



phi.us

**PRO FORUM**





# Builder Perspective on Air Sealing



# *Introductions*

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**Jon Erickson**

**CleaRESULT**

***Senior Project Manager***

*Certified Phius Builder Trainer*

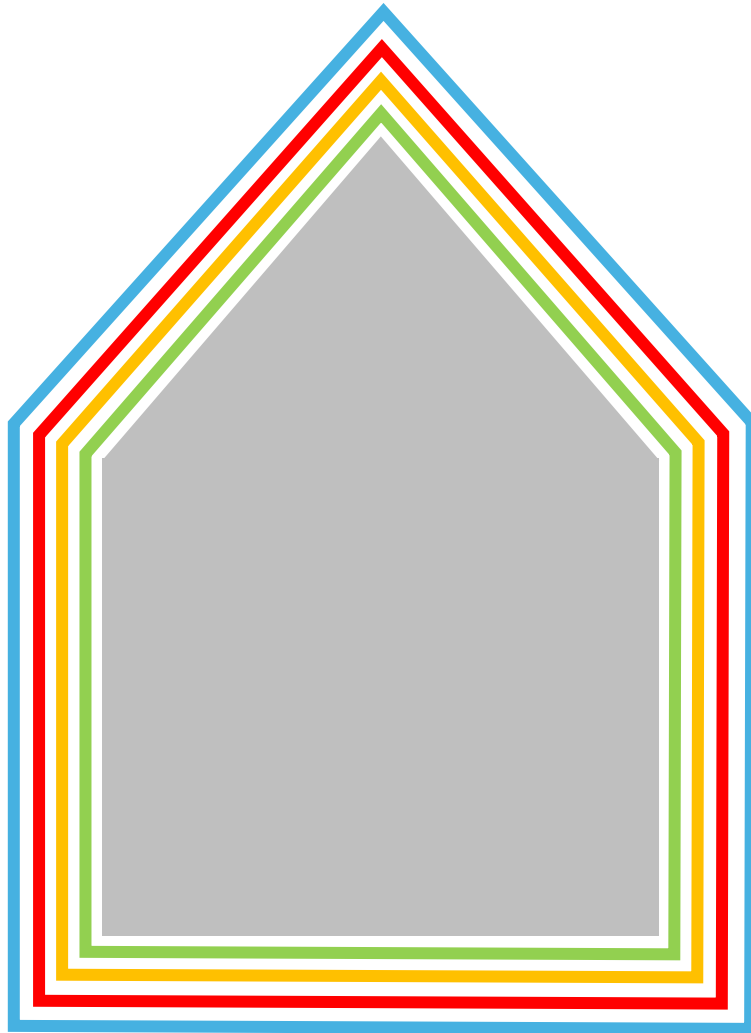
*Certified Phius Consultant*

*Certified Phius Verifier*

*HERS Rater*

*ACCA Certified Residential HVAC Design*

# Four Control Layers



**WATER**

**AIR**

**THERMAL**

**WATER VAPOR**



# Methodology - airtightness

*what is the function of the air barrier?*



# What rides on air?



Water Vapor

Heat

Pollutants

Sound

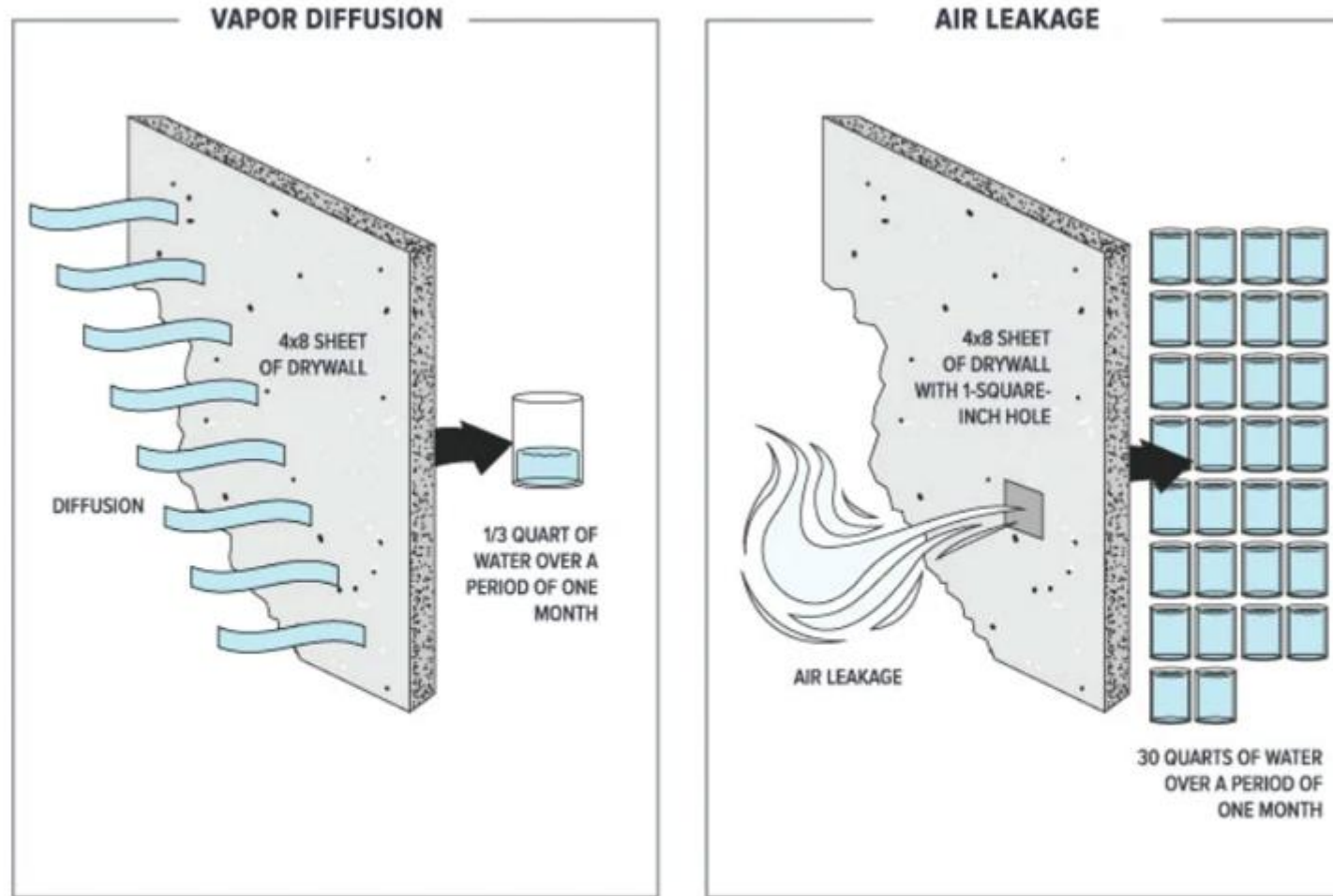
Fire

**Air Barrier**

*multiple functions*



# How does water vapor move?



## VAPOR DIFFUSION VS. AIR LEAKAGE

INTERIOR TEMPERATURE = 70° F  
RELATIVE HUMIDITY = 40%

©CCPIA



# Decoupling Air & Vapor Control



**AIR BARRIER**

Convection

**VAPOR RETARDER**

Diffusion

**AVB?**

# Decoupling Air & Vapor Control



**AIR BARRIER**

Convection

A

**VAPOR RETARDER**

Diffusion

VB?

# Decoupling Air & Vapor Control



**AIR BARRIER**

Convection

A

**VAPOR RETARDER**

Diffusion

~~VB?~~

VR?



# TABLE R402.5.1.1



| COMPONENT            | AIR BARRIER, AIR SEALING CRITERIA                                                                                                            |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| General requirements | A <b>continuous</b> air barrier shall be installed in the building thermal envelope.<br>Breaks or joints in the air barrier shall be sealed. |

**con·tin·u·ous:**

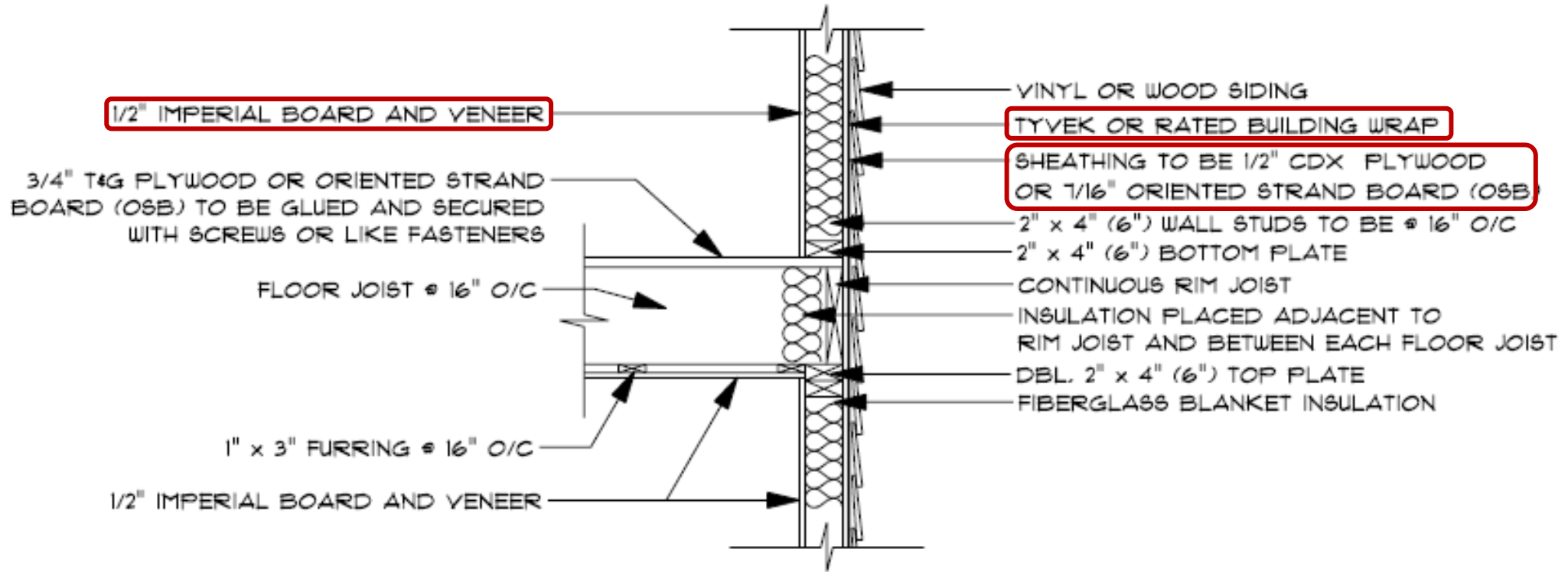
*forming an unbroken whole; without interruption*

A **system** of materials and components that are connected continuously around the interior or exterior of the building

# Choosing Materials



# Air Sealing Details



TYPICAL WALL TO FLOOR TO WALL DETAIL #12



# Air Sealing Details



1/2" ZIP SHEATHING STRUCTURAL 1  
w/ TAPED SEAMS  
\* PRIMARY AIR BARRIER

R-21 ROXUL BATT INSULATION

1/2" INTERIOR GYP. BD.

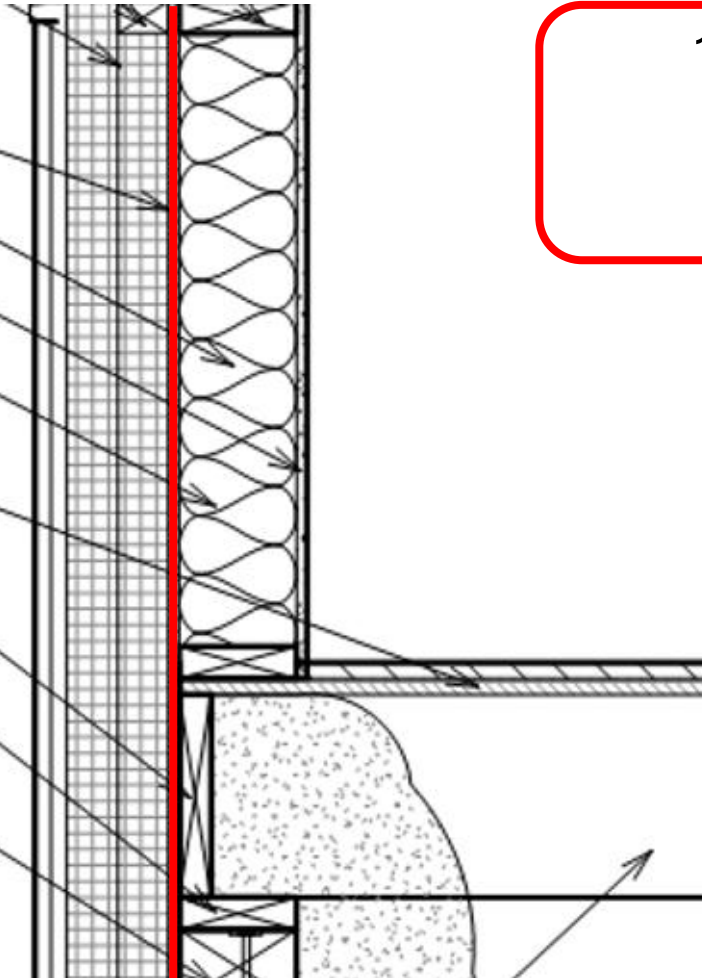
NEW 2x6 WALL FRAMING

HARDWOOD FLOORS OVER  
3/4" T&G ADVANTECH SUBFLOOR

9 1/2" LVL RIM JOIST

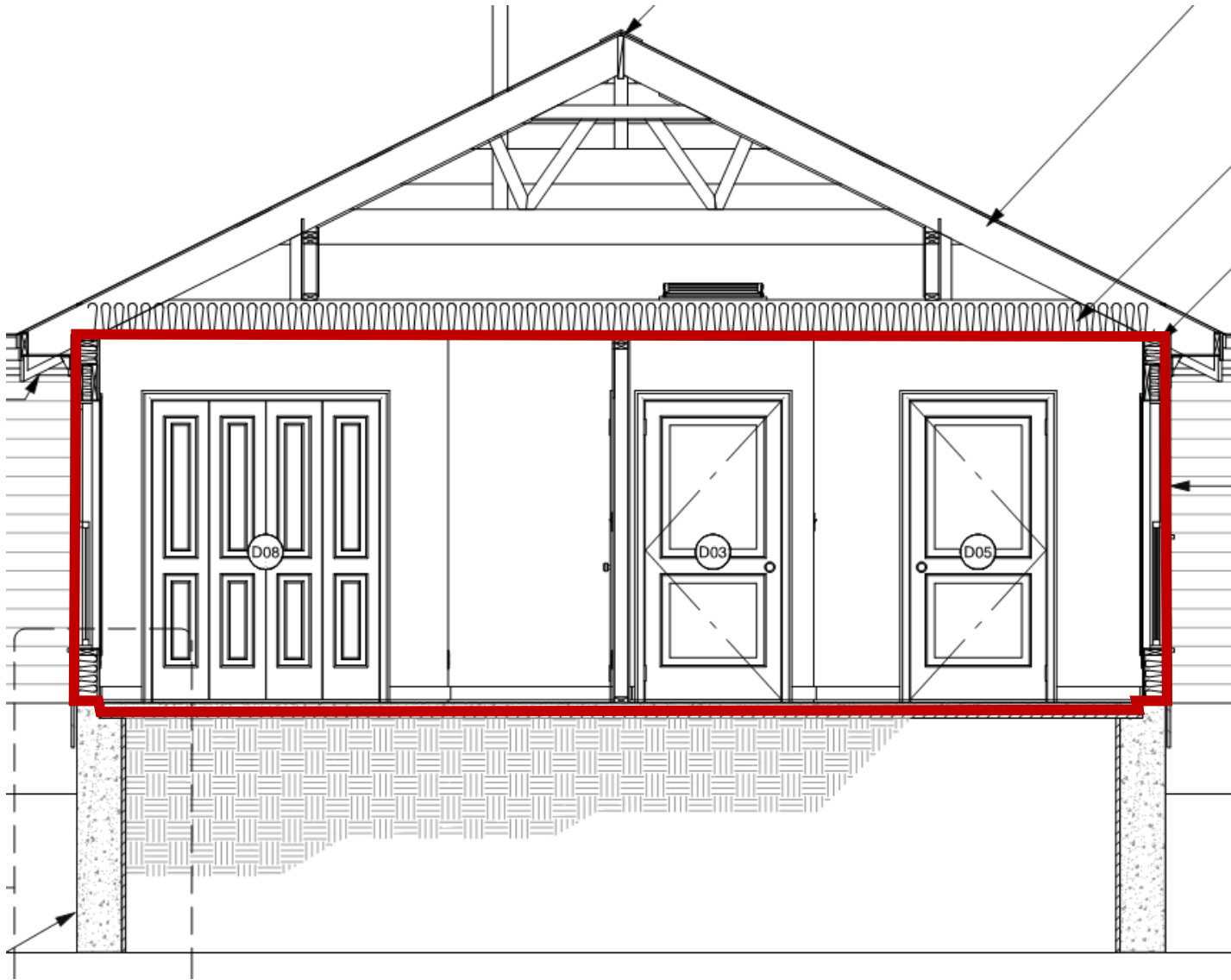
2x6 PT. PLATE

4x6 PT. PLATE



1/2" Zip Sheathing Structural  
w/ Taped Seams  
\*Primary Air Barrier

# Define then Design



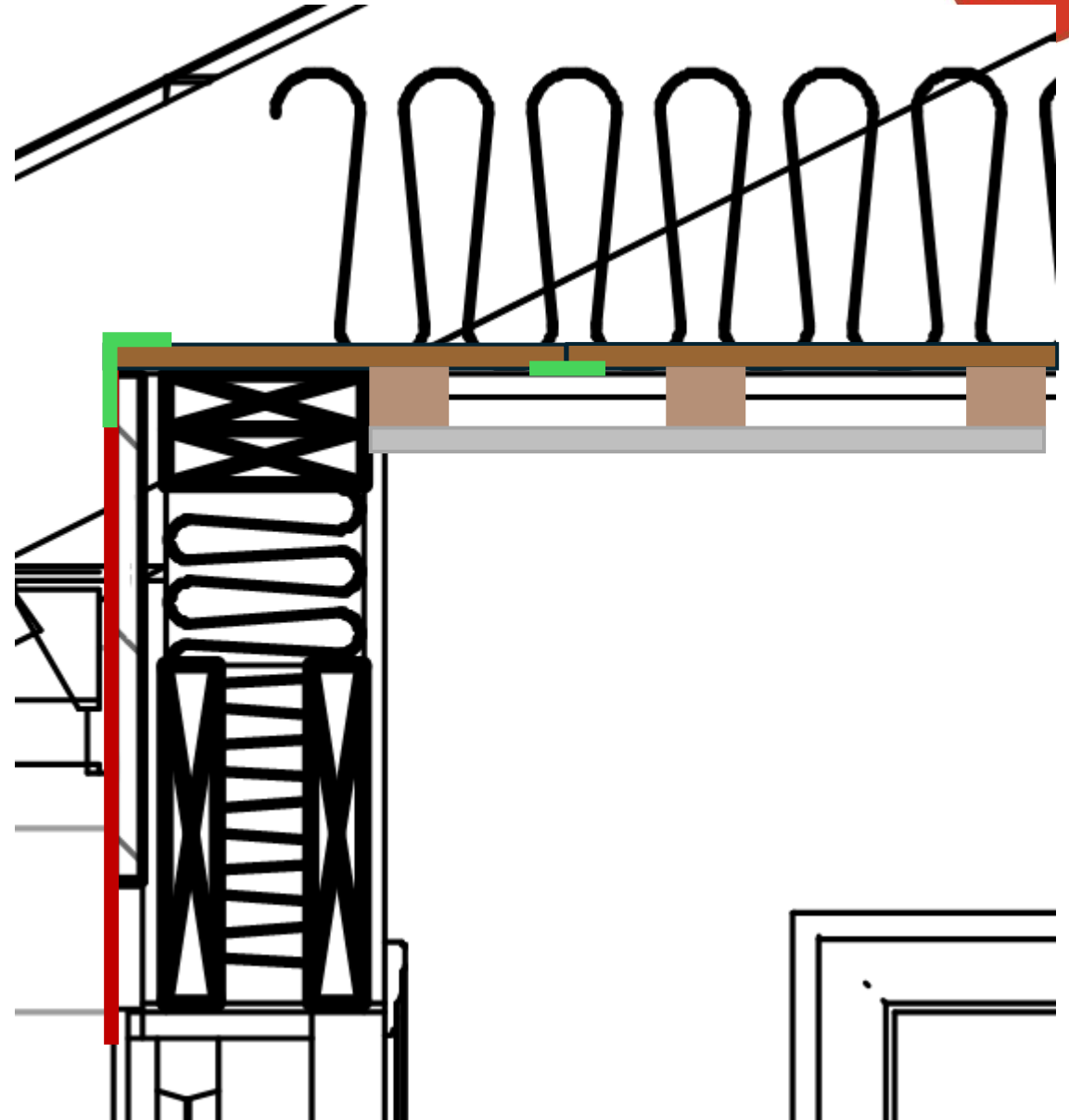
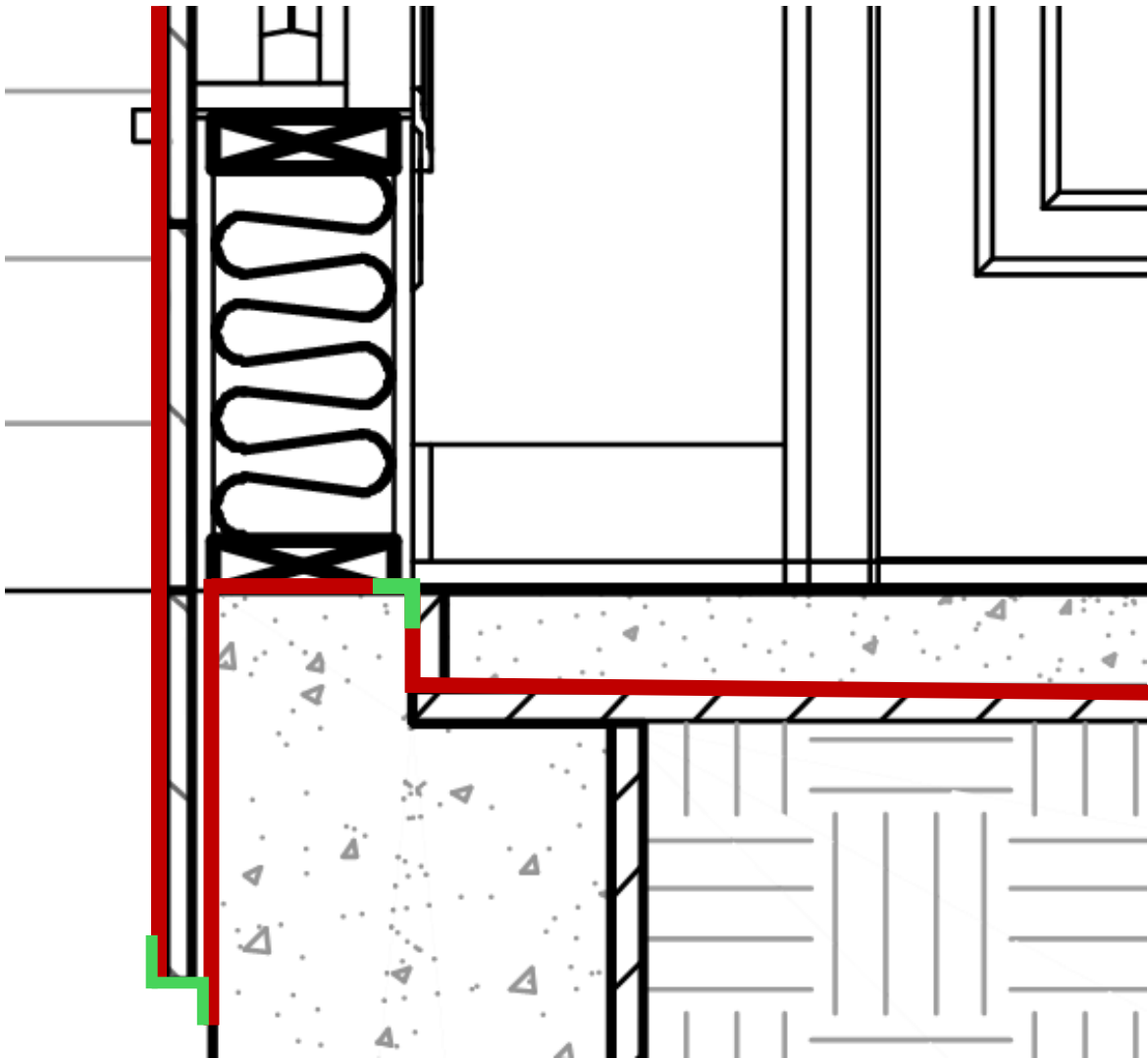
Step 1:

Define the enclosure boundaries.

Step 2:

Draw a line around the enclosure without taking pen from paper.

# Define then Design









# Ductwork

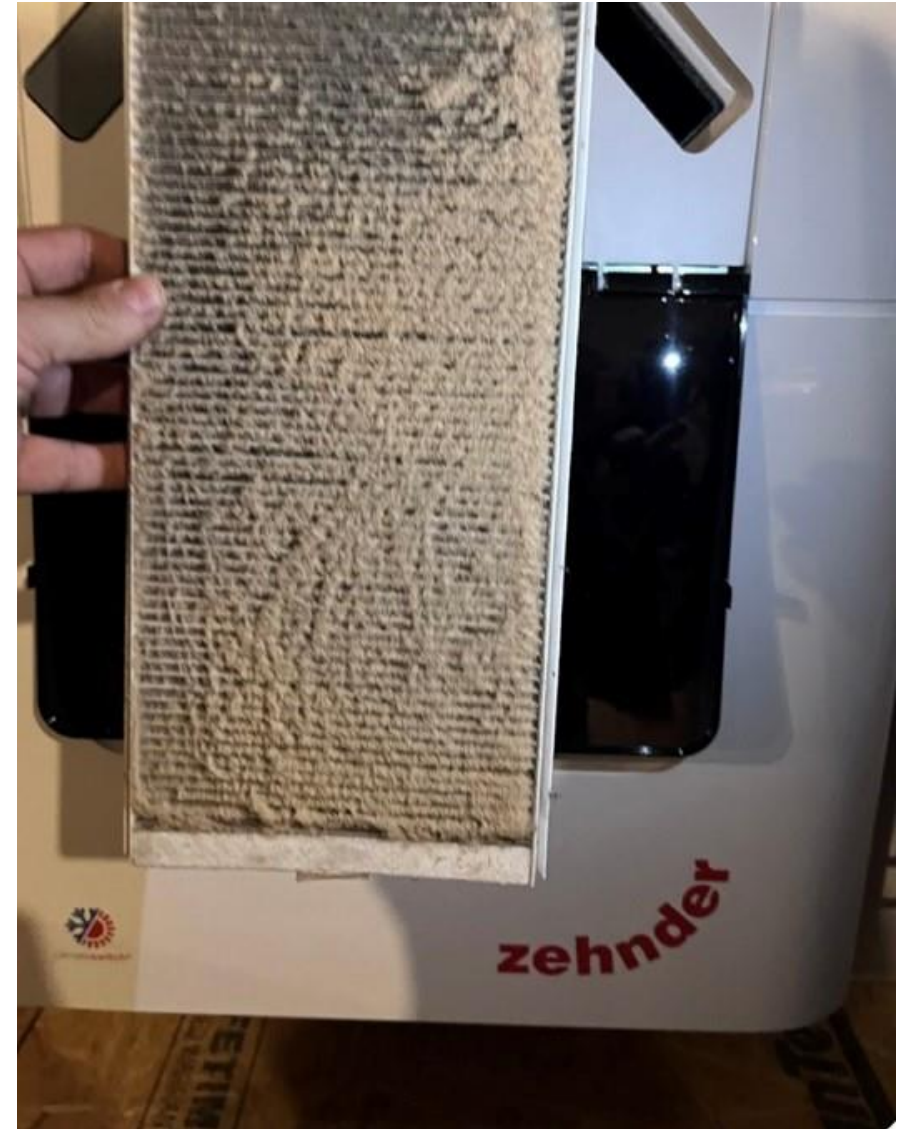


Ductwork directly connected to the exterior requires:

- *Air Control Layer*
- *Thermal Control Layer*
- *Vapor Control Layer*

*(consider it an “extension” of the assembly)*

# Balanced Mechanical Ventilation





# Introductions

**Sharon Libby Eyerly**

**Walsh Construction Co. Quality Director**

25 Years!

Started in 1999 with the mission of addressing moisture related issues common in multi-family building at the time

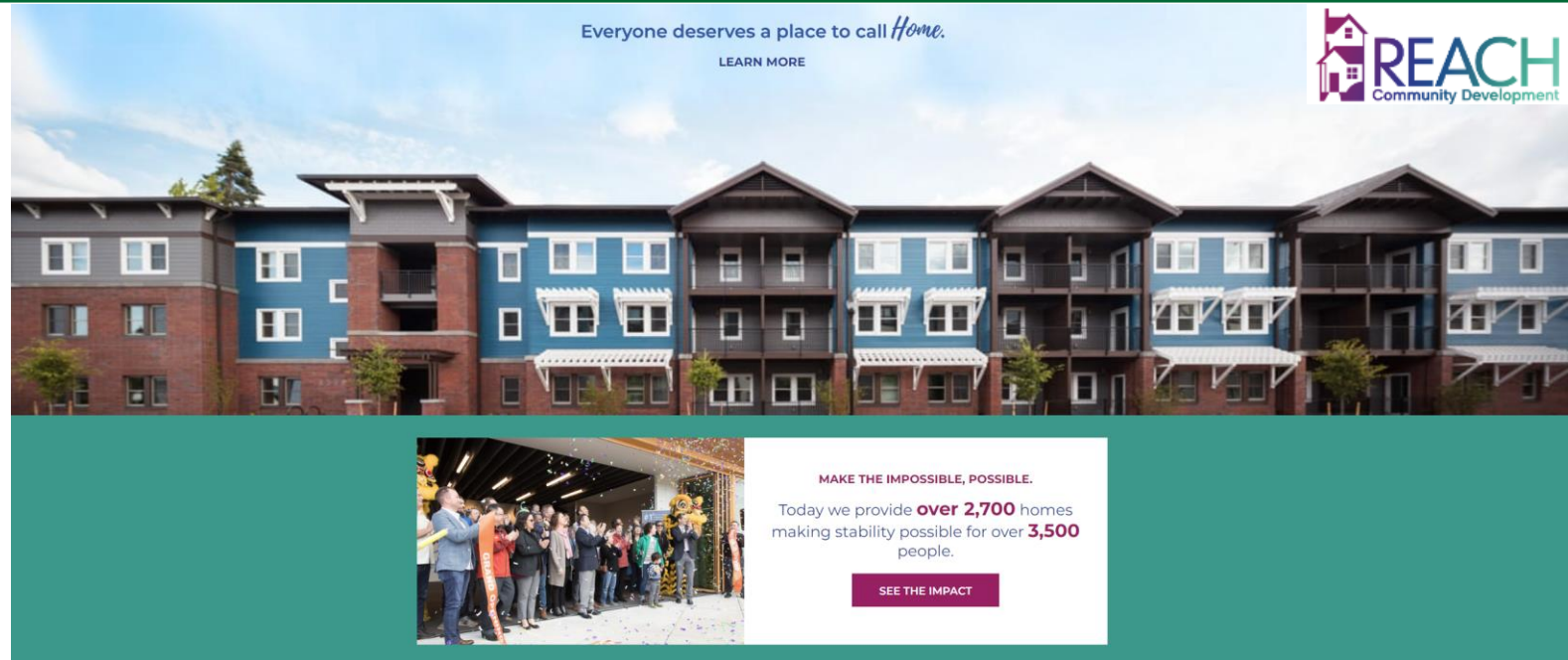
Continued to respond to owners' needs and goals of high-performance





## Non-profit / mission-based clients

- Limited funding
- Long term owners
- Healthy places to live



Owners provide the compelling vision

Task us with creating a high-performance building

Establish the project goals – airtight, durable, energy efficient, code compliant, Passive House, Net Zero, etc.



## Walsh's Quality Program addresses:

- Durability
- Energy-efficiency
- Constructability
- Creating healthy places to live
- Meeting/exceeding high-performance goals

**Aligns well with Passive House principles**







# Introductions

## Passive Projects:

Orchards at Orenco P1, PHI

Orchards at Orenco P2, Phius

DESC Hobson Place South, Phius

Mercy Greenbrae at Marylhurst Commons, Phius\*

Terwilliger Plaza Parkview, Phius\*

\*Phius certification is in process

Certifications standard on most OR/WA projects:

Evergreen Sustainable Development Standard &  
Earth Advantage

Other:

Net Zero, Living Building Challenge, LEED, Built Green

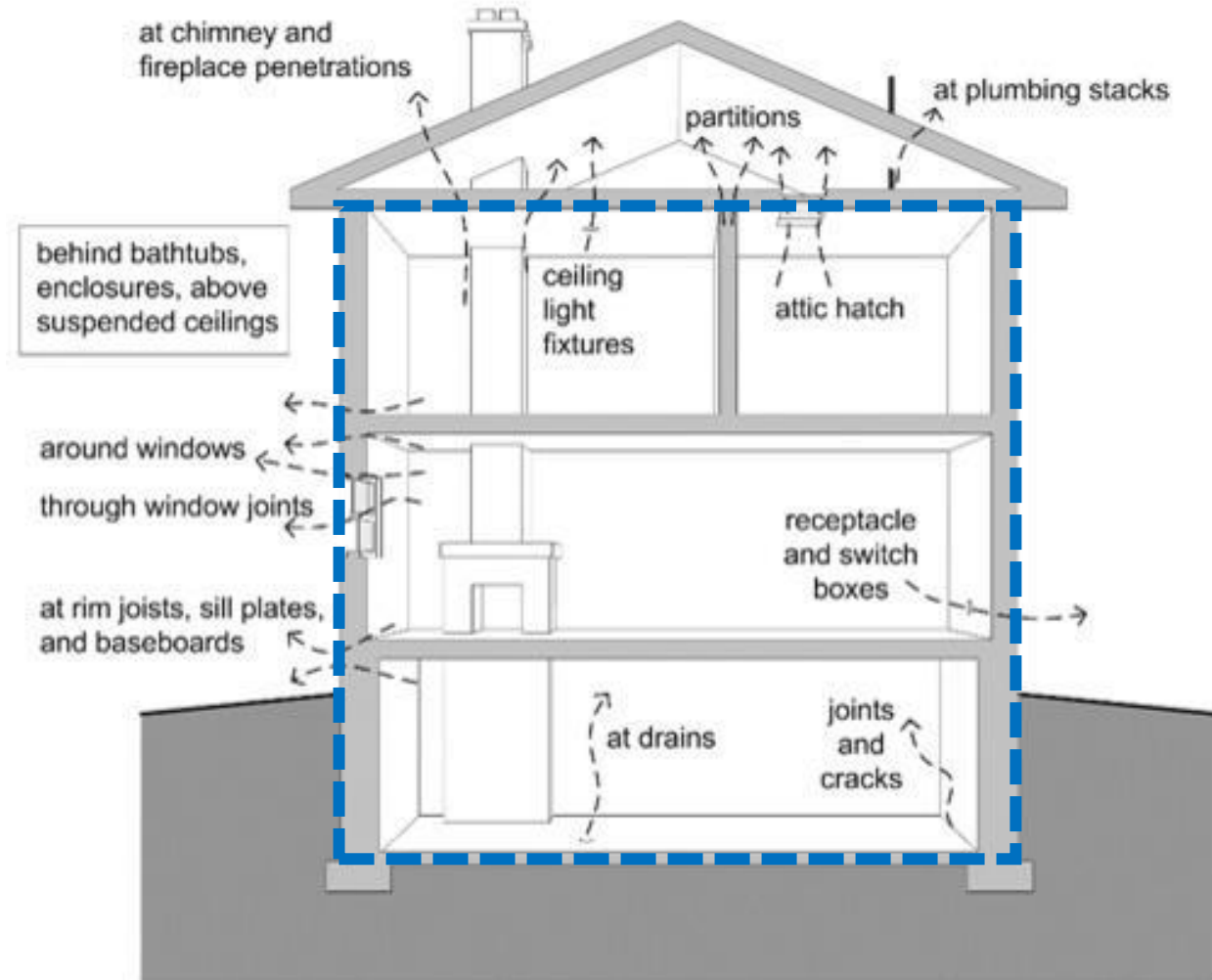


## What is an air barrier?

Air barriers are **systems of materials** used to control airflow in building enclosures. They typically completely enclose the air within a building. The physical properties which distinguish air barriers from other materials are the ability to resist air flow and air pressure.

Joseph Lstiburek, Building Science Corporation

RR-0403: Air Barriers





# Preconstruction (Design)

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## Where is the line of air control?

Air barriers keep outside and inside air out of the building enclosure. Air barriers can be located anywhere in the building enclosure—at the exterior surface, the interior surface, or at any location in between. In heating climates, interior air barriers control the exfiltration of interior, often moisture-laden, air. Whereas exterior air barriers control the infiltration of exterior air and prevent wind-washing through insulation.

Wherever they are, air barriers should be:

- impermeable to air flow
- **continuous over the entire building enclosure**
- able to withstand the forces that may act on them during and after construction
- durable over the expected lifetime of the building

Joseph Lstiburek, Building Science Corporation

RR-0403: Air Barriers

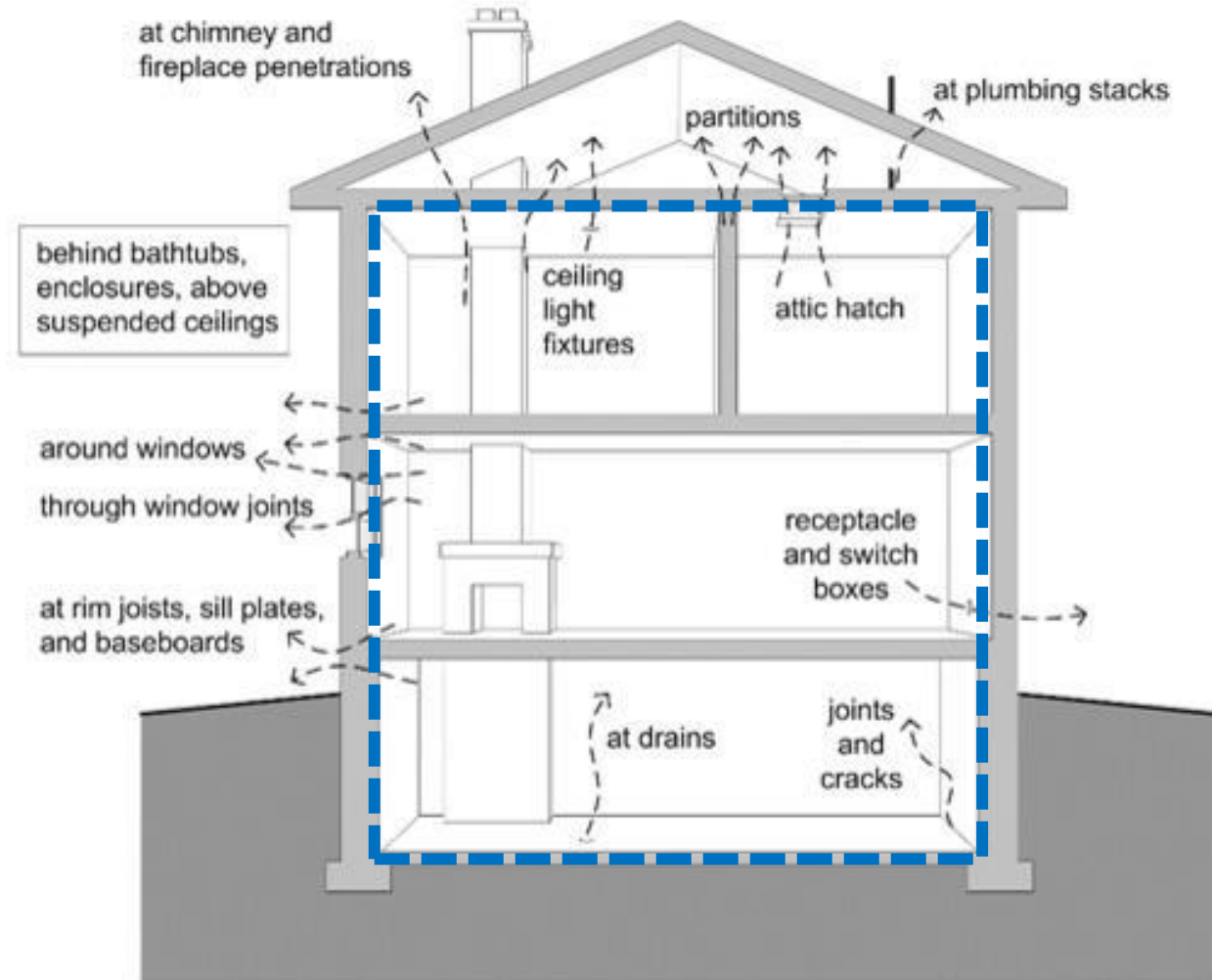


# Preconstruction (Design)

## Where is the line of air control?

### Interior vs Exterior

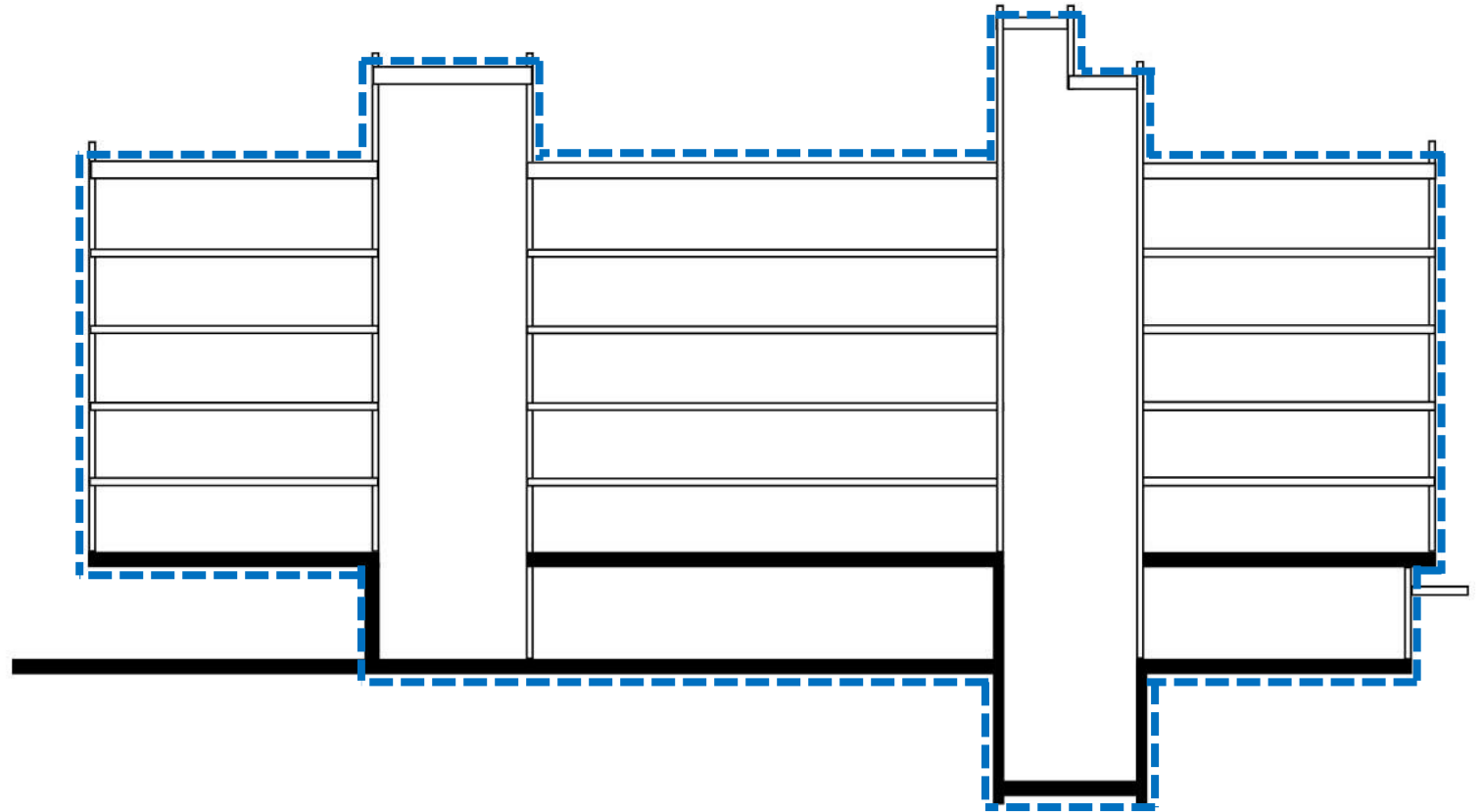
- Detailing
- Durability
- Sequencing of work
- Material transitions



Where is the line of air control?

Interior vs Exterior

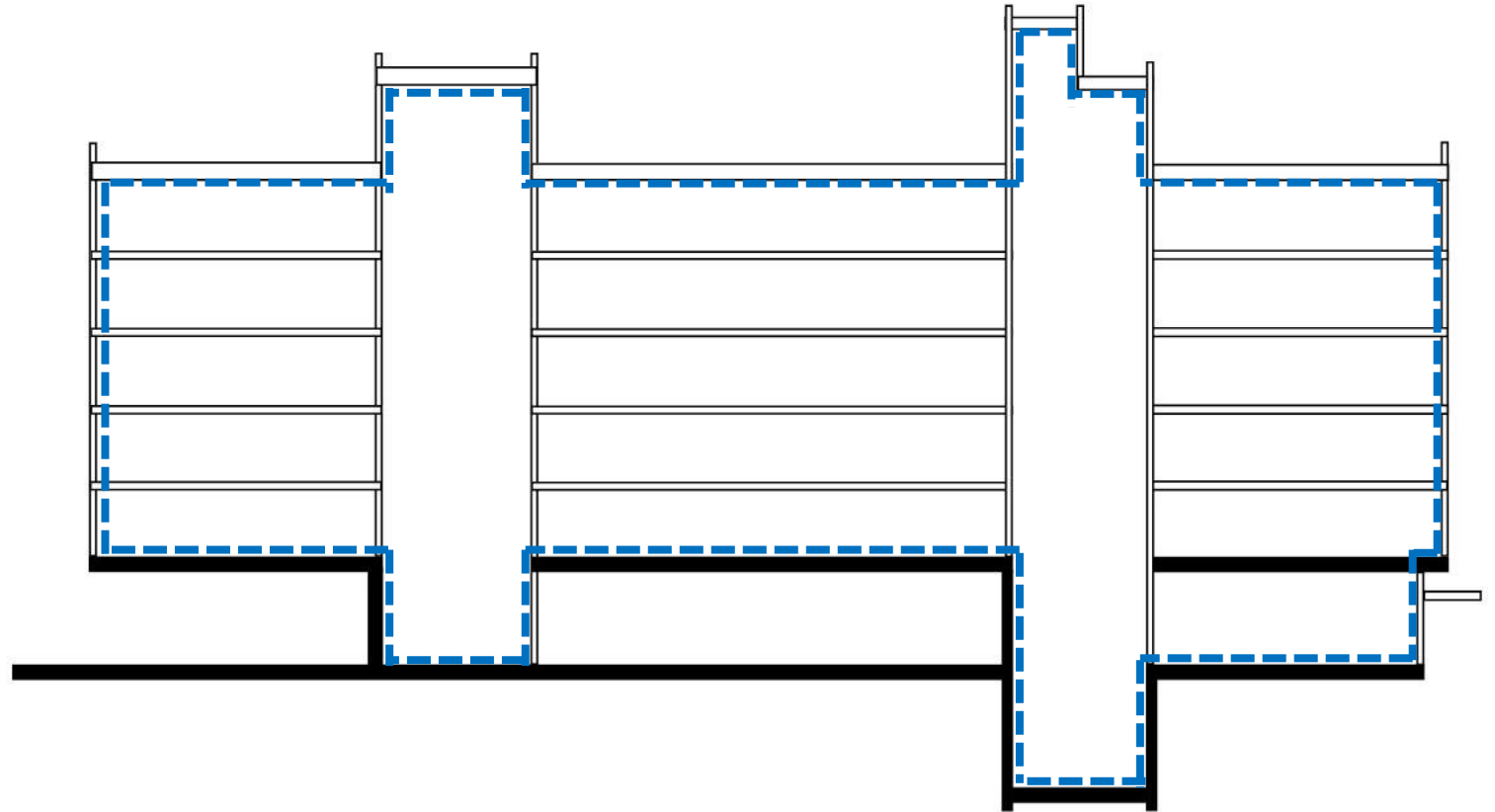
- Detailing
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Where is the line of air control?

Interior vs Exterior

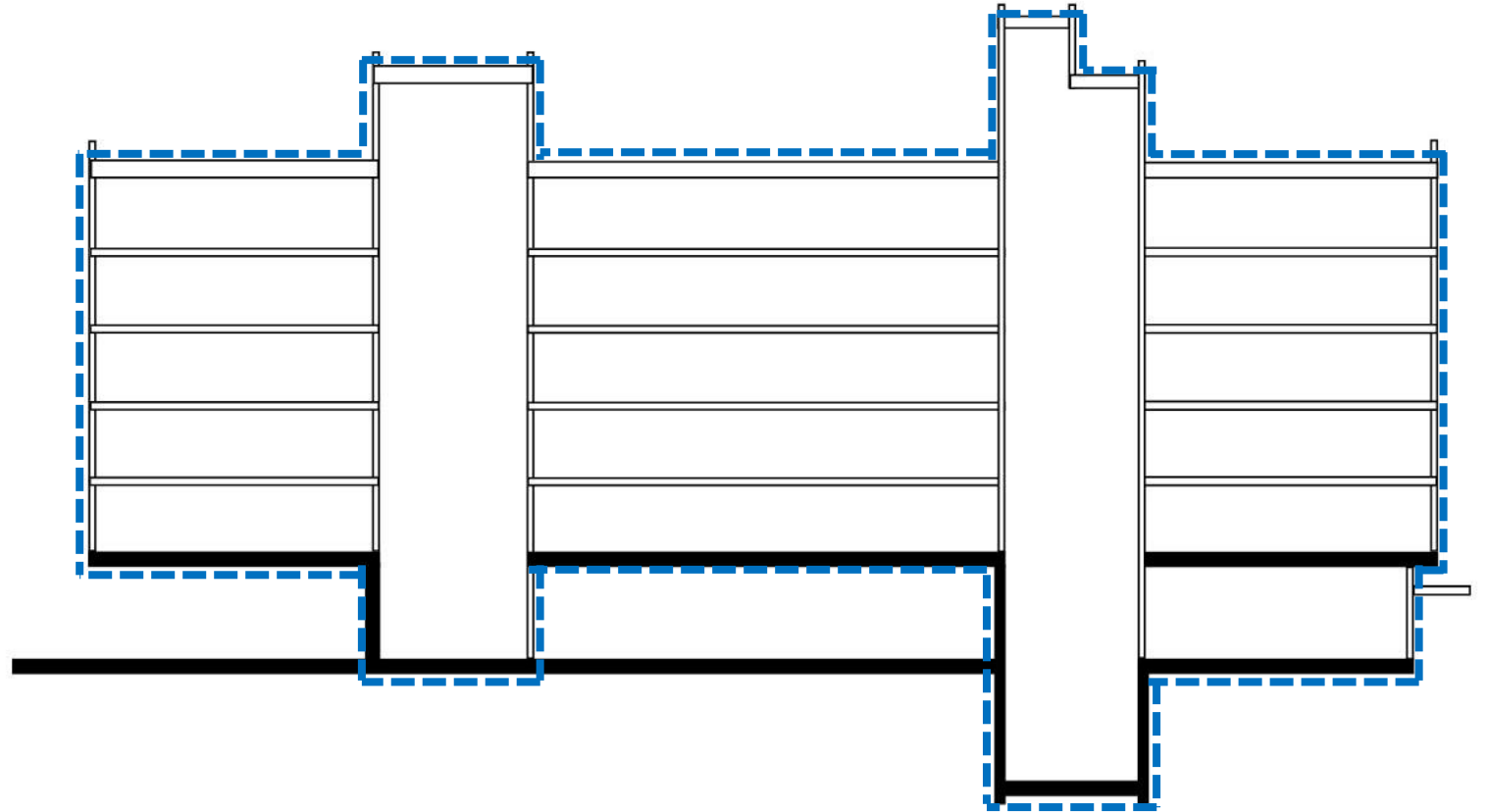
- Detailing
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Where is the line of air control?

Interior vs Exterior

- Detailing
- Durability
- Sequencing of work
- Material transitions

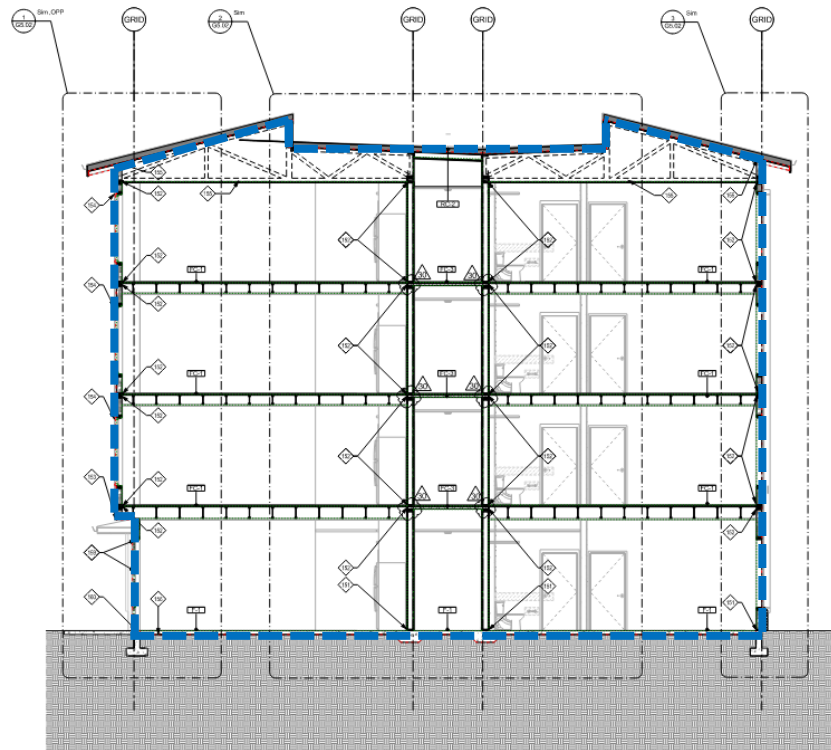




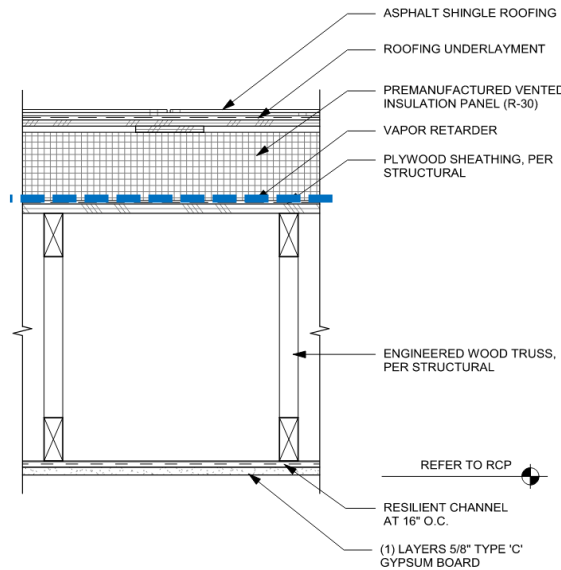
# Preconstruction (Design)

## Where is the line of air control?

### Whole Building



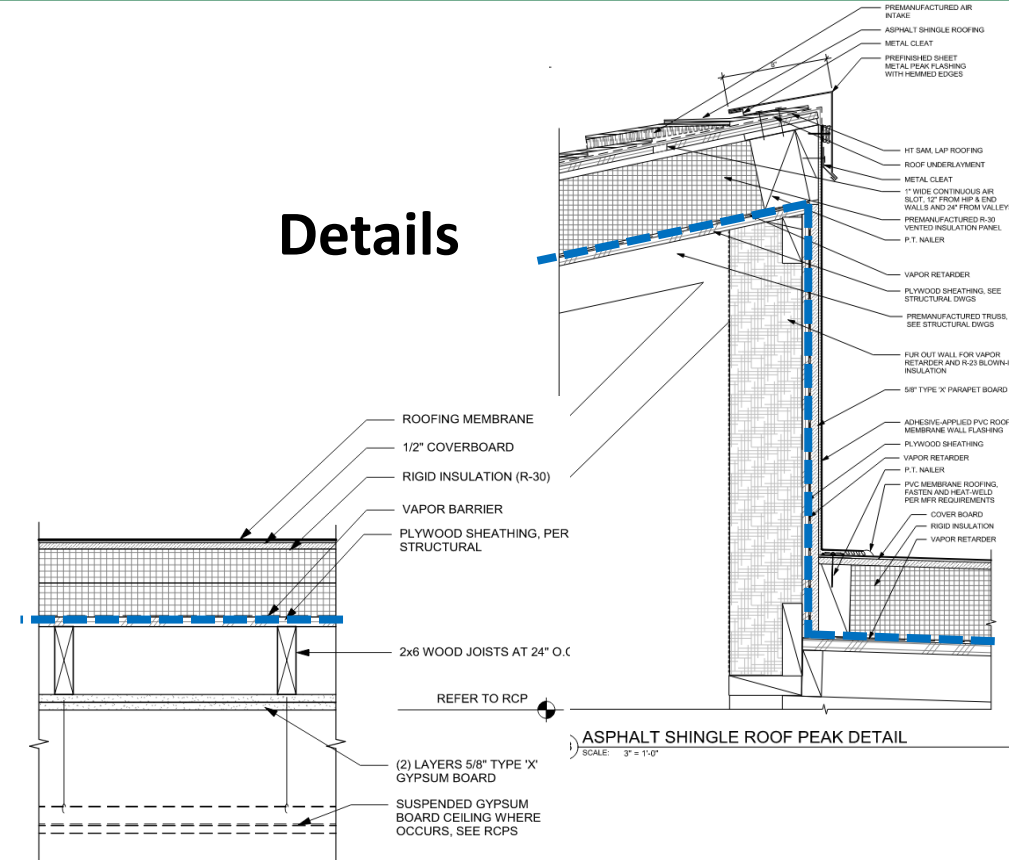
### Assemblies



**RC-1 - ROOF/CEILING (1-HR ASSEMBLY)**

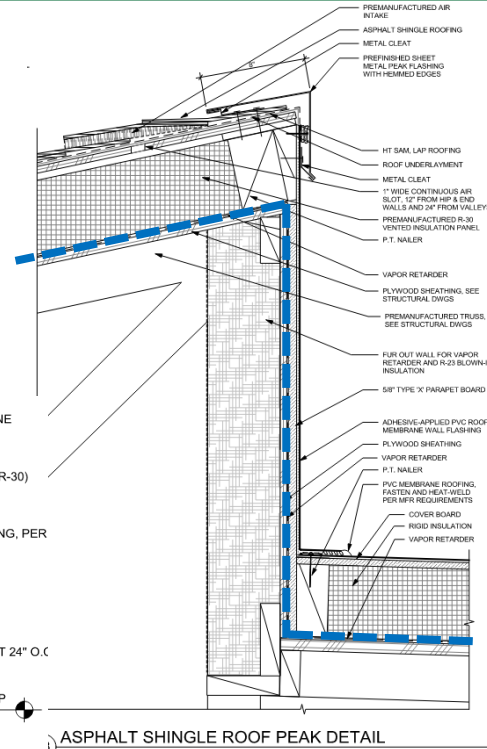
(TYPICAL AT LOW-SLOPE UPPER ROOF)  
BASED ON 2018 GA FILE NO. RC 2603, 2604, 2608 OR 2609

### Details



**RC-2 - ALT ROOF/CEILING (1-HR ASSEMBLY)**

(TYPICAL AT SLOPED UPPER ROOF ABOVE CORRIDORS)  
BASED ON 2019 OSSC CHAPTER 7, TABLE 721.1(3), #21-1.1



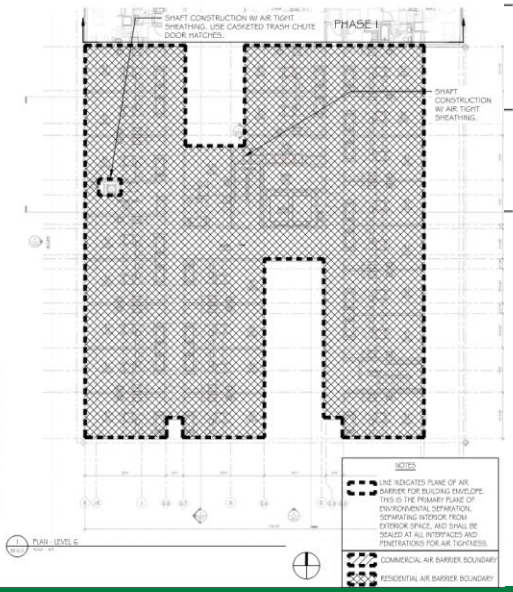
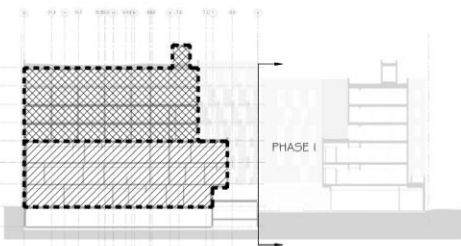
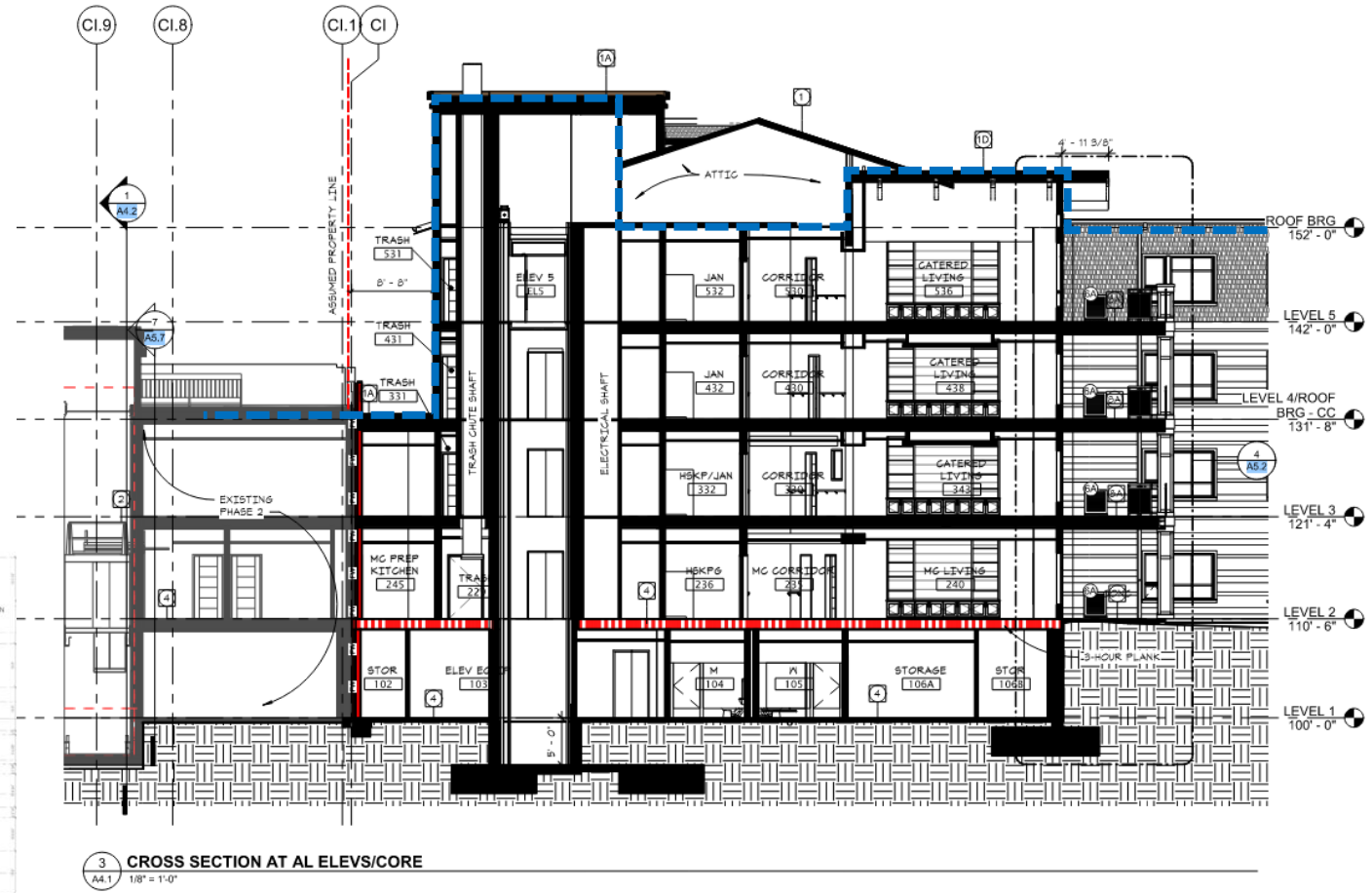
**ASPHALT SHINGLE ROOF PEAK DETAIL**

SCALE: 3" = 1'-0"

# Preconstruction (Design)

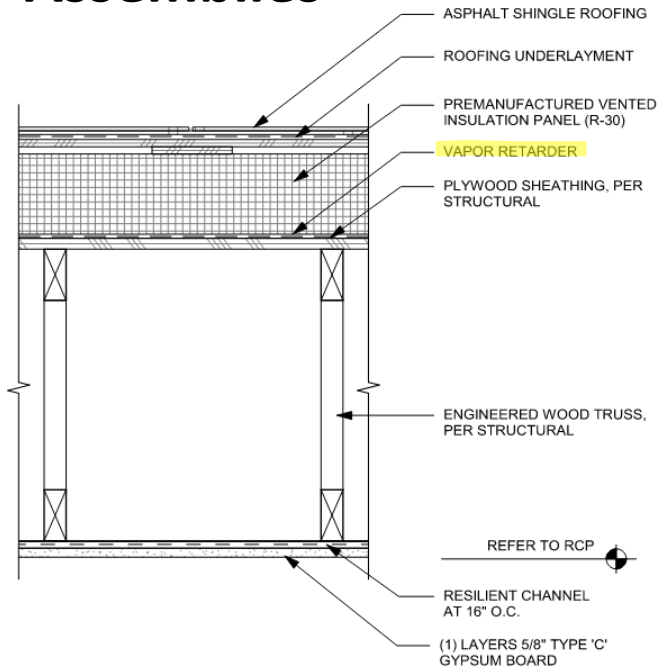
Where is the line of air control?

Whole Building



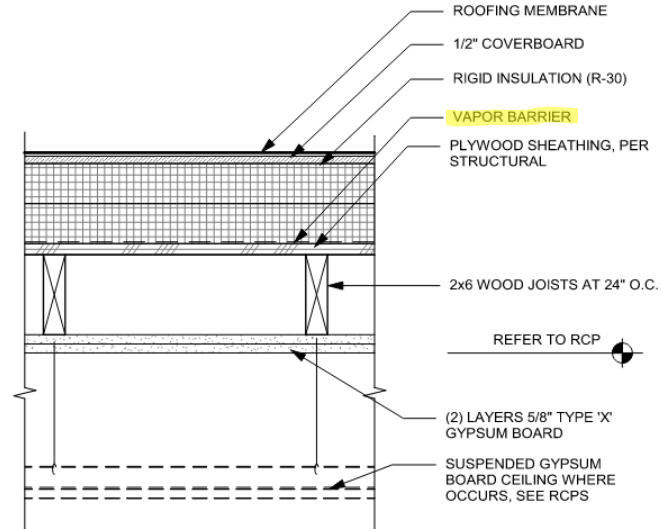
## Where is the line of air control?

### Assemblies



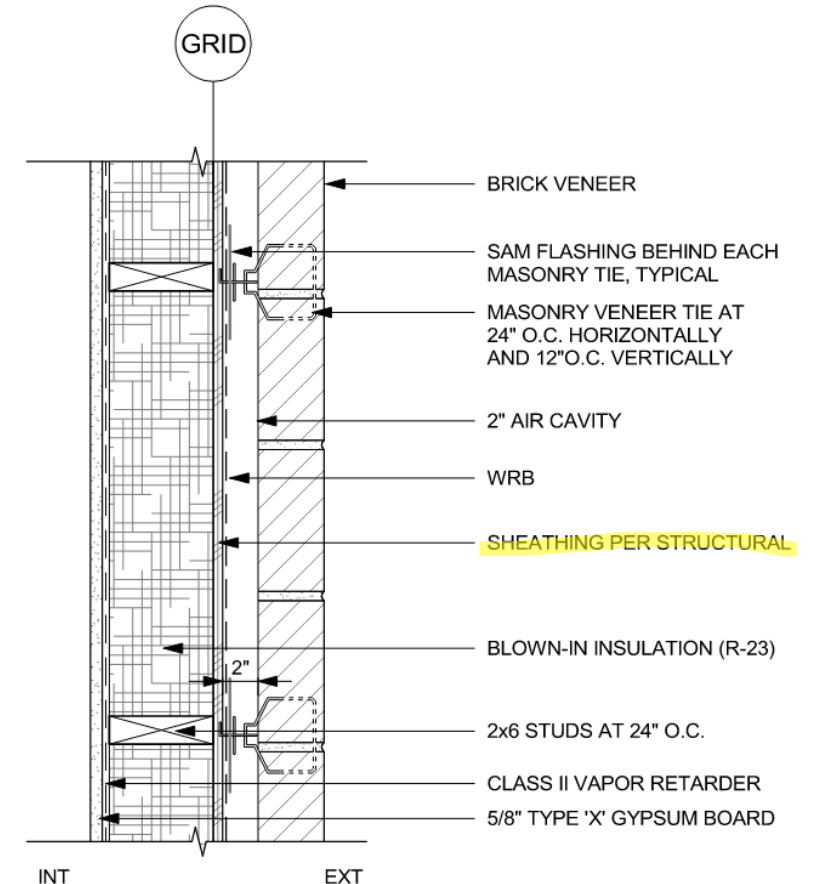
RC-1 - ROOF/CEILING (1-HR ASSEMBLY)

(TYPICAL AT LOW-SLOPE UPPER ROOF)  
BASED ON 2018 GA FILE NO. RC 2603, 2604, 2608 OR 2609



RC-2 - ALT ROOF/CEILING (1-HR ASSEMBLY)

TYPICAL AT SLOPED UPPER ROOF ABOVE CORRIDORS  
BASED ON 2019 OSSC CHAPTER 7, TABLE 721.1(3), #21-1.1



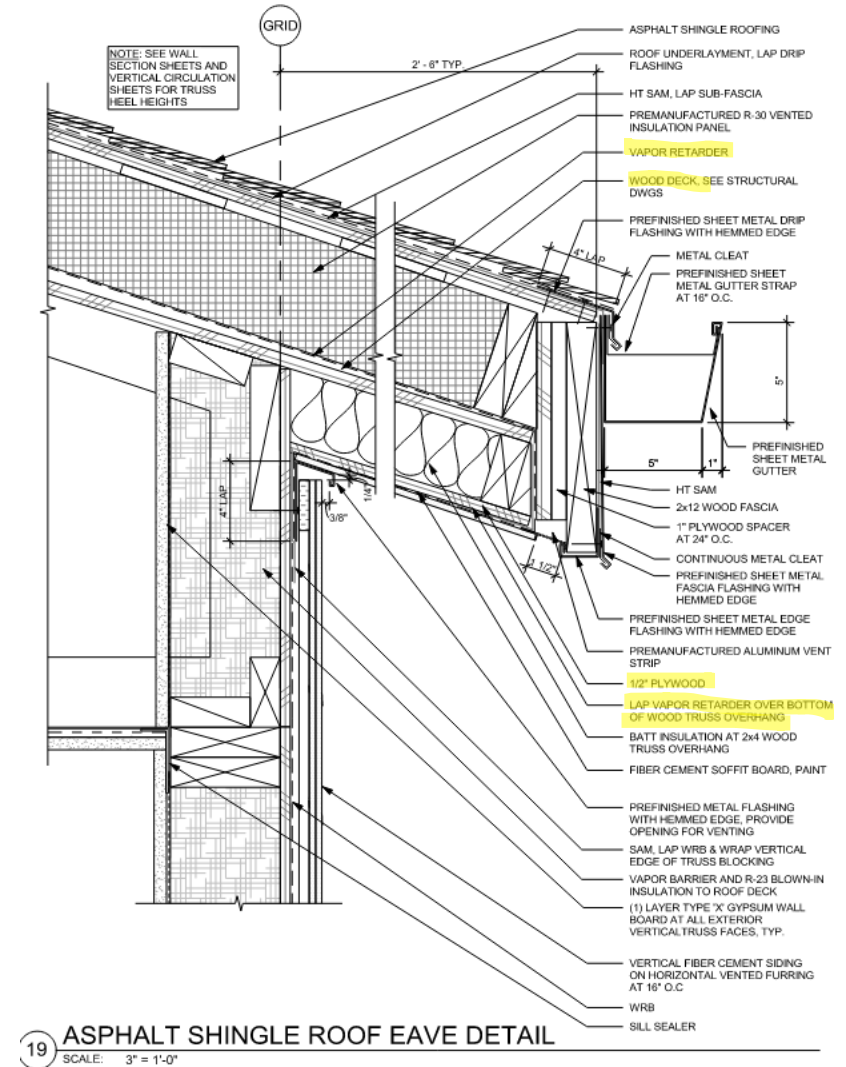
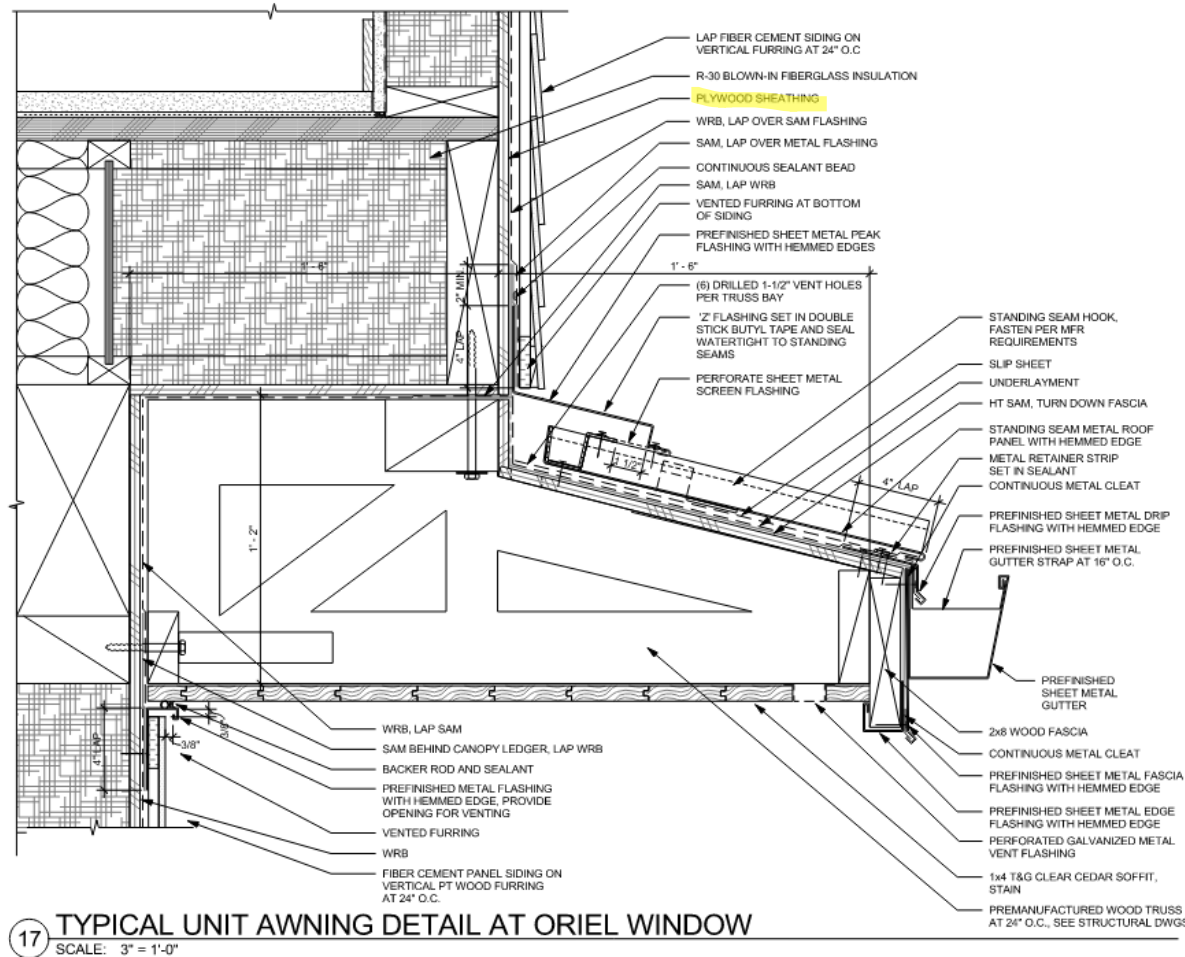
A - EXTERIOR WALL (1-HR ASSEMBLY)

(TYPICAL AT EXTERIOR WALLS)  
FIRE-RESISTANCE-RATED WOOD-FRAME WALL AND FLOOR/CEILING ASSEMBLY  
NO. WS6-1.6

# Preconstruction (Design)

## Where is the line of air control?

## Details

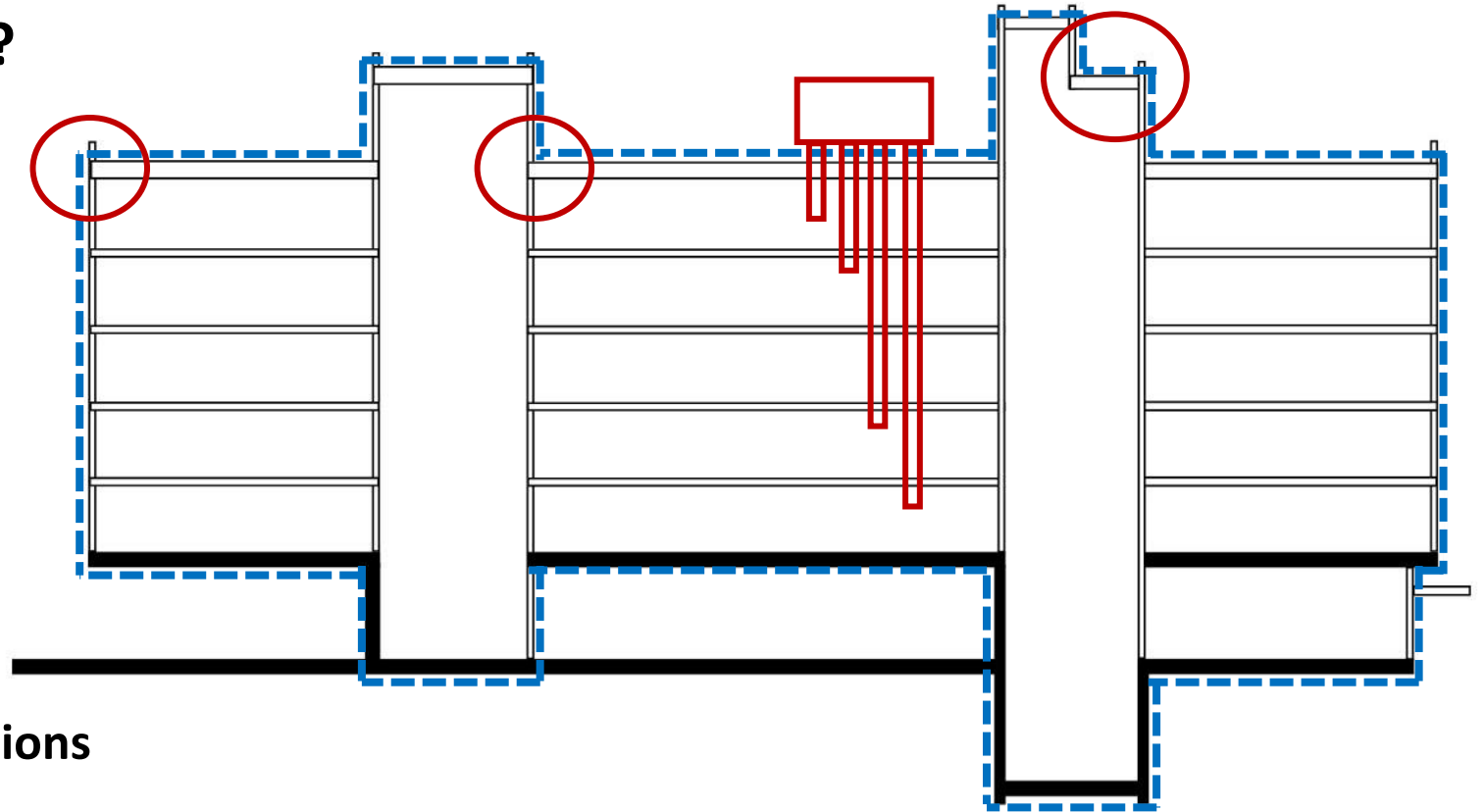




## Where is the line of air control?

### ROOF

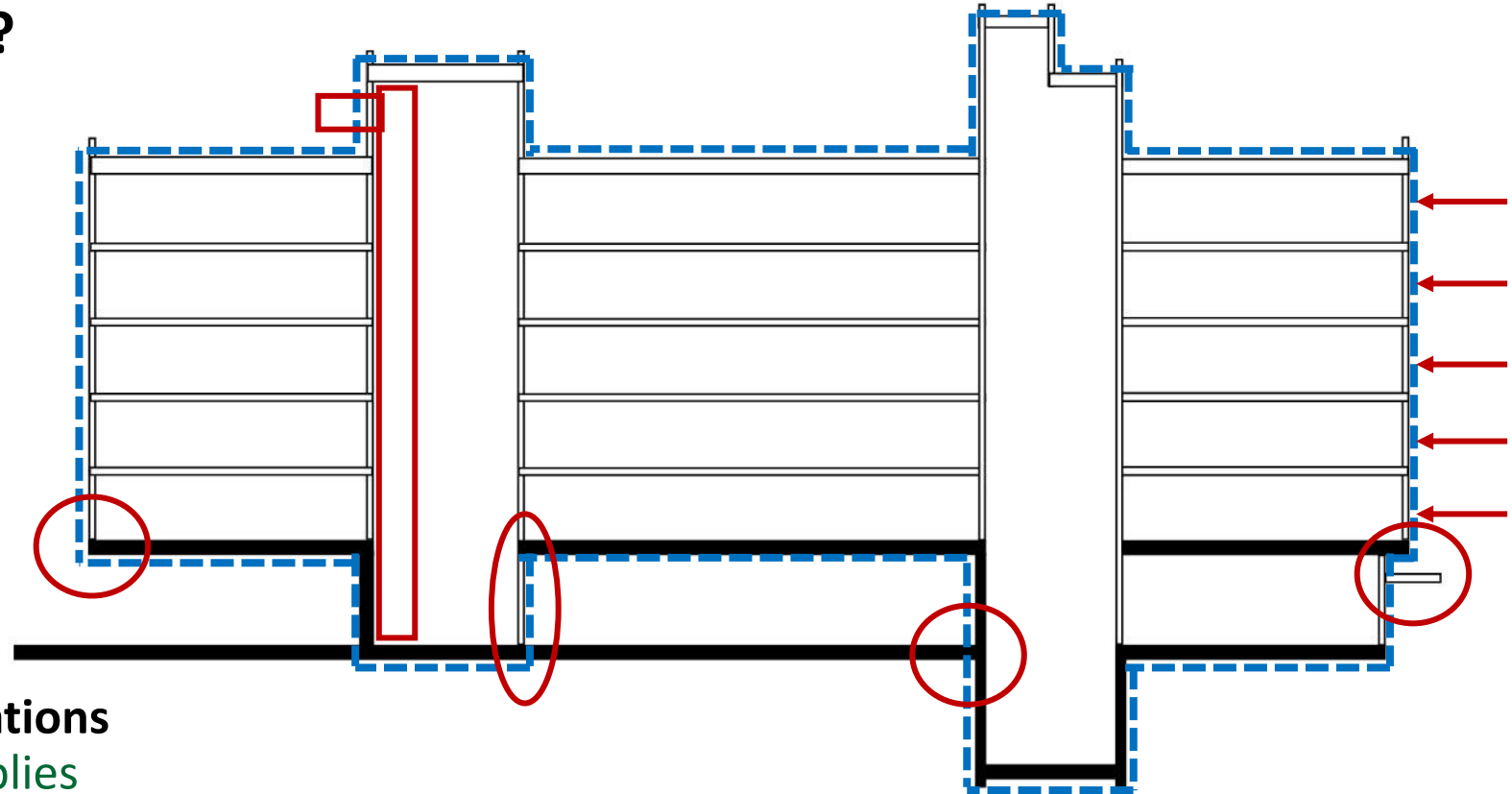
- **Whole Building**
  - Pitched
  - Flat
- **Assembly**
  - Roof construction
  - Roof/ceiling
- **Transition, Terminations, Penetrations**
  - Top of Wall
  - Penthouse, Parapet
  - Vents, Utilities, Shafts



## Where is the line of air control?

### WALLS

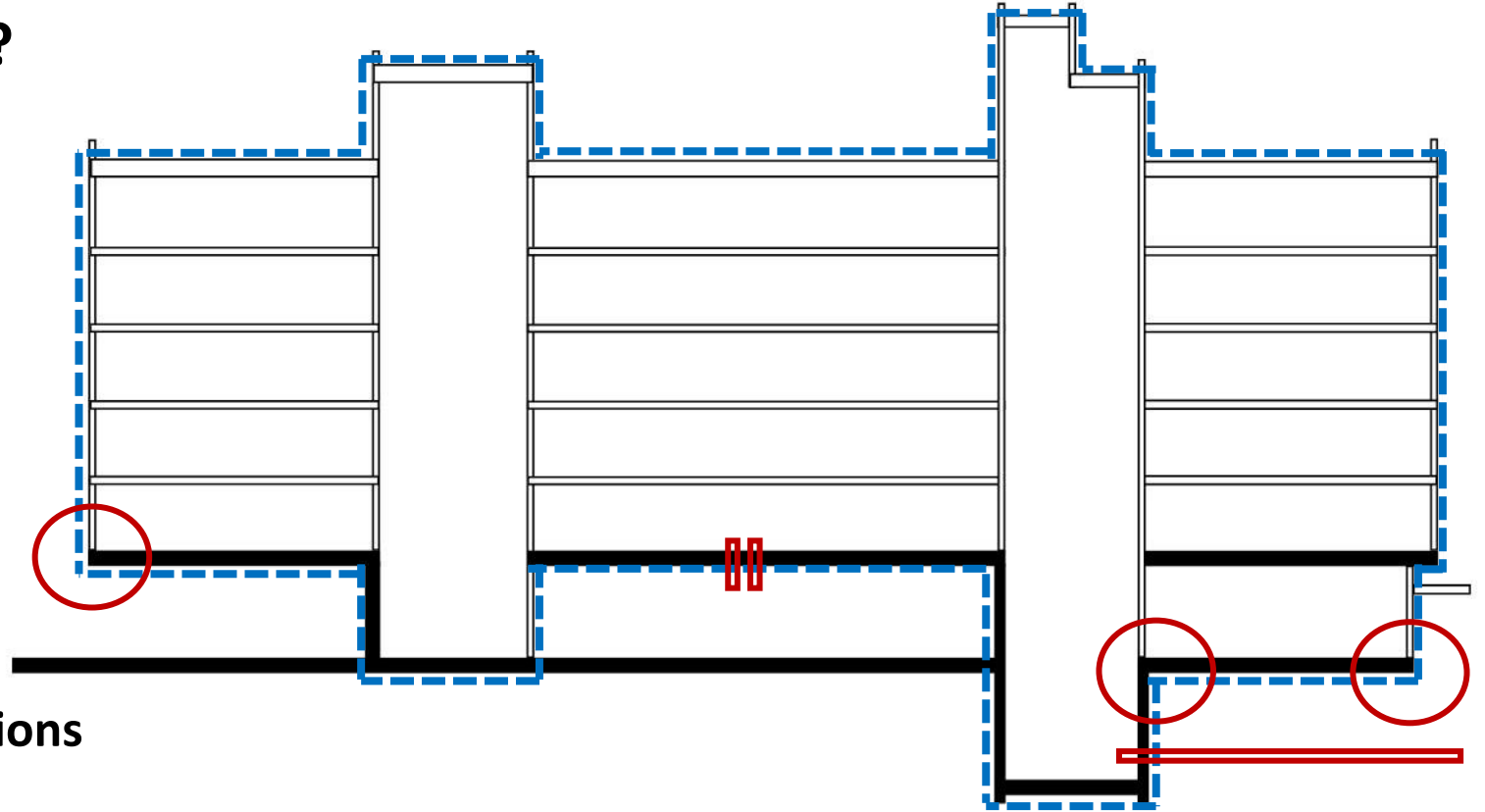
- **Whole Building**
  - Simple or articulated
  - Things poking out / attachments
- **Assembly**
  - Walls (and penthouse)
  - Parapets
  - Slab edges
- **Transitions, Terminations, Penetrations**
  - Transitions between assemblies
  - Windows, Doors, Storefronts
  - Decks, Shades,
  - MEP



## Where is the line of air control?

### FLOOR

- **Massing**
  - Continuity on all 6-sides
  - Unconditioned spaces
- **Assembly (assemblies)**
  - Construction type changes
  - Slab / Elevated Slab
  - Floor framing / Crawlspace?
- **Transitions Terminations Penetrations**
  - Slab penetrations (elevated)
  - Vaults
  - Utility, radon venting, etc.



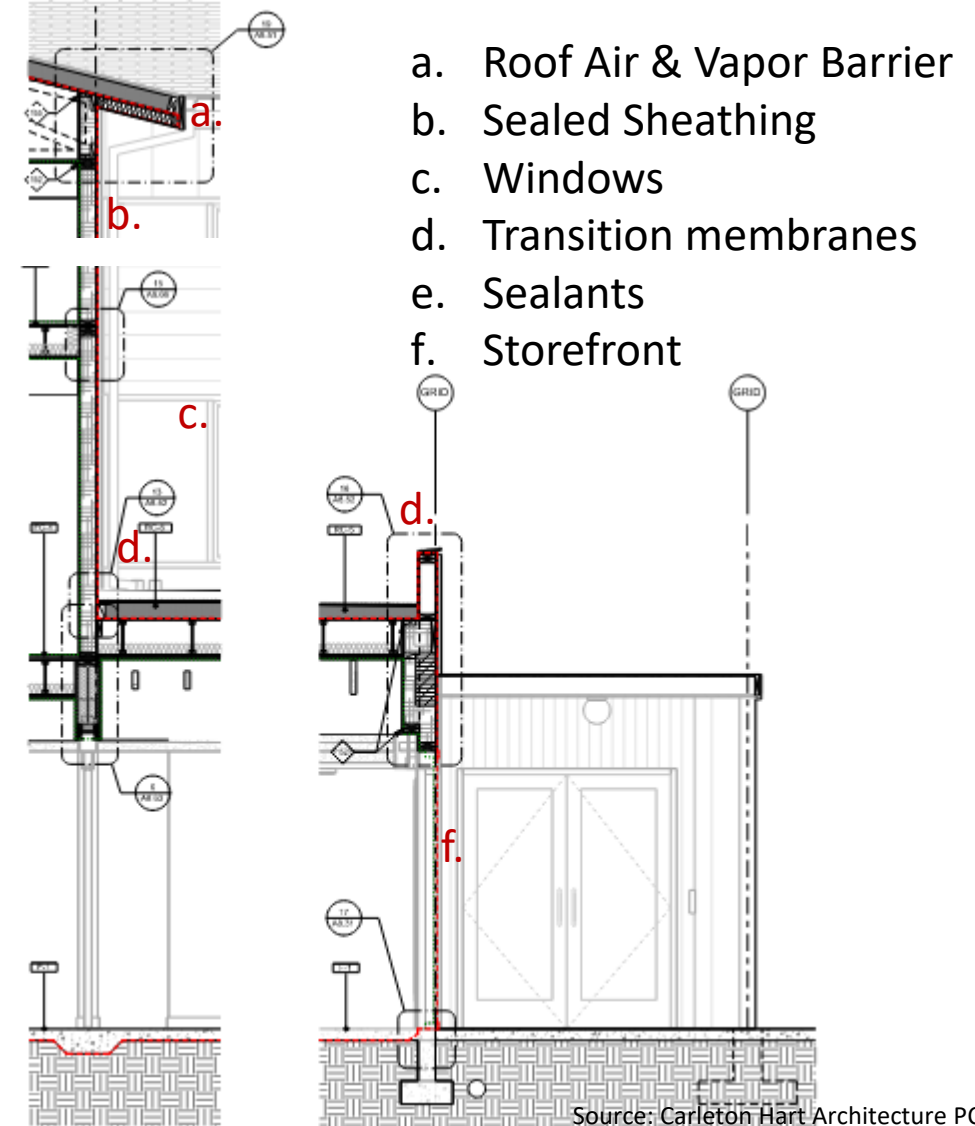
## What is the line of air control?

### MATERIALS

Air barriers are **systems** of materials used to control airflow in building enclosures. They typically completely enclose the air within a building. The physical properties which distinguish air barriers from other materials are the ability to resist air flow and air pressure.

Joseph Lstiburek, Building Science Corporation

RR-0403: Air Barriers



## What is the line of air control?

### MATERIALS NEED TO BE CONTINUOUS

Wherever they are, air barriers should be:

- impermeable to air flow
- continuous over the entire building enclosure
- able to withstand the forces that may act on them during and after construction
- durable over the expected lifetime of the building

Joseph Lstiburek, Building Science Corporation

RR-0403: Air Barriers





## Building Enclosure Coordination

### Coordination Meeting

- Whole team – architect, consultants, installers, manufacturer representatives
- No substitutions on Division 7 or exterior windows/doors Div 8, submittal process
- Trust but verify
- Verify design and expected performance align
- Set expectations for construction







## Building Enclosure Coordination

### Verification

- Verify materials & design
- Practice and example of accepted design
- Practice trade interface
- Exterior wall mock-up

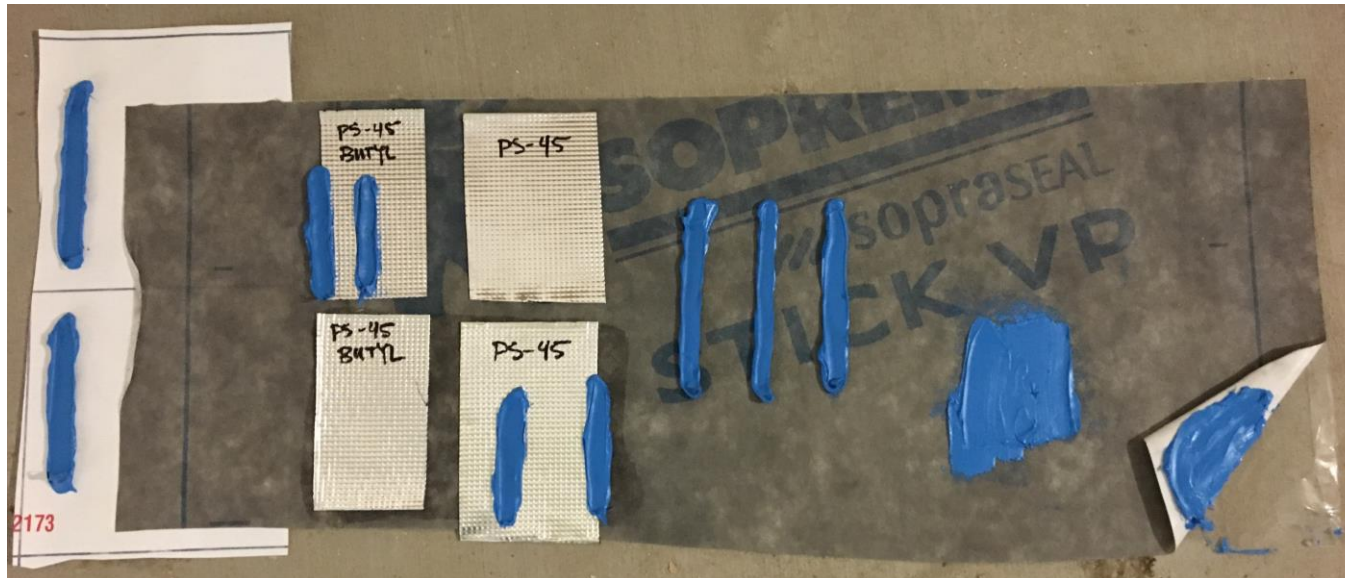




## Building Enclosure Coordination

### Verification

- Exterior wall mock-up
- Performance testing (adhesion, compatibility, water, air, etc.)

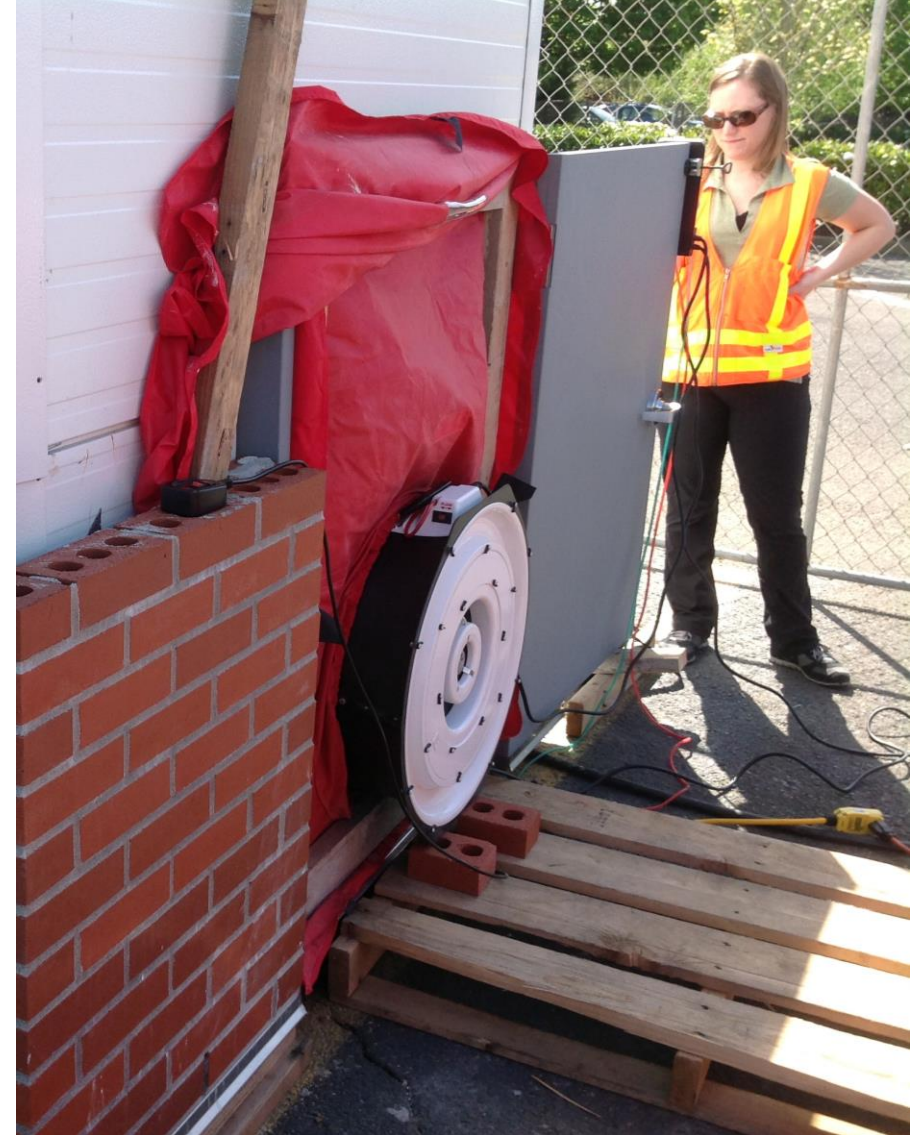




## Building Enclosure Coordination

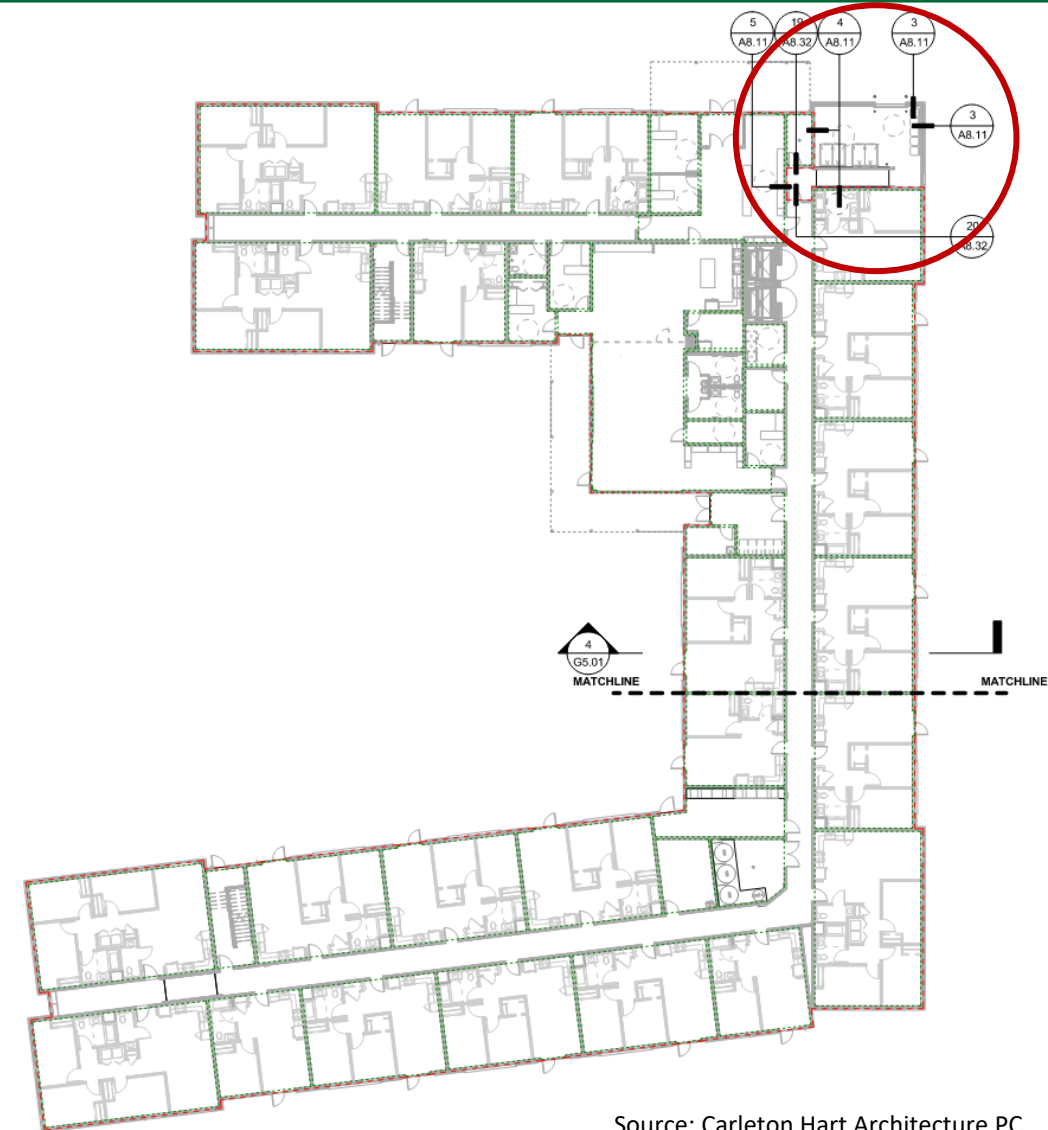
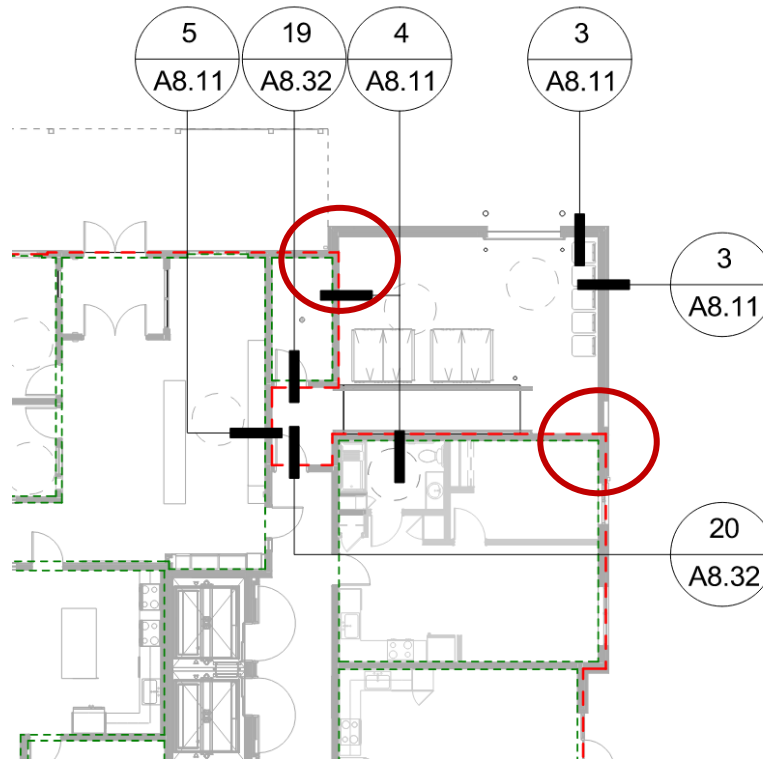
### Verification

- Exterior wall mock-up
- Performance testing (adhesion, compatibility, water, air, etc.)
- Test the tricky details



## Understanding & Executing the line of air control

- Trade coordination
- Pre-stripping
- Sequence



## Understanding & Executing the line of air control

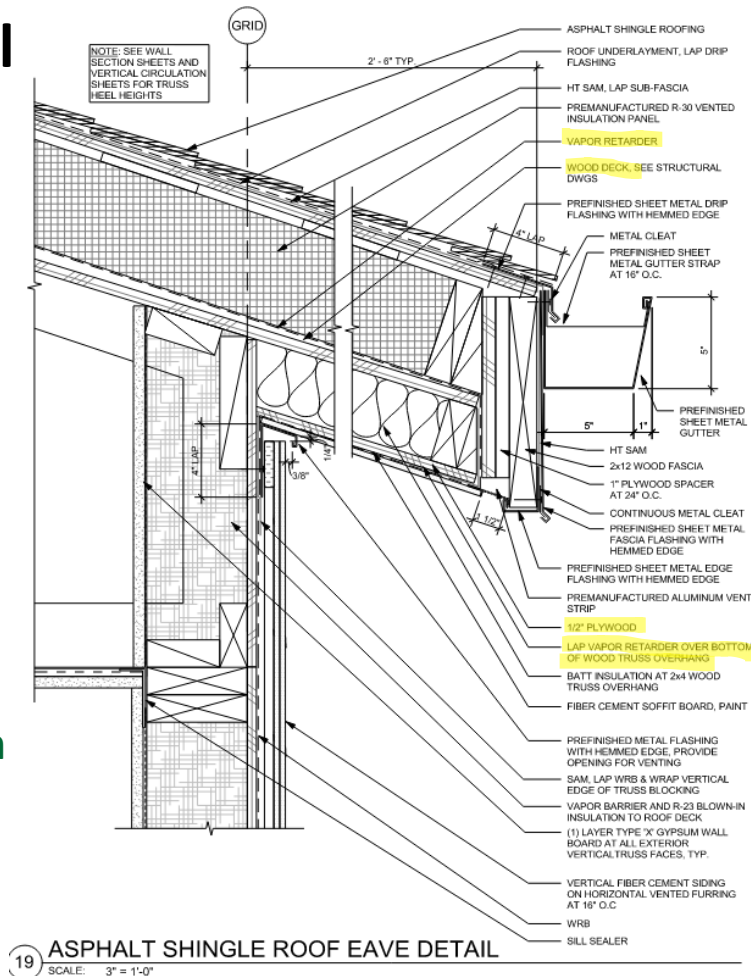
- Trade coordination
- Sequence
  - Drywall connections at ceiling /exterior walls
  - Sealed sheathing seams
  - Adhesive membrane at stem wall
  - Slab edge insulation (boundary wall)





## Understanding & Executing the line of air control

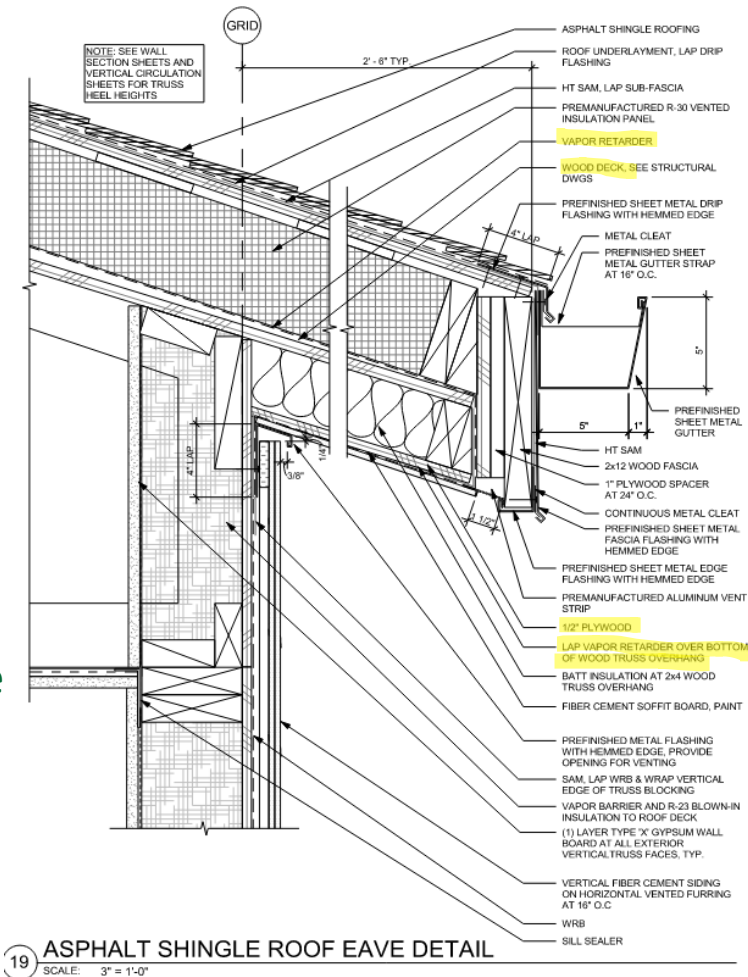
- Trade coordination
  - Framer
  - WRB/AB
  - Roofer
- Transitions
  - Roof to wall
- Sequence
  - Trades
  - Water protection





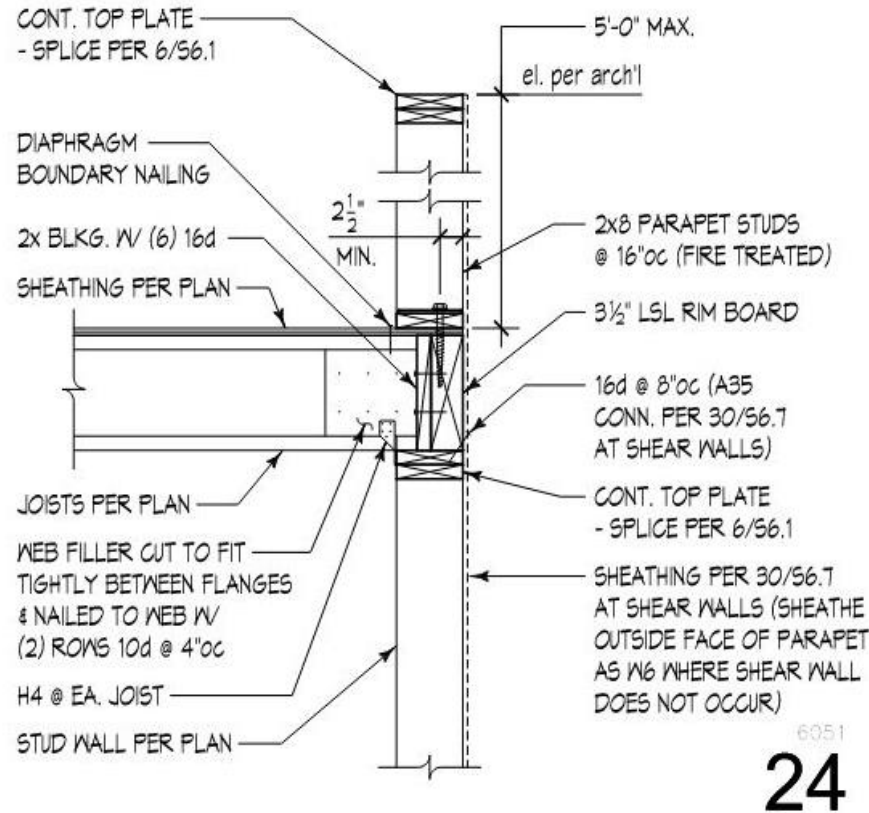
## Understanding & Executing the line of air control

- Trade coordination
  - Framers
  - WRB/AB
  - Roofer
- Transitions
  - Roof to wall
- Sequence
  - Construction phase protections

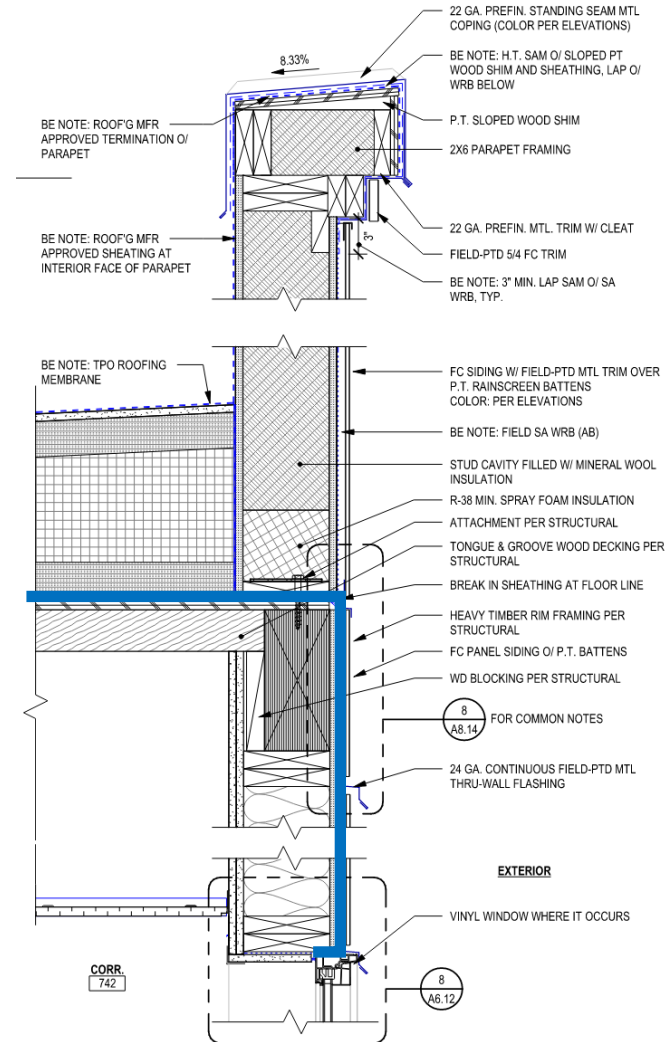


# Understanding & Executing the line of air control

- Trade coordination
  - Framers
  - WRB/AB
  - Roofer
- Transitions
  - Roof to wall
- Sequence
  - Mobilizing trades



# Construction





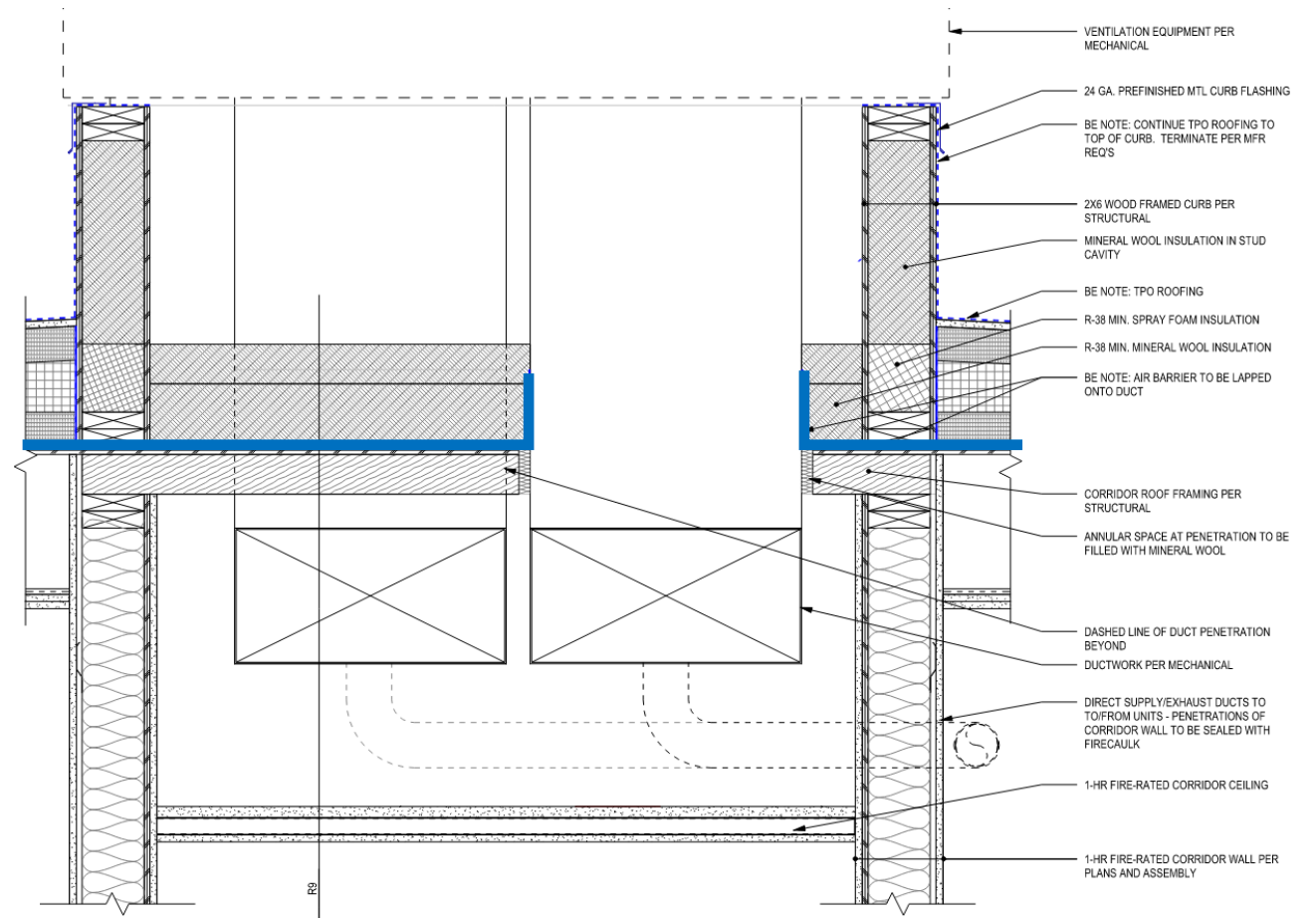
## Understanding & Executing the line of air control

- Trade coordination
  - Framers
  - WRB/AB
  - Roofer
- Transitions
  - Roof to wall
- Sequence
  - Mobilizing Trades



## Understanding & Executing the line of air control

- Trade coordination
  - Framers
  - Roofers
  - Insulators
  - Mechanical
- Penetrations
  - Mechanical equipment
  - Ductwork sealing
- Sequence
  - Mobilizing Trades



17 SECTION DTL - ROOF ERV EQUIPMENT SUPPORT CURB  
A8.15 SCALE: 1 1/2" = 1'-0"



## Understanding & Executing the line of air control

- Trade coordination
  - Framers
  - Roofers
  - Insulators
  - Mechanical
- Penetrations
  - Mechanical equipment
  - Ductwork sealing
- Sequence
  - Mobilizing Trades



## Understanding & Executing the line of air control

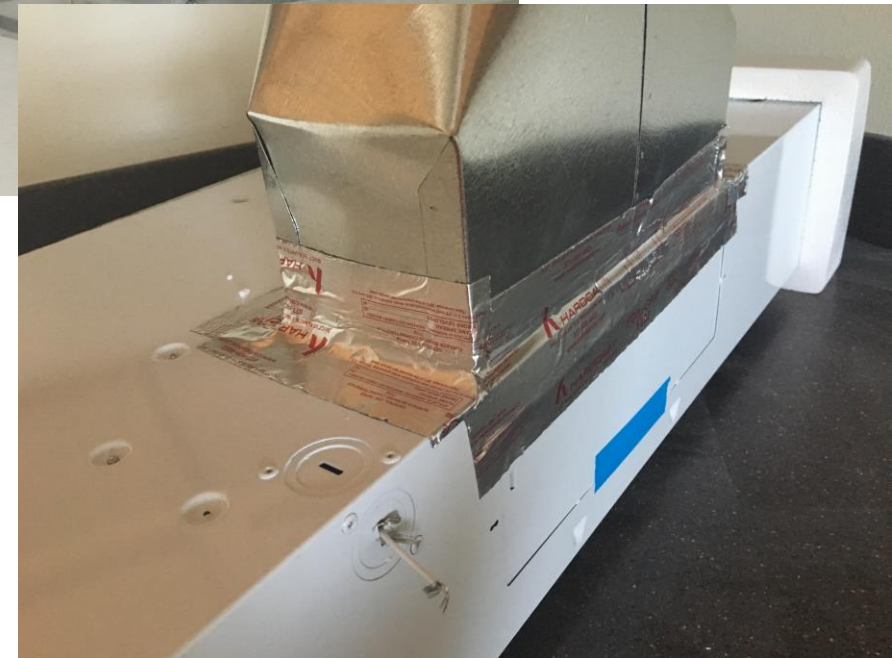
- Trade coordination
  - Framers
  - Roofer
  - Insulator
  - Mechanical
- Penetrations
  - Mechanical equipment
  - Ductwork sealing
- Sequence
  - Mobilizing Trades





## Understanding & Executing the line of air control

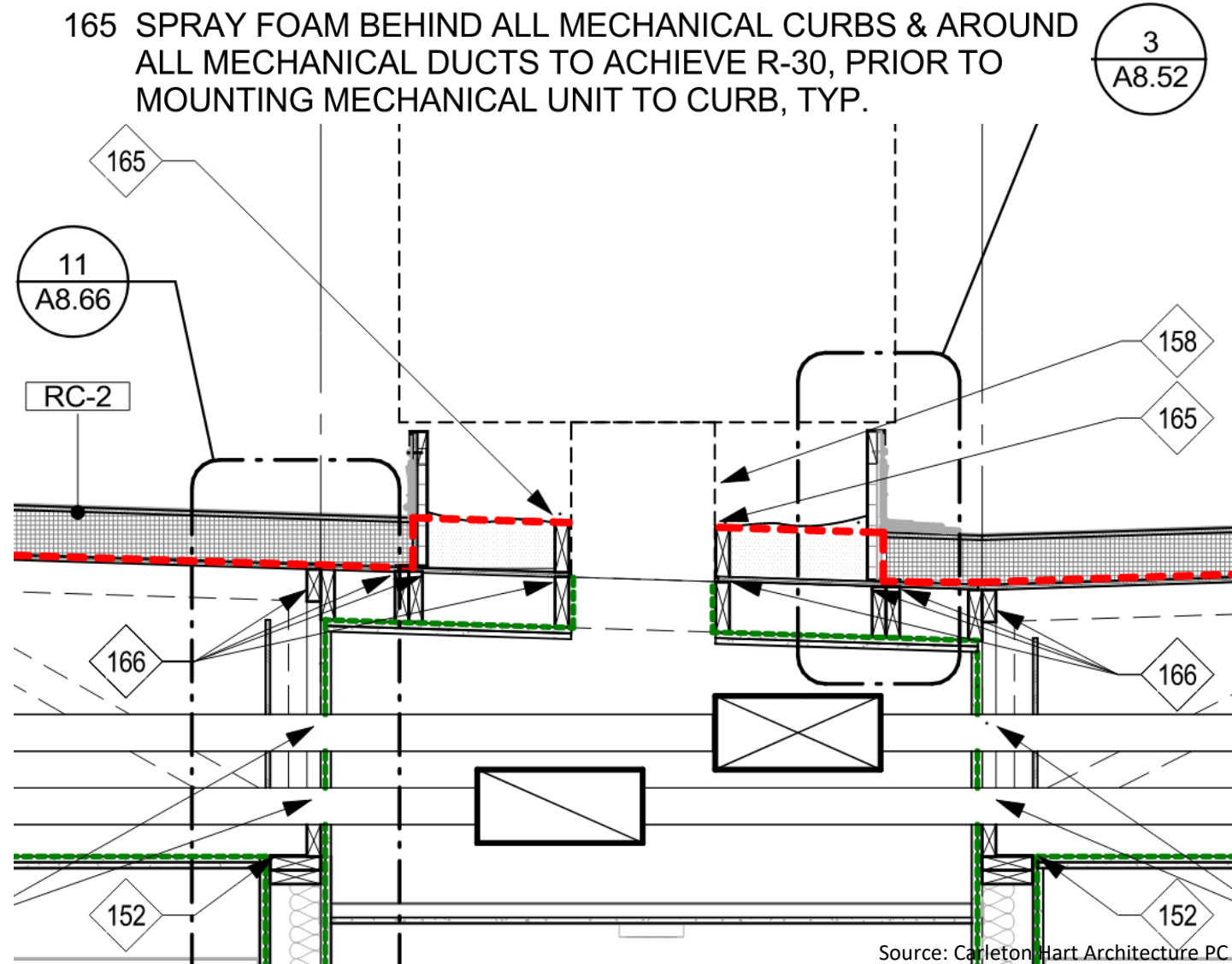
- Trade coordination
  - Ductwork airtightness matters
  - Know the metric
  - Know what it takes
  - Set / communicate expectations
  - Coordinate work
  - Visual verification
  - Pre-testing?



## Understanding & Executing the line of air control

- Trade coordination
  - Framers
  - Roofer
  - Insulator
  - Mechanical
- Penetrations
  - Mechanical equipment
  - Mechanical ducting

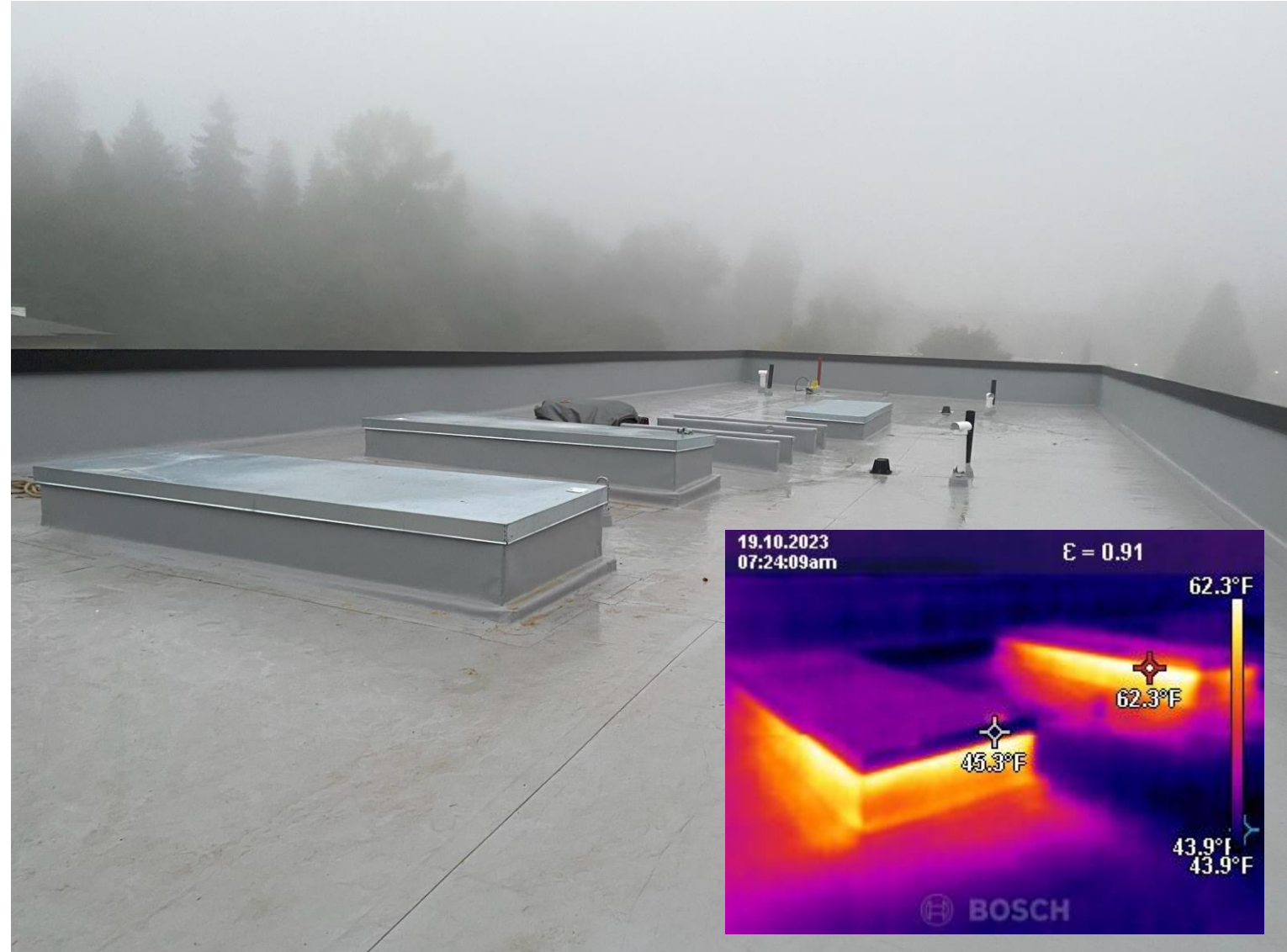
165 SPRAY FOAM BEHIND ALL MECHANICAL CURBS & AROUND ALL MECHANICAL DUCTS TO ACHIEVE R-30, PRIOR TO MOUNTING MECHANICAL UNIT TO CURB, TYP.





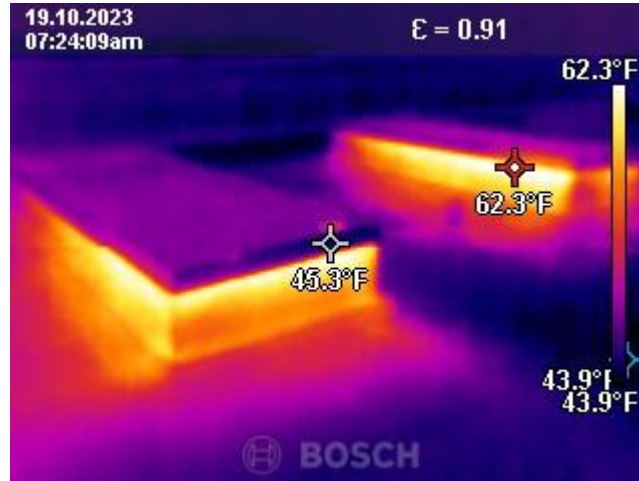
## Understanding & Executing the line of air control

- Trade coordination
  - Framers
  - Roofer
  - Insulator
  - Mechanical
- Penetrations
  - Mechanical equipment
  - Ductwork sealing
- Sequence
  - Mobilizing Trades



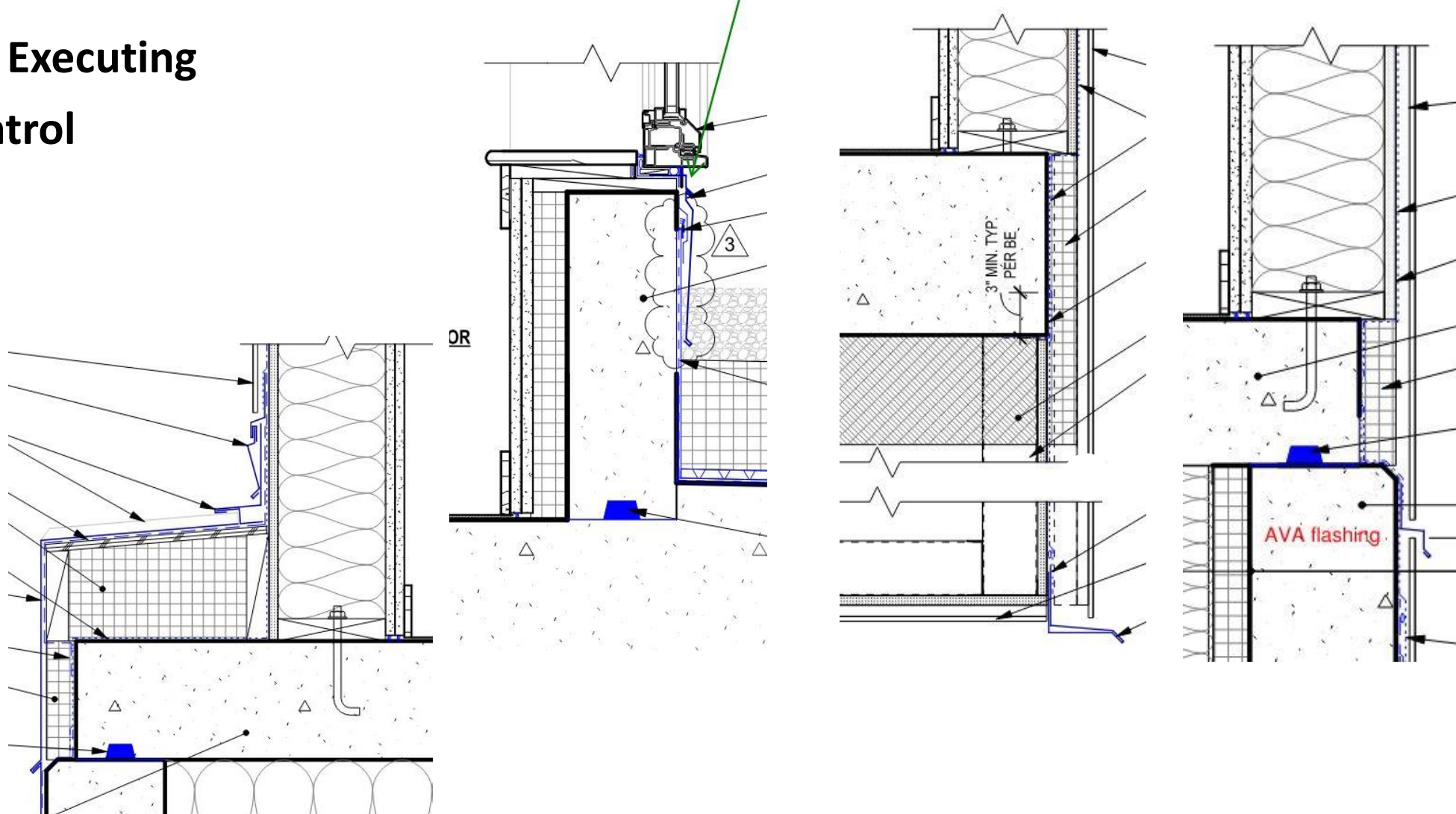
## Understanding & Executing the line of air control

- Trade coordination
  - Framers
  - Roofer
  - Insulator
  - Mechanical
- Penetrations
  - Mechanical equipment
  - Ductwork sealing
- Sequence
  - Mobilizing Trades



## Understanding & Executing the line of air control

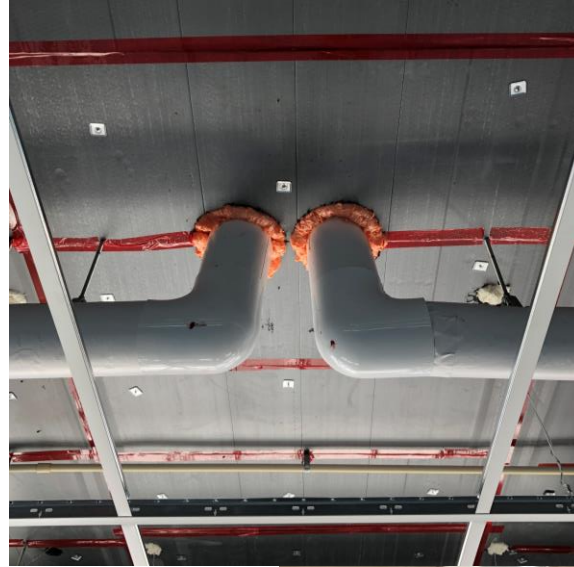
- Trade coordination
  - Framing
  - WRB/AB
  - Insulator
  - Cladding
- Sequence





## Understanding & Executing the line of air control

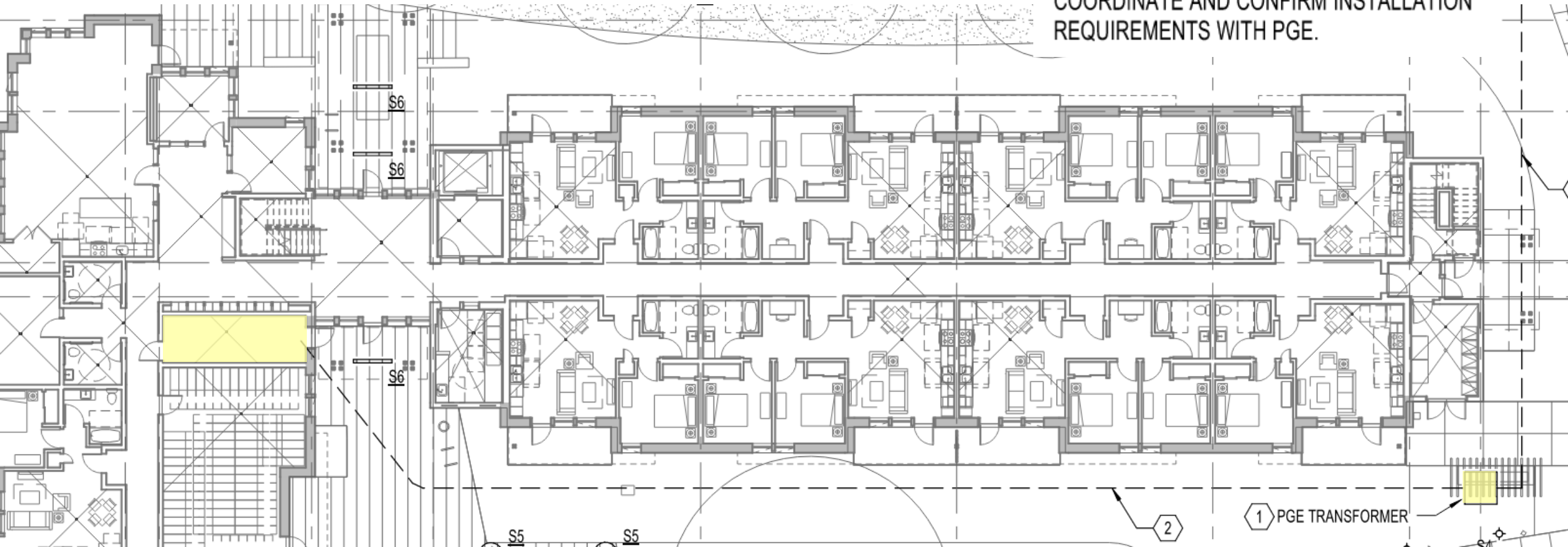
- Trade coordination
  - Concrete
  - Fire Protection (approval)
  - Utilities
- Penetrations
  - MEP
- Sequence
  - Mobilizing Trades





## Understanding & Executing the line of air control

2. UNDERGROUND CONDUIT FOR TRANSFORMER SECONDARY CONDUCTORS. COORDINATE AND CONFIRM INSTALLATION REQUIREMENTS WITH PGE.



## Understanding & Executing the line of air control

- Trade coordination
- Penetrations
- Sequence
  
- Pre-test diagnostics
- Lessons learned





# Construction - Summary

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## Understanding & Executing the line of air control

### Key Details for Air Control Layer Continuity

- Roof to wall
- Wall to foundation
- Floor lines
- Window and door perimeters
- Penetrations
- Transitions between wall types
- Transitions between cladding materials
- Transitions to interior materials

**Simple massing is key to simplifying execution of details**

# Air Barrier Verification & Testing

## Verifying Installation (GC)

- Verification (visual, performance, etc.)
- Collaboration (plan-ahead, be a resource)
- Documentation (installation photos, also document decisions)

## Should you Pre-Test?

- Need to have a complete or very nearly complete air barrier
- Set-up for diagnostics
- Plan to learn something





# Whole Building Air Test Prep

## Whole Building Air Barrier Testing

- Air barrier diagrams
  - reviewed in BEC
  - utilized for completion checklist
- Checklist
- Set up for diagnostics
  - Infrared
  - Smoke (big and small)

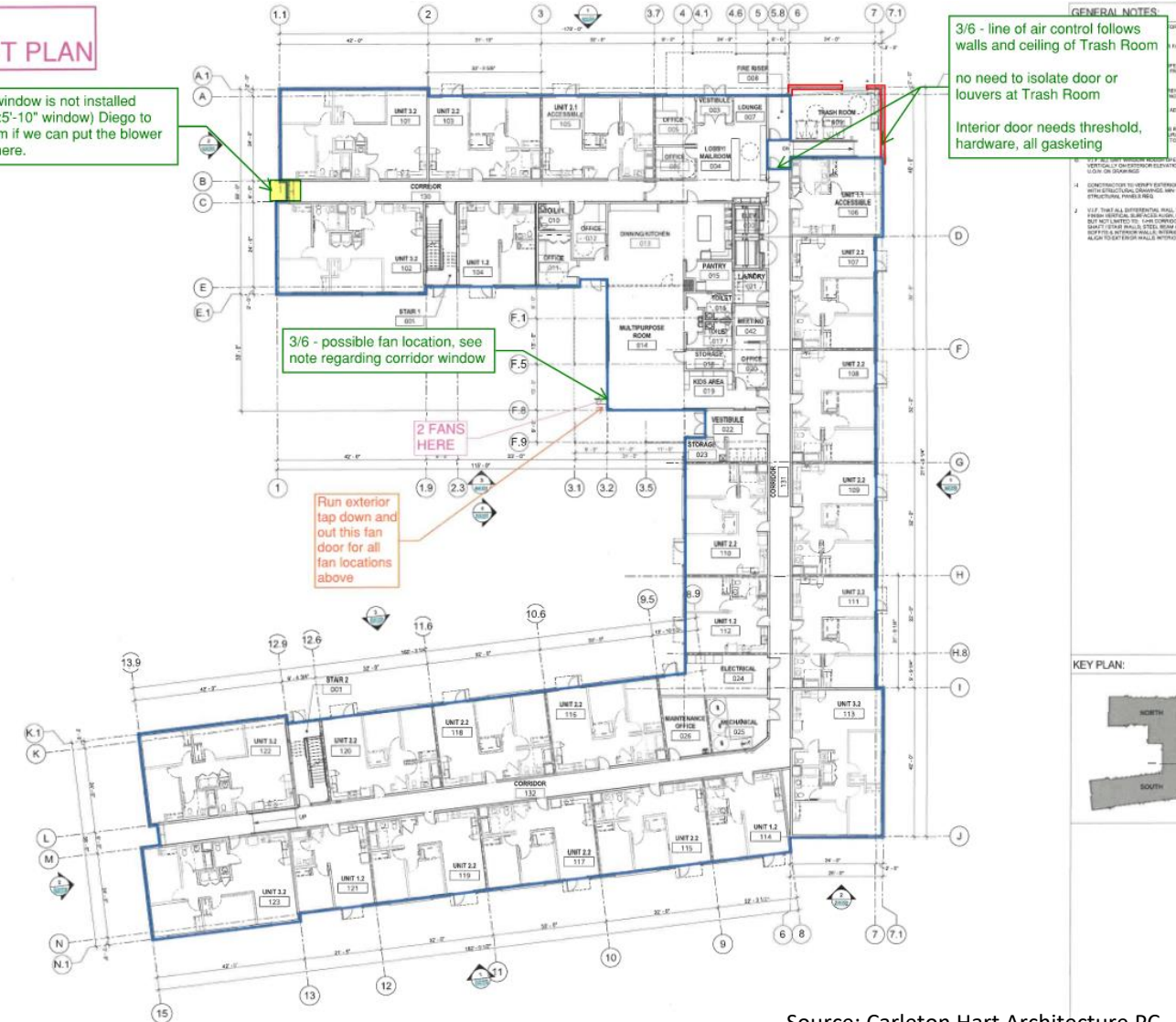


# Whole Building Air Test Prep

## Whole Building Air Barrier Testing

### MCAH AIR LEAKAGE TEST PLAN

- Air barrier diagrams
  - reviewed in BEC
  - utilized for completion checklist
- Checklist
- Set up for diagnostics
  - Infrared
  - Smoke (big and small)



# Whole Building Air Test Prep

**Construction Bulletin 24-01**

Construction Standards Manual Div. No.: 01 40 10 – Quality Requirements

Issued By: Brian Lenz

Issue Date: 1/22/2024

**Guidelines for Air Barrier Test Readiness**

The whole building air leakage test is a requirement in the Washington State Energy Code and the Oregon Energy Efficiency Specialty Code. Preparation for the test should begin in preconstruction, ensuring that the air barrier is designed to be continuous, continue during construction with the execution of the air barrier detailing, and be further focused during the months, weeks, and days leading up to the test

**Preconstruction/Design Phase**

- Documents include design details, air barrier boundary and enclosure area calculations
- Details reviewed for air barrier continuity as part of QA process
- Confirm that QA redlines have been addressed
- WA - Clarify if C406.11 (2018) or C406.2.13.1(2021) reduced air infiltration energy credits being pursued.
- OR – Clarify if testing or 3<sup>rd</sup> Party evaluation required
- Walsh project team communicates that procuring/contracting for test and test prep is in owner scope
- Confirm Air Test timing in schedule relative to Elevator Pressurization Test, typically before
- **Confirm applicable Energy Code and threshold air leakage rates**

| X | Code - WA                                                                                           | Maximum Air Leakage @75Pa | Required Remediation for Failed Test                                          |
|---|-----------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------|
|   | 2018 WA State Energy Code<br>2018 SEA Energy Code                                                   | 0.25 cfm/sf               | Inspect, seal where possible and report if <0.40<br>Retest required if >0.40  |
|   | 2018 WA State Energy Code - C406.11<br>(Reduced air infiltration)<br>2018 SEA Energy Code – C406.11 | 0.17 cfm/sf               | Inspect, seal where possible, retest until passing                            |
|   | 2021 WA State Energy Code                                                                           | 0.25 cfm/sf               | Inspect, seal, retest until passing                                           |
|   | 2021 WA State Energy Code – C406.2.13.1<br>(Reduced Air Infiltration - Base)                        | 0.17 cfm/sf               | Inspect, seal, retest until passing                                           |
|   | 2021 WA State Energy Code – C406.2.13.1<br>(Reduced Air Infiltration - Enhanced)                    | 0.0825 cfm/sf             | Inspect, seal, retest until passing                                           |
|   | <b>Code - OR</b>                                                                                    |                           |                                                                               |
|   | 2021 International Energy Conservation Code<br>(ASHRAE 90.1 )                                       | 0.40 cfm/sf               | Inspect, seal where possible and report if <0.60;<br>Retest required if >0.60 |
|   | <b>Other Special Requirement</b>                                                                    |                           |                                                                               |
|   | PHIUS 2021                                                                                          | 0.08 cfm/sf               |                                                                               |
|   | Other                                                                                               |                           |                                                                               |

**Construction / Execution of Design – Air Barrier Interface Requiring Coordination**

- Pre-stripping required to make line of air control continuous – (Framer / WRB)
- Roof to wall air barrier tie-in – (Roofer / WRB / Sider)
- Base of wall to foundation connection – (WRB / Sider)
- Roof to base of wall connection - (Roofer / WRB / Sider)
- Coursing of WRB, laps at thru-wall & head flashings – (WRB / Sider)
- Slab penetrations at line of air control, separating conditioned-unconditioned space - (MEP / Walsh)
- HVAC –
  - o Unit venting, ERV's, duct sealing – (HVAC / WRB / Sider)
  - o Range hoods, leave boot to duct connection off – (HVAC)
  - o Louvers, dampers, ERV's in Commercial / T1 / resident support spaces – (HVAC / Storefront / WRB / Sider)

- Storefront – frames, glazing/gaskets, thresholds/sweeps – (Storefront / WRB / Sider)
- Hollow metal doors – frames, thresholds/sweeps, 4-sided frame if appropriate – (WRB / Door installer / Sider)
- Trash chute flanged frame trim sealed to GWB – (GWB / WALSH-RDF)
- Air sealing at interior walls between conditioned/unconditioned spaces – (GWB)
- MEP penetrations and fire caulking – (MEP / GWB / Fire / WRB)

**Air Barrier Test Prep**

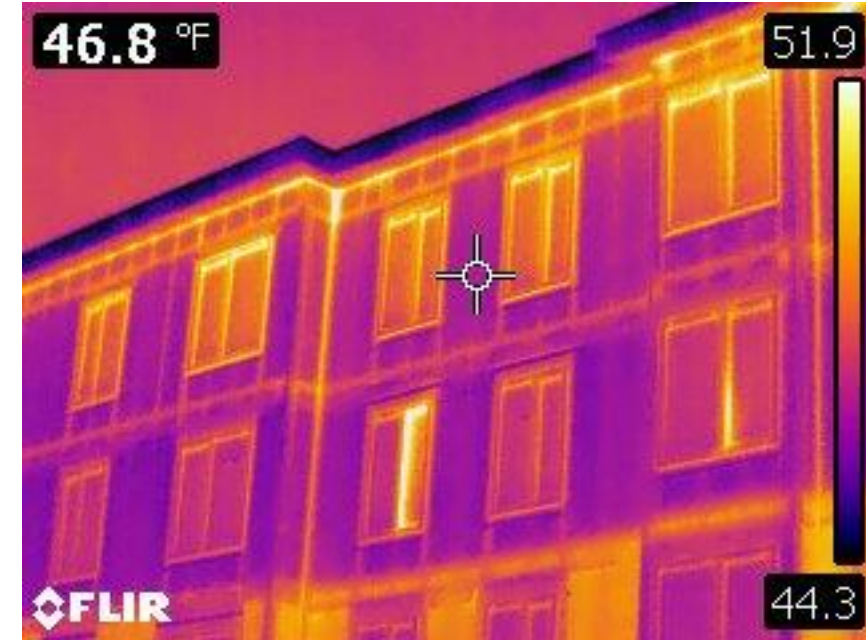
| Two Months Prior to Targeted Test Date |                                                                                                                                                        | Day of Test                                                                                                                                                                                                                       |                                                            |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| X                                      | Task                                                                                                                                                   |                                                                                                                                                                                                                                   |                                                            |
|                                        | Secure date with testing agency                                                                                                                        | Confirm testing agency's ETA on site                                                                                                                                                                                              | Walsh Superintendent<br>Testing Agency                     |
|                                        | Confirm all enclosure components complete, except range hood connectic typical list)                                                                   | Remind installers of time building is locked down, plan on either leaving building or remaining inside during test with very limited in/out access. Superintendent to minimize number of installers permitted inside during test. | Walsh Superintendent                                       |
|                                        | Confirm HVAC install will be complete, including louvers / dampers                                                                                     | Meet with testing agency crew leader upon arrival on site to discuss masking sequence and expectations                                                                                                                            | Testing Agency<br>Walsh Superintendent<br>Walsh QA Manager |
|                                        | Confirm RDF labor including available – Skin Dr plus one (for prep and tes                                                                             | Discuss timing for infrared imagery , inside and out (if ambient conditions permit), which may require some lengthened test cycles.                                                                                               | Walsh Superintendent<br>Testing Agency                     |
|                                        | Confirm enclosure area calc's are agreed upon by testing agency & design                                                                               | Meet with entire agency crew together in first unit to be prepped, confirm masking protocol                                                                                                                                       | Testing Agency / RDF<br>Skin Dr. Walsh QA<br>Manager       |
| Four Weeks Prior to Test Date          |                                                                                                                                                        |                                                                                                                                                                                                                                   |                                                            |
|                                        | Receive testing plan and checklist from testing agency                                                                                                 | RDF crew follows testing agency crew floor by floor, filling p-traps checking masking and windows in units, corridors, and utility rooms                                                                                          | Walsh QA Manager<br>RDF Skin Doctor                        |
|                                        | Schedule pre-test site meeting with site walk (see below for agenda)                                                                                   | Walsh/RDF crew check all exterior doors for hardware, threshold and weatherstripping, mask off where needed                                                                                                                       | Walsh QA Manager<br>RDF Skin Dr.                           |
| Two to Three Weeks Prior to Test I     |                                                                                                                                                        | HVAC equipment shut down / powered off                                                                                                                                                                                            | HVAC / Electrical                                          |
|                                        | Hold site meeting and site walk with testing agency, HVAC and Electrical i in with Elevator installers)                                                | Fire alarm in test mode                                                                                                                                                                                                           | Fire Protection                                            |
|                                        | <b>Agenda: Discuss</b>                                                                                                                                 | Verify rooftop HVAC equipment properly masked after testing agency crew completes isolations                                                                                                                                      | Walsh QA Manager<br>RDF Skin Dr.                           |
|                                        | Power requirements - Non-GFCI circuits                                                                                                                 | Remove 1% of ceiling tiles (if applicable)                                                                                                                                                                                        | WALSH QA Mgr. / RDF<br>Skin Dr.                            |
|                                        | How many fans and where they are located                                                                                                               | Building locked down 15-30 minutes prior to fan start-up                                                                                                                                                                          | WALSH Superintendent                                       |
|                                        | Confirm what Walsh/RDF personnel will be filling P-traps and checking the closed/latched                                                               | NO ENTRY / NO EXIT SIGNS (English - Spanish) placed on Level 1 doors                                                                                                                                                              | WALSH Superintendent<br>RDF Skin Doctor                    |
|                                        | Confirm test time - arrival on site and building lockdown for start of test                                                                            | During Test                                                                                                                                                                                                                       |                                                            |
|                                        | Roof – Identify all HVAC equipment and louvers, confirm units to be shut c masking needed                                                              | Walsh / RDF staff stationed near exit doors to confirm no entry/exit                                                                                                                                                              | RDF Personnel<br>Walsh Superintendent                      |
|                                        | Residential units – confirm masking protocol for ERV's, range hoods and v                                                                              | Infrared and smoke puffer diagnostics                                                                                                                                                                                             | RDF Skin Doctor<br>Walsh QA Manager                        |
|                                        | Laundry Rooms – confirm masking protocol for dryer exhaust ducts, floor c fans                                                                         | Confirm key isolations remain securely in place (doors, missing IGU's, HVAC) remain securely in place                                                                                                                             | RDF Skin Doctor<br>Walsh QA Manager                        |
|                                        | Trash Rooms – confirm air sealing at door assembly/trim                                                                                                | Walsh/RDF personnel walk corridors listening / feeling for signs of air leakage anomalies and diagnose, remediate if possible                                                                                                     | RDF Skin Doctor<br>Walsh QA Manager                        |
|                                        | Corridors – confirm supply grilles, PTAC's (hopefully none!)                                                                                           | Review preliminary results with testing agency lead technician                                                                                                                                                                    | Walsh QA Manager                                           |
|                                        | Level 1 - Review ERV's, confirm motorized dampers will be powered close locations of ducted louvers and those with sealed back pans, typically in sl   | Attempt diagnostics if results poorer than expectations, particularly if wide variance between positive and negative results. (Check key isolations to confirm they are intact, look for open windows, doors, hatches)            | RDF Skin Doctor<br>Walsh QA Manager                        |
|                                        |                                                                                                                                                        | Rerun test if corrections have been made and review results                                                                                                                                                                       | Testing Agency<br>Walsh QA Manager                         |
|                                        |                                                                                                                                                        | Assist testing agency with masking removal and replacement of any grilles, screens or access panels that have been removed or opened                                                                                              | RDF Personnel<br>RDF Skin Doctor                           |
| One Week Prior to Test Date            |                                                                                                                                                        |                                                                                                                                                                                                                                   |                                                            |
|                                        | Confirm date and time of test with testing agency                                                                                                      | Walsh Superintendent                                                                                                                                                                                                              |                                                            |
|                                        | QA Manager walks with superintendent and Skin Dr to confirm air barrier completeness and address plan/schedule for remedying incomplete installations. | Walsh Superintendent<br>Walsh QA Manager<br>RDF Skin Dr.                                                                                                                                                                          |                                                            |
| One to Two Days Prior to Test Date     |                                                                                                                                                        |                                                                                                                                                                                                                                   |                                                            |
|                                        | QA Manager walks building to verify air barrier completeness                                                                                           | Walsh QA Manager                                                                                                                                                                                                                  |                                                            |
|                                        | Confirm superintendent's planned test time, verify with testing agency                                                                                 | WALSH Superintendent                                                                                                                                                                                                              |                                                            |



# Whole Building Air Test Prep

## Lessons Learned in Building Air Tightness

- **Diagnostics**
  - Tools – infrared, smoke, blower door
  - Test timing
- **Applying Lessons Learned**





# Questions?

Walsh team at Greenbrae  
Marylhurst, OR



October 22, 2024