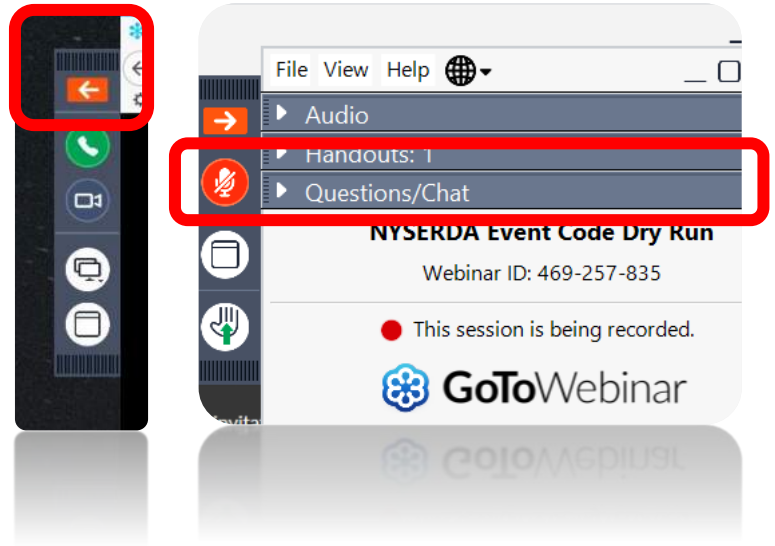
Webinar Overview

All attendees have been placed on mute.

Use the Question Section on the webinar control panel to ask a question at anytime during the presentation.

Q&A will take place at the end of each segment.

Webinar will be recorded and sent.



Submit Responses via PollEverywhere

- Respond at PollEV.com/swa335
- Or text swa335 at 22333 to join, then send your answer

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Residential New Construction Passive House Multi-family buildings with five units or more

PASSIVE HOUSE INCENTIVE STRUCTURE FOR MULTI-FAMILY (5 UNITS OR MORE)				
Incentive Timing	**Activity**	**Incentive Amount**	**Max Incentive (Per Unit)**	**Max Incentive (Per Project)**
Pre-Construction	Feasibility Study[1]	Up to 100% of Feasibility Study Costs	N/A	$5,000.00
	Energy Modeling[2]	75% of Energy Modeling Costs (Before 90% Design Drawings)	$500.00	$30,000.00
		50% of Energy Modeling Costs (90% Design/50% Construction)	$250.00	$15,000.00
Post Construction	Certification[3]	Up to 100% of Certification Costs	$1,500.00	$60,000.00

1. Feasibility Study will require documentation in the form of a Feasibility Study report and invoice from the Passive House Consultant
2. Incentives will only be awarded prior to 50% Construction Drawings for Passive House projects. No incentives will be granted after 50% Construction Drawing set.
3. Certification may be either through PHIUS, PHI, or EnerPHit certification offerings.

Next steps you can take...
Contact your Energy Efficiency Representative or

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Workshop 2, Part 2
Air Sealing for Homes

Steven Winter Associates, Inc.

Since 1972, Steven Winter Associates, Inc. has been providing research, consulting, and advisory services to improve the built environment for private and public sector clients.

Our services include:

- Energy Conservation and Management
- Decarbonization
- Sustainability Consulting
- Green Building Certification
- Accessibility Consulting

Our teams are based across four office locations:
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For more information, visit
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Learning Objectives

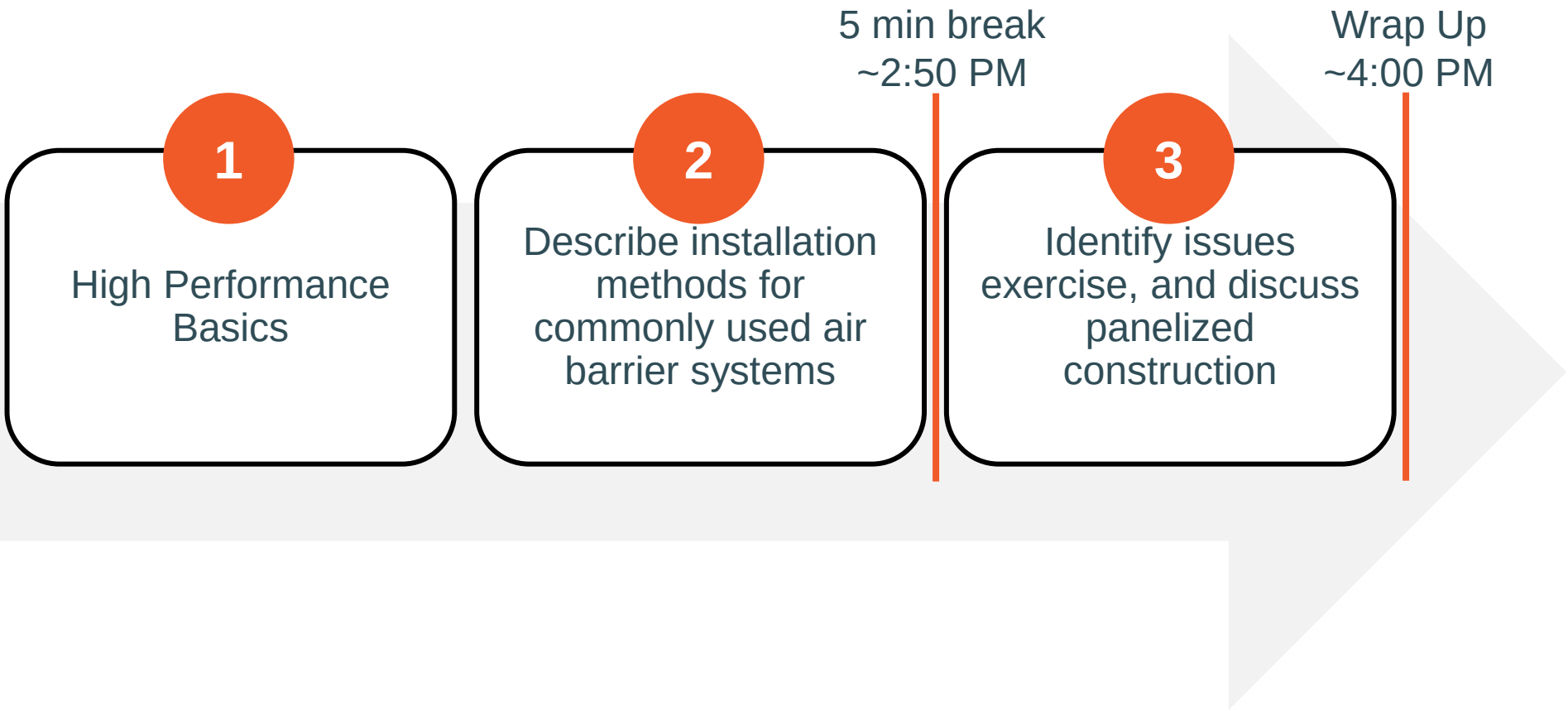
Summarize typical materials and methods for air barriers on high performance projects

Identify challenging details and propose solutions to overcome

Describe common approaches for air barriers on residential projects

Recognize alternative strategies for air barrier implementation

Overview of Presentation



Why are We Here

- Push for Building Electrification (Passive House as a pathway)
- Incentives available
- Benefits
  - Drastically lower energy use and operational cost savings
  - Healthy air quality from ventilation systems
  - Consistent and comfortable room temperatures without air drafts
  - Increased natural lighting and quieter acoustic conditions
  - A more resilient and comfortable building

What is your profession?

A. Architect

B. Engineer

C. Contractor/CM

D. Owner/Developer

E. Consultant

F. Other

What is the one thing that you were hoping to learn about today? (hint: link words with an underscore)

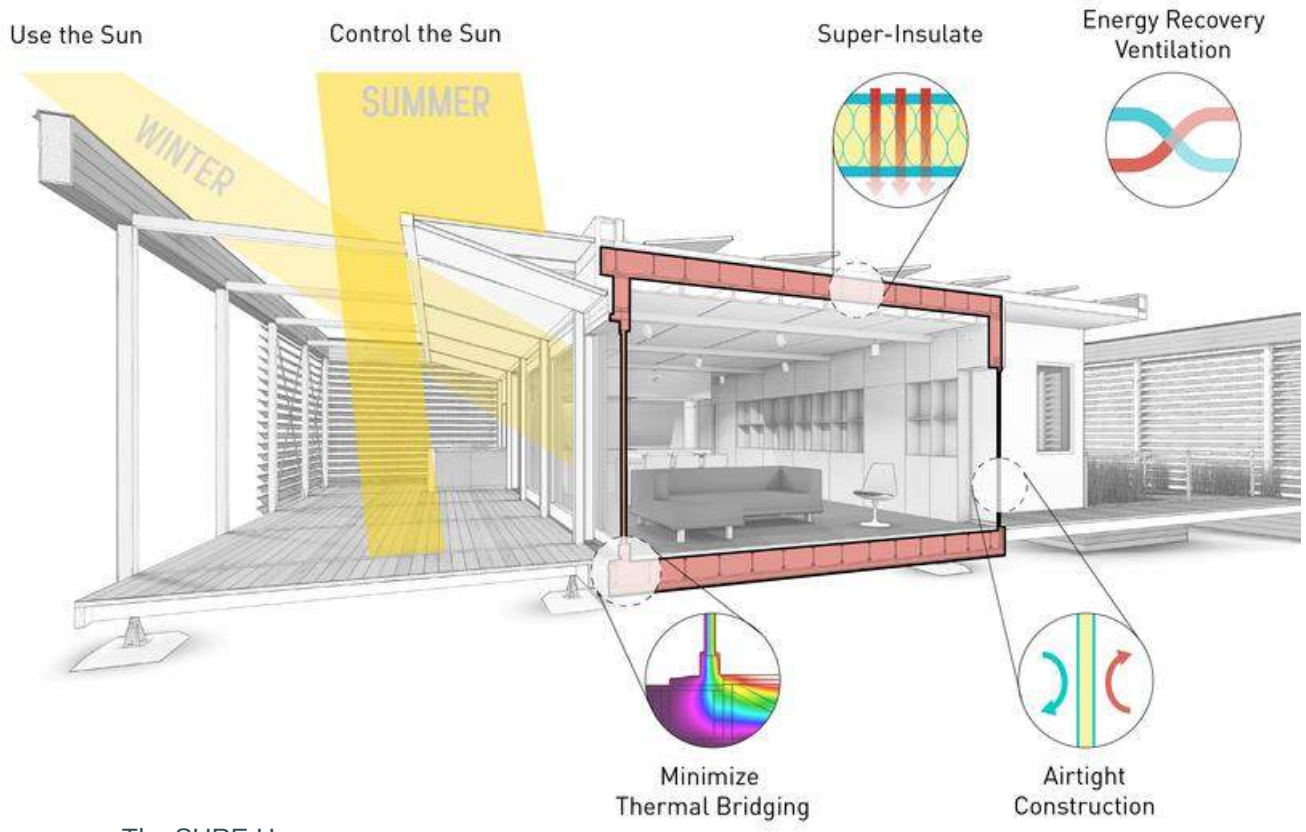
These **Trainings - Each has two parts**

- **Workshop 1:** Continuous Insulation
- **Workshop 2:** **Air Sealing for Homes**
- **Workshop 3:** High Performance Ventilation Systems for Homes

High Performance Basics

Goals of High Performance Buildings

- Building durability
- Energy $ reduction
- Optimal thermal comfort
- Superior indoor air quality
- Carbon emissions reductions



The SURE House

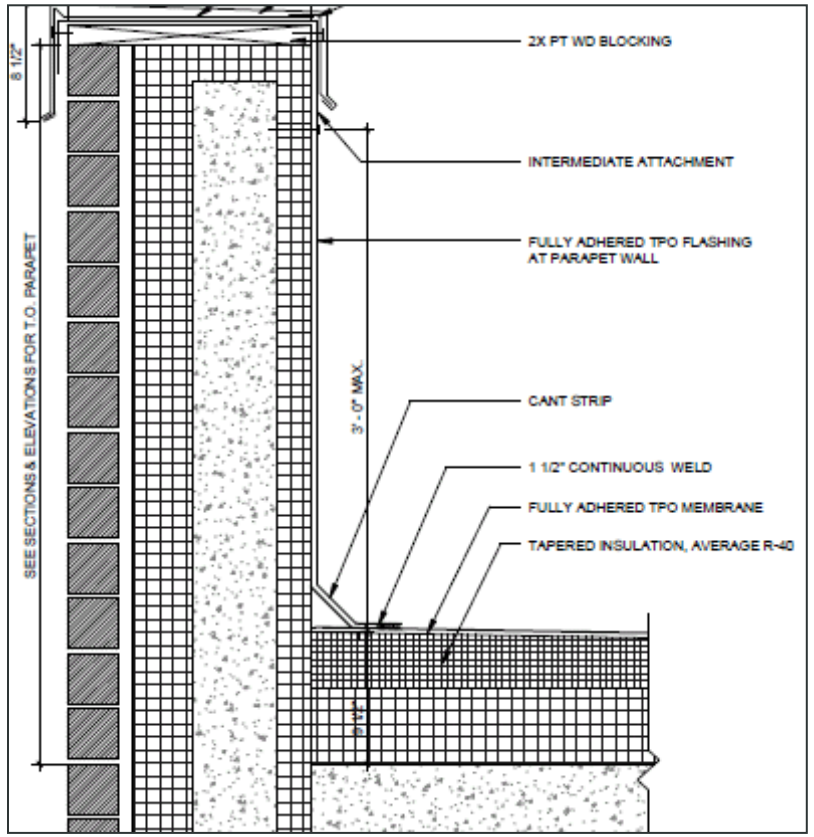
Winner of the 2015 D.O.E. Solar Decathlon

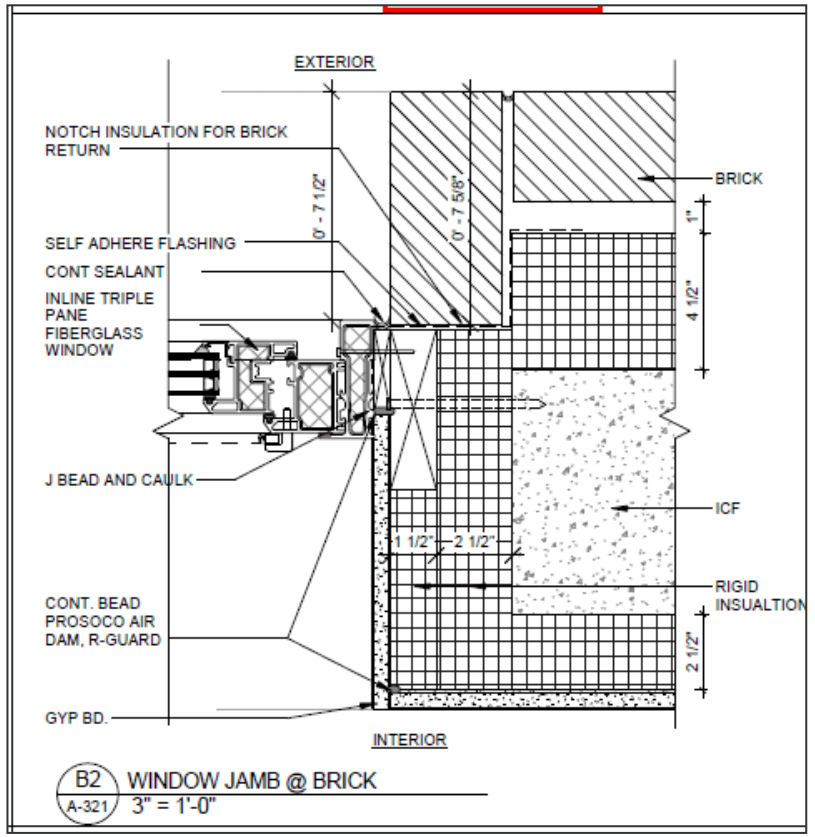
www.surehouse.org

Passive House as a Pathway to High Performance

- Thermal insulation continuity
- Thermal bridge free construction
- Solar control
- Airtightness
- Balanced mechanical ventilation

Continuous Insulation

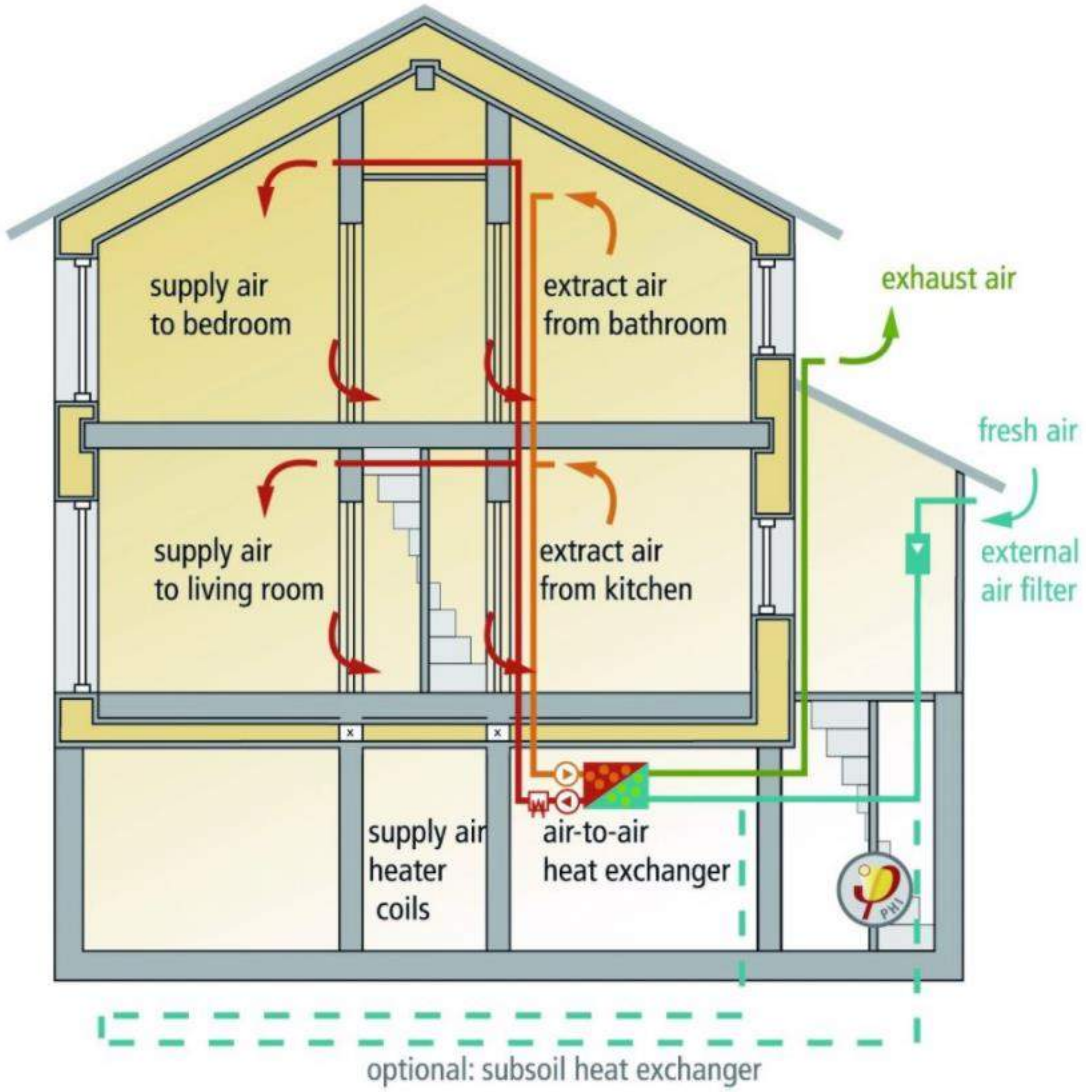




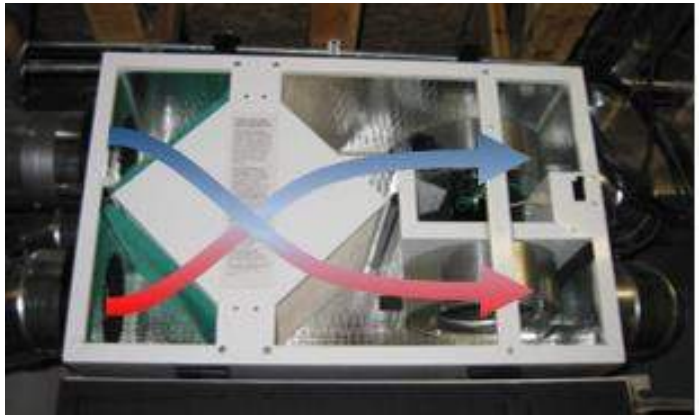
Air-Tightness Blower Door Testing

- Basic Components
  - Gauge (manometer)
  - Shroud
  - Frame
  - Fan

Balanced Ventilation and Heat/Energy Recovery



- Provide fresh, filtered air 24 hours a day
- Heat exchanger +75% Efficient
- Highly insulated and air-sealed ductwork



Questions?

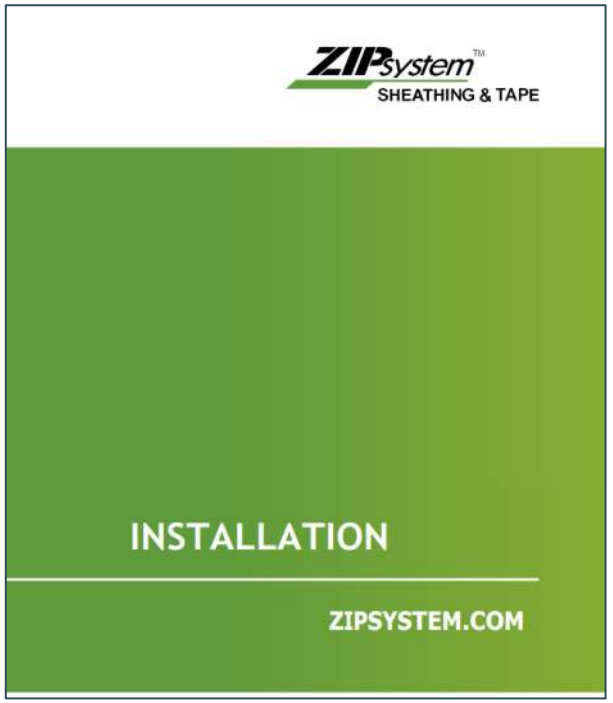
Common Approaches to Air Barriers

Air Barrier Strategy

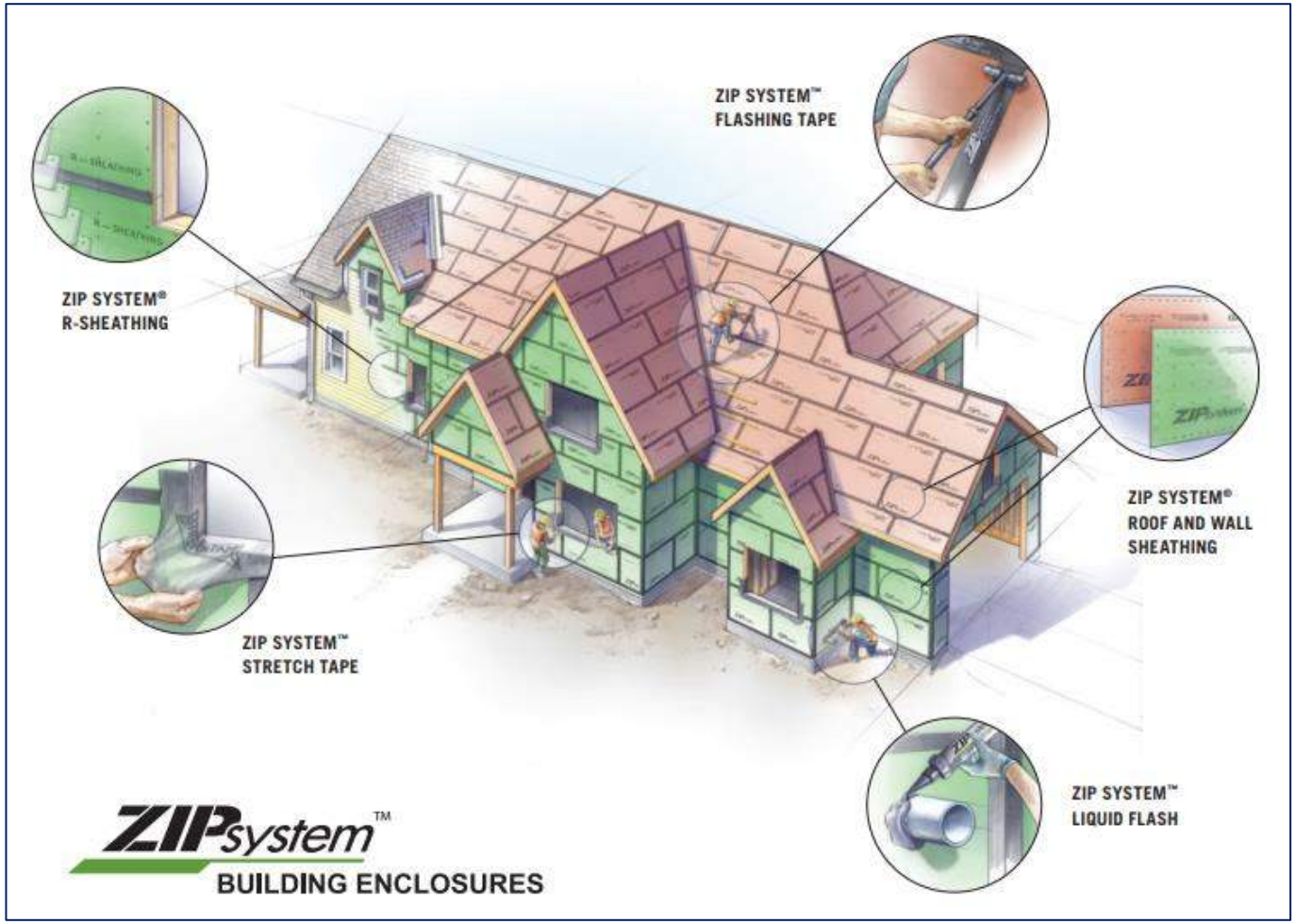
- With all of the previously mentioned options from Part 1, the two most seen approaches by SWA on smaller, wood framed projects are:
  - Sheathing with integrated air barrier
  - Self adhered sheet membrane
- Ensure the selected installer is comfortable with the selected system. Regardless, training should be provided so they understand all the proper techniques for installation.

Directions and Help

- Always consult and follow the manufacturer's data sheet and install directions
- Involve product reps as often as needed for assistance



Zip System



- Components of the system include:
  - Wall sheathing
  - Roof sheathing
  - Zip R sheathing
  - Stretch tape
  - Flashing tape
  - Liquid flash

Building Layout – Zip System Demo Install

Connection from Below to Above Grade

Zip System – Sill Flashing

Zip System – Jamb Flashing

Zip System – Head Flashing

Zip System – Exterior Window Caulking

Zip System – Interior Window Taping

Zip System – Vertical Joint Taping

Zip System – Horizontal Joint Taping

Zip System – Corner Taping

Zip System – Liquid Flash

Zip System – Liquid Flash at Roof Overhang (Tricky)

Zip System – Roof Overhang Tape (Very Hard)

Zip System – Pipe Penetration Gasket

Zip System – Final Walkaround

Blower Door Test - Initial

Blower Door Test - Final

In general, how well do you see the Zip System being installed on job sites? (hint: link words with an underscore)

Exterior Wall and Window Mock-up

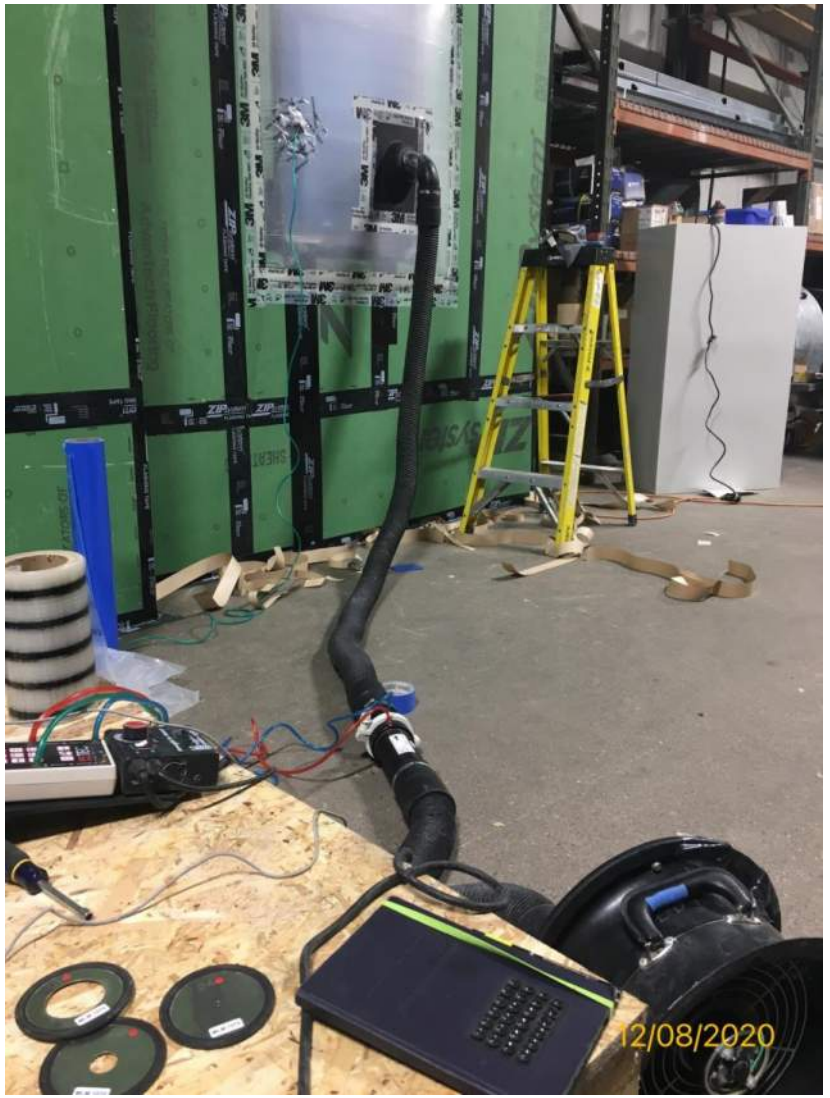
- Mock-ups are important for both visual review of the details along with performance testing
- Mock-ups can vary in terms of extensiveness

A simple mock-up could be the first window installed on the project.

An extensive mock-up could be a full six-sided box with various details reflected.

Exterior Wall and Window Mockup

- A key detail to be tested is the installed window into the rough opening and its connection to the wall air barrier
- This is an important detail to ‘pass’ in terms of being on target for meeting the final whole building blower door leakage rate at the end of the project



Exterior Wall / Window Mockup – Finding Issues

Sheet Membrane Products

- There are various manufacturers; only one was selected for the purposes of this presentation
- Each manufacturer has the main product, along with accessories and auxiliary materials; ensure the specifications call these supplemental products out as well
- This will avoid issues and ensure that installers provide all materials to provide a fully complete system

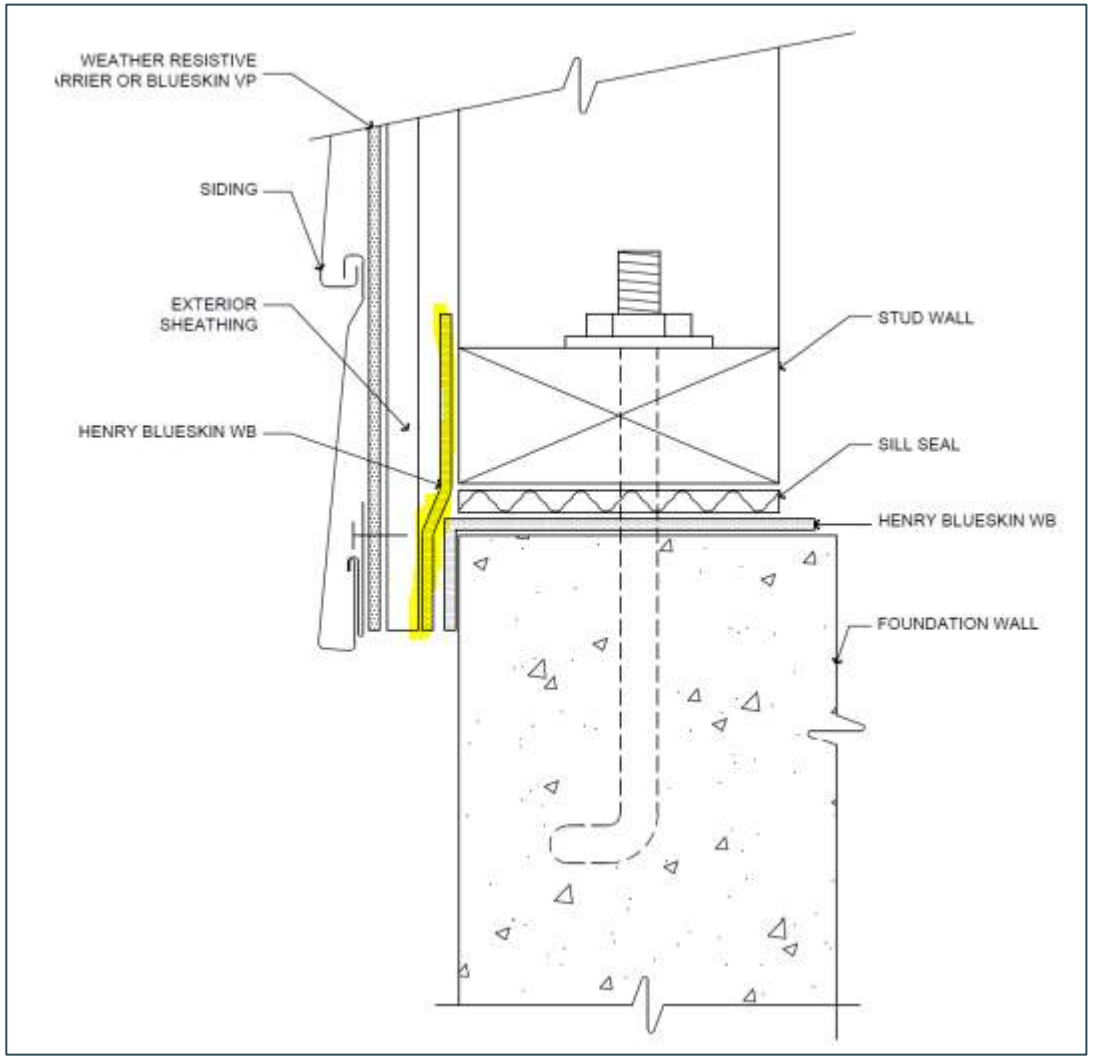
Sheet Membrane Products Example

System components	Product name	Product description
Primary product	**Blueskin® VP160 Self-Adhered Water Resistive Air Barrier**	**Water resistive barrier (WRB)**
Auxiliary materials	Blueskin® SA Self-Adhered Water Resistive Air Barrier	Self-adhered flashing
	Blueskin® SALT Self-Adhered Water Resistive Air Barrier	Low-temperature self-adhered flashing
	Blueskin® Butyl Flash	Self-adhered flashing
	Blueskin® VP160 Self-Adhered Water Resistive Air Barrier	Self-adhered flashing
	Metal Clad® Self-Adhered Water Resistive Air Barrier	Self-adhered flashing
	Air-Bloc® LF Liquid-Applied Flashing	Liquid-applied flashing
	212 All Purpose Crystal Clear Sealant	Termination sealant
	925 BES Sealant	Building envelope sealant
	Aquatac™ Primer	Water based primer
	Blueskin® Adhesive	Solvent-based adhesive
	Blueskin® LVC Adhesive	Low VOC solvent-based adhesive
	Blueskin® Spray Prep Adhesive	Aerosol primer
	Blueskin® LVC Spray Primer	Low VOC solvent-based primer
	Blueskin® TWF Self-Adhered Thru-Wall Flashing	Thru-wall flashing

Uncommon Tools That Installers Need

- Counter roller
- Handheld roller
- Tape application tool
- Plastic taping knife set
- Putty knife
- Caulking spatulas
- Wet film thickness gauge

Sheet Membrane – Below Grade Connection



Sheet Membrane – Above Grade Walls

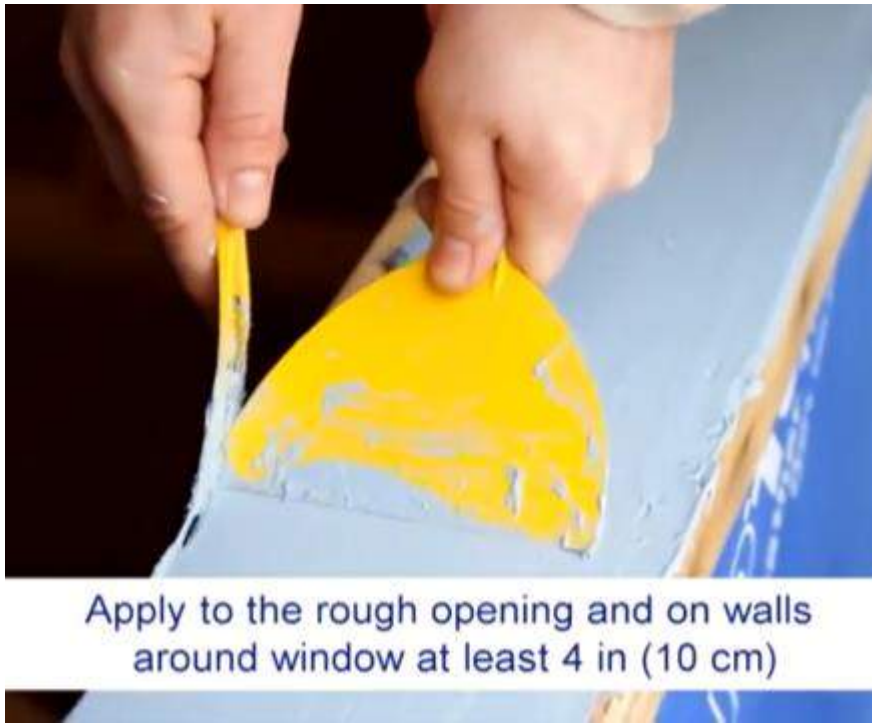
Source: Berkeley Passive House

Sheet Membrane – Rough Opening Option 1

- Thicker gauge sheet membrane from the manufacturer, wraps all four sides of the rough opening.

Source: Henry Company

Sheet Membrane – Rough Opening Option 2



- Liquid flashing membrane used instead to wrap the entire rough opening

Source: Henry Company

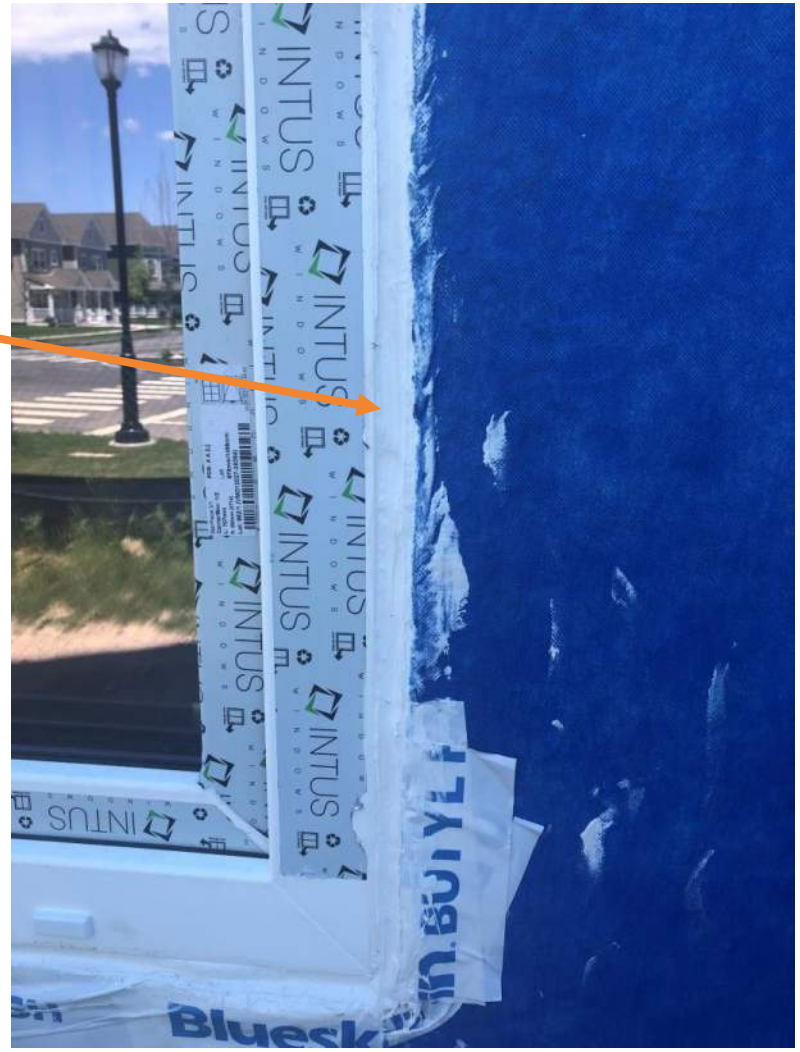
Windows Interior Sealing

Windows Interior Sealing & Looking for Leaks

Sheet Membrane – Flanged Windows

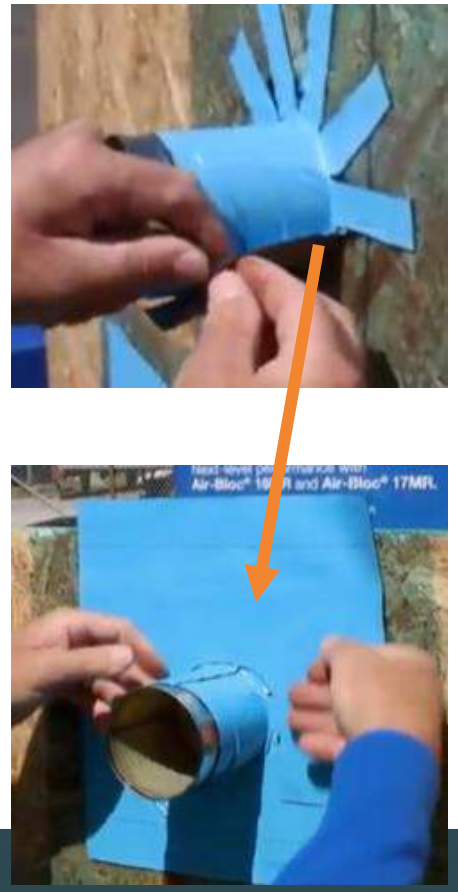
Source: Henry Company

Sheet Membrane – High Performance Windows



Mechanical Penetrations

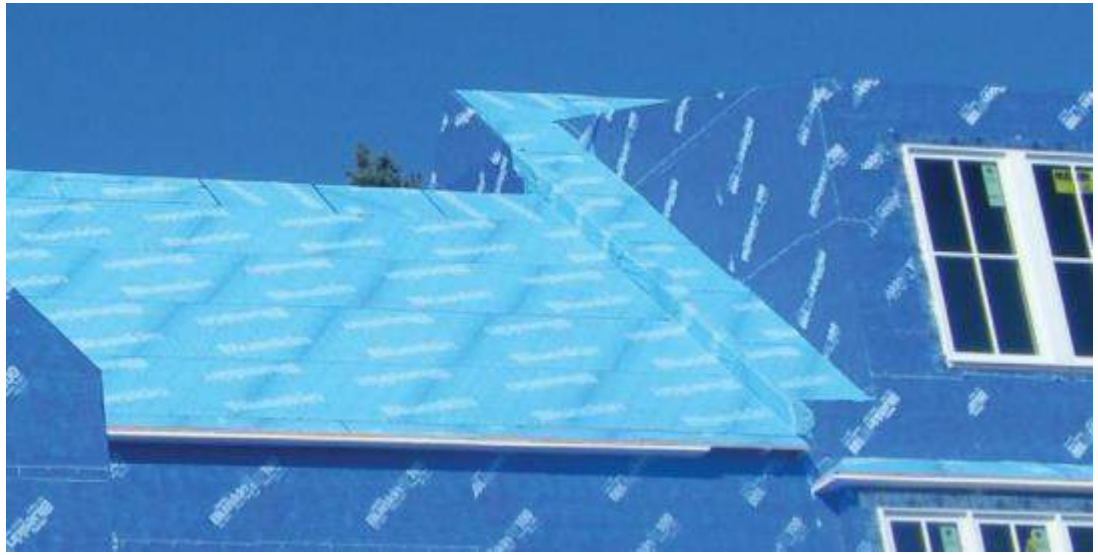
- Individual ventilation intake and exhaust ports need to be well air sealed for both air tightness and condensation concerns.
- Can be addressed with both sheet membrane or liquid flashing/sealant options.



Pipe and Wire Penetration Gaskets

Source: 475 High Performance Supply

Sheet Membrane – Wall to Roof



What issues have you seen with sheet membrane systems? (hint: link words with an underscore)

Contractor Trainings

- Important to review project goals and implementation with whole team

Contractor Trainings

Run a sample blower door test if possible to illustrate air leakage concepts to the project team.

Look at project site conditions if possible to see details in actions.

Construction Oversight

- Heavy focus on air tightness – strong recommendation to have a dedicated air barrier supervisor from the contractor's team overseeing installation and continuity.
- Preferable to work with dedicated air barrier subcontractors or ones that have proven experience with stringent air tightness requirements
- Don't forget about the other trades – although they won't be "graded" with an air barrier test, the quality of work is important for achieving PH.
- Architect, owner, and/or energy consultant levels of involvement

General contractor and consultants happy after passing the whole building blower door test. Susie Clemens project.

Questions?

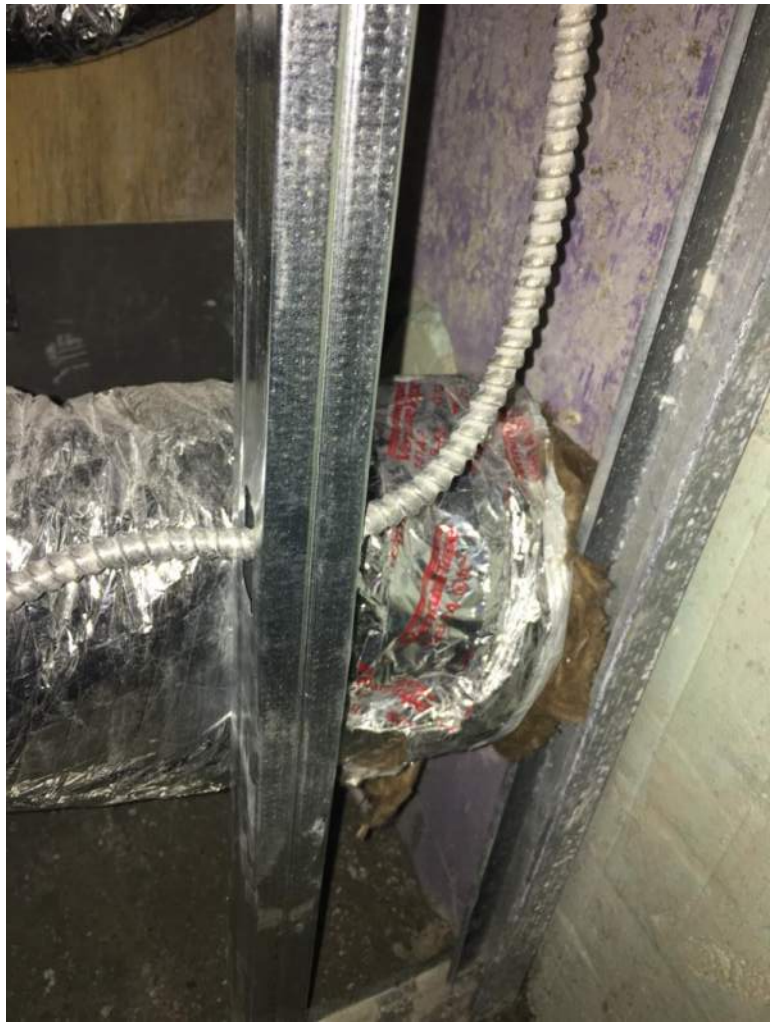
5 Minute Break

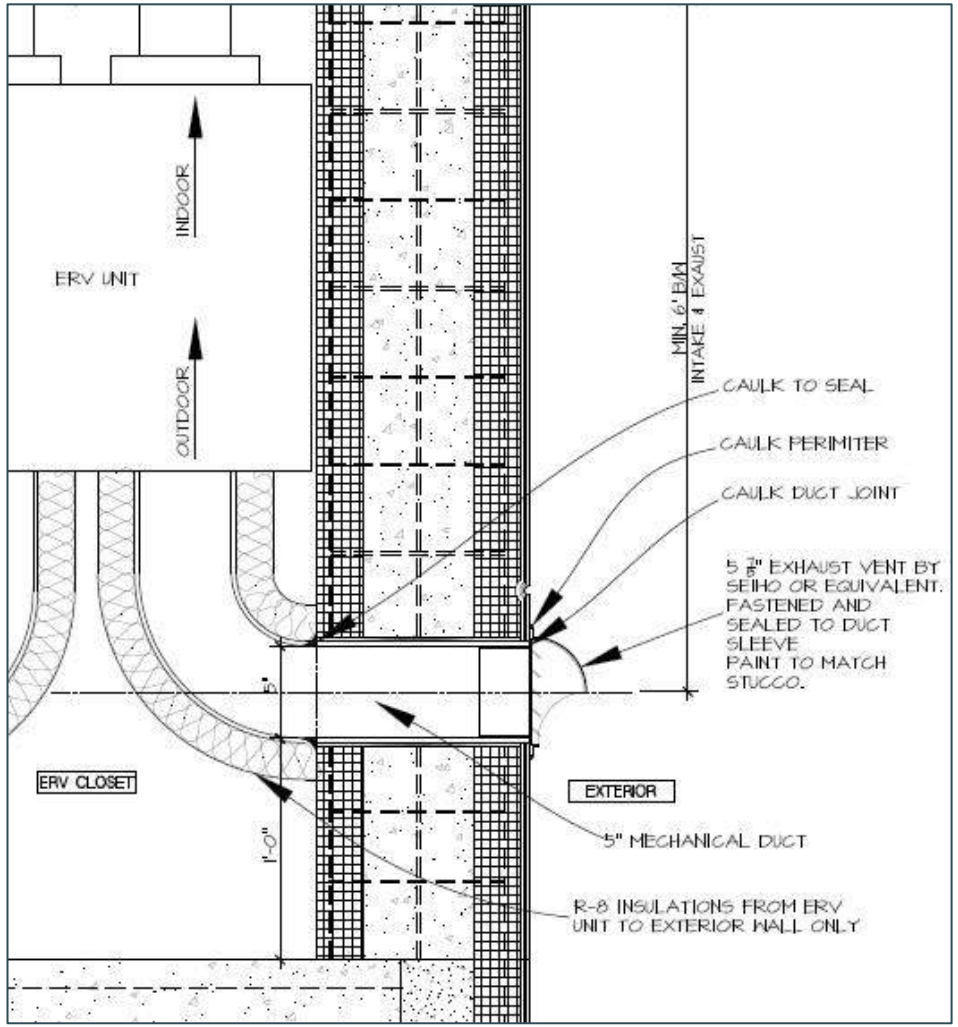
What's wrong with this photo?

What do you see wrong? Image 1

What item(s) do you see wrong in this photo, Image 1? (hint: link words with an underscore)

What do you see wrong? Image 2





What item(s) do you see wrong in this photo, Image 2? (hint: link words with an underscore)

What do you see wrong? Image 3

What item(s) do you see wrong in this photo, Image 3? (hint: link words with an underscore)

What do you see wrong? Image 4

What item(s) do you see wrong in this photo, Image 4? (hint: link words with an underscore)

What do you see wrong? Image 5

What item(s) do you see wrong in this photo, Image 5? (hint: link words with an underscore)

What do you see wrong? Image 6

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What do you see wrong? Image 7

What item(s) do you see wrong in this photo, Image 7? (hint: link words with an underscore)

What do you see wrong? Image 8

What item(s) do you see wrong in this photo, Image 8? (hint: link words with an underscore)

What do you see wrong? Image 9

What item(s) do you see wrong in this photo, Image 9? (hint: link words with an underscore)

Panelized Construction

Panelized Construction

- If it is an option for the project, panelized construction can benefit the project in several ways
- Still need to deal with sealing the panel to panel joints on site
- Exact tolerances of factory built panels vs. in field conditions and making it fit
- Finding a panelizer and installer with a track record, that can service the project location

Panelized Construction - Benefits

- Controlled environment
- More exact dimensions
- Quality control
- Build faster (potentially)
- Reduce weather damage to materials during construction
- Less waste

Panelized – Controlled Environment

- Air barrier is applied in a controlled environment which allows for a better installation. Reduces exposure to typical construction site conditions such as:
  - Wind
  - Rain
  - Moisture/humidity
  - Wet/damp surfaces
  - Dust
  - Temperature (too high, too low)

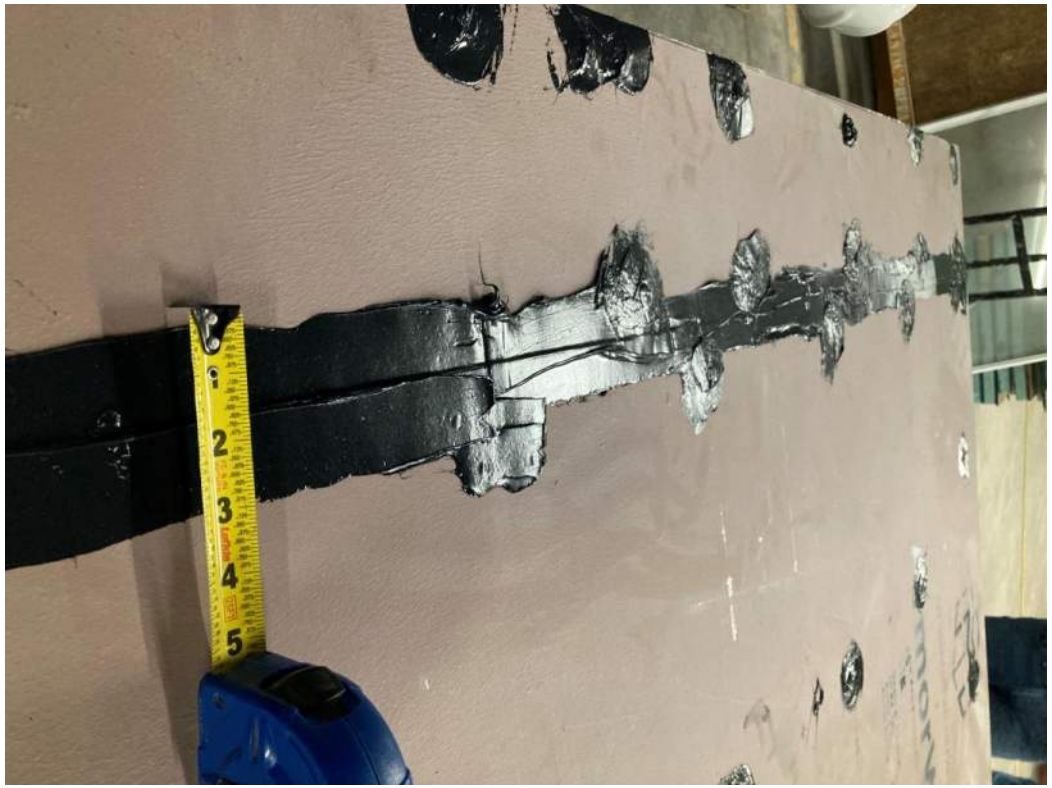
Panelized – Controlled Environment

- Products stored inside, in a temperature-controlled environment
- This contrasts with a typical job site where if materials are not properly stored, they can become damaged from the elements if they are just left out

Panelized – More Exact Dimensions

- Studs and panels can be cut to exact dimensions in the controlled factory environment
- Reduces waste, ensures materials are used more efficiently
- Image to the right – factory project manager has the CAD drawings for easy comparison to the panel that is on the work surface

Panelized – Quality Control



- Allows panels to be inspected for proper sealing, prior to arriving on the job site

Panels On Site - Storage

- Panels that arrive on site and aren’t installed right away need to be protected from the elements
- Ensure panels are fully covered with plastic sheeting or similar to keep them out of the rain and from getting wet prior to installation
- Ensure there is enough space on the site to accommodate the shipments of panels

Panels to Panel Joints – To be sealed on site

Panels to Panel Joints – To be sealed on site

Panels Joints – Foundation and Roof

What are your final thoughts and takeaways from the presentation today? (hint: link words with an underscore)

Questions & Final Discussion

Join Us for More Trainings!

- **Workshop 1:** Continuous Insulation
- **Workshop 2:** Air Sealing for Homes
- **Workshop 3:** High Performance Ventilation Systems for Homes

Contact Us

Steven Winter Associates, Inc.
307 7th Ave., New York, NY 10001

Scott Pusey
Principal Sustainability Consultant | CPHC
spusey@swinter.com
717.587.0921 (c)
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