be installed at a higher level than the exhaust pipe.The nozzle must be pulled downwards at connection, which will activate the balancer.

Fan connection alternatives

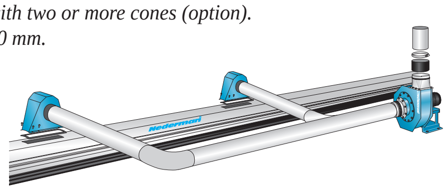
For one extraction unit up to 1200 m³/h
End connection included in rail part numbers. Connection Ø 160 mm.



For two extraction units up to 2400 m³/h
Top connection with one cone (option).Connection Ø 200 mm.



For more than two extraction units more than 2400 m³/h
Top connection with two or more cones (option). Connection Ø 200 mm.



Jay R. Smith Mfg. Co.®

Rainwater Harvesting Products

Rainwater Harvesting Filters and Storage Tank Components for All Roof Areas.

A GREEN IDEA JAY R. SMITH MFG. CO.

RMS RAINWATER MANAGEMENT SOLUTIONS

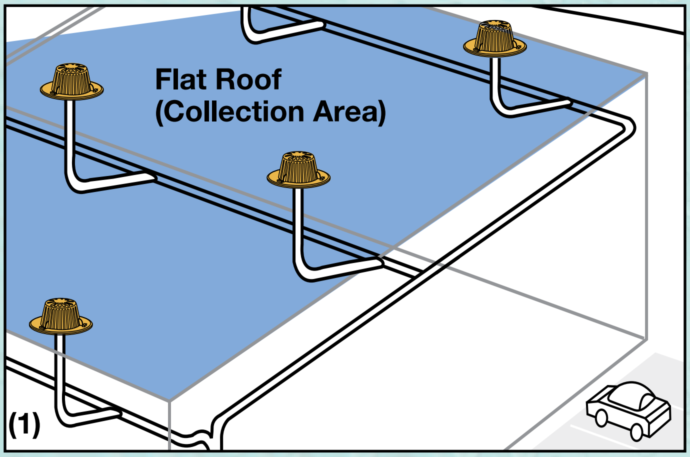
wisy

In Cooperation with WISY AG and Rainwater Management Solutions (RMS) - The Leaders in Rainwater Products and Consulting.

Rainwater Harvesting: Co

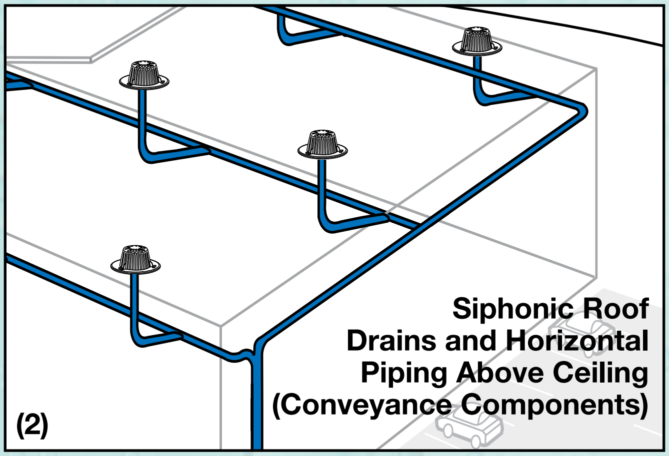
The Collection, Conveyance and Storage of Rainwater for Later Use

Commonly, rainwater harvesting systems are constructed of three primary segments; (1) a collection method, (2) a conveyance component and (3) a storage facility. Rainwater harvesting collection, conveyance and storage systems can be incorporated into almost any existing building, although it is easier to incorporate a rainwater harvesting system into new construction.



(1) A collection or catchment system is a simple structure comprised of roofs and/or gutters that direct the rainwater through a conveyance system and into a storage container. Roofs are ideal as catchment areas as they easily collect large volumes of rainwater. The amount and quality of rainwater collected from a catchment area depends upon the rain intensity, roof surface area and type of roofing material. For a 1,000 square foot roof, about 620 gallons of rainwater can be collected, per inch of rainfall, regardless of pitch.

(2) Conveyance components are required to transfer the rainwater from the roof catchment to



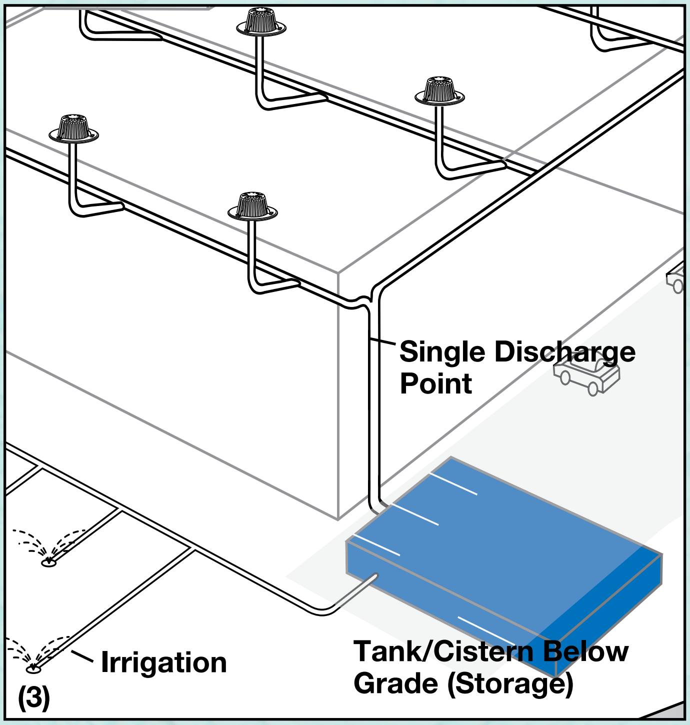
storage. Conveyance is usually accomplished by connecting roof drains and piping from the catchment area (or roof top) to one or more downspouts that transport the rainwater through a filter system to storage in tank or retention pond for reuse or recharge.*

A siphonic roof drainage system is one of the most effective technologies offered for capturing rainwater from a building roof top to aid in implementing rainwater harvesting. In a siphonic system several roof drain outlets can be connected to a single vertical discharge pipe. Fewer discharge points and no requirement for pitch in the piping means the rainwater can be easily routed horizontally below the roof to a storage tank or retention pond.

*Conventional gutters and downspouts are recommended for conveying rainwater on small businesses, homes, and other buildings or structures where a conventional (gravity) or Siphonic Roof Drain System is not practical.

llection, Conveyance and Storage

One of the major benefits of designing a building with siphonic roof drainage and rainwater harvesting systems is reduced overall construction and facility operation costs. Additional benefits include reduced discharge of rainwater to lakes, streams, rivers and sanitary systems, and decreased dependence on municipal water supplies. For more information about Siphonic Roof Drains contact your local Jay R. Smith Mfg. Co. representative or visit www.jrsmith.com.



(3) Storage tank (or cisterns) for the harvested rainwater make stored rainwater available when needed. Depending on the space available these storage containers can be constructed above grade, partly underground, or below grade. Various types of rainwater storage containers can be found in use. They include cylindrical ferrocement tanks (reinforced steel and concrete), mortar jars (large jar shaped vessels constructed from wire reinforced mortar), single and battery (interconnected) tanks made of either galvanized steel, concrete, ferrocement, fiberglass, or polyethylene, or they could be made of wood, metal, or earth. Storage tanks should be located as close to supply and demand points as possible to reduce the distance the water is conveyed.

The size of the storage container needed for a particular application is determined by the amount of water available for storage (a function of roof size and local rainfall), the amount of water likely to be used (a function of demand), and the projected length of time without rain, aesthetics, and budget.

Before water is stored in a storage tank (or cistern), and prior to use, it should be filtered to remove particles and debris. Filtration is a key element in the storage and use of harvested rainwater. Upon leaving the tank, the stored water is extracted from the cleanest part of the tank, just below the surface of the water, using a floating filter.

Considerations for Fitting a Rainwater Collection System:

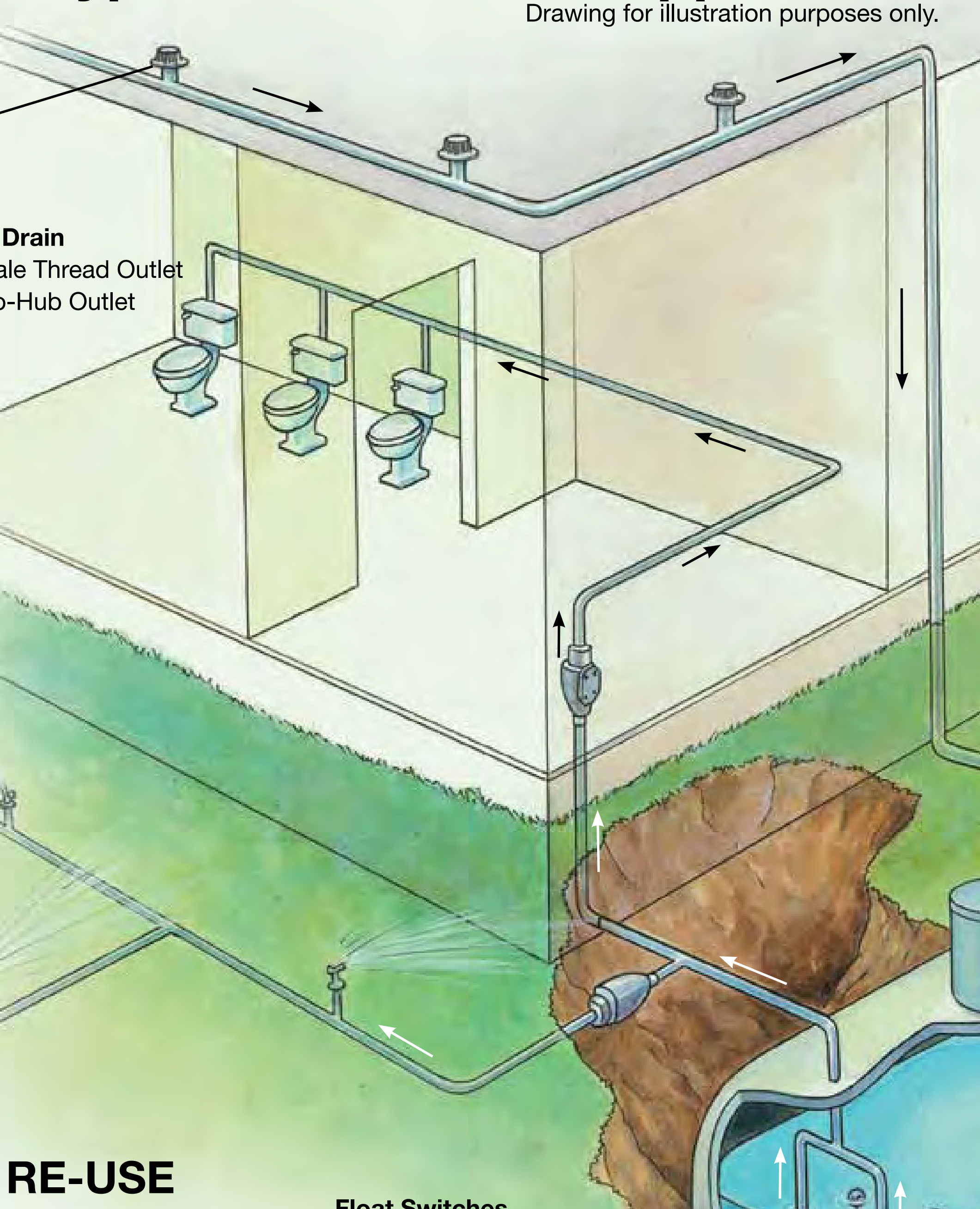
1. The drainage from the roof needs to be directed to bring water to a central point.
2. Access to the tank and excavation is required.
3. Internal plumbing requires rainwater to be identified and kept separate from other water sources.

Typical Commercial Application

Drawing for illustration purposes only.

A **Rainwater is collected on the roof.**

B **The harvested rainwater is conveyed through the roof drains and piping to a single point of discharge.**



15 1/4" DIA.,
Siphonic Roof Drain
Fig. # 1005T Male Thread Outlet
1005Y No-Hub Outlet
Page 8

G The extracted rainwater can be used for toilets and urinals, irrigation, mechanical systems, laundries or other non-potable uses.

THE RAINWATER RE-USE PROCESS

How It Works In A Commercial Application

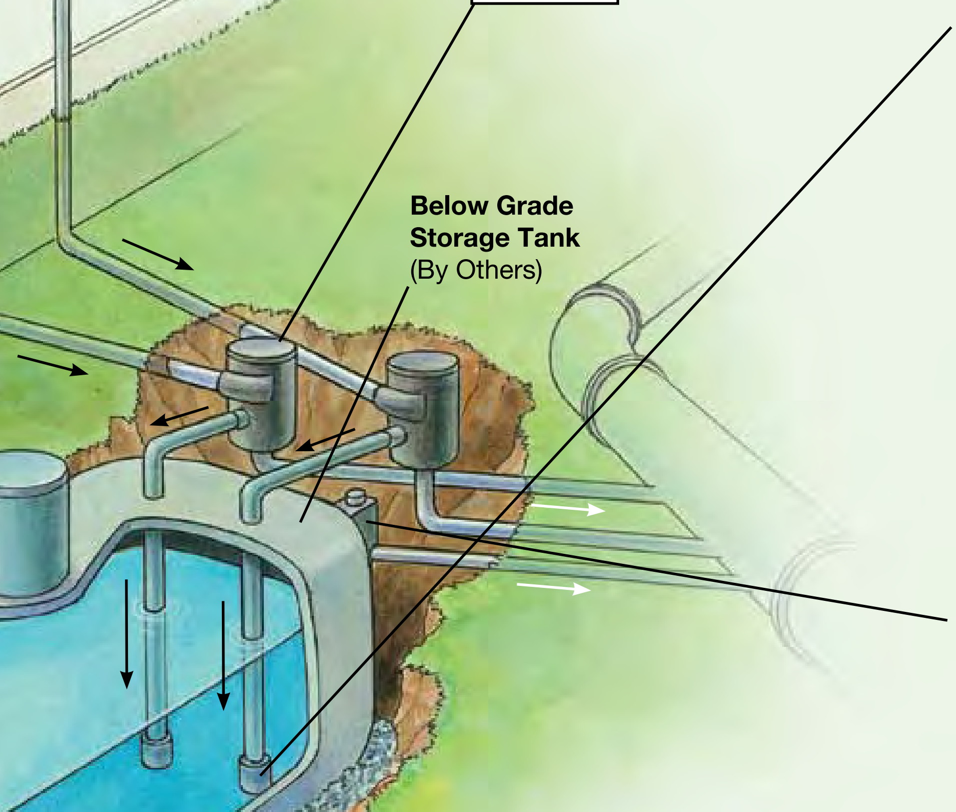
Commercial applications typically have a high pay back due to the higher water volume gathering capability of large roof surfaces and the demand by commercial users for water. Illustrated above is an example of how a rainwater harvesting system could be used in a commercial application.

NOTE: During low rainfall events, an alternative make-up water source such as the city or county water system is required to supply the building's water needs. The appropriate backflow preventer assemblies, per the local jurisdiction, are required for this application.

Float Switches

Fig. #RH9542FSO – Dry Run Protection, Normally Open (N/O)
Page 25

Fig. #RH9542FSC – Back-up Water Feed, Normally Closed (N/C)
Page 25



C At the point of discharge, the rainwater is transported through a vortex filter that removes large and fine debris.

Vortex Rainwater Fine Filter for Above or Below Grade Application
Fig. #RH9521-12
Page 13

Smoothing Inlet
Fig. #RH9530SI
Page 14

D From the filter, the collected water enters the storage tank through the smoothing inlet.

Water quality is maintained by removing the organic matter and by the action of incoming water which introduces oxygen. Water that is kept aerobic in this way does not become foul smelling, even when stored for long periods.

E The overflow/backwater device in the tank is designed to skim floating particles from the surface of the water when the storage unit overflows. (By Others)

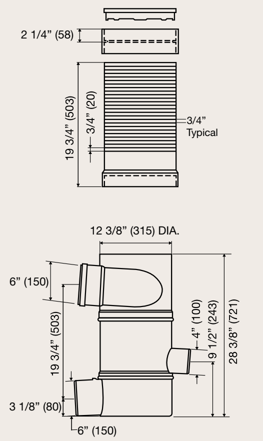
F

Storage Tank Floating Filter and Hose
Fig. #RH9532C
Page 14

Harvested water is extracted from the cleanest part of the tank, just below the surface of the water, using a floating filter and pump.

RH9520-06, 6” Outlet - Vortex Rainwater Fine Filter for Above or Below Grade Applications for Roof Area Up to 5,500 Square Feet

Used in installations where multiple downspouts are connected together to a single pipe into the vortex filter. The vortex rainwater filter can filter up to a 5,500 square foot roof area for site irrigation, toilet and urinal flushing, janitorial use, laundries, fire protection, evaporative cooling tower make-up, process water, or other non-potable uses.



NOTE: Dimensions shown in parentheses are in millimeters.

Blind Insert

Stainless Steel Wall Bracket

Figure Number: RH9520-06 – 6” Sewer and Drain Outlet

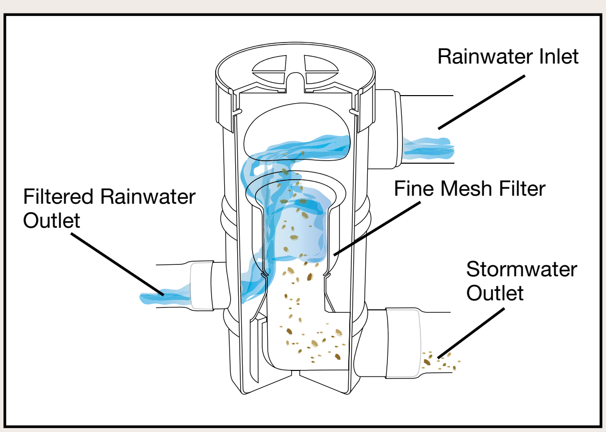
FUNCTION: The vortex rainwater fine filter is typically installed in the underground piping system to remove debris from the storm water system and divert 90% of clean rainwater to an underground storage tank. (An above grade application is possible). The filter operates as a first flush device. The filter assembly consists of a 12 inch stainless steel lift handle, removable stainless steel 280 micron fine mesh filter and polypropylene filter housing, upper ring, and housing lid. The mesh filter should be cleaned at least twice a year. The housing lid carries loads up to 30 tons (DIN 1072/SLW30).

Regularly Furnished:
Polypropylene Filter Housing, Upper Ring, and Housing Lid (RH9520-06)
280 micron Stainless Steel Fine Mesh Filter (RH9520F)
12” (305) Stainless Steel Lift Handle (RH9520LH12)

Accessories:
- ☐ Blind Insert (RH9520BI)
  Used in place of the mesh filter to divert flow directly to the storm water system. Stainless Steel.
- ☐ 20” Extension Tube (RH9520ET)
  This polypropylene tube is used for inspection and as an access opening to the ground level. It is fitted with a collar to accept the lid. Is easily cut to length due to molded-in parallel lines. Up the three extension tubes can be combined together.
- ☐ Stainless Steel Wall Bracket (RH9520WB)
  For securing the filter unit to a wall in above ground applications.

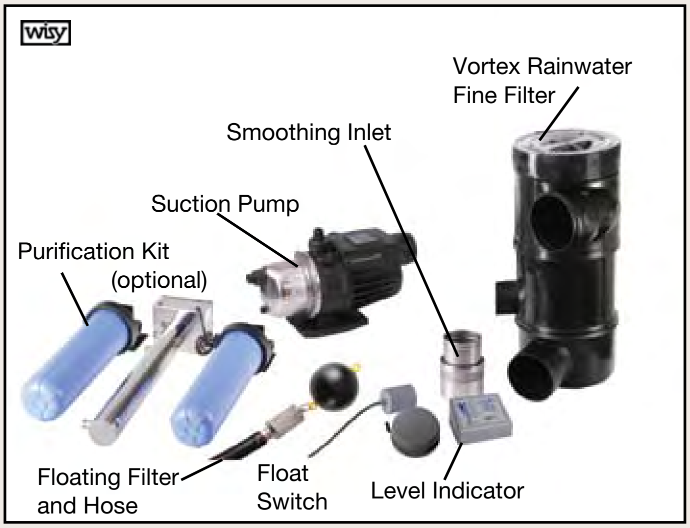
Options:
- ☐ 25 inch Stainless Steel Lift Handle (RH9520LH25)
  To remove mesh filter for cleaning.
- ☐ 39 inch Stainless Steel Lift Handle (RH9520LH39)
  To remove mesh filter for cleaning.

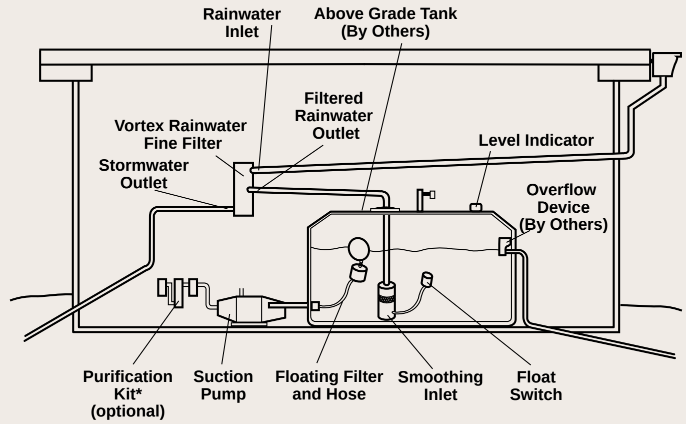
How the Vortex Rainwater Filter Works



A product of WISY AG in cooperation with RMS.

PACKAGE 5: RH9500-05
Above Grade Rainwater Harvesting Package with Optional Purification Kit for Roof Area Up to 5,500 Sq. Ft.





Drawing for illustration purposes only.

Order Figure Number: RH9500-05

FUNCTION: Rainwater system with vortex rainwater fine filter, storage tank floating filter, smoothing inlet, float switch, level indicator, purification kit* (optional) and pump. The package works on roof areas up to 5,500 square feet to collect rainwater for site irrigation, toilet and urinal flushing, janitorial use, fire protection, evaporative cooling tower make-up, process water, showers, washing machines, dishwashers, and other potable or non-potable uses.

Regularly Furnished: Vortex rainwater fine filter (Fig. #RH9520-06) with wall bracket (Fig. #RH9520WB); floating filter (specify coarse or fine filter); smoothing inlet (Fig. # RH9530SI-04); storage tank level indicator (Fig. # RH9530LI); float switch for dry run protection (Fig. #RH9542FSO); and pump (specify voltage).

Optional Component:
Purification Kit – **Figure Number**: RH9550PK*, complete with 20” filter housing (2), string wound 1 micron sediment filter, carbon filter for odor and taste, mounting brackets (2), filter wrenches (2), and 15 gpm ultraviolet light.
* To purchase, the Purification Kit must be approved by a licensed plumbing engineer.

Specify Suction/Booster Pump Voltage:
115 Volts – **Figure Number**: RH9540-1BP115
220 Volts – **Figure Number**: RH9540-1BP220

Specify Course or Fine Floating Filter:
Floating Filter with Coarse Filter Housing – **Figure Number**: RH9532C
Floating Filter with Fine Filter Housing – **Figure Number**: RH9532F

Rainwater Harvesting Storage Tank Providers, Page 14.

NOTE: For roof area above 5,500 square feet see “Selecting a Rainwater Harvesting Package by Roof Area” on page 16.

See product catalog pages 12, 14 and 24-25 for component descriptions.

RAINWATER HARVESTING PACKAGE COMPONENTS

Storage Tank Overflow Device

The overflow device is connected to the overflow pipe within the storage container. The device can prevent the entry of drain odors from the storm drain into the storage container, provides backflow protection, and removes surface debris through a skimming effect.

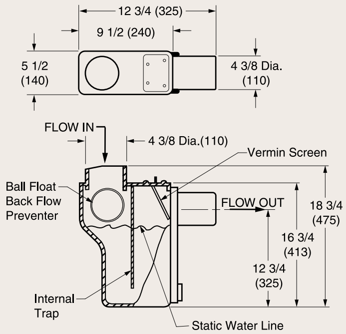


Figure Number: RH9530DOK – Multi-functional Overflow Device

FUNCTION: The Multi-functional overflow device is made of impact-resistant ABS plastic that eliminates drain odors in the storage tank, provides vermin and backflow protection, and skims surface debris. Comes with support strut, clamp, and fits 4 inch overflow piping.

Sensor Type Storage Tank Level Indicator

Sensor level indicator shows the water level in the storage container or cistern using a wireless device. This device transmits an ultrasonic sound wave that echoes back from the fluid surface. That echo is converted to a depth and displayed on the indoor bench unit indicating the depth of the water in the storage tank.

FUNCTION: Wireless sensor that gives remote tank level readings. Sensor has an operating range of up to 1,640 feet. The maximum detection range is 13 feet. Sensor and bench unit operate on four “AA” batteries.

Figure Number: RH9530LI

Purification Kit (Optional Component for Packages 4, 5, 6 and 7)

Designed to treat rainwater for potable uses. To purchase, the Purification Kit must be approved by a licensed plumbing engineer.

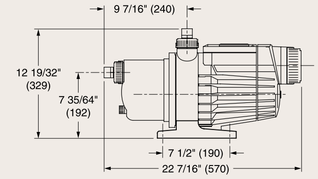
FUNCTION: Treats rainwater for potable uses. Kit includes 20” filter housing (2), 1 string wound micron sediment filter, carbon filter for odor and taste, mounting brackets (2), filter wrench (2), and 15 g.p.m. ultraviolet light.

Figure Number: RH9550PK – Purification Kit

Suction/Booster Pump

1 Horsepower Suction/Booster Pump (Specify 115 or 220 volts, single phase) – **Figure Number**: RH9540-1BP, a complete unit includes a pump, motor, diaphragm tank, pressure and flow sensor, control and check valve for residential applications. The controller ensures that the pump starts automatically when water is consumed and stops automatically when the consumption ceases.

Operating specification for booster pump (RH9540-1BP):
System Pressure – Max. 110 psi (7.5 bar)
Inlet Pressure – Max. 45 psi (3 bar)
Suction Lift – Max. 26 ft. (8m)
Liquid Temperature – 32°F to 95 °F
Ambient Temperature – 32°F to 113 °F



SIDE VIEW

Pump Data and Weights

Pump Type	HP	Input Voltage	Inlet NPT	Discharge NPT	Max. Amps	Ship Weight
RH9540-1BP115	1	110 - 120	1"	1"	9.2	30 lbs.
RH9540-1BP220	1	220 - 240	1"	1"	4.5	30 lbs.

Specify Suction/Booster Pump Voltage:
115 Volts – **Figure Number**: RH9540-1BP115
220 Volts – **Figure Number**: RH9540-1BP220

Float Switches

FUNCTION: The Normally Open Float Switch is necessary to provide dry run protection for the pump. If the water level in the tank reaches a minimum level, the Normally Open Float Switch closes to ensure the pump does not continue to pump and burn up. Once the tank fills to a level which allows the pump to activate, the switch opens and allows the pump to continue operation. The switch is normally attached to the inletpipe or the cistern pump.

Figure Number: RH9542FSO – Dry Run Protection, Normally Open (N/O)

FUNCTION: The Normally Closed Float Switch is used to open and close a solenoid valve. In the event the level in the tank reaches a minimum level, the Normally Closed Float Switch opens the closed solenoid valve to allow back up water to supply the system. Once the tank reaches a predetermined level, the Normally Closed Float Sitch closes the solenoid valve to allow the rainwater system to operate normally.

Figure Number: RH9542FSC – Back-up Water Feed, Normally Closed (N/C)

So How Do I Calculate How Much Rainwater Can Be Harvested?
Average Rainfall per Month x Roof Area (sq. ft.) x .62 (Roof-Type Coefficient) x The Filter Collection Efficiency of .90 = Gallons per Month

Jay R. Smith Mfg. Co. Rainwater Harvesting

Did you know: Storage tanks act as quantity controls and can help reduce the cumulative effect of stormwater on downstream systems.
U.S. Department of Housing and Urban Development

Hornby Island Fire Hall
Electrical Sechematic Design Report

Prepared for:
SIMCIC + UHRICH ARCHITECTS
Suite 230 3 West 3rd Avenue
Vancouver, BC V5Y 3T8

Developed by:
Opal Engineering Inc.
1340 Barberry Drive
Port Coquitlam, BC V3B 1G3

Project No: SUA-02

16 Jun, 2014 – Issued for review

3.2 POWER DISTRIBUTION

a) The building will be constructed with a 120/208V, 3 phase, 4 wire distribution which shall be sized to accommodate immediate requirements with a 25% spare capacity for future building alterations or additions.

b) The electrical distribution shall be complete with single phase protection, to remove power upon loss of a electrical phase (which may cause motor loads to overheat and ignite if left energized during a single phase power event).

c) The design shall incoporate the fire hall's existing power generator to provide standby power on prolonged power outtages.

d) Transient voltage surge suppression (TVSS) shall be provided on the main switch to minimize the impact of lightning or related events and prolong the life of building equipment.

3.3 PANEL BOARDS

a) Branch circuit panel boards shall be located throughout the facility to suit the architectural layout and electrical lighting, power and mechanical load locations. Panels will be fully rated with lockable door, bolt-on breakers and drip hoods (where required).

3.4 RECEPTACLES & POWER OUTLETS

a) Branch circuit wiring and receptacles shall be provided throughout the facility as required by code and to meet the user's needs.

b) Conveince outlets shall be specification grade, white decora style with stainless coverplates. Red outlets shall be provided for units on generator power.

c) Receptacles within 1.5m of edge of sink shall be groubnd fault interrupter type.

d) All receptacles shall be identified with branch circuit number using type written adhesive labels.

3.5 LIGHTING & LIGHTING CONTROL

a) The facility will incorporate energy efficient lumenaires enhanced with an automated lighting control system which shall reduce total energy consumption and maximize the effective life of the luminaires by automatically turning off all luminaires in unoccupied areas.

b) The design will use LED, fluorescent and high-intensity-discharge (HID) luminaires. These luminaires shall be selected based on the functional layout of each space. In general, the lighting shall be primarily fluorescent T8 lamps with program start electronic ballasts.

3.9 FIRE ALARM SYSTEMS

a) A single stage addressible fire alarm sytem shall be provided. The system shall notify the central station of an alarm condition via owner supplied ULC approved monitoring equipment.

3.10 PUBLIC ADDRESS & TELEPHONE SYSTEMS

a) A telephone system shall be provided with itegral paging function.

b) A public address system with wall speakers shall be provided where required, as coordinated with the users.

3.11 RF TELEVISION SYSTEM (CABLE TV)

a) A coaxial cable television system shall be provided with TV outlets in ammenity areas as coordinated with the users.

3.12 STRUCTURED VOICE & DATA CABLING

a) A category 6 structured cabling system will be provided in the facility complete with patch panel and patch cords (two per outlet).

b) Category 3 cross-connect cabling shall be provided to interface the patch panel with utility bix block demark.

3.13 WIRELESS DATA SYSTEM

a) Wireless data points (POIP wireless routers) shall be added throughout the facility as required to provide complete wifi coverage within the building.

3.14 INTRUSION ALARM SYSTEM

a) Rough-in for an owner supplied security system shall be provided. The rough-in shall include power to future control panel and conduit stubs from accessible ceilings to all exterior doors.

3.15 SECURITY CAMERA (CCTV) SYSTEM

a) A CCTV system will not be provided within this scope of work. Rough-in for future CCTV can be provided as directed by the users.

3.16 MECHANICAL EQUIPMENT

a) Motor control, disconnects, breakers and associated branch circuit wiring shall be provided for all mechanical and owner equipment.

LEED Canada 2009 Scorecard

Project: **Hornby Island Firehall**

Sustainable Sites — Possible Points 26

Yes	Likely	Unlikely	No	R			Points
7	7		12				
Y					Prereq 1	**Construction Activity Pollution Prevention**	Required
1					Credit 1	**Site Selection**	1
			5		Credit 2	**Development Density and Community Connectivity**	3 or 5
			1		Credit 3	**Brownfield Redevelopment**	1
			6		Credit 4.1	**Alternative Transportation**, Public Transportation Access	3 or 6
1					Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
	3				Credit 4.3	**Alternative Transportation:** Low-Emitting & Fuel-Efficient Vehicles	3
	2				Credit 4.4	**Alternative Transportation**, Parking Capacity	2
1					Credit 5.1	**Site Development:** Protect and Restore Habitat	1
1					Credit 5.2	**Site Development:** Maximize Open Space	1
	1				Credit 6.1	**Stormwater Design:** Quantity Control	1
	1				Credit 6.2	**Stormwater Design:** Quality Control	1
1					Credit 7.1	**Heat Island Effect**, Non-Roof	1
1					Credit 7.2	**Heat Island Effect**, Roof	1
1					Credit 8	**Light Pollution Reduction**	1

Water Efficiency — Possible Points 10

Yes	Likely	Unlikely	No	R			Points
10							
Y					Prereq 1	**Water Use Reduction,** 20%	Required
4					Credit 1	**Water Efficient Landscaping**	2 or 4
2					Credit 2	**Innovative Wastewater Technologies**	2
4					Credit 3	**Water Use Reduction**	2 to 4

Energy & Atmosphere — Possible Points 35

Yes	Likely	Unlikely	No	R			Points
14		18	3				
Y				CA	Prereq 1	**Fundamental Commissioning of Building Energy Systems**	Required
Y				EM	Prereq 2	**Minimum Energy Performance**	Required
Y				M	Prereq 3	**Fundamental Refrigerant Management**	Required
12		7			Credit 1	**Optimize Energy Performance**	1 to 19
		7			Credit 2	**On-Site Renewable Energy**	1 to 7
		2			Credit 3	**Enhanced Commissioning**	2
2					Credit 4	**Enhanced Refrigerant Management**	2
			3		Credit 5	**Measurement and Verification**	3
		2			Credit 6	**Green Power**	2

Materials & Resources — Possible Points 14

Yes	Likely	Unlikely	No	R			Points
6		4	4				
Y				A	Prereq 1	**Storage & Collection of Recyclables**	Required
			3		Credit 1.1	**Building Reuse:** Maintain Existing Walls, Floors, and Roof	1 to 3
			1		Credit 1.2	**Building Reuse:** Maintain Interior Non-Structural Elements	1
2					Credit 2	**Construction Waste Management**	1 to 2
		2			Credit 3	**Materials Reuse**	1 to 2
2					Credit 4	**Recycled Content**	1 to 2
2					Credit 5	**Regional Materials**	1 to 2
		1			Credit 6	**Rapidly Renewable Materials**	1
		1			Credit 7	**Certified Wood**	1

Indoor Environmental Quality — Possible Points 15

Yes	Likely	Unlikely	No	R			Points
12		1	2				
Y					Prereq 1	**Minimum Indoor Air Quality Performance**	Required
Y					Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
			1		Credit 1	**Outdoor Air Delivery Monitoring**	1
		1			Credit 2	**Increased Ventilation**	1
1					Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
1					Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1					Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1					Credit 4.2	**Low-Emitting Materials**, Paints	1
1					Credit 4.3	**Low-Emitting Materials**, Flooring Systems	1
1					Credit 4.4	**Low-Emitting Materials**, Composite Wood	1
1					Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1					Credit 6.1	**Controllability of Systems**, Lighting	1
1					Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1					Credit 7.1	**Thermal Comfort**, Design	1
			1		Credit 7.2	**Thermal Comfort**, Verification	1
1					Credit 8.1	**Daylight & Views**, Daylight	1
1					Credit 8.2	**Daylight & Views**, Views	1

Innovation & Design Process — Possible Points 6

Yes	Likely	Unlikely	No	R			Points
3	3						
1					Credit 1.1	**Innovation in Design**:	1
1					Credit 1.2	**Innovation in Design**:	1
	1				Credit 1.3	**Innovation in Design**:	1
	1				Credit 1.4	**Innovation in Design**	1
	1				Credit 1.5	**Innovation in Design**:	1
1					Credit 2	**LEED® Accredited Professional**	1

Regional Priority — Possible Points 4

Yes	Likely	Unlikely	No	R			Points
3			1				
			1		Credit 1	**Durable Building**	1
1					Credit 2.1	**Regional Priority Credit:** WEc3 Water Use Reduction	1
1					Credit 2.1	**Regional Priority Credit:** EAc1 Optimize Energy Performance	1
1					Credit 2.3	**Regional Priority Credit:** MRc2 Construction Waste Management	1

Total Score — Possible Points 110

Yes	Likely	Unlikely	No
55	10	23	22

Certified: 40-49 points **Silver:** 50-59 points **Gold:** 60-79 points **Platinum:** 80 points +

R : Responsibility

- **A :** Architect
- **BE :** Building Envelope
- **C :** Civil
- **CA :** Commissioning Agent
- **CM :** Construction Manager/ Contractor
- **E :** Electrical
- **EM :** Energy Modeling Specialist
- **L :** Landscape Architect
- **M :** Mechanical
- **O :** Owner
- **v:** Varies

NOTE:
Please note that this Scorecard is only a preliminary assessment of the LEED status of the project at the time of its issuance. The anticipated Credit achievements are subject to change during the design and construction of the project and can only be confirmed following the CaGBC review.

MLA
Michel Labrie Architect

Hornby Island Firehall

PRELIMINARY CODE REVIEW [DRAFT]

RELEVANT CODE	BC Building Code (BCBC) 2012
DATE	May 2014
ASSUMPTIONS	The following Building Code Concepts Report outlines the applicable BCBC requirements for the Hornby Island Firehall Project. The intent of this report is to document the design team's building code assumptions in this phase, and to assist the team in the preparation of code compliant drawings. This report will also provide the Regional District of Nanaimo with a summary of building code concepts proposed for the project.

PROJECT DESCRIPTION

		BCBC 2012 REFERENCE
Type	New Construction, Part 3	1.3.3.2
Gross Area	Max 750m^2 *(*see note 2)*	1.3.3.4 3.2.2.76
Number of Storeys	2	1.4.1.2
Number of Streets/ Access Routes	2 *(*see note 2)*	3.2.2.10 3.2.5.6
Sprinkler System	Not required	3.2.2.74
Standpipe	Not required	3.2.5.8

BUILDING CODE REVIEW

Major Occupancy	Group F, Division 2, up to 2 Storeys, Post-Disaster	3.2.2.76
Other Occupancy	Group D *(*see note 4)*	3.2.2.60
Construction	Combustible	3.2.2.74.2
Occupant Loads	(Group F2) Load: 30 Persons (Group D) Load: 44 Persons **see note 4*	3.1.17.1.1(c)
Required Fire Resistance Ratings (FRR):	Floor Assemblies: 45 min FRR Fire Separation Loadbearing walls, columns + arches supporting an assembly required to have a FRR: 45 min FRR	3.2.2.76.2 (a-b) 3.2.2.60
Other Fire Separations	Between F2 + D: None FRR Mechanical/Electrical Room: 1 hr FRR Janitor's Room: 45 min FRR Between Storage Garage + Other: 1.5 hr FRR Hazardous Storage: 1 – 2 hr FRR Between Mtg Rm + Other: 1 hr FRR	3.1.3.1.1 3.6.2.1.7 3.3.1.21 3.3.5.6 3.3.6.3 3.1.2.6

Travel Distance	Group D: 40m Group F2: 30m Storage Garage: 60m	3.4.2.5
Number of Exits	Min. 2 from each floor area	3.4.2.1.1
Exit capacity	To be determined upon confirmation of occupant loads	3.4.3.2
Washroom Requirements	Group D: 1 male, 1 female (incl. 1 accessible) Group F2: 2 male, 2 female **see note 5*	3.7.2.2.12 3.7.2.2.14 3.8.2.32
Persons with Disabilities	Group F2: "Access shall be provided to all areas to which the public is permitted" Group D: "in…fire stations…access shall be provided to all areas to which the public is admitted." Access from the street to one main entrance, and to all parts of the building required to be accessible.	3.8.2.3.2 3.8.2.32 3.8.3.5

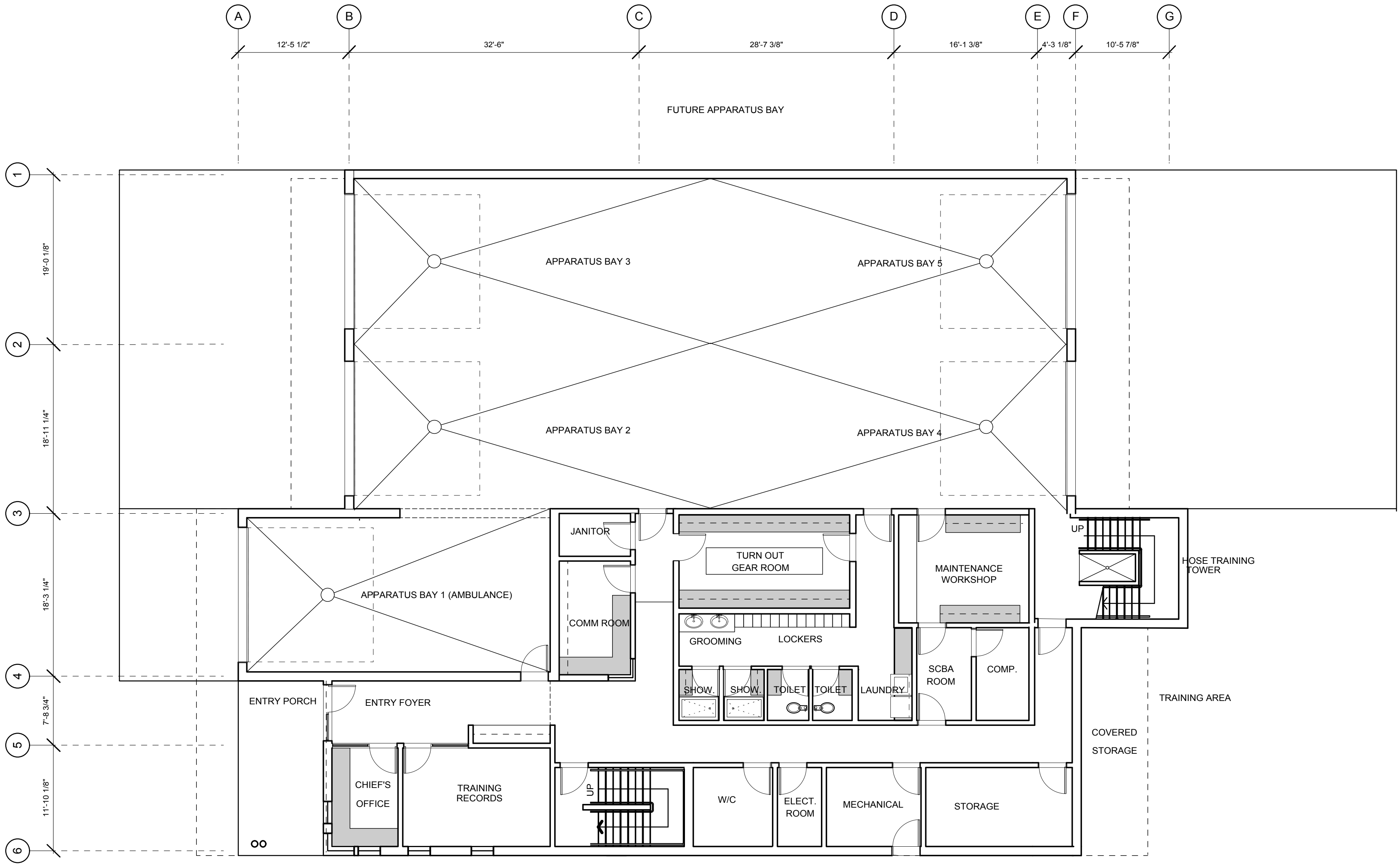
POST-DISASTER REQUIREMENTS

Snow + Rain Load	Post-disaster importance factor for snow load (I_S) = 1.25 (ULS) = 0.9 (SLS)	4.1.7.1.1 4.1.7.1.3
Wind Load	Post-disaster importance factor for wind load (I_W) = 1.25(ULS) = 0.75 (SLS)	4.1.7.1.1 4.1.7.1.3
Earthquake Load and Effects	Post-disaster importance factor for earthquake loads and effects (I_E) = 1.5 (ULS)	4.1.8.5.1
Deflections + Drift Limits	See BCBC for limits	4.1.8.13
Environmental Separations	"…for post-disaster buildings, seismic effects must be taken into account in the design for environmental separation, as these buildings are required to have an adequate degree of functionality after the design event to meet their intended function (see Article 4.1.8.13 for deflections drift limits…)"	5.2.2.1.(2)(c)

NOTES + ASSUMPTIONS

1	Major Occupancy	Exceptions for major occupancies: In a building in which the aggregate area of all major occupancies of a particular group or division is not more than 10% of the floor area of the story in which they are located these major occupancies need not be considered as major occupancies for the purposes of this subsection.	3.3.3
2	Building Size + Construction Relative to Occupancy	Maximum building area could be expanded to $900m^2$ if the project is "facing 3 streets". Access route on west side of building will be required to comply with design requirements in BCBC.	3.2.2.76 3.2.5.6
3	Assembly Occupancy	An assembly occupancy is permitted to be classified as Group D, provided the number of persons in the room does not exceed 30, the suite is separated with a FRR of 1hr, and a permanent sign indicating max occupant load is conspicuously posted per BCBC requirements.	3.1.2.6
4	Occupant Loads	Preliminary occupant load determination has been estimated based on assembly occupancy of the Meeting Rm being classified as Group D with a max room load of 30. Final occupant load to be confirmed as floor plans are finalized.	3.1.17.1
5	Accessibility	Based on preliminary occupancy numbers, 1 public, accessible WC is required. There are no requirements for HC parking stalls.	3.8.2.3.2 3.8.2.32 3.8.3.4.2


EDGE OF GRAVEL DRIVEWAY
TREELINE
44.5
45.0
45.5
46.0
46.5
47.0
47.5
48.0
48.5
49.0
49.5
50.0
0.75 FIR
#251
0.20 FIR
#264
ENTRY GATE TO BE MAINTAINED
GRAVEL DRIVEWAY
SLOPE
EXISTING TREE TO REMOVED
WATER TANK 1
WATER TANK 2
WATER TANK 3
FUTURE APPARATUS BAYS
CONCRETE APRON
SLOPE AWAY 2%
OVERFLOW PARKING (8 SPOTS)
FIREHALL APPARATUS (4 BAY) FFE - 48.0M
TRENCH DRAIN
SLOPE UP 2.5%
HOSE/TRAINING TOWER
VERTICAL TRAINING AREA
EXISTING TREE TO REMAIN
COVERED STORAGE
FIREHALL FFE - 48.0M
SLOPE UP 4.0%
MAIN ENTRY FFE - 48.0M
SLOPE UP 6.0%
VOLUNTEER PARKING
COMMUNITY LANDSCAPE/PUBLIC ART SPACE
ENTRY BRIDGE TO SECOND FLOOR
VOLUNTEER PARKING (8 SPOTS)
WALKING/BIKING TRAIL
SLOPE UP 3.0%
TOP OF BANK
CENTRAL ROAD



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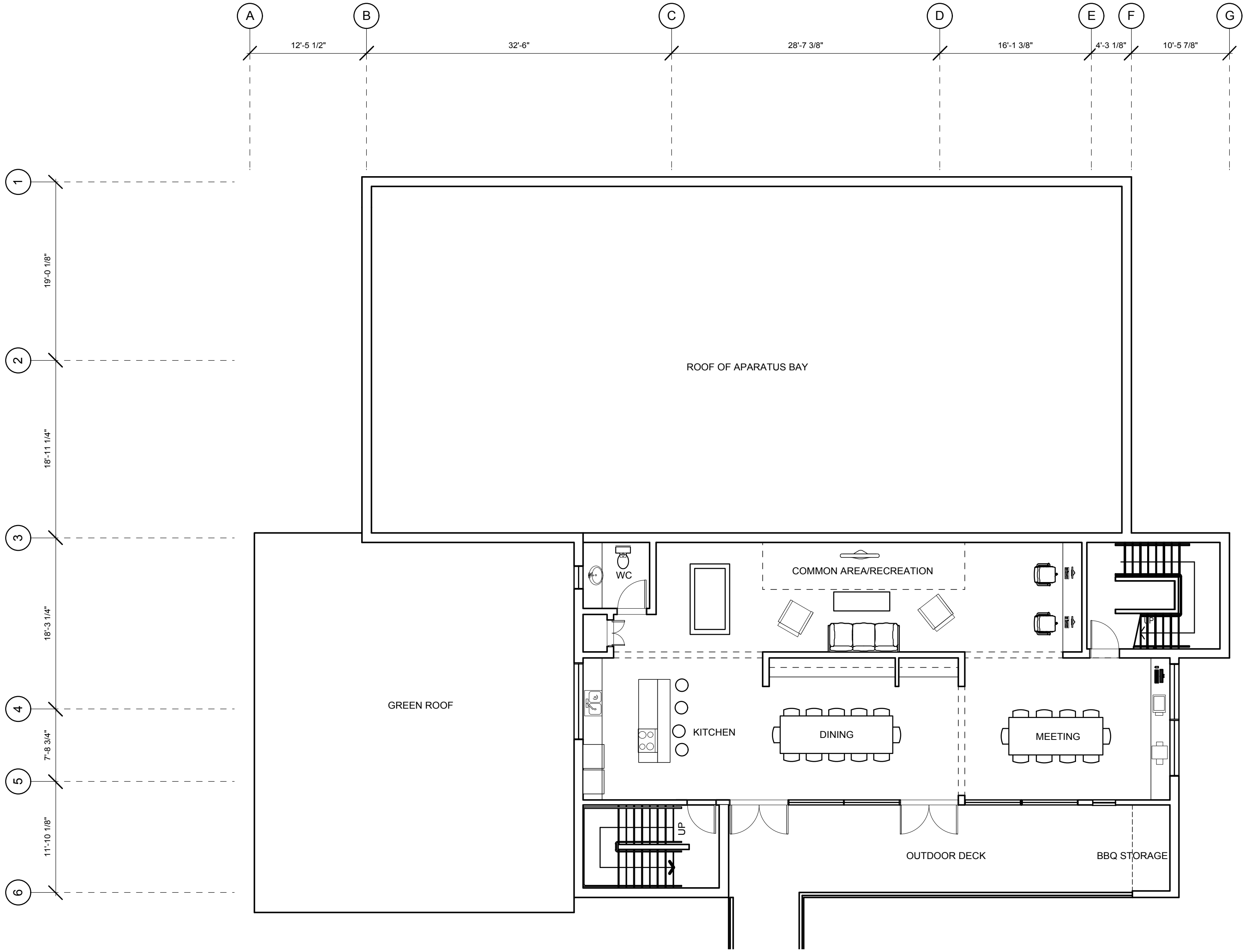
Hornby Island Firehall

Ground Floor Plan

SCALE: 1/16" =1'

DATE: July 14, 2014

A 1.01



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Hornby Island Firehall

Upper Floor Plan

SCALE: 1/16" =1'

DATE: July 14, 2014

A 1.01