

The background of the slide features a faint architectural sketch of a multi-story building with a grid of windows. Overlaid on this is the Passive House logo, which consists of a stylized yellow 'A' shape with a green circle inside, containing the text 'PASSIVE HOUSE'.

# Passive House

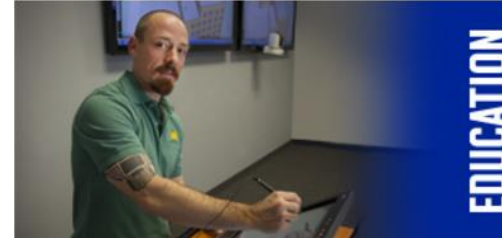
Realizing an Owner's Vision

Gahl Sorkin Spanier CPHC CPHT LEED AP BD+C MBA INSEAD

# About AEA

*Energy Efficiency is our Specialty,  
Affordable Housing is our Priority*

- The Association for Energy Affordability, Inc. is dedicated to achieving energy efficiency in new and existing affordable buildings, and low income communities.
- With locations in NY, CA, and IL AEA representatives engage in a broad range of educational, technical and construction management activities to
  - Energy Audits and Green Building Consulting
  - Energy Efficiency Program Design and Implementation
  - Weatherization Assistance Program Provider.
  - Training for contractors, building operators and EE professionals
- Promote mission, develop the industry and sustains it.



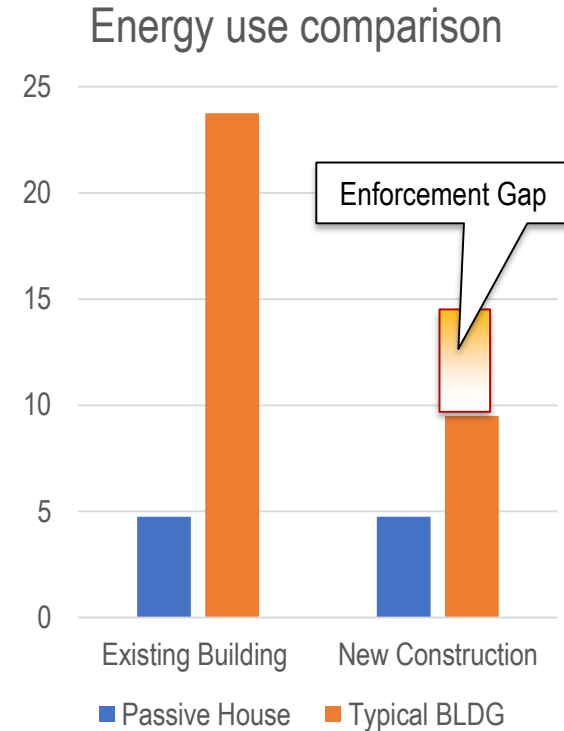
# Presentation outline

- Briefly explain Passive House principles and how they were applied at HANAC Corona
  1. Robust continuous insulation
  2. High performance fenestrations
  3. Thermal bridge free design
  4. Air tight Envelope
  5. Heat Recovery Ventilation
- Describe HANAC, Inc. goals in envisioning a Passive house project.
- Some challenges to realizing HANAC's Vision and their resolution

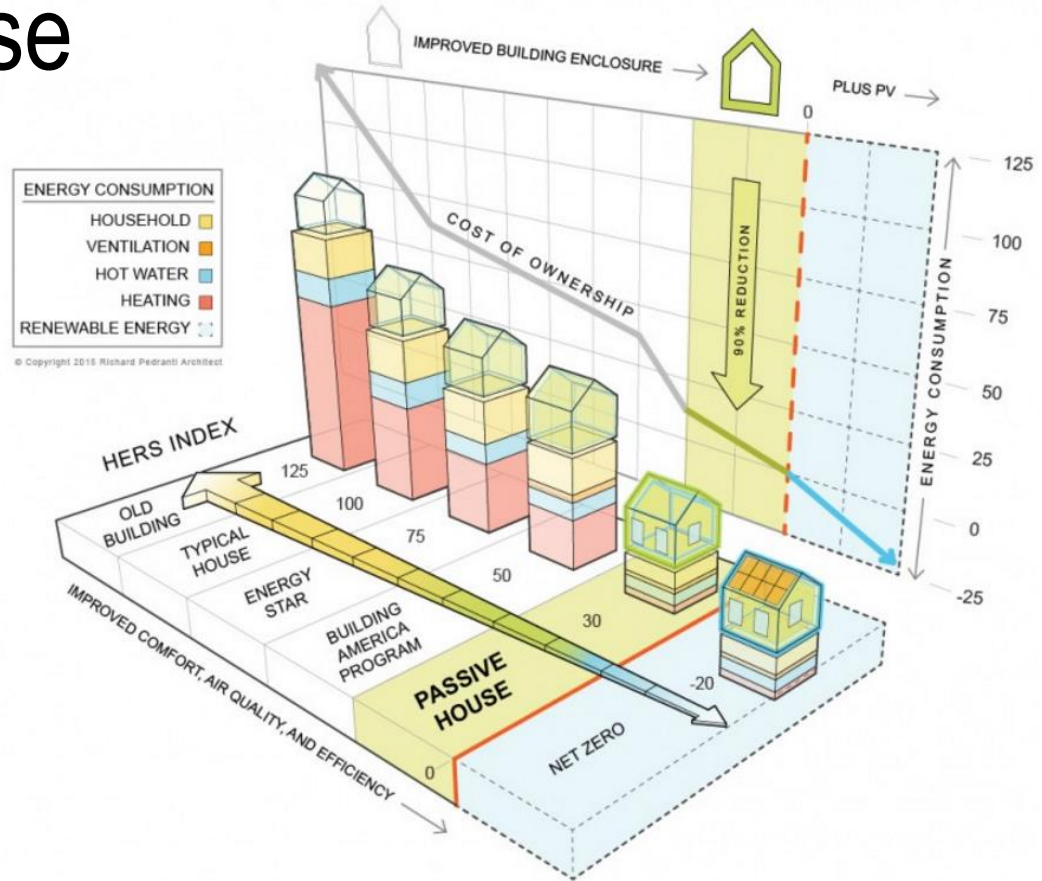
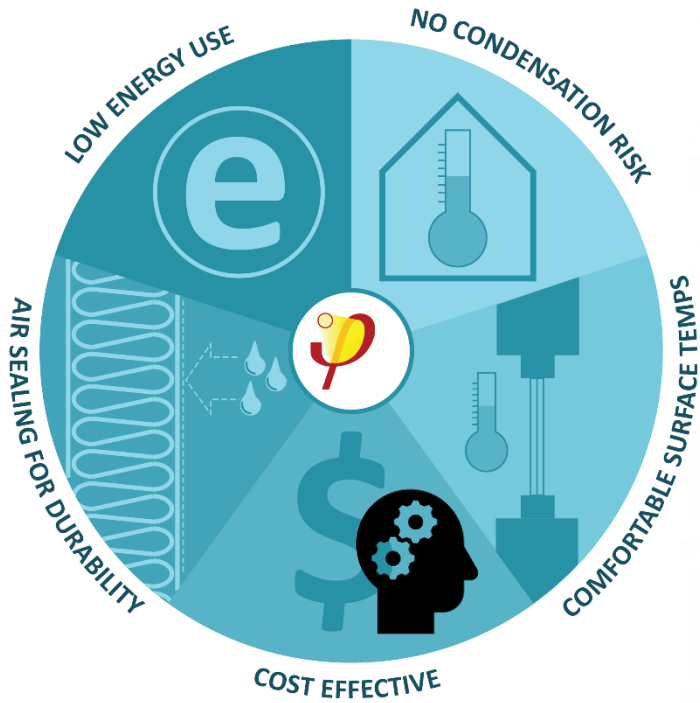


# What is Passive House

- Tried and tested Energy Efficiency methodology
- Focus on **Energy, comfort and air quality**
  - Based on : 5 design principles
  - Iterative energy modeling
  - Post construction testing
- Applies to building large and small of any type
- Less well known, understood, shortage of skilled contractors and design professionals



# Why Passive House





# Project Details

## HANAC Corona Senior Residence

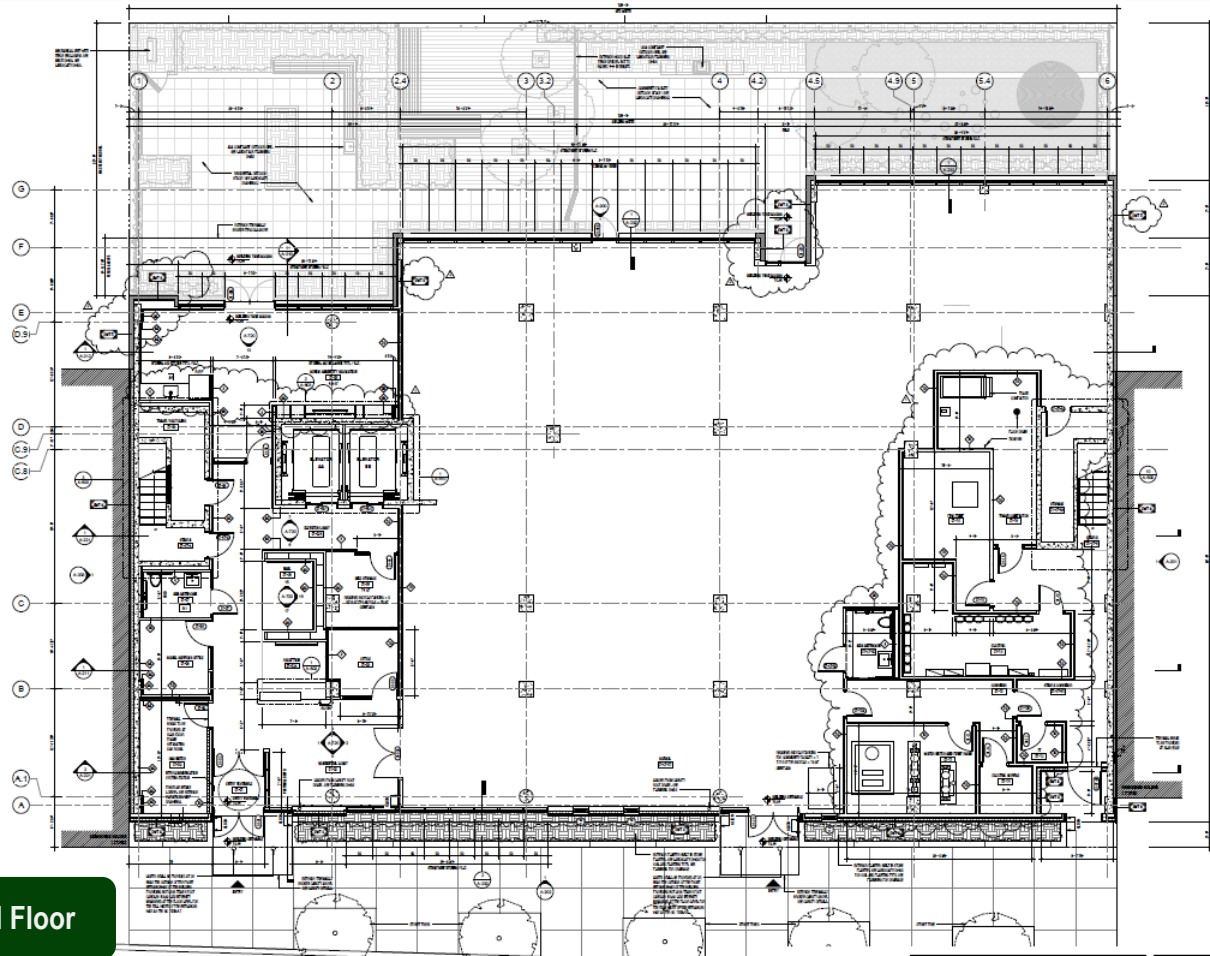
Location	Corona, Queens NY
Units	68
Stories above Grade	8
Floor Area	57,675 ft <sup>2</sup>
Residential	52,644 ft <sup>2</sup>
Ground Floor Daycare	5,031 ft <sup>2</sup>
E.E. Programs	NYSERDA MPP Enterprise Green Communities Passive House Institute



54-13 101st Street

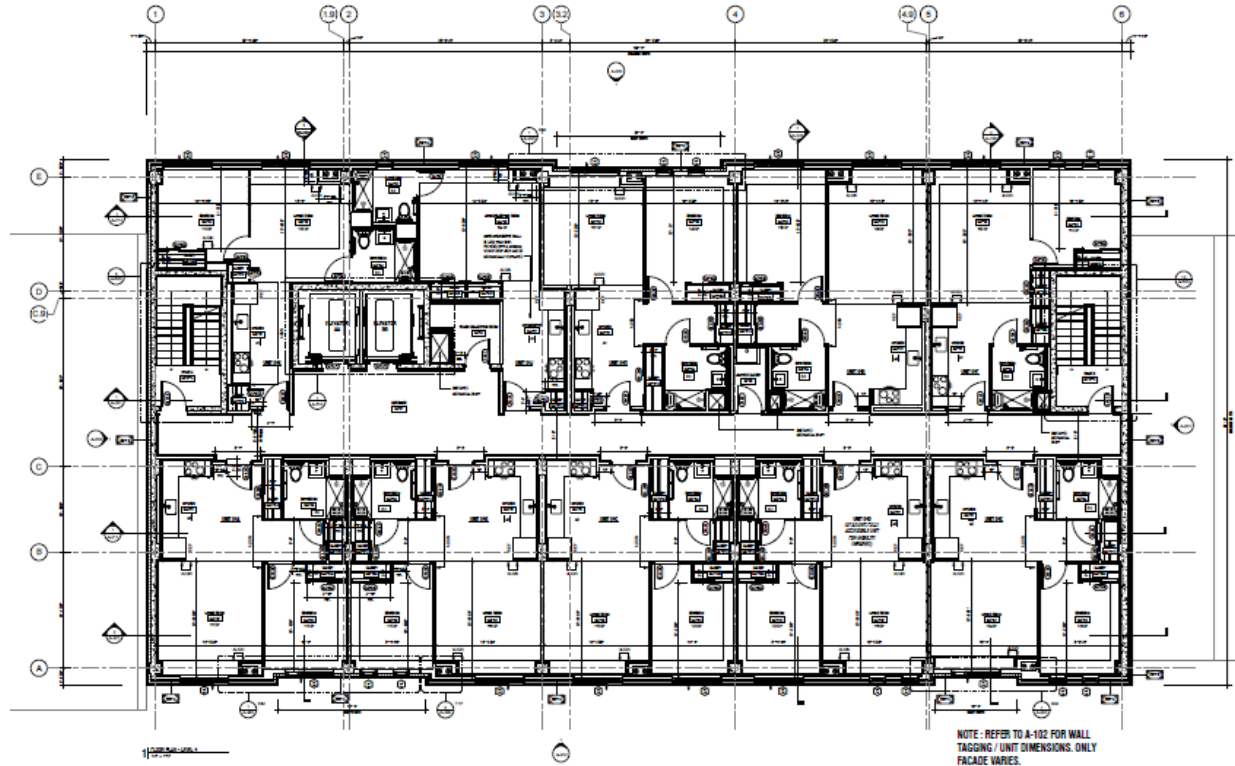






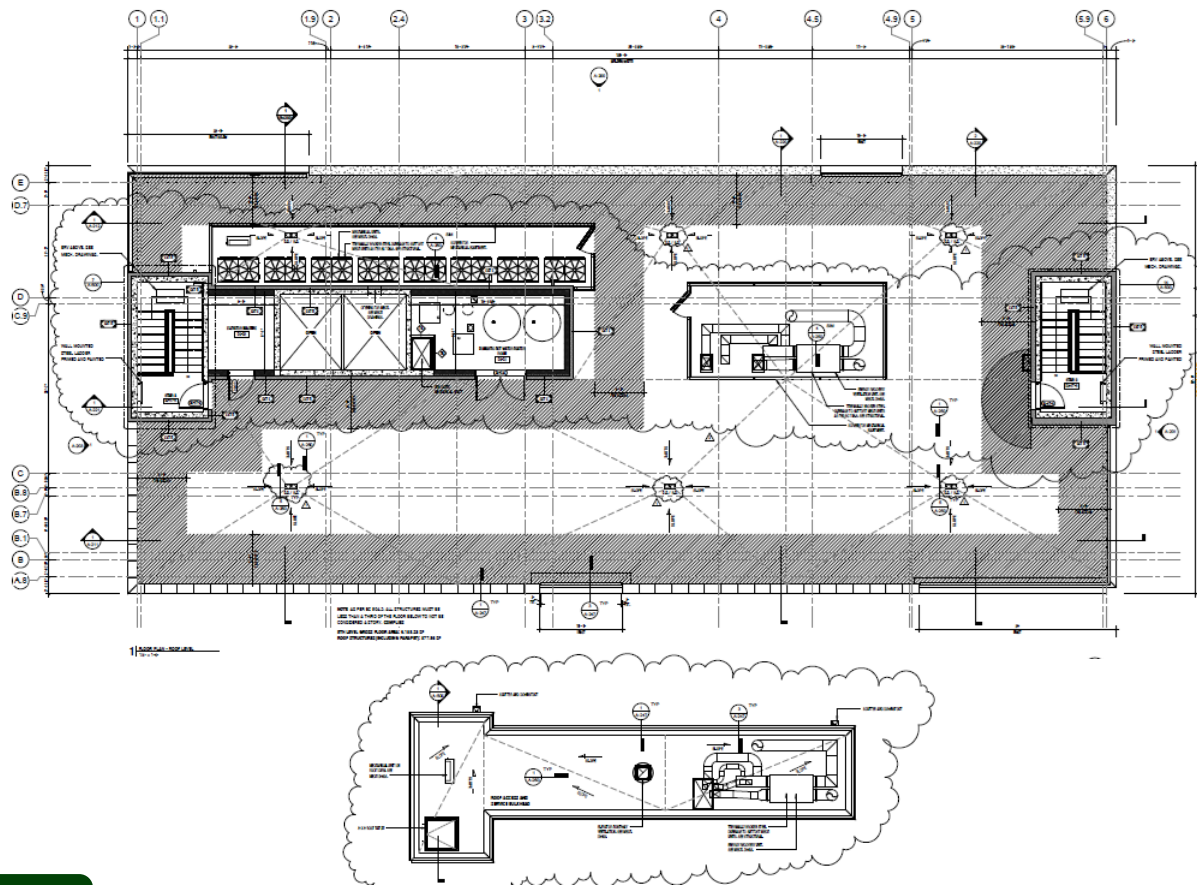
Ground Floor





Typical floor





Roof



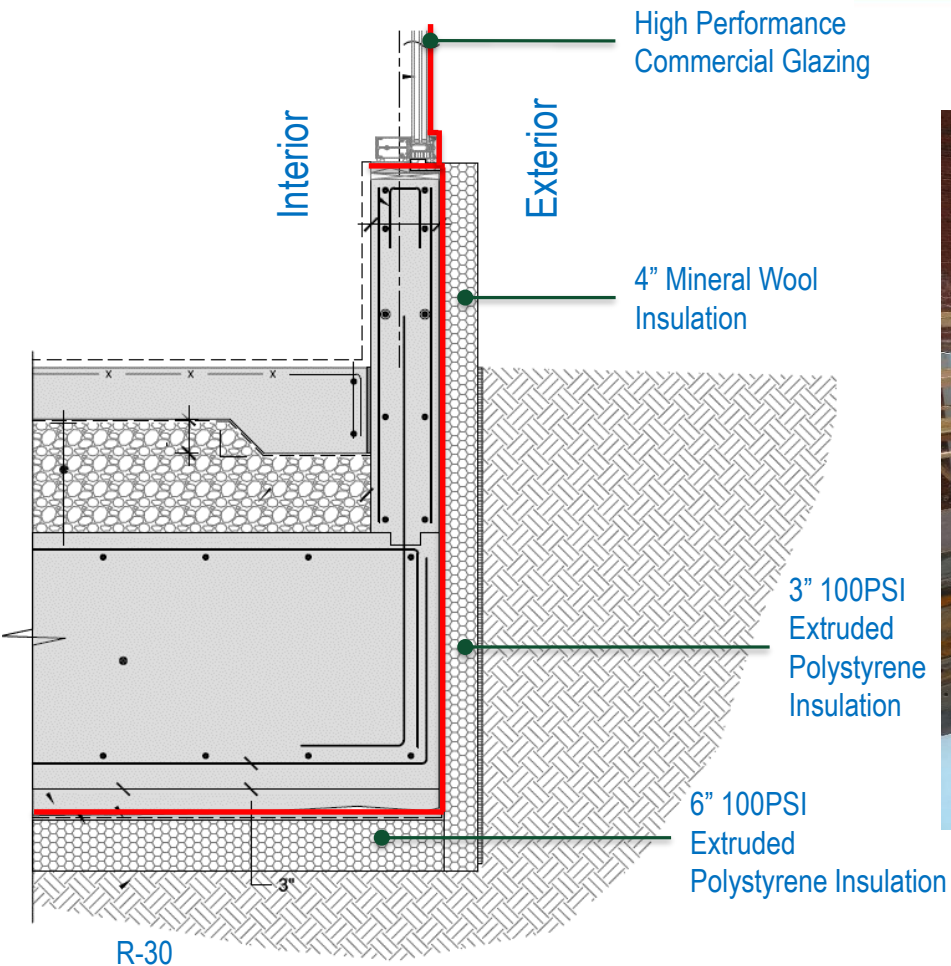
# Continuous High R-Value Insulation

1

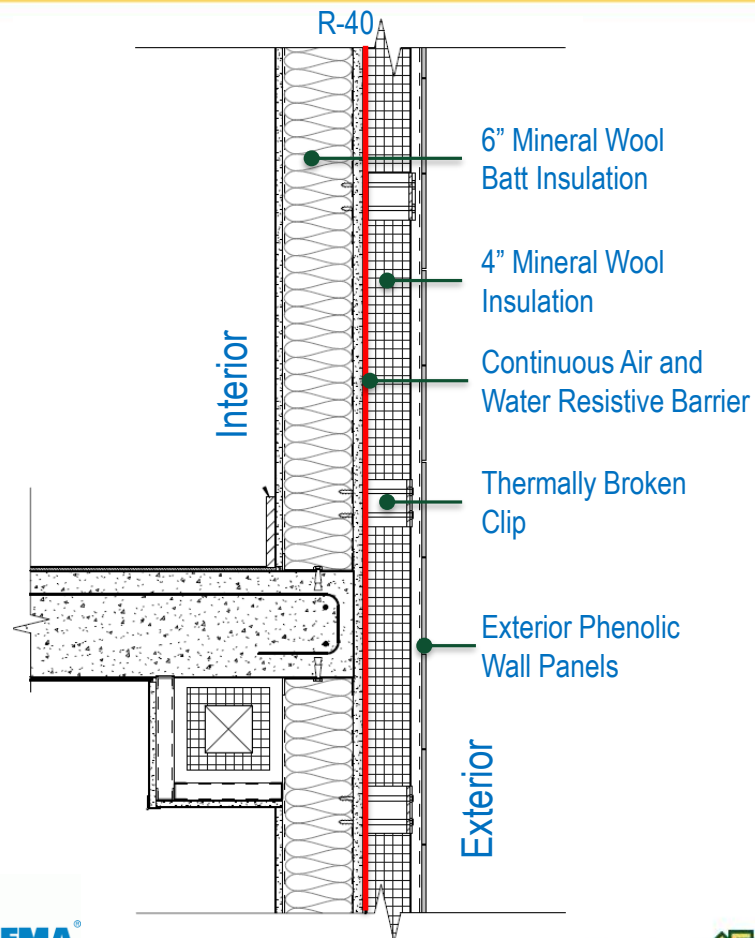
HIGH R-VALUES  
 $R \geq 38 \text{ (hr}\cdot\text{ft}^2\cdot^\circ\text{F)/Btu}$

- Reduce heat loss (winter)
- Reduce heat gain (summer)
- Comfortable interior surface temps











# High Performance Windows



**HIGH R-VALUES**  
 $R \geq 38 \text{ (hr} \cdot \text{ft}^2 \cdot \text{°F)/Btu}$

**AIRTIGHTNESS**  
 $n_{50} \leq 0.6 \text{ ACH@50}$

**THERMAL  
BRIDGE FREE**



1

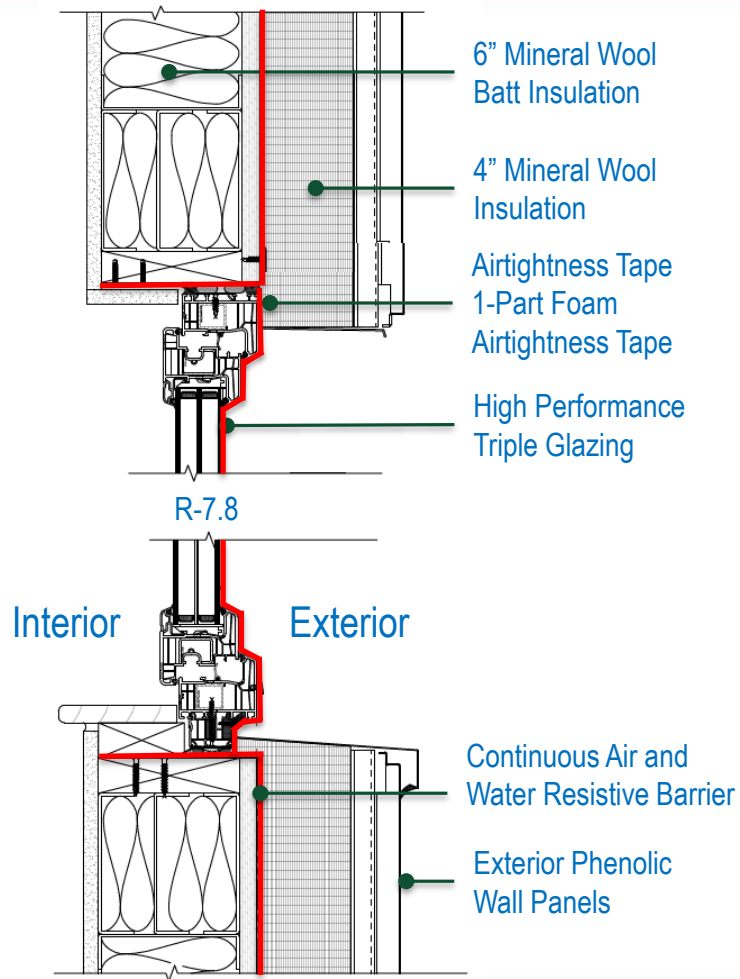
2

4

**TRIPLE GLAZING**  
 $R_w \geq 7.1 \text{ (hr} \cdot \text{ft}^2 \cdot \text{°F)/Btu}$   
SHGC 0.5 – 0.62

High-Performance glazing adds more energy to the home than it loses  
Glass's high int. surface temps lead to increased occupant comfort





INTUS WINDOWS



# Thermal Bridge Free Construction

1

HIGH R-VALUES  
 $R \geq 38 \text{ (hr} \cdot \text{ft}^2 \cdot ^\circ\text{F)/Btu}$

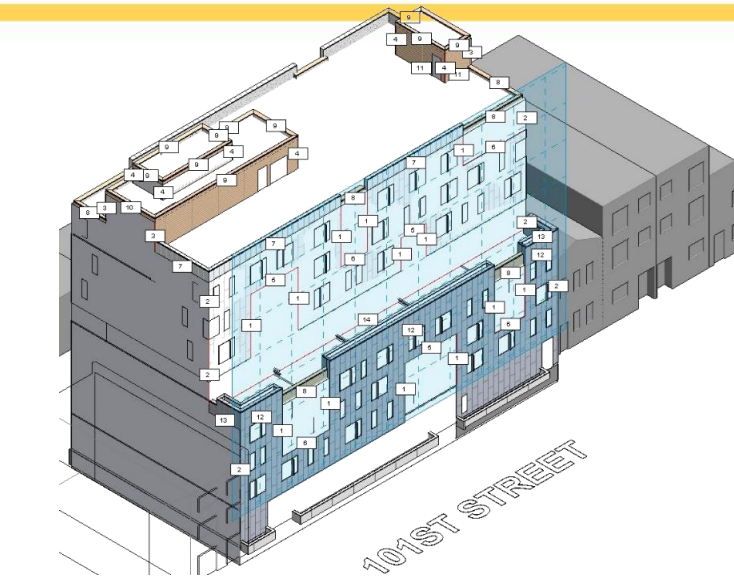
2

AIRTIGHTNESS  
 $n_{50} \leq 0.6 \text{ ACH@50}$

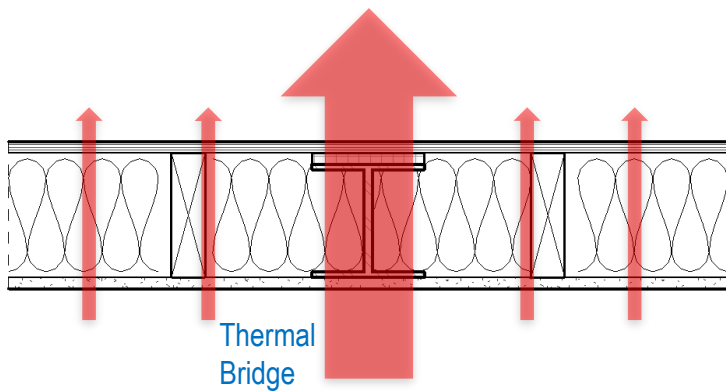
3

THERMAL  
BRIDGE FREE

- Reduce heat loss
- High internal surface temps lead to reduced damage from condensation (mold)



Structural  
Thermal  
Breaks



# Continuous Air-Tightness Layer

1

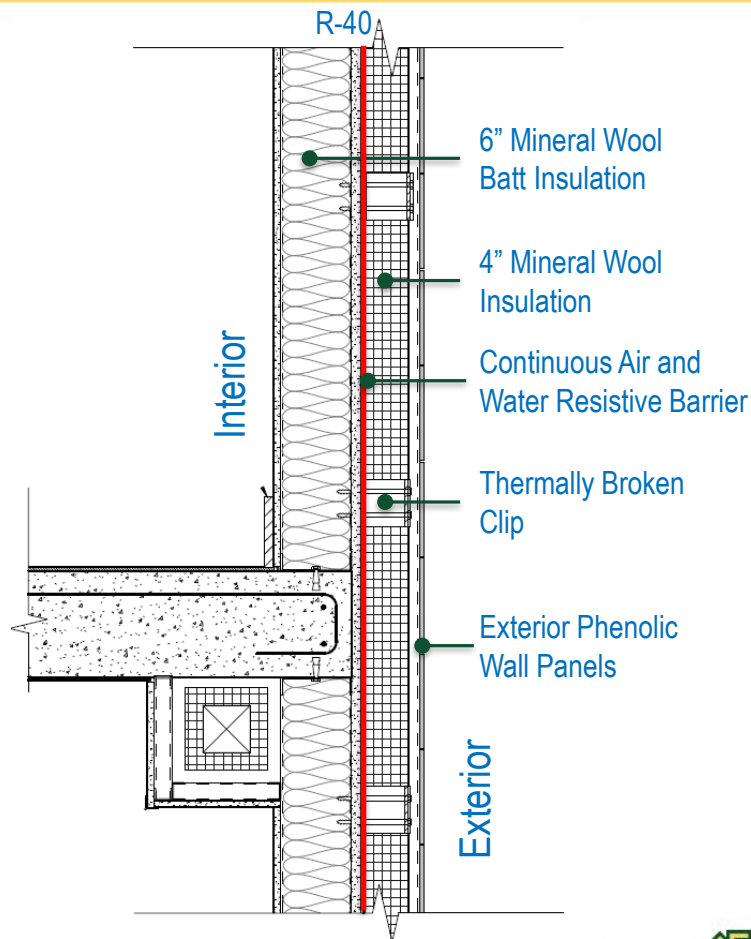
HIGH R-VALUES  
 $R \geq 38 \text{ (hr} \cdot \text{ft}^2 \cdot ^\circ\text{F)/Btu}$

AIRTIGHTNESS  
 $n_{50} \leq 0.6 \text{ ACH@50}$

2

- Reduce drafts
- Reduce possibility of moisture damage to envelope
- Reduce heat loss (winter)
- Reduce humidity (summer)







# Air Sealing Testing



MECHANICAL VENTILATION  
WITH  $\geq 75\%$  HEAT RECOVERY  
(ELECTRICITY DEMAND  $\leq 0.765$  W/CFM)

# Mechanical Heat Recovery Ventilation

- Clean, filtered fresh air all year round
- Reduced heat loss in winter
- Eliminate stale air

HIGH R-VALUES  
 $R \geq 38$  (hr·ft<sup>2</sup>·°F)/Btu

AIRTIGHTNESS  
 $n_{50} \leq 0.6$  ACH@50

THERMAL  
BRIDGE FREE

TRIPLE GLAZING  
 $R_w \geq 7.1$  (hr·ft<sup>2</sup>·°F)/Btu  
SHGC 0.5 – 0.62



UL 181 Approved  
Flexible Ducting

Supply Air  
(60CFM)

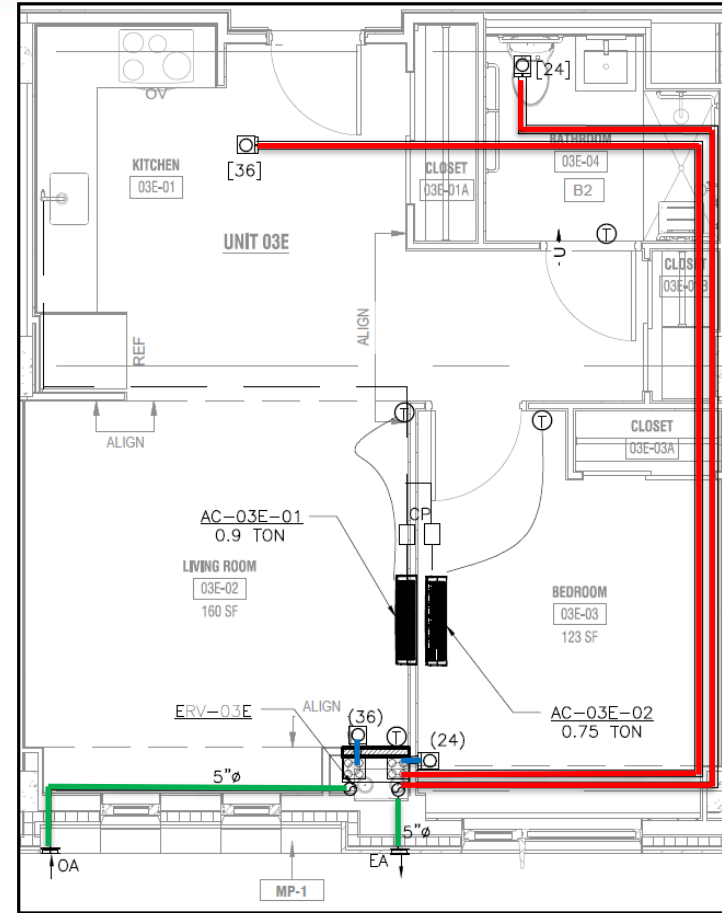
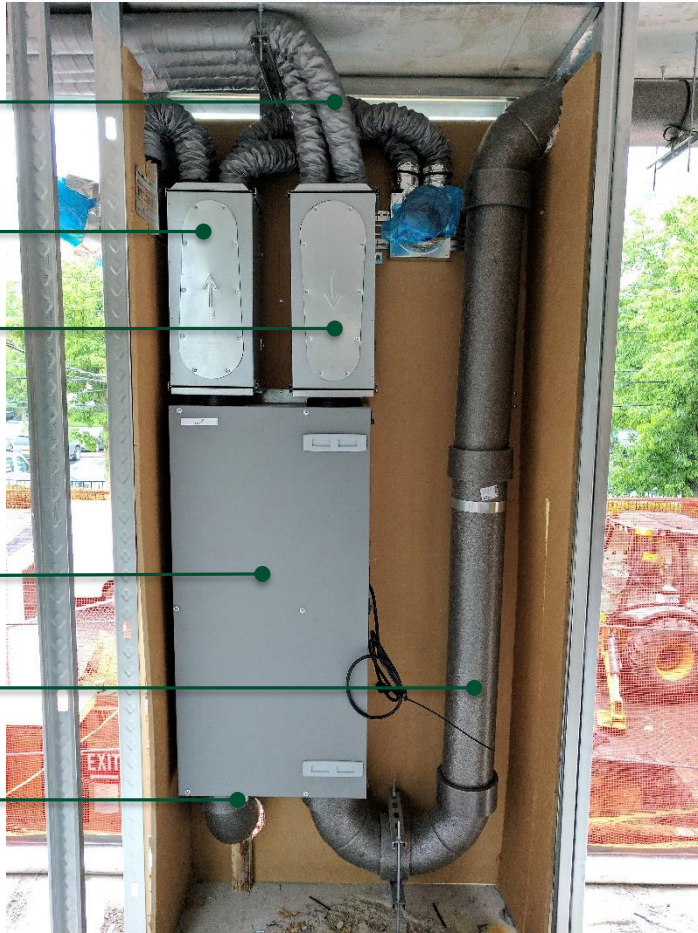
Exhaust Air  
(60CFM)

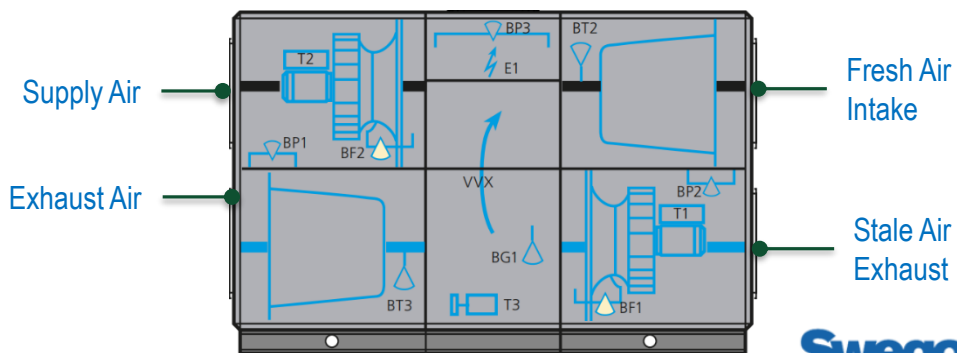
**zehnder**  
always  
around you

ERV Core

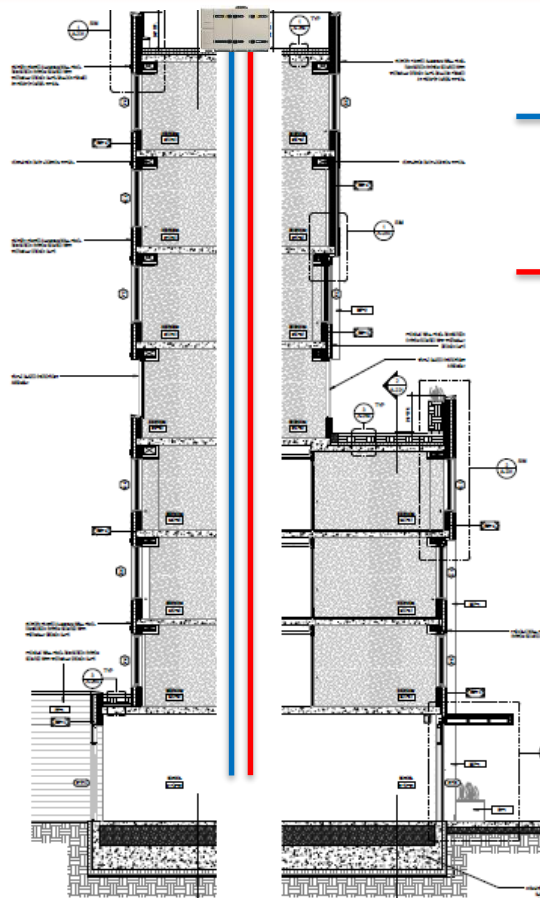
Stale Air  
Exhaust

Fresh Air  
Intake





Swegon



Supply Air:  
Common Area  
Corridors

Exhaust Air:  
Janitor's Closets  
Trash Collection  
Rooms





**HIGH R-VALUES**  
 $R \geq 38 \text{ (hr} \cdot \text{ft}^2 \cdot ^\circ\text{F)/Btu}$

**AIRTIGHTNESS**  
 $n_{50} \leq 0.6 \text{ ACH@50}$

**THERMAL  
BRIDGE FREE**

1

2

3

5

4

**MECHANICAL VENTILATION  
WITH  $\geq 75\%$  HEAT RECOVERY**  
*(ELECTRICITY DEMAND  $\leq 0.765 \text{ W/CFM}$ )*

Yearly Heat Demand ( $q_H$ )	$\leq 4.75 \text{ kBtu}/(\text{ft}^2 \cdot \text{yr})$
or Peak Heating Load ( $p_H$ )	$\leq 3.17 \text{ Btu}/(\text{hr} \cdot \text{ft}^2)$
Yearly Cooling Demand ( $q_C$ )	$\leq 4.75 \text{ kBtu}/(\text{ft}^2 \cdot \text{yr})$
Primary Energy	$\leq 38.0 \text{ kBtu}/(\text{ft}^2 \cdot \text{yr})$
Building Airtightness ( $n_{50}$ )	$\leq 0.6 \text{ ACH@50}$

**TRIPLE GLAZING**  
 $R_w \geq 7.1 \text{ (hr} \cdot \text{ft}^2 \cdot ^\circ\text{F)/Btu}$   
 $\text{SHGC } 0.5 - 0.62$



# Seniors' Needs

- Accessibility, adequate air, light and thermal comfort
- Supportive lively environment
- Stability- capability to stay in one place
- Affordability – i.e low overall costs



# In Passive House

- High levels of Thermal comfort – no temperature stratification vertically or horizontally.
- Constant fresh air – but no energy penalty
- Setup to harvest multigenerational opportunities



Photos for illustration



# In a Passive House

- Low energy means low operation AND reduction in some capital costs
- Energy loads so low most building systems can be run with generator.
- Thermal constant for Passive house= 200 hours – over a week of thermal comfort without heat.



# Implementation Challenges

- Confidence in the system
  - Reluctance to reduce plant size to modeled estimate- precedents
  - Only 50% of energy saving acknowledge for underwriting.
- Learnings across all disciplines- Passive House multifamily is new for everyone
- Controlling costs – dispelling the PH is expensive perception and reducing on-site labor which drives costs.





# Mitigating Challenges-Confidence

- Working with engineering team to reduce plant size to the level the feel comfortable with.
- Working with underwriters to ratify assumptions and to take example from local and foreign precences.
- Working with School Construction Authority team to remove regulatory limits to implement Passive House in the Pre-K



# Mitigating Challenges- Learning

- Offsite and onsite training for owners, contractors and subs.
- Multiple Certified Passive House Designers and Tradepersons on staff
- Support from an experienced European based PH certifier.



# Mitigating Challenges-costs

- Creating a pre-bid mockup to reduce the “PH fear factor”
- Using simple multipurpose prefab components like board mounted air barrier.
- Working closely with contractor on resolving during construction change orders.
- Investing in Training + testing rather than re-work



# It's a teams work!



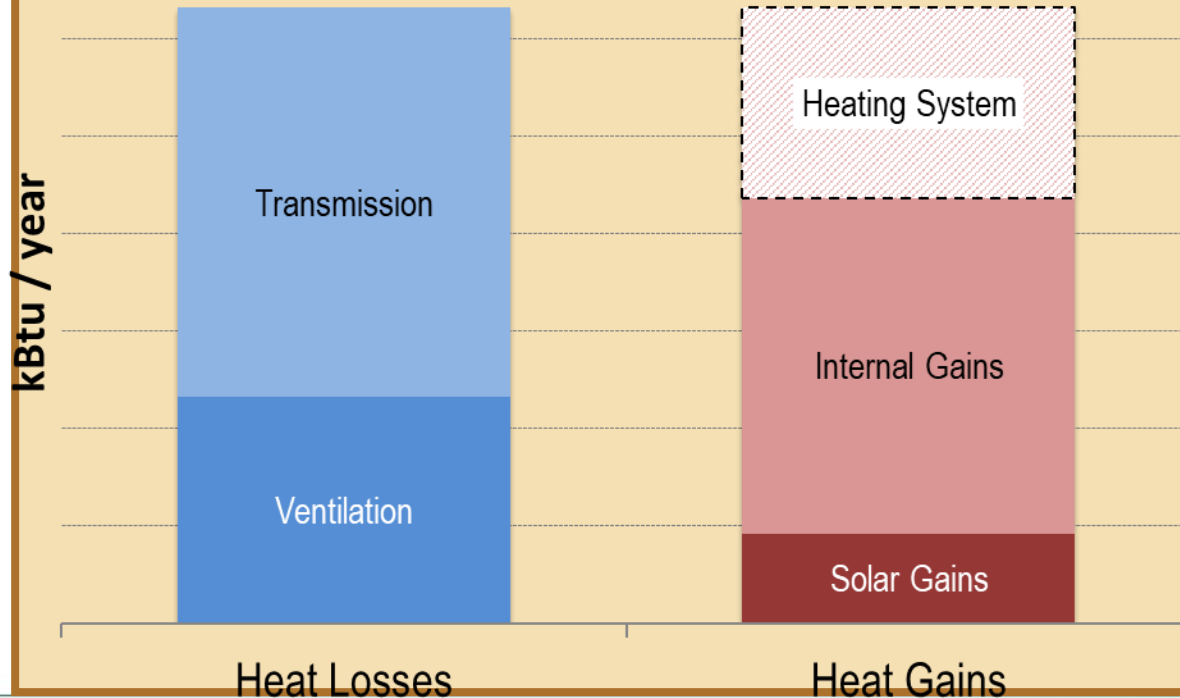
**THINK**

**NEWYORK ENGINEERS**





Yearly Heat Demand ( $q_H$ )	$\leq 4.75 \text{ kBtu}/(\text{ft}^2 \cdot \text{yr})$	$2.85 \text{ kBtu}/(\text{ft}^2 \cdot \text{yr})$
or Peak Heating Load ( $p_H$ )	$\leq 3.17 \text{ Btu}/(\text{hr} \cdot \text{ft}^2)$	$7.92 \text{ Btu}/(\text{hr} \cdot \text{ft}^2)$
Yearly Cooling Demand ( $q_C$ )	$\leq 4.75 \text{ kBtu}/(\text{ft}^2 \cdot \text{yr})$	$3.80 \text{ kBtu}/(\text{ft}^2 \cdot \text{yr})$
Primary Energy	$\leq 38.0 \text{ kBtu}/(\text{ft}^2 \cdot \text{yr})$	$37.40 \text{ kBtu}/(\text{ft}^2 \cdot \text{yr})$
Building Airtightness ( $n_{50}$ )	$\leq 0.6 \text{ ACH@50}$	$0.2 \text{ ACH@50}$



# Thank You

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