TarsemHaus

Background

TarsemHaus is a four storey, 8-unit multifamily residential building located in Squamish, British Columbia. It's a mix of concrete and wood frame construction. The triangular lot required a unique architectural design, and the constructed building is V shaped with a central courtyard. The ground level contains the garages and storage spaces, located outside of the thermal envelope and in the flood plain. Suite entry is via the central courtyard on level 2. The unique 2- and 3-bedroom floor plans each include a private roof top deck. The project won the Design of the Year for 2018 award in the residential category by the District of Squamish Advisory Design Panel. With the guidance of RDH, it achieved the Certified Passive House Classic standard in 2020.

Building Data

Project Name: TarsemHaus townhouses

Address: 1009 Aspen Road, Squamish, BC

Building Use: Residential

Year of Construction: 2019

Heating Demand: 12 kWh/m²a

Heating Load: 10 W/m²

Overheating: 1%

PER: 57kWh/m²a

Airtightness final test result: 0.52 ACH

U-value of external wall: 0.084 W/m²K

U-value of suspended floor: 0.077 W/m²K

U-value of roof: 0.066 W/m²K

U-value of windows: 0.78 W/m²K

Ventilation heat recovery efficiency: 86%

Ventilation humidity recovery efficiency: 73%

Cost of construction: 3066 €/m^2 Treated Floor Area according to PHPP

Project Team

CLIENT
Tyler OVINGTON
LTO Developments Inc.

ARCHITECTURAL
Derek VENTER, Architect AIBC
DVAD inc. DEREK VENTER ARCHITECTURAL DESIGN

LANDSCAPE
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Tom Barratt Ltd. Landscape Architects

STRUCTURAL
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Equilibrium Consulting Inc

GEOTECHNICAL
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EXP Services Inc.

SURVEY
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Bunbury & Associates BC Land Surveyors

CIVIL
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R.F. Binnie & Associates Ltd.

MECHANICAL
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Smith + Andersen

ELECTRICAL
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Smith + Andersen

PASSIVE HOUSE CERTIFIER
Brittany COUGHLIN, P.Eng., BEMP, CPHC, LEED AP
RDH Building Science Inc.

Certification ID

7089 Project-ID (*www.passivehouse-database.org*)

Author

Frederick Keitel, Certified Passive House Consultant December 6, 2022

Elevations

South elevation

West elevation

North Elevation

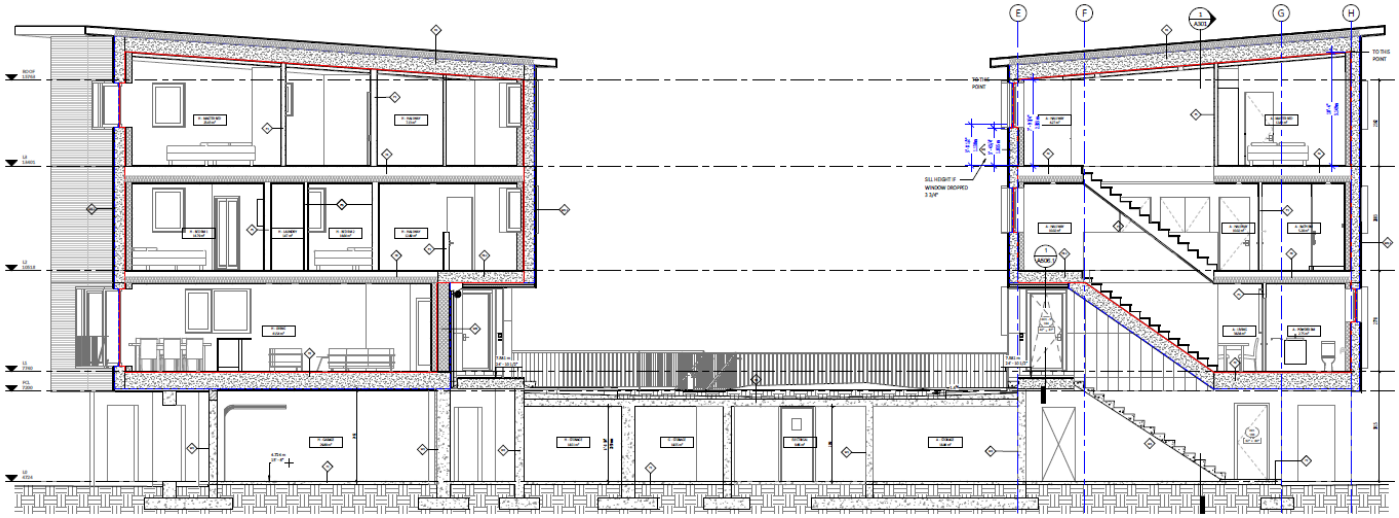
Courtyard, looking south

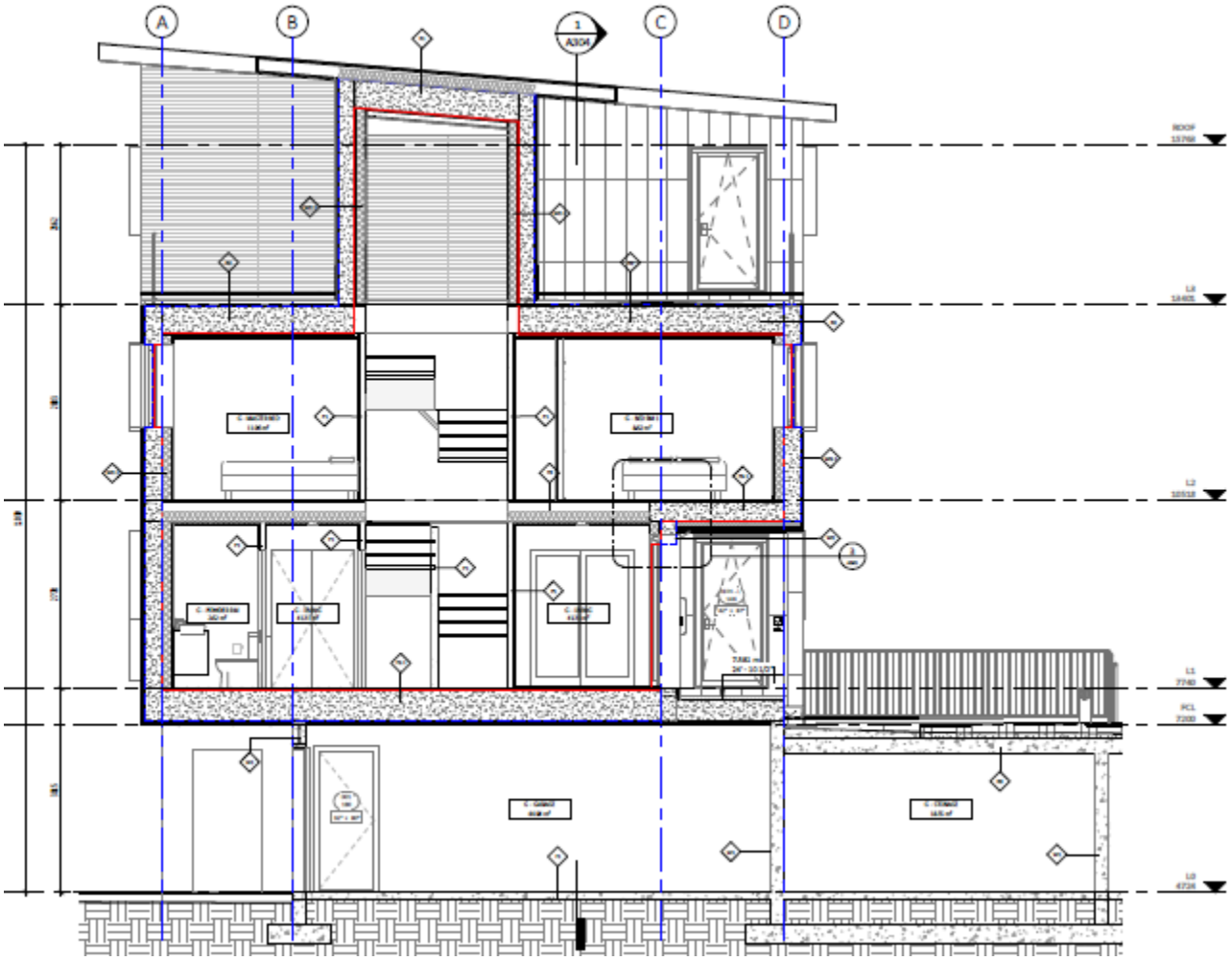
East elevation

Northeast corner

Interior

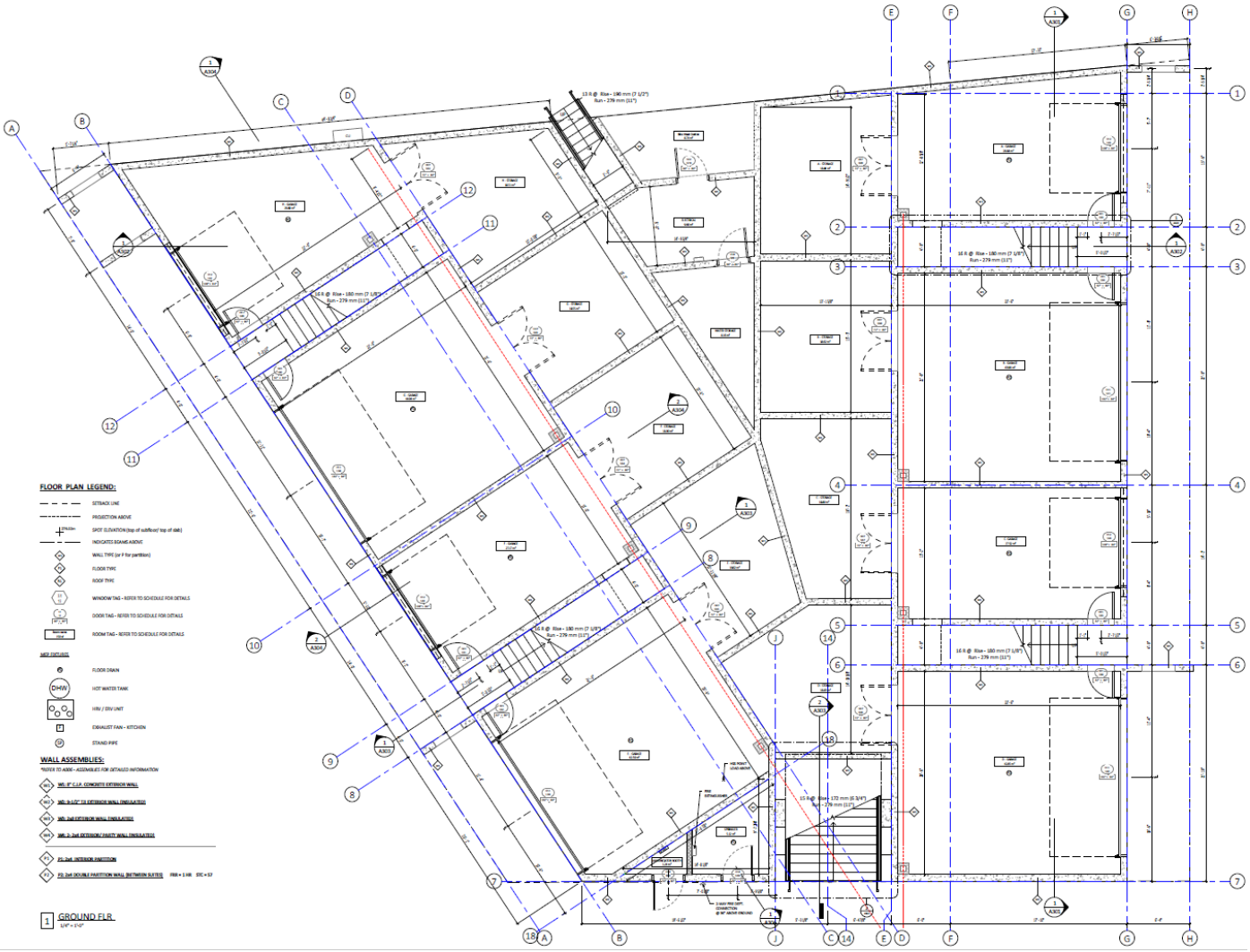
Building Sections



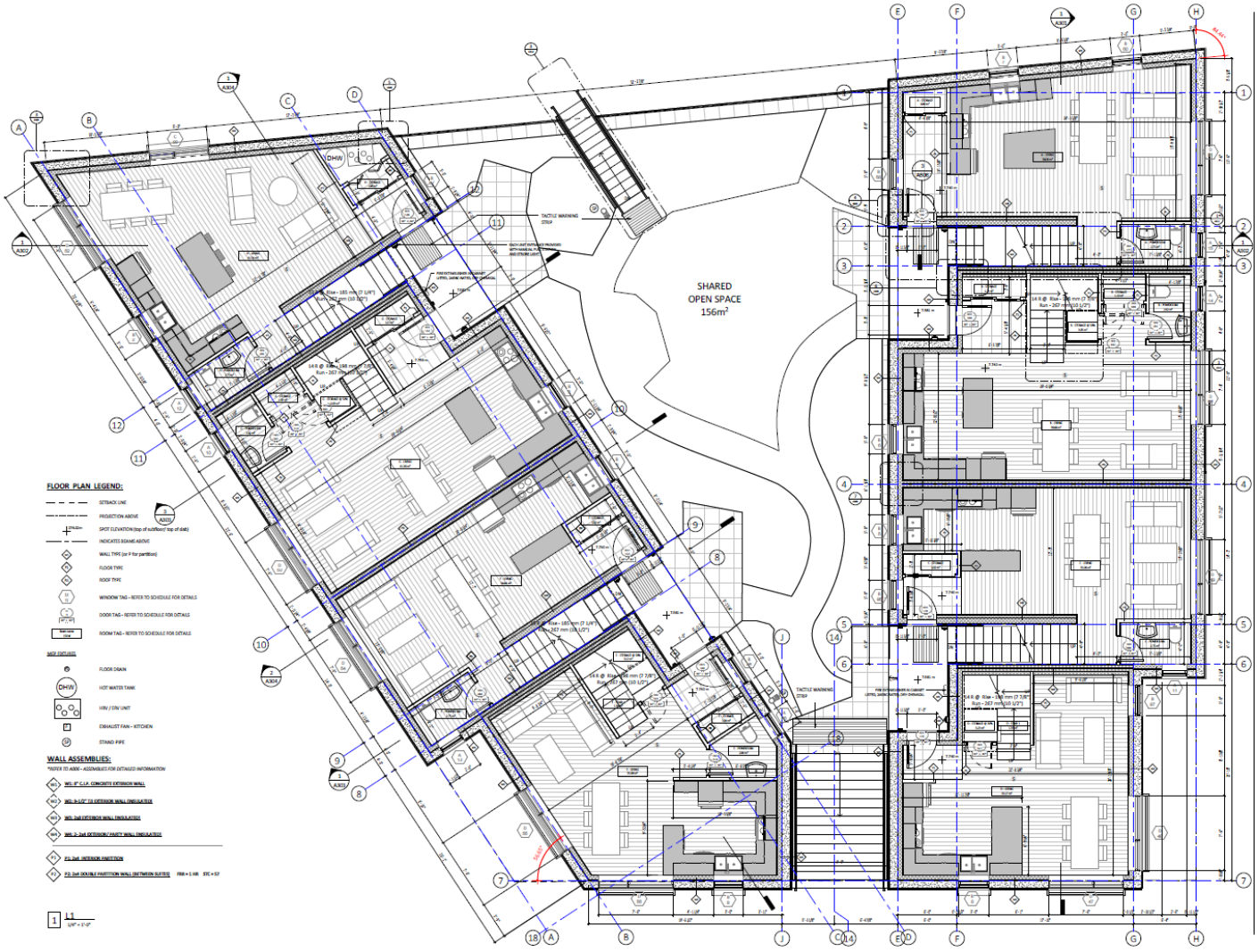


Floor Plans

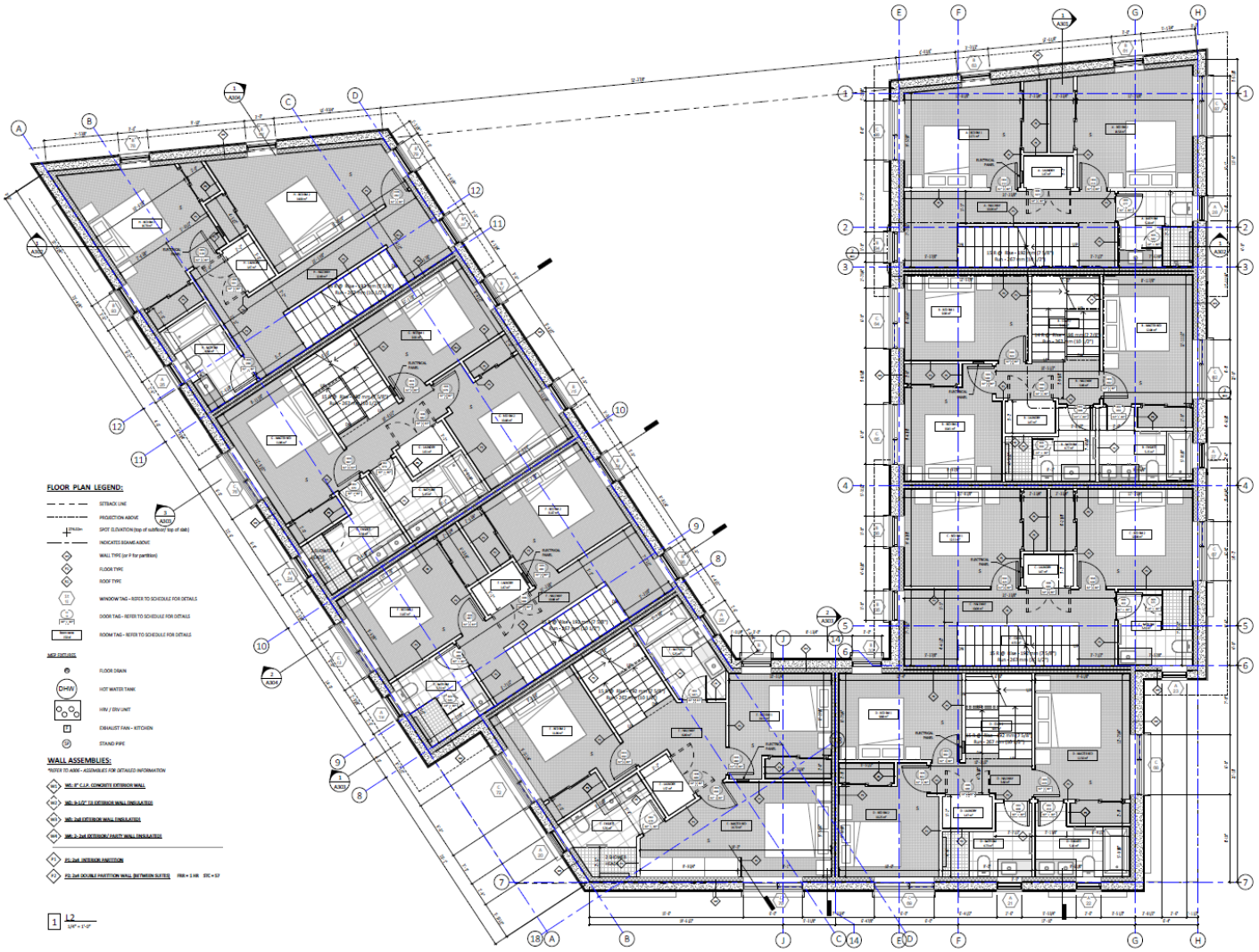
Ground Floor



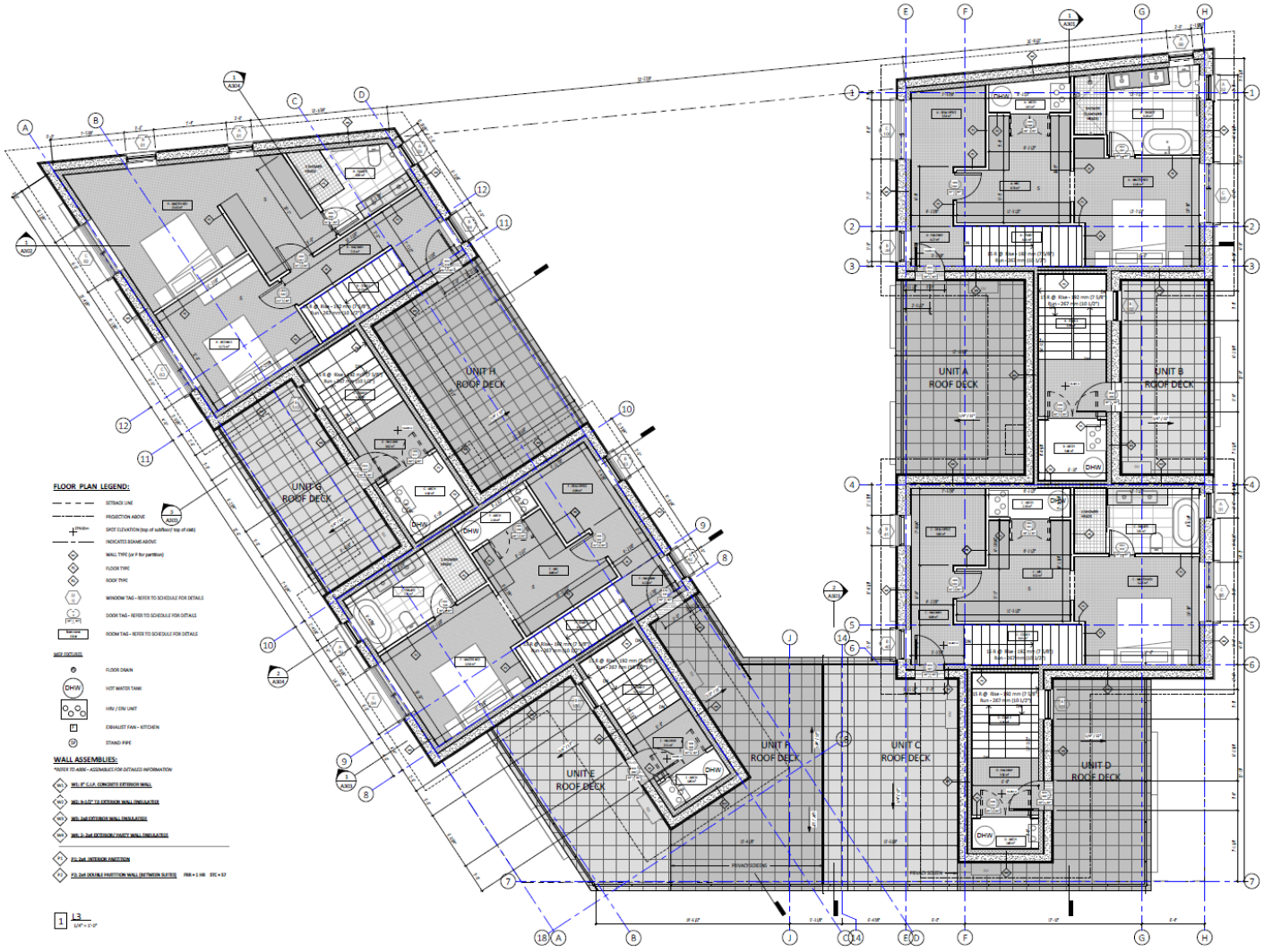
Level 2



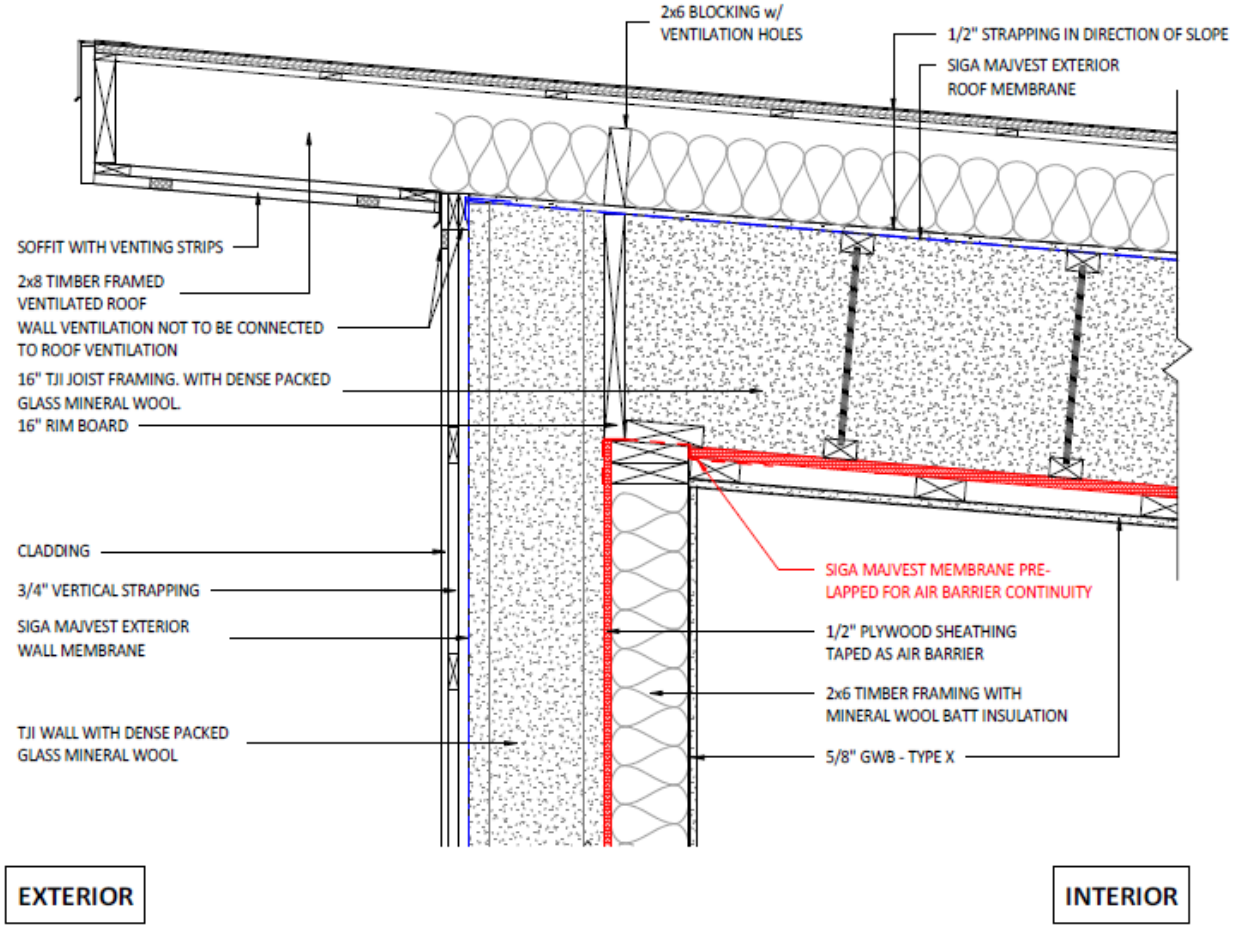
Level 3


FLOOR PLAN LEGEND:
SETBACK LINE
PROJECTION ABOVE
INDICATES SIGNAGE ABOVE
WALL TYPE (or P for partition)
FLOOR TYPE
ROOF TYPE
WINDOW TAG – REFER TO SCHEDULE FOR DETAILS
DOOR TAG – REFER TO SCHEDULE FOR DETAILS
ROOM TAG – REFER TO SCHEDULE FOR DETAILS
MEP FIXTURES
FLOOR DRAIN
DHW
HOT WATER TANK
HRV / ERV UNIT
EXHAUST FAN – KITCHEN
STAND PIPE
WALL ASSEMBLIES:
*REFER TO A000 - ASSEMBLIES FOR DETAILED INFORMATION
W1
W2
W3
W4
P1
P2

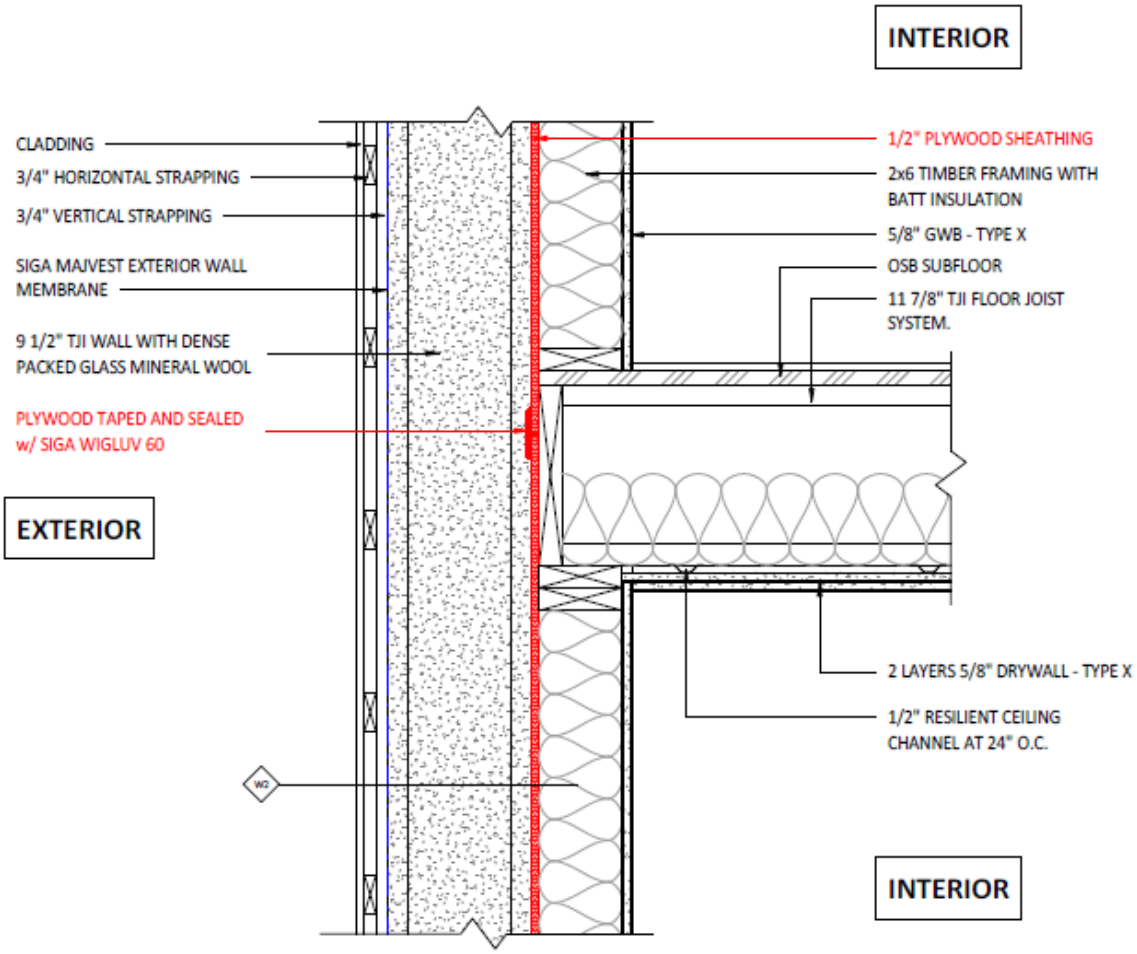
Level 4


UNIT A ROOF DECK
UNIT B ROOF DECK
UNIT C ROOF DECK
UNIT D ROOF DECK
UNIT E ROOF DECK
UNIT F ROOF DECK
UNIT G ROOF DECK
UNIT H ROOF DECK
FLOOR PLAN LEGEND:
WALL ASSEMBLIES:

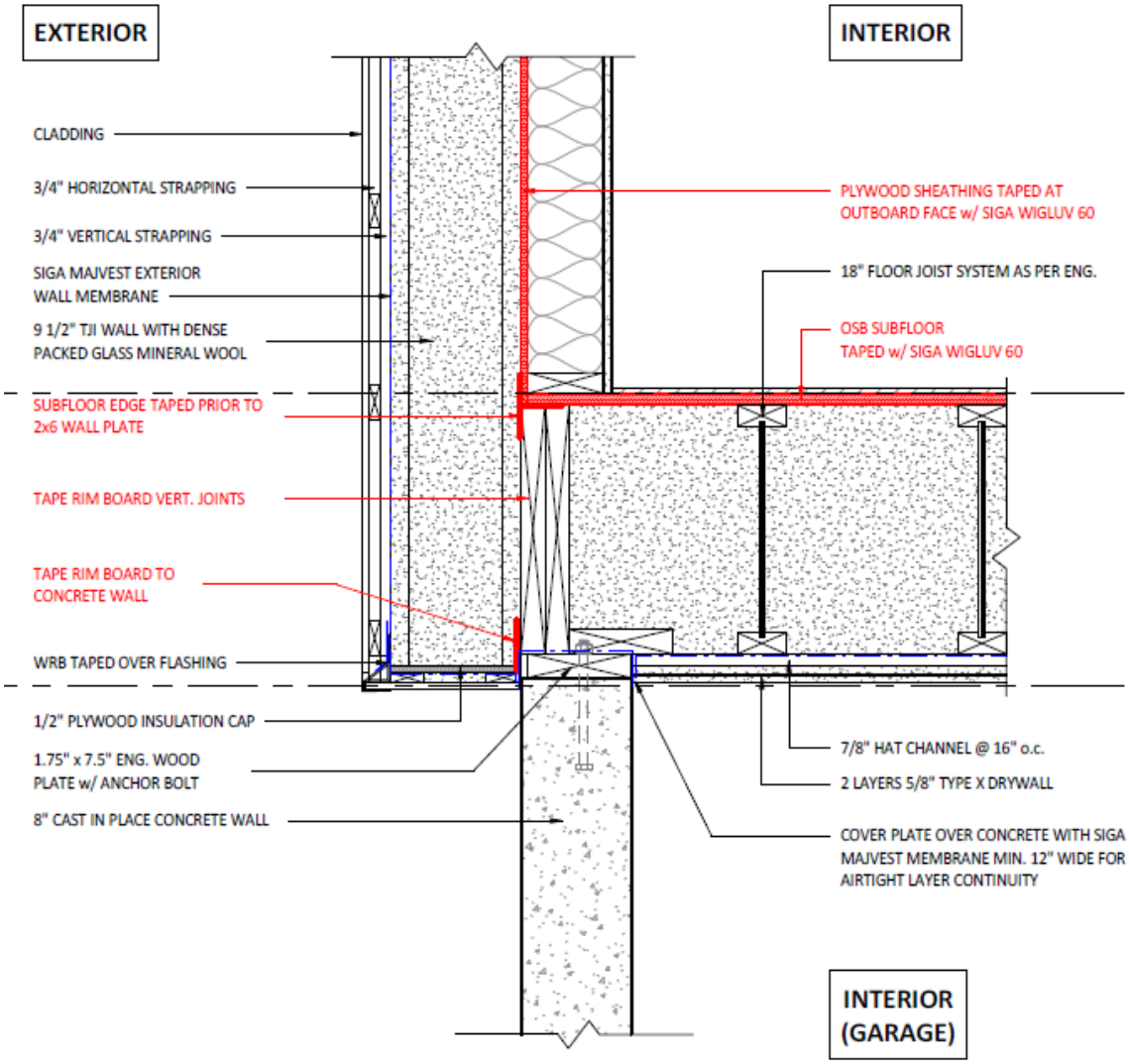
Assemblies



16” TJI Roof (vented) U value=0.066W/m²K



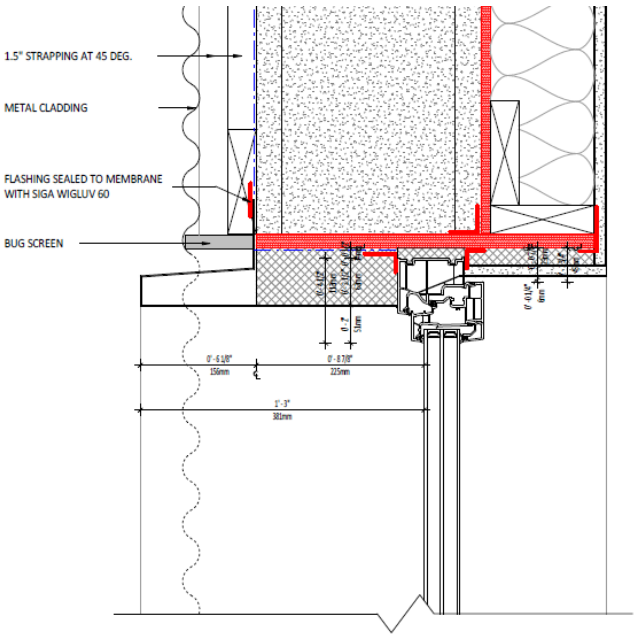
2 x 6 Wall with 11 7/8” TJI U-value=0.084 W/m²K

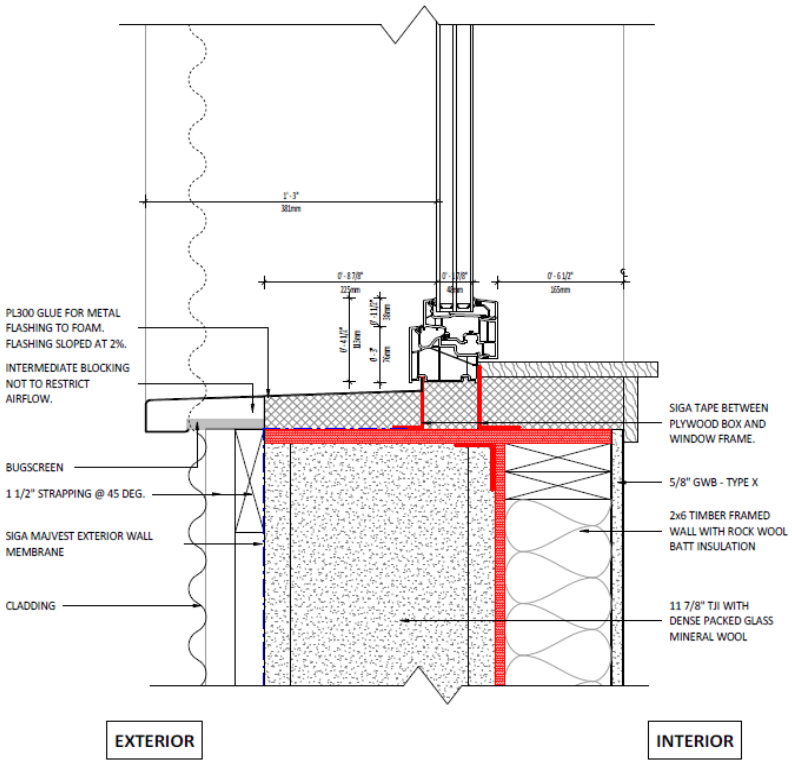


18" TJI floor over garage U-value=0.077 W/m²K

Windows

The windows used for this project were supplied by NeuFenster. The Internorm KF410 UPVC windows have a frame U value of 0.85W/m²K with extra insulation added in the frames. The KF410 doors have a frame U value of 0.92W/m²K. The windows use 48mm thick triple pane glazing units from Saint-Gobain Glass. The g value is 0.54 and the U value is 0.528W/m²K where 4mm panes of glass are used, and 0.550W/m²K and 0.590W/m²K where 6mm panes are required. Argon gas is used between the panes of glass and the insulating glazing edge spacer provides a psi value of 0.033. U-value (installed, avg) = 0.78 W/m²K

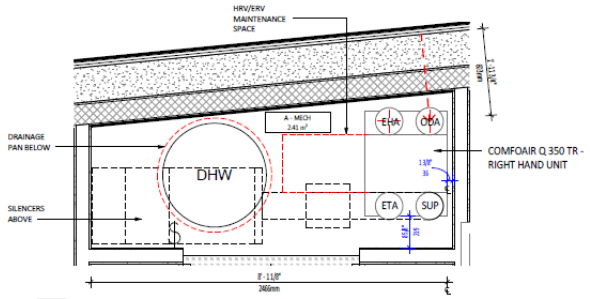




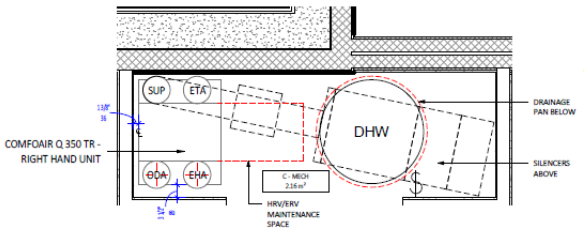
Mechanical Rooms – Ventilation and Domestic Hot Water

Each dwelling unit contained a uniquely shaped mechanical room. The Zehnder Q350 TR ventilation units, Comfopipe and Comfotube ducting, charcoal filter boxes, the 1.5kW duct heaters and the Rheem Marathon direct electric DHW tanks all had to fit in these small spaces. The outdoor air and exhaust air Zehnder Comfopipes needed to be less than one meter in length to maintain high effective heat recovery efficiency, and penetrated either the roof or wall. Each of the room ceiling diffusers had multiple Zehnder Comfotubes connected to provide the correct room ventilation flow rate. These 3" flexible pipes made it easier to run the ventilation duct work throughout the building. The mechanical rooms were modelled in Revit to take out the guess work by the mechanical contractor. The BC Building Code requires kitchen exhaust venting to the building exterior, so an equivalency was required to allow a recirculation kitchen exhaust hood. We used the Vancouver Building Bylaw alternative solution for kitchen exhaust as a template.

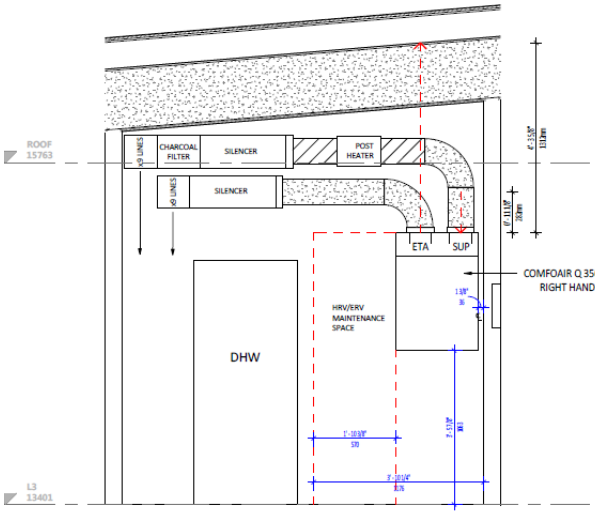
ODA Outdoor air to ventilation unit
SUP Supply air to bedrooms and living rooms
ETA Extract air from washrooms and kitchen
EHA Exhaust air from ventilation unit to outside



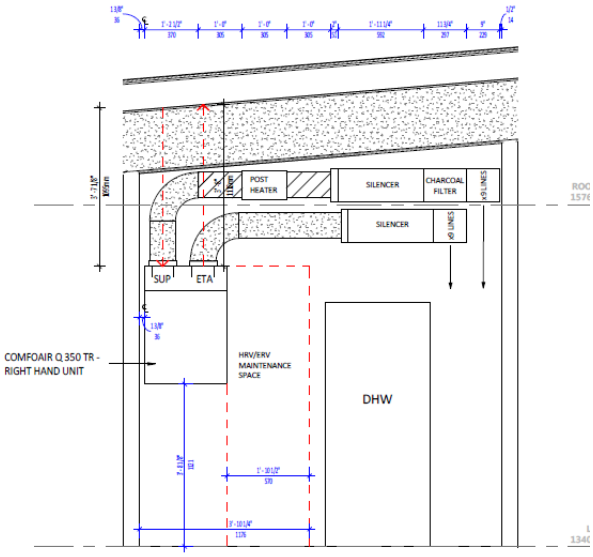
1 UNIT A - MECH. ROOM
1 : 24



3 UNIT C - MECH. ROOM
1 : 24



9 UNIT A - MECH ROOM
1 : 24



11 UNIT C - MECH ROOM
1 : 24

Component id:	1006vs03
Manufacturer:	Zehnder Group Nederland B.V.
Air flow range from:	70 m^3/h
To:	270 m^3/h
Heat recovery rate:	86 %
Specific electric power:	0.22 Wh/m^3
Efficiency ratio:	0.76
Humidity recovery:	73 %
Sound level of unit:	43.0 dB(A)
Climate zones:	Cool, temperate
Certified since:	Nov. 11, 2016

Leakage

Internal leakage: 0.39 %
External leakage: 0.28 %

Acoustic duct

Outdoor air: 39.2 dB(A)
Supply air: 52.1 dB(A)
Extract air: 39.2 dB(A)
Exhaust air: 51.6 dB(A)

Airtightness

The building airtightness was tested on two occasions by Capital Home Energy. Prior to the blower door test, the building air barrier needed to be completed. Siga Majvest membrane and Siga Wigluv tape wrapped the building walls, roof and garage ceiling. Construction sequencing was important in order for the air barrier to be continuous. This meant prelapping the sill plates and top plates, for example. On the interior, the vapour retarder layer plywood was taped with Siga Wigluv. In the end, the airtightness requirements were met by taping both sides of the windows. With the initial blower door test, smoke was getting through the window drainage cavity. The final airtighness result was 0.52 ACH,n50.

Heating/Ventilation System

HVAC Systems Present:

Pictures

Discussion of Results

Combined Test Data (Average Values)

	Results	95% Confidence Interval		Uncertainty
Air flow at 50 Pa, V_{50} [L/s]	362.85	353.80	372.10	+/-2.5%
Air changes at 50 Pa, n_{50} [/h]	0.52	0.5115	0.5380	+/-2.5%
Permeability at 50 Pa, q_{50} [L/s/m²]				
Specific leakage at 50 Pa, w_{50} [L/s/m²]	0.358	0.349	0.367	+/-2.5%
Effective leakage area at 50 Pa, A_L [cm²]	398.0	388.0	408.5	+/-2.5%
Equivalent leakage area at 50 Pa, A_L [cm²]	652.5	636.5	669.5	+/-2.5%
Normalized leakage area at 50 Pa [cm²/m²]				

Certificate

Certified Passive House Classic

RDH BUILDING SCIENCE

Authorised by:

Passive House Institute

Dr. Wolfgang Feist
64283 Darmstadt
Germany

TarsemHaus Townhomes
1009 Aspen Road, V8B 0R5 Squamish, Canada

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

Client	Tyler Ovington PO Box 1957 V8B 0B4 Squamish, Canada
Architect	Derek Venter Architectural Design 10 - 1040 Legacy Way V8E 0J8 Whistler, Canada
Building Services	Smith + Andersen 6400 Roberts St #300 V5G 4C9 Burnaby, Canada
Energy Consultant	Frederick Keitel (DVAD Inc.) 10 - 1040 Legacy Way V8E 0J8 Whistler, 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)]	12	≤	15	-
Heating load	[W/m²]	10	≤	-	10
Cooling					
Frequency of overheating (> 25 °C)	[%]	1	≤	10	
Airtightness					
Pressurization test result (n_{50})	[1/h]	0.5	≤	0.6	
Renewable primary energy (PER)					
PER-demand	[kWh/(m²a)]	57	≤	60	60
Generation (reference to ground area)	[kWh/(m²a)]	0	≥	-	-

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

A one time exemption has been granted as pressure measurements confirming uniform pressure were not recorded during the final airtightness test. It has been noted in the airtightness testing report that the party walls did not have drywall allowing airflow between units during the test.

Certifier: Brittany Coughlin, RDH Building Science Inc.