LEGACY PASSIVE HOUSE
WHISTLER, BRITISH COLUMBIA

PASSIVE HOUSE DESIGN BRIEF | V0
PREPARED FOR THE PASSIVE HOUSE INSTITUTE
MARCH 3, 2022

Photo credit: Integra Architecture + Melvin Lau
PROJECT DATA

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Legacy Passive House</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>1020 Legacy Way, Whistler BC</td>
</tr>
<tr>
<td>Building Use</td>
<td>Residential</td>
</tr>
<tr>
<td>Year of Construction</td>
<td>2019</td>
</tr>
<tr>
<td>Space Heating</td>
<td>13 kWh/m²/yr</td>
</tr>
<tr>
<td>Space Cooling</td>
<td>n/a</td>
</tr>
<tr>
<td>Primary Energy Renewable</td>
<td>70 kWh/m²/yr</td>
</tr>
<tr>
<td>Generation of Renewable Energy</td>
<td>0 kWh/m²/yr</td>
</tr>
<tr>
<td>Airtightness Test Result at 50 Pa</td>
<td>0.15 ACH (0.169 L/s/m²)</td>
</tr>
<tr>
<td>U-value of external wall</td>
<td>0.124 W/(m²K)</td>
</tr>
<tr>
<td></td>
<td>71 Btu/(hr-F-ft²)</td>
</tr>
<tr>
<td>U-value of floor slab</td>
<td>0.080 W/(m²K)</td>
</tr>
<tr>
<td></td>
<td>46 Btu/(hr-F-ft²)</td>
</tr>
<tr>
<td>U-value of roof</td>
<td>0.058 W/(m²K)</td>
</tr>
<tr>
<td></td>
<td>97 Btu/(hr-F-ft²)</td>
</tr>
<tr>
<td>U-value windows</td>
<td>0.75 W/(m²K)</td>
</tr>
<tr>
<td>Ventilation Heat Recovery Efficiency</td>
<td>81%</td>
</tr>
<tr>
<td>Special features</td>
<td>Prefabricated wood panels with 3% wood waste. Dense packed cellulose insulation with 85% post-consumer recycled newspapers.</td>
</tr>
</tbody>
</table>

BACKGROUND

Developed in the Resort Municipality of Whistler, the apartment building consists of 24 units on 4 floors over a single level of parking built and certified to Passive House standards. There is a mix of 1 bed and 2 bed rental units with a common laundry area. The gross floor area is 17,859 sq.ft. (1,659 m²) achieving a FSR of 1.14. Parking includes 27 surface and underground vehicle spaces with EV stations wired in. In-suite bicycle storage is provided in each unit.

Horizontal solar shades extend south are used to block high solar angles and reflective interior blinds are used to block low solar angles.

The building is owned and operated by the Whistler Housing Authority as part of the municipality’s affordable housing inventory for housing Whistler’s workforce.

NORTH WEST ELEVATION OF BUILDING.

CERTIFICATION ID

6363 Project-ID (www.passivehouse-database.org)

PROJECT TEAM

Architect          | Integra Architecture Inc. |
Passive House Consultant | RDH Building Science Inc. |
Electrical         | Gager Electrical Consultants |
Mechanical         | Pinchin Ltd |
Structural         | Equilibrium Structural Engineering |
Building Enclosure | Aqua Coast Engineering |
Passive House Contractor | BC Passive House |
Contractor          | Durfeld Constructors |
Passive House Certifier | Peel Passive House Consulting Ltd |

AUTHOR

RDH Building Science Inc.

Date    Signature
ELEVATIONS

NORTH WEST ELEVATION

NORTH EAST ELEVATION

SOUTH WEST ELEVATION

SOUTH WEST ELEVATION
FLOOR CONSTRUCTION

SUSPENDED SLAB ASSEMBLY

MODELLED ASSEMBLY IN PHPP

EXTERNAL WALL TO SUSPENDED SLAB INTERFACE DETAIL

WGA Exterior Wall

Hardie Plastrad siding
Strapping 19x89mm
Tyvak moisture barrier
Plywood 10mm
SPF 38x255mm @ 10mm O.C.
OGR 13mm air/vapour barrier
SPF 35x95mm stud/service wall
GWB 15mm

High-quality Tape
WALL CONSTRUCTION

MAIN WALL ASSEMBLY

MODELLED ASSEMBLY IN PHPP

INTERMEDIATE FLOOR INTERFACE DETAIL
ROOF CONSTRUCTION

MAIN ROOF ASSEMBLY

MODELLED ASSEMBLY IN PHPP

ROOF TRUSS INTERFACE DETAIL

ROOF TRUSS INTERFACE DETAIL

R1A. Sipped Roof System
Asphalt shingles
Synthetic roof underlayment
Plywood 15mm
SPF 56x80mm cross stepping @ 640mm O.C.
SPF 56x200mm @ 610mm O.C.
SBS Membrane
Plywood 15mm
TJX 90x @ 846mm O.C.
OSB 25.4mm air vapour barrier
SPF 56x140mm @ 610mm O.C.

High-award Tase
WVA. Exterior Wall
Horizontal Retailling
Insulation @ 120mm
Tyvek moisture barrier
Plywood 15mm
SPF 56x200mm @ 560mm O.C.
OSB 15mm air vapour barrier
SPF 56x40mm stud nervous wall
GWB 15mm
WINDOWS AND WINDOW INSTALLATION

TYPICAL WINDOW HEAD INSTALLATION

TYPICAL WINDOW SILL INSTALLATION

TYPICAL WINDOW JAMB INSTALLATION

Window manufacturer: Aluron Sp. Z o.o., Zawiercie, Poland

Window construction: Aluminum clad wood framed windows

U-value frame (Uf): 0.78 W/(m²K)

Insulated glazing unit:
- 4 mm glass
- 18 mm 90% Ag 10% Air
- 4 mm glass
- 18 mm 90% Ag 10% Air
- 4 mm glass

Centre of glass U-value: 0.528 W/(m²K)

g-value: 0.526
AIR BARRIER STRATEGY

Mid-construction airtightness testing was conducted on May 17, 2019 and the final airtightness test was conducted on October 3rd, 2019 by RDH Building Science Inc.

Summary of Testing Results

- Volume (Vn50): 5,744 m²
- Enclosure surface area: 2,482 m²
- Pressurization results: 0.1561 ACH
- Depressurization results: 0.1464 ACH
- Average: 0.15 ACH +/- 2.8%

Airtightness Concept

- Slab on grade: Concrete slab
- Below Grade walls: Concrete walls
- Suspended slab: Concrete slab
- Above grade walls: Taped OSB Sheathing
- Roof: Taped OSB Sheathing

TEST FAN WAS INSTALLED AT THE MAIN ENTRANCE ON THE GROUND FLOOR.

TEST FAN SETUP AT THE MAIN ENTRANCE ON THE GROUND FLOOR.

TAPED OSB FORMS THE MAIN AIR BARRIER ON THE WALLS AND ROOF ASSEMBLY.
SERVICE WATER HEATING

Service water heating is provided by a water source heat pump that uses Whistler low temperature district energy system. Three storage tanks with thermal jackets help minimize heat losses. Variable frequency drives are provided on circulation pumps. Continuous insulated circulation pipes with oversized pipe hangers were used to further minimize demand.
HVAC SYSTEM

Ventilation

The entire building is served by a single ERV located in the attic. Each suite has a variable air volume damper in the supply and extract duct runs to allow for suite level ventilation control. Duct runs are kept short and straight to minimize pressure losses. There are three mechanical shafts to distribute the ventilation air through the vertical ducts. All suites are provided with controls for ventilation in their bathrooms and kitchens.

Heating and Cooling

All spaces will be heated and cooled via a water source variable refrigerant flow (VRF) system connected to the ERV main supply air duct. This serves as the primary heating source for the building. When the outdoor air temperature is below 13 °C to 12 °C the supply air setpoint is 22C. When the outdoor air temperature is above 25 °C, the ERV and heat pump will run in cooling mode to maintain supply air temperature to the suites at 13 °C. Each suite has an electric baseboard controlled via local thermostat to provide supplementary heating to meet the demands of the peak heating loads.

The heating/cooling system is connected to Whistler’s low temperature district energy system. The building’s space heating utilizes the district energy system by means of a water source heat pump. The source of the district energy is from the wastewater treatment plant.

WATER SOURCE VRF HEAT PUMP PROVIDES SPACE CONDITIONING THROUGH THE YEAR. (LEFT) IN SUITE ELECTRIC BASEBOARDS ARE PROVIDED FOR TOP UP HEATING. (RIGHT)

SCHEMATIC OF WHISTLER'S DISTRICT ENERGY. Source: Resort Municipality of Whistler
## Passive House Verification

**Building:** WHA Passive House Employee Rentals  
**Street:** 1520 Legacy Way  
**Postal Code/City:** V8N 1B1 Whistler  
**Province/Country:** British Columbia CA-Canada  
**Building type:** Multi-unit Residential Building  
**Climate data set:** CA0922a-Whistler  
**Climate zone:** 3: Cool-temperate  
**Altitude of location:** 611 m  
**Home owner / Client:** Whistler Housing Authority  
**Street:** 1460 Dave Murray Pk #325  
**Postal Code/City:** V8N 1B2 Whistler  
**Province/Country:** British Columbia CA-Canada  
**Mechanical engineer:** Pinchin Ltd  
**Street:** 13775 Commerce Pkwy  
**Postal Code/City:** V8Y 2V4 Richmond  
**Province/Country:** British Columbia CA-Canada  
**Energy consultant:** RDH Building Science Inc.  
**Street:** 4333 Still Creek Dr #400  
**Postal Code/City:** V6G 5C5 Vancouver  
**Province/Country:** British Columbia CA-Canada  
**Certification:** Pass Passive House Consulting  
**Street:** 118 Craighead Rd  
**Postal Code/City:** L0Y 0S3 Blue Mountains  
**Province/Country:** Ontario CA-Canada  

### PHPP Results

**Year of construction:** 2018  
**Interior temperature winter [°C]:** 20.0  
**Interior temp. summer [°C]:** 25.0  
**No. of dwelling units:** 24  
**No. of occupants:** 59.8  
**Internal heat gains (PH) heating case (W/m²):** 2.5  
**PH cooling case (W/m²):** 4.4  
**Specific capacity (W/m² per m² TFA):** 60  
**Mechanical cooling:**

### Specific building characteristics with reference to the treated floor area

<table>
<thead>
<tr>
<th>Space heating</th>
<th>Heating demand kWh/(m²a)</th>
<th>Heating load W/m²</th>
<th>Criteria</th>
<th>Alternative criteria</th>
<th>Fulfilled?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13</td>
<td>11</td>
<td>≤ 15</td>
<td>- 10</td>
<td>yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Space cooling</th>
<th>Cooling &amp; dehumid. demand kWh/(m²a)</th>
<th>Cooling load W/m²</th>
<th>Frequency of overheating (&gt; 25 °C)</th>
<th>Frequency of excessively high humidity (&gt; 12 ph%)</th>
<th>Airtightness</th>
<th>Non-renewable Primary Energy (PE)</th>
<th>Primary Energy Renewable (PER)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 9</td>
<td>≤ 9</td>
<td>≤ 10</td>
<td>≤ 20</td>
<td>0.15</td>
<td>≤ 148</td>
<td>70</td>
</tr>
</tbody>
</table>

| Airtightness | Presurization test result m³/s | ≤ 0.6            | yes                               |

| Non-renewable Primary Energy (PE) | PE demand kWh/(m²a) | ≤ 80 | 70 | yes |

| Primary Energy Renewable (PER) | Generation of renewable energy (in relation to pre- kWh/(m²a) netto building footprint area) | ≤ 30 | 0 | yes |

*Criteria fulfilled by yes, no requirement.*