aeroseal®

BUILDINGENERGY® BOSTON

MARCH 23-24, 2026 • WESTIN BOSTON SEAPORT DISTRICT • NESEA.ORG/BE26

Conference + Trade Show of the Northeast Sustainable Energy Association (NESEA)

3.24.26

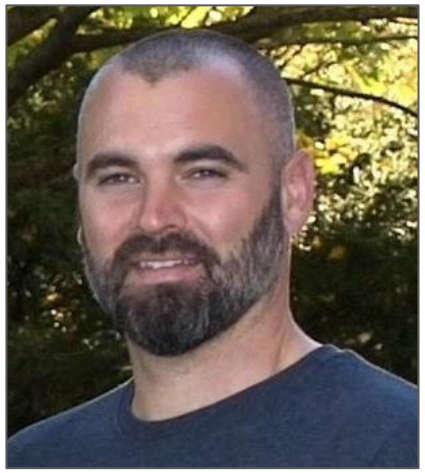
Multifamily Passive House Air Sealing Case Studies: Historic & New Buildings

Agenda

- Today’s speakers
- Air sealing for Passive Building
- Case study: Historic renovation multifamily Phius REVIVE
- Case Study: New construction multifamily Phius Core
- Duct sealing to Passive House standards
- Q & A/discussion

Today's Speakers

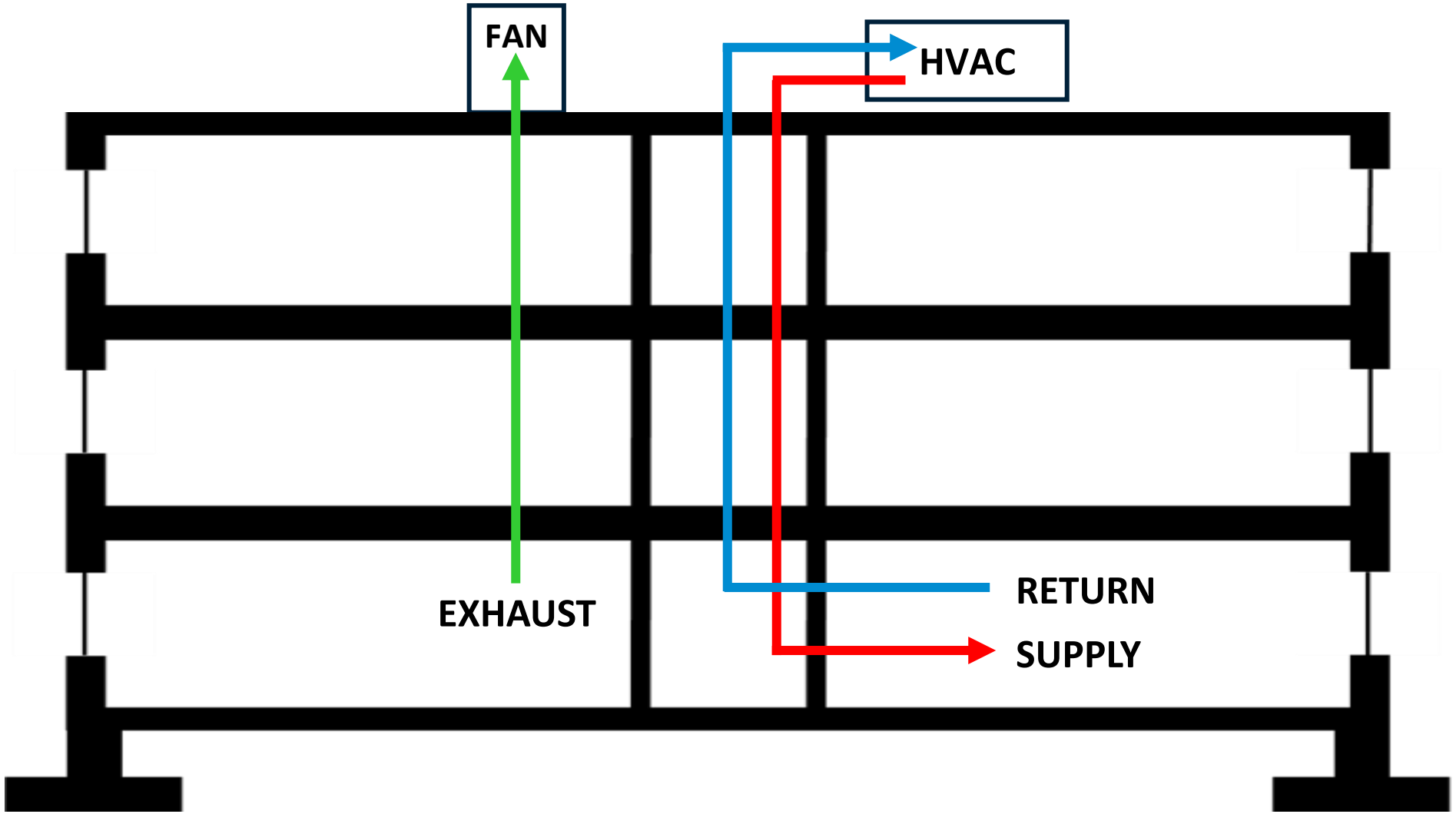
Bill Shadid
Aeroseal
Business Development Leader:
Architects & Engineers



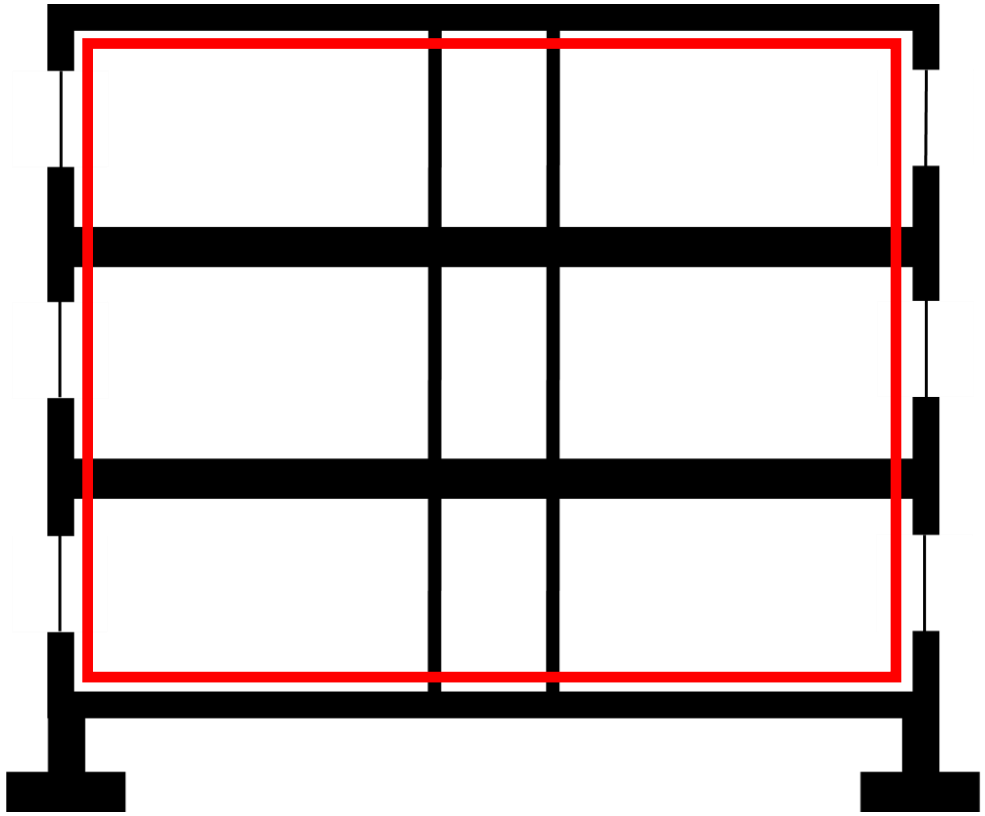
Alex MacLean
Aeroseal
Sales & Field Technical Support

Air Sealing for Passive Buildings

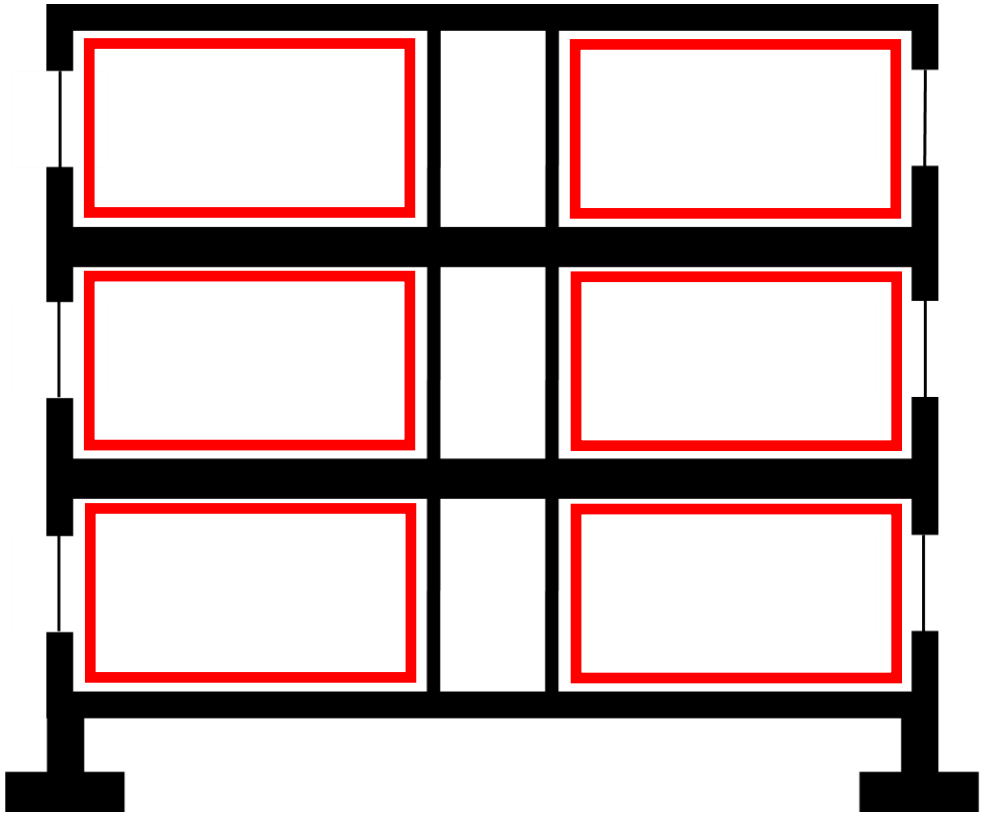
Duct Sealing: Supply, Return, & Exhaust



Building Envelope Air Sealing: Both Ext Envelope & Compartmentalization



Exterior Envelope Air Barrier
(seals air leaks to the outside)



Compartmentalization Air Barriers
(seals air leaks between rooms in the bldg.)

= Air Barrier

Case Study: Historic Renovation Multifamily Phius REVIVE

Two Historic Structures Renovated at Harvard University

- Add housing units for graduate students and faculty
- Build sustainable housing that is better for residents and the environment

5 Sacramento Street, Cambridge MA

13 Kirkland Place, Cambridge MA

Project Team

- Architect = Kelly Boucher Architecture
- Passive House consultant = Thornton Tomasetti, Prudence Ferreira
- Passive House verifier = Mark Newey
- General Contractor = Windover Construction

5 Sacramento Street Pre Renovation

- Built in 1891
- Queen Anne Victorian
- Renowned local architect George Fogerty
- 9,260 square feet
- Wood frame construction
- Used as a healthcare clinic prior to renovation
- Goal: renovate to include 5 units

13 Kirkland Place Pre Renovation

- Built in 1856 as a 2 story, 14 room single family home
- Expanded in early 1900's
- Bracketed Italianate
- By Isaac Cutler
- 5,386 square feet
- Wood frame construction
- Used as a 3 unit residential building prior to renovation
- Goal: renovate to include 4 units

Project Details

Project Details/Info	5 Sacramento Street	13 Kirkland Place
Location	Cambridge, MA	Cambridge, MA
Climate Zone	5A-Cool-Humid	5A-Cool-Humid
Building Type	Multifamily	Multifamily
Project Type	Retrofit	Retrofit
# of Stories	4	4
# of Units	5	4

Achieve 2 Ambitious Sustainability Certifications

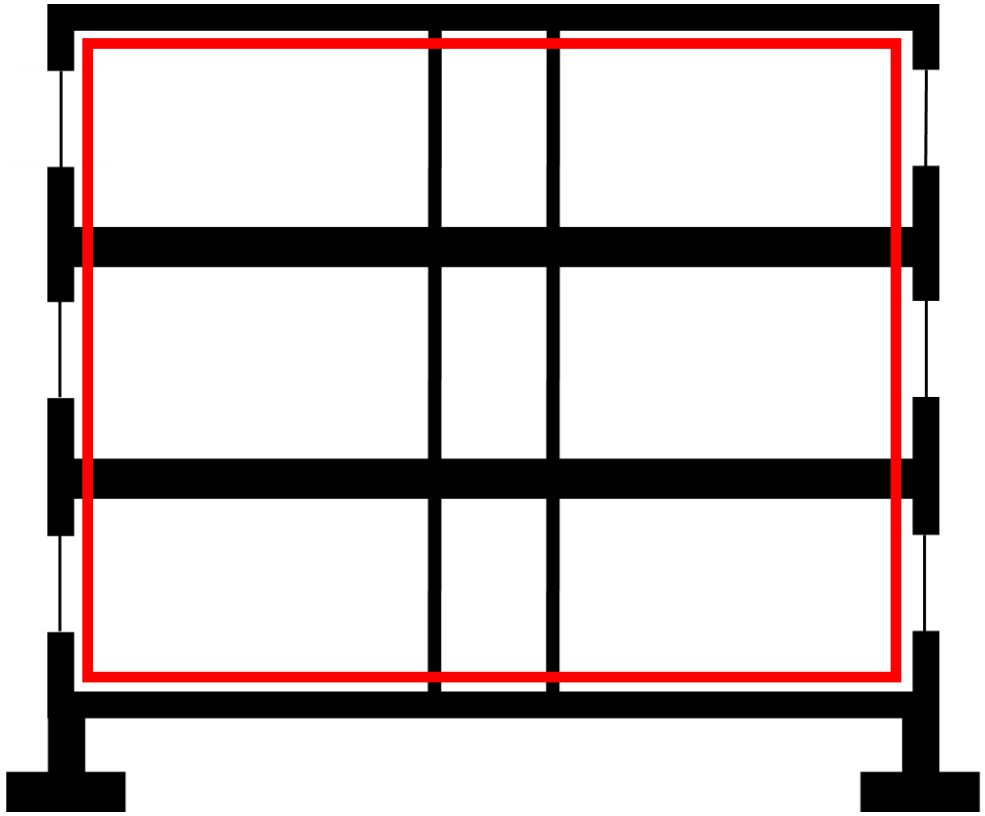
aerobarrier by aeroseal

International Living Future Institute

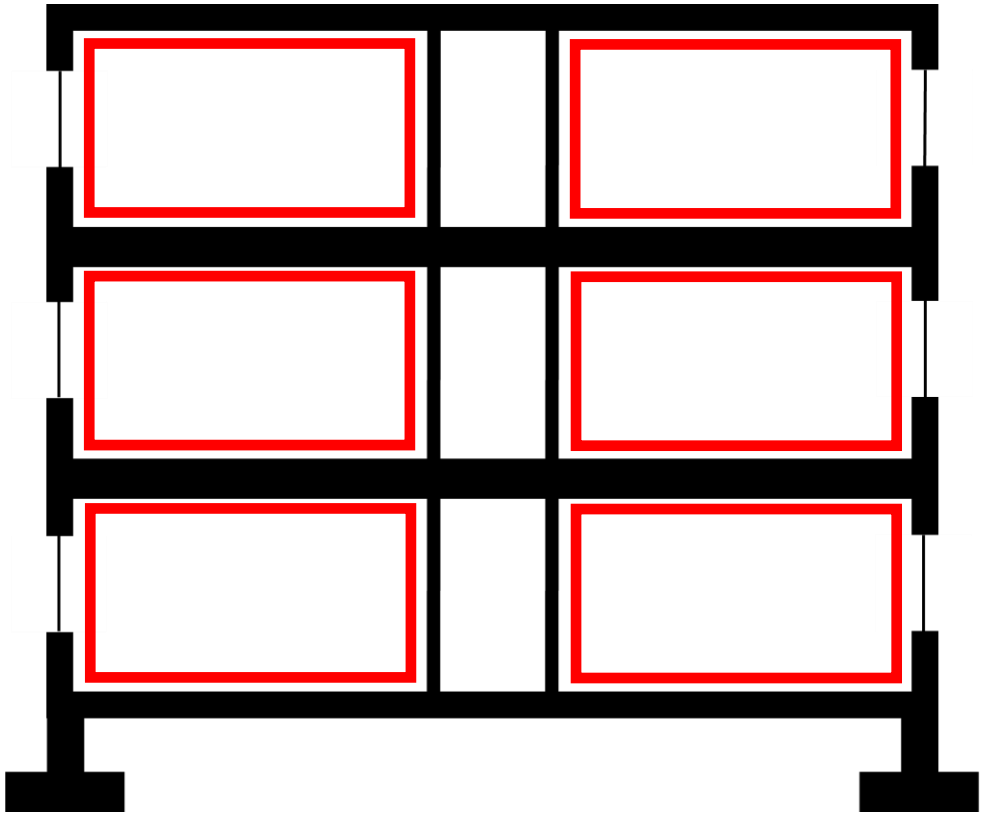
Passive Building Strategy Development

- Phius Verifier involved in passive building strategy and how that might affect air tightness
- Due to historic preservation requirements, exterior envelope would need to be improved from the inside
- A second wood stud wall was built inside the exterior wall with separation and staggered joints
- Closed cell spray foam to be applied to walls and roof
- AeroBarrier air sealing to be applied after spray foam installed, complemented by targeted manual air sealing

AeroBarrier Used to Seal Both Exterior Envelope & Compartmentalization



Exterior Envelope Air Barrier
(seals air leaks to the outside)



Compartmentalization Air Barriers
(seals air leaks between rooms in the bldg.)

= Air Barrier

Improving the Envelope From the Inside

Before New “Interior Wall”

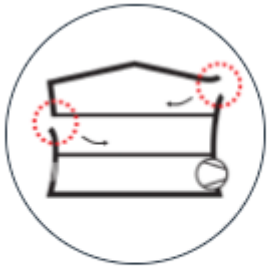
After New “Interior Wall” Framed

Photos courtesy of Mark Newey, Phius Verifier

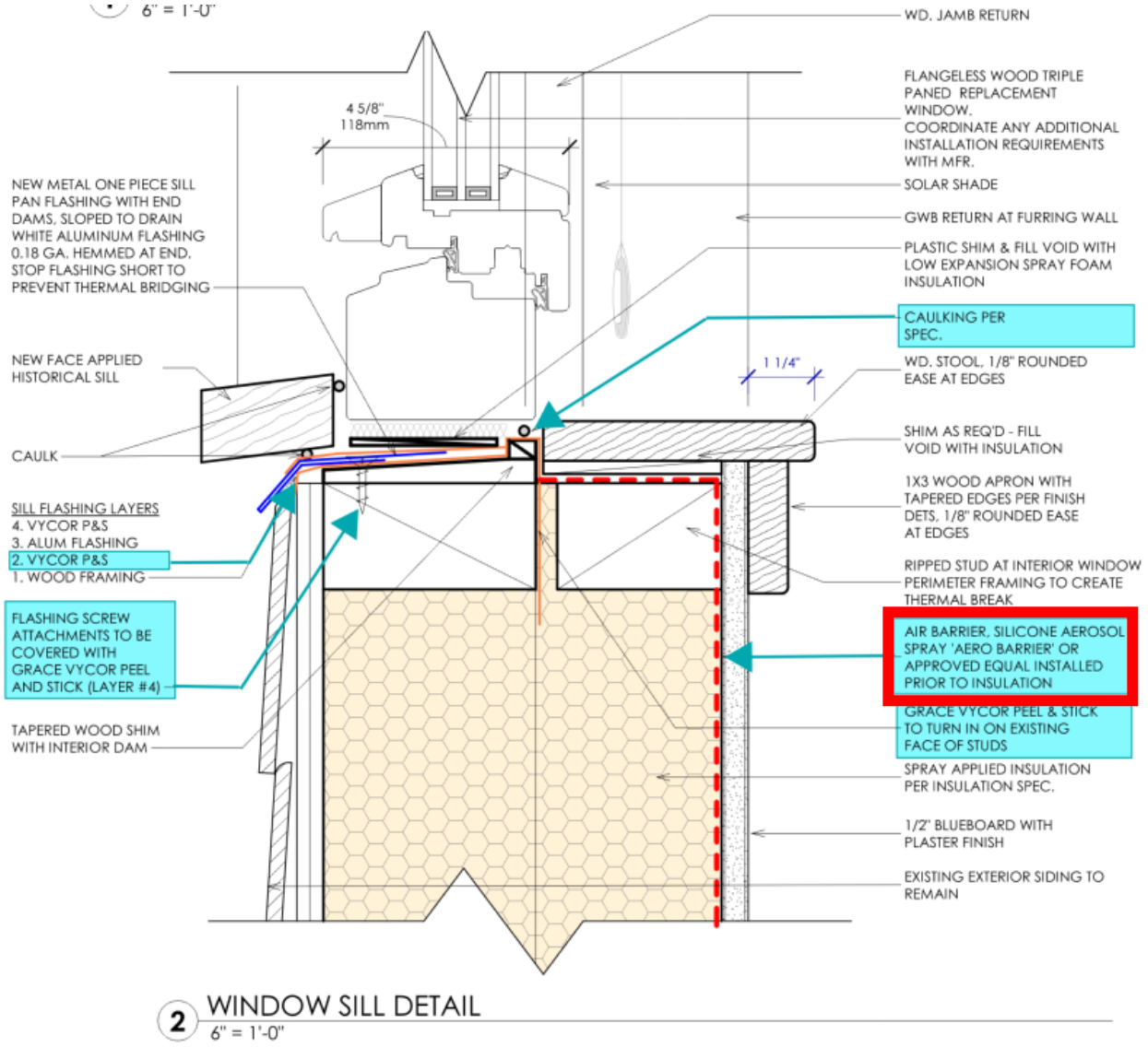
Maintain a Thermal Break With New Framing

Photos courtesy of Mark Newey, Phius Verifier

Passive Building Principles: AIR CONTROL



Airtightness



Drawing courtesy of Thornton Tomasetti

Thermal Insulation

- Closed cell spray foam was installed in exterior wall and roof
- Installation was challenging in terms of getting proper depth and coverage
- There were many locations where spray foam had to stop due to framing blockages
- Can still be leakage paths between spray foam and wood studs

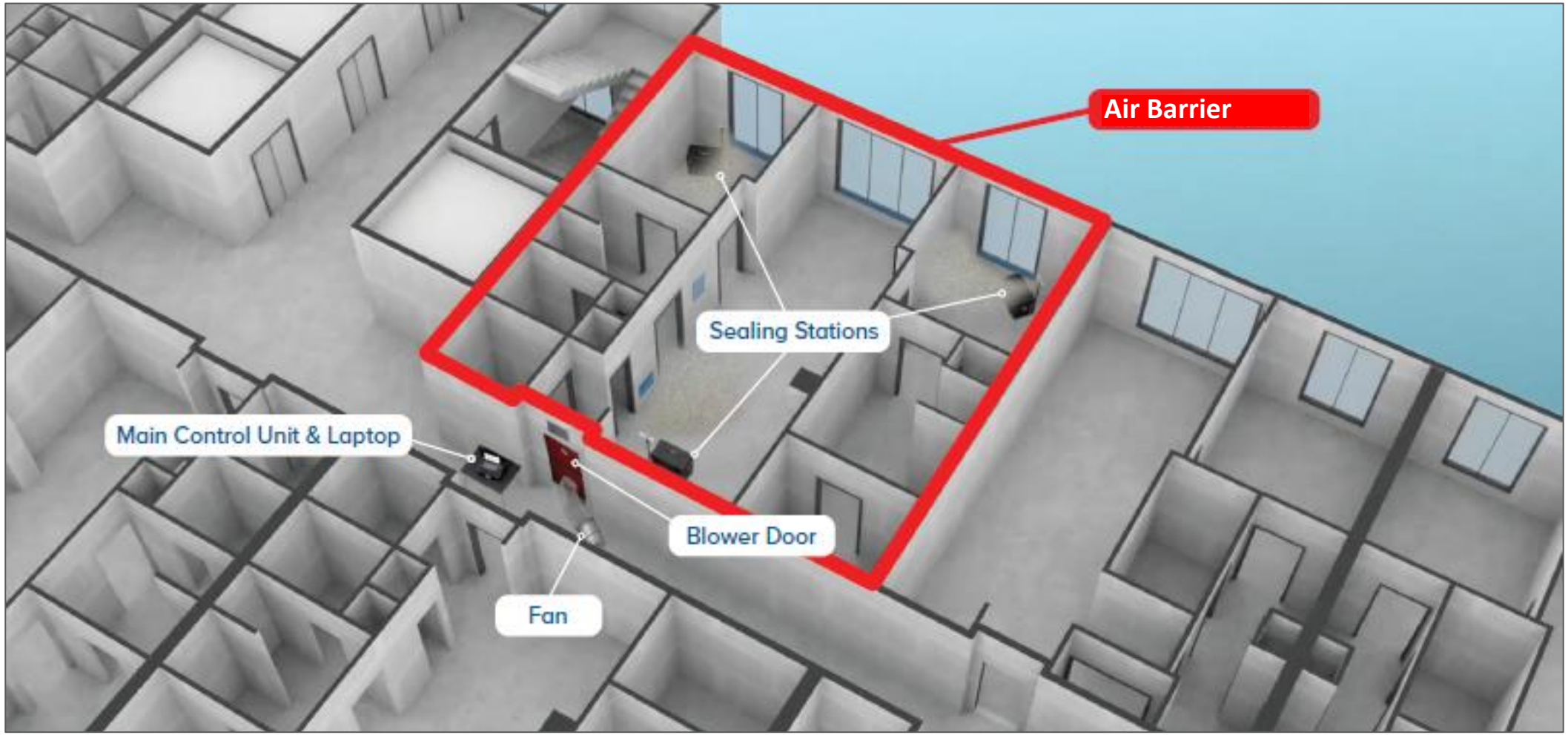
Photo courtesy of Mark Newey, Phius Verifier

AeroBarrier Building Envelope Air Sealing

AeroBarrier is a sealant and an installation and leak testing system that seals air leaks in the building envelope

- The AeroBarrier X1 Sealant is what is installed and seals the air leaks
- The automated AeroBarrier system installs the sealant, using a blower door to direct the sealant into the leaks
- The AeroBarrier system also runs a continuous blower door test, providing air leakage measurements while sealing and the final air leakage result as soon as the installation is completed

AeroBarrier Air Sealing System Deployed

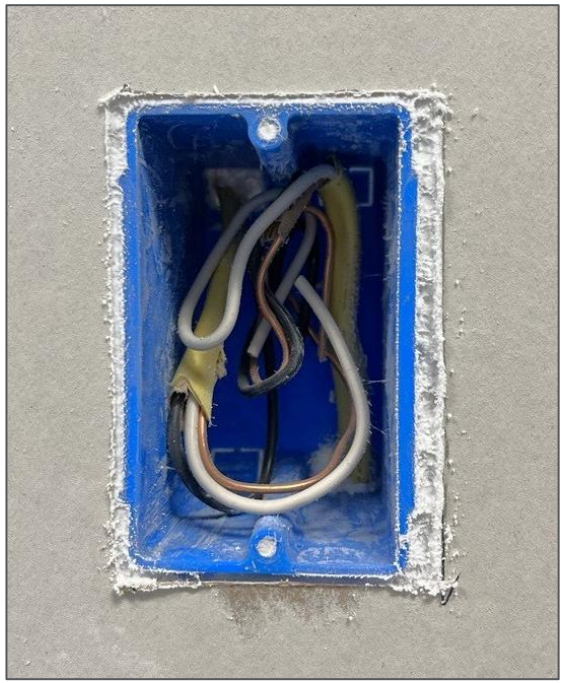


AeroBarrier Being Installed in a 2 BR Apartment

AeroBarrier Building Envelope Sealant From Start to Finish of a Seal

AeroBarrier sealant starts as a liquid

Then is aerosolized Into a fog



And ultimately adheres & dries only at the leakage points as a flexible sealant

Air Sealing the Exterior Envelope: Seal Progression

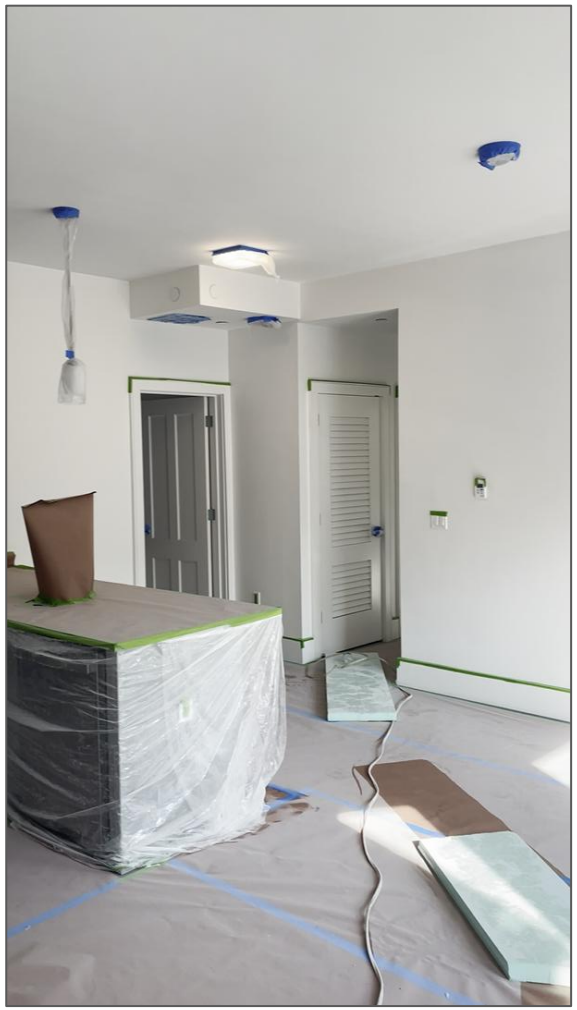
- AeroBarrier applied after closed cell spray foam in place
- Didn't know real leakage until foam installed due to sheathing gaps
- AeroBarrier seals exterior envelope & achieves air leakage goal
- Issues with contractor run blower door tests

- AeroBarrier compartmentalizes individual apartment units, achieving air leakage goal for each unit

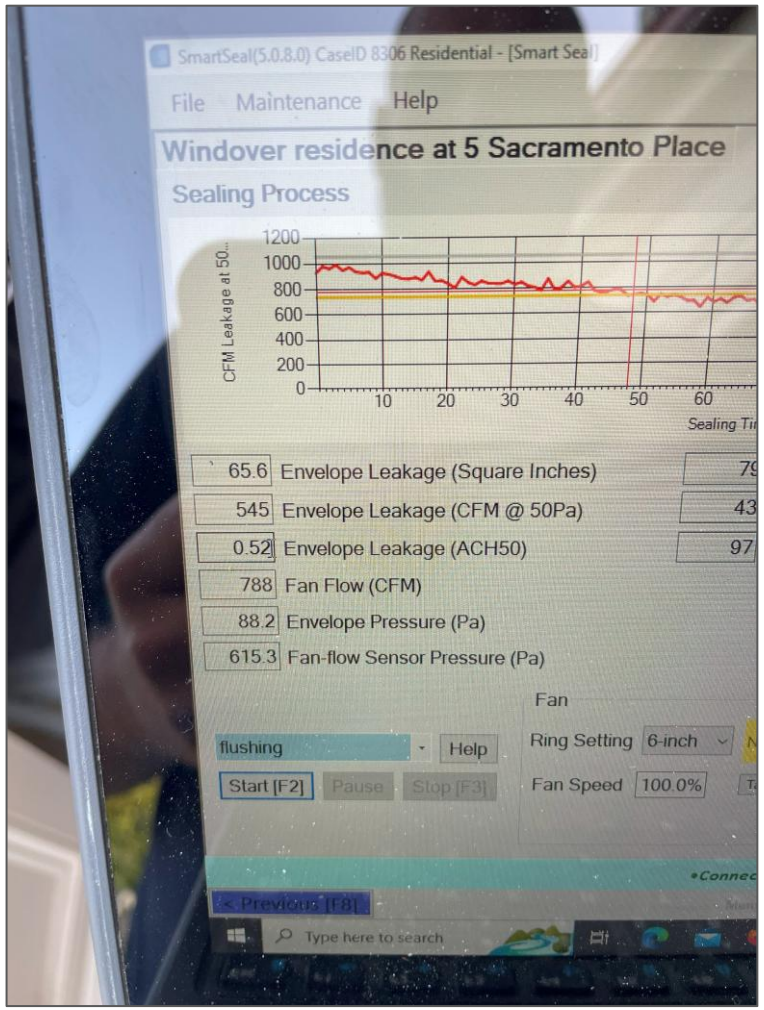
- 6-9 months later, contractor is failing final whole building blower door tests
- Potential causes were new penetrations & framing shrinkage over the winter
- AeroBarrier called back to job sites for additional sealing
- Contractor decides to try targeted AeroBarrier sealing at 5 Sacramento St. without success
- AeroBarrier seals whole building exterior envelope again & achieves air leakage goal

Air Sealing the Exterior Envelope: Seal Images

AeroBarrier Set Up Outside



Prep Work Inside for Finished Unit



AeroBarrier Laptop Screen During Seal

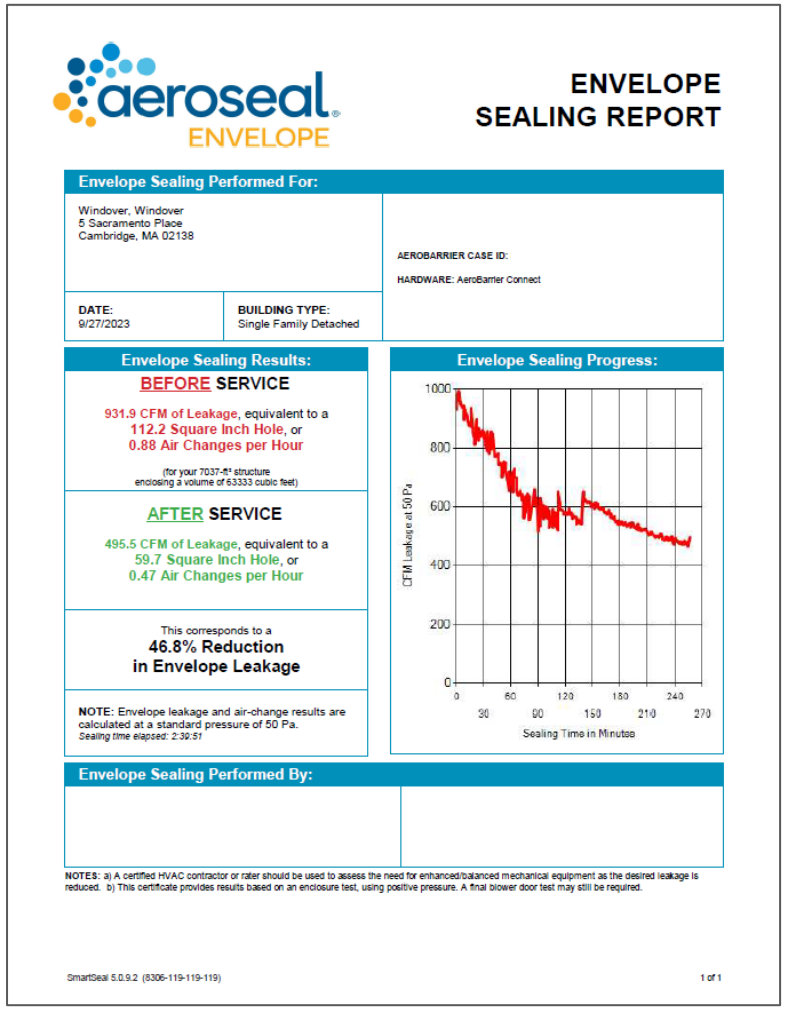
Air Sealing For Compartmentalization

- Compartmentalization was complex due to:
  - Demising walls and floors that didn't line up with the framing and structural system
  - Floor system also a challenge due to a lot of wires, pipes, and ducts fit below the floor
- Contractor experienced difficulty with manual air sealing between units
- AeroBarrier application met compartmentalization leakage requirements in one seal per unit

Photos courtesy of Mark Newey, Phius Verifier

Air Leakage Results: Final Envelope Sealing Reports

aerobarrier by aeroseal



aeroseal ENVELOPE

ENVELOPE SEALING REPORT

Envelope Sealing Performed For:

Windover, Windover
5 Sacramento Place
Cambridge, MA 02138

AEROBARRIER CASE ID:

HARDWARE: AeroBarrier Connect

DATE: 9/27/2023

BUILDING TYPE: Single Family Detached

Envelope Sealing Results:

BEFORE SERVICE

931.9 CFM of Leakage, equivalent to a
112.2 Square Inch Hole, or
0.88 Air Changes per Hour

(for your 7037-ft² structure enclosing a volume of 53333 cubic feet)

AFTER SERVICE

495.5 CFM of Leakage, equivalent to a
59.7 Square Inch Hole, or
0.47 Air Changes per Hour

This corresponds to a
46.8% Reduction in Envelope Leakage

NOTE: Envelope leakage and air-change results are calculated at a standard pressure of 50 Pa.
Sealing time elapsed: 2:39:51

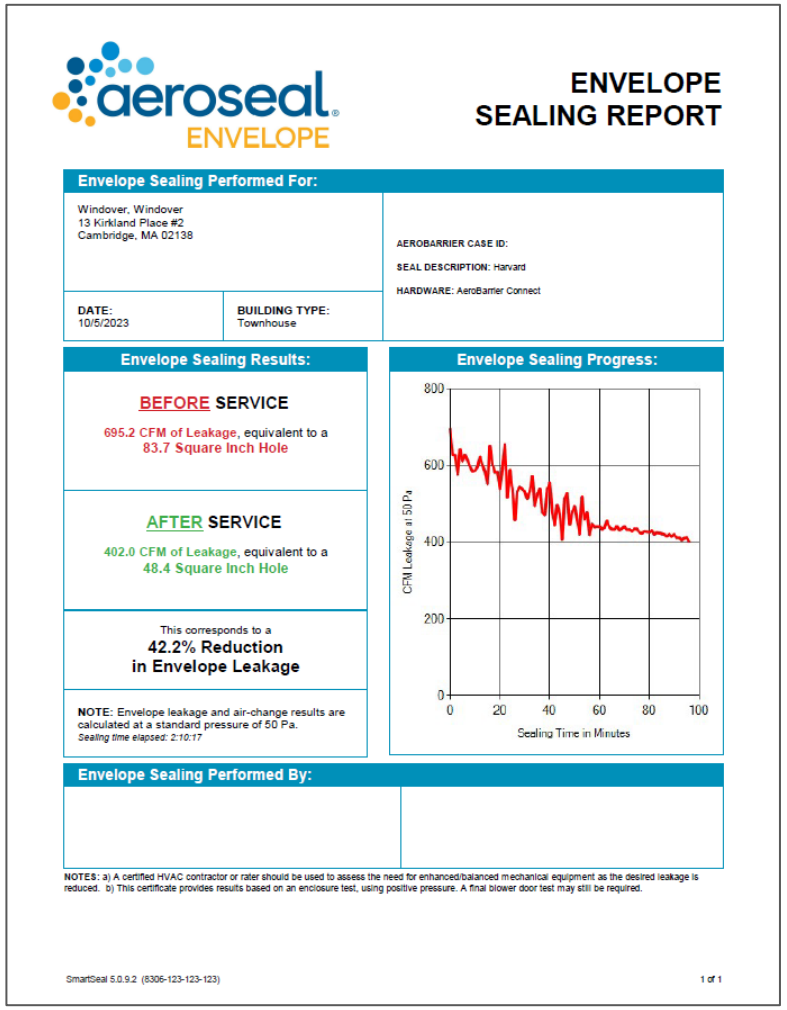
Envelope Sealing Progress:

Envelope Sealing Performed By:

NOTES: a) A certified HVAC contractor or rater should be used to assess the need for enhanced/balanced mechanical equipment as the desired leakage is reduced. b) This certificate provides results based on an enclosure test, using positive pressure. A final blower door test may still be required.

SmartSeal 5.0.9.2 (8306-119-119-119) 1 of 1

5 Sacramento Street



aeroseal ENVELOPE

ENVELOPE SEALING REPORT

Envelope Sealing Performed For:

Windover, Windover
13 Kirkland Place #2
Cambridge, MA 02138

AEROBARRIER CASE ID:

SEAL DESCRIPTION: Harvard

HARDWARE: AeroBarrier Connect

DATE: 10/5/2023

BUILDING TYPE: Townhouse

Envelope Sealing Results:

BEFORE SERVICE

695.2 CFM of Leakage, equivalent to a
83.7 Square Inch Hole

AFTER SERVICE

402.0 CFM of Leakage, equivalent to a
48.4 Square Inch Hole

This corresponds to a
42.2% Reduction in Envelope Leakage

NOTE: Envelope leakage and air-change results are calculated at a standard pressure of 50 Pa.
Sealing time elapsed: 2:10:17

Envelope Sealing Progress:

Envelope Sealing Performed By:

NOTES: a) A certified HVAC contractor or rater should be used to assess the need for enhanced/balanced mechanical equipment as the desired leakage is reduced. b) This certificate provides results based on an enclosure test, using positive pressure. A final blower door test may still be required.

SmartSeal 5.0.9.2 (8306-123-123-123) 1 of 1

13 Kirkland Place

5 Sacramento Street After Renovation

5 Sacramento Street

13 Kirkland Place

Final Details & Air Leakage Results

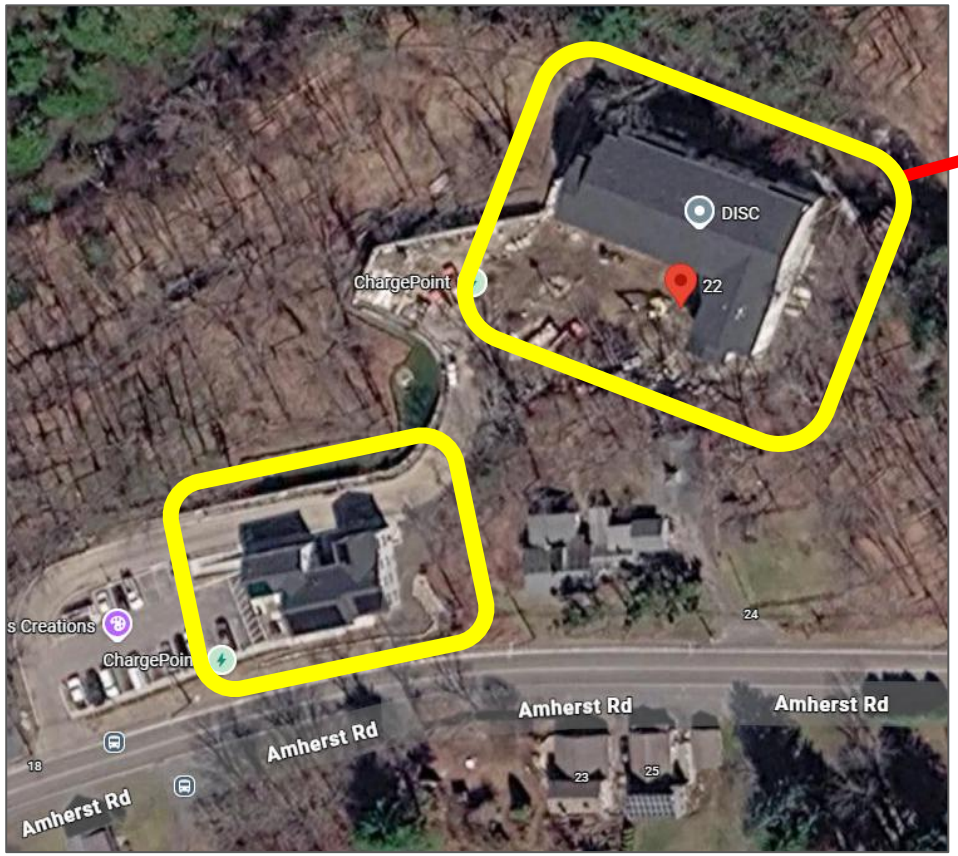
Project Details/Information	5 Sacramento Street	13 Kirkland Place
Location	Cambridge, MA	Cambridge, MA
Climate Zone	5A-Cool-Humid	5A-Cool-Humid
Building Type	Multifamily	Multifamily
Project Type	Retrofit	Retrofit
# of Stories	4	4
# of Units	5	4
Phius Program Ver. Achieved	**Phius CORE REVIVE 2021**	**Phius CORE REVIVE 2021**
Interior Conditioned SF	5968	3618
All Electric?	**Yes**	**Yes**
Air Leakage Achieved	**0.05 CFM50/SF**	**0.054 CFM50/SF**

Lessons Learned: 135+ Year Old Phius Retrofits

- Frequent blower door tests by the contractor is good, but need to ensure they are properly trained on using the blower door equipment
- Conduct more field investigation of existing conditions before design and construction documents are completed to eliminate surprises during construction
- Include more exterior envelope details in the construction documents
- Consider applying AeroBarrier prior to the spray foam insulation to seal against exterior sheathing and thus identify earlier any existing exterior envelope issues
- Improve communication between contractor, passive house professionals, and air sealing subcontractors

Case Study: New Construction Multifamily Affordable Housing Phius Core

New Construction Affordable Housing Apartments



Amethyst Brook Apartments
2 Buildings

Featured Building:
22 Amherst Rd., Pelham MA

Amethyst Brook Apartments
22 Amherst Road

Project Details/Info	22 Amherst Road
Location	Pelham, MA
Climate Zone	5A-Cool-Humid
Building Type	Multifamily
Project Type	New Construction
Year Completed	2025
Interior Conditioned Area (sf)	29,688
# of Stories	4
# of Units	28

22 Amherst Road
Pelham, MA

Project Team

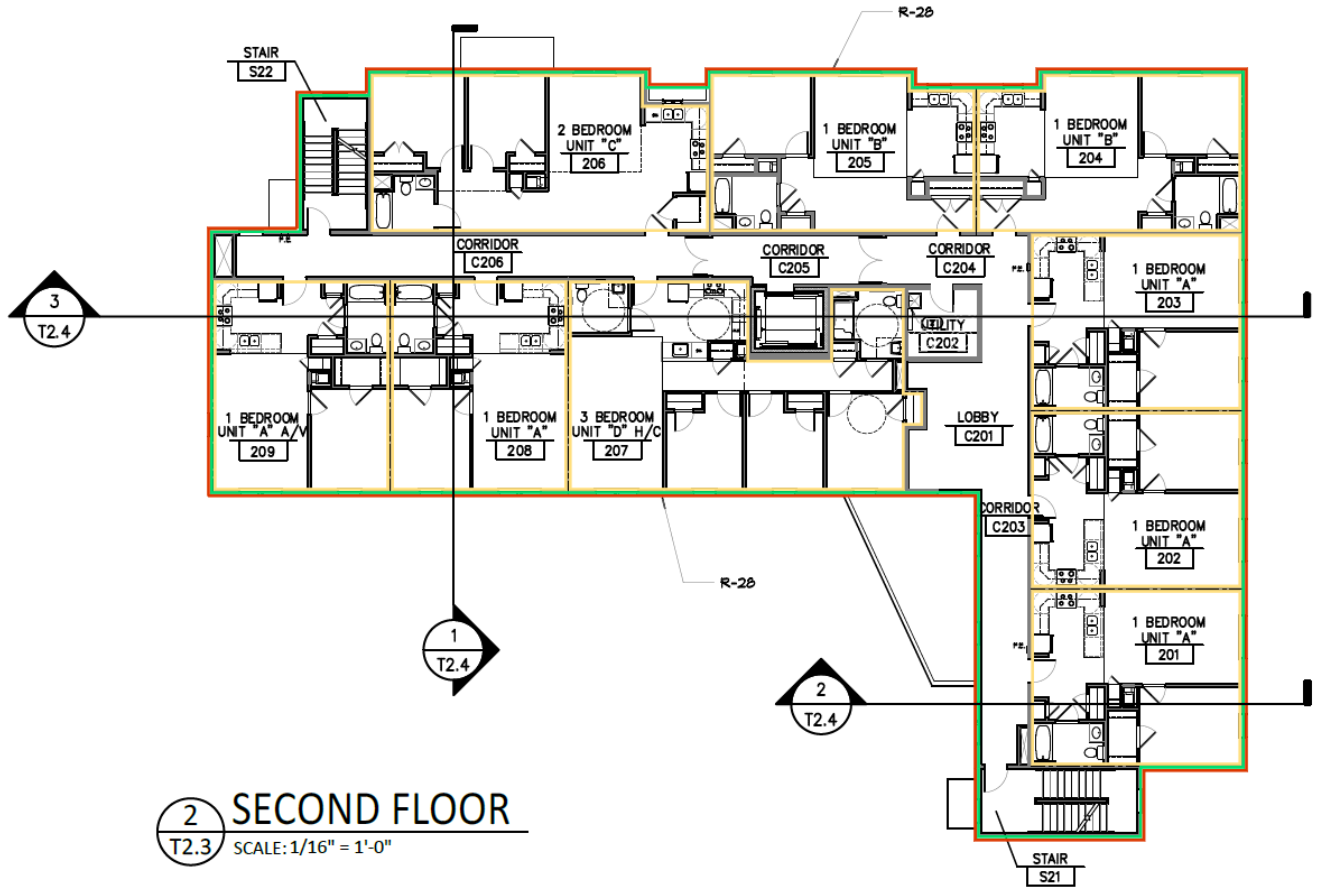
- Architect = Architecture EL
- Passive House consultant = Ken Neuhauser & Chris Kennedy
- Passive House verifier = Matt Zarotny
- General Contractor = Western Builders Inc.

Passive House Goal

phius CORE

2021

Defining Building Envelope Air Sealing Scope & Requirements: Floor Plans



PHIUS PASSIVE HAUS REQUIREMENTS:

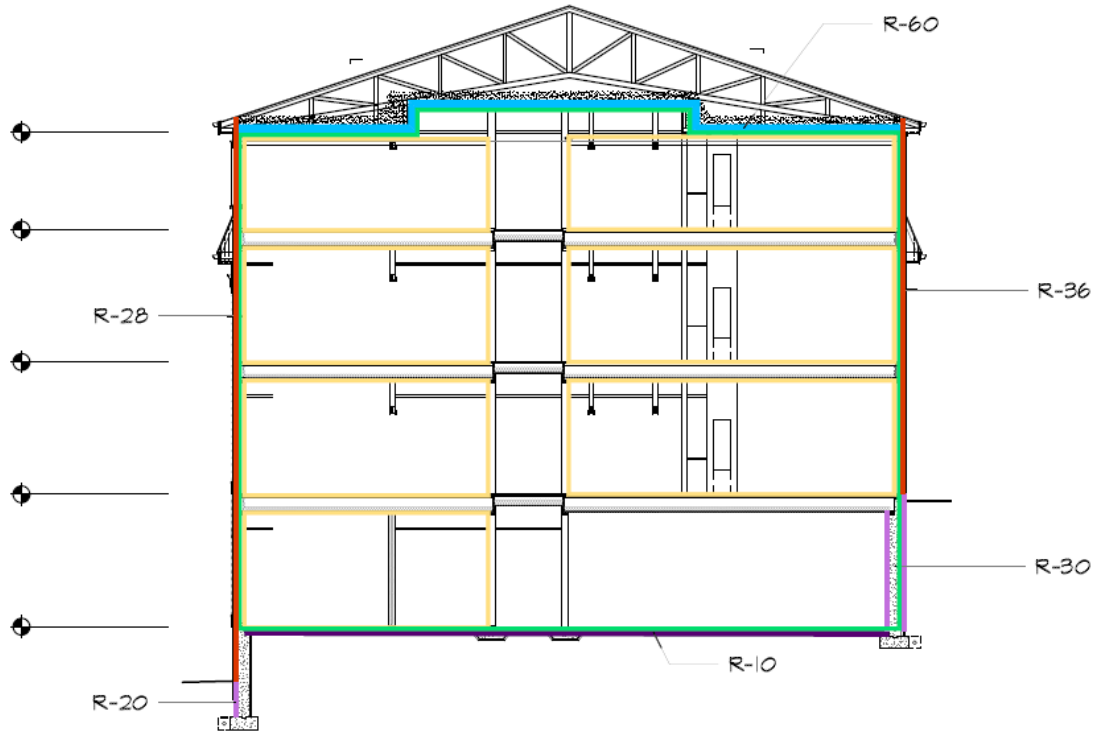
PASSIVE HAUS AIR LEAKAGE THRESHOLD:
AIR LEAKAGE FOR ENCLOSURE MUST BE LESS THAN OR EQUAL TO

EXTERNAL AIR BOUNDARY
LIMIT < 0.06 CFM50/ SQ FT

INTERNAL AIR BOUNDARY
LIMIT < 0.3 CFM50/ SQ FT

Drawings courtesy of Architecture EL

Defining Building Envelope Air Sealing Scope & Requirements: Building Sections



1 T2.4 MAIN BUILDING SECTION
SCALE: 1/8" = 1'-0"

PHIUS PASSIVE HAUS REQUIREMENTS:

PASSIVE HAUS AIR LEAKAGE THRESHOLD:
AIR LEAKAGE FOR ENCLOSURE MUST BE LESS THAN OR EQUAL TO

EXTERNAL AIR BOUNDARY
LIMIT < 0.06 CFM50/ SQ FT

INTERNAL AIR BOUNDARY
LIMIT < 0.3 CFM50/ SQ FT

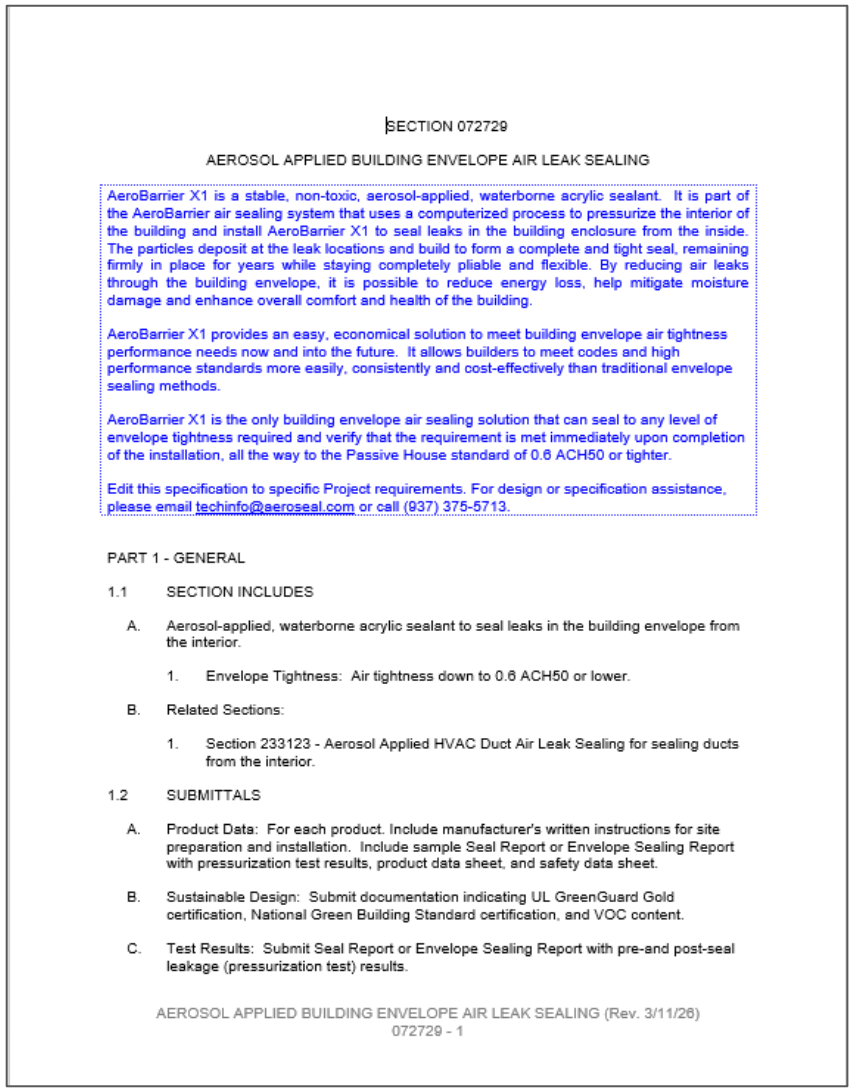
Drawings courtesy of Architecture EL

Include Air Sealing in Project Specifications

aerobarrier by aeroseal

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

Section 07 11 13	Bituminous Dampproofing
Section 07 13 26	Self-Adhering Sheet Waterproofing
Section 07 16 16	Crystalline Waterproofing
Section 07 21 00	Building Insulation
Section 07 21 19	Foamed-In-Place Insulation
Section 07 21 25	Cellulose Insulation
Section 07 25 00	Weather Barriers
Section 07 27 26	Aerosol-Applied Sealant
Section 07 31 13	Fiberglass Asphalt Shingles
Section 07 44 00	Faced Panels
Section 07 46 33	Plastic Siding
Section 07 46 46	Fiber Reinforced Cementitious Siding
Section 07 54 23	Thermoplastic Polyolefin Roofing
Section 07 62 00	Sheet Metal Flashing and Trim
Section 07 92 00	Joint Sealants



SECTION 072729

AEROSOL APPLIED BUILDING ENVELOPE AIR LEAK SEALING

AeroBarrier X1 is a stable, non-toxic, aerosol-applied, waterborne acrylic sealant. It is part of the AeroBarrier air sealing system that uses a computerized process to pressurize the interior of the building and install AeroBarrier X1 to seal leaks in the building enclosure from the inside. The particles deposit at the leak locations and build to form a complete and tight seal, remaining firmly in place for years while staying completely pliable and flexible. By reducing air leaks through the building envelope, it is possible to reduce energy loss, help mitigate moisture damage and enhance overall comfort and health of the building.

AeroBarrier X1 provides an easy, economical solution to meet building envelope air tightness performance needs now and into the future. It allows builders to meet codes and high performance standards more easily, consistently and cost-effectively than traditional envelope sealing methods.

AeroBarrier X1 is the only building envelope air sealing solution that can seal to any level of envelope tightness required and verify that the requirement is met immediately upon completion of the installation, all the way to the Passive House standard of 0.6 ACH50 or tighter.

Edit this specification to specific Project requirements. For design or specification assistance, please email techinfo@aeroseal.com or call (937) 375-5713.

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Aerosol-applied, waterborne acrylic sealant to seal leaks in the building envelope from the interior.

1. Envelope Tightness: Air tightness down to 0.6 ACH50 or lower.

B. Related Sections:

1. Section 233123 - Aerosol Applied HVAC Duct Air Leak Sealing for sealing ducts from the interior.

1.2 SUBMITTALS

A. Product Data: For each product. Include manufacturer's written instructions for site preparation and installation. Include sample Seal Report or Envelope Sealing Report with pressurization test results, product data sheet, and safety data sheet.

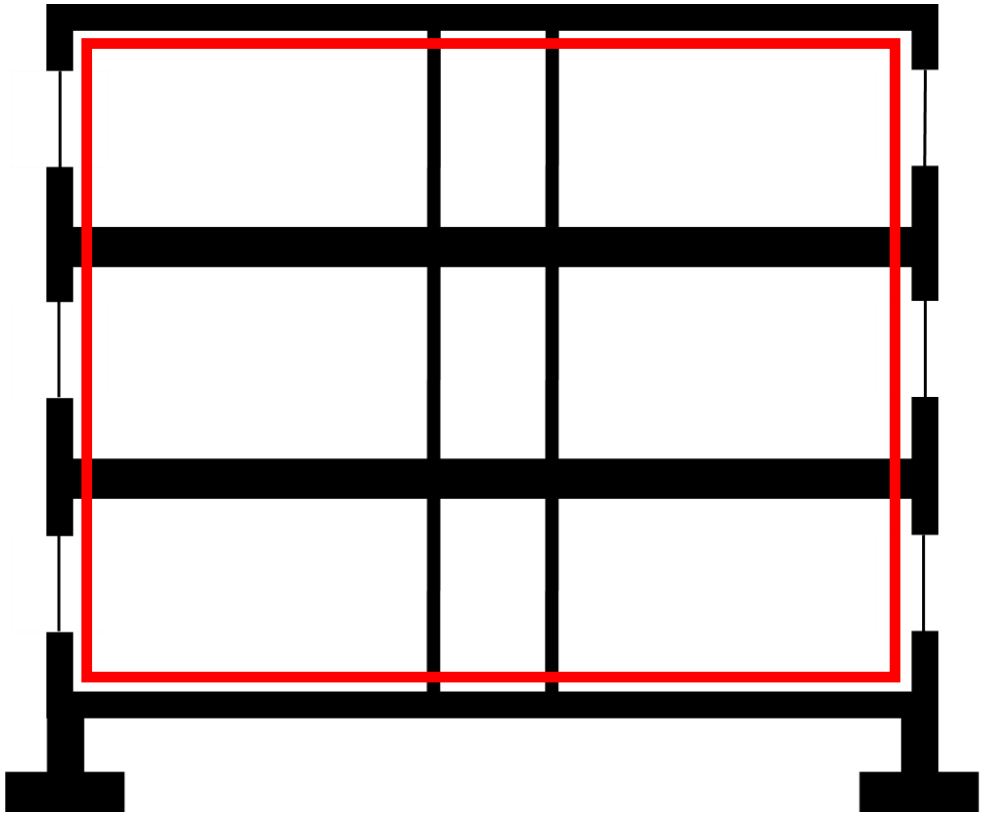
B. Sustainable Design: Submit documentation indicating UL GreenGuard Gold certification, National Green Building Standard certification, and VOC content.

C. Test Results: Submit Seal Report or Envelope Sealing Report with pre-and post-seal leakage (pressurization test) results.

AEROSOL APPLIED BUILDING ENVELOPE AIR LEAK SEALING (Rev. 3/11/26)
072729 - 1

Images courtesy of Architecture EL

AeroBarrier Used to Seal the Exterior Envelope

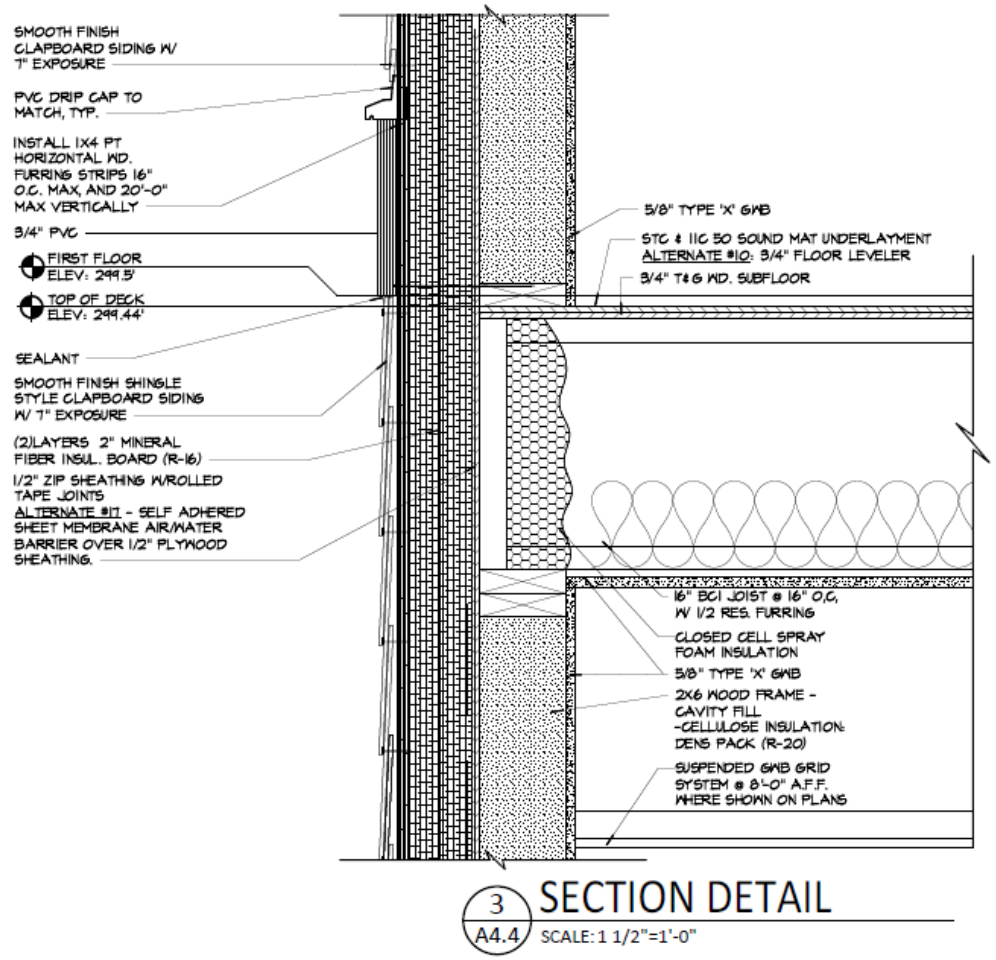


= Air Barrier

Exterior Envelope Air Barrier
(seals air leaks to the outside)

Air Sealing Strategy: Exterior Building Envelope

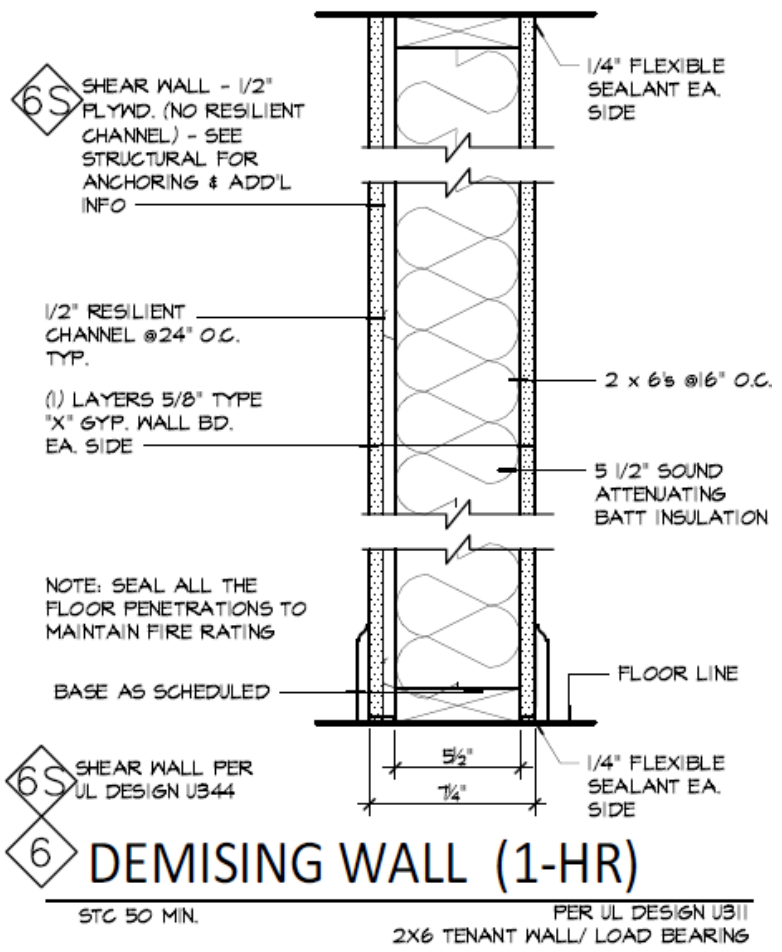
- Combination sheathing/insulation board at the exterior (taped & rolled)
- AeroBarrier applied to inside face of exterior sheathing
  - Before insulation installed
  - After MEP penetrations complete
  - Minimizes disturbance of exterior envelope air barrier during remainder of construction
- Some additional manual sealing done at the interior as well



Drawings courtesy of Architecture EL

Air Sealing Strategy: Interior Building Envelope

- Manual applied sealant at top plate, bottom plate, & penetrations



Drawings courtesy of Architecture EL

AeroBarrier Exterior Envelope Whole Building Air Sealing Deployment

Mobilization #1

- AeroBarrier applied to Third Floor (top floor) since work progressed from top down & more penetrations at attic
- MEP's continued at lower levels at this time

Mobilization #2

- AeroBarrier applied on First Floor & Second Floor at one time
- Guarded 3rd Floor initially to seal 1st & 2nd Floors
- Then unguarded 3rd Floor while AeroBarrier system running to continue with whole building exterior envelope seal & confirm leakage requirement met
- (3 seal days)

- Whole building air leakage passed
- No need for additional AeroBarrier sealing

- Whole building air leakage passed
- No need for additional AeroBarrier sealing

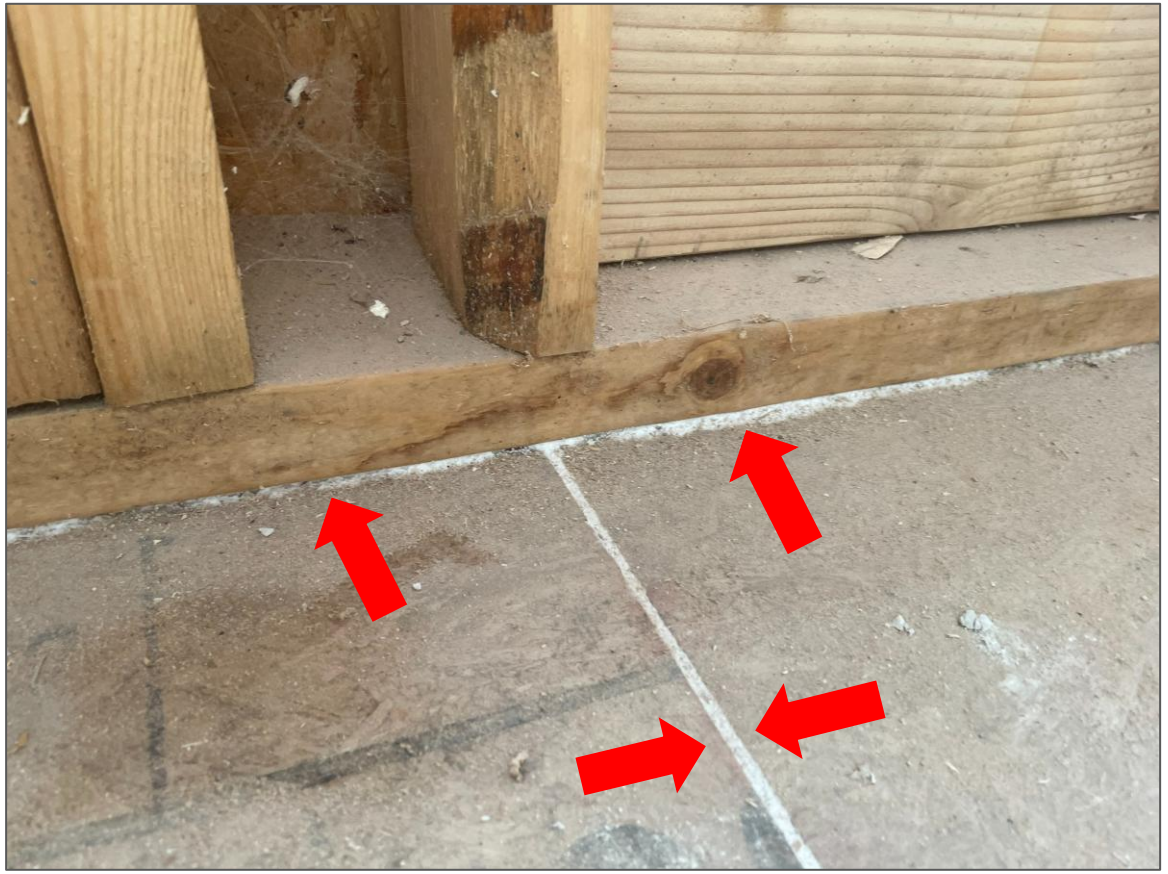
AeroBarrier Installation at Sheathing

AeroBarrier seal at exterior sheathing

AeroBarrier Installation Video

AeroBarrier Results: Seal Examples

Sealant at Top Plate Exterior Wall



Sealant at Base Plate & Subfloor of 3rd Floor

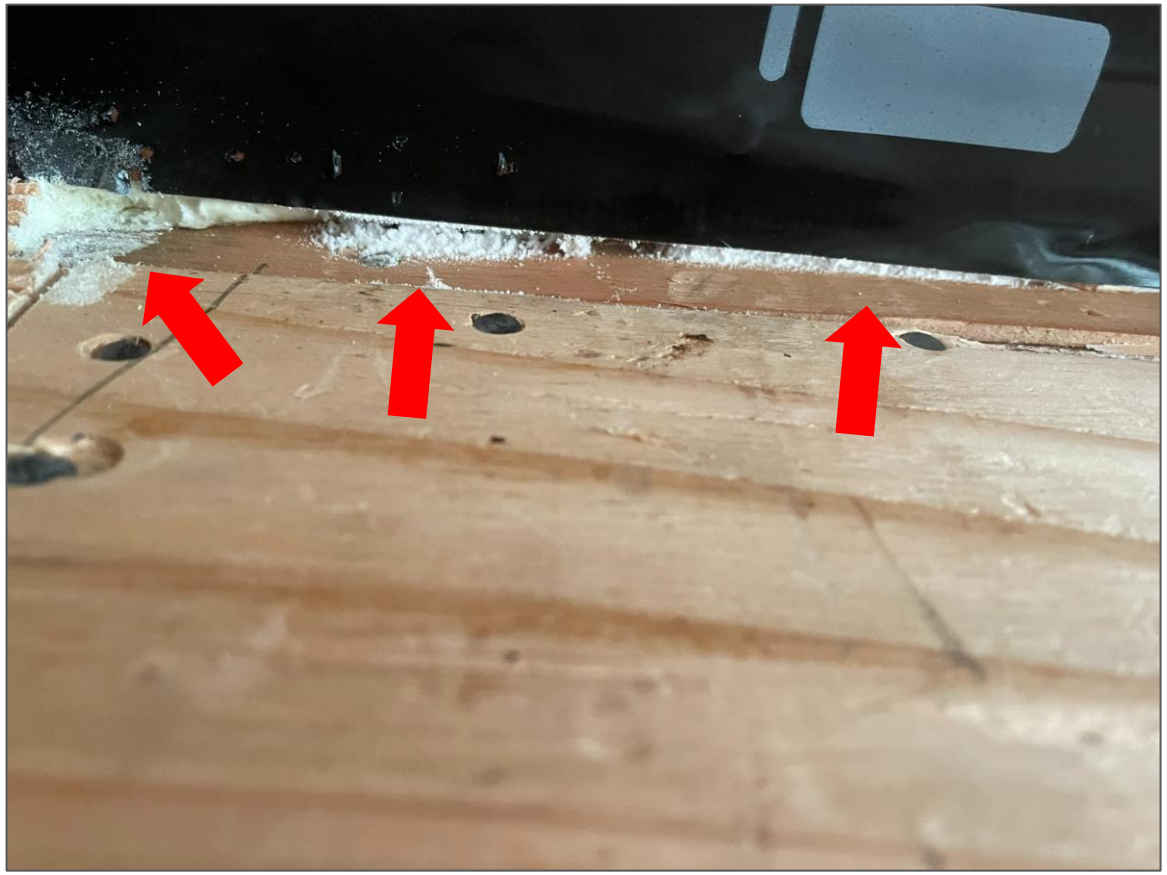
(AeroBarrier still found & sealed leakage where caulk was installed)

= Leakage areas sealed by Aeroseal Duct Sealant

AeroBarrier Results: Seal Examples

3rd Floor Top Plate (view from side)

(AeroBarrier found & sealed leakage where sealant tape installed)



3rd Top Floor Plate (view from below)

= Leakage areas sealed by Aeroseal Duct Sealant

AeroBarrier Results: Seal Report

aerobarrier by aeroseal

aeroseal ENVELOPE

ENVELOPE SEALING REPORT

Envelope Sealing Performed For:

Amethyst apt, western builders
22 amherst rd
pelham, MA 01002

AEROBARRIER CASE ID: 8306
SEAL DESCRIPTION: Amethyst
HARDWARE: AeroBarrier Connect

DATE: 11/26/2024
BUILDING TYPE: Multifamily

Envelope Sealing Results:

BEFORE SERVICE
6101.2 CFM of Leakage, equivalent to a 734.6 Square Inch Hole

AFTER SERVICE
978.8 CFM of Leakage, equivalent to a 117.8 Square Inch Hole

This corresponds to a
84% Reduction in Envelope Leakage

NOTE: Envelope leakage and air-change results are calculated at a standard pressure of 50 Pa.
Sealing time elapsed: 3:18:13

Envelope Sealing Progress:

Envelope Sealing Performed By:

SealTight Energy Solutions

Seal Tight Energy Solutions
79 Aquidneck Dr
Tiverton, RI 02878
Phone: 401-264-6952

NOTES: a) A certified HVAC contractor or rater should be used to assess the need for enhanced/balanced mechanical equipment as the desired leakage is reduced. b) This certificate provides results based on an enclosure test, using positive pressure. A final blower door test may still be required.

SmartSeal 5.0.8.27 (8306-325-325-325) 1 of 1

Exterior envelope air leakage achieved = **0.051 cfm50/sf**

Phius CORE 2021 Certified

Lessons Learned

- Human error exists with manual air sealing
- AeroBarrier application at exterior sheathing is very beneficial to achieving Passive House air leakage requirements – enables passing the mid project blower door test and knowing your requirement is met much sooner
- Construction schedule issues and changes that affect projects also have a big impact on air sealing – whether an AeroBarrier application or other air sealing methods
- Need to continue to get better at not introducing new air leaks after air sealing has been done
- All passive house projects should have an “air boss” so that communication about air sealing is good amongst the GC & all relevant trades throughout the project to eliminate issues

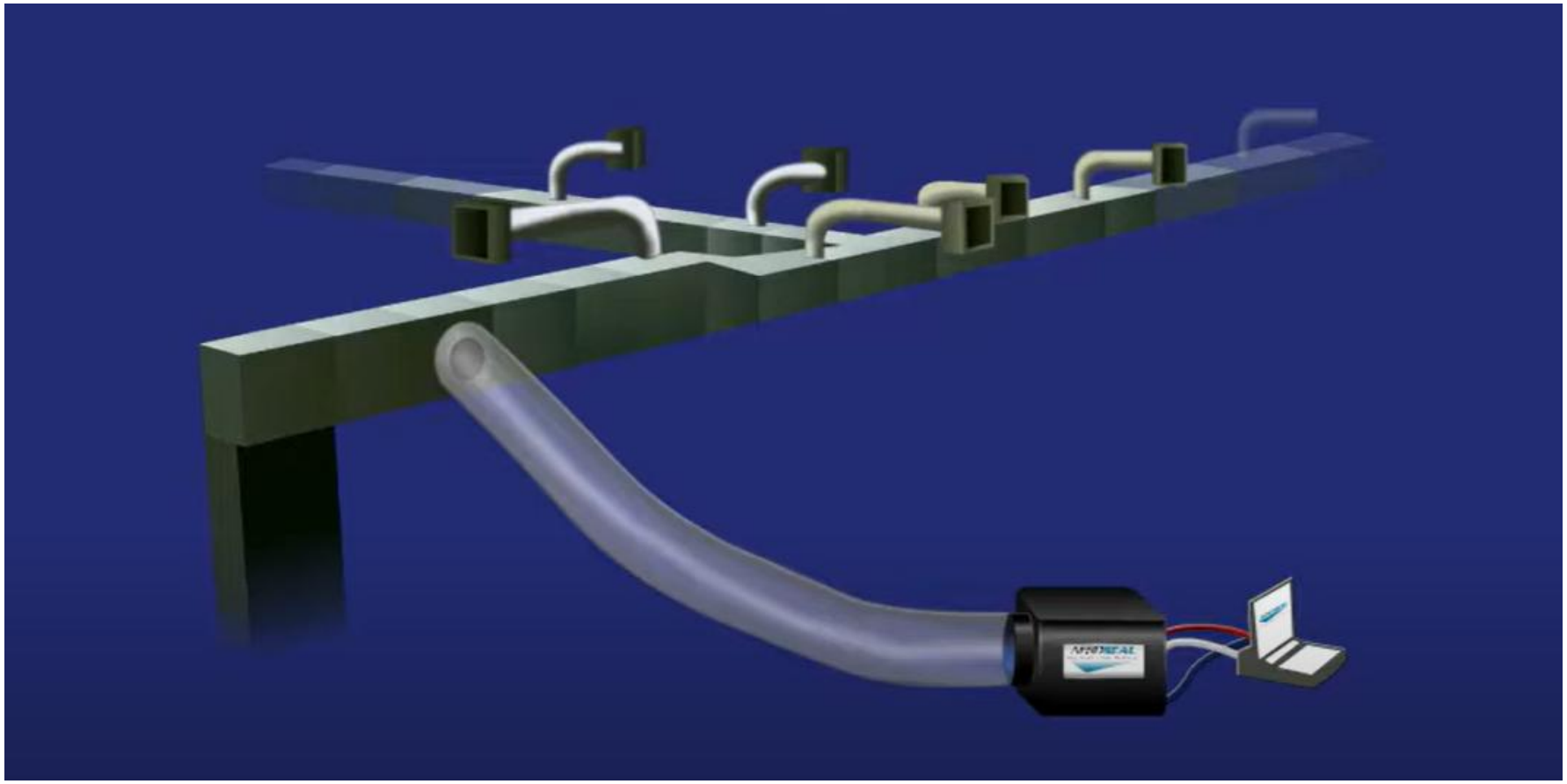
Duct Sealing to Passive House Standards

Aeroseal Duct Sealing

Aeroseal is a sealant and an installation and air leak testing system that seals air leaks in HVAC ductwork from the inside of the ducts

- The Aeroseal Duct Seal sealant is what is installed and seals the air leaks
- The automated Aeroseal system installs the sealant, pressurizing the ductwork to direct the sealant into the leaks from the inside
- The Aeroseal system also runs a continuous duct leakage test, providing air leakage measurements while sealing and the final air leakage result as soon as the installation is completed

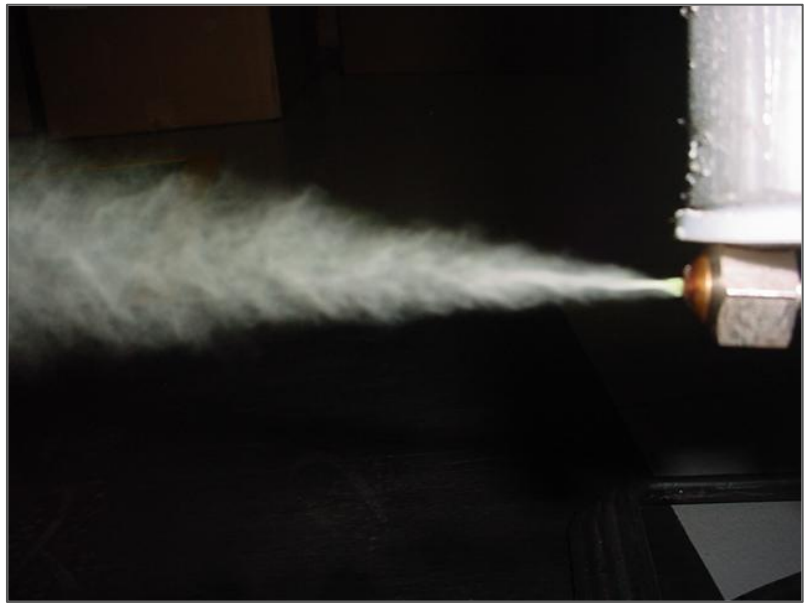
Aeroseal Duct Sealing System Deployed



Automated & Computer Controlled Duct Sealing

Aeroseal Duct Sealant From Start to Finish of a Seal

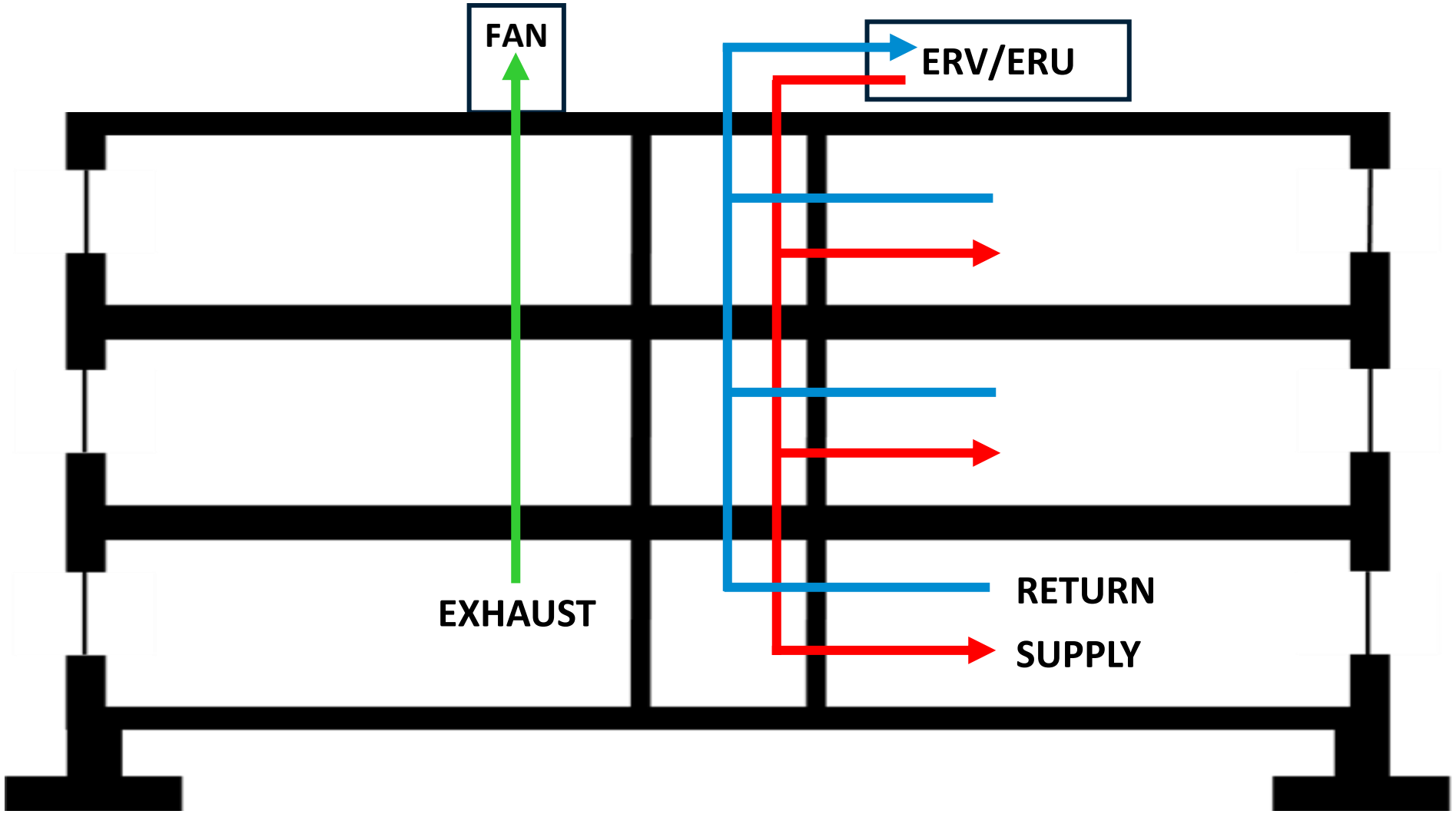
Aeroseal Duct Seal sealant starts as a liquid



Then is aerosolized into a fog inside the ductwork

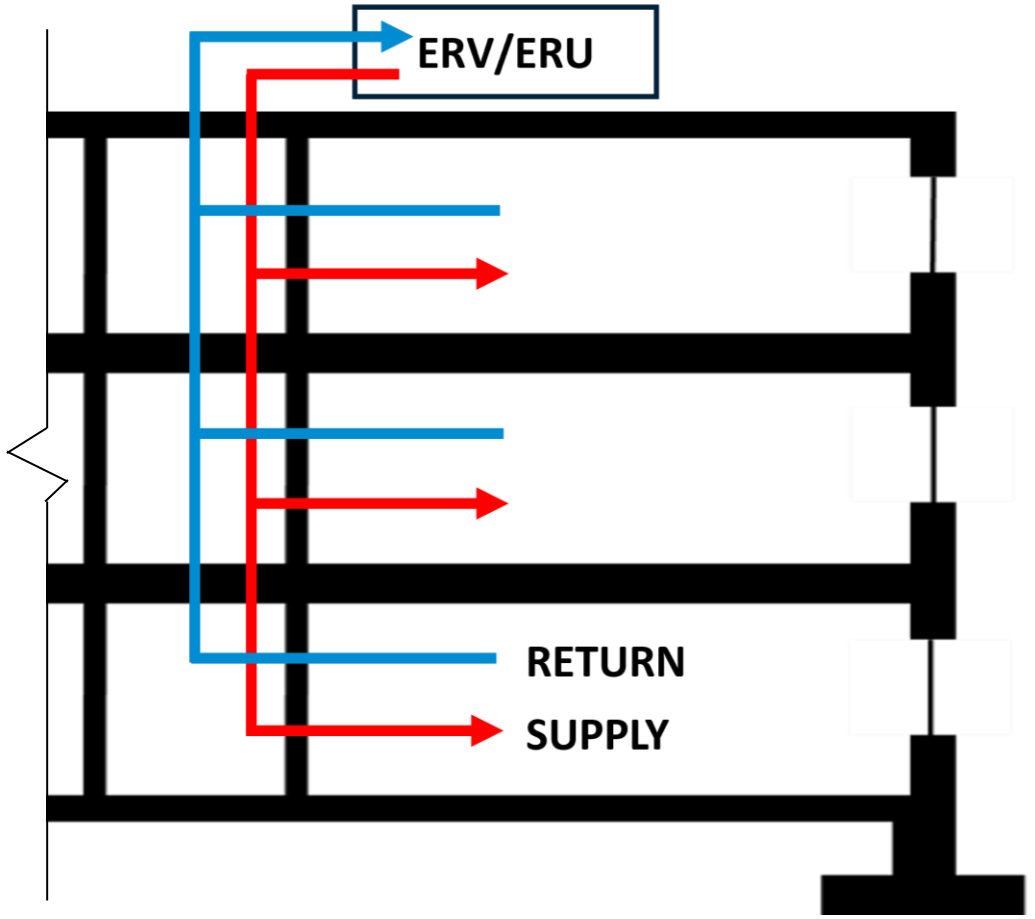
And ultimately adheres & dries only at the leakage points as a flexible sealant

Passive House Duct Sealing Can Include Exhaust, Supply, Return



Aeroseal Duct Sealing on Passive House Projects is Expanding to Include All Ducts

- Aeroseal has been a lot used to seal leakage in the exhaust system
  - Horizontal runs & vertical risers
  - Longer runs of ductwork harder to achieve the passive house leakage requirement
- Recently Aeroseal is being used to seal ductwork on the growing number of projects using centralized ERV/ERU's
  - Longer runs of ductwork harder to achieve the passive house leakage requirement
  - Horizontal runs & vertical risers



Some Phius Certified Multifamily Projects Including Aeroseal Duct Sealing

Betty Greene Apartments: Certified

Old Colony Phases 4 & 5: Certified
Old Colony Phase 6: Design Certified

Rindge Commons: Design Certified

Q+A/Discussion

Q+A/Discussion

Thank You!

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