

# ICF PASSIVE HOUSE in RIVER FOREST, IL

## Post-construction Lessons Learned

■ TOM BASSETT-DILLEY ARCHITECT, LTD. ■  
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### **ARCHITECT and LEAD CPHC**

Tom Bassett-Dilley, CPHC, AIA, President of  
Passive House Alliance Chicago



### **GENERAL CONTRACTOR**

Brandon Weiss, Graduate Master Builder, PHIUS Cetified Builder,  
Master Certified Green Professional, LEED-AP, Certified Aging In  
Place Specialist, Board Member of PHAC

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### **ICF/THERMAL ENVELOPE CONTRACTOR**

Eric Barton, CPHC, PHIUS Certified Builder, LEED-AP Homes, Graduate  
Master Builder, VP of Passive House Alliance Chicago

## OUTLINE

1. Integrated Design Approach
2. Construction and Code
3. Certification
4. Performance and Use
5. Q&A

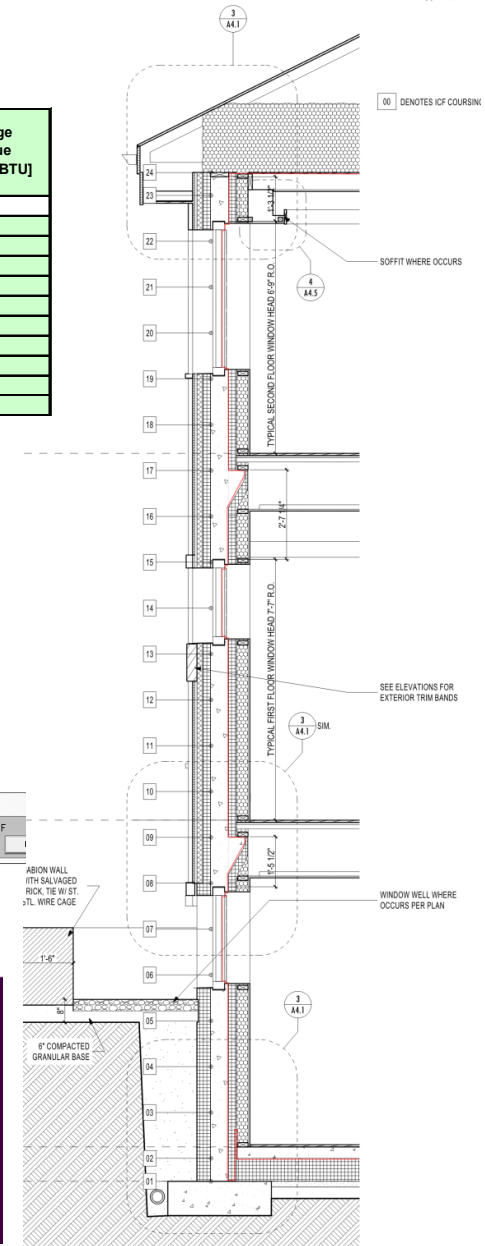
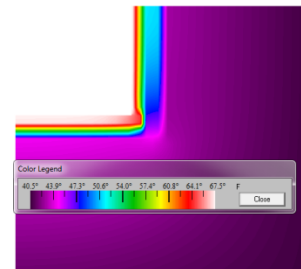
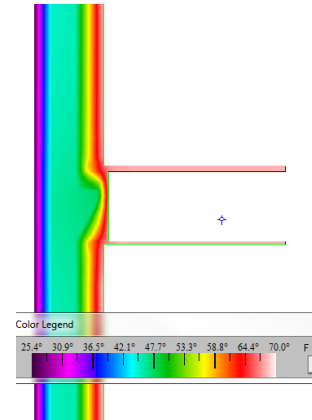


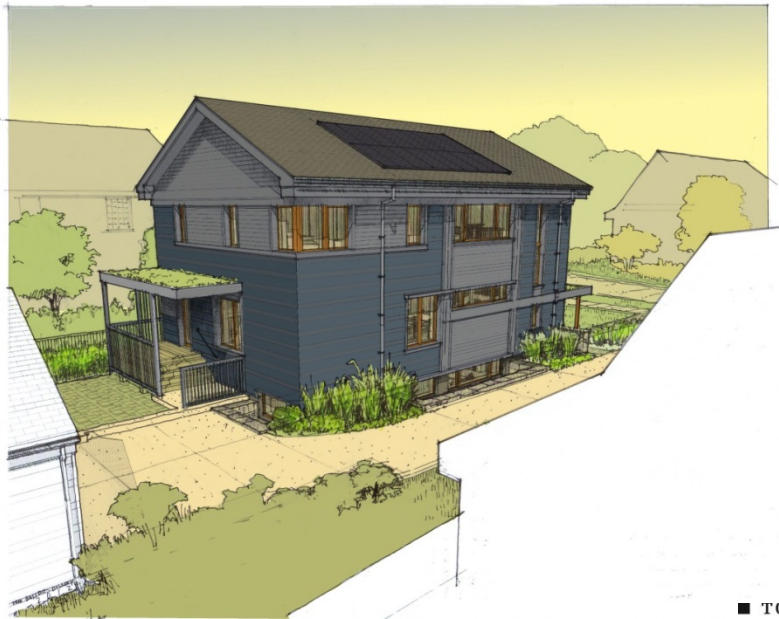
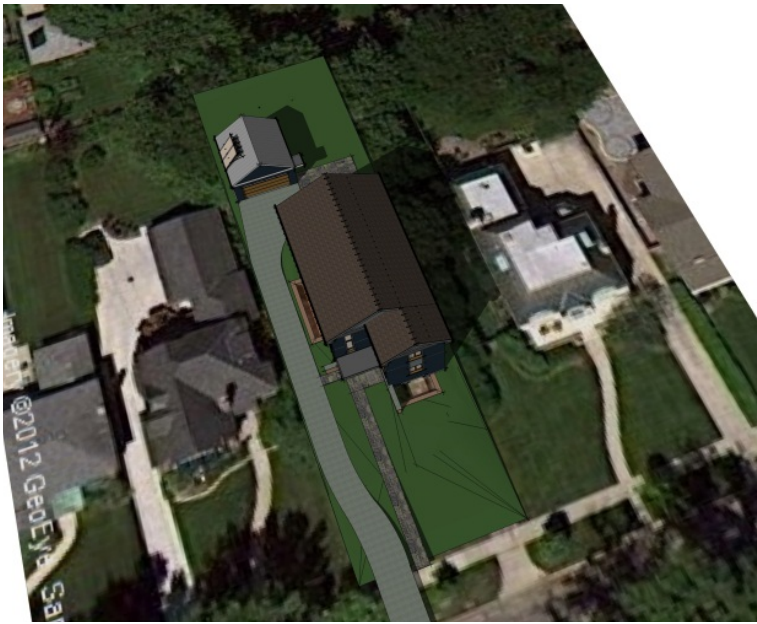


# INTEGRATED DESIGN

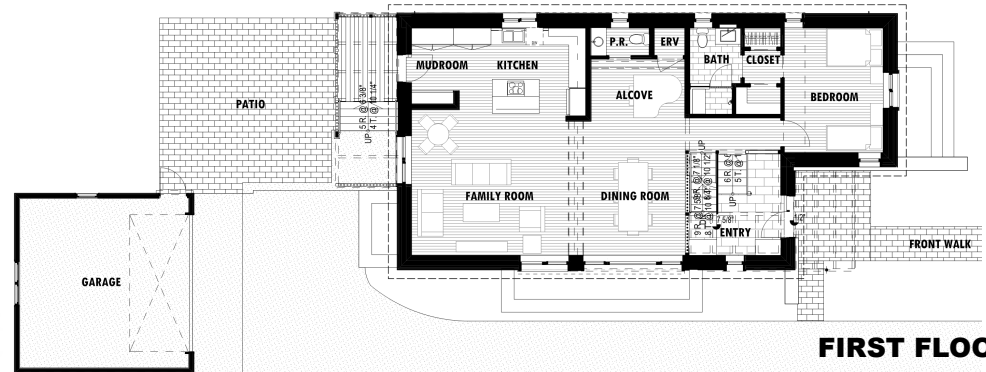
- All parties should have goals aligned
  - Discuss objectives
  - Eric and Tom-training
- Start design with Passive House principles
  - PH is a design problem, not an engineering “fix”!
  - Compactness, orientation
- Review key details early
  - Air barrier
  - Windows
  - HVAC
- Continue reviewing (and adjusting if necessary) details during construction

Building Element Overview	Average R-Value [(hr.ft².F)/BTU]
North Windows	6.6
East Windows	7.3
South Windows	7.2
West Windows	7.3
Horizontal Windows	
Exterior Door	7.5
Exterior Wall - Ambient	52.0
Exterior Wall - Ground	47.8
Roof/Ceiling - Ambient	96.1
Ground 1	36.2





**SECOND FLOOR**



**FIRST FLOOR**



**BASEMENT**

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# CONSTRUCTION

1. ICFs
2. Slab
3. Air barrier detailing
4. HVAC
5. Windows



# CONSTRUCTION

ICFs



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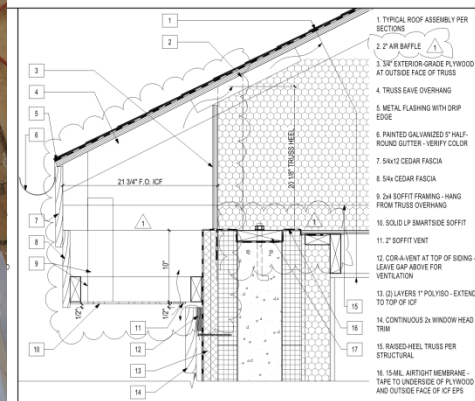
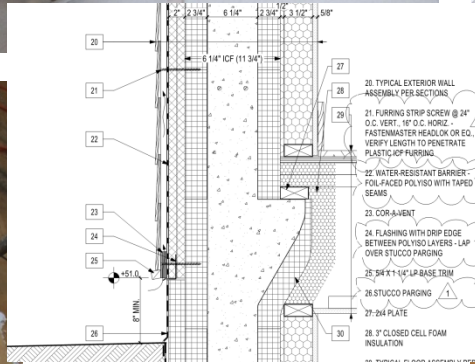


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# CONSTRUCTION

ICFs/bearing,  
transitions



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# CONSTRUCTION

## ICFs



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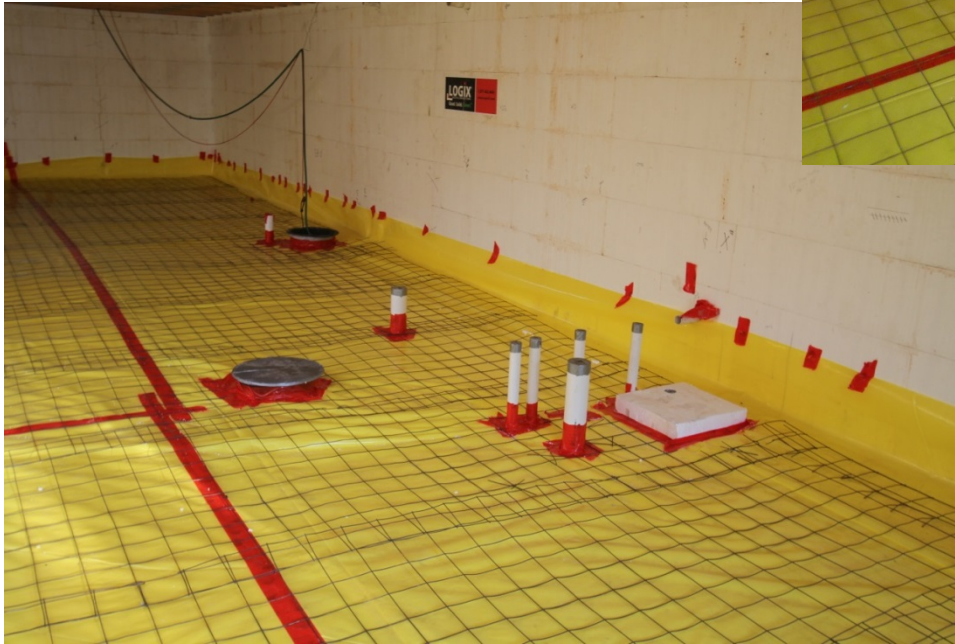
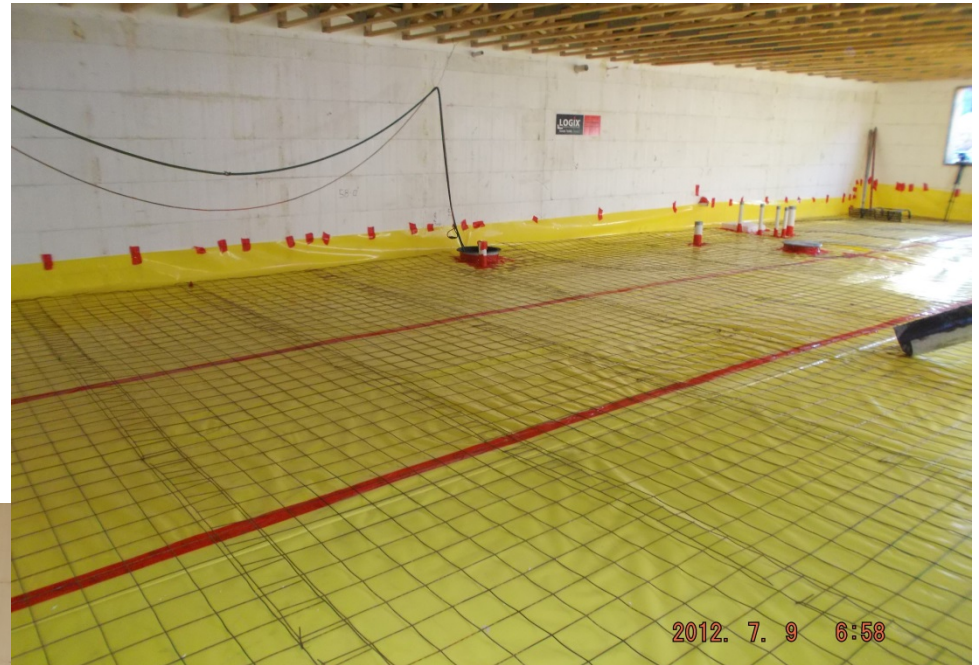


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# CONSTRUCTION

## Slab



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## Slab



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# CONSTRUCTION

Air barrier



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# CONSTRUCTION

## Air barrier



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# CONSTRUCTION

Air barrier



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# CONSTRUCTION

## HVAC



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# CONSTRUCTION

## HVAC

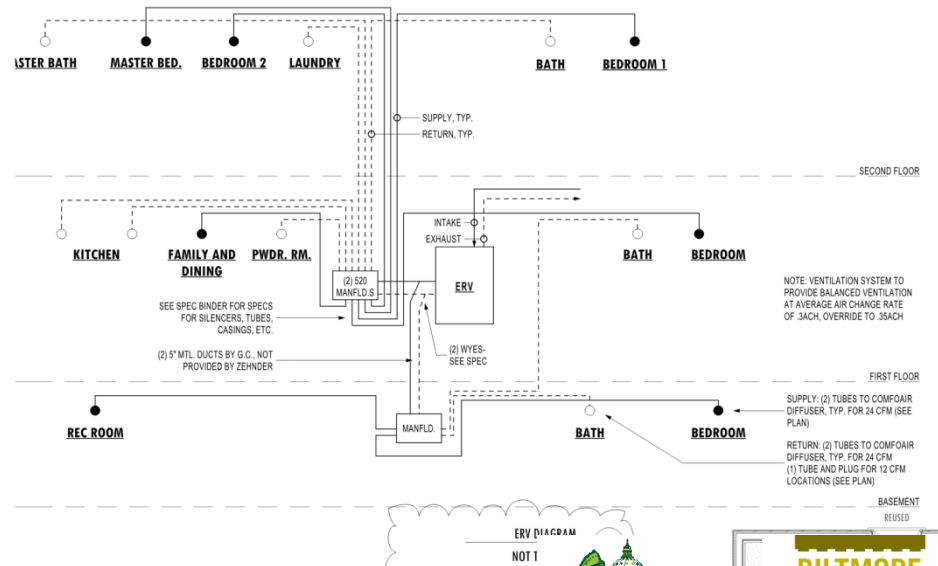


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# CONSTRUCTION HVAC



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# CONSTRUCTION

## Windows



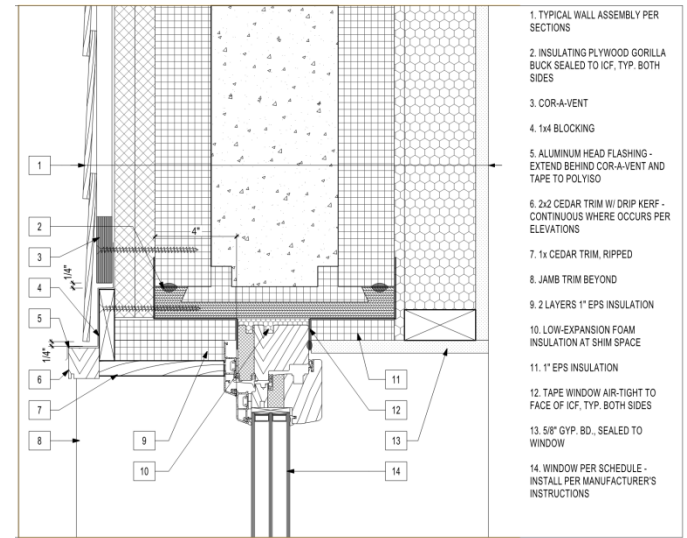
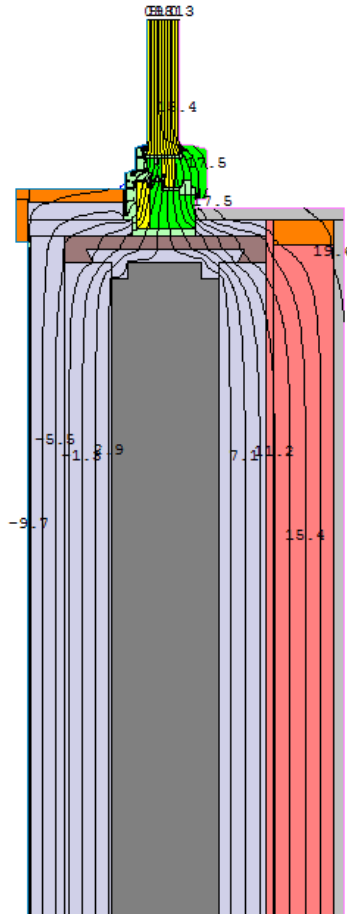
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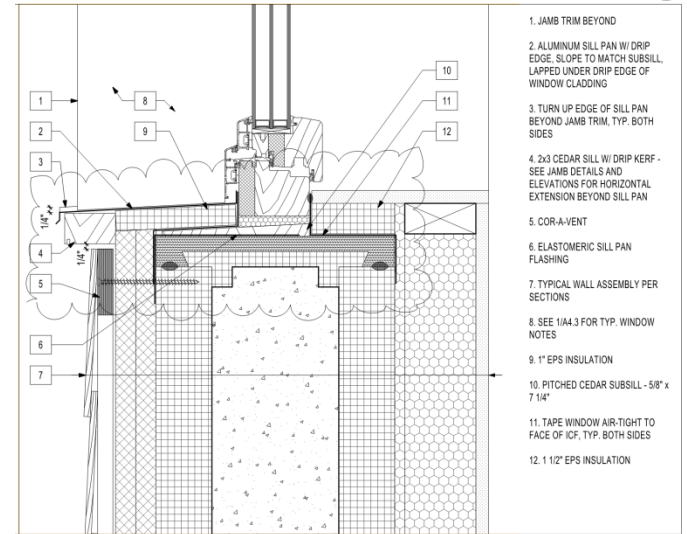
# CONSTRUCTION

## Windows



WINDOW HEAD - TYPICAL  
SCALE: 3" = 1'-0"

1



WINDOW SILL - TYPICAL  
SCALE: 3" = 1'-0"

3

THERM calc from Zola:  
installation psi value .005  
BTU/hr. Ft. F



# CONSTRUCTION

## Windows



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# CONSTRUCTION

## Windows



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# CONSTRUCTION

## Exterior



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# CONSTRUCTION

## Exterior



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# CONSTRUCTION

Finish



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# FINISH



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# CODE

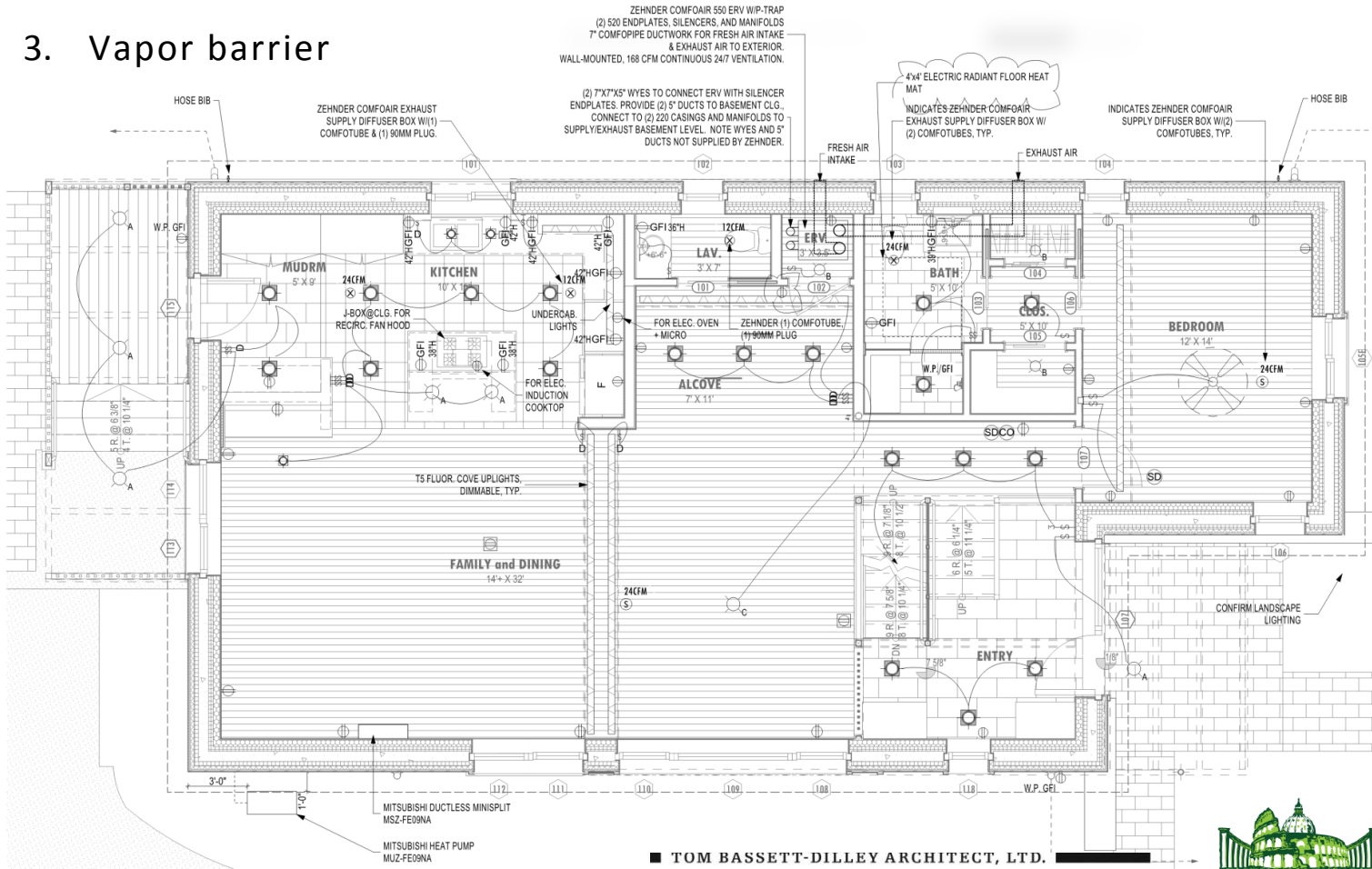
1. Attic hatch

Heating Load  $P_H$  = **13532** BTU/hr

2. Heat load

Specific Heating Load  $P_H / A_{TFA}$  = **3.8** BTU/hr.ft<sup>2</sup>

3. Vapor barrier



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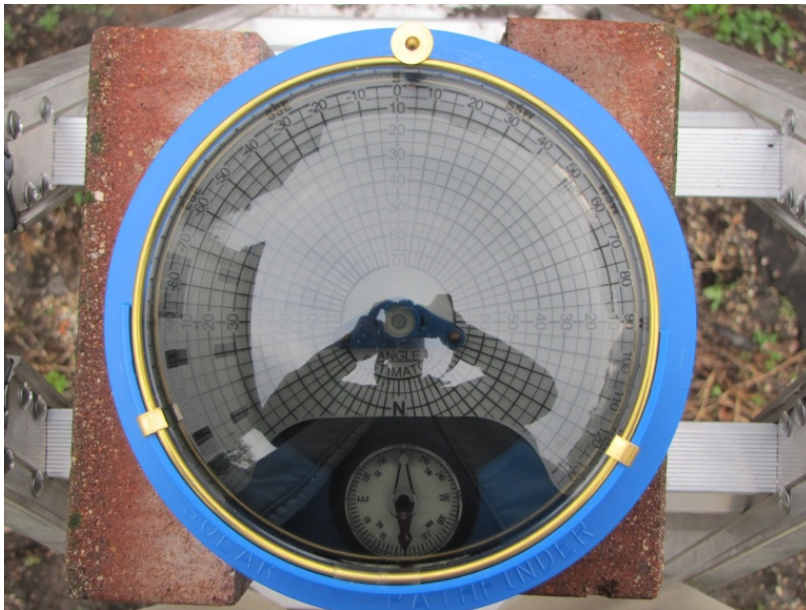


# CERTIFICATION

1. Start early! PHIUS feedback is key
2. Get shading figured out early
3. Facilitate communication between PHIUS rater and PHIUS

Energy Demands with Reference to the Treated Floor Area				
Treated Floor Area:	3455	ft <sup>2</sup>		
Applied:	Monthly Method		PH Certificate:	Fulfilled?
Specific Space Heat Demand:	4.35	kBTU/(ft <sup>2</sup> ·yr)	4.75 kBTU/(ft <sup>2</sup> ·yr)	Yes
Pressurization Test Result:	0.60	ACH <sub>50</sub>	0.6 ACH <sub>50</sub>	Yes
Specific Primary Energy Demand (DHW, Heating, Cooling, Auxiliary and Household Electricity):	28.4	kBTU/(ft <sup>2</sup> ·yr)	38.0 kBTU/(ft <sup>2</sup> ·yr)	Yes
Specific Primary Energy Demand (DHW, Heating and Auxiliary Electricity):	12.6	kBTU/(ft <sup>2</sup> ·yr)		
Specific Primary Energy Demand Energy Conservation by Solar Electricity:		kBTU/(ft <sup>2</sup> ·yr)		
Heating Load:	3.92	BTU/(ft <sup>2</sup> ·hr)		
Frequency of Overheating:		%	over 77.0 °F	
Specific Useful Cooling Energy Demand:	1.85	kBTU/(ft <sup>2</sup> ·yr)	4.75 kBTU/(ft <sup>2</sup> ·yr)	Yes
Cooling Load:	2.75	BTU/(ft <sup>2</sup> ·hr)		

BEFORE



Energy Demands with Reference to the Treated Floor Area				
Treated Floor Area:	3598	ft <sup>2</sup>		
Applied:	Monthly Method		PH Certificate:	Fulfilled?
Specific Space Heat Demand:	4.63	kBTU/(ft <sup>2</sup> ·yr)	4.75 kBTU/(ft <sup>2</sup> ·yr)	Yes
Pressurization Test Result:	0.60	ACH <sub>50</sub>	0.6 ACH <sub>50</sub>	Yes
Specific Primary Energy Demand (DHW, Heating, Cooling, Auxiliary and Household Electricity):	34.7	kBTU/(ft <sup>2</sup> ·yr)	38.0 kBTU/(ft <sup>2</sup> ·yr)	Yes
Specific Primary Energy Demand (DHW, Heating and Auxiliary Electricity):	20.4	kBTU/(ft <sup>2</sup> ·yr)		
Specific Primary Energy Demand Energy Conservation by Solar Electricity:		kBTU/(ft <sup>2</sup> ·yr)		
Heating Load:	4.05	BTU/(ft <sup>2</sup> ·hr)		
Frequency of Overheating:		%	over 77.0 °F	
Specific Useful Cooling Energy Demand:	0.96	kBTU/(ft <sup>2</sup> ·yr)	4.75 kBTU/(ft <sup>2</sup> ·yr)	Yes
Cooling Load:	2.91	BTU/(ft <sup>2</sup> ·hr)		

AFTER

# PERFORMANCE

## 1. Blower door



blower door1.MOV



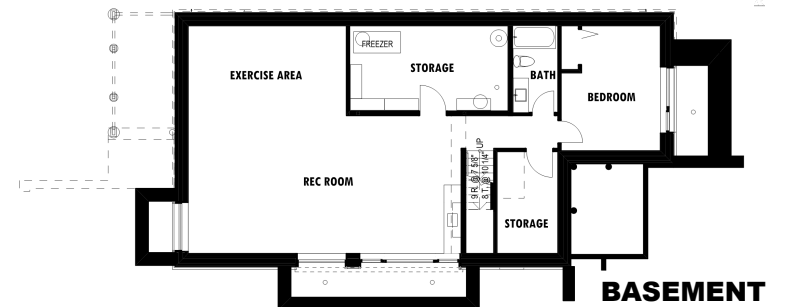
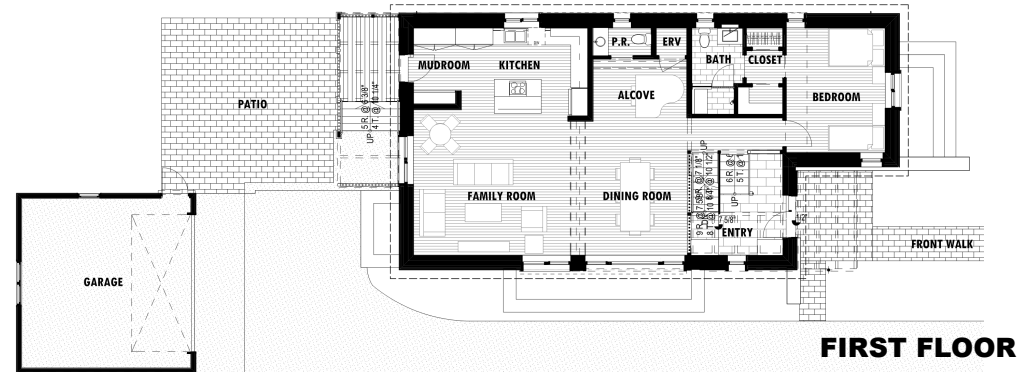
blower door2.MOV





# PERFORMANCE

1. Initial temperatures and humidity
2. Point source heating and cooling
3. Owner training for HVAC



Thank you

Q & A

See [www.passivehousemidwest.blogspot.com](http://www.passivehousemidwest.blogspot.com)  
for blog that follows construction

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