Strategies and Solutions for the Limitations of the ABAA QAP

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Building Exterior Solutions, a Terracon Company

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Learning Objectives:

- Understand current building code requirements for an air barrier.
- Understand the extent of air barriers addressed by ABAA and its QAP.
- Discuss locations of the building's air barrier that are typically overlooked.
- Discuss means to assure the quality of the building's air barrier.

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Building Enclosure Control Layers:

- Heat
- Air
- Water (Bulk)
- Water (Vapor)

Phenomenon	Mechanism	Strategies
Heat	Conduction, Convection, Radiation	Insulation
Air	Convection	Air Barrier
Water (bulk)	Gravity, Surface Tension, Capillary Action, Momentum, Air Pressure	shingle laps, drip edges, air gap, baffles, waterproofing, WRB, flashing, etc.
Water (vapor)	Diffusion	Vapor Retarder

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Building Enclosure Control Layers:

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Building Enclosure Control Layers:

YES
NO
DEPENDS

	Bulk Water	Heat	Air	Vapor
Aluminum Framed Curtain Wall	waterproofing	YES! This is your insulation whether you like it or not	yes	Class I Vapor Retarder
Mechanically Fastened Spun Polyolefin	WRB	NO	can be if taped	Permeable (36 perms)
Fluid-Applied (20-mil, 40-mil, etc.)	waterproofing	NO	yes	Depends on product, thickness
Sheathing with integral Fluid-Applied	WRB	NO (unless R-board is used)	yes	12 perms coating (Permeable), 2 perms sheahing (Class III Vapor Retarder)
Polyisocyanurate	maybe if taped, depends on facer	YES	maybe if taped	Depends on product, thickness
Vinyl Wallpaper	NO	NO	NO	Class I Vapor Retarder
Spray Polyurethane Foam	maybe if closed cell	YES (closed cell higher R-value/in)	yes, about 1" for cc, about 3.5" for oc	oc never, cc at certain thickness
Precast Concrete	YES	negligible	yes at 3" per PCI	yes at 3" per PCI, Class II
Oriented Strand Board, 1/2-inch	NO	negligible	yes, if joints are taped/sealed	Class III Vapor Retarder
Self-Adhered Membrane	waterproofing	NO	yes	Depends on product, thickness

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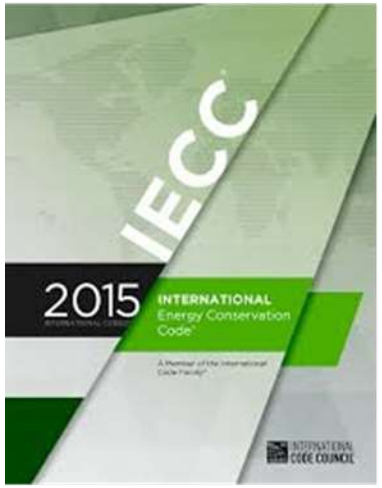
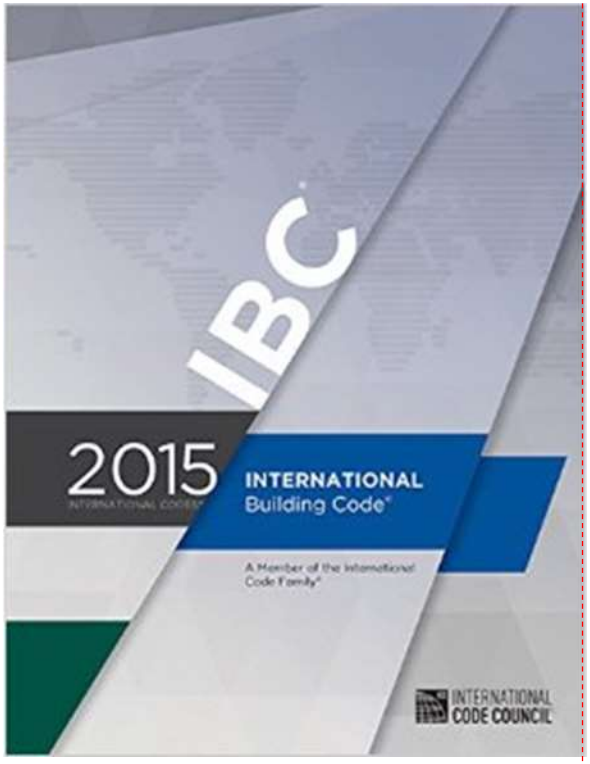
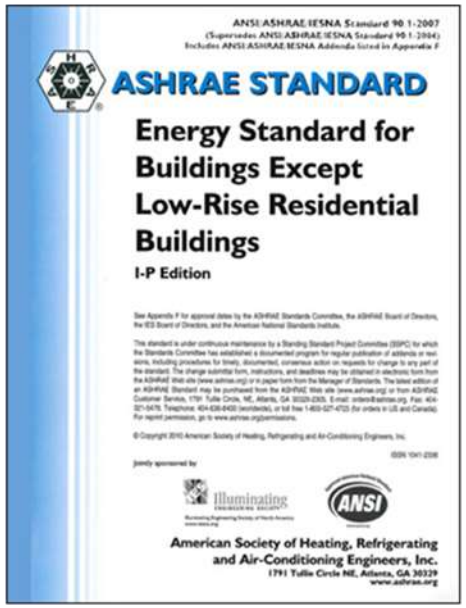
Building Code Air Barrier Requirements:







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Codes

Standards

Extents of Air Barrier per IECC 2015:

- Prescriptive Requirement:
- IECC 2015 C402.5.1.2.1 Materials
- Materials with an air permeability not greater than 0.004 cfm/sf at 75 Pa

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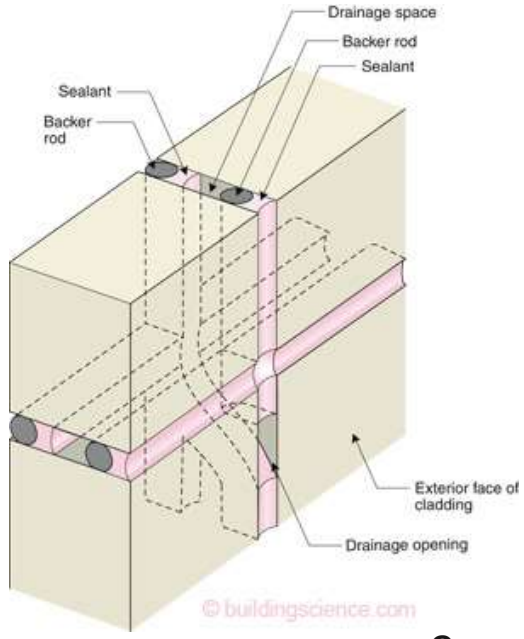
Extents of Air Barrier per IECC 2015:

- Prescriptive Requirement:
- IECC 2015 C402.5.1.2.1 **Assemblies**

- **Assemblies** of materials and components with an average air leakage not greater than **0.04 cfm/sf at 75 Pa**



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Extents of Air Barrier per IECC 2015:

Additional Prescriptive Requirements:

- IECC 2015 C402.5.2 Air Leakage of Fenestration
- IECC 2015 C402.5.3 Rooms containing fuel-burning appliances
- IECC 2015 C402.5.4 Door and access openings to shafts, chutes, stairways and elevator lobbies
- IECC 2015 C402.5.5 Air intakes, exhaust openings, stairways, and shafts
- IECC 2015 C402.5.6 Loading dock weatherseals
- IECC 2015 C402.5.7 Vestibules
- IECC 2015 C402.5.8 Recessed Lighting

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Extents of Air Barrier per IECC 2015:

Prescriptive Requirements **OR** Performance Requirement:

- IECC 2015 C402.5 Air Leakage – thermal envelope
- Tested air leakage rate of the building thermal envelope is not greater than **0.40 cfm/sf** at 75 Pa per ASTM E779



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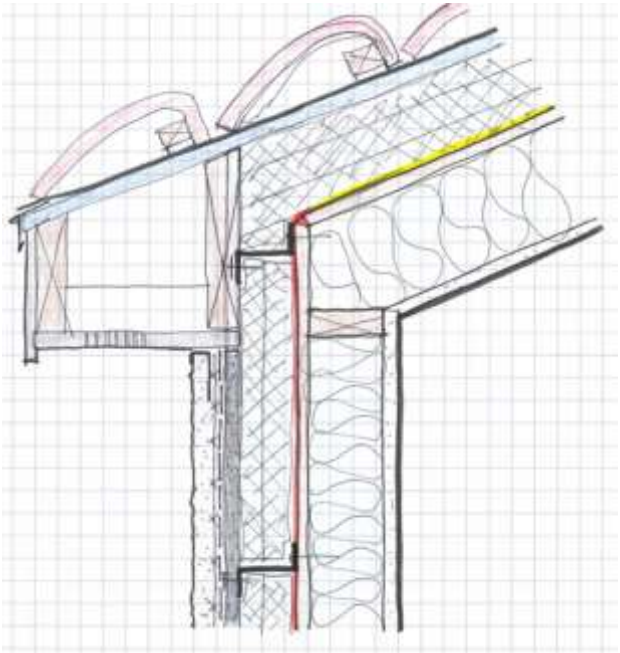
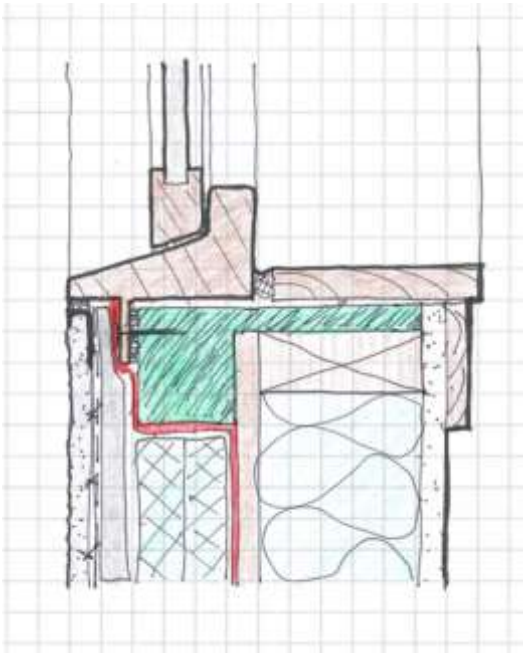
The Devil is in the Details:





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Air Barrier Codes and Standards:

- **US commercial average*:** 1.55 CFM/SF @ 75 Pa
- **2015 IECC:** 0.40 CFM/SF @ 75 Pa
  - Building Test per ASTM E779
  - Exception for climate zone 2B
- **USACE Standard:** 0.25 CFM/SF @ 75 Pa
- **Canadian Standard:** 0.15 CFM/SF @ 75 Pa
- **PHIUS:** 0.05 CFM/SF @ 75 Pa

US Commercial Average: 1.8 cfm/sf @ 0.3 in w.c. per NIST (Nat. Inst. Of Science and Tech) Report 4

*per Emmerich and Persily (2005) measured 203 commercial and institutional buildings

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Stair Steps from Sam Rashkin, DOE

PHIUS
Passive House Institute US

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Whole Building Air Leakage Testing:

209,000 SF University Facility 0.29 CFM/SF @ 75 Pa

Equivalent of 19.1 SF "hole" in enclosure

Test Condition	Leakage Air Flow			Leakage Area		Est. Damper Leakage		
	Flow@75Pa (cfm)	Normalized (CFM75/ft²)		ELA[3] (ft²)	EqLA[4] (ft²)	Flow@75Pa (cfm)	% of Total	EqLA[4] (ft²)
		6-sided[1]	Above-grade[2]					
Preliminary Test: Oct. 15								
Depressurization	90,700	0.5	0.7	24	46	–	–	–
Final Test: Oct. 16-17								
Pressurization	55,700	0.31	0.41	18.5	33.4	–	–	–
Depressurization	49,500	0.27	0.37	19.7	33.6	3000[6]	6	2.2[6]
Average[5]	52,600	0.29	0.39	19.1	33.5	–	–	–

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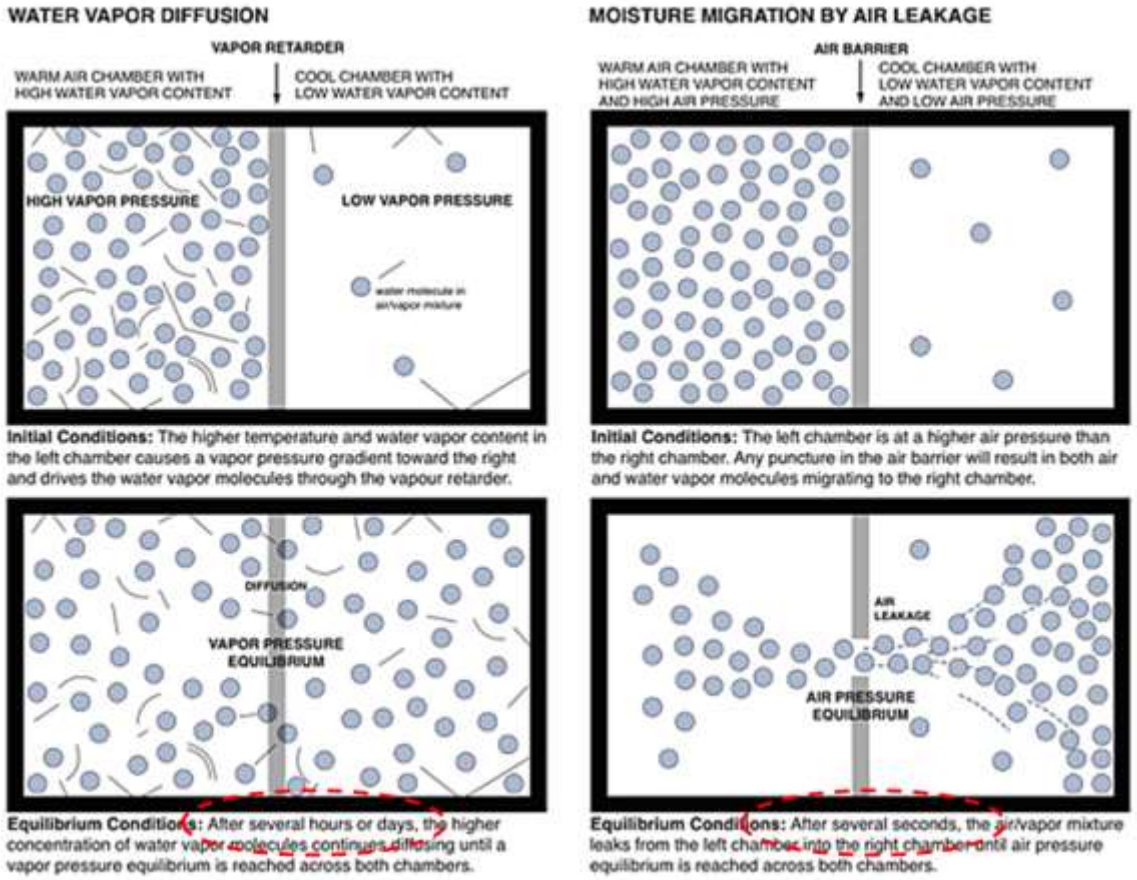
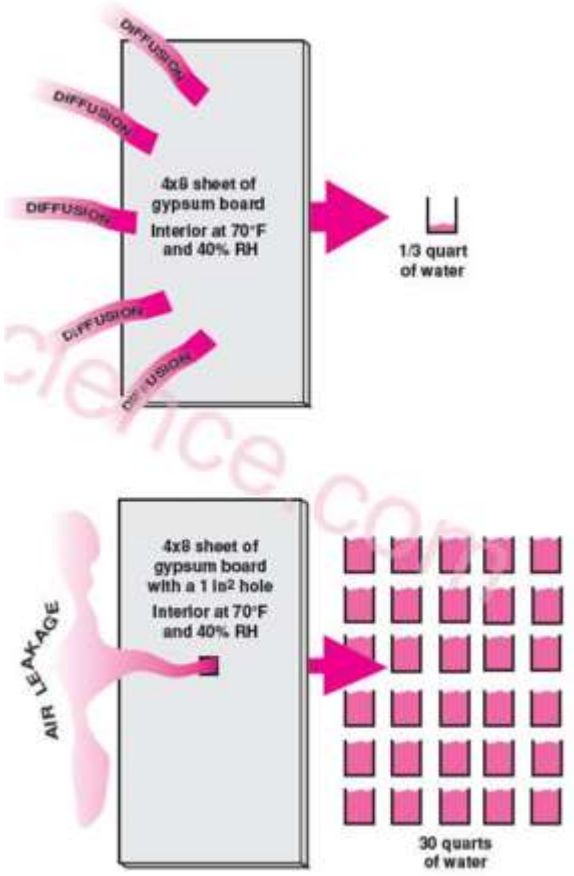
Ramifications of Air Barrier Discontinuity:





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Ramifications of Air Barrier Discontinuity:

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Extent of Air Barrier Covered by ABAA:

The ABAA Quality Assurance Program (QAP) has been designed to provide working and effective air barrier systems in buildings by having a competent and professional installer meeting precise requirements for the proper installation of quality air barrier products……

- Air Barrier Products
- Professional Installers

…… for the extent of the air barrier covered by the QAP.

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Where Are All the Air Barriers?

- Substrate for Wall Cladding
  - Cavity Walls (Brick/Stone Masonry)
  - Lathe & Plaster
  - Adhered Stone
  - EIFS
  - Metal Panels
  - Lap Siding
- Exposed Barriers
  - Architectural Precast
  - Elastomeric Coating
  - Painted Drywall
  - Ceilings Beneath Vented Attics
- Roofing
- Terraces
- Fenestrations
- Foundations and Slabs

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How Many Different Air Barriers and Installers?

- One for each cladding type?
  - Separate Contracts
  - Required as part of the cladding warranty
- Roofing
- Fenestrations
- Exposed Barriers

Which Air Barriers Might Utilize the ABAA QAP?

- Air Barriers Approved by ABAA
  - Self-Adhered Sheets
  - Liquid Applied
  - Spray Polyurethane Foam (Medium Density Closed Cell)
  - Mechanically Fastened Commercial Building Wraps
- Contractors Approved by ABAA

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What Are the Boundaries of the ABAA Air Barrier Assemblies?

- Window Perimeters
- Door Perimeters
- Adjacent Non-ABAA Air Barrier Systems
- Transition to Waterproofing
  - Below Grade
  - Horizontal Decks
- Transition to Exposed Air Barriers
  - Architectural Precast Panels
  - Elastomeric Coatings
- Transition to Roofing
  - Single Ply Roofing
  - Roofing Underlayments

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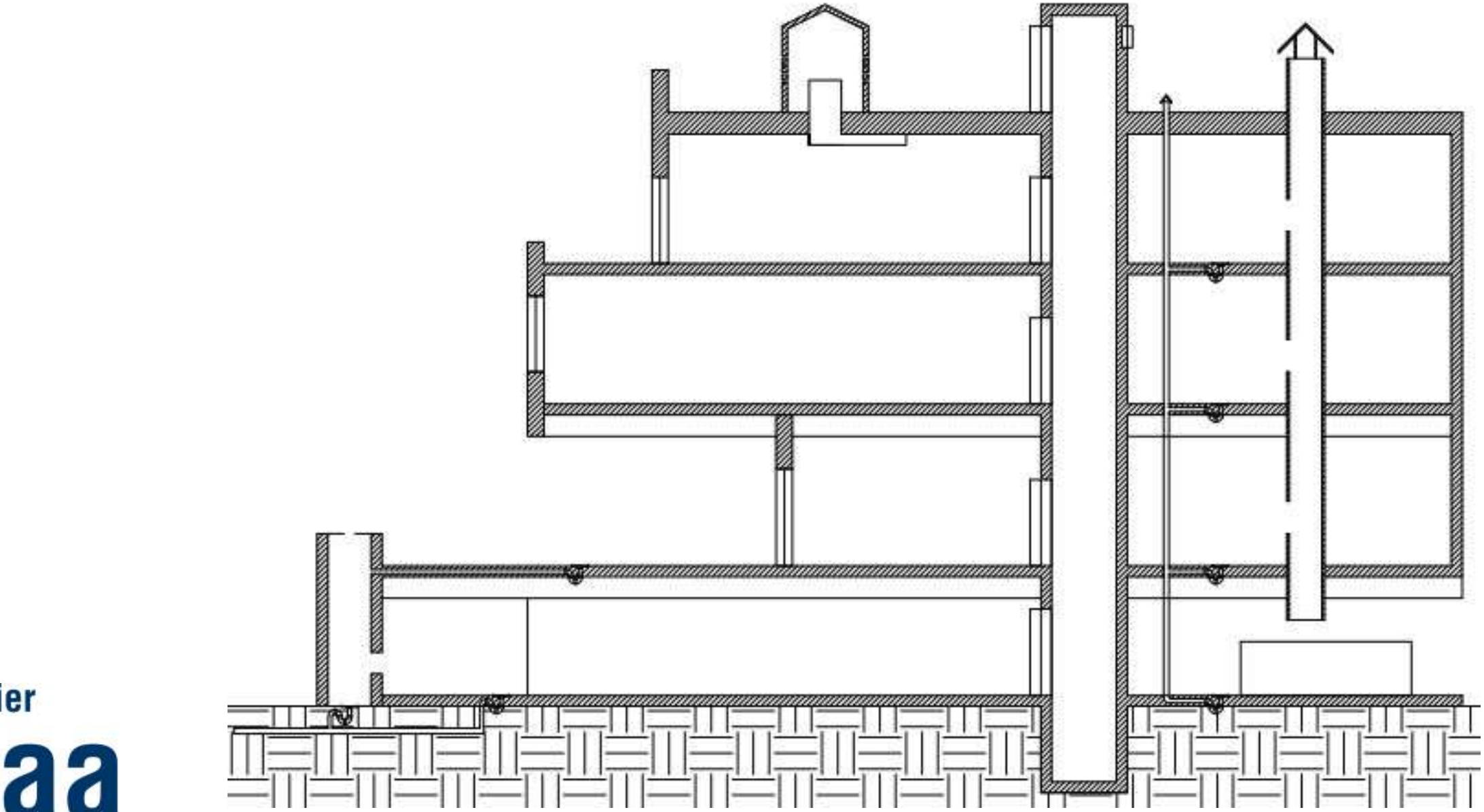
Key Conditions Typically Overlooked

- Elevator Shafts
- Mechanical Chases
- Trash Chutes
- Stairwells
- Expansion Joints
- Drains w/ P-traps & Vent Pipes
- Loading Docks
- Garage Space Adjacent to Occupied Space
- Elevated Exterior Decks
- Roof
- Precast Panels



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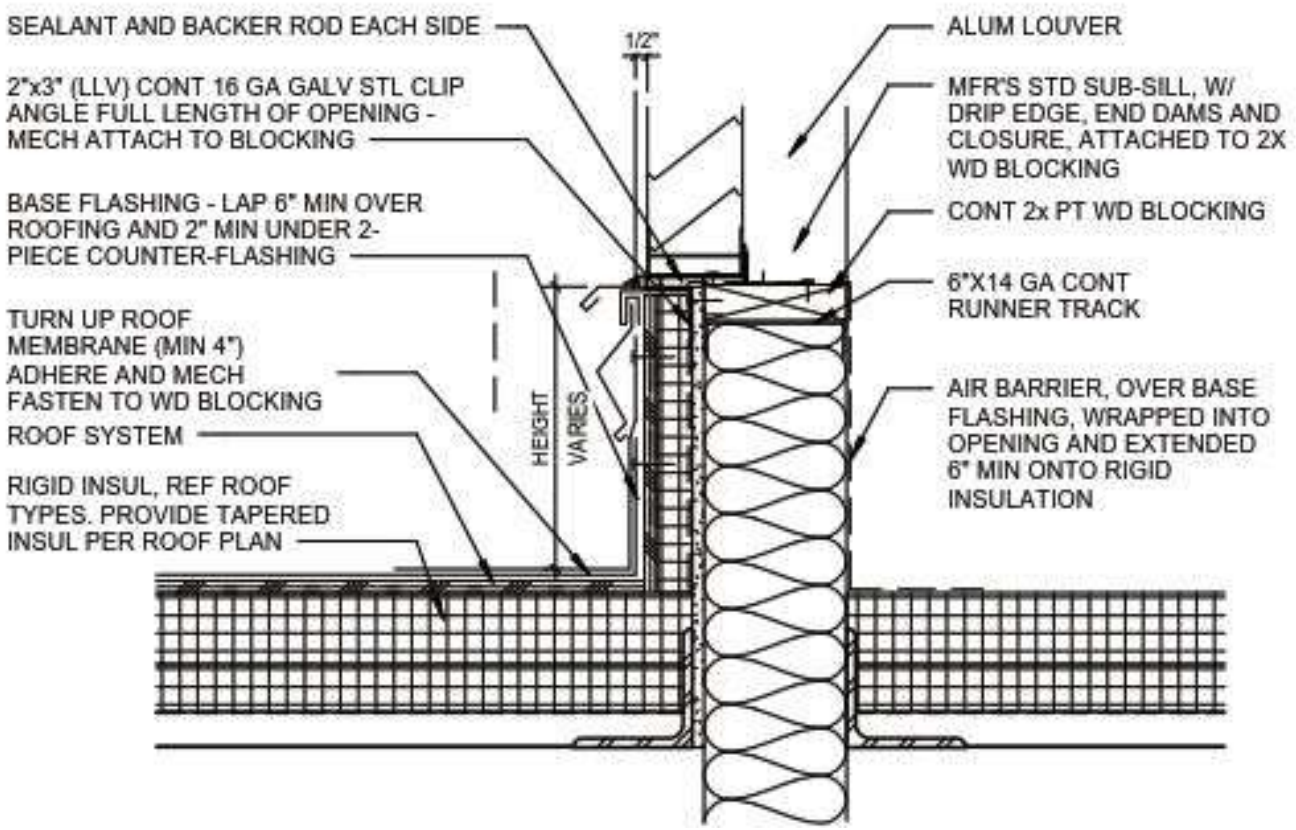
Dormers, Doghouses and Elevator Overruns



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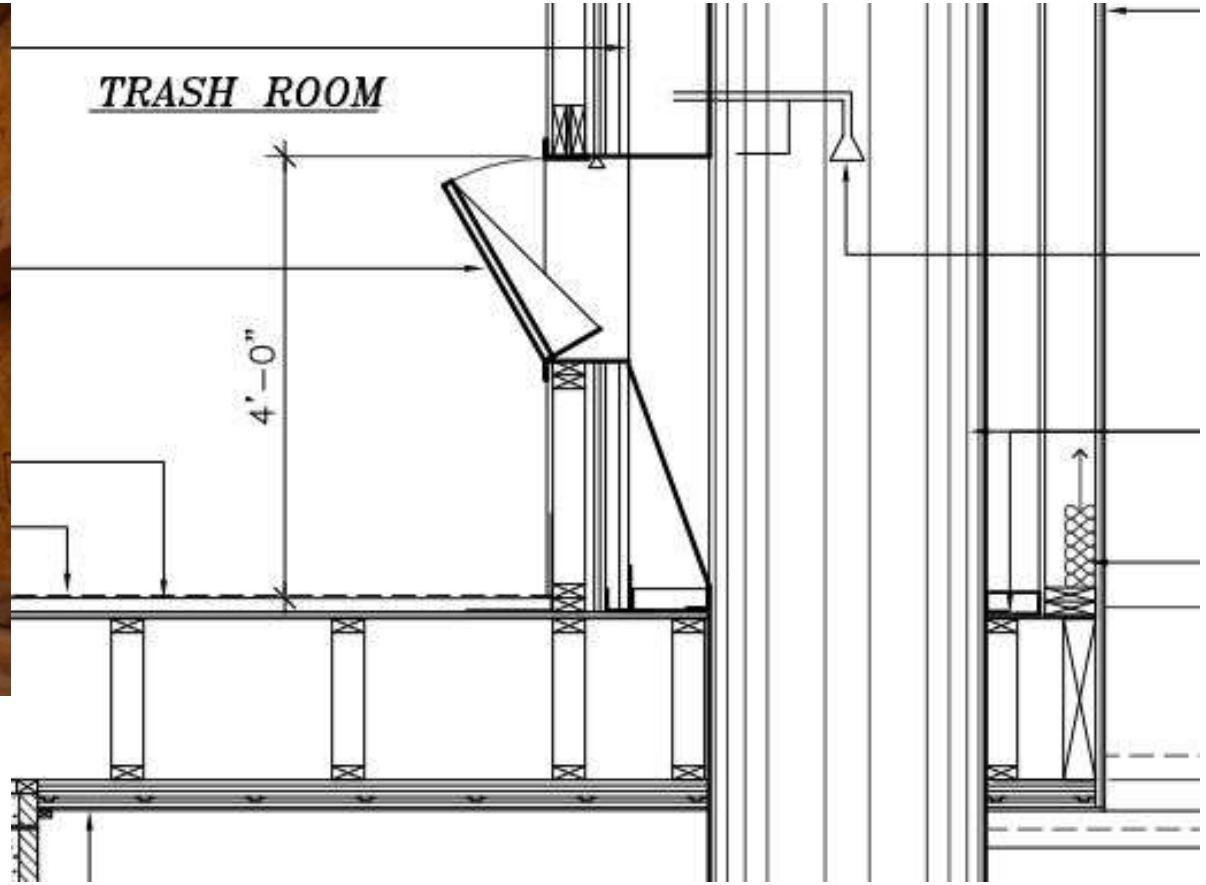
Trash Chutes and Vertical Chases



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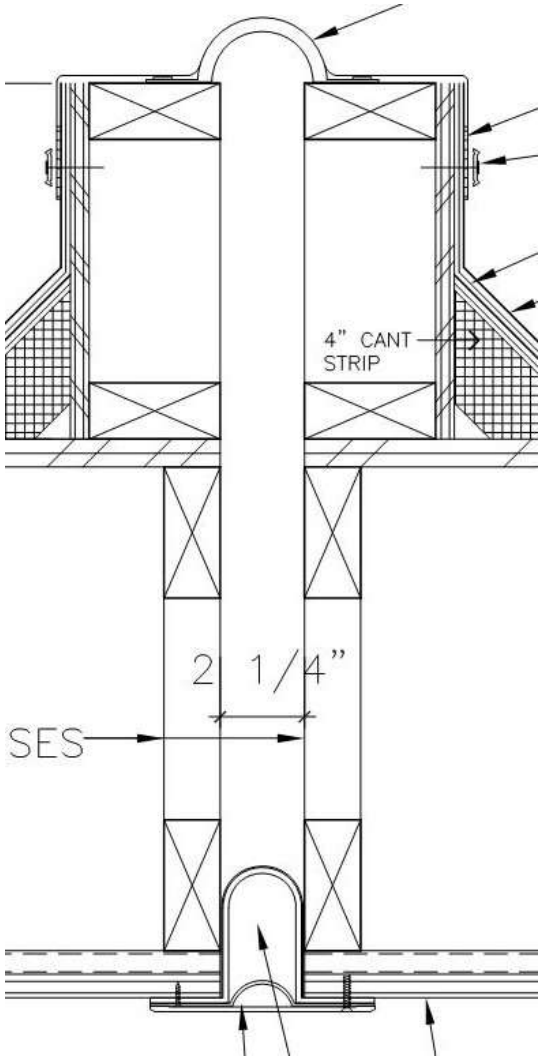
Expansion Joints



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Quality Assurance of a Building's Air Barrier

- ABAA Quality Assurance Program (QAP)
  - ABAA Approved Materials Installed
  - ABAA Contractors
- Non-ABAA Portions of a Building's Air Barrier???
- Whole Building Air Leakage Tests???
- Should the Role of ABAA Expand???

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