Passive House Documentation

Rochester Passive House
ID: 5575

Single family home with two floors and full basement in Honeoye Falls, NY

PH Designer: Matthew Bowers – Airtight Services Inc
Architect: William Grate – Grater Architects PC
Builder: Tad Garbacik – Garbacik Construction

Special features: Drain Water Heat Exchanger; Whole House IAQ and Energy monitoring system

U-Value exterior wall: 0.103 W/(m²K)
U-Value exterior wall BG: 0.094 W/(m²K)
U-Value roof: 0.057 W/(m²K)
U-Value windows: 0.92 W/(m²K)

PHPP Space Heating Demand: 15 kWh/(m2a)
PHPP Primary Energy Demand: 66 kWh/(m2a)
Air Test (n50): 0.1 1/h
Heat recovery efficiency: 77**%**

2. Construction Task

Rochester Passive House, located in the rural setting of Honeoye Falls, NY, is certainly an example of how comfort is achieved though energy efficiency.

The 270 m^2 home's traditional farmhouse aesthetic cloaks a 16-inch double-wall assembly that is insulated with dense-packed cellulose, achieving an R-55. The interior load-bearing 2x4 wall acts as a service cavity. The carefully sealed ZIP system on the exterior side of the interior wall is the air barrier layer. A 1.5-inch rain screen gap and a weather resistant barrier layer on the exterior side of the double-wall assembly guard against moisture intrusion.

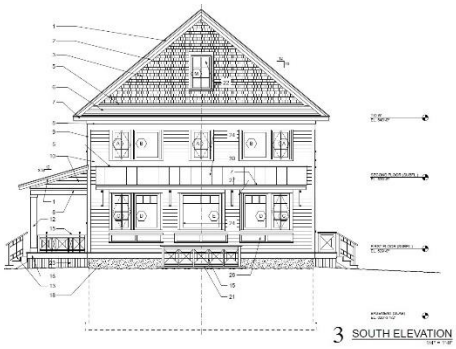
The southern glazing with optimized overhangs ensures maximum solar gain in the winter months and full shade in the summer months. For more information or details visit: RochesterPassiveHouse.blogspot.com

This project was certified by the Passive House Academy (PHA)

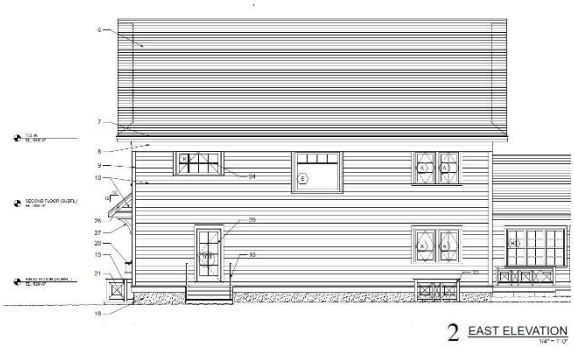
3. Elevations

West Elevation

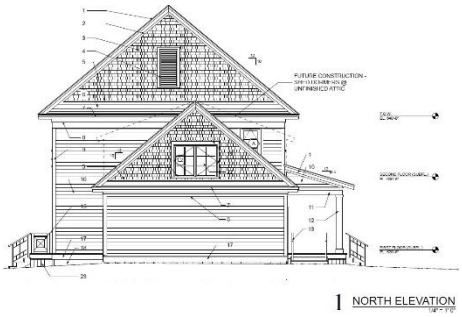
South Elevation



East Elevation



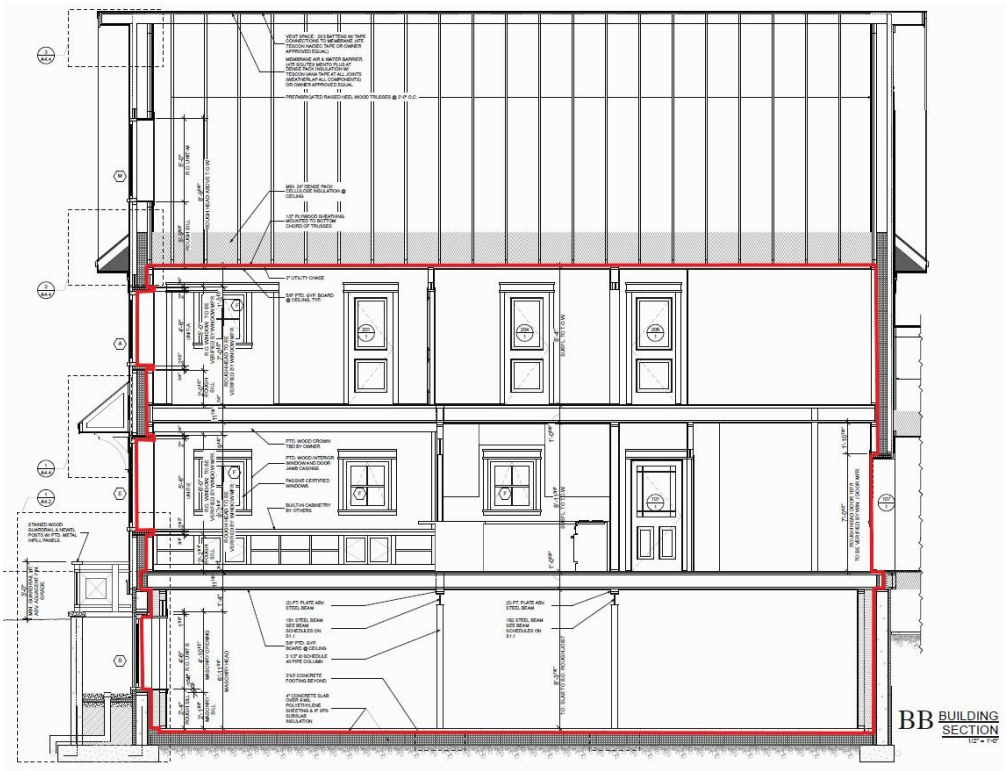
South Elevation



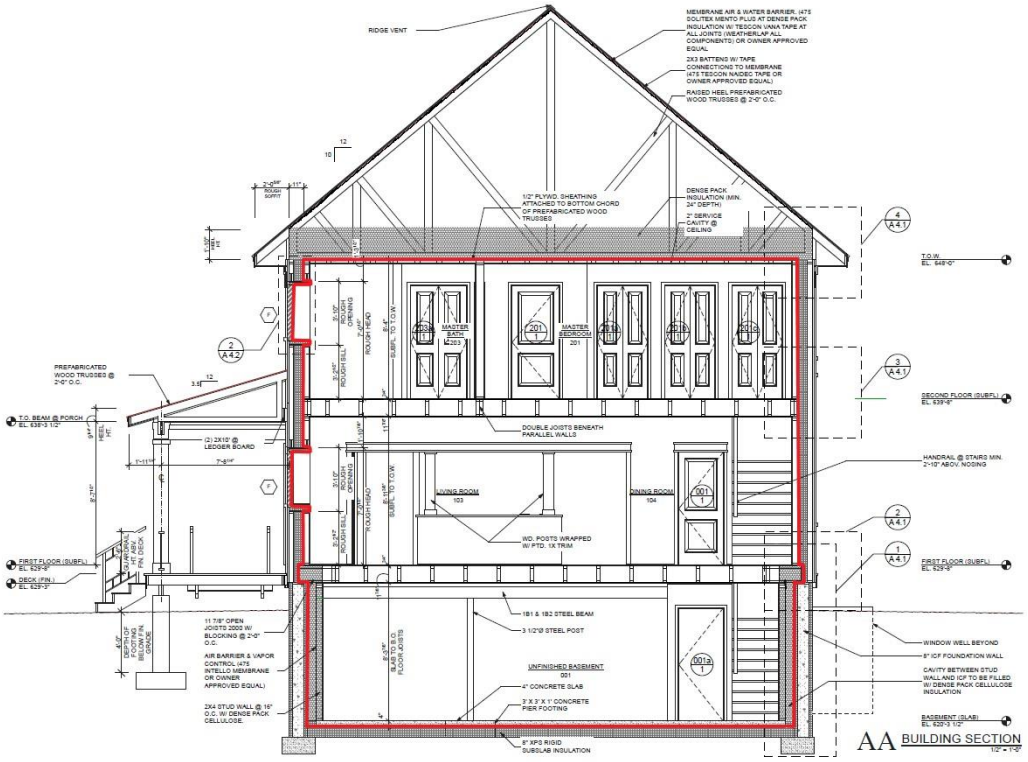
4. Interior Photograph

5. Cross-sections

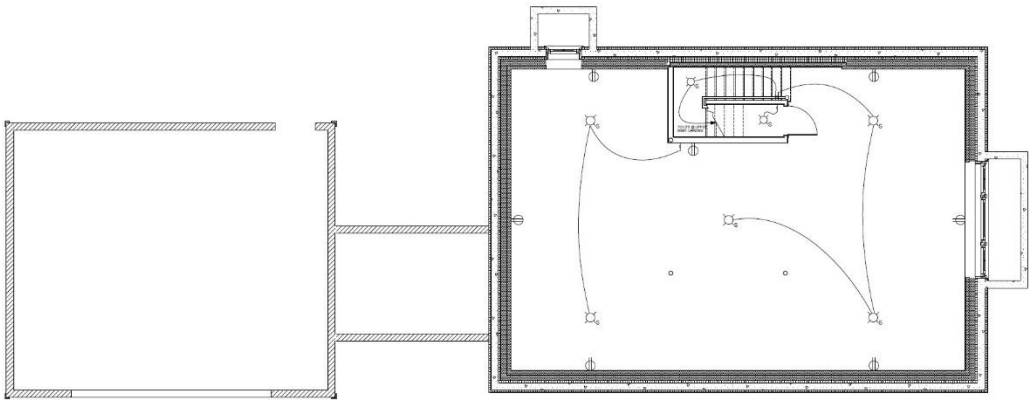
Longitudinal cross-section:



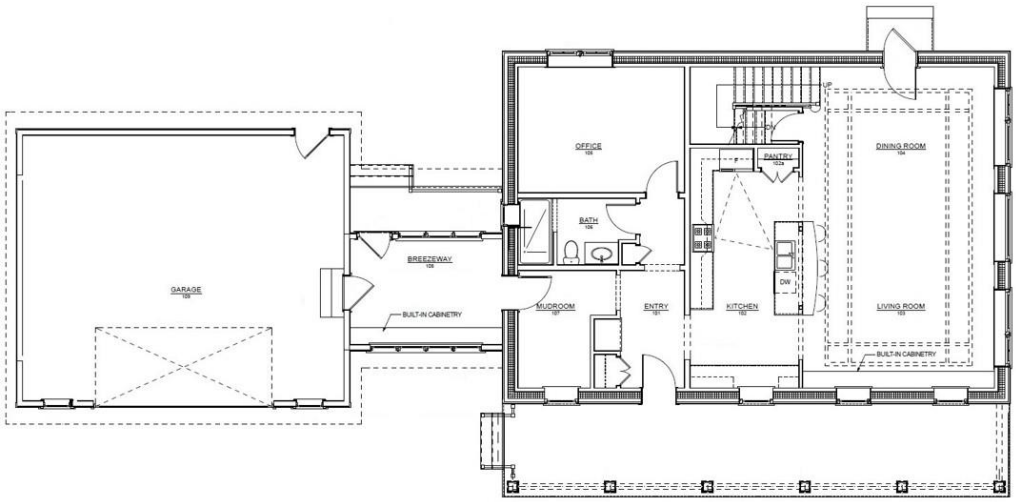
Lateral section at main house / living room / entry:



6. Floor Plans



Basement

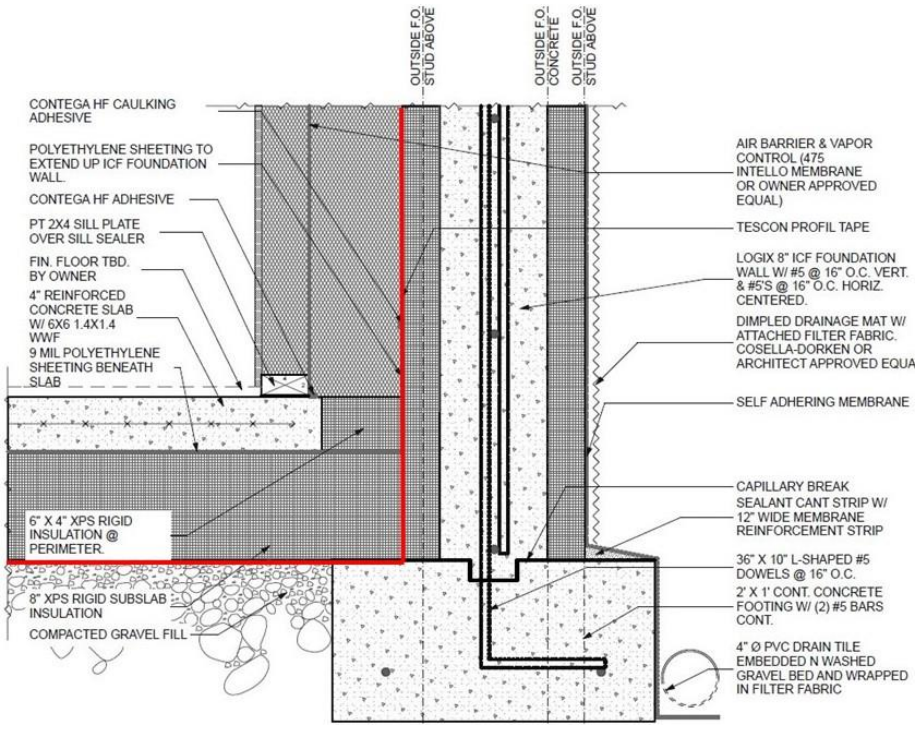


1st Floor

2nd Floor

7. Construction of Floor Slab / Basement Ceiling

The basement slab was constructed with 15 Mil Radon Barrier as the primary air barrier followed by was installed before 8” of EPS Insulation and a 4” Slab. The Basement wall is ICF construction with 2x4 wall installed 8” inboard. The 8” cavity is insulated with dense packed cellulose



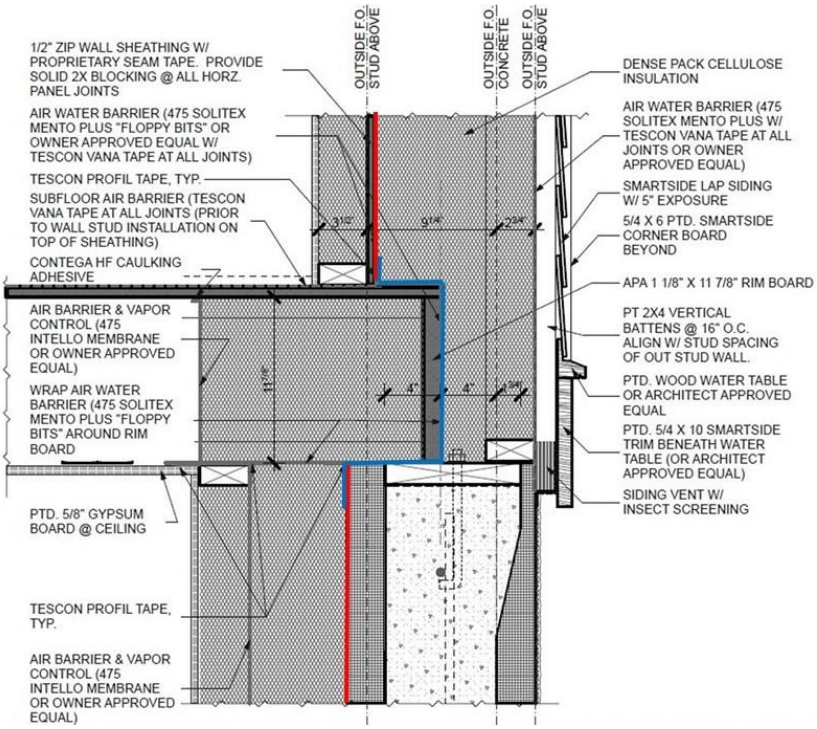
8” EPS Insulation

Slab Poured to Perimeter EPS

8” Cavity being insulated

8. Construction of the Exterior Walls

Double 2x4 wall construction with interior wall load bearing. Primary air barrier is Zip System. Insulated with Dense packed cellulose. Interior Service Cavity is insulated with damp spray cellulose

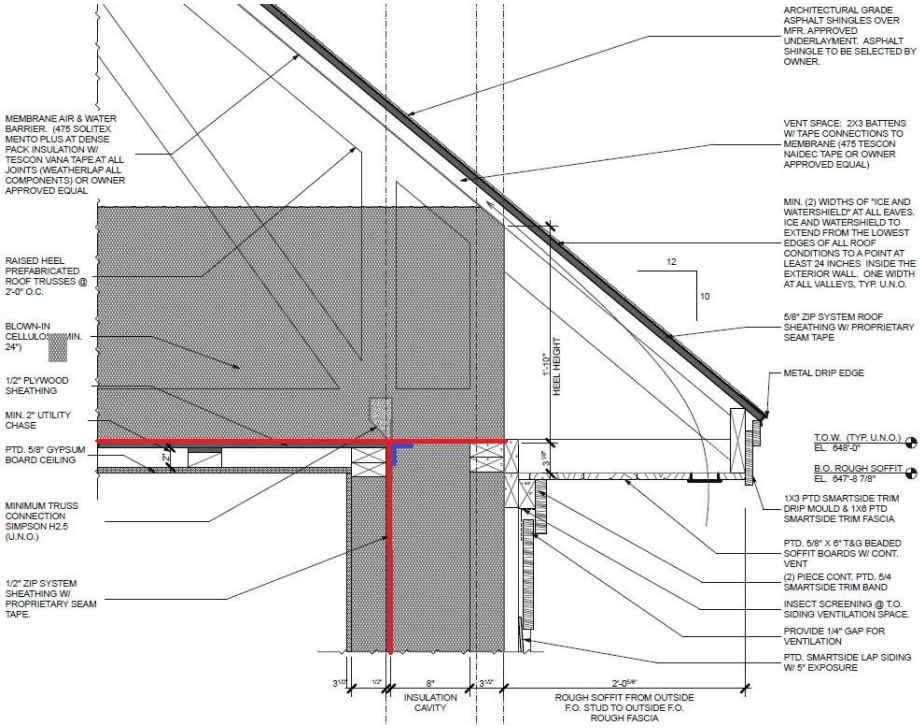


Mento Plus bridged the inside face of ICF to Zip System around the Rim Joist

Windows were sheathed over to do blower door test before window installation

9. Construction Roof / Ceiling of the Top Floor

The roof system consists of wood trusses with blown in cellulose insulation above the Zip System Air Barrier.

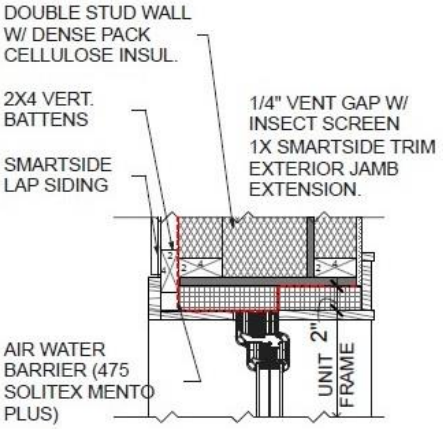


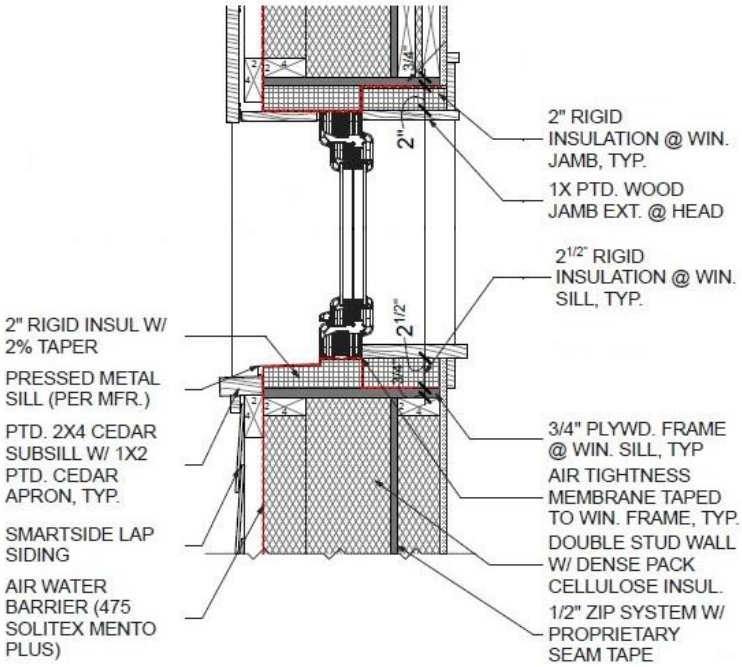
Service Cavity created with 2x4 on flat with ½" OSB Scraps

Truss chords were painted at 28" so insulated knew he had to cover the orange marks

10. Windows and Installation of the Window

- Description of the construction of the window (frame): Zola Thermo uPVC window
- U-Value of frame Uf: 1.0 W/(m^{2}K)
- Construction type glazing: Triple glazing with Swisspacer V
- U-Value of glass/ Ug: 0.60 W/(m2K)
- g-Value of glazing: 0.62 (South) / 0.49 (North) / 0.28 (East and West)





Air Barrier brought to inside

Buck Insulated

Bucks were built with the window sheathing cutouts

Insulation wrapped with Air Barrier

11. Airtight Building Envelope

- Roof: Zip System with taped joints
- Exterior wall: Zip system sheathing with taped joints
- Foundation wall: Inside face of ICF Wall

Pressurization test conducted Airtight Services Inc.

Date of Test: 6/29/2017

Test File: 0530 Bowers multipoint BD 50CFM Pres PHI 29Jun17

Technician: Bill LaBine

Customer: Matt Bowers
340 Quaker MH Rd
Mendon, NY 14472
Phone: 585-750-8192
Email: bowersmt@yahoo.com
Website: rochesterpassivehouse.blogspot.com

Project Number: 0530

Building Address: Rochester Passive House

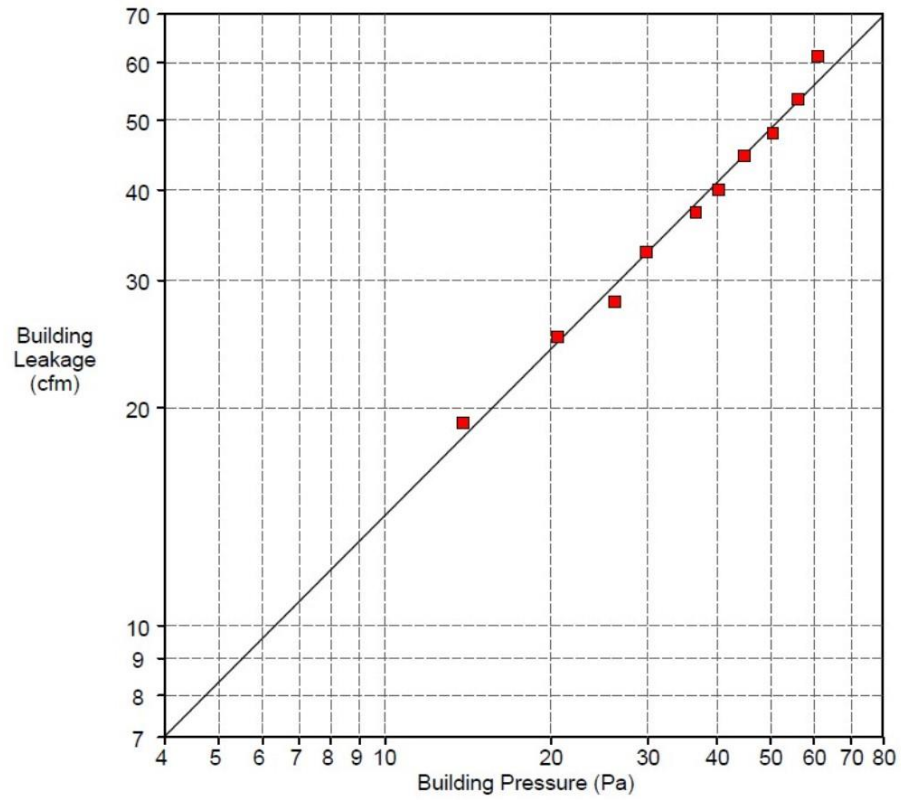
Test Results

1.	Airflow at 50 Pascals: (50 Pa = 0.2 w.c.)	49 CFM50 (+/- 3.9 %) 0.10 ACH50
2.	Leakage Area:	2.7 in2 LBL ELA @ 4 Pa
3.	Building Leakage Curve:	Flow Coefficient (C) = 2.4 (+/- 24.1 %) Exponent (n) = 0.765 (+/- 0.068) Correlation Coefficient = 0.99419
4.	Test Settings:	Test Standard: RESNET Multi-Point Test Test Mode: Pressurization
5.	Accuracy Level	Standard Level of Accuracy Test

Infiltration Estimates

1.	Estimated Average Annual Infiltration Rate:		3.0 CFM 0.01 ACH 0.7 CFM per person		
2.	Estimated Design Infiltration Rate:	Winter:	5.2 CFM 0.01 ACH	Summer:	3.7 CFM 0.01 ACH

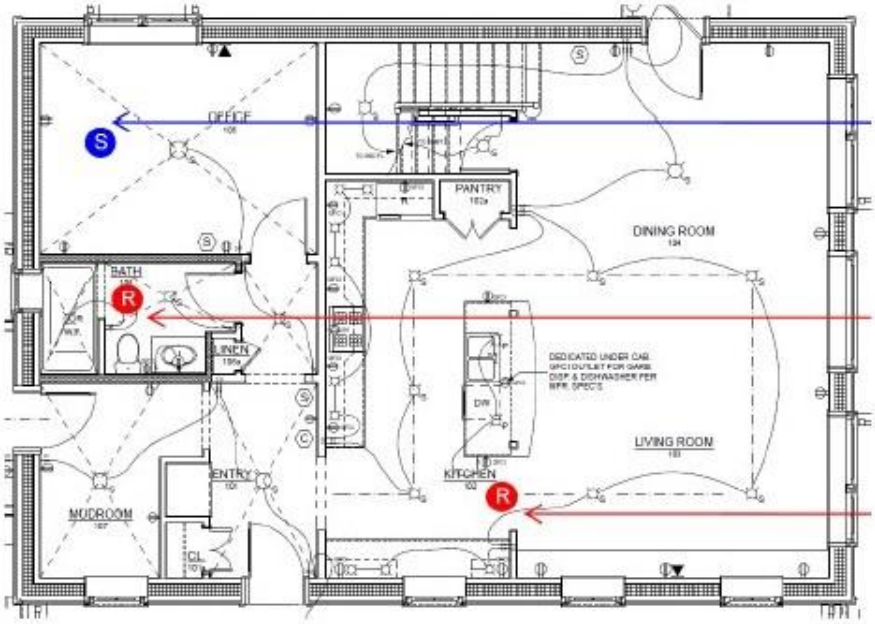
Date of Test: 6/29/2017 Test File: 0530 Bowers multipoint BD 50CFM Pres PHI 29Jun17



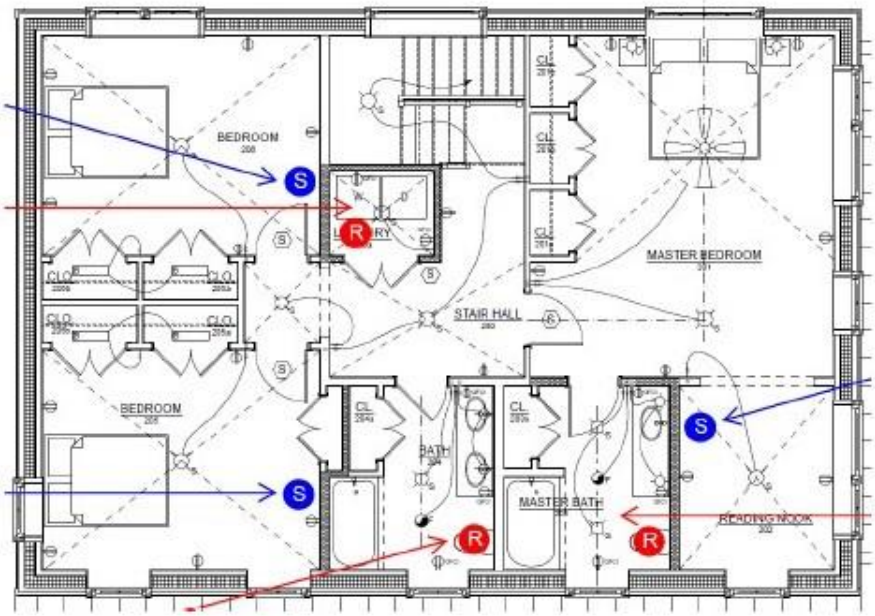
12. Layout of the ventilation system ducting

Ventilation ducting utilizes Zehnder Comfotube system. Drawings below are labeled with supply and return locations.

1st Floor



2nd Floor

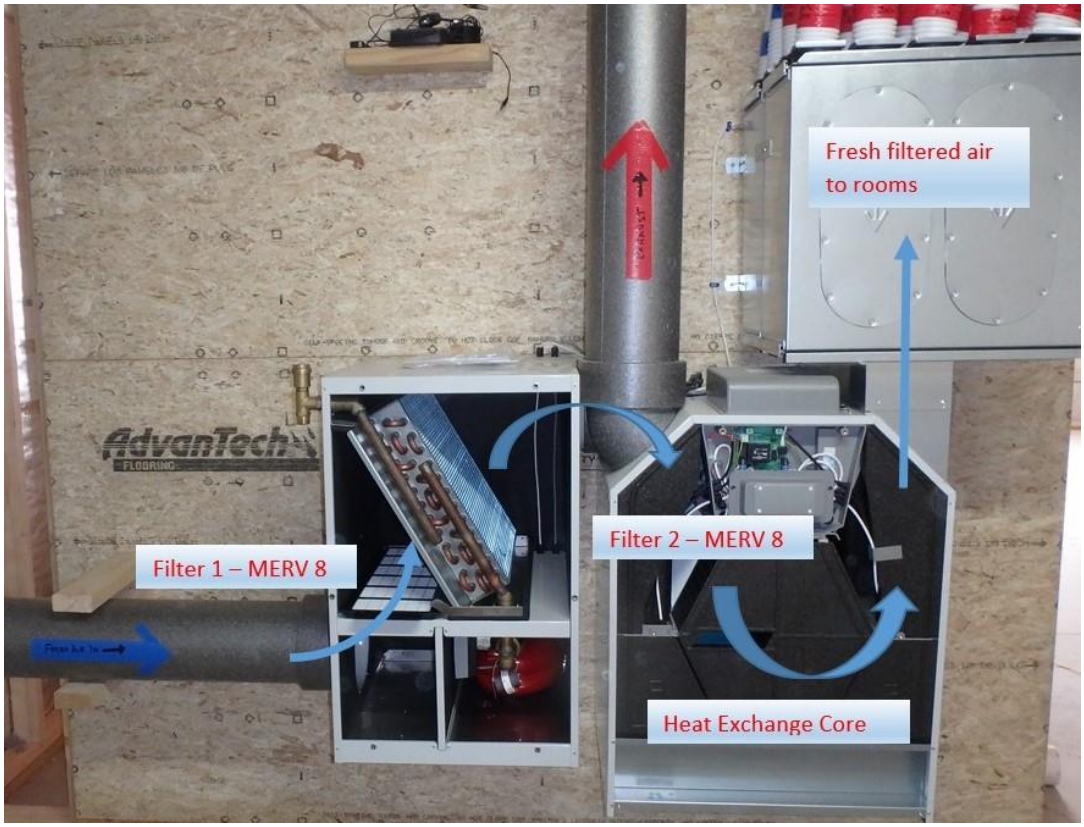


Installation

13. Ventilation Unit / Central Ventilation Unit

The home utilizes a central heat recovery ventilator located in the basement, connected to round ducts that distribute air in a home-run arrangement from a manifold.

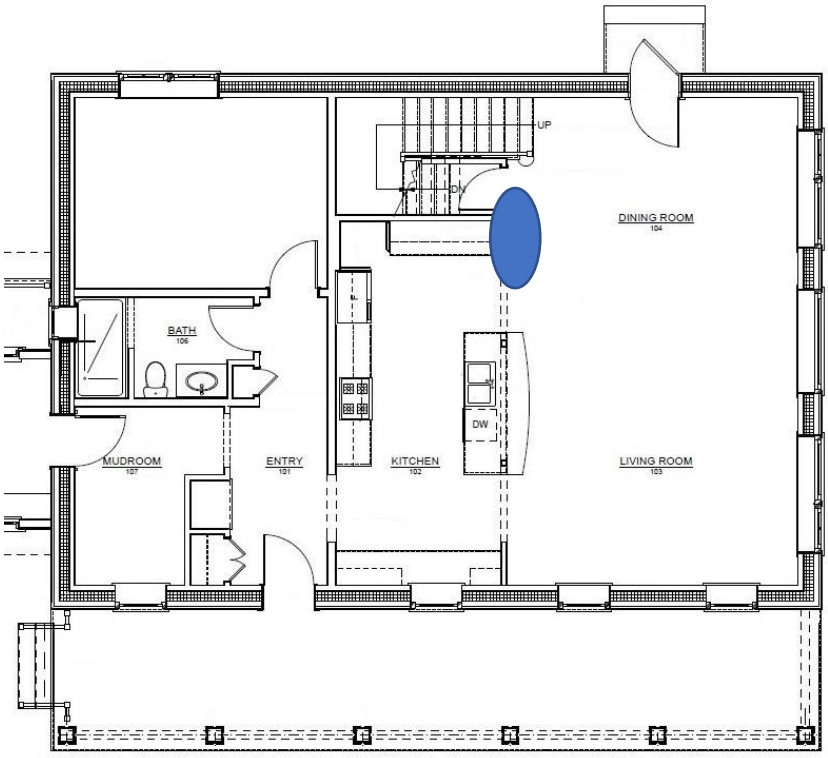
- Product type of the ventilation unit: Zehnder Comfoair 350
- Effective heat recovery: 0.84
- Electrical efficiency [Wh/m^3]: 0.29 Wh/m3



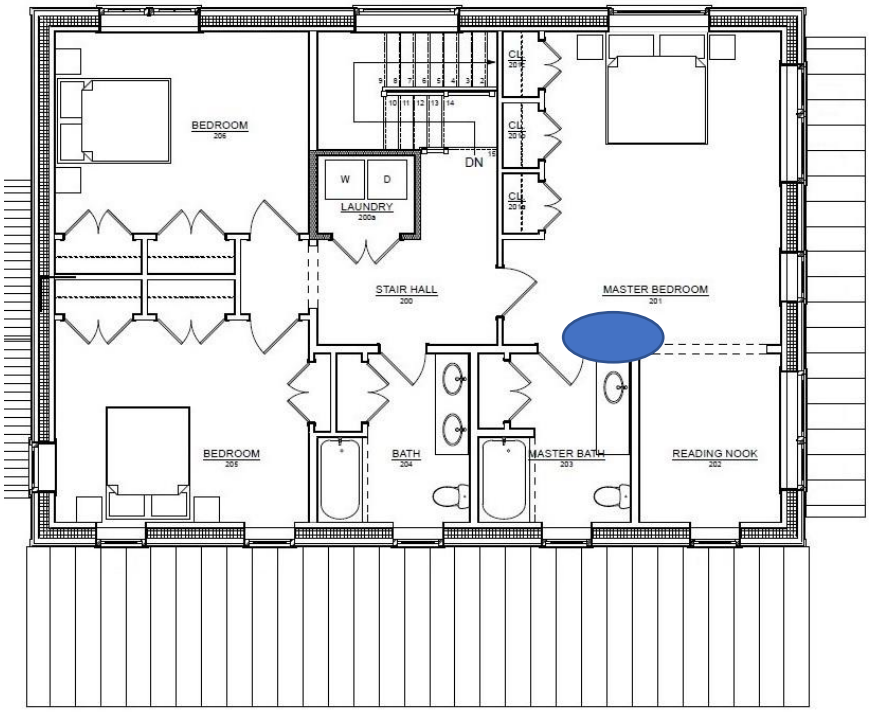
14. Heat Supply

Heating and cooling is provided by 2 separate ductless minisplit heat pumps

1st Floor:



2nd Floor



15. Short Documentation of PHPP-Results (Verification Sheet)

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	270.0	m²		
Space heating	Heating demand	**15**	**kWh/(m²a)**	15 kWh/(m²a)	**yes**
	Heating load	**10**	**W/m²**	10 W/m²	**yes**
Space cooling	Overall specif. space cooling demand		**kWh/(m²a)**	-	**-**
	Cooling load		**W/m²**	-	**-**
	Frequency of overheating (> 25 °C)	1.8	%	-	**-**
Primary energy	Heating, cooling, dehumidification, DHW, auxiliary electricity, lighting, electrical appliances	**90**	**kWh/(m²a)**	120 kWh/(m²a)	**yes**
	DHW, space heating and auxiliary electricity	49	kWh/(m²a)	-	**-**
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	**-**
Airtightness	Pressurization test result n_{50}	**0.1**	**1/h**	0.6 1/h	**yes**

* empty field: data missing; '-': no requirement

16. Construction costs
Withheld.

17. Year of Construction
2016-2017

18. Information about the designer / Architect
Matthew Bowers spent 6 years in the Navy as a nuclear engineer and became interested in Thermodynamics and Fluid Mechanics. Once his tour was over, he attended RIT's Mechanical Engineering Technology Program where he wanted to become a HVAC designer. While at RIT he learned of "homes so efficient they don't need furnaces". He then focused his career path on Passive House. He graduated with the highest honors in 2010. Since 2013 Bowers has worked as a Certified Passive House Consultant and Tradesman and HERS Rater. In 2017 Matt started his own Company - Rochester Passive House Consulting - specializing in high performance homes. He has been featured in the Journal of Light Construction's Energy Column under multiple topics including Blower Door Testing for extremely tight homes, Infrared Scanning, Blower Door Testing and Retrofitting airtightness and trouble spots for airtightness in new homes. He was the designer of Rochester's 1st Certified Passive House – his personal home. Matt started certifying Passive Houses in 2019 and providing assistance with PHPP and FLIXO.

19. Information about the planner of building services
Matthew Bowers – Airtight Services Inc

20. Information about the planner of building physics
Airtight Services Inc – 5856 DeFisher Rd Marion, NY 14505

21. Information about the structural designer
Grater Architects PC

22. User's experiences
RochesterPassiveHouse.blogspot.com
Very Satisfied with house

23. Available Research Materials / Publications
Listed on Passive House Database:
https://passivehouse-database.org/index.php?lang=en#d_5575

Blog on Construction and further details:
RochesterPassiveHouse.blogspot.com