Passive House Object Documentation

Project ID 4748
Six-Unit Condominium Victoria, BC Canada
www.Northparkpassive.com

Project Architect: Adam Fawkes, HCMA
www.HCMA.ca
Passive House Consultant: Mark Bernhardt, Bernhardt Contracting Ltd.

This six-unit condominium was built for the market in Victoria BC, Canada. It is the first Passive House market condominium in Canada. The wall assembly is a 2x8 wood frame structural wall and 2x4 service cavity with concrete slab and foundation walls. Each of the six apartments has a separate entrance and south-facing patio windows overlooking the street. Construction was completed in September 2015 and the residence has been occupied by the suite buyers since then.

U-value of exterior wall	0.157 W/(m²K)	Annual heating demand:	11 kWh/(m²a)
U-value of basement floor slab	0.184 W/(m²K)	Primary energy demand:	152 kWh(m²a)
U-value of Foundation wall	0.114 W/(m²K)	Primary energy Renewable:	73 kWh(m²a)
U-value of roof	0.112 W/(m²K)	Generation of Renewable energy:	60 kWh(m²a)
U- value of window	0.74 W/(m²k)		
Heat recovery	90%	Pressure test n_{50}	$0.5h^{-1}$

1. Pictures of the North Park Passive House:

East Elevation

South Elevation

West Elevation

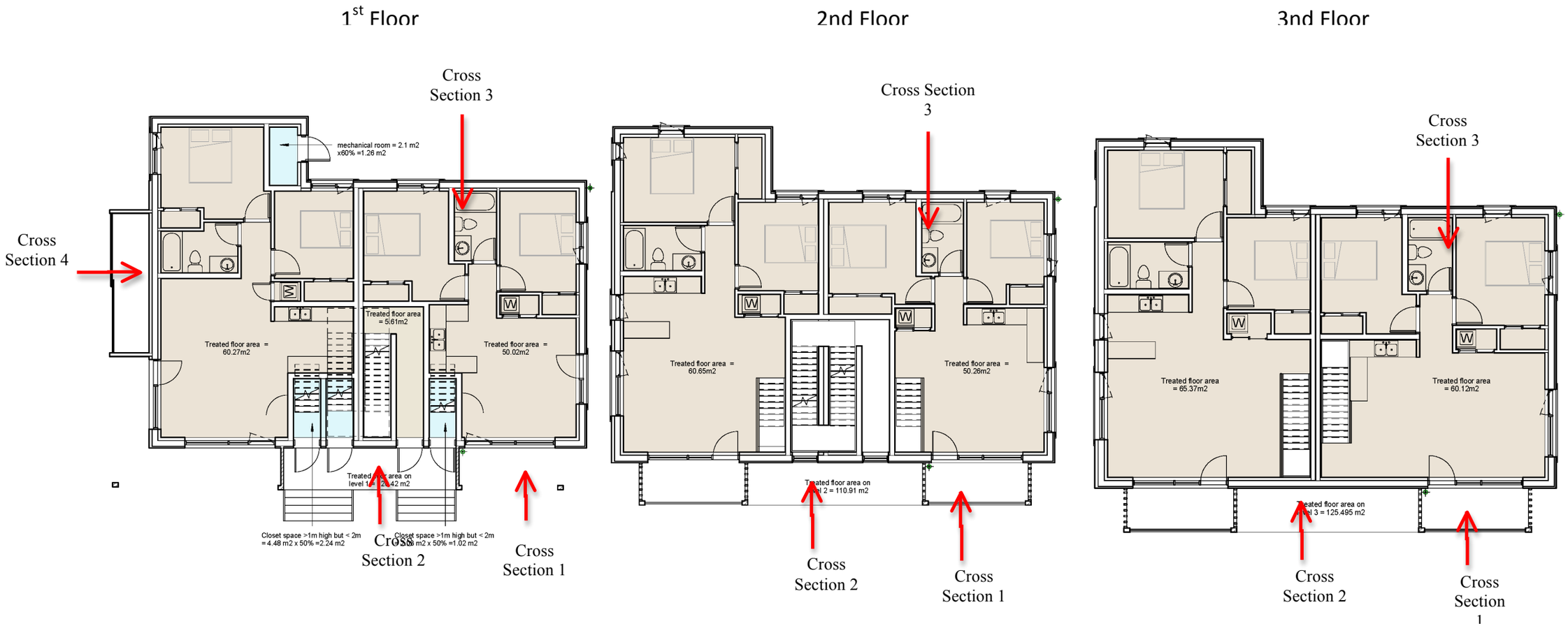
North Elevation

2. Pictures of interior:

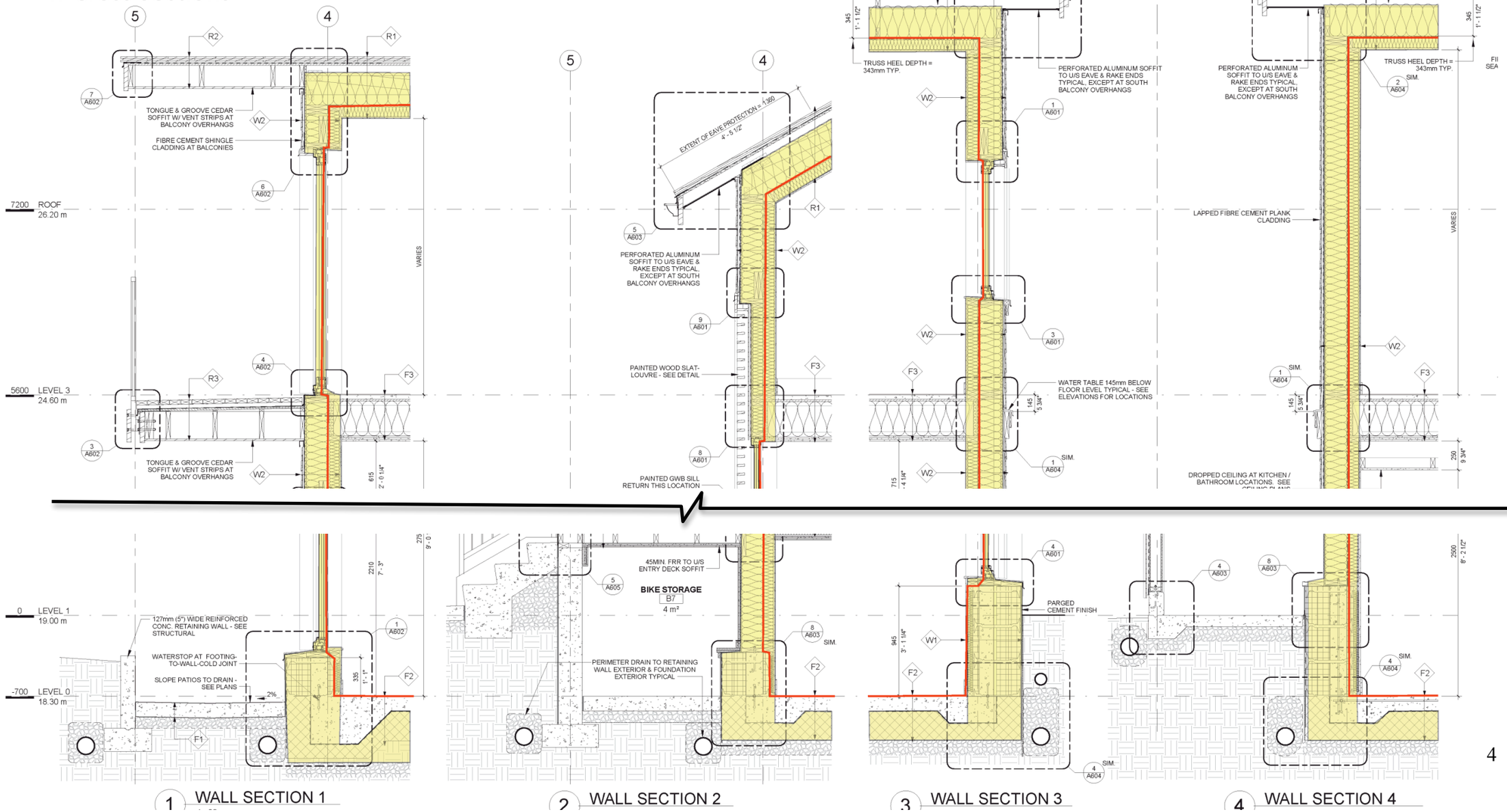
Kitchen and Living Room

North Bedrooms

3. Floor Plans:



4. Cross Sections



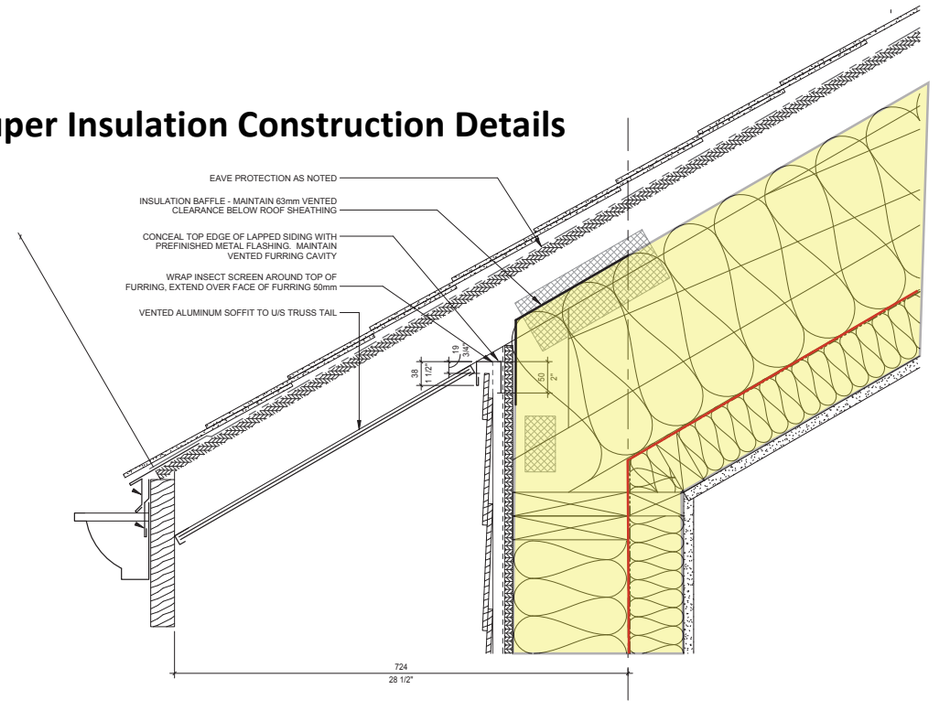
1 WALL SECTION 1

2 WALL SECTION 2

3 WALL SECTION 3

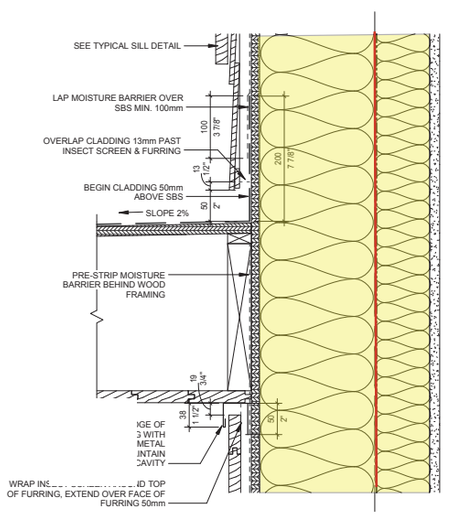
4 WALL SECTION 4

5. Super Insulation Construction Details



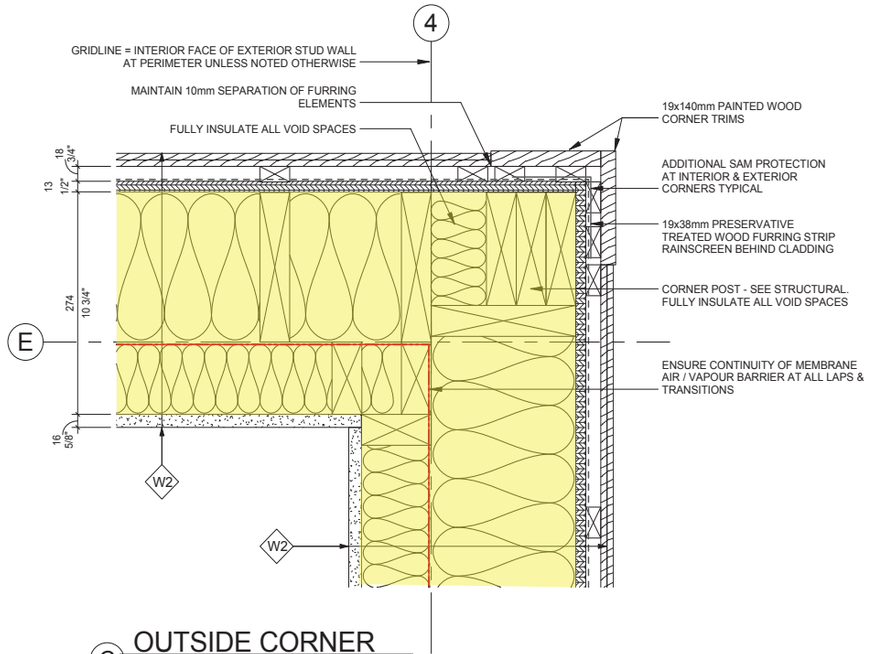
ROOF AT EAVE

1 : 5



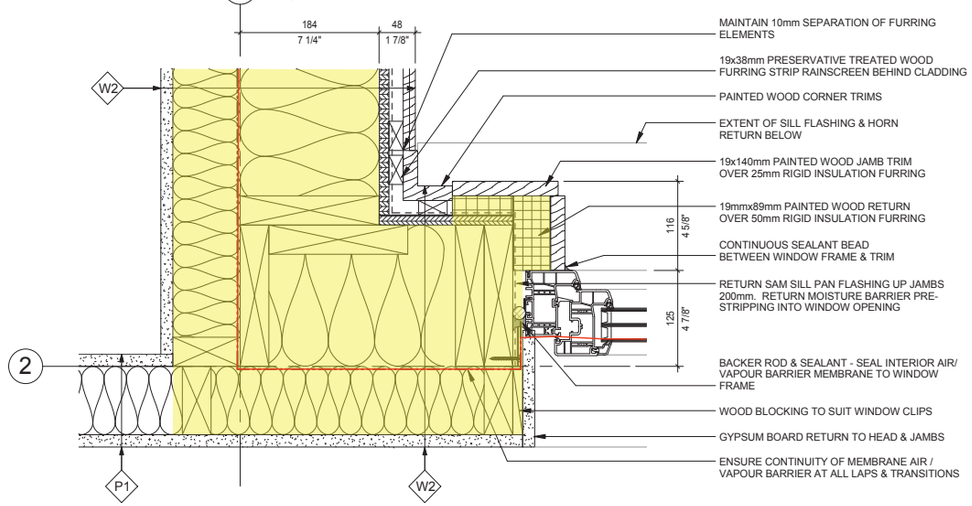
CANOPY ROOF AT WALL

1 : 5



OUTSIDE CORNER

C 1 : 5

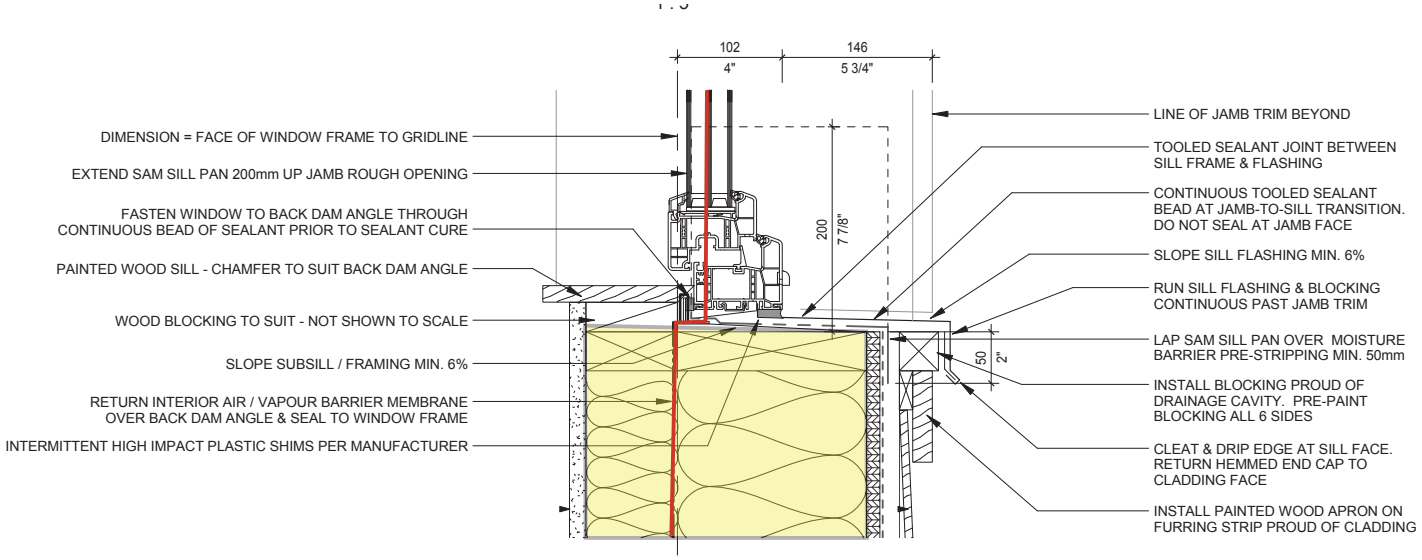


INSIDE CORNER

1 : 5

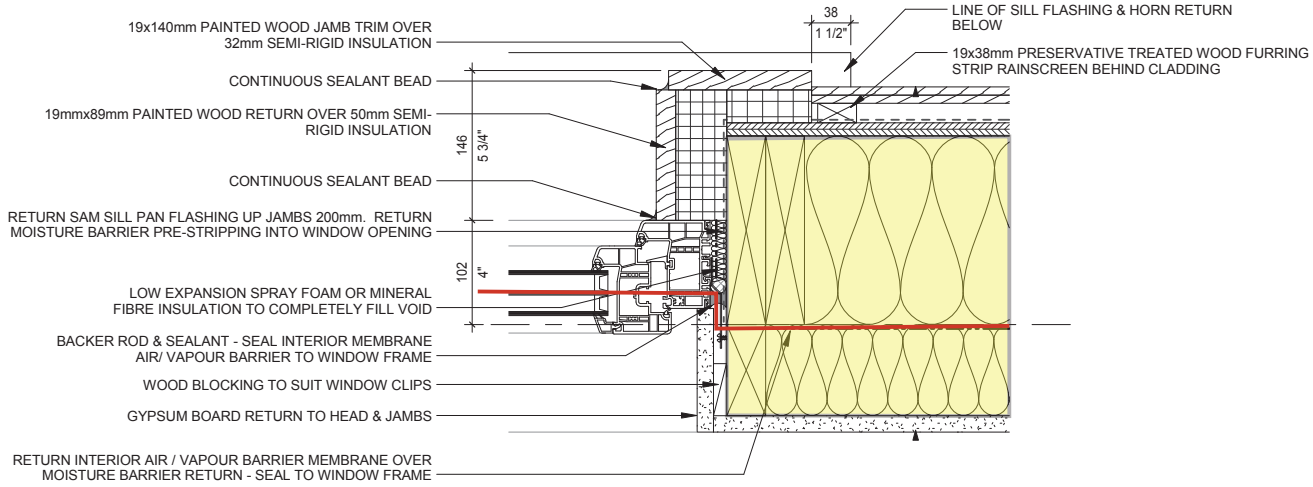
6. Window Installation

The windows and doors are installed in the centre of the wall assembly. The windows & doors are EuroLine 4700 series Thermo Plus using a certified Rehau frame and Cardinal 180 glazing, having a U_g-Value of 0.74 and a g-Value of 0.58. The airtight layer is sealed with SIGA tape to the window frame interior, and the window heads and jambs are over insulated on the exterior with EPS foam. The over insulation is protected by wood trim and a screen assembly. The window frames have a U value of 0.79 and a glazing edge Ψ value of 0.03. The installation Ψ values are 0.015 for the over insulated jambs and heads and 0.035 for the sills.



WINDOW SILL AT WOOD FRAMING

1 : 5



WINDOW JAMB

1 : 5

Exterior EPS layer

7. Heat supply:

The primary heat for the building is electric resistance heat mats under the tiled bathroom and entry floors. There is no mechanical cooling. Exterior shade and a moderate climate make cooling unnecessary.

Heat Mat under Bathroom Floor Tile

8. Description of airtight envelope & test document

The Air Tight Layer is the Siga Majpell fabric located on the inside of the 2x8 structural wall, taped at all seams with SIGA tapes. The fabric is continuous from the concrete foundation to the ceiling and then across the ceiling. The ledger on which the upper floor joists are hung is bolted over the fabric. Window & door frames have rod & caulk plus air seal tape on the inside from the fabric to the window frame. A service cavity was installed inside the air-tight layer after a mid-construction blower door test. Final blower door test was performed after completion, with the certificate attached below.

RDH
Making Buildings Better

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TO **Mr. Mark Bernhardt**
EMAIL **mark@bernhardtcontracting.com**
Bernhardt Contracting Ltd.
1535 Oak Crest Drive
Victoria BC V8P 1K7

8820.002
North Park Passive House
Blower Door Test Results

DATE July 15, 2015

REGARDING **Whole Building Air Leakage Testing – Results of Final Test**

Dear Mark,

The following memo summarizes the results of the final whole building airtightness test, conducted June 16, 2015.

Summary of Key Building Parameters and Results

BUILDING AND TEST – BASIC INFORMATION	
Building Address	860 Queens Avenue, Victoria BC V8T 1M5
Building Elevation	26 m
Net Building Volume (V_{n50})	1080 m^3
Date of Test	June 16, 2015
Indoor Temperature	23° C
Outdoor Temperature	20° C
Wind speed	Negligible
Testers	Robert Lepage, Christy Love

SUMMARY OF RESULTS	
Air Changes per Hour, ACH_{50}, depressurization	0.47
Air Changes per Hour, ACH_{50}, pressurization	0.58
Average ACH_{50}	**0.53**

Floor plans are included as an attachment to this report.

Testing Methodology

This test measures the efficacy of the air barrier system after drywall has been installed, and is indicative of the air leakage of the completed building. The testing methodology generally complied with standard CGSB 149.10-M86, with air volume calculated according to Passive House requirements (detailed below). Testing was conducted under both pressurization and depressurization (not required by ASTM or CGSB, but required for Passive House certification), with the average of both tests determining the ACH_{50}. A multi-point approach was used, beginning with five pressure measurement points recorded for each test: 60Pa, 50Pa, 40Pa, 30Pa, and 20Pa to obtain the air leakage equation of the building. A regression line was calculated and the air leakage rate at 50Pa

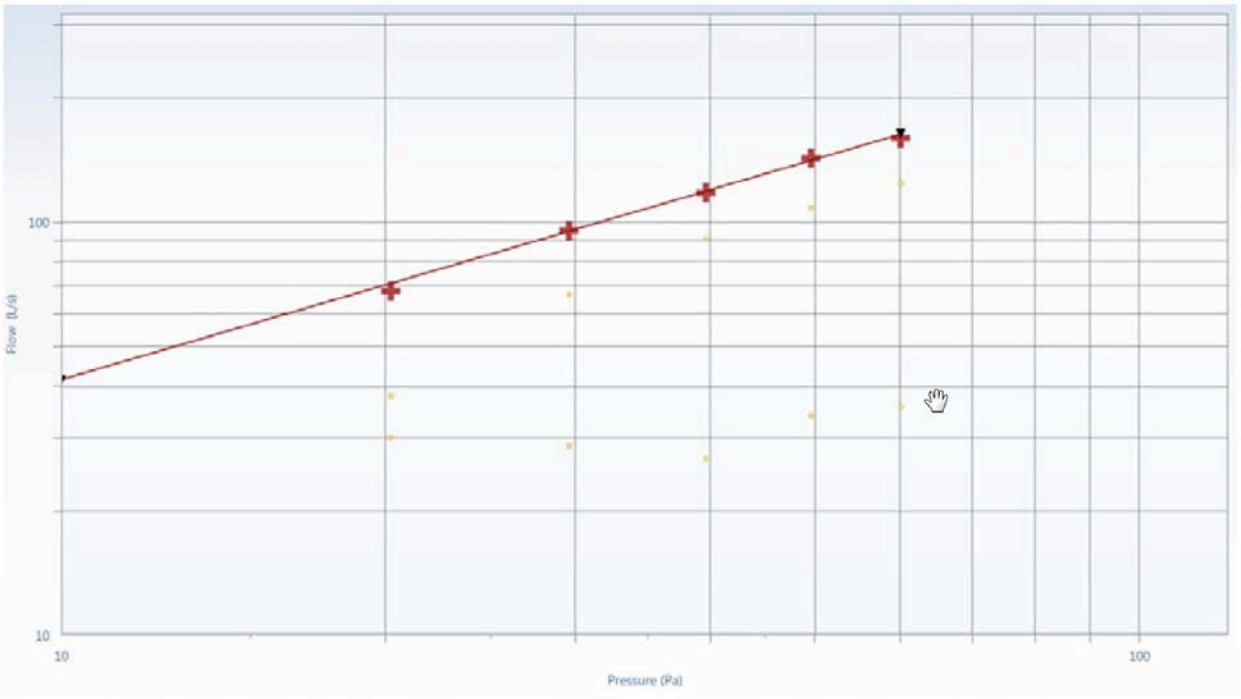


Figure 6: Flow Rate vs. Induced Pressure Differential, Depressurization Test

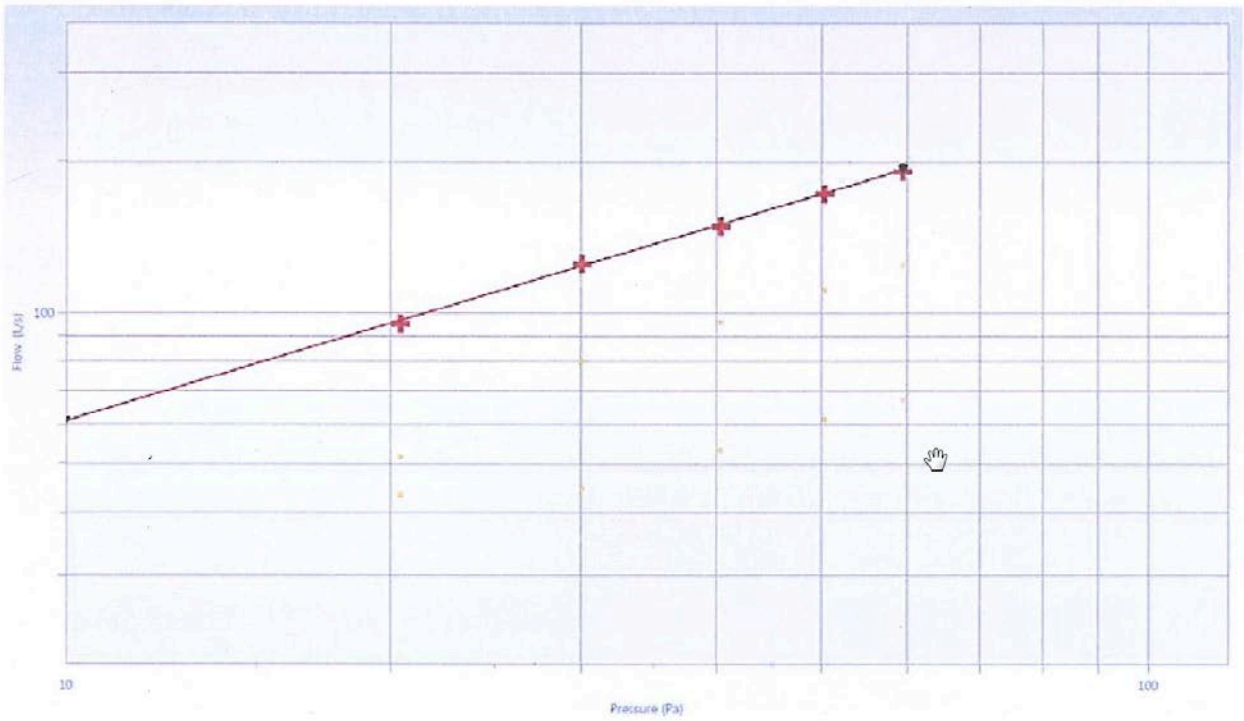


Figure 7: Flow Rate vs. Induced Pressure Differential, Pressurization

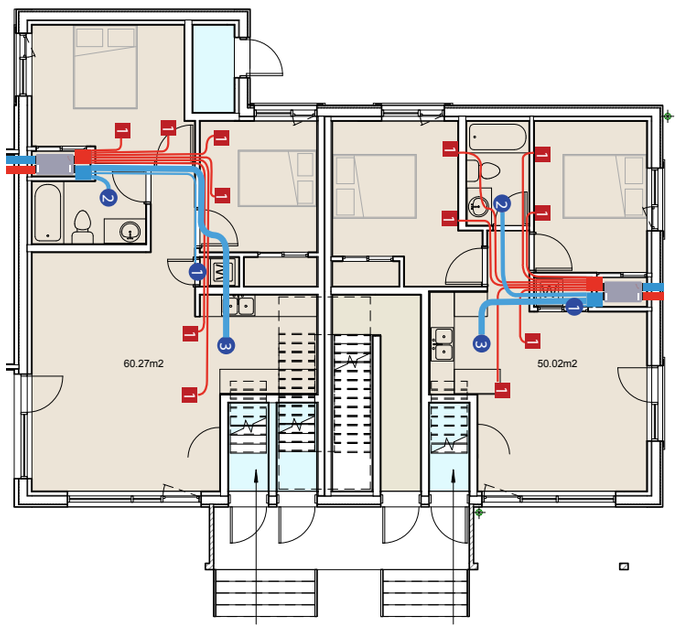
1st Floor

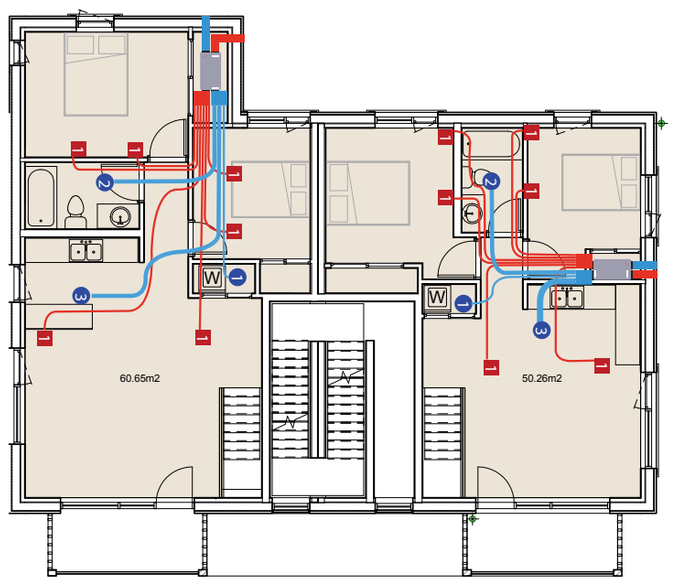
2nd Floor

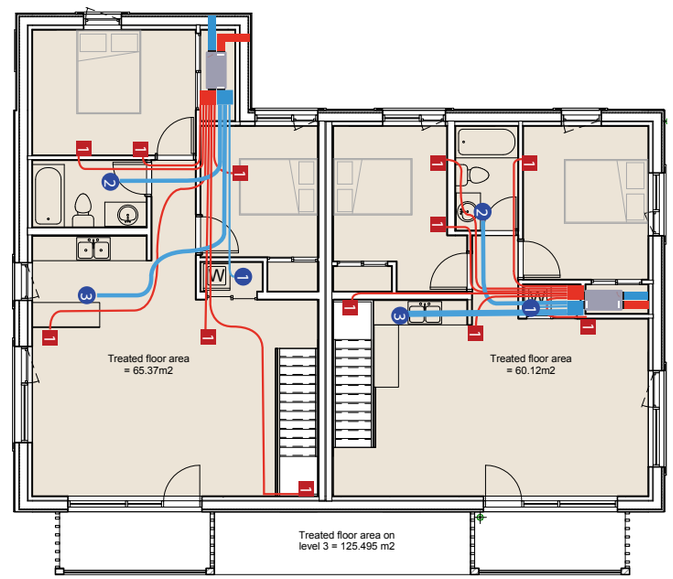
3nd Floor

Ventilation distribution system:

Ventilation is provided by six Zehnder 200 HRVs located in the ceiling of a closet in each suite, adjacent to the exterior wall. The ventilation system has an effective heat recovery of 90% and an electrical efficiency of 0.42. From the ventilation manifold, Zehnder Comfo Tube ducts supply and extract air, with no central ventilation ducting. All Comfo Tubes run within interior walls, or within the service and ventilation cavity of the ceiling. All living rooms and bedrooms have one or two supply ducts depending on required supply volume. All bathrooms and laundry areas have exhaust vents, with kitchens having three exhaust tubes to allow higher levels of extraction



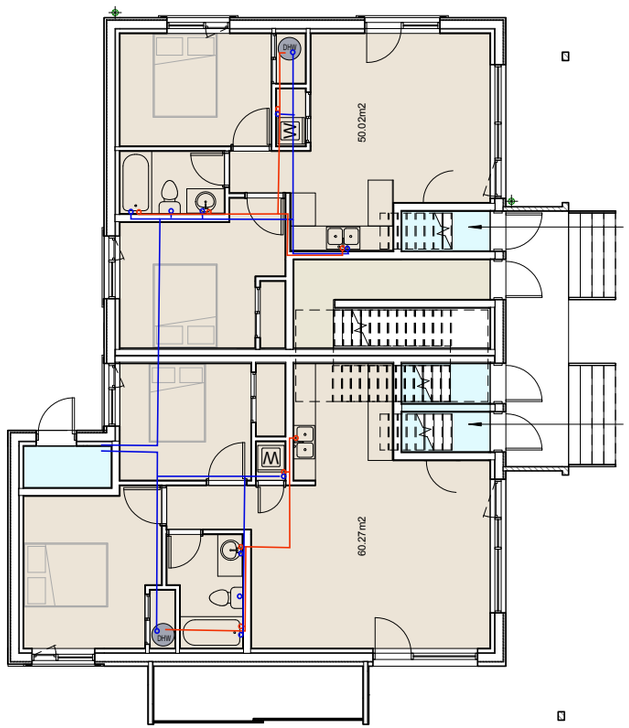


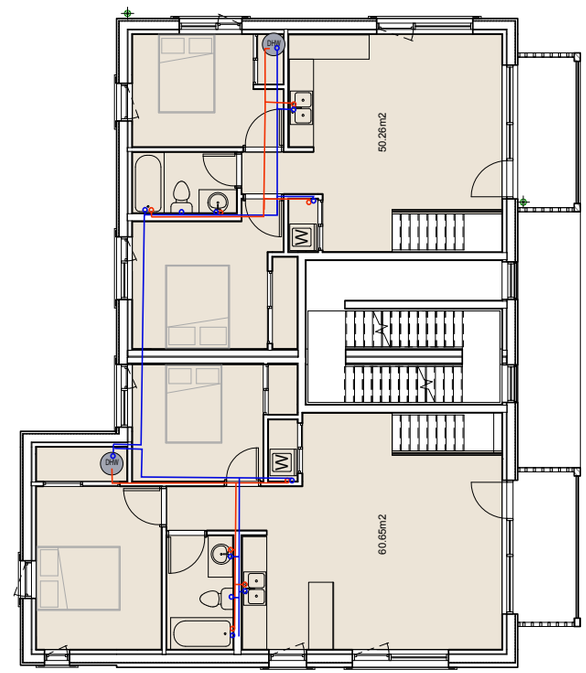


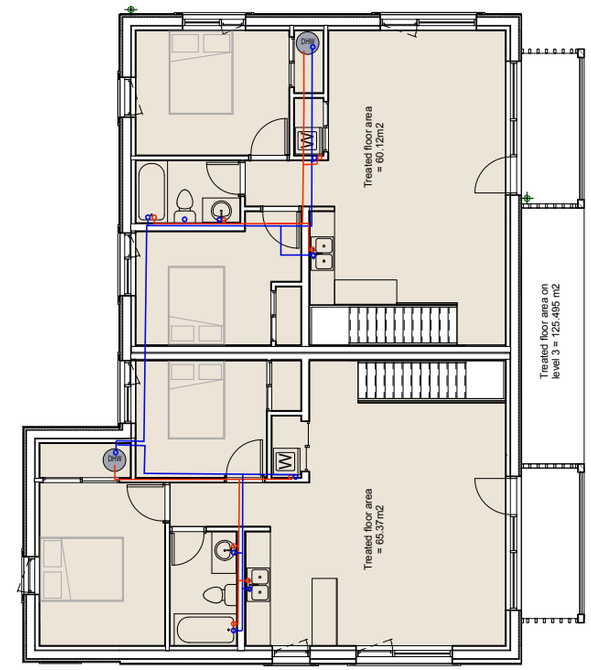
1st Floor 2nd Floor 3nd Floor

9. Domestic Hot Water Supply

The Domestic Hot water is supplied by 3000 watt 40 gallon Ream Marathon tanks located in each unit. This system was chosen for its reliability, long-term durability, and performance.







10. PHPP results:

Certification Documentation

Specific building characteristics with reference to the treated floor area

				Criteria	Alternative criteria	Fulfilled?[2]
	Treated floor area m²	364.9				
Space heating	Heating demand kWh/(m²a)	11	≤	15	-	yes
	Heating load W/m²	11	≤	-	10	
Space cooling	Cooling & dehum. demand kWh/(m²a)	-	≤	-	-	-
	Cooling load W/m²	-	≤	-	-	
	Frequency of overheating (> 25 °C) %	0	≤	10		yes
	Frequency excessively high humidity (> 12 g/kg) %	0	≤	20		yes
Airtightness	Pressurization test result n_{50} 1/h	0.5	≤	0.6		yes
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	152	≤	-		-
Primary Energy Renewable (PER)	PER demand kWh/(m²a)	73	≤	60	73	yes
	Generation of renewable energy kWh/(m²a)	60	≥	-	29	

[2] Empty field: Data missing; "-": No requirement

I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

Passive House Classic? yes

Task:	First name:	Surname:	Signature:
2-Certifier	Tomas	O'Leary	

Certificate ID	Issued on:	City:
11734_MosArt_EP_20150924_TOL	01.10.2015	Wicklow

This building has been awarded the

Quality Approved Passive House

certificate by MosArt Ltd.

This certification is based solely on the design data and specifications provided to MosArt Ltd by the client for the purpose of certification. MosArt Ltd has checked and approved the building's energy balances according to these data.

This certification does not cover quality assurance of the construction work or design implementation. MosArt Ltd hereby takes no responsibility for any faults in the above.

Certificate

Certified Passive House Classic

Authorised by:

Passive House Institute

Dr. Wolfgang Feist
64283 Darmstadt
Germany

North Park Passive House
860 Queens Ave., BC V8T 1M5 Victoria, Canada

Certified Passive House
Passive House Institute
| classic | plus | premium |

Client	Bernhardt Developments Ltd. 1535 Oak Crest Dr BC V8P 1K7 Victoria, Canada
Architect	Adam Fawkes, HCMA Architecture & Design Suite 300-569 Johnson Street BC V8P 1K7 Victoria, Canada
Building Services	Bernhardt Developments Ltd. 1535 Oak Crest Dr BC V8P 1K7 Victoria, Ireland
Energy Consultant	Mark Bernhardt 1535 Oak Crest Dr BC V8t 1M5 Victoria, Canada

Passive House buildings offer excellent thermal comfort and very good air quality all year round. Due to their high energy efficiency, energy costs as well as greenhouse gas emissions are extremely low.

The design of the above-mentioned building meets the criteria defined by the Passive House Institute for the 'Passive House Classic' standard:

Building quality		This building		Criteria	Alternative criteria
Heating					
Heating demand	[kWh/(m²a)]	11	≤	15	-
Heating load	[W/m²]	11	≤	-	10
Cooling					
Frequency of overheating (> 25 °C)	[%]	0	≤	10	
Frequency of excessively high humidity	[%]	0	≤	20	
Airtightness					
Pressurization test result (n_{50})	[1/h]	0.5	≤	0.6	
Non-renewable primary energy (PE)					
PE demand	[kWh/(m²a)]	152	≤	-	
Renewable primary energy (PER)					
PER-demand	[kWh/(m²a)]	73	≤	60	73
Generation (reference to ground area)	[kWh/(m²a)]	60	≥	-	29

The associated certification booklet contains more characteristic values for this building.

##

Certifier: Tomas O'Leary, Passive House Academy

11. Construction costs:

CAN $ 908,500 or $1,957.00/$m^2$ of gross floor area.

12. Total project cost:

CAN $1,950,00.00 (includes land & other costs). This is the total project sale value.

13. Year of construction: 2015

14. Project architect:

Adam Fawkes HCMA, Victoria, BC

15. Building services planning:

Bernhardt Contracting Ltd., Victoria, BC

16. Building physics:

Mark Bernhardt, Bernhardt Contracting Ltd., Victoria, BC

17. Structural Engineer:

Richie Smith P.Eng, M.Sc. Hoel Engineering Ltd Victoria, BC

18. Experience:

Experiences, descriptions and photos relating to the project are found on: wwww.bernhardtcontracting.com/projects and www.northparkpasssive.com. So far the building is preforming as expected. RDH Building Science is currently monitoring the buildings performance in a one-year monitoring and verification program.

19. Publications & studies on the project:

The project is one of the projects included in a business case analysis of Passive House construction in Canada. The Canadian Mortgage & Housing Corporation, BC Housing, Vancity, RDH Building Science, Bernhardt Contracting Ltd., Synergy Sustainability Institute, and others support this research.

As this project was the first of its type to the market, it received widespread media coverage, both locally and nationally.