



**BUILDINGENERGY NYC**  
THURSDAY, OCTOBER 16, 2025 • NEW YORK, NY • [NESEA.ORG/BENYC25](https://www.nesea.org/benyc25)  
Conference + Trade Show of the Northeast Sustainable Energy Association (NESEA)

10.16.25

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# Air Sealing Brings New Life to Old Buildings: 2 Case Studies

# Agenda



- Today's speakers
- What we're focused on today: bringing today's high performance to the renovation of yesterday's buildings
- Air sealing key points
- Hetzel Hall: building envelope air sealing case study
- Jaycee Place: duct air sealing case study
- Q & A/discussion

# Today's Speakers



**Bill Shadid**

Aeroseal  
Business Development Leader:  
Architects & Engineers



**Tom Holmes**

Aeroseal  
Bus. Develop. Mgr. Northeast

# What We're Focused On Today

# Using Existing Buildings vs. Building New Buildings is a Great Idea



**Less Carbon**



**Less Waste**



**Good Buildings**

# Then Why Don't We Continue Using Existing Buildings More Often?



**Older Building  
With Performance  
of a New Building?**



**Perceived  
Complexity**



**Perceived  
High Cost**

# Today's Focus: New Life for 2 Existing Buildings



# | Air Sealing Key Benefits

# Air Sealing Key Benefits for the Building Envelope & Ductwork



Benefits of Air Sealing – 1						
Air Sealing Type	Reduced Energy Use & Costs	Increased Comfort	Reduce Moisture in the Ext. Wall	Increased Indoor Air Quality	Reduce Outside Noise	Reduce Insects & other Pests
Building Envelope						
Ductwork						

# Air Sealing Key Benefits for the Building Envelope & Ductwork



Benefits of Air Sealing – 2					
Air Sealing Type	Smaller HVAC System	Increased HVAC System Efficiency	Building Code	High Performance Standards	Gain \$ Incentives
Building Envelope					
Ductwork					

# Hetzel Hall: Building Envelope Air Sealing Case Study

# Univ. of New Hampshire Hetzel Hall



# Why Renovate?



- Preservation of History
  - Celebrating 100 years
- University's commitment to sustainability
- Embodied Carbon

## Challenges

- Predictability
  - Schedule
  - Cost \$\$\$



# Hetzel Hall: Project Overview



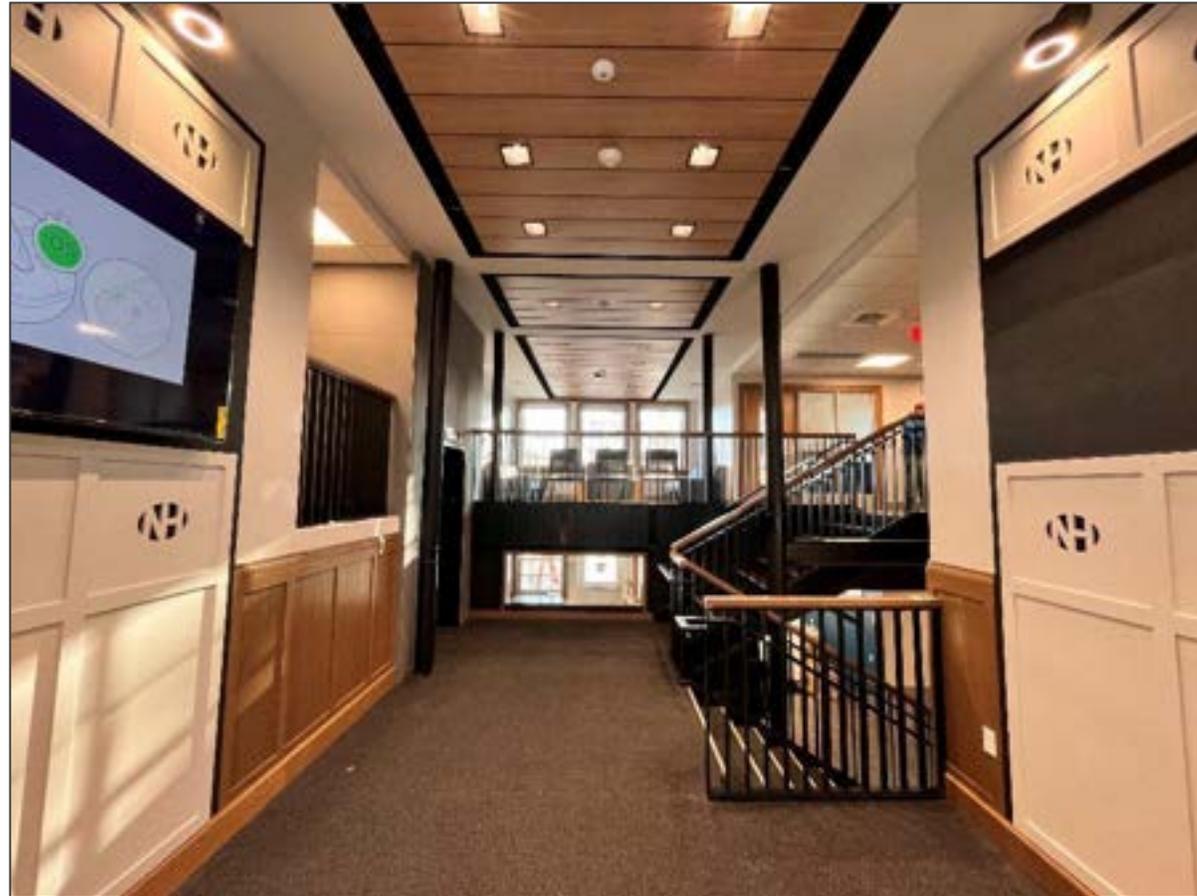
- Architect = Lavallee Brensinger Architects
- Building originally constructed in 1925 by EF Huddleston
- Concrete foundations, multi-wythe masonry / terra cotta exterior load bearing walls, wood framed roof
- Cast-in place concrete floor and joist system with steel girders and columns
- Design-build 33,500 sf gut demolition and reconstruction
- 140 beds; 60/40 ratio, singles to doubles
- Issued 4 bid packages in 7 months



# Balancing the Past and the Future



**Before**



**After**

# Balancing the Past and the Future



**Before**



**After**

# Balancing the Past and the Future

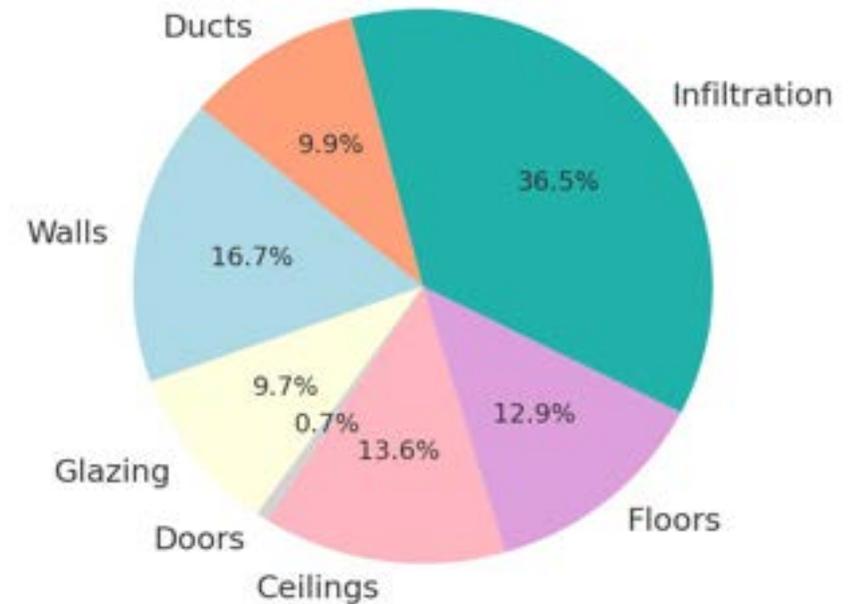
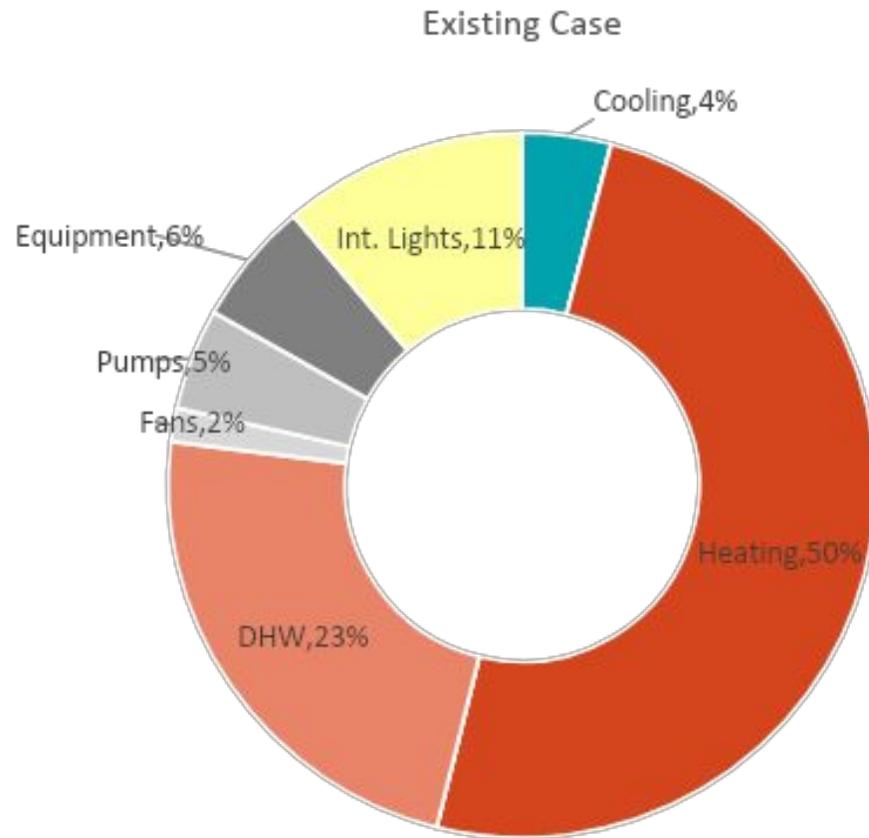


**Before**

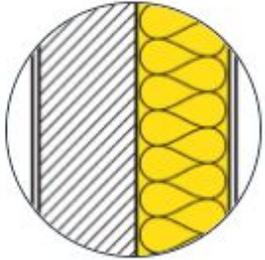


**After**

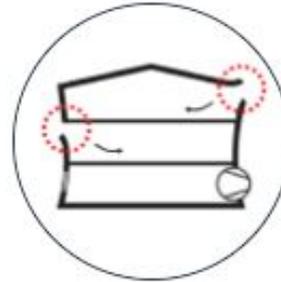
# Prioritization of Energy Conservation Measures



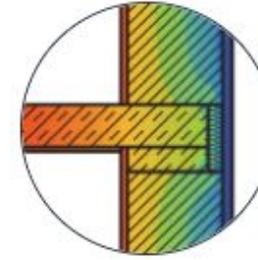
# Exterior Envelope Goals



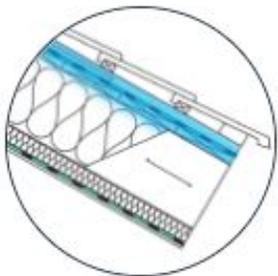
**High-Performance Enclosure**



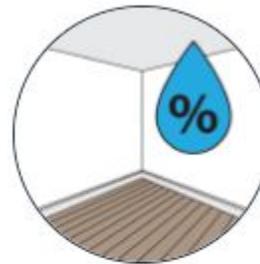
**Airtightness**



**Thermal Bridge Elimination**



**Material Moisture**



**Air Humidity**



**High Performance Glazing**

# Condition of Interior After Demo & Before Exterior Air Sealing



# Exterior Wall Improvements Considered

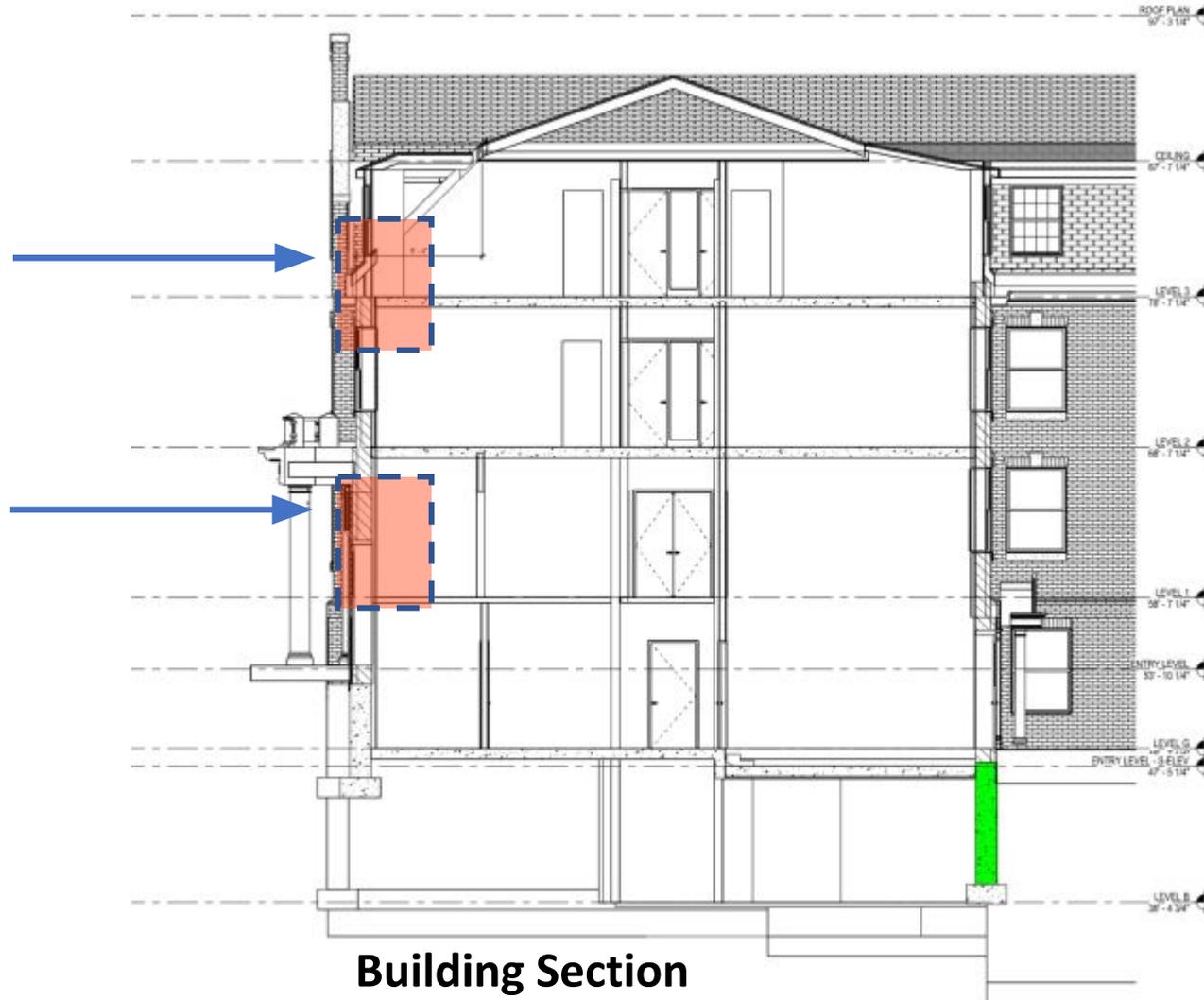


**Case 1: SINGLE WYTHE MW + SMART VAPOR BARRIER**

and

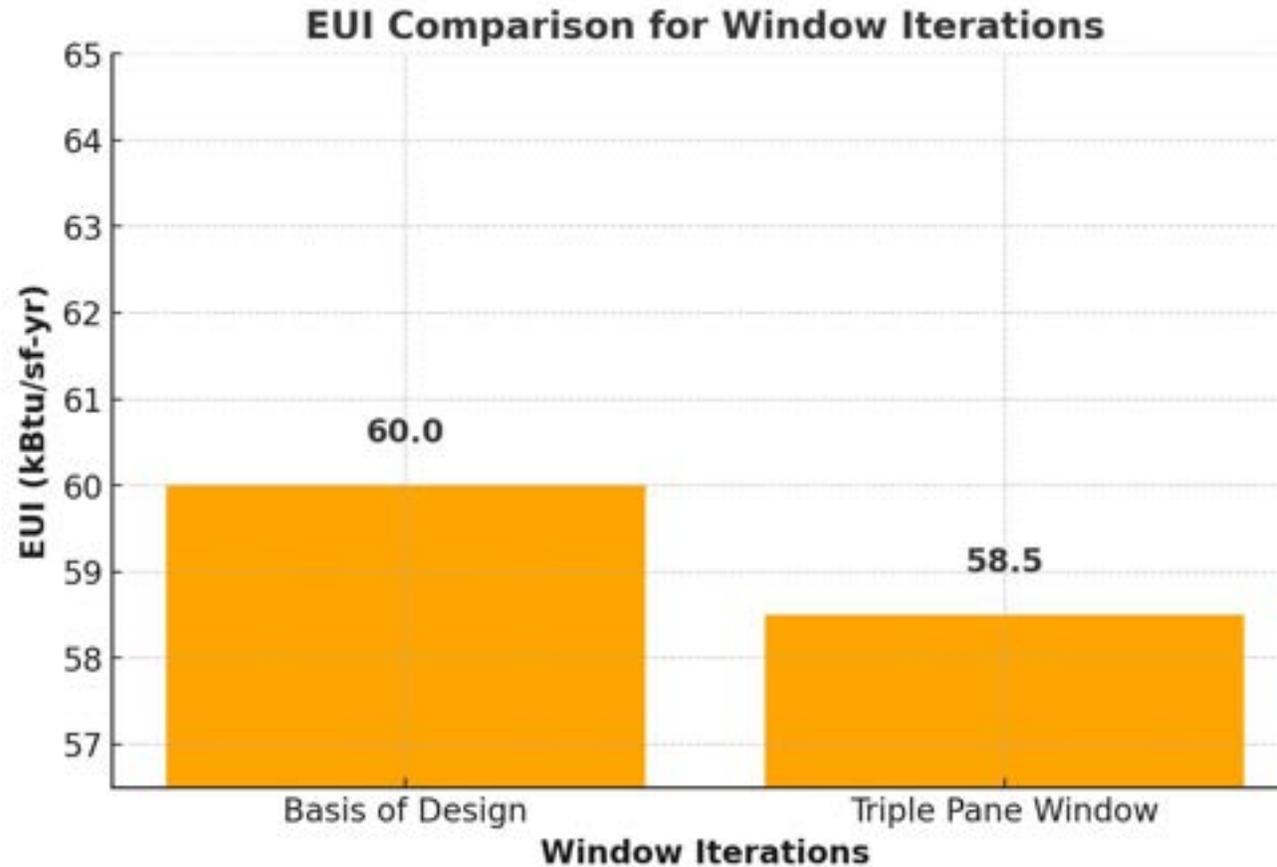
**Case 2: SINGLE WYTHE MW + NO VAPOR RETARDER**

**Case 3: DOUBLE WYTHE MW + SMART VAPOR BARRIER**

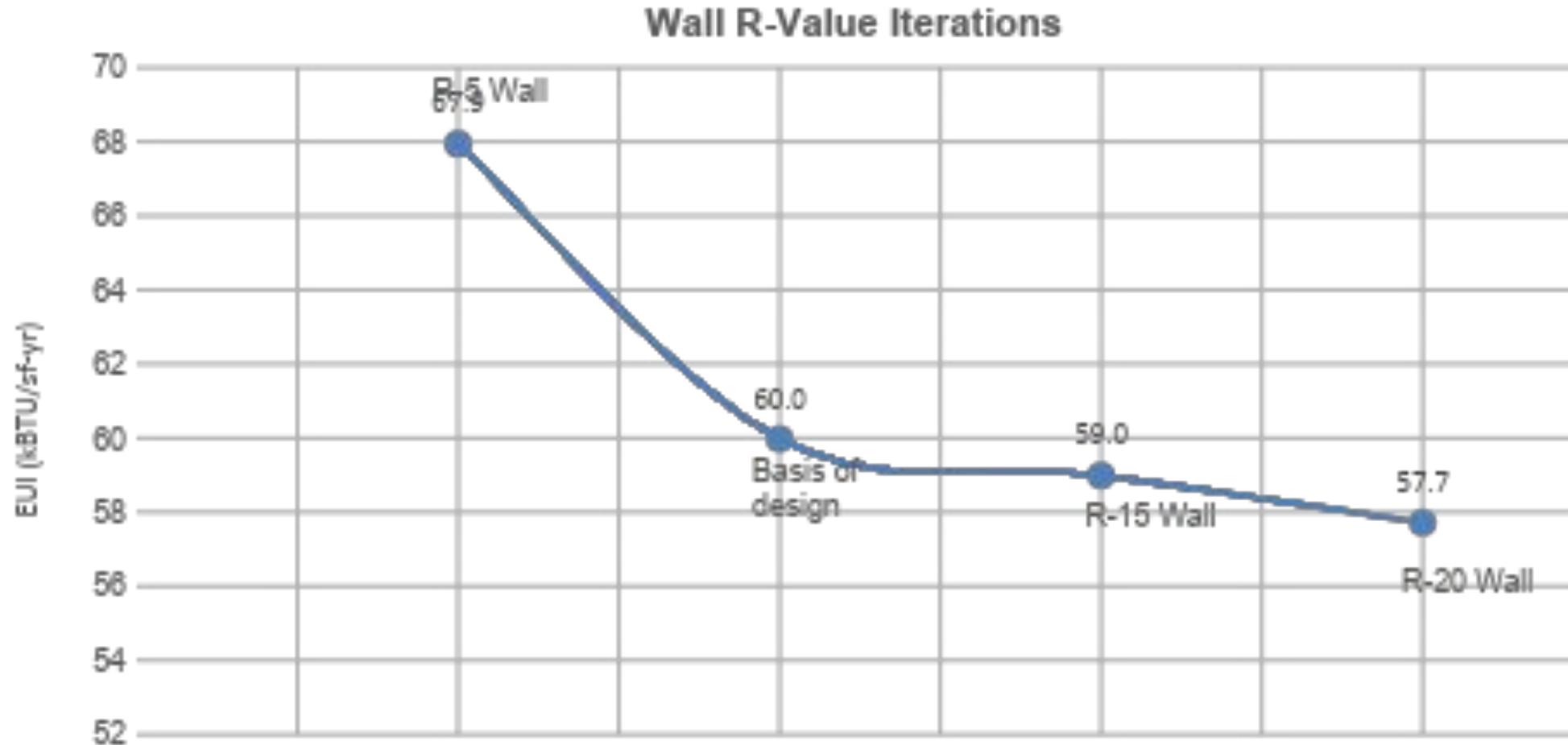


**Building Section**

# Window Replacement for Thermal & Air Leakage



# Exterior Wall Optimizations Studied

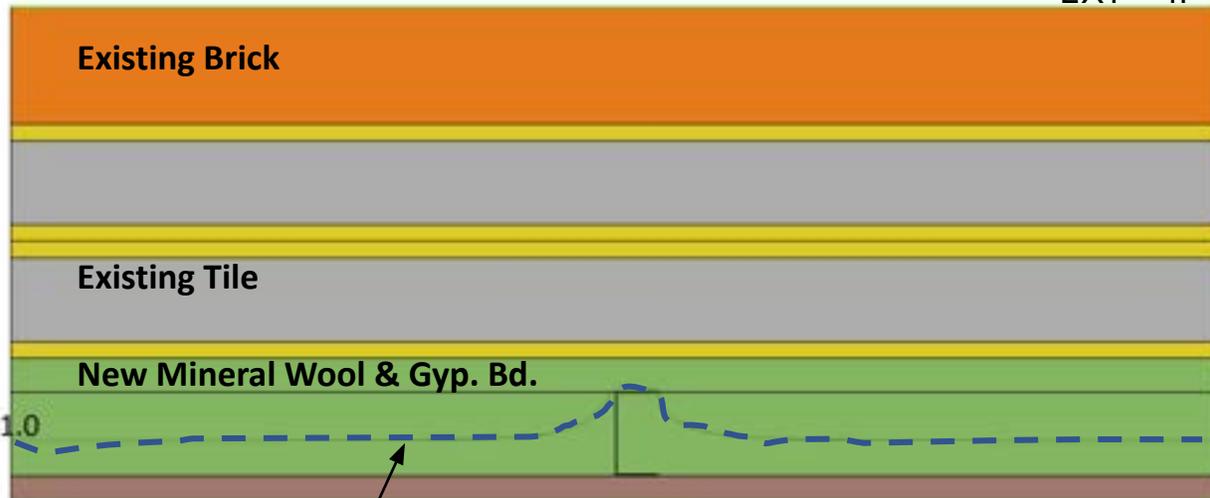


# Metal vs. Wood Stud Exterior Wall Comparison



### Ext. Wall w/Steel Stud @ Interior

EXT - 1F



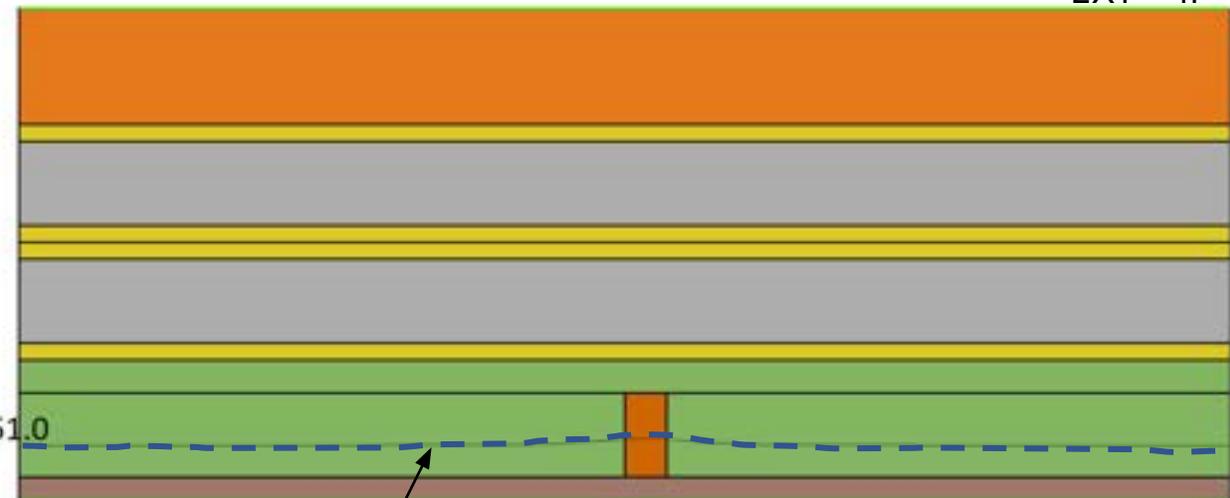
DP - 51F

Dew Point Temp.

INT - 70F  
RH - 50%

### Ext. Wall w/Wood Stud @ Interior

EXT - 1F



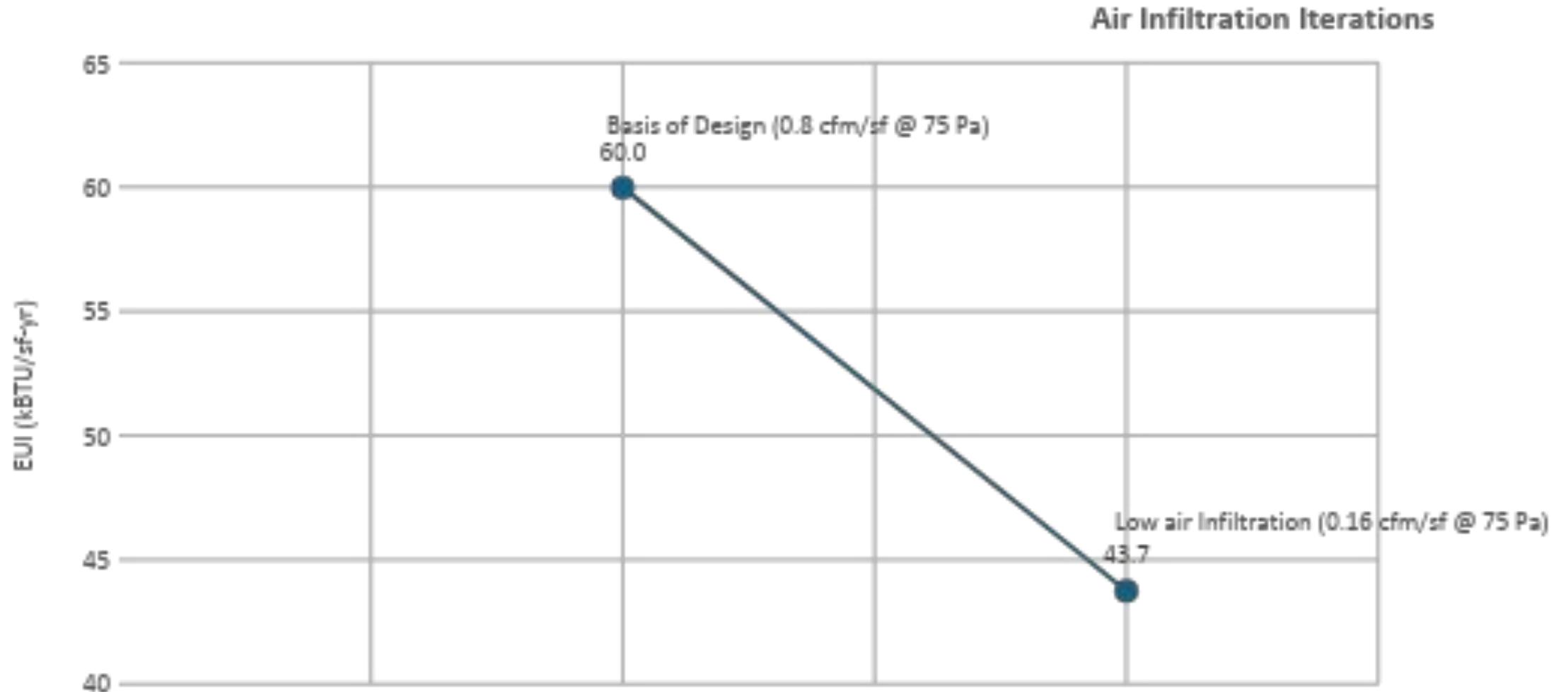
51.0

Dew Point Temp.

INT - 70F  
RH - 50%

Plan View

# Reducing Infiltration: What We Wanted to Accomplish



# Exterior Envelope Air Sealing Strategy



## Parameters

- No changes to building exterior
- Significant reduction in air leakage needed
- Methods and materials to work with existing masonry construction with very small leaks not able to be seen
- Time and cost were important considerations
- Verification of air tightness needed

## Primary Solution: AeroBarrier

- Seals from the interior
- Proven effective with immediate verification
- Pressurized application with blower door finds and seals even the smallest leaks
- Automation saves time & is cost neutral
- Air tightness known immediately

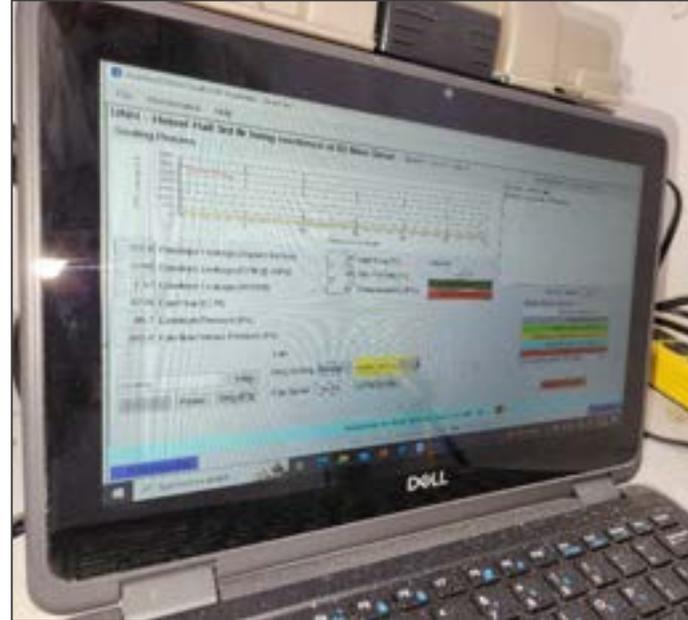
# AeroBarrier Overview



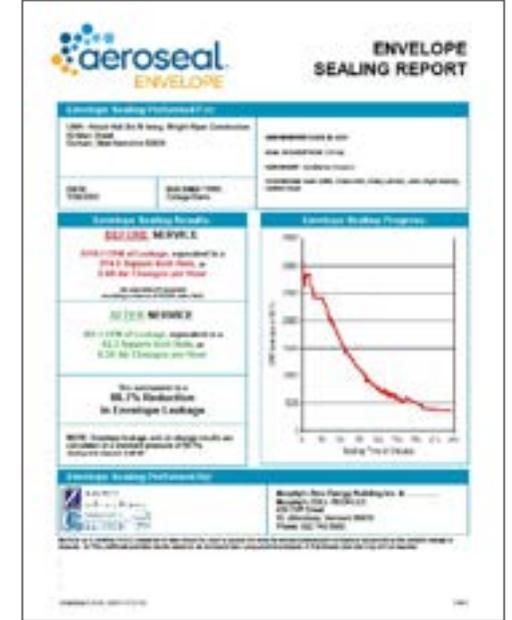
**Uses Higher Pressure Inside**



**Blower Door Directed**

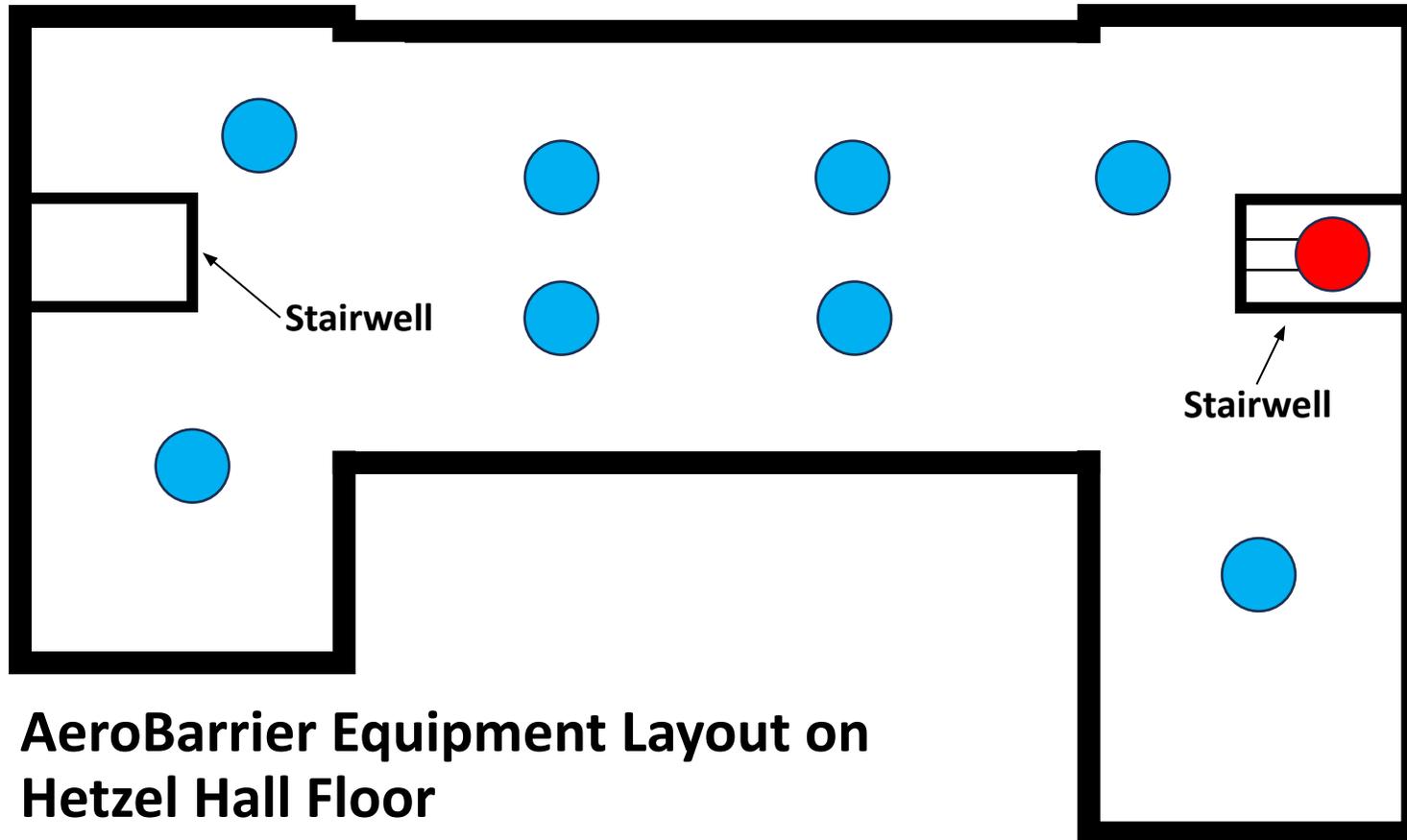


**Computer Automated**



**Immediately Verified**

# Hetzel Hall AeroBarrier Application: Sealing Station Placement



**AeroBarrier Equipment Layout on  
Hetzel Hall Floor**

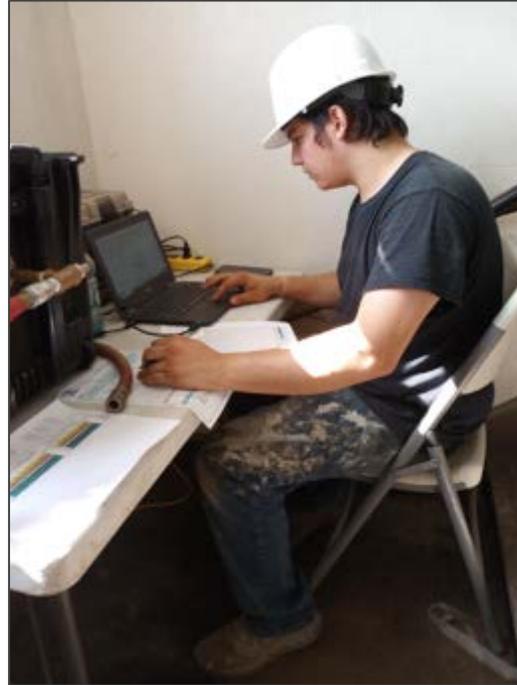
**Sealing Station  
Spraying Sealant Fog**

 = AeroBarrier Sealing Station       = Blower door, fan, main control unit

# AeroBarrier Application at Hetzel Hall



**Blower Door & Fan  
Installed in Stairwell**



**Technician w/Laptop  
Running the Seal**



**Sealing Stations Spraying Sealant Fog**

# Scheduling Was Critical

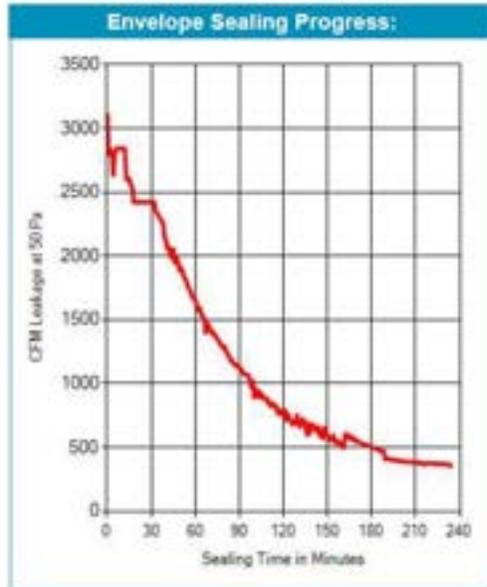


## Key Factors

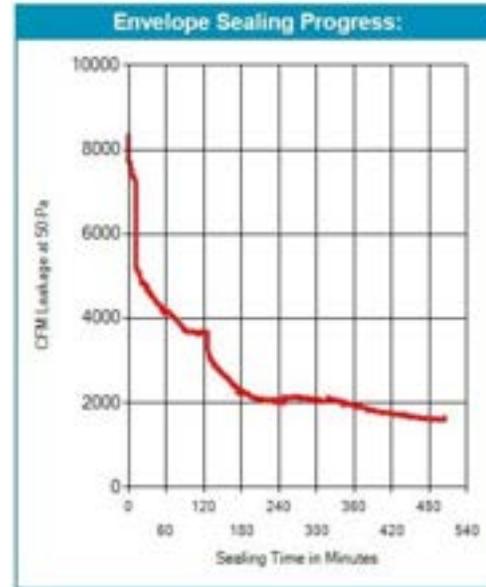
- Tight construction schedule
- Sealing done in 4 mobilization phases
- AeroBarrier done on weekends when other trades not on job site (work can be done with other trades on site)
- Each floor ready for work by other trades on Monday morning



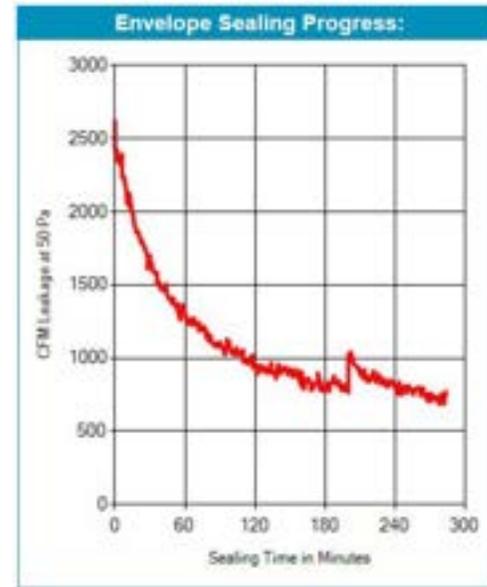
# Envelope Sealing Reports By Phase



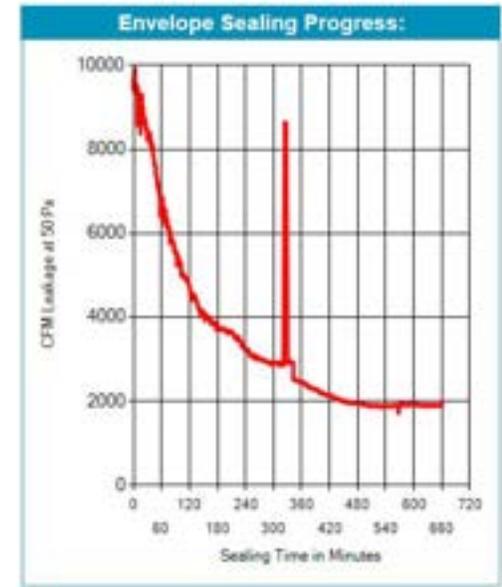
Phase 1 Seal



Phase 2 Seal



Phase 3 Seal



Phase 4 Seal

# Sealing Results By Phase



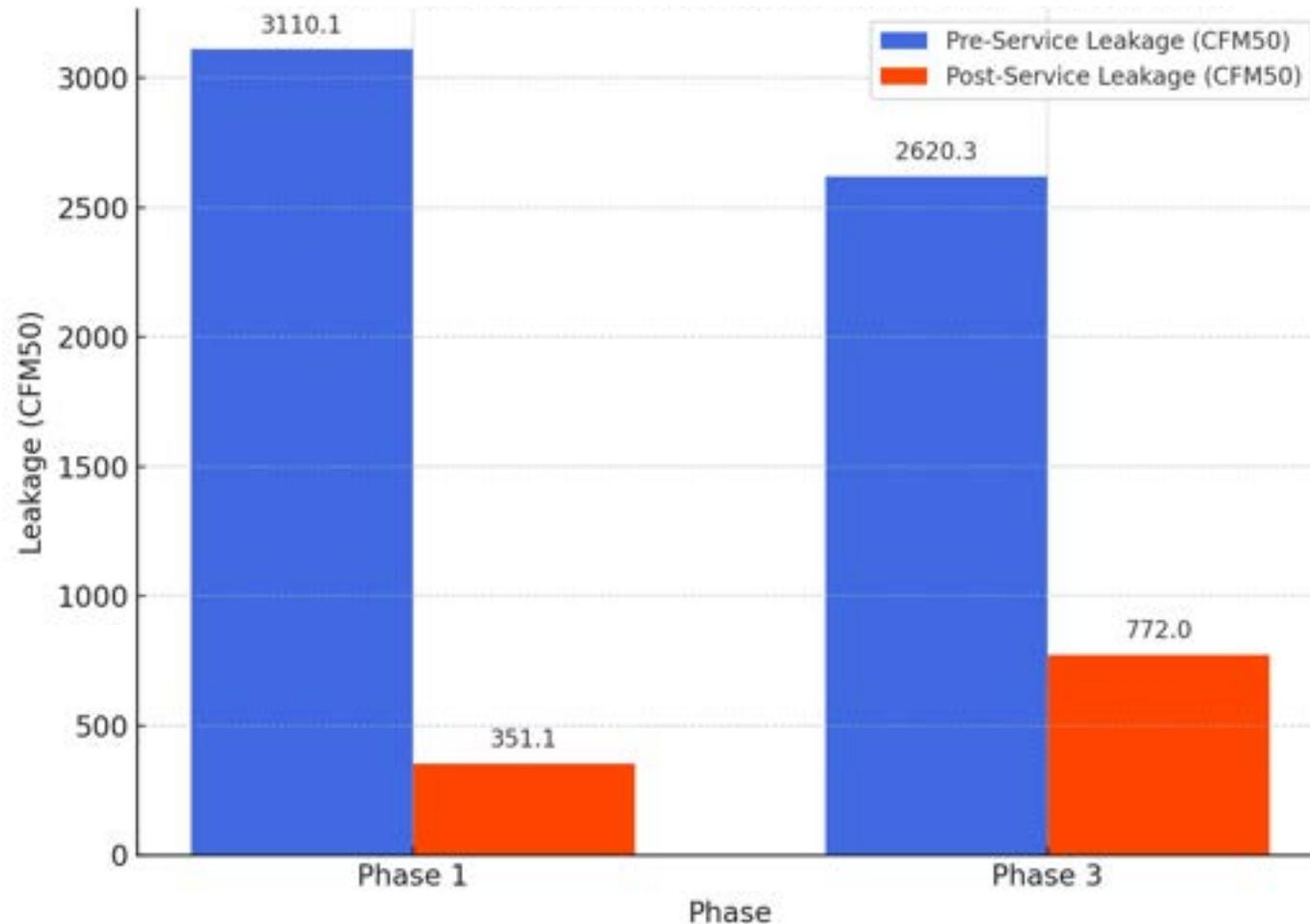
Sealing Phase	After ACH50	Before cfm	After cfm
Phase 1: 3 <sup>rd</sup> Floor Living	0.30 ACH50	3,110 cfm	351 cfm
Phase 2: 1 <sup>st</sup> & 2 <sup>nd</sup> Floors Living, Stair D	0.62 ACH50	8,350 cfm	1,655 cfm
Phase 3: Basement Living, Stairs A & B	1.40 ACH50	2,620 cfm	772 cfm
Phase 4: 4 <sup>th</sup> Floor Living, Stairway C	1.55 ACH50	9,403 cfm	1,964 cfm
<b>Total CFM Reduction (unguarded)</b>		<b>23,523 cfm</b>	<b>4,753 cfm</b>

**Total Air Tightness Achieved = 0.86 ACH50**

# Sealing Results: Phases 1 & 3



Hetzel Hall Phases 1 & 3: Ext. Envelope Air Leakage Reduction Over Time



# Exterior Wall: Work After Air Sealing



**Ext. Wall After AeroBarrier**

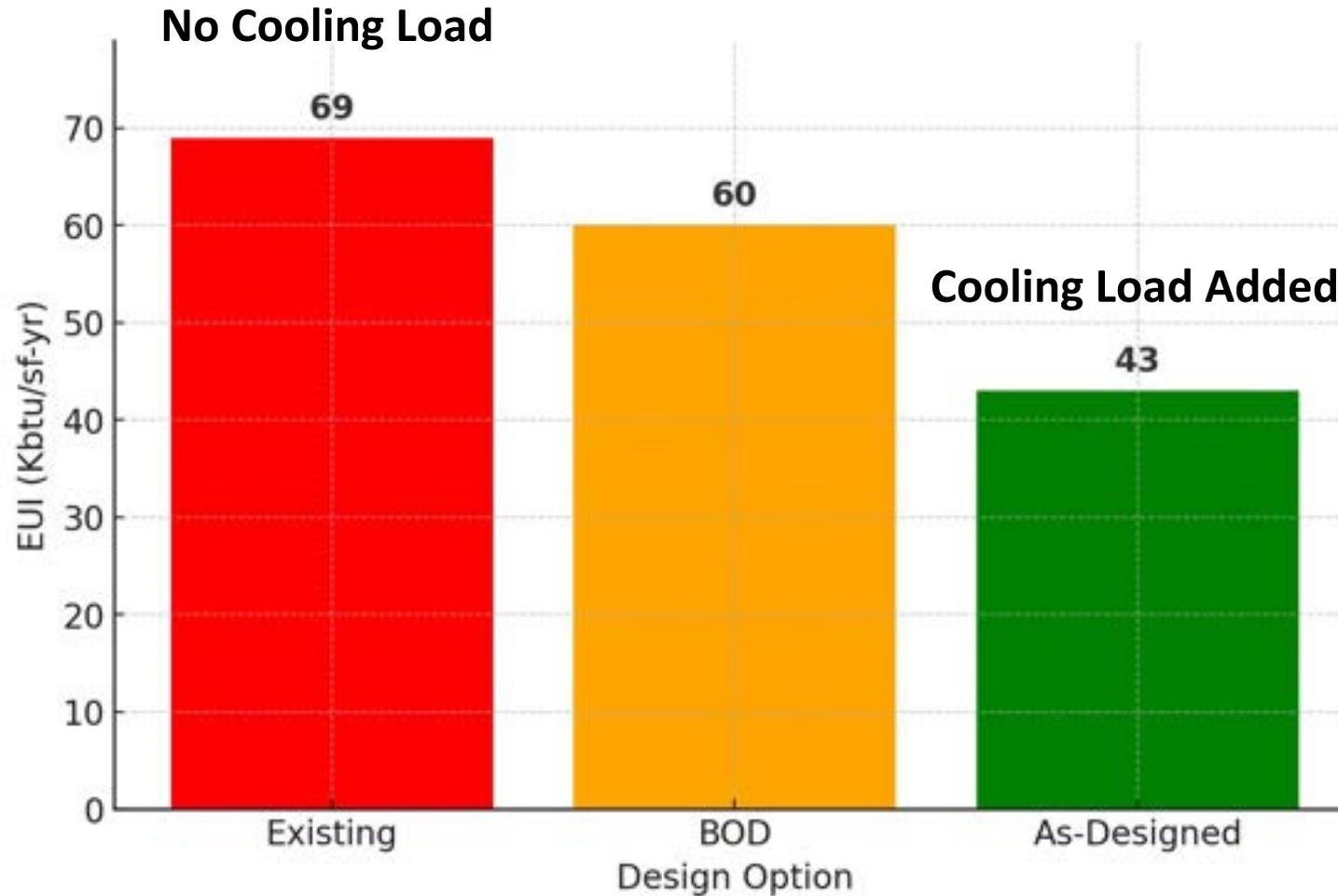


**Mineral Wool Added**



**Wood Studs Installed**

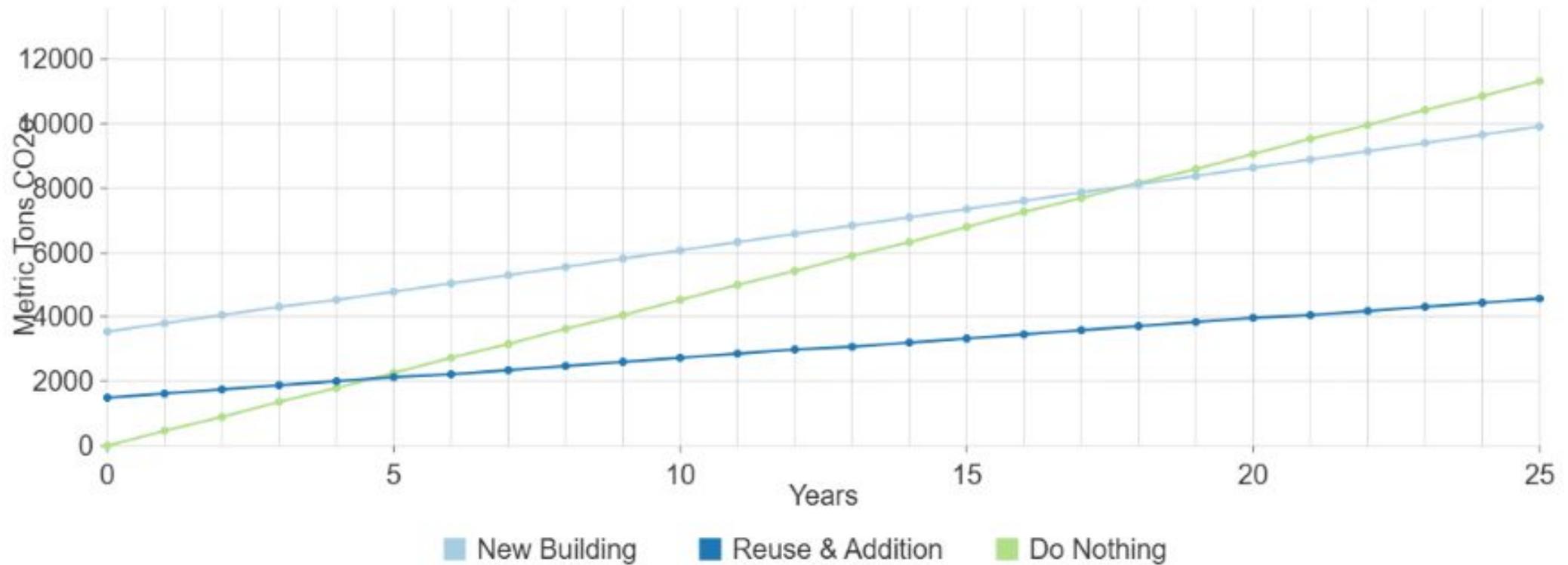
# Building Energy Savings



# Carbon Footprint Comparison



### Cumulative Emissions Over Time



# Hetzel Hall Deep Retrofit Worked!



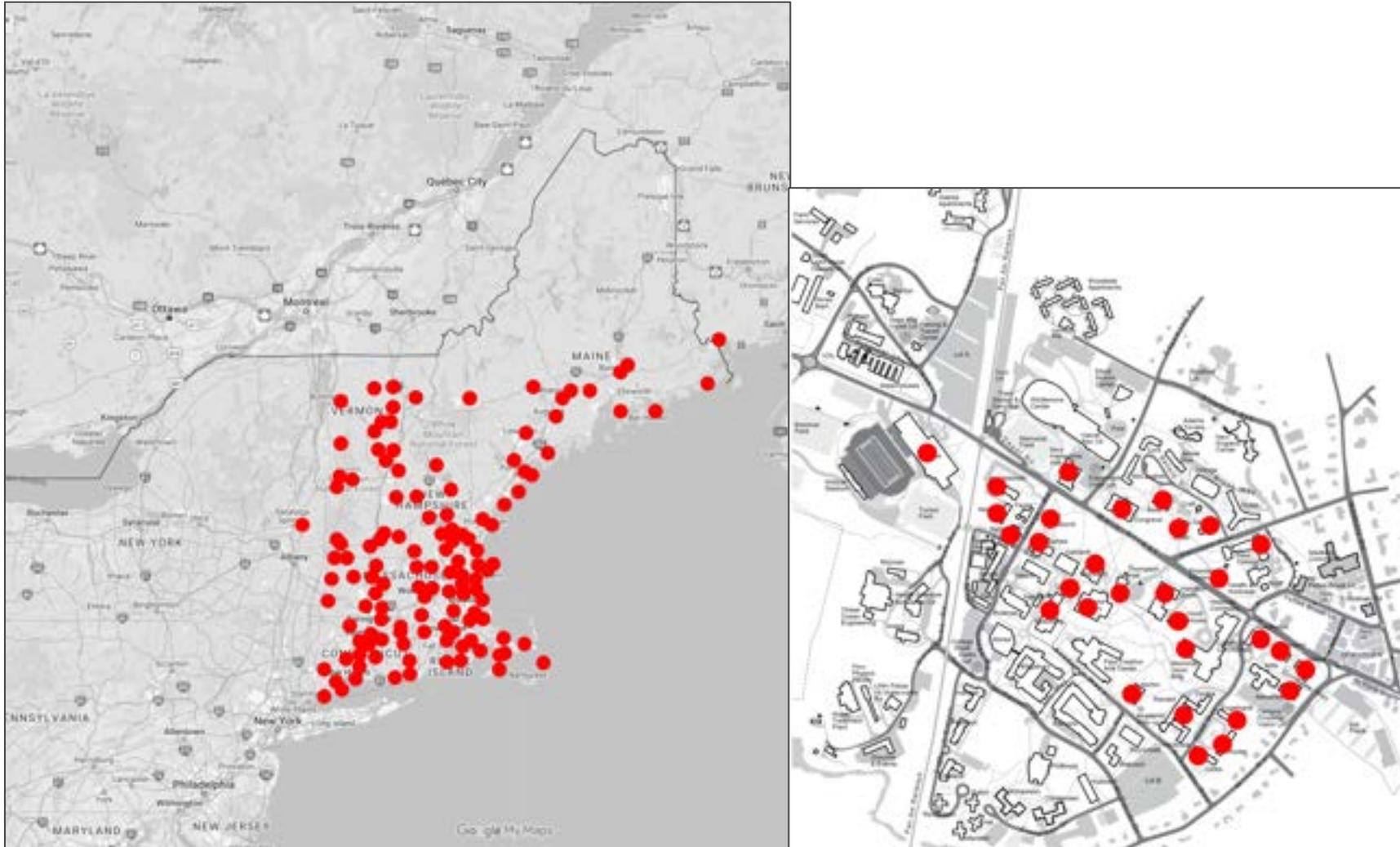
*“The greenest building is one that is already built”*

# Lessons Learned



- Air sealing goals were accomplished with AeroBarrier
- Air sealing would have been much more challenging with other methods and materials due to project constraints including timeline
- Initial and final blower door test should be added to scope
- Communication and education with GC and relevant trades regarding air sealing is important
- Make sure to optimize sequencing and scheduling

# Opportunity Abounds

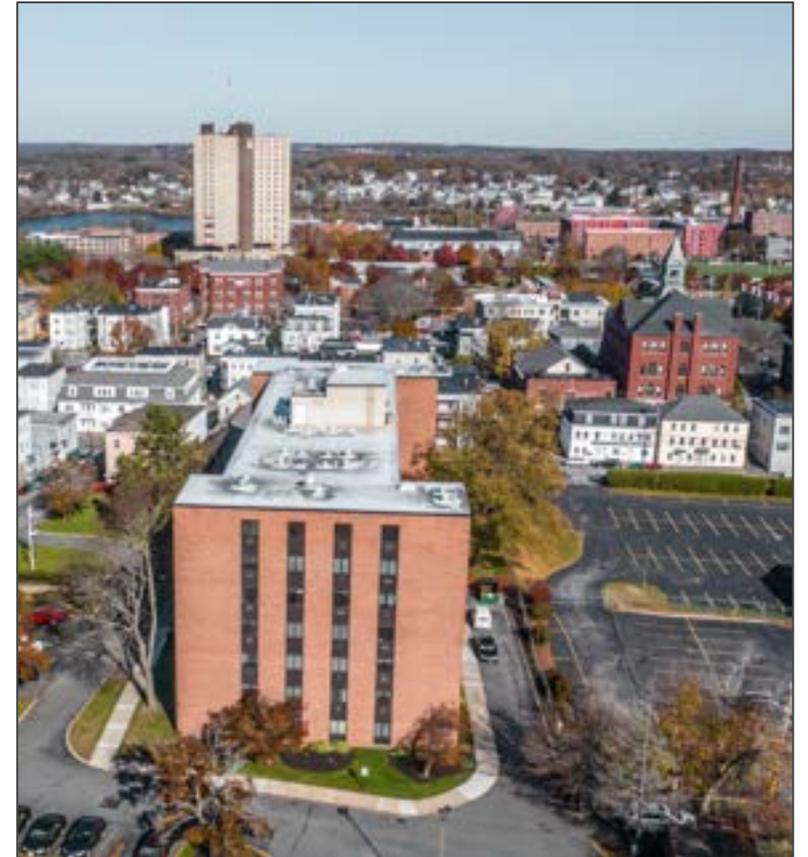


# Jaycee Place: Ventilation Overhaul Case Study

# Jaycee Place: Project Overview



- 100,600 SF, 8 Story Apartment Building constructed in 1976
- 138 low income, affordable apartments
- Part of major modernization project
  - ✓ *Apartment & Common Area Renovations*
  - ✓ *New Space Heating Boilers & Controls*
  - ✓ *New DHW Boilers*
  - ✓ *Elevator Modernization*
  - ✓ *Site Improvements*
  - ✓ ***Central Ventilation System Upgrade & Fan Replacement***



# Jaycee Place: Project Overview



## SUMMARY OF ENERGY CONSERVATION MEASURES

Energy Conservation Measure	Priority	Estimated Savings	Est. Cost <sup>1</sup>
<b>Heating, Air Conditioning, Ventilation, &amp; Hot Water</b>			
Ventilation Upgrade Investigation	High	To Be Determined	\$ 400,000
Building Heat Monitoring	High	12% Heating Fuel Use	\$ 20,000
Temperature Limiting Thermostats	Medium	10% Heating Fuel Use	\$ 50,000
Pipe Insulation			
Retro-Commission Domestic Water System			
Sleeve Air Sealing			
Boiler Vent Air Sealing			
<b>Heating, Air Conditioning, Ventilation, &amp; Hot Water</b>			
Elevator Modernization			
Transformer Upgrade			
Boiler Distribution Pump Control			
Toilet Replacement			
Aerator Replacement			
Showerhead Replacement			
Submeter Irrigation Water			
Duct Cleaning	High	N/A	\$ 120,000
Venting Review by Engineer of Record	High	N/A	\$ -
Boiler Service	High	N/A	\$ 1,500
<b>Measures Evaluated but Not Recommended</b>			
Replace Heating Boilers			
Refrigerator Replacement			
Upgrade Lighting and Controls			
Solar Photovoltaic			
Solar Domestic Hot Water			
Combined Heat and Power (CHP or Cogen)			
Window Replacement			

Jaycee Place Apartments, Lowell, MA  
 Scope of Work  
 April 5, 2022  
 Page 8 of 9

Energy Conservation Measure	Priority	Estimated Savings	Est. Cost <sup>1</sup>
<b>Heating, Air Conditioning, Ventilation, &amp; Hot Water</b>			
Ventilation Upgrade Investigation	High	To Be Determined	\$ 400,000
Building Heat Monitoring	High	12% Heating Fuel Use	\$ 20,000
Temperature Limiting Thermostats	Medium	10% Heating Fuel Use	\$ 50,000
Pipe Insulation	High	2% Domestic Heat Fuel Use	\$ 1,500
Retro-Commission Domestic Water System	High	To Be Determined	\$ 6,000

- Clean existing dryer exhaust ductwork.
- Provide new roof top bathroom exhaust fans. Clean video inspect/document and install mastic liner to fill gaps in exhaust ductwork and install new exhaust grille, fire damper, and constant airflow regulator (CAR) at each bathroom.
- Replace existing air conditioning system at elevator machine room.

### Division 26 – Electrical

- All controls (load center panels, switches, thermostats, telephone jacks, etc.) throughout seven (7) handicap dwelling units shall be located no higher than 48-inches AFF. All non-counter type standard outlets shall be mounted a minimum of 15 inches AFF but no greater than 48 AFF.

1. This is a rough estimated cost and is intended for initial analysis purposes only. Contractor bids will be required to understand actual project costs.

# How We Make them Work



## Optimize Vent Air Flows:

- Standardized, Consistent Flows
- Self-Balancing to All Vents and to All Floors
- Reduces Heating & Cooling Loads



## Reduce Exhaust Riser Leakage via Automated Duct Sealing

- Focuses 95% of Exhaust Flow to the Vents
- Allows Reduced Fan Flows Without Compromising Vent Performance

## Optimize the Fans:

- Reduce Gross Flows 30% - 60%
- Reduce Fan Power 20% - 50%
- Reduce Kw Demand
- Improved Fan Life

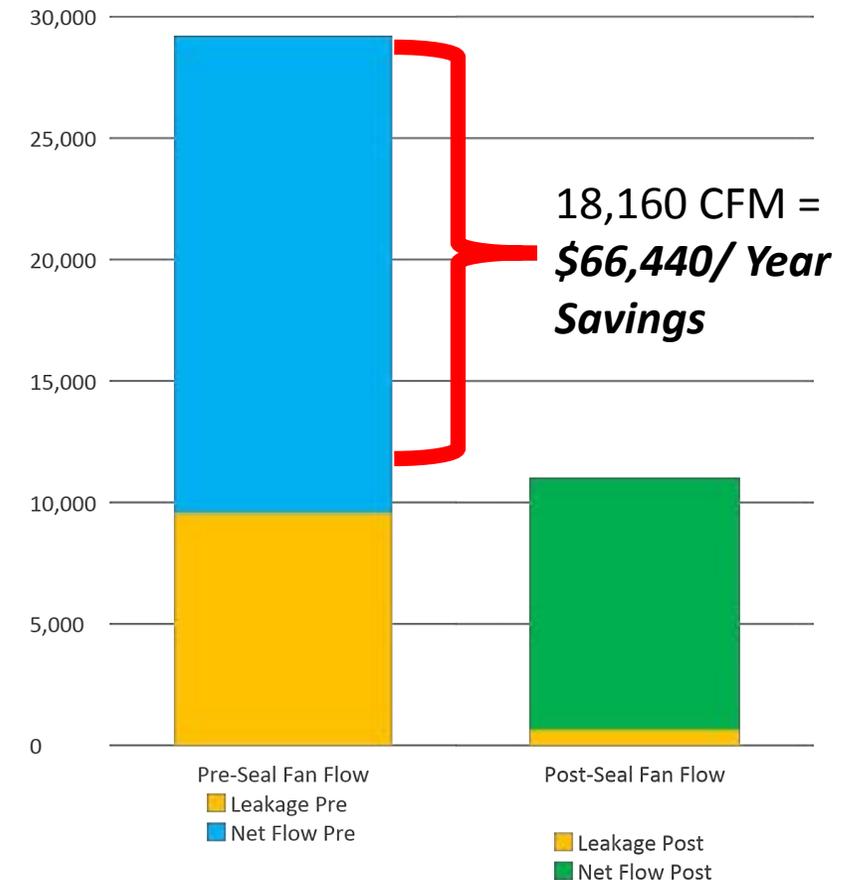


# Exhaust Leakage Reduction & Optimization



- Each CFM of Exhaust Costs:
  - \$3.00 (2.1 Terms) of Natural Gas per Year
  - \$0.16 (1 kWh) of Electricity per Year
- Eliminate 6,000 CFM of Duct Leakage with Aeroseal duct sealing
- Manually Seal the Rooftop Curbs
- Manually Seal Gaps at the Vents
- Install Self-Balancing Constant Flow Regulators with Revised Design Flows

Fan Leakage & Design Flow Change



# Aeroseal Duct Sealing System



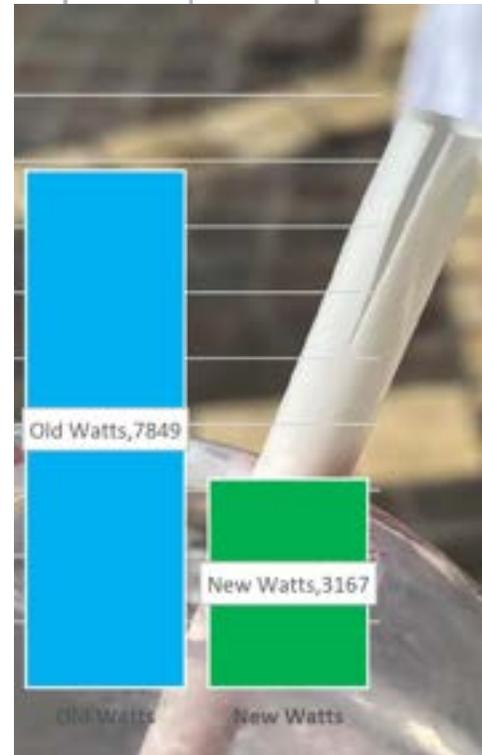
- Seals gaps up to 5/8"
- Goes everywhere the *Air Goes*
- Reliably eliminates 90%+ of all leakage
- 100% Performance Verification
- Sealant remains flexible; 40+ year life (3yr warranty)
- No lingering odors or off-gassing
- Over 300,000 homes and 10,000



# Replacing the Fans



Fan Replacement Wattage Reduction



- 38 New Fans Replace Aging, Poorly Performing Fans
- 60% Reduction in Fan Power
- 40,000 Annual kWh Savings
- \$9,000 Annual Electric Savings
- 4 kW Shed from Demand Load
- Each Fan Individually Tuned to Match Performance Needed

# Project Results (Inspect What You Expect)



	Pre-Production Model Estimates (from original energy model)		
	Existing	Proposed	Difference
Total Exhaust CFM <i>(Fan System Detail)</i>	28,185	10,691	17,494
Electric Use (kWh)	<i>(from Fan System Detail)</i>		
Fan Energy (kWh)	99,536	27,497	72,039
Heating Energy Use (kWh)	0	0	0
Cooling Energy Use (kWh)	27,273	10,345	16,927
Total Electric Use (kWh) Fan & Cooling	126,809	37,842	88,966
Heating Fuel Use (Therm)	<i>(from Fan System Detail)</i>		
Heating Energy Use (Nat Gas)	60,169	22,651	37,518
Annual Cost Savings (Dollars)	Quantity	Unit/ Rate	
Electricity (kWh)	88,966	\$0.167	\$14,831
Nat Gas (Therm)	37,518	\$1.440	\$54,026
	Total Annual Savings:		\$68,857
Annual GHG Reductions (tCO2e)			
Electricity (kWh)	88,966	0.0007090	63.1
Nat Gas (Therm)	37,518	0.0053000	198.8
	Total GHG Reductions:		261.9

	Post-Production Data Validation (Live Data This Workbook)		
	Existing	Proposed	Difference
Total Exhaust CFM <i>(Fan System Detail)</i>	29,222	11,062	18,160
Electric Use (kWh)	<i>(from Fan System Detail)</i>		
Fan Energy (kWh)	81,224	38,395	42,829
Heating Energy Use (kWh)	0	0	0
Cooling Energy Use (kWh)	28,276	10,704	17,572
Total Electric Use (kWh) Fan & Cooling	109,500	49,099	60,401
Heating Fuel Use (Therm)	<i>(from Fan System Detail)</i>		
Heating Energy Use (Nat Gas)	62,383	23,236	39,147
Annual Cost Savings (Dollars)	Quantity	Unit/ Rate	
Electricity (kWh)	60,401	\$0.167	\$10,069
Nat Gas (Therm)	39,147	\$1.440	\$56,371
	Total Annual Savings:		\$66,440
Annual GHG Reductions (tCO2e)			
Electricity (kWh)	60,401	0.0007090	42.8
Nat Gas (Therm)	39,147	0.0053000	207.5
	Total GHG Reductions:		250.3

Variance (Results vs Estimate)		
Variance	Units	Var %
666	CFM	3.81%
-29,210	kWh	-40.55%
0	kWh	0.00%
645	kWh	3.81%
-28,565	kWh	-32.11%
1,629	Therm	4.34%
(\$4,762)	Dollars	-32.11%
\$2,345	Dollars	4.34%
(\$2,417)	Dollars	-3.51%
-20	tCO2e	-32.11%
9	tCO2e	4.34%
-12	tCO2e	-4.44%

# Incentives Used



## MA LEAN Program paid for the fans

- Complete Project: \$360,000
- Fan Incentive: (\$100,000)
- Net Project Cost: \$260,000
- Savings per Year: \$66,000
- Simple ROI: Less than 4 Years
- Measure Life: 20 Years

### FEDERAL, STATE, AND UTILITY COMPANY INCENTIVE PROGRAMS

Program Name	Incentive Details	Incentive Amount
Mass Save – Energy Efficiency Programs	<p>Rebates or incentives including:</p> <ul style="list-style-type: none"> <li>• Programmable Thermostats</li> <li>• Air Sealing &amp; Weatherization</li> <li>• Pipe Insulation</li> <li>• Heating System Controls</li> <li>• Motor or Drive Controls</li> <li>• Faucet Aerators</li> </ul>	Varies on scope. Some measures are direct installation by the program and are paid up to 70% by the Sponsors of Mass Save.
Mass Save – Technical Assistance and Engineering Services	<p>Assistance in selection, engineering, and installation of:</p> <ul style="list-style-type: none"> <li>• Building Envelope / Weatherization Improvements</li> <li>• Energy Management Systems</li> <li>• HVAC Systems</li> <li>• Variable Frequency Drives</li> </ul> <p>Also provided are targeted Commissioning and Retro-Commissioning services.</p>	<p>Pre-qualified independent engineers and consultants help businesses become more energy efficient.</p> <p>Financial assistance of up to 50% of the cost provided by the Sponsors of Mass Save.</p>
LEAN Low-Income Multi-Family Program	<p>Possible measures:</p> <ul style="list-style-type: none"> <li>• Air sealing</li> <li>• Programmable Thermostats</li> <li>• DHW measures: <ul style="list-style-type: none"> <li>○ Pipe Insulation</li> <li>○ Low-Flow Showerheads</li> <li>○ Faucet Aerators</li> <li>○ System Replacement</li> </ul> </li> <li>• Refrigerators</li> <li>• Duct Sealing</li> </ul>	A program administrator will detail energy efficiency measures and will assess benefit cost ratios. Cost-effective measures are at no cost to the owner.

# Lessons Learned



- Securing Incentives Add Time & Complexity
  - Late adoption of incentives resulted in dropping AC sleeve air sealing measures, which would have been a good complimentary improvement.
  - Long timeline meant ventilation work scope wasn't integrated into the rest of the project.
- Commissioning Is King!
  - Project concluded in June, but we returned in October for final commissioning under “winter conditions”
  - “Real World” fan performance had us revise our energy model

# Q&A/Discussion

# Thank you!

**Bill Shadid**

Aeroseal

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