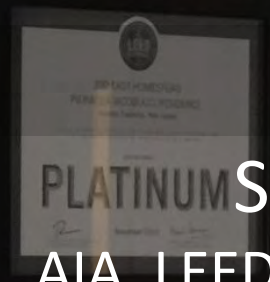
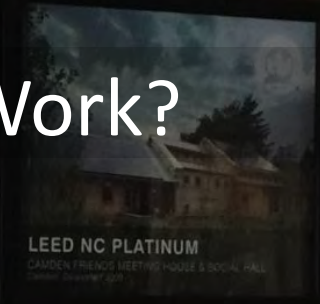


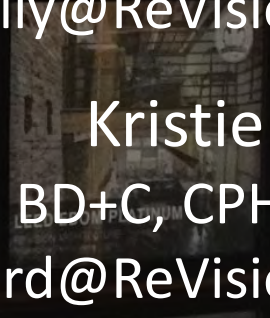
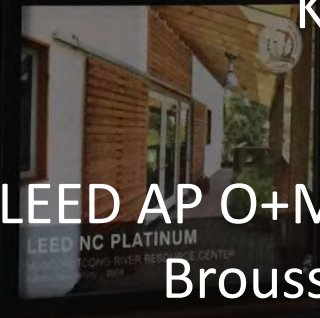


Re:Vision

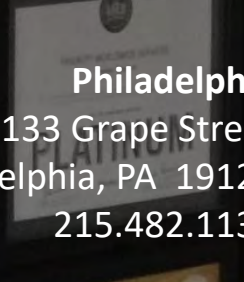
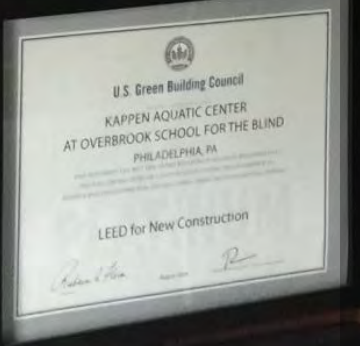
# Postmortem: Do Ratings Systems Really Work?



Scott Kelly  
AIA, LEED Fellow, LFA  
Kelly@ReVisionArch.com



Kristie Broussard  
LEED AP O+M, BD+C, CPHC, WELL AP  
Broussard@ReVisionArch.com



Philadelphia  
133 Grape Street  
Philadelphia, PA 19127  
215.482.1133

DEEP GREEN ARCHITECTURE  
SUSTAINABILITY CONSULTING  
COMMUNITY ENGAGEMENT  
RESEARCH AND TRAINING



**Scott Kelly**

AIA, CPHC, LEED Fellow, LFA  
Kelly@ReVisionArch.com



**Kristie Broussard**

CPHC, LEED AP, WELL AP  
Broussard@ReVisionArch.com



**Remove  
the barriers  
to green  
building**



# SESSION CONTENT

- History of rating systems
- Project examples:
  - Layout background of who the client is.
  - Explain the context of the project and the project approach.
  - Successes.
  - Challenges.
- Conclusions from the above
- Facilitate dialogue & questions!



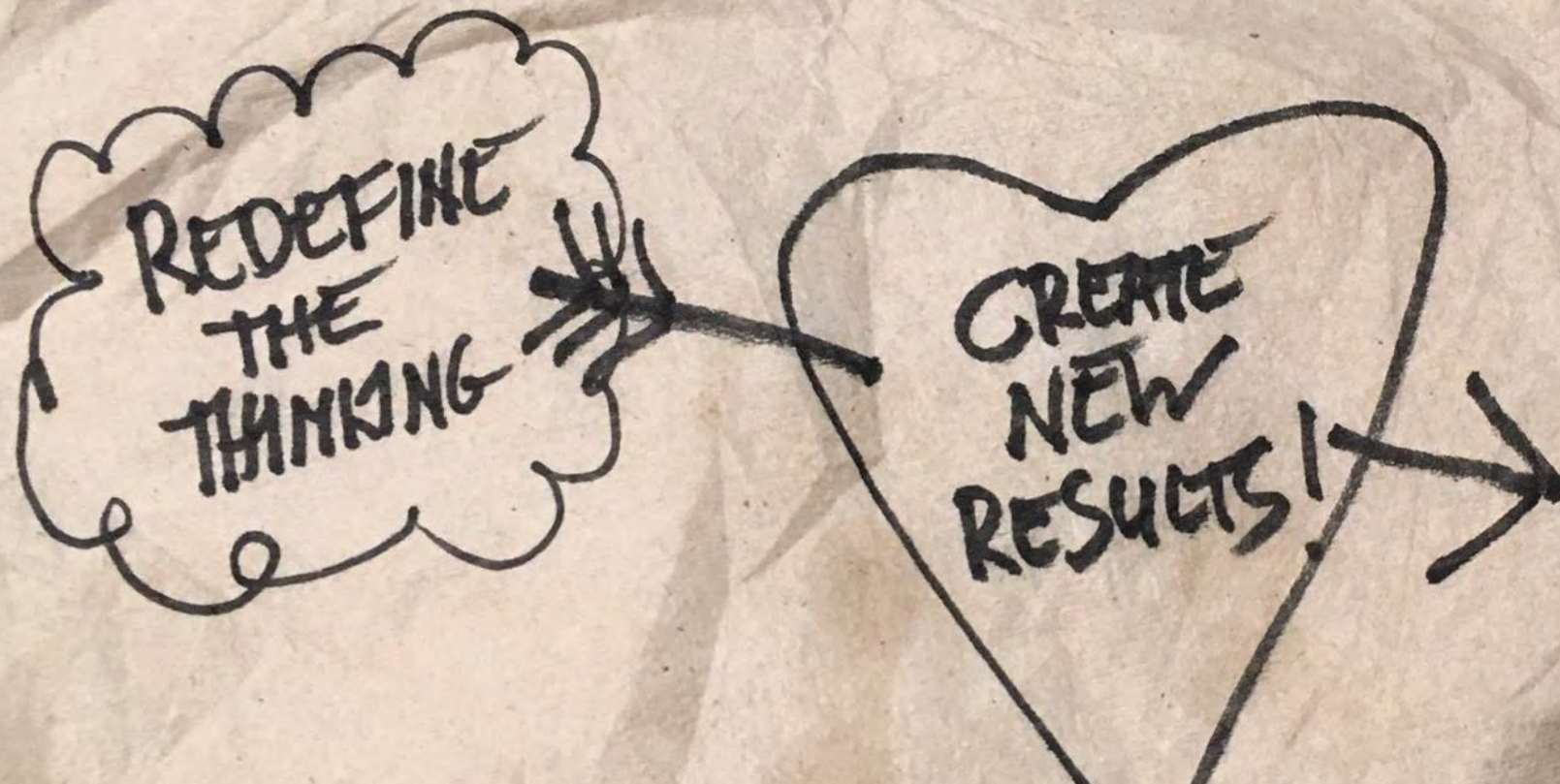
# HISTORIC NARRATIVE OF RATING SYSTEMS:



...and some of their relationships to the changing codes NYC

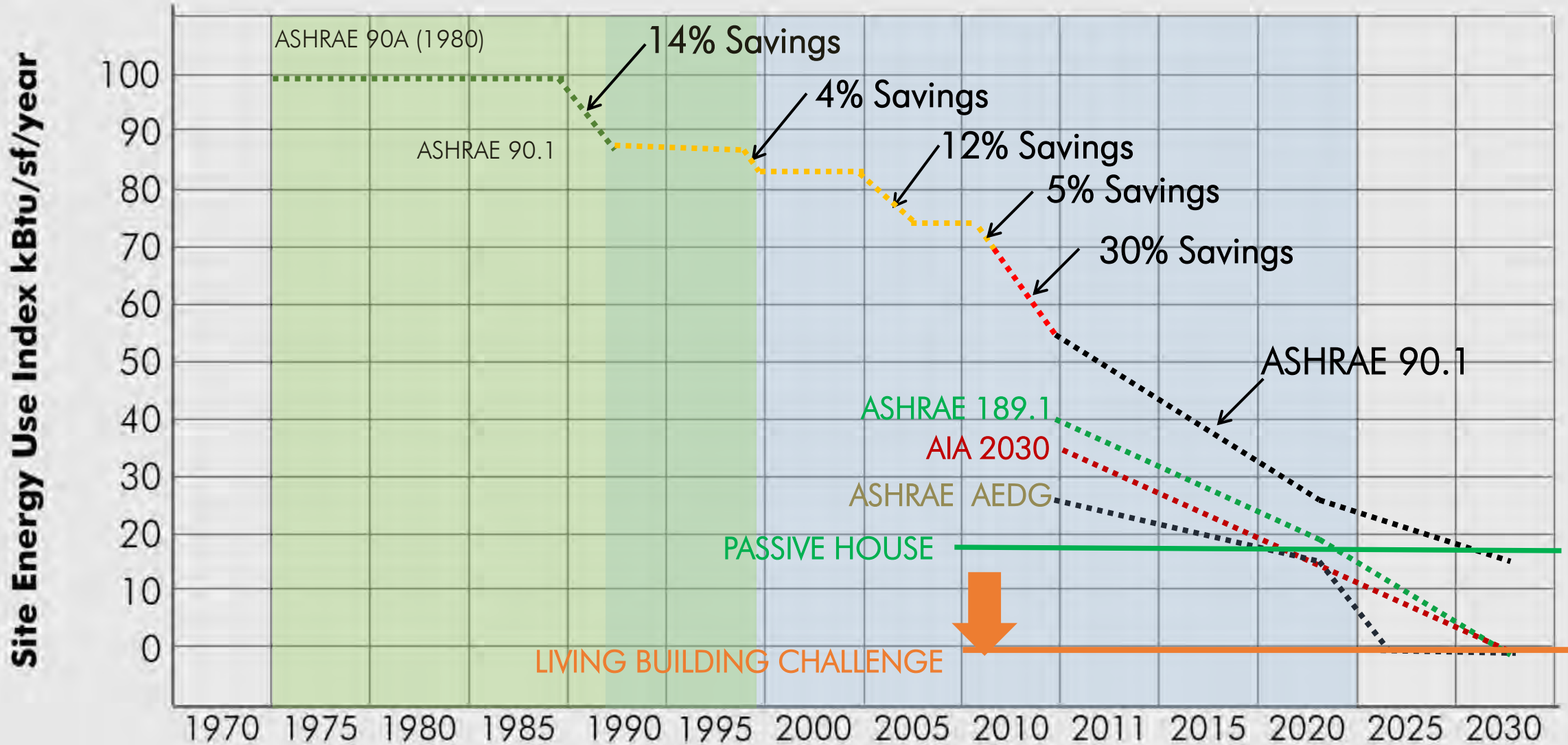
The way we design...

Introduce a rating system...



# A history of the codes that rating systems refer to...

(code = the minimum we do to not break the law)







INTEGRATIVE  
PROCESS

LOCATION &  
TRANSPORTATION

MATERIALS &  
RESOURCES

WATER  
EFFICIENCY

ENERGY &  
ATMOSPHERE

SUSTAINABLE  
SITES

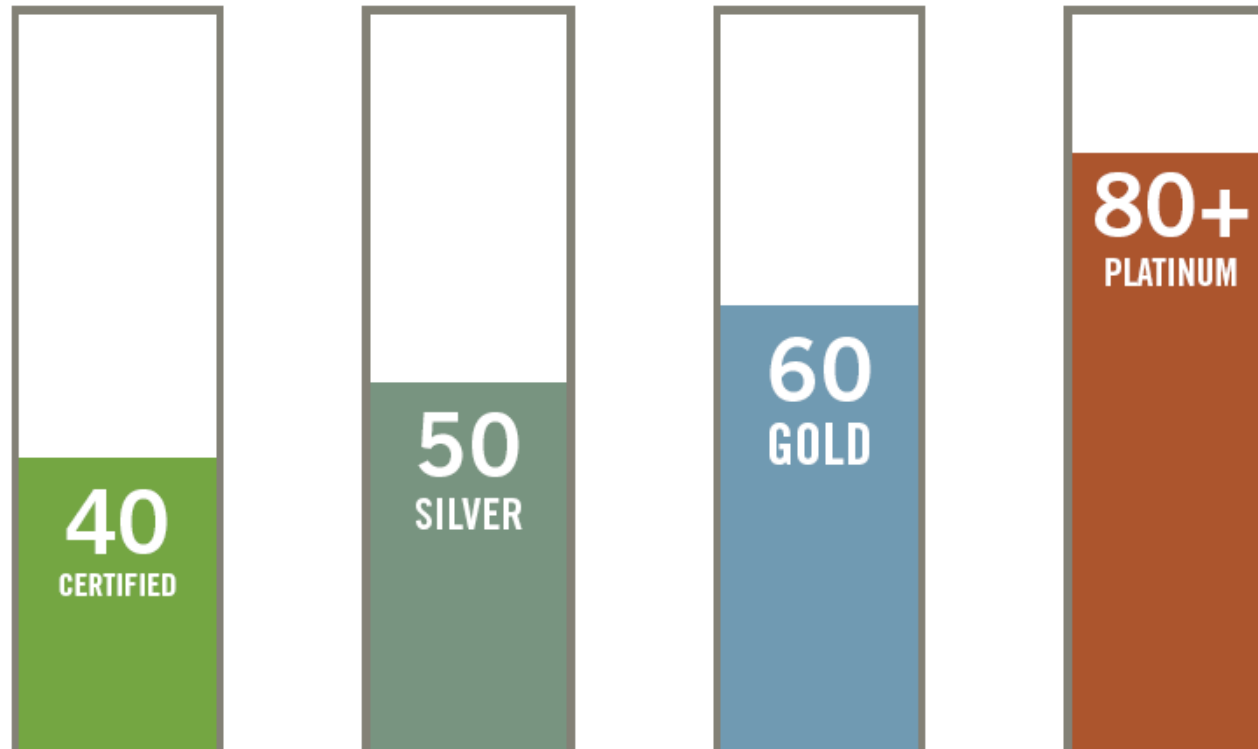
INDOOR  
ENV. QUALITY

INNOVATION

REGIONAL  
PRIORITIES



# 100 Point Scale







INTEGRATIVE  
PROCESS



LOCATION &  
TRANSPORTATION



MATERIALS &  
RESOURCES



WATER  
EFFICIENCY



# LEED

ENERGY &  
ATMOSPHERE



SUSTAINABLE  
SITES



INDOOR  
ENV. QUALITY



INNOVATION



REGIONAL  
PRIORITIES



**LEED is flexible enough to apply to all building types – commercial as well as residential.** It works throughout the building lifecycle – design and construction, operations and maintenance, tenant fit-out, and significant retrofit.

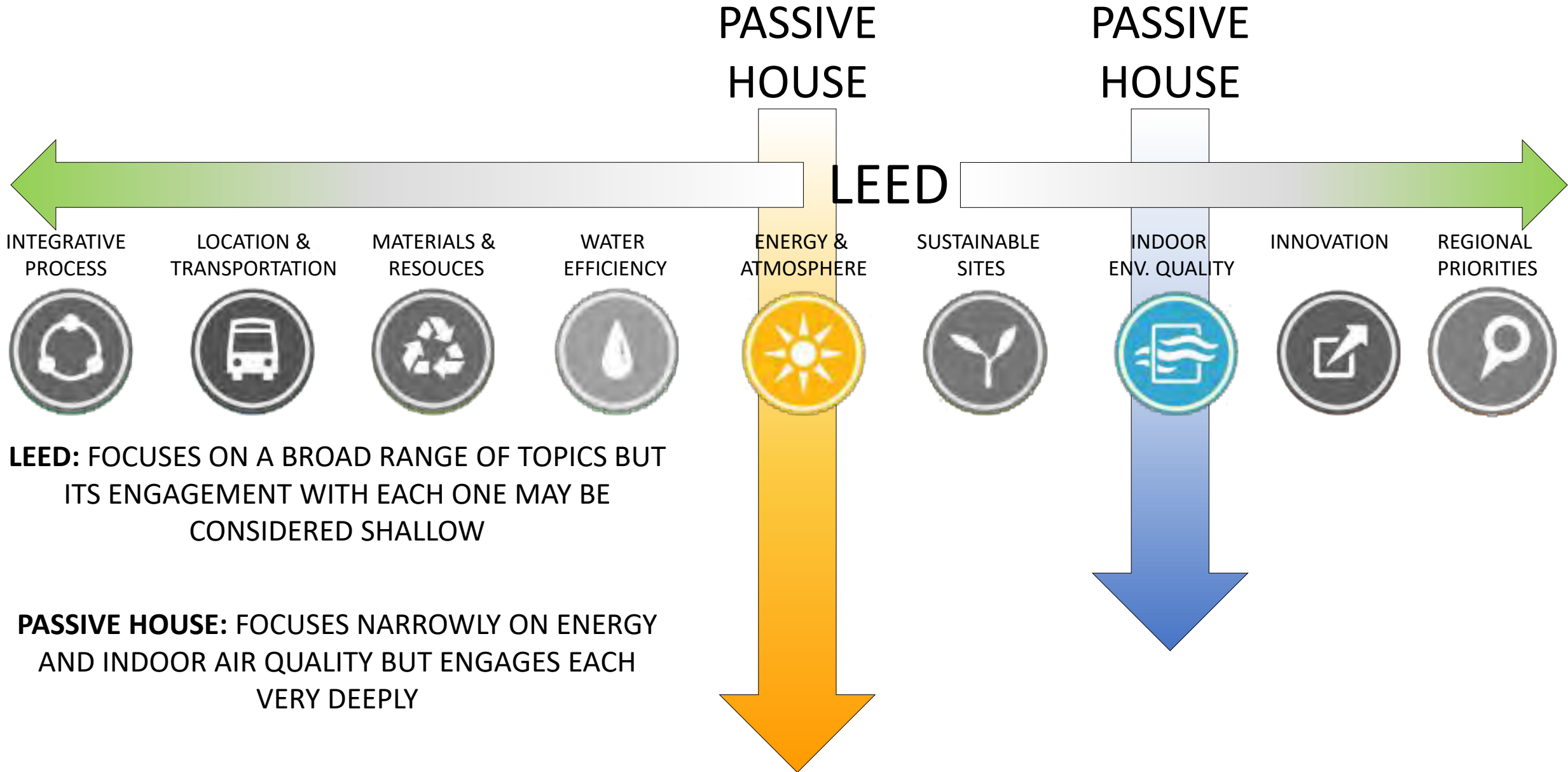


# LEED v4.1

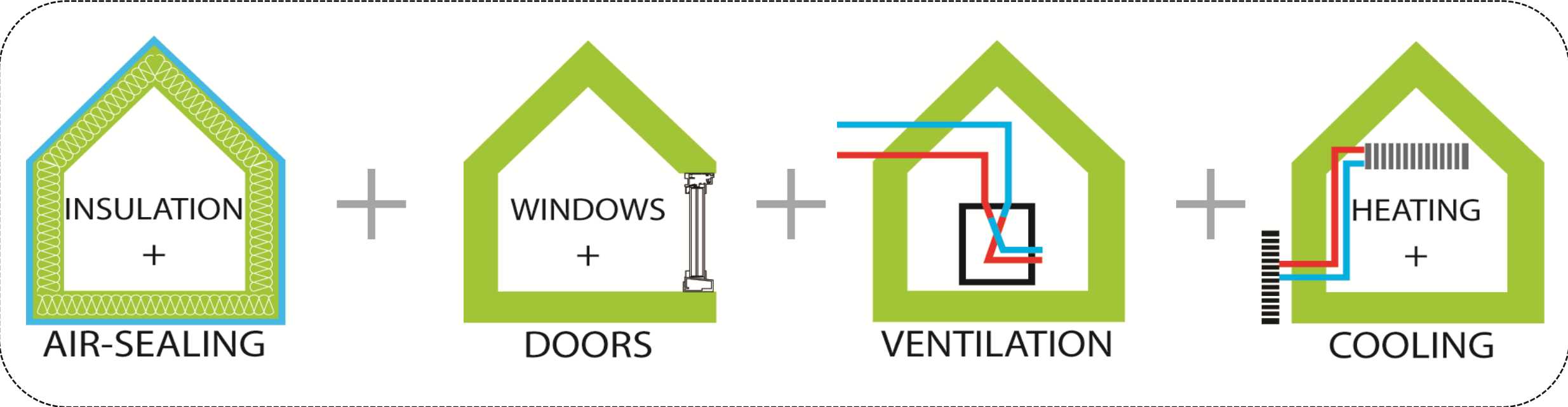
Energy metrics include both cost and greenhouse gas emissions







# LENSES OF PASSIVE HOUSE

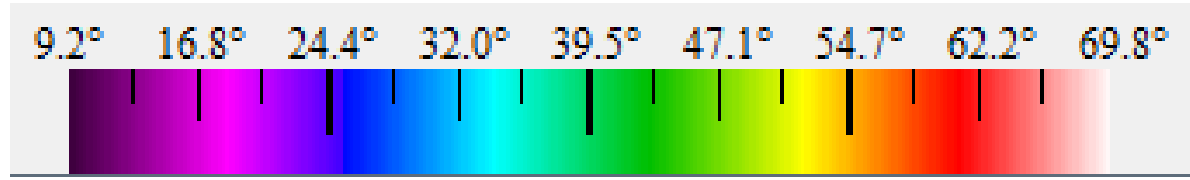


# Building Envelope Representations

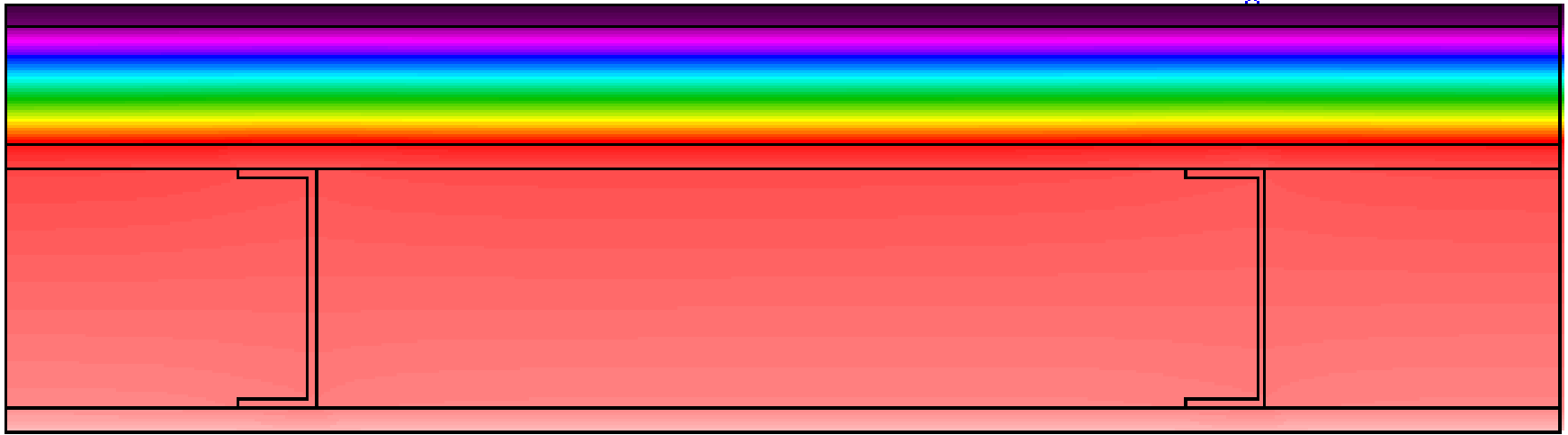
Typical Building Envelope

Passive House Building Envelope

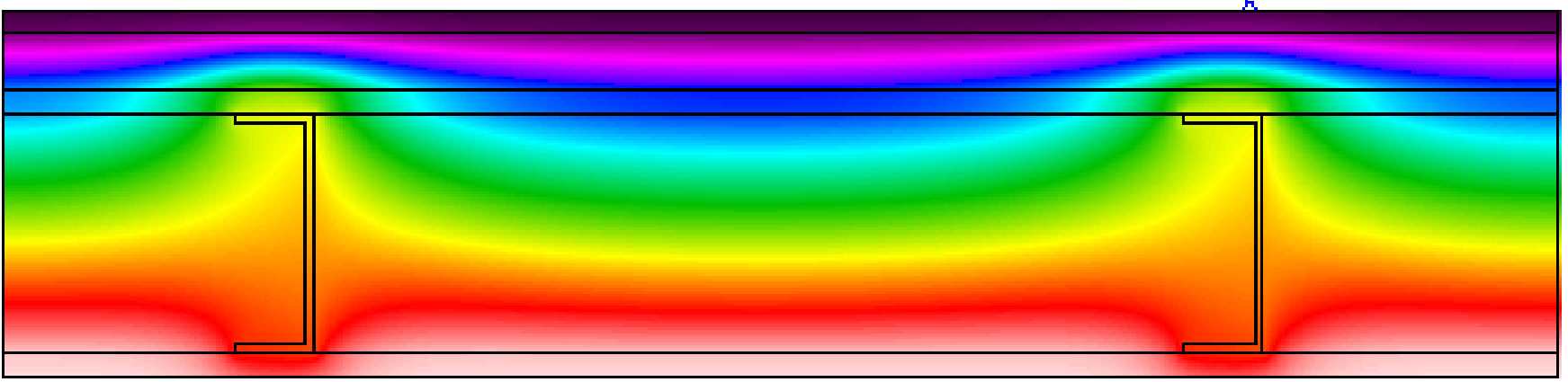




Passive House Construction



ASHRAE Baseline Construction



# Certification Matryoshkas

**PHIUS: Up to 5 Story Residential**

**DOE Zero Energy Ready Homes**

**ENERGY STAR  
v3**

**HERS  
Rating**

**EPA Indoor  
airPLUS**

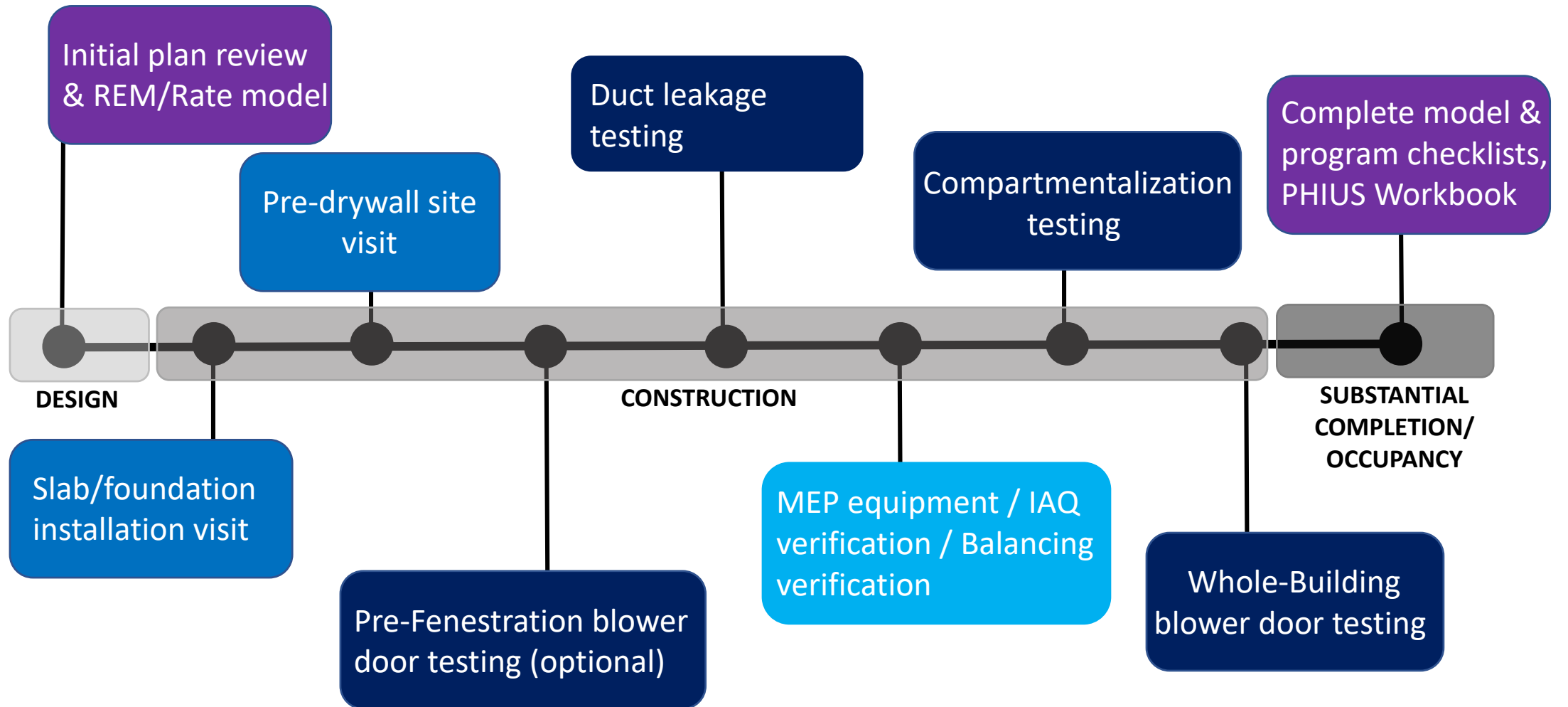
**PHIUS: Other  
Projects**

**EPA Indoor  
airPLUS**

**2021: ENERGY  
STAR  
Multifamily**



# Timeline of Verification





**LIVING  
BUILDING  
CHALLENGE<sup>SM</sup>**

# THE METAPHOR OF THE FLOWER

ROOTED IN PLACE AND YET:

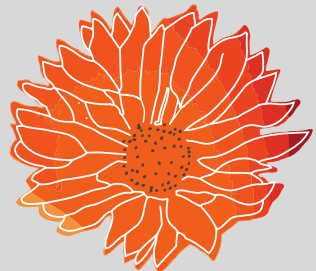
Harvests all energy + water

Is adapted to climate and site

Operates pollution free

Is comprised of integrated systems

Is beautiful



**LIVING  
BUILDING  
CHALLENGE**<sup>SM</sup>

## A PHILOSOPHY BASED ON RESULTS

1. All Imperatives assigned to a Typology are mandatory.
2. Living Building Challenge certification is based on actual, rather than modeled or anticipated, performance.

**PETALS**

**PLACE**

**WATER**

**ENERGY**

**HEALTH &  
HAPPINESS**

**MATERIALS**

**EQUITY**

**BEAUTY**

# IMPERATIVES

ECOLOGY OF PLACE 🌍

URBAN AGRICULTURE

HABITAT EXCHANGE

HUMAN SCALED LIVING 🌍

RESPONSIBLE WATER USE 🌍

NET POSITIVE WATER

ENERGY + CARBON REDUCTION 🌍

NET POSITIVE ENERGY

HEALTHY INTERIOR ENVIRONMENT 🌍

HEALTHY INTERIOR PERFORMANCE

ACCESS TO NATURE

RESPONSIBLE MATERIALS 🌍

RED LIST 90%

RESPONSIBLE SOURCING

LIVING ECONOMY SOURCING

NET POSITIVE WASTE

UNIVERSAL ACCESS 🌍

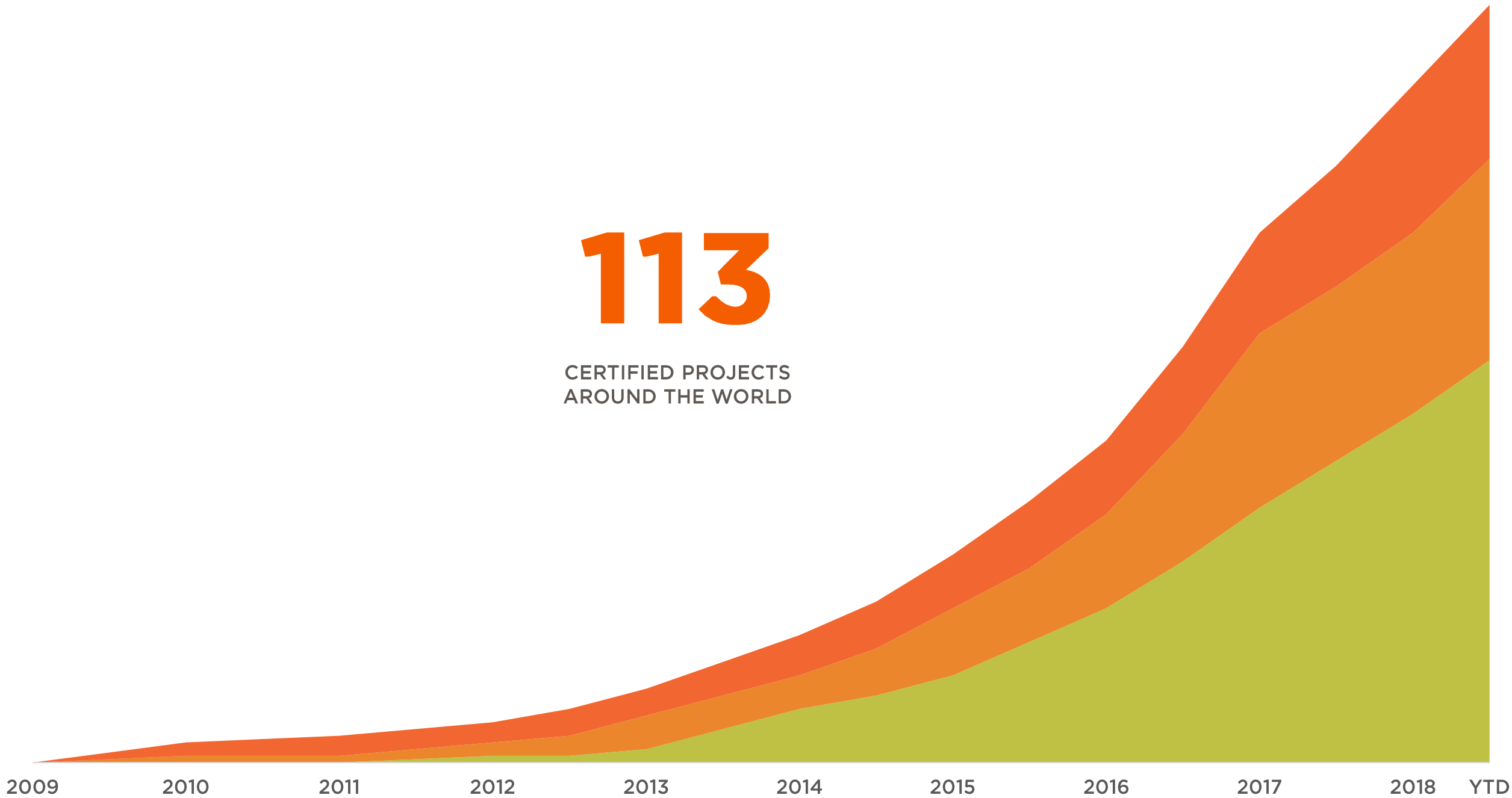
INCLUSION 🌍

BEAUTY + BIOPHILIA 🌍

INSPIRATION + EDUCATION 🌍

# 113

CERTIFIED PROJECTS  
AROUND THE WORLD



# IT'S TIME TO STEP UP TO THE LIVING BUILDING CHALLENGE



**World class efficiency and characteristics, reinforcing a fossil fuel free future.**

- 100% building energy load offset with on-site renewables, driving efficiency
- Pathway for premium off-site renewables for certain project types



PETAL CERTIFICATION

**One pillar of deep regenerative design built on a holistic high-performance foundation.**

All Core Imperatives are required, plus the remaining Imperatives to complete either the Water, or Energy or Materials Petal.

ALL CORE IMPERATIVES

#### Water

06 Net Positive Water

#### Energy

08 Net Positive Carbon

#### Materials

13 Red List

14 Responsible Sourcing

15 Living Economy Sourcing

16 Net Positive Waste



LIVING CERTIFICATION

**Summit of holistic aspiration and attainment; fully restorative.**

All Imperatives must be achieved to certify:

- |    |                              |
|----|------------------------------|
| 01 | Ecology of Place             |
| 02 | Urban Agriculture            |
| 03 | Habitat Exchange             |
| 04 | Human Scaled Living          |
| 05 | Responsible Water Use        |
| 06 | Net Positive Water           |
| 07 | Energy + Carbon Reduction    |
| 08 | Net Positive Carbon          |
| 09 | Healthy Interior Environment |
| 10 | Healthy Interior Performance |
| 11 | Access to Nature             |
| 12 | Responsible Materials        |
| 13 | Red List                     |
| 14 | Responsible Sourcing         |
| 15 | Living Economy Sourcing      |
| 16 | Net Positive Waste           |
| 17 | Universal Access             |
| 18 | Inclusion                    |
| 19 | Beauty + Biophilia           |
| 20 | Education + Inspiration      |

# 10 BEST PRACTICES FOR GREEN BUILDING

PLACE

HEALTH

MATERIALS

EQUITABLE  
ACCESS

INCLUSION

WATER

EDUCATION

TRANSPORTATION

ENERGY

BEAUTY +  
BIOPHILIA



INTERNATIONAL  
**LIVING FUTURE**  
INSTITUTE<sup>SM</sup>





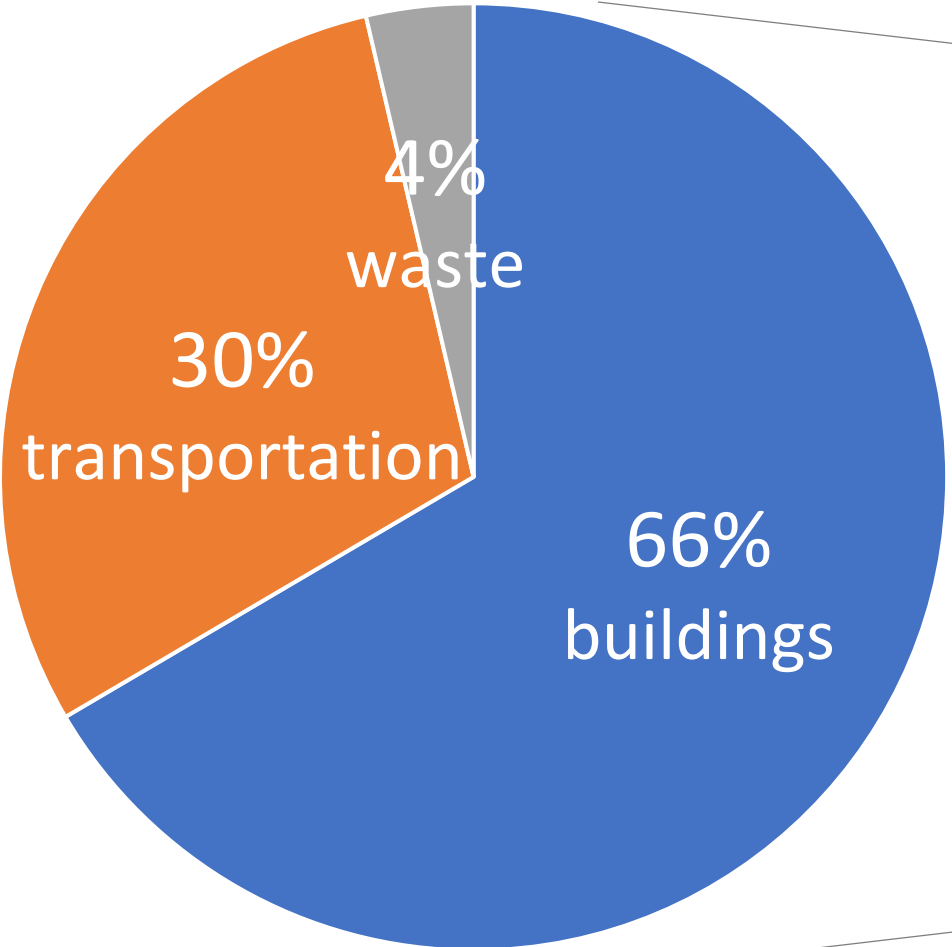
# LEED v4.1

Energy metrics include both cost and greenhouse gas emissions

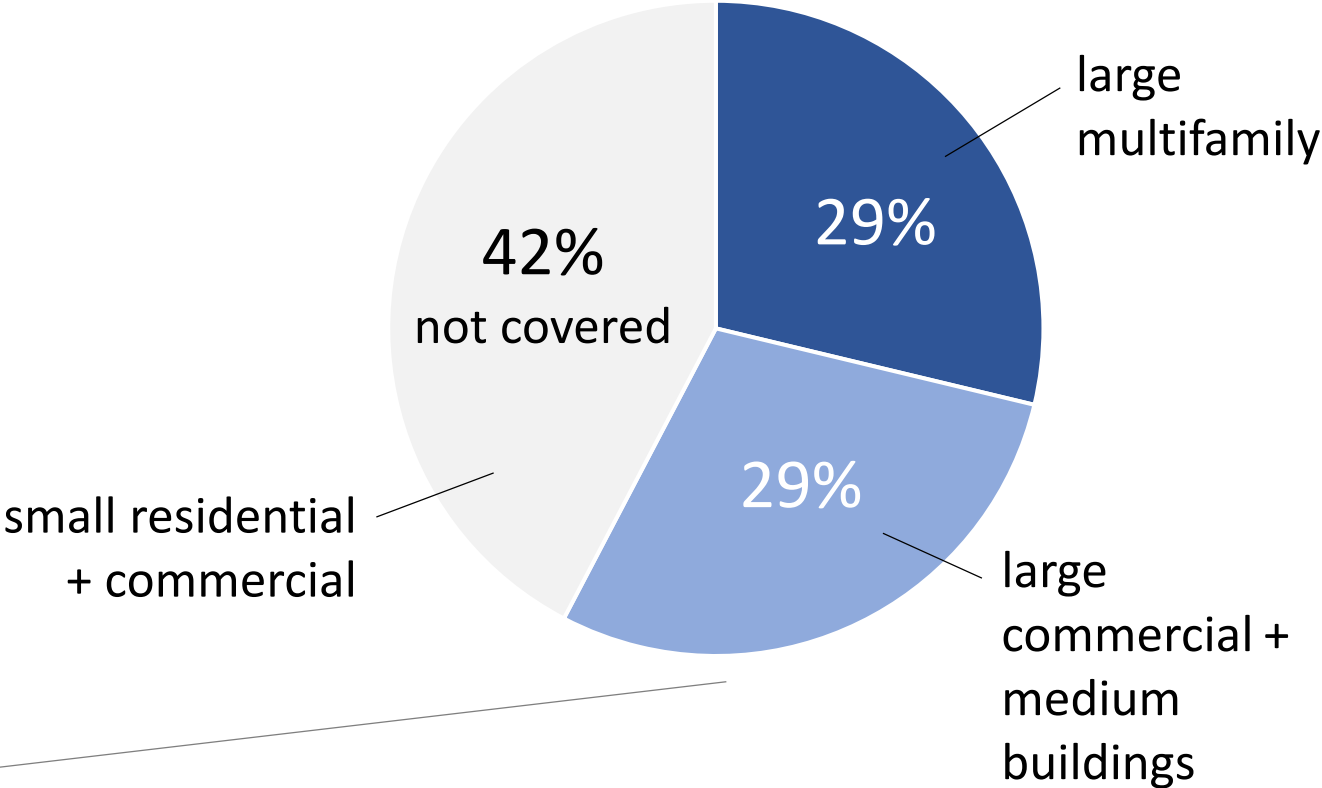


# Carbon Emissions in NYC

## Citywide Carbon Emission Sources



## Citywide Building Areas



Source: NYC Greenhouse Gas Inventory 2016

Source: NYC Department Of Planning Pluto Dataset 2017

# NYC Carbon Emissions Cap: LL97

## Occupancy Group

A – Assembly

B – Business

B – Ambulatory Health

E – Educational

F – Factory

I - Institutional

M – Mercantile

R1 – Hotel

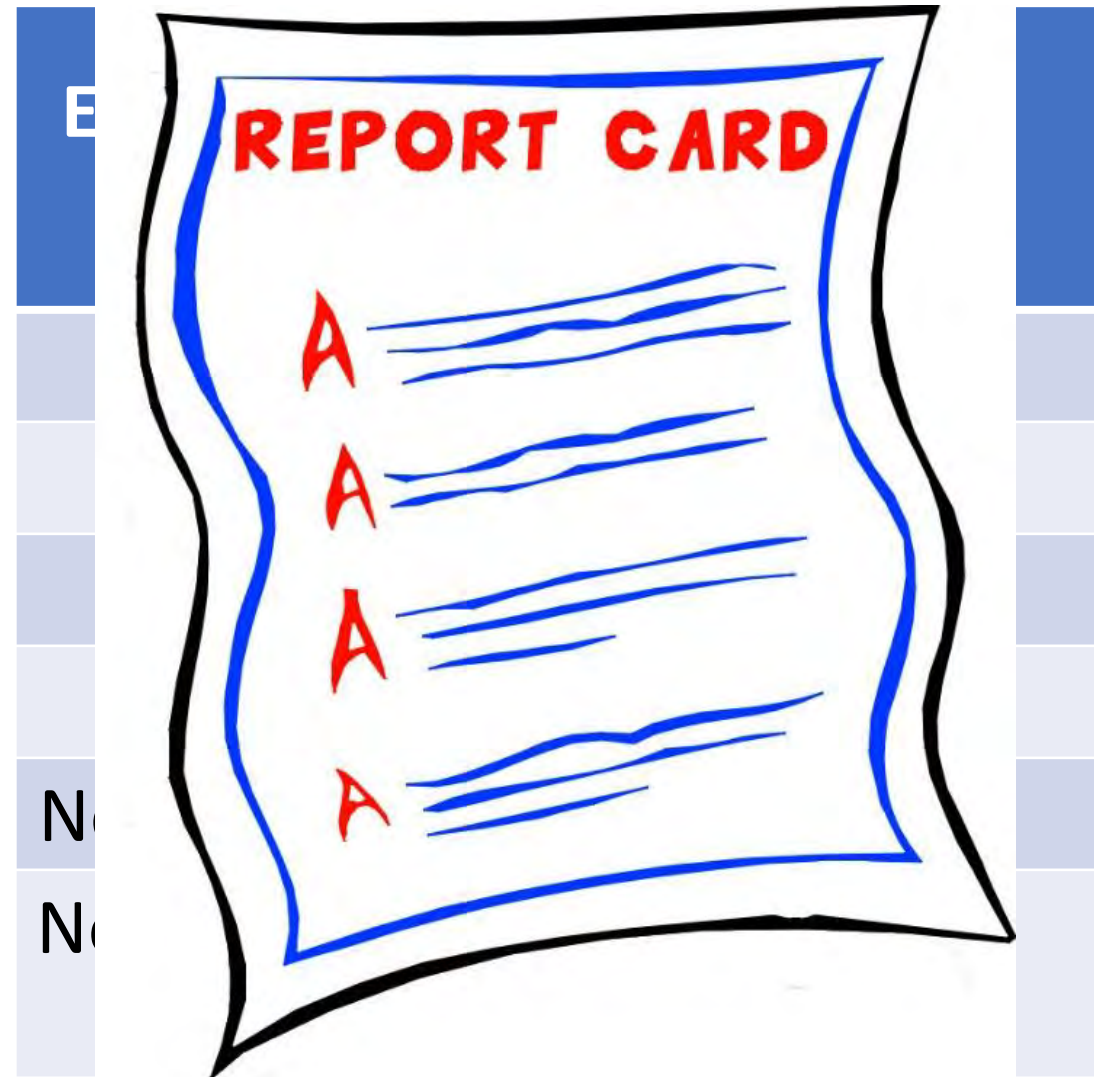
R2 – Residential

S - Storage

- Emissions caps on buildings >25,000 sf
- Includes onsite (site) and offsite (source) emissions in a single limit
- Increasingly stringent limits on carbon emissions / sf in 2024 and 2030
  - ~40% citywide emissions reductions by 2030 from a 2005 baseline

# NYC Building Efficiency Grade: LL33 / LL95

Beginning in 2020, buildings  
>25,000 sf must post  
building efficiency grades  
publicly in lobby



# PROJECT EXAMPLES OF LEED, PH, AND LBC



# LEED Project Example:

*LEED Platinum project*

STROUD WATER RESEARCH  
CENTER, MOORHEAD  
ENVIRONMENTAL COMPLEX



# OUR FOCUS IS FRESH WATER

**S**ince 1967, Stroud™ Water Research Center has focused on one thing — fresh water. We seek to advance knowledge and stewardship of freshwater systems through global research, education, and watershed restoration.

## What We Do

FRESHWATER  
RESEARCH



ENVIRONMENTAL  
EDUCATION



WATERSHED  
RESTORATION









Existing  
Greenhouse

New  
Building

Existing  
Building

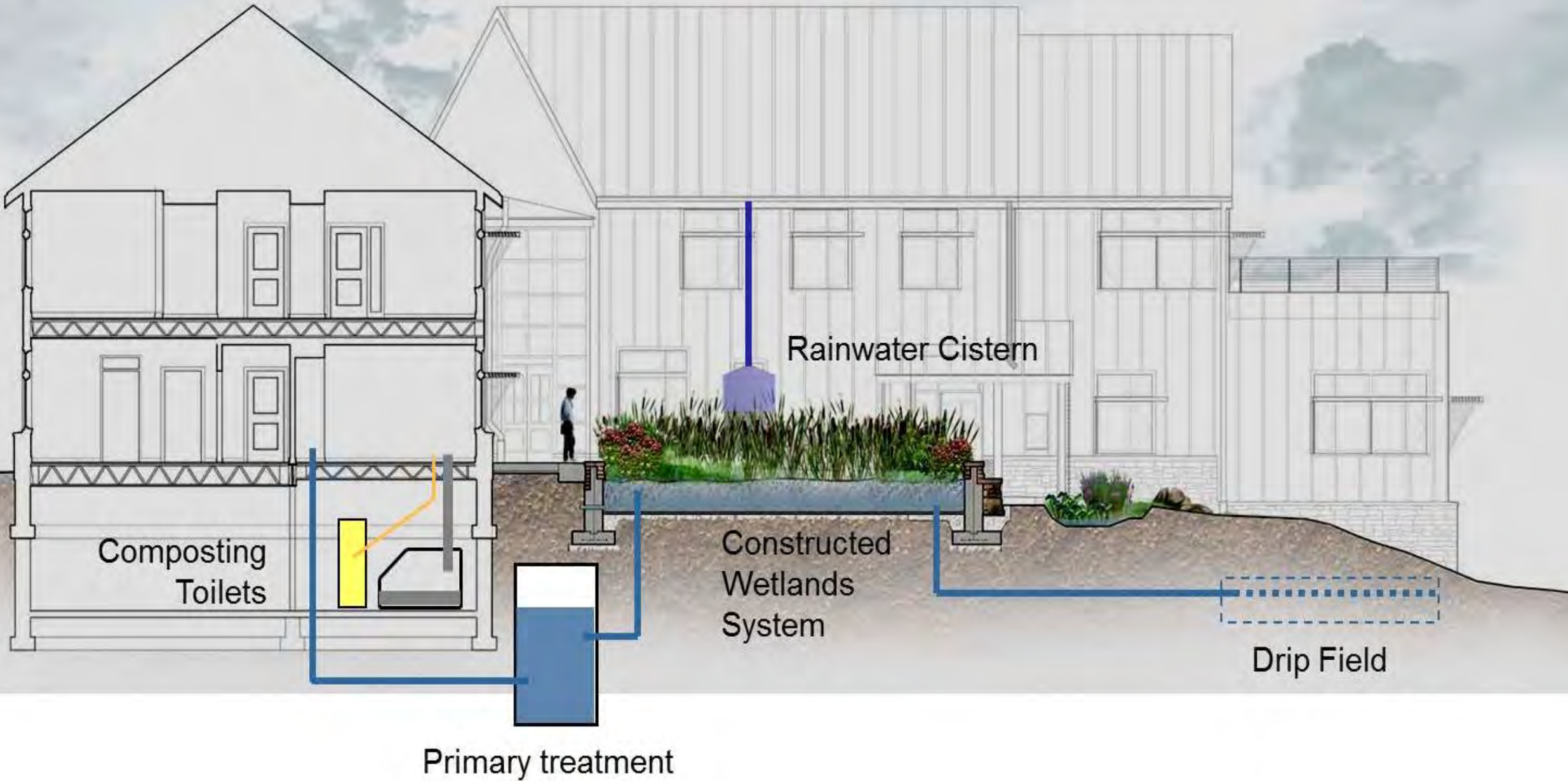
Existing  
Barn







# SUCSESSES: getting all of the water right





# SUCSESSES: inspirational charrette



# SUCCESSSES: transformative process for all

## STROUD WATER RESEARCH CENTER WETLAND WASTEWATER TREATMENT

**Plants at perimeter of each cell**

- 1 *Typha latifolia* "Broadleaf Cattail"
- 2 *Scirpus pungens* "Three Square Bulrush"
- 3 *Scirpus tabernaemontani* "Softstem Bulrush"
- 4 *Lobelia cardinalis* "Red Cardinal Flower"

**Plants in the center of each cell**

- 1 *Phlox x 'Minnie Pearl'* "Minnie Pearl Phlox"
- 2 *Coreopsis rosea* "Pink Tickseed"
- 3 *Amelanchier leavis* "Service Berry"
- 4 *Penstemon digitalis* "Husker Red" Beardstongue

**Plants in the drip irrigation field**

- 1 *Phlox x 'Minnie Pearl'* "Minnie Pearl Phlox"
- 2 *Coreopsis rosea* "Pink Tickseed"
- 3 *Amelanchier leavis* "Service Berry"
- 4 *Penstemon digitalis* "Husker Red" Beardstongue

## STROUD WATER RESEARCH CENTER RAIN GARDEN PLANT IDENTIFICATION

**Plants in Rain Garden A:**

- 1 *Amelanchier leavis* "Service Berry"
- 2 *Osmunda claytoniana* "Interrupted Fern"
- 3 *Fothergilla gardenii* "Dwarf Witch Alder"
- 4 *Penstemon digitalis* "Husker Red" Beardstongue
- 5 *Alter oblongifolius* "Raydon's Favorite" aromatic aster
- 6 *Chalonia Globosa* "White Turtlehead"
- 7 *Artemisia 'Blue Ice'* "Blue Star"
- 8 *Coreopsis rosea* "Pink Tickseed"
- 9 *Lobelia spicata* "Blazing Star"
- 10 *Ajuncus effusus* "Common Rush"

**Plants in Rain Garden B:**

- 11 *Vernonia noveboracensis* "NY Iron Weed"
- 12 *Panicum Virgatum* "Shenandoah" Red Switchgrass
- 13 *Dwarf Inkberry Bush*
- 14 *Crocus sp.* "Crocus"
- 15 *Waldsteinia ternata* "Barely Strawberry"
- 16 *Hydrangea quercifolia* "pee wee" Oakleaf Hydrangea
- 17 *Acer rubrum* "Red Maple"
- 18 *Iris versicolor* "Blue Flag Iris"
- 19 *Magnolia virginiana* "Sweetbay Magnolia"

## STROUD WATER RESEARCH CENTER ROOF GARDEN PLANT IDENTIFICATION

**Plants in Roof Garden A:**

- 1 *Eragrostis spectabilis* "Purple Love Grass"
- 2 *Koeleria glauca* "Blue Hair Grass"
- 3 *Allium tuberosum* "Garlic Chives"

**Plants in Roof Garden B:**

- 4 *Talinum calycinum* "Famflower"
- 5 *Andropogon gerardii* "Big Bluestem"
- 6 *Sedum spurius* "Raspberry"
- 7 *Sedum spurius* "John Creech"
- 8 *Sedum spurius* "Fulda Glow"
- 9 *Sedum spurius* "Vera Jameson"
- 10 *Achillea millefolium* "White Yarrow"
- 11 *Campanula rotundifolia* "Bluebell Bellflower"
- 12 *Sedum floriferum* "Weihenstephaner gold"

## STROUD WATER RESEARCH CENTER WETLAND WASTEWATER TREATMENT

**A constructed wetland is an artificial wetland, marsh or swamp created as a new or restored habitat for treatment of wastewater, stormwater runoff or for land reclamation after ecological disturbances, thus providing habitats for plants and wildlife. These natural biofilters remove sediments and pollutants such as heavy metals.**

**Subsurface-flow wetlands**  
This subsurface-flow wetland treats wastewater by moving it through a gravel or sand medium on which plants are rooted. In subsurface-flow systems, wastewater moves through the substrate and out. These systems require less land area for water treatment and are inhospitable to mosquitoes (as there is no standing surface water). After passing through the wetland, the water is pumped to a drip irrigation system where it gradually returns to the ground.

**What happens in cold weather?**  
Wetlands are temperature-dependent. The engineer must design for the worst case, which is the low temperatures occurring in winter. Snow cover actually helps.

**What about odor?**  
Subsurface wetlands have wastewater flow under the gravel surface so odors are trapped and become food for microorganisms attached to gravel and plant root surfaces.

**What happens when it rains?**  
The wastewater is diluted by the rain and shortens treatment time. Surface and ground water is kept out by a surrounding berm and impervious liner.

**Wetland Plants**

**Leaching Chamber** collects and diffuses water to the drainage area.

**Berm**

**From septic**

**To drip irrigation field**

Source: Stroud construction documents provided by RCI Inc.

## STROUD WATER RESEARCH CENTER STORMWATER MANAGEMENT: LANDSCAPING

### RAIN GARDENS

A rain garden is a shallow, constructed depression that is planted with deep-rooted native plants and grasses. The depression receives runoff during storms. The rain garden slows down the rush of water from surrounding surfaces, holds the water for a short period of time and allows it to naturally infiltrate into the ground. Our rain gardens are engineered to release excess water through a drainage system leading to the edge of the forest.

**When sized and constructed properly, rain gardens are able to handle the amount of stormwater produced in an average event. One inch of rain falling on an average 30 x 50 foot surface = 1,500 square feet or 935 gallons of water!**

**A rain garden will:**

- protect rivers and streams
- reduce low water levels in creeks
- filter runoff pollution & improve water quality
- create habitat for birds & butterflies
- improve soil structure
- reduce mosquito breeding

### POROUS PAVERS

Reducing or minimizing impervious surfaces such as pavement is another way to reduce stormwater runoff and allow water to soak into the ground. Alternatives to impervious surfaces include bricks, flagstones, interlocking pavers, stone and bark chips, as well as new varieties of porous asphalt and concrete.

## RADIANT FLOOR HEATING

Radiant floor heating is one of the most efficient forms of heating available today. Radiant systems can be up to 30 percent more efficient than forced-air heating, especially if the building is well insulated. Our radiant floor system is supplied by hot water pumped from a geothermal heat pump through flexible polyethylene tubing embedded in the floor. Heat radiates from the tubing to warm the slate floor, which in turn radiates that captured heat to the room. The tubing lies upon a thick membrane tacked to the subfloor. The tubing is then covered by thin-set mortar, mesh fabric, more thin-set mortar, and then the slate tiles. The layering system allows for expansion and contraction of the flexible tubing without cracking the thin-set mortar or loosening the tile. Though the air temperature remains relatively constant, you stay comfortable because the surrounding surfaces don't steal warmth from the room.

**Forced Air Heating**

**Radiant Floor Heating**

Source: Wirsbo USA

**STROUD WATER RESEARCH CENTER**

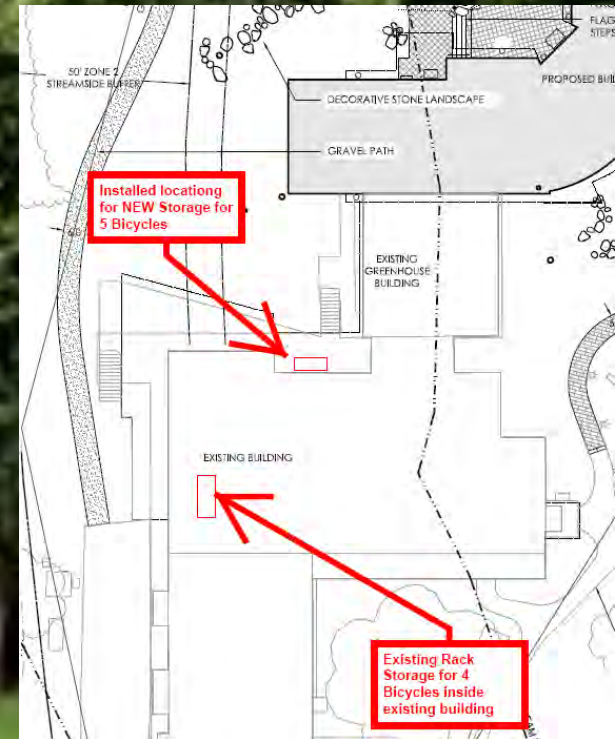
A vision can only be carried forward if it is inspirational, strategic, communicated and memorialized.

- Drew Lavine, Re:Vision



# CHALLENGES:

- Framework of the time
- LEED was not well enough known
- Was that necessary?





# Passive House Project Example: Liberty 52: Stephen F. Gold Community Residences PHIUS 2015



- Component 1: Frame Wall
- Component 2: Soffit
- Component 3: Roof
- Component 4: Slab
- Component 5
- Component 6
- Component 7: East-3F-FWM-L
- Component 8: East-3F-FW
- Component 9: East-3F-OWM-R
- Component 10: East-3F-OWM-L
- Component 11: East-2F-OWM-L
- Component 12: East-3F-OW
- Component 13: East-2F-OW
- Component 14
- Component 15: East-1F-Storefront-L
- Component 16: East-1F-Storefront-R
- Component 17: East-1F-OW
- Component 18: East-1F-OWM-L
- Component 19: East-1F-OWM-R
- Component 20: East-1F-OWM-L
- Component 21: East-1F-OWM-R
- Component 22: East-2E-OWM-R

Assigned assembly

Name	R [hr ft² °F/Btu]
Wall_3" PolyIso_0.5" PLYWD_2x6 w-R15 Mineral Wool_0.625" GWB - fast	36.997

Select from database

Edit

Available assemblies

Floor_4" Concrete - 2" EPS	8.82
Wall_2" PolyIso_0.5" PLYWD_2x6 w-R23 Batt_0.625" GWB	25.721
3" EPS_12" Concrete	12.078
Floor_4" Concrete - 2" EPS	7.632
Roof_1/2" XPS_6" PolyIso_0.75" PLYWD	39.741
707 Composite Sliding Door	2.886
Laundry Chase	16.977

New  
Delete  
Copy  
Insert  
New/Insert:  
after

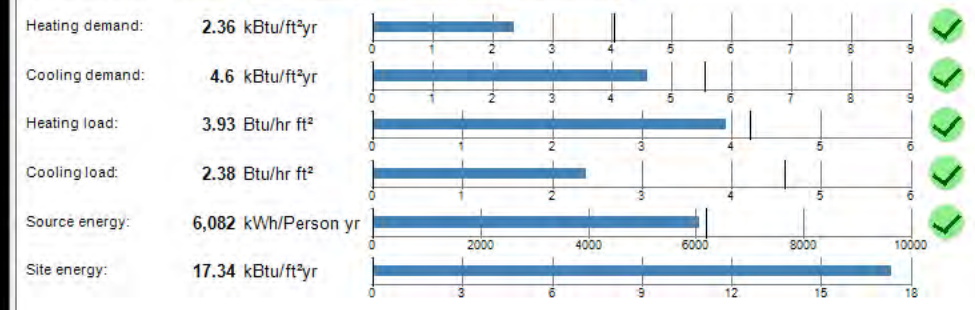
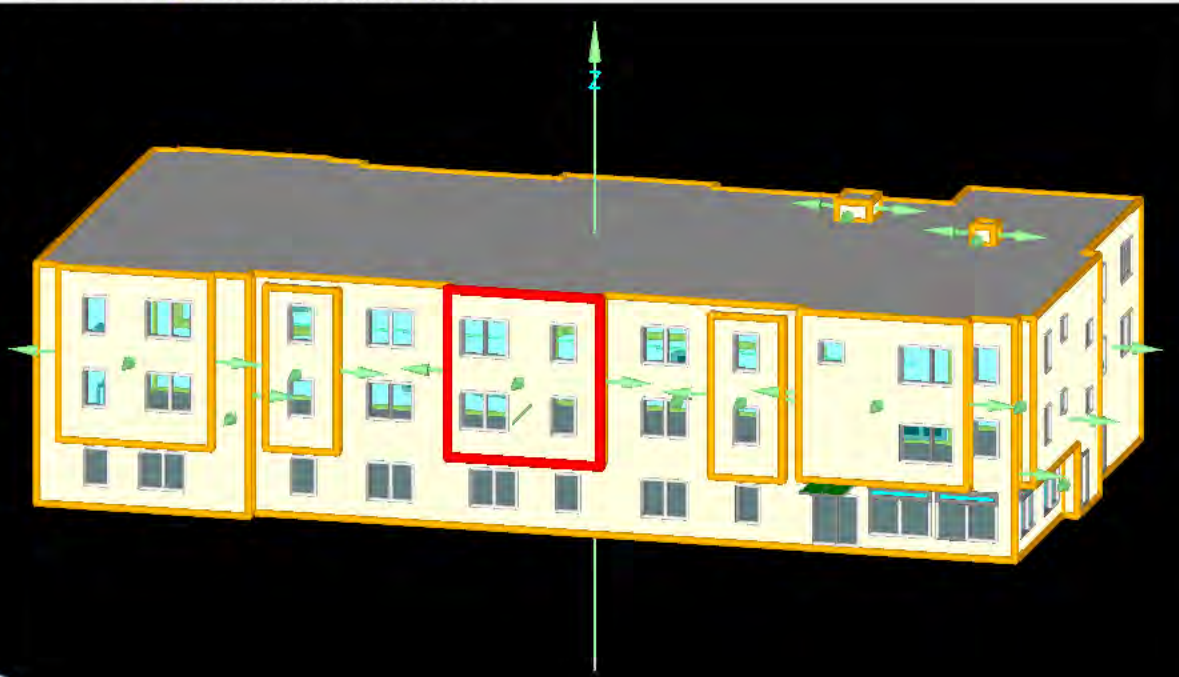
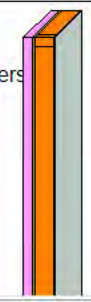
Assign

Inhomogenous layers

Thermal resistance: 36.997 / 40.336 hr ft² °F/Btu (EN ISO 6946 / homogenous layers)

Heat transfer coefficient (U-value): 0.026 Btu/hr ft² °F

Thickness: 9.391 in



- Component 1: Frame Wall
- Component 2: Soffit
- Component 3: Roof
- Component 4: Slab
- Component 5
- Component 6
- Component 7: East-3F-FWM-L
- Component 8: East-3F-FW
- Component 9: East-3F-OWM-R
- Component 10: East-3F-OWM-L
- Component 11: East-2F-OWM-L
- Component 12: East-3F-OW
- Component 13: East-2F-OW
- Component 14
- Component 15: East-1F-Storefront-L
- Component 16: East-1F-Storefront-R
- Component 17: East-1F-OW
- Component 18: East-1F-OWM-L
- Component 19: East-1F-OWM-R
- Component 20: East-1F-OWM-L
- Component 21: East-1F-OWM-R
- Component 22: East-2E-OWM-R

- General
- Assign
- Wall\_3
- Availab
- Floor\_4
- Wall\_2
- 3" EPS
- Floor\_4
- Roof\_1/
- 707 Cor
- Laundry



Passive House Institute US

October 9, 2018

Mr. Salamon,

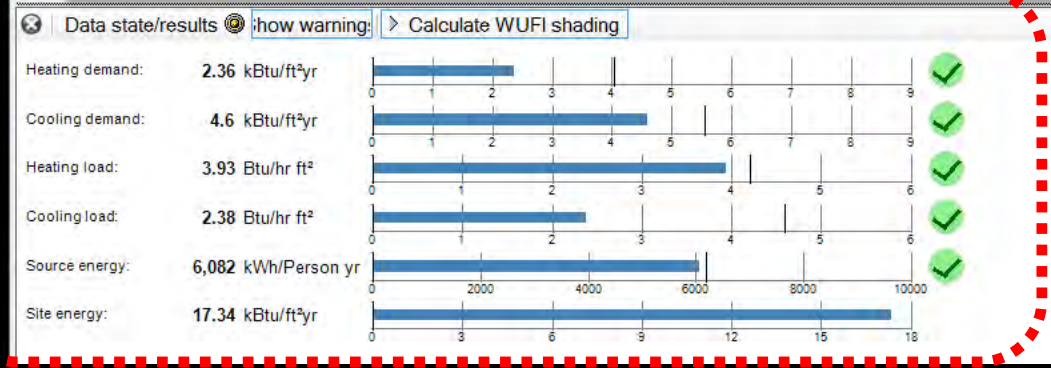
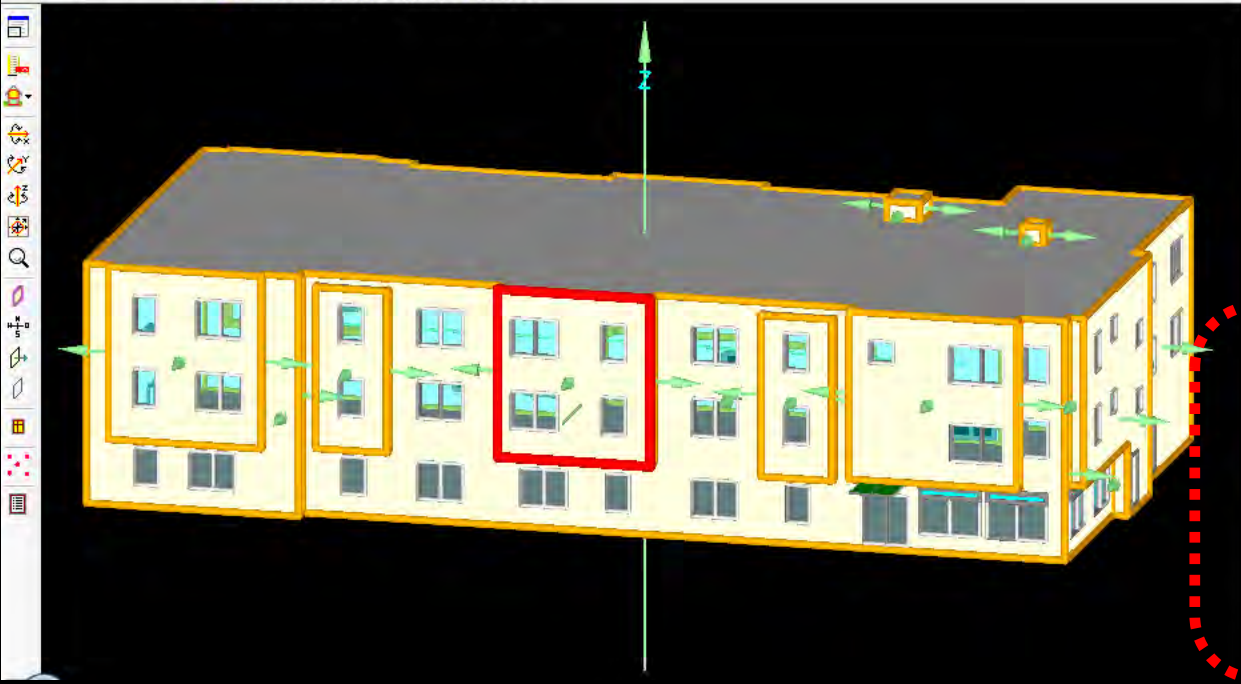
I'm pleased to inform you that project #1560: Liberty 52 is now a pre-certified *PHIUS+* 2015 project. Congratulations to you and your team.

In the next few days, please review the Project Details listed in the database and update them as necessary, as the project is now publicly visible. (We have set the iCFA, AHD, PE, and Heat Load to match the energy model.) Also, if you have any new photos for marketing or publicity purposes, please upload these to the Photos tab.

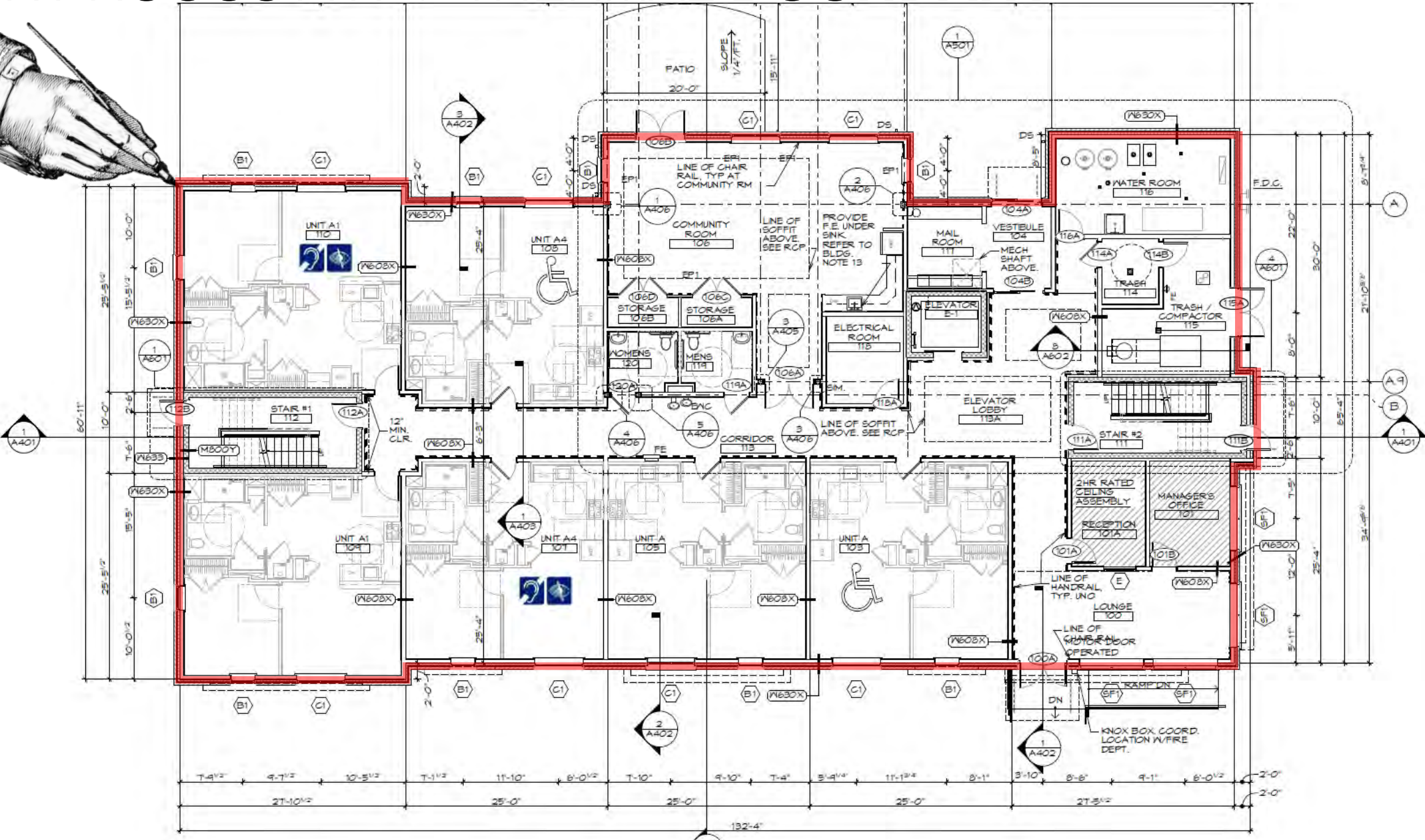
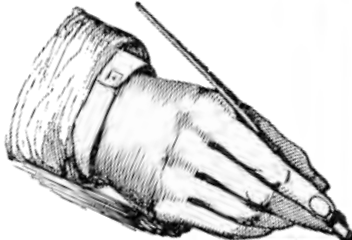
Thank you for choosing *PHIUS+* 2015, and best wishes to your team on achieving final certification. Please contact us when commissioning is complete and you are ready for final certification review, or earlier if you have any other issues to discuss.

Regards,

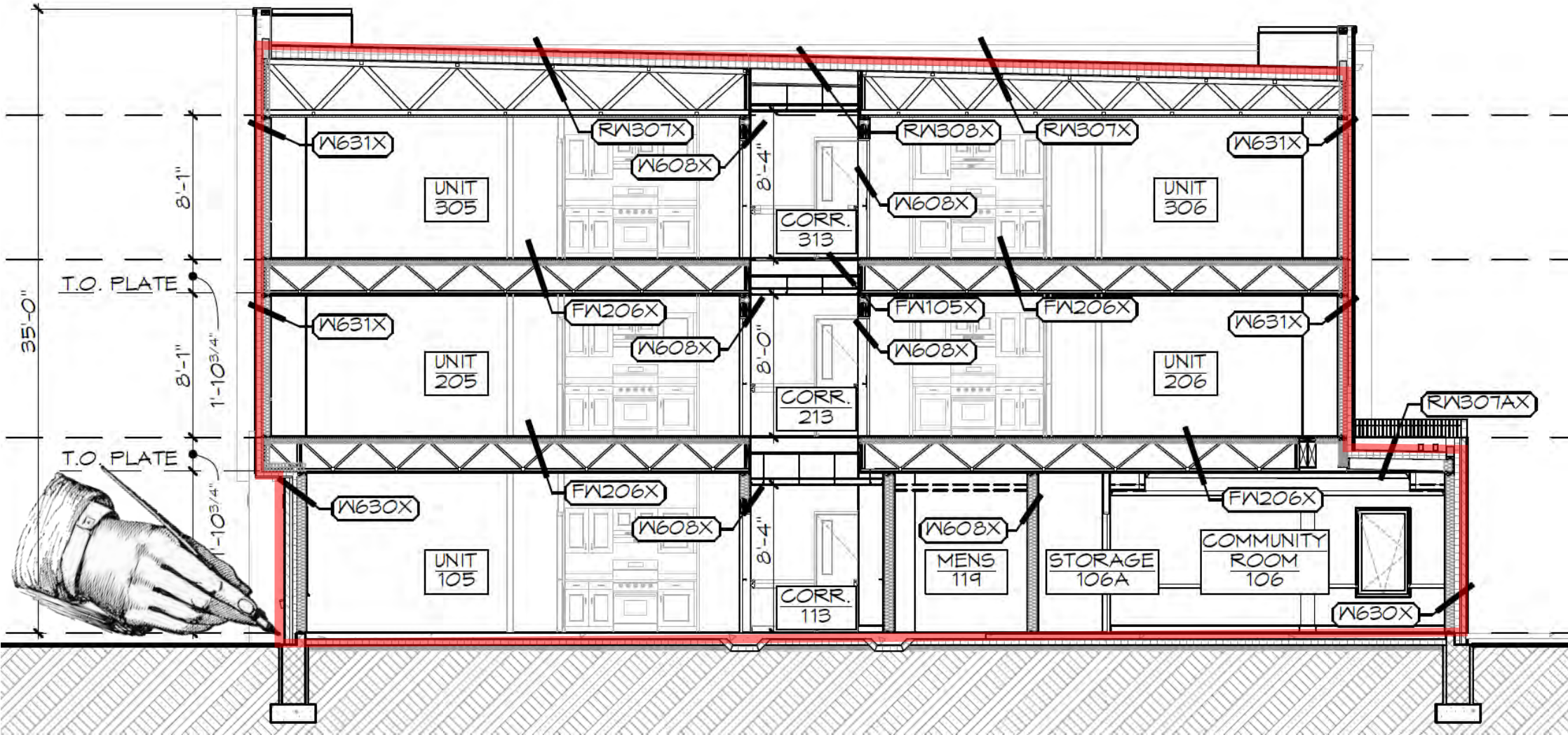
Lisa White  
Graham S. Wright  
James Ortega  
Andres Pinzon



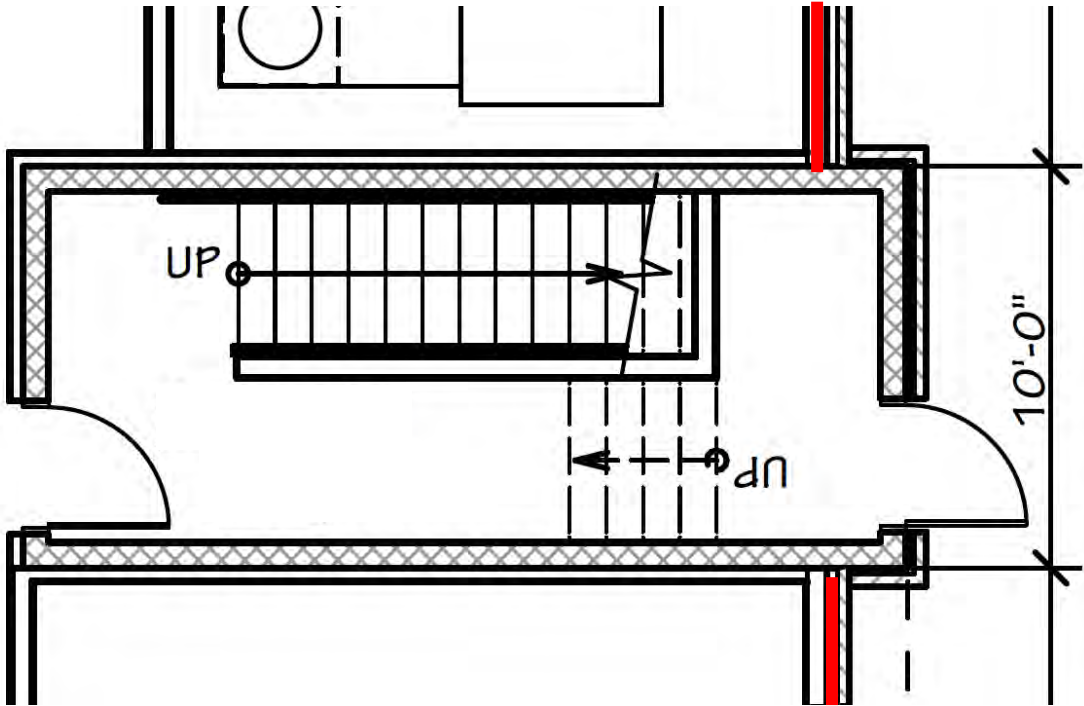
# CONTINUOUS AIR + THERMAL BOUNDARY



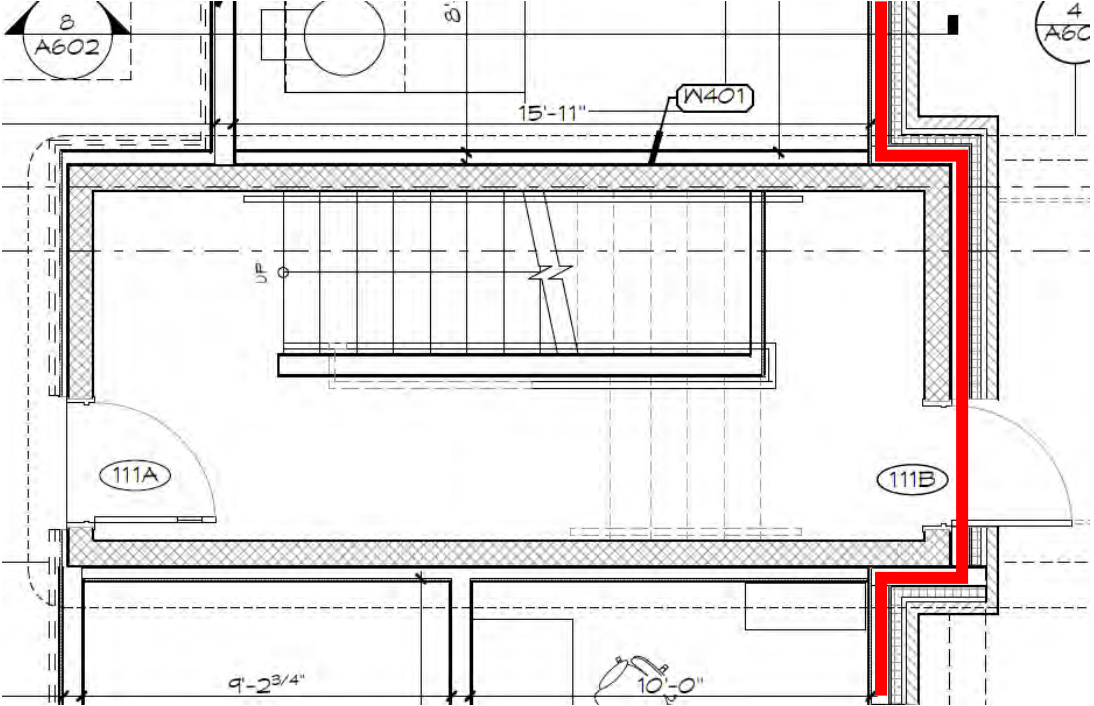
# CONTINUOUS AIR + THERMAL BOUNDARY



# CONTINUOUS AIR + THERMAL BOUNDARY



BEFORE



AFTER

# CONTINUOUS AIR + THERMAL BOUNDARY

DASHED LINE INDICATES PATH OF CONTINUOUS AIR BARRIER (VAPOR BARRIER UNDER SLAB TO FACE OF ZIP SHEATHING AT EXTERIOR WALL)

FLUID APPLIED FLASHING OVER METAL FLASHING

BRICK VENEER

R-21 KRAFT-FACED BATT INSULATION

1" R5 XPS RIGID INSULATION AS THERMAL BREAK BETWEEN SLAB/FOUNDATION

1" MIN. AIRSPACE

10 MIL POLYETHYLENE VAPOR BARRIER UNDER SLAB. ROUTE THROUGH AND LAP/TAPE TO ZIP SHEATHING

WEEP HOLES @ 24" O.C. MIN

FINISH GRADE SLOPED AWAY FROM BUILDING. SEE CIVIL DRAWINGS

THROUGH WALL METAL FLASHING

MORTAR BASE W/MORTAR NET

FOAMGLASS PERINSUL HIGH LOAD INSULATION BLOCK AS THERMAL BREAK BETWEEN BRICK/FOUNDATION

2" EPS RIGID INSULATION UNDER SLAB

2" EPS RIGID INSULATION ON BOTH SIDES OF FOUNDATION WALL

REINFORCED CMU FOUNDATION WALL. SEE STRUCTURAL DRAWINGS.

LIQUID APPLIED CAPILLARY BREAK

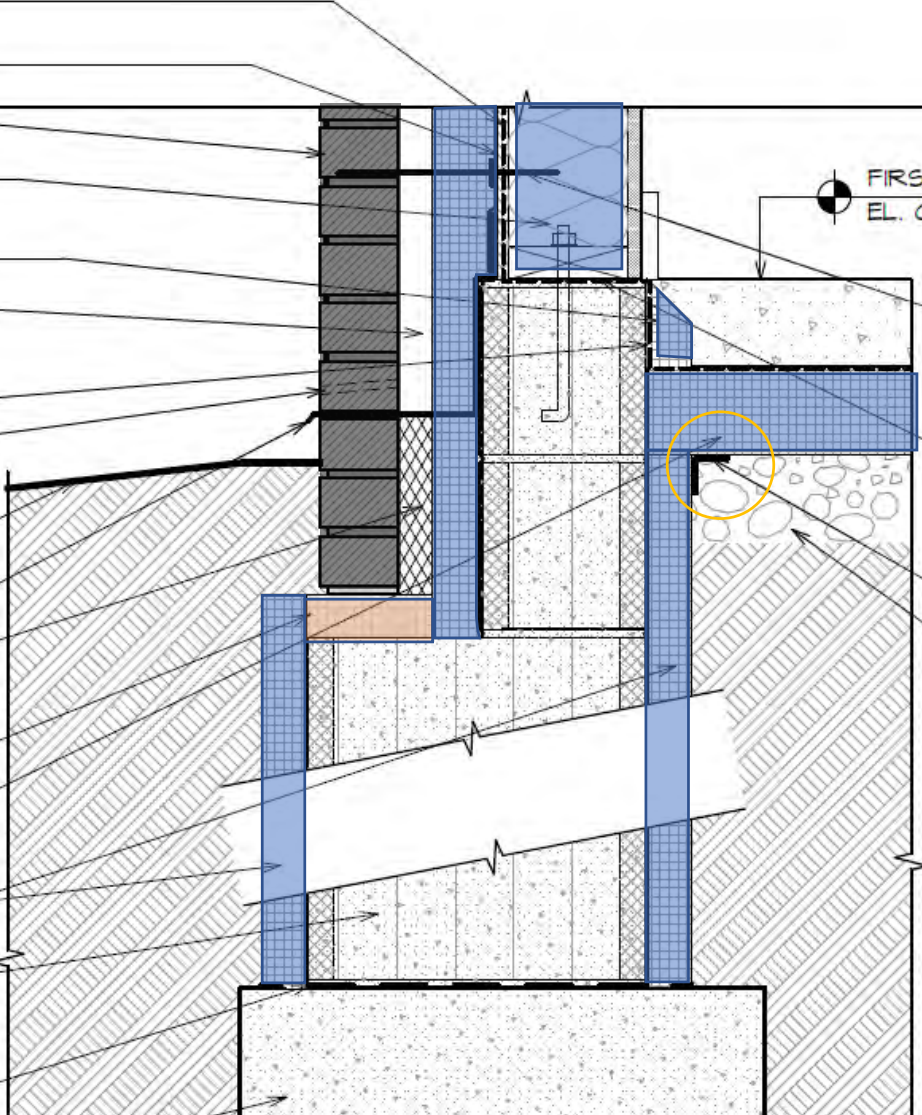
FIRST FLOOR SLAB  
EL. 0'-0"

THERMAL 2 SEAL WING NUT ANCHORS BY HOHMANN & BARNARD 5' LENGHT-SP, 24" OC MAX SPACING HORIZONTAL & VERTICAL

PT 2x6 BORATE TREATED SILL PLATE ON SILL SEALER. ANCHOR TO SLAB PER STRUCTURAL DRAWINGS.

TAPE INSULATION SEAMS.

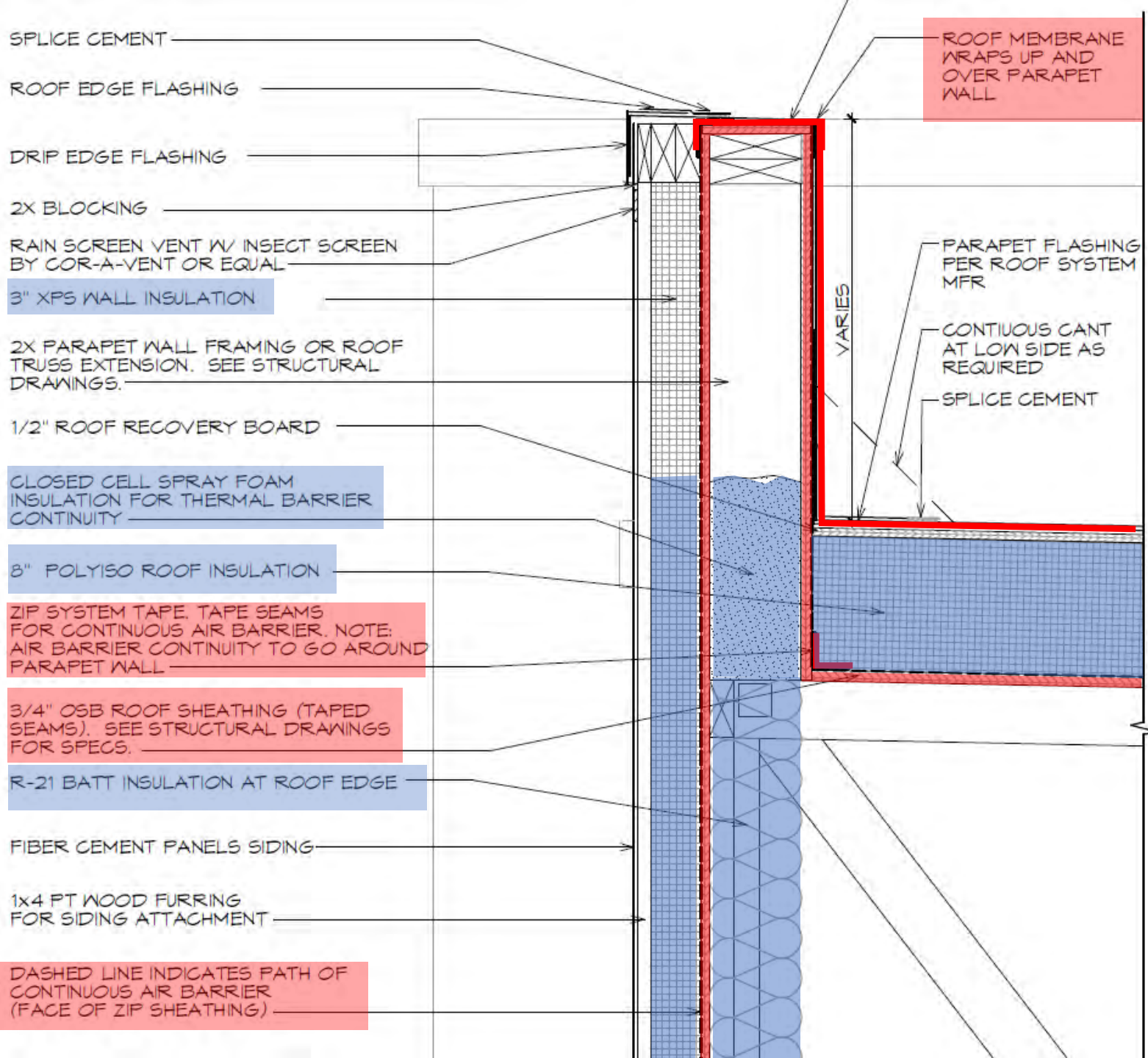
6" STONE BASE. REFER TO GEOTECHNICAL REPORT





# CONTINUOUS AIR + THERMAL BOUNDARY





- Sequencing
- Responsibility of Trades
- Anticipating details and coordinating with key trades
- Sum is greater than the parts

# CONTINUOUS AIR + THERMAL BOUNDARY



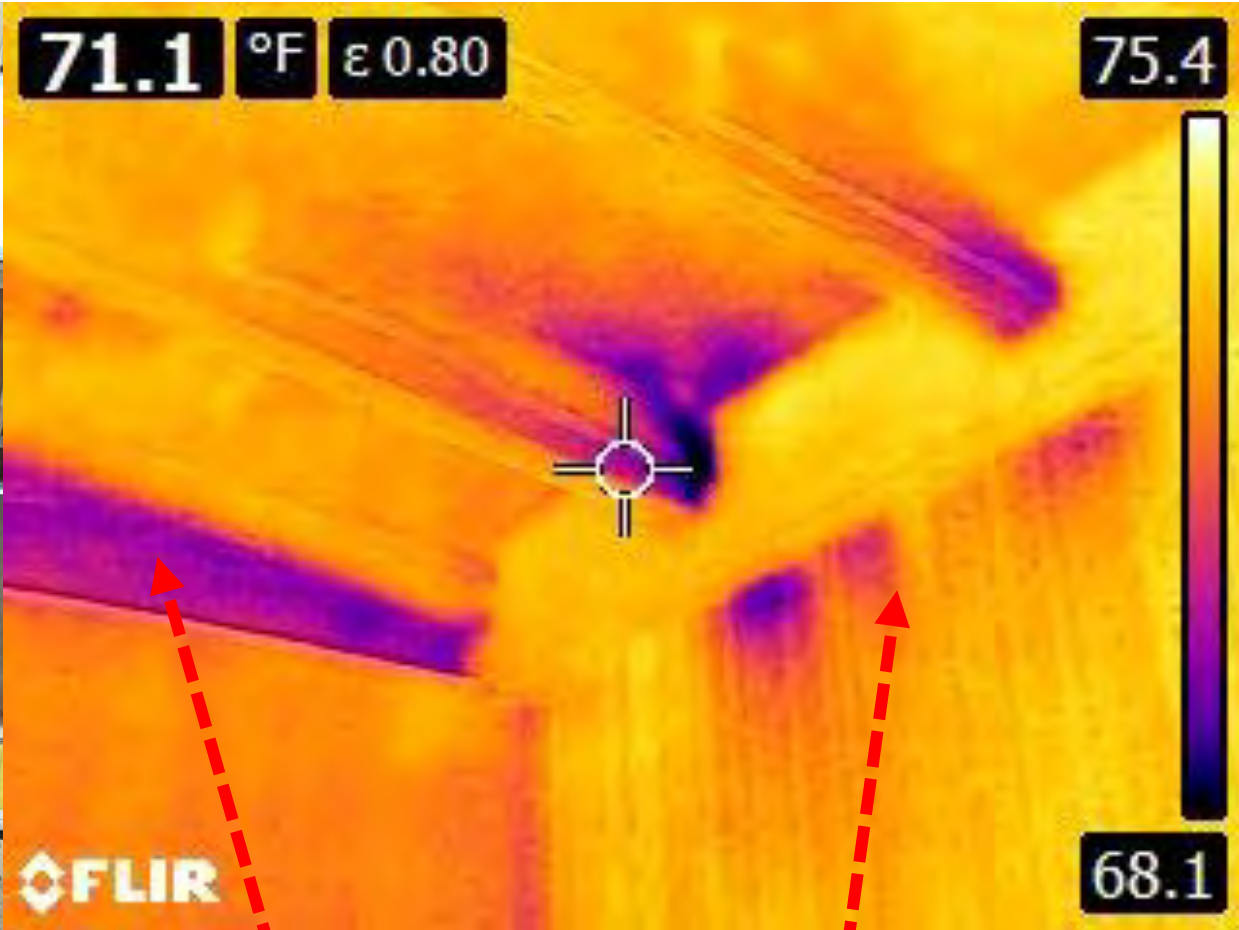
**TOO CLOSE**



**6" – 8" MIN**

↑ Image: Kimchi & Kraut

# CONTINUOUS AIR + THERMAL BOUNDARY

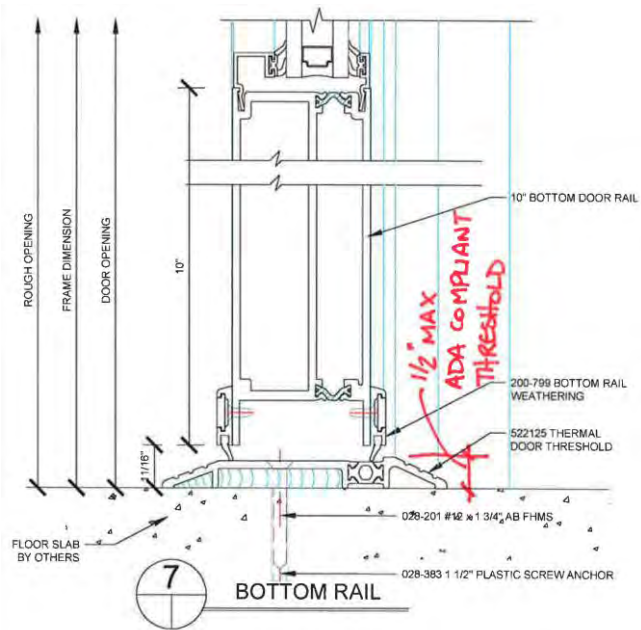


No Insulation

Air Leakage

# PASSIVE HOUSE DESIGN SUBSTITUTIONS

- Ask if other products might work
- Teamwork



# PASSIVE HOUSE **FIELD SUBSTITUTIONS**

- Read specs carefully



# Passive House

- Understand design intent
- It takes teamwork
  - constructability
  - sequencing
  - understand responsibility of trades
- Allow enough space for proper installation
- Verify substitutions meet benchmark before installing

