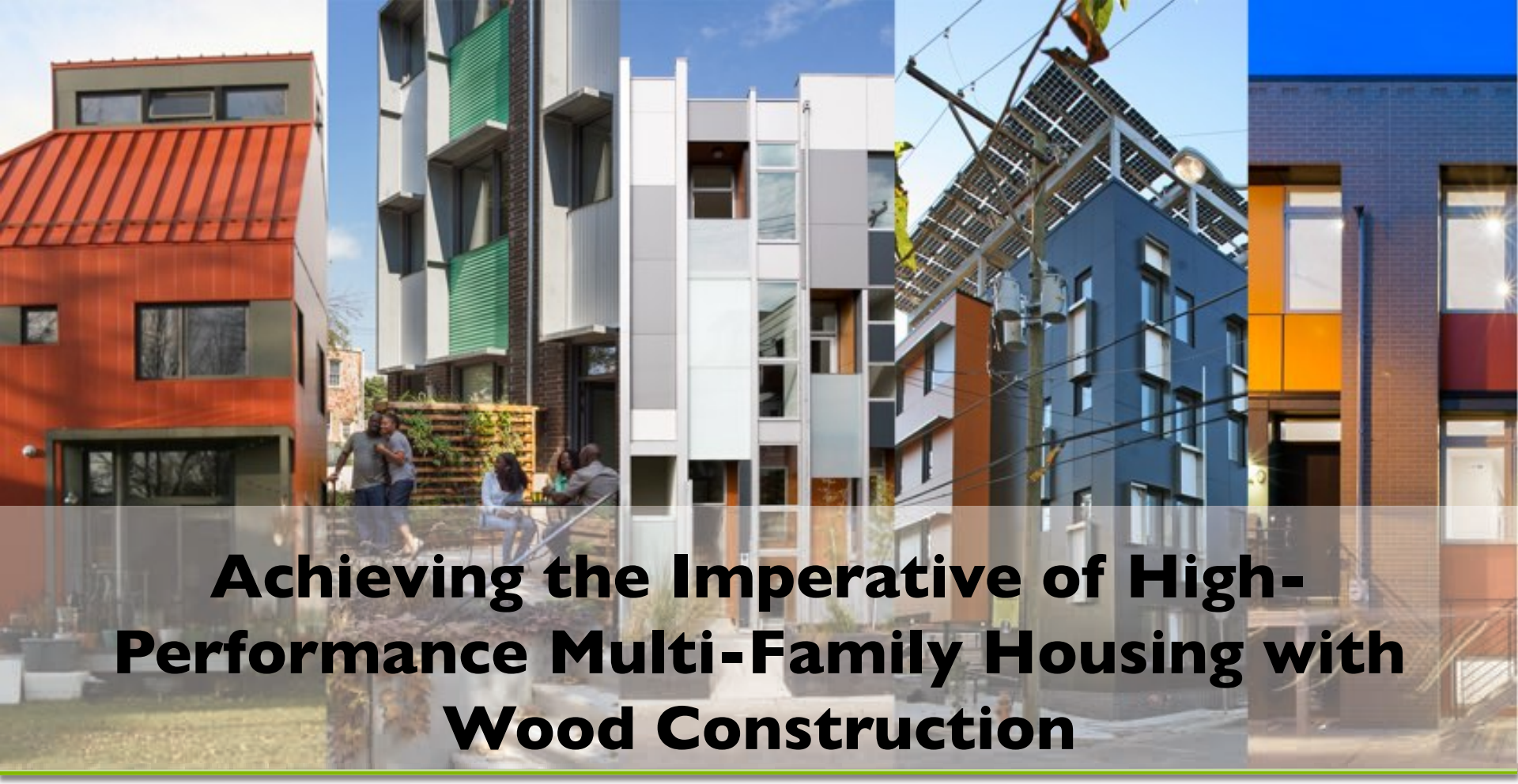

Achieving the Imperative of High-Performance Multi-Family Housing with Wood Construction

Presented by : Timothy McDonald, RA,
President, Onion Flats, Philadelphia

Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.

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This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Course Description

A growing belief among design and construction professionals is that simply building to the energy code's baseline minimums is no longer good enough. One approach that's becoming increasingly popular for multi-family projects is Passive House design. The Pennsylvania Housing Finance Agency (PHFA), which has funded 17 multi-family Passive House projects, is propelling the affordable housing industry toward a net-zero energy standard by 2030. This initiative has proved a catalyst for the significant expansion of passive house/net-zero-capable housing, inspiring 14 more states to similarly incentivize passive house through their low-income housing tax credit programs. This webinar will share cost data, strategies, and lessons learned through completed Passive House projects nationwide, demonstrating the radical, affordable, and scalable way the affordable housing industry is combatting climate change through improved energy performance.

Learning Objectives

Review the defining principals of Passive House design and how it differs from traditional energy-efficiency design.

Highlight areas of the building enclosure that are critical to design, detail and install correctly in order to achieve deep energy savings.

Demonstrate the ability of high-performance, wood-frame, multi-family projects to achieve affordability.

Explore the potential increased use of Passive House techniques in multi-family housing.

ONION FLATS
DEVELOPMENT

ONION FLATS
ARCHITECTURE

ONION FLATS
CONSTRUCTION

GREEN ROOFS
GRASS
SOLAR SYSTEMS

1997 - *2019*

Ed Mazria, Greenbuild Philly 2013

Ed Mazria, Greenbuild Philly 2013

Ed Mazria, Greenbuild Philly 2013

RADICAL

AFFORDABLE

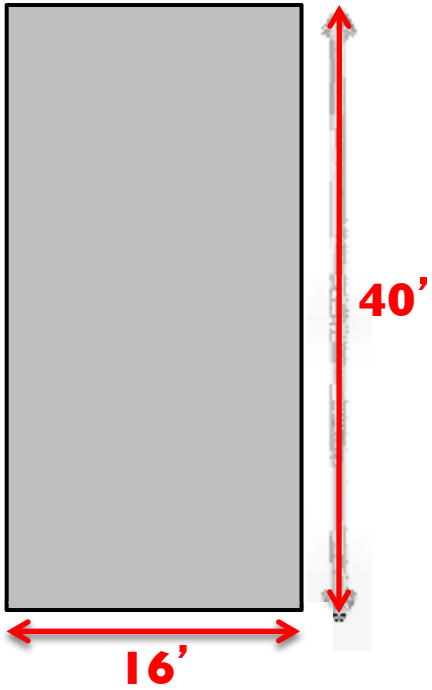
SCALABLE

CARBON NEUTRAL BUILDINGS by 2050

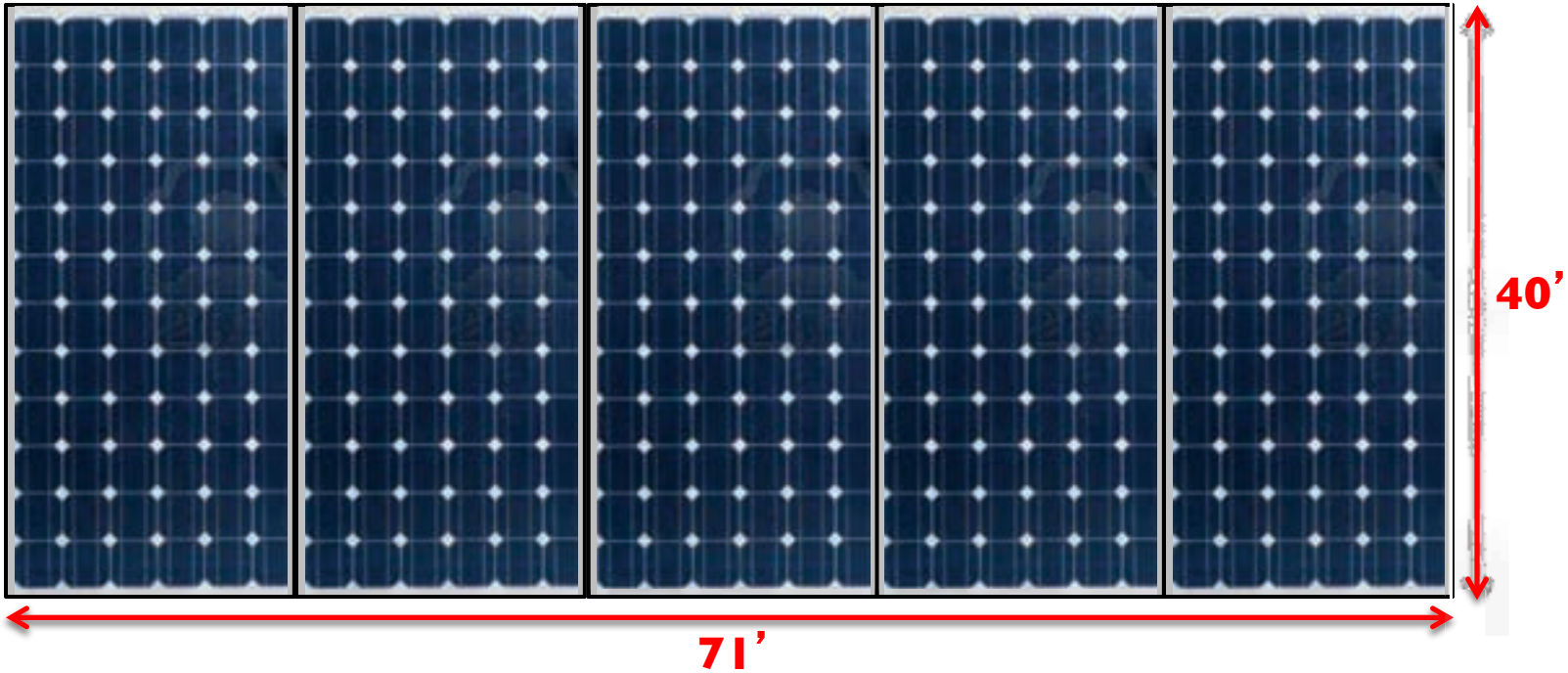
BUILDINGS MUST GENERATE WHAT THEY NEED

CARBON NEUTRAL BUILDINGS by 2050

ON THEIR OWN SITE



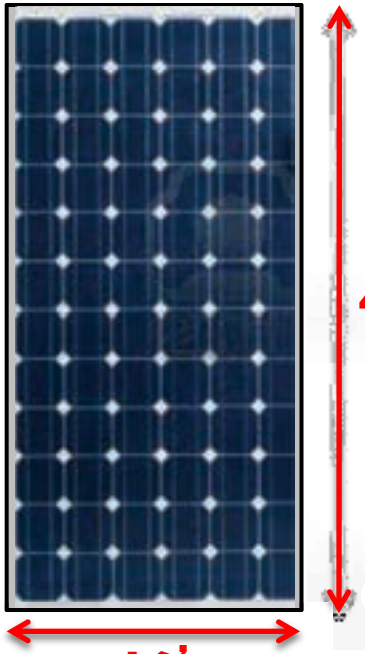
1900 sf home
39,000 kWh/yr



1900 sf home

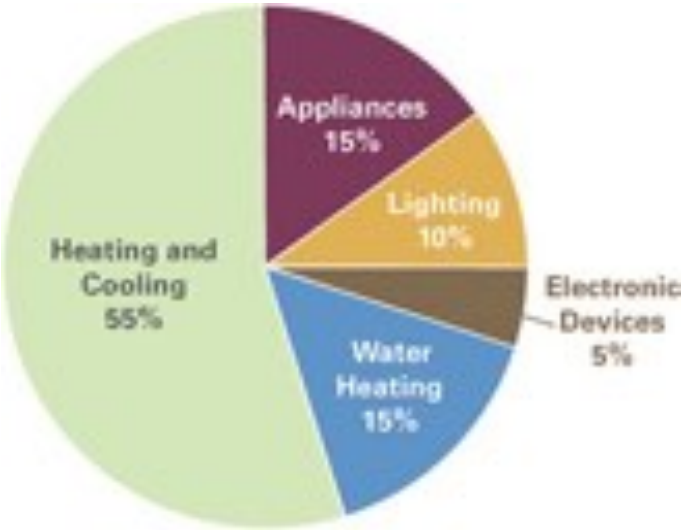
39,000 kWh/yr

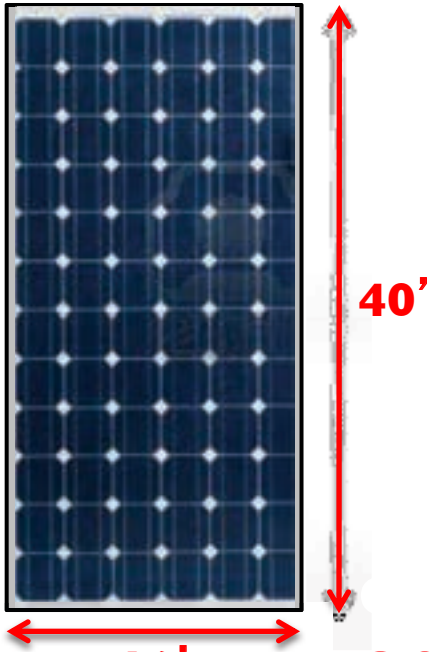
2832 sf roof



80% REDUCTION

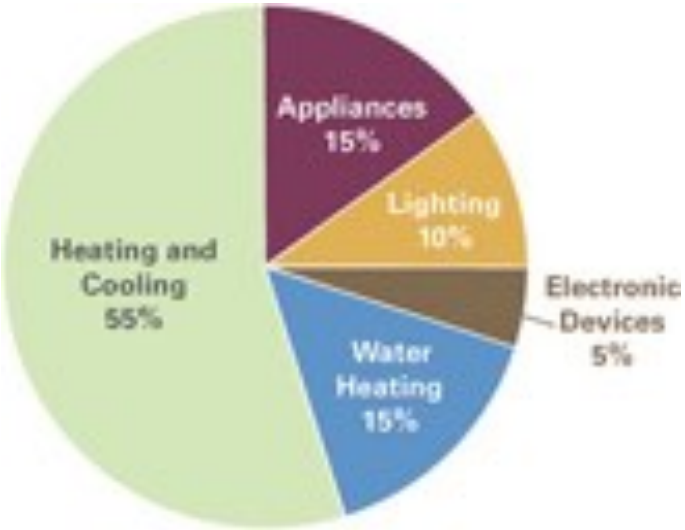
4.5 kWh/sf/yr

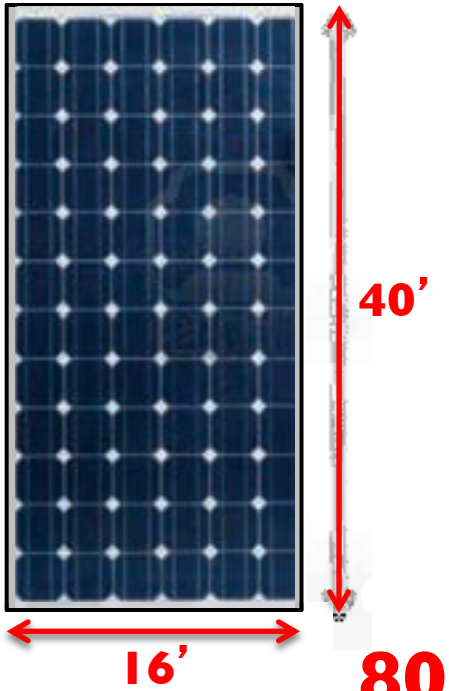




80% REDUCTION

4.5 kWh/sf/yr

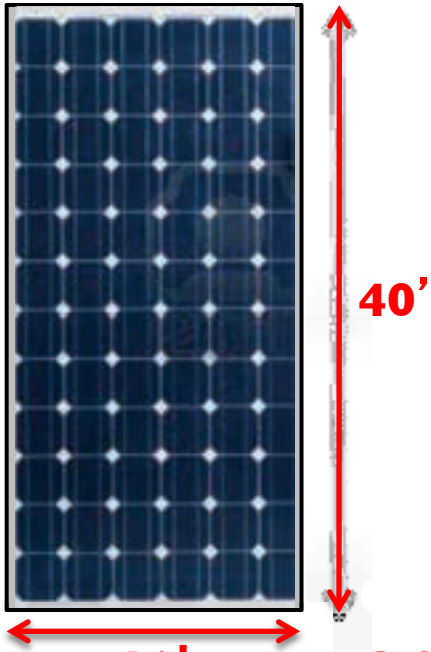




80% REDUCTION

4.5 kWh/sf/yr

Certified
Passive House
Passive House Institute



"Fabric First" approach

80% REDUCTION

4.5 kWh/sf/yr

Certified Passive House
Passive House Institute

Envelope and Thermal Comfort Principles

1. **Continuous Insulation-** creating steady indoor temperatures that won't drop below 50 degrees without heating source

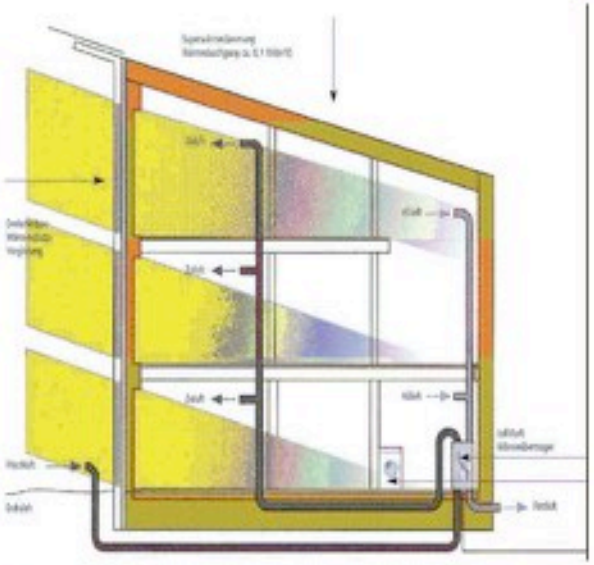
2. **Thermal Bridge Free Construction-** minimizes condensation/ building deterioration

3. **Compact Building Shape-** excellent surface-to-volume ratio (< 1)

4. **Airtightness-** minimizes moisture diffusion into wall assembly

5. **Balanced Ventilation with Heat Recovery with minimal Space Conditioning System -** exceptional efficiency, indoor air-quality and comfort

6. **Optimal Solar Orientation and Shading** – maximizing solar gains for winter, minimizing gains for the summer case



7. **Energy Efficient Appliances and Lighting-** highly efficient use of household electricity

8. **User Friendliness -** user manuals are recommended to be given homeowners

PHIUS
Passive House Institute US

BLDG MPG

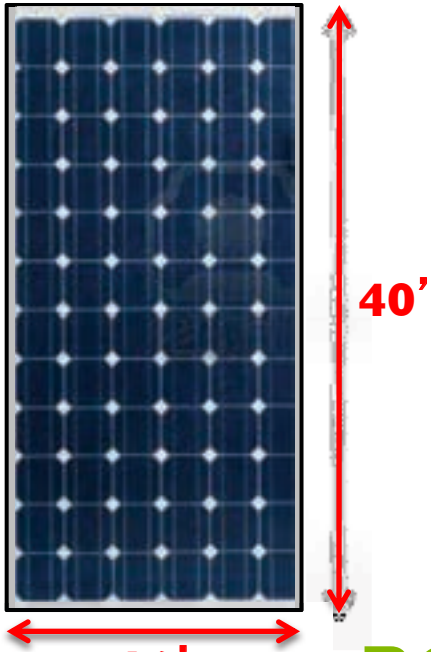
PERFORMANCE

Certified
Passive House
Passive House Institute

Requirements

1. Specific Space Heating/Cooling Demand	4.75 kBTU/sf/yr
2. Air-Tightness	.6 ACH50
3. Specific Primary Energy Demand	38 kBTU/sf/yr
	4.5 kWh/sf/yr

Certified
Passive House
Passive House Institute



Consumption

PH METRIC

4.5 kWh/sf/yr

(Site Energy)

Production

ROOF METRIC

4.5 kWh/sf/yr

(Site Energy)

CARBON NEUTRAL BUILDINGS by 2050

LEGISLATE IT

CARBON NEUTRAL BUILDINGS by 2050

DEMONSTRATE IT

FORCE THEM

LEGISLATE IT

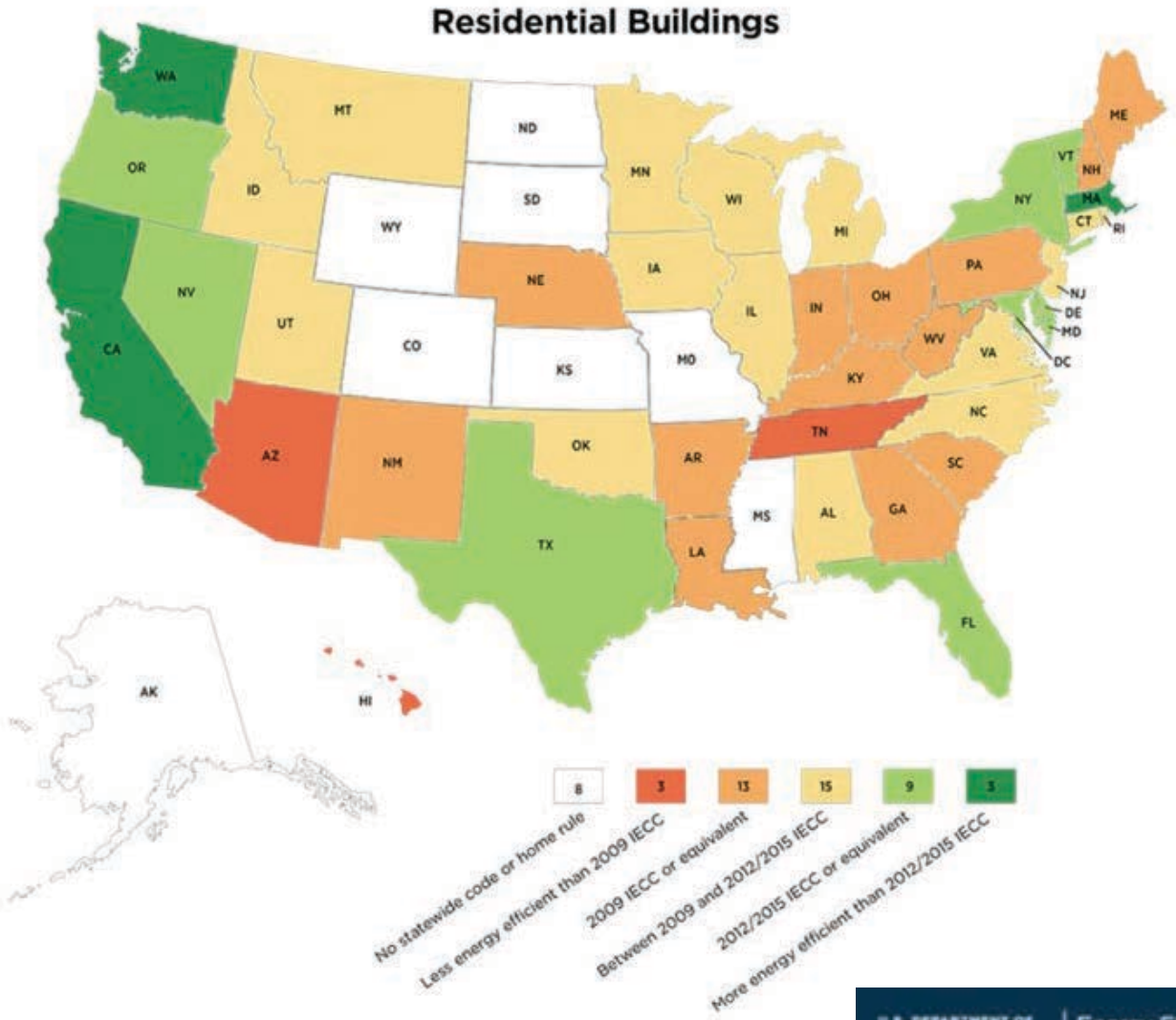
CARBON NEUTRAL BUILDINGS by 2050

DEMONSTRATE IT

INSPIRE THEM

LEGISLATE IT

ENERGY CODE

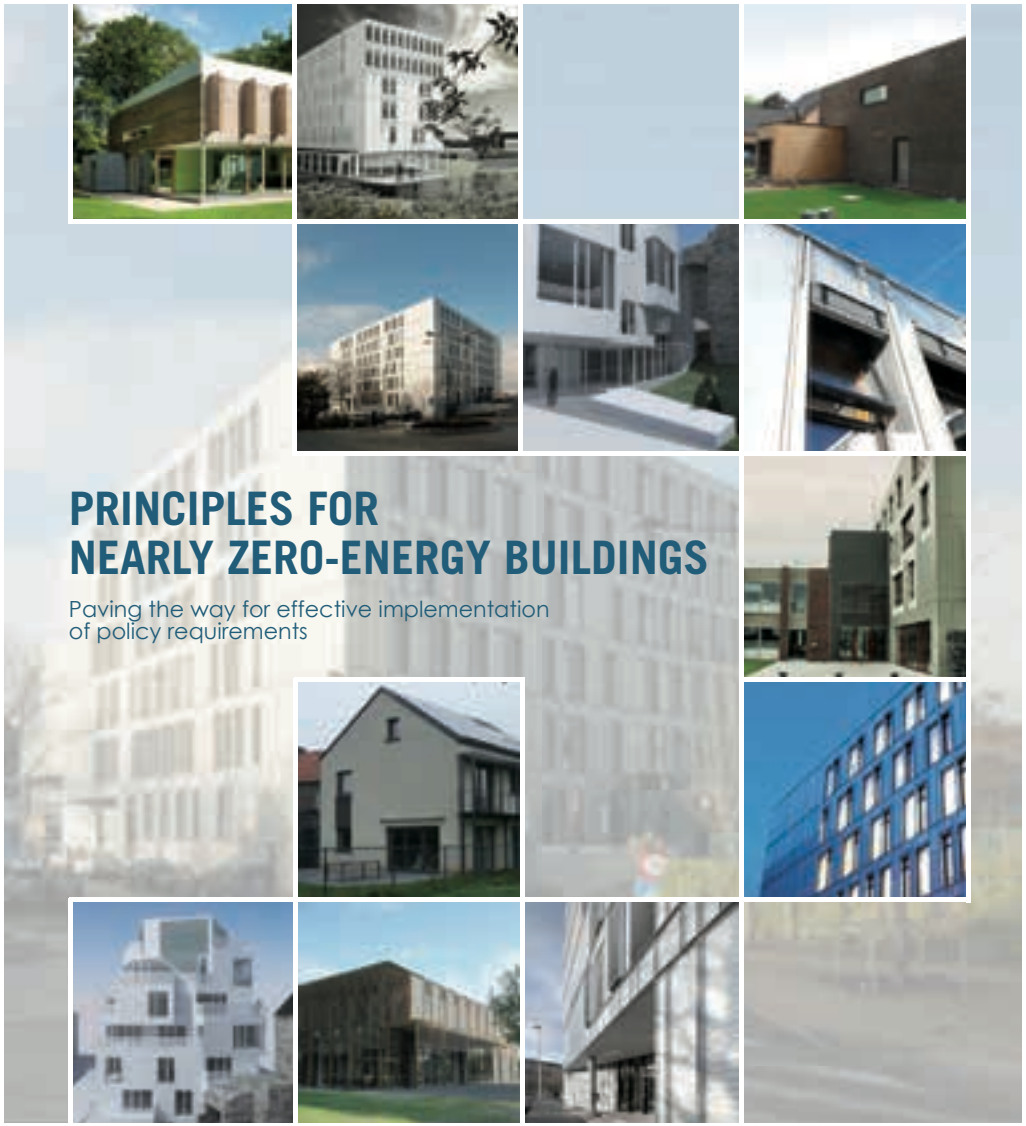


Updated as of December 15, 2017

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

BRUSSELS 2015

"….calls for all buildings to be Nearly-Zero Energy Buildings by the end of 2020…. Brussels' new regulation is based on the Passive House Standard, making it mandatory for all new builds as well as all retrofits as of January 2015." IPHA



BPIE

Climate Mayors Follow

U.S. #ClimateMayors working together to advance local climate action, national emission reduction policies, & the Paris Climate Agreement www.climatemayors.org

Jun 1, 2017 · 14 min read

402 US Climate Mayors commit to adopt, honor and uphold Paris Climate Agreement goals

STATEMENT FROM THE CLIMATE MAYORS IN RESPONSE TO PRESIDENT TRUMP'S WITHDRAWAL FROM THE PARIS CLIMATE AGREEMENT

Building Code Revision Launches California Toward Zero Net Energy Buildings

Bill Roth | Monday November 11th, 2013 | 2 Comments

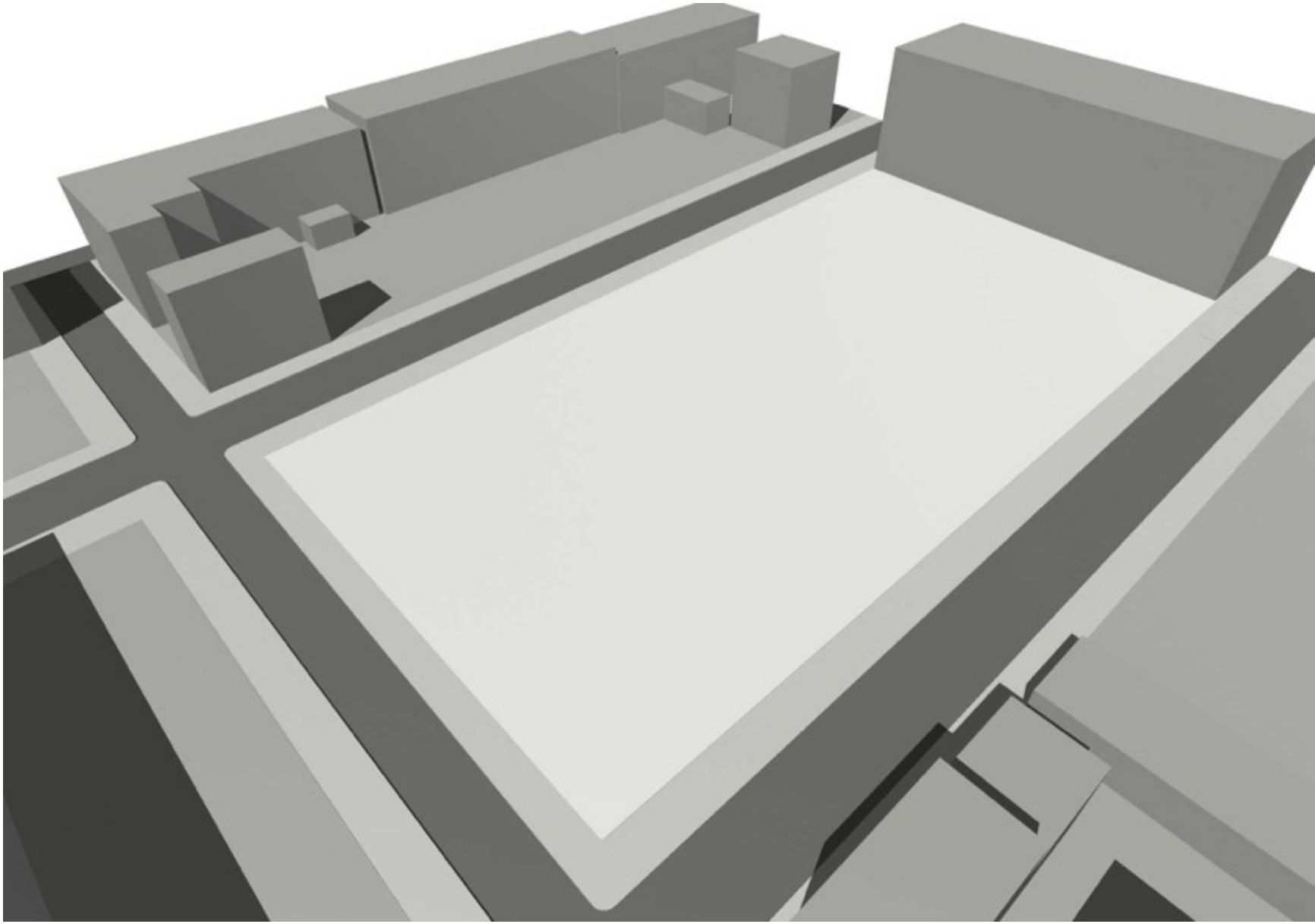
Like 63 g+1 7 Tweet 81 Share 119

Starting in 2014, California is implementing a tsunami of building code revisions called Title 24. These revised building codes will move California's residential and commercial buildings toward Zero Net Energy (ZNE). In a ZNE building, the annual energy consumption is equal to its annual production of renewable energy. Under Title 24, all new residential construction is to be ZNE by 2020 with all new commercial buildings achieving this ZNE goal by 2030.

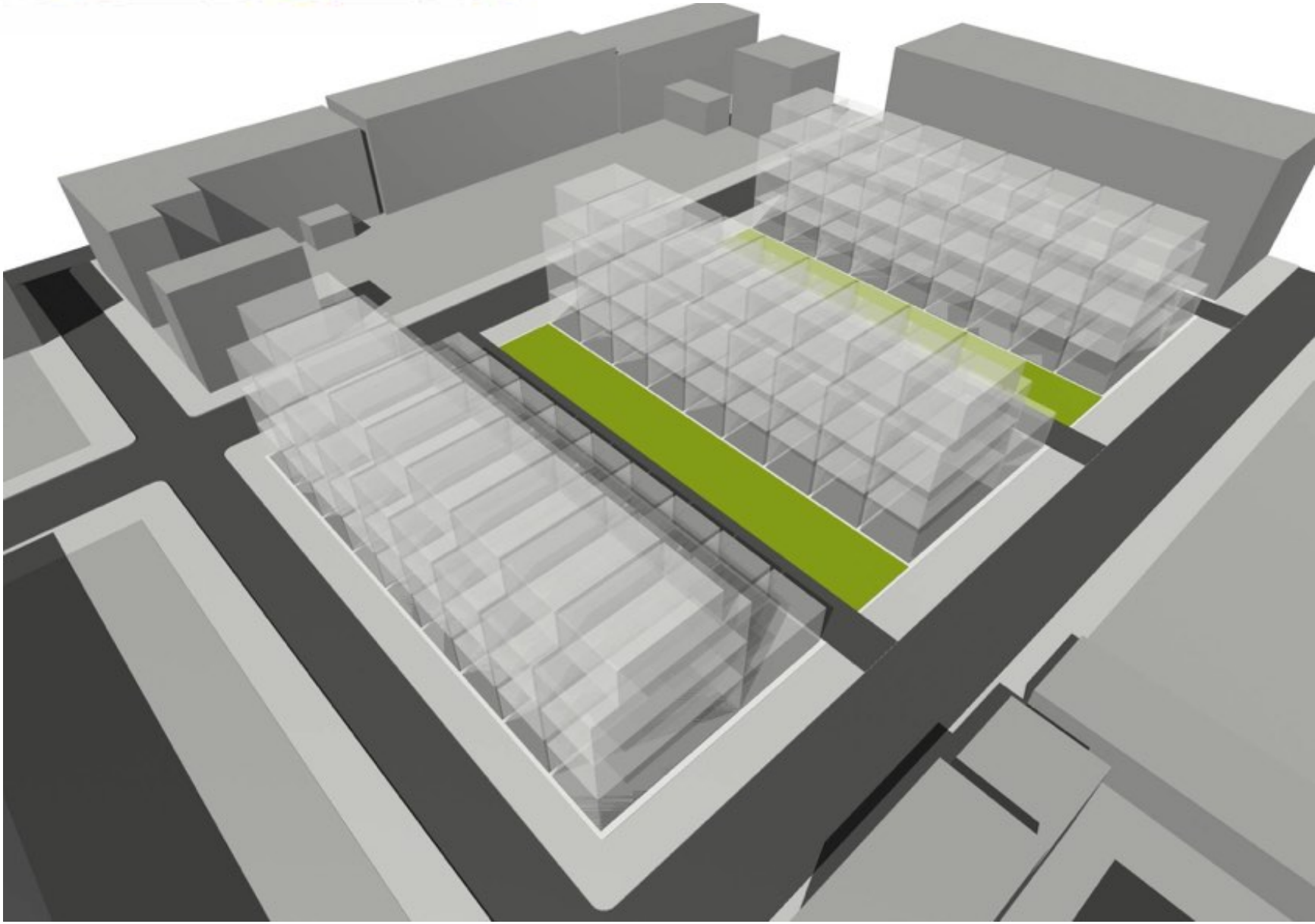
Title 24 moves building design toward "comprehensive building solutions." This building design approach first focuses upon reducing energy consumption through the integration of smart and energy efficient technologies. The final design step after reducing the building's energy consumption is to install onsite renewable energy generation like solar panels.

DEMONSTRATE it!

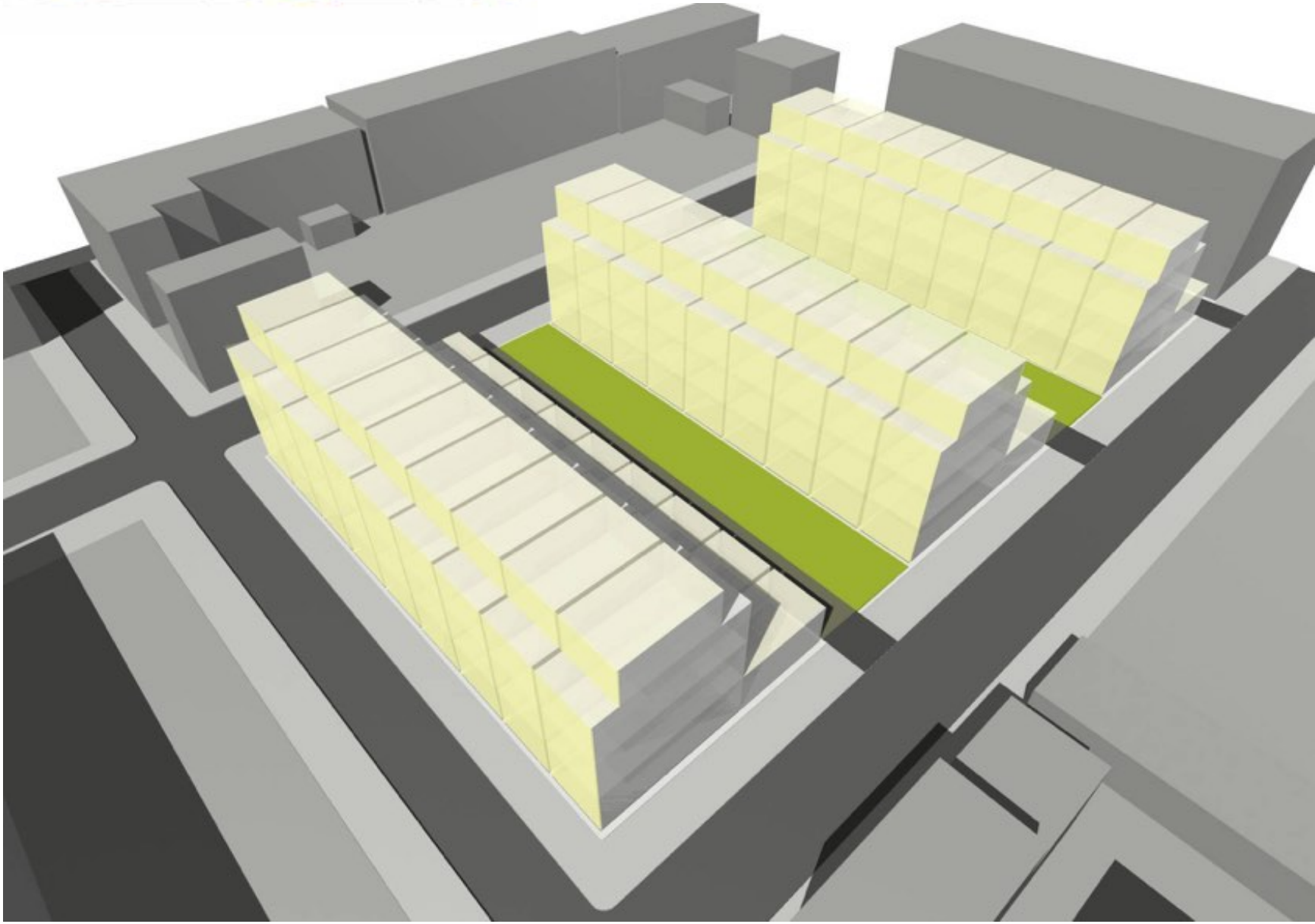
STABLE FLATS 2015: 26 townhomes

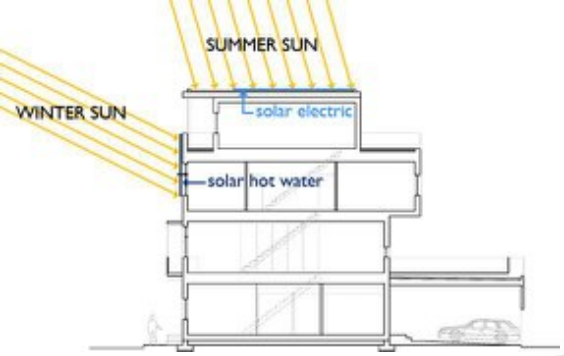


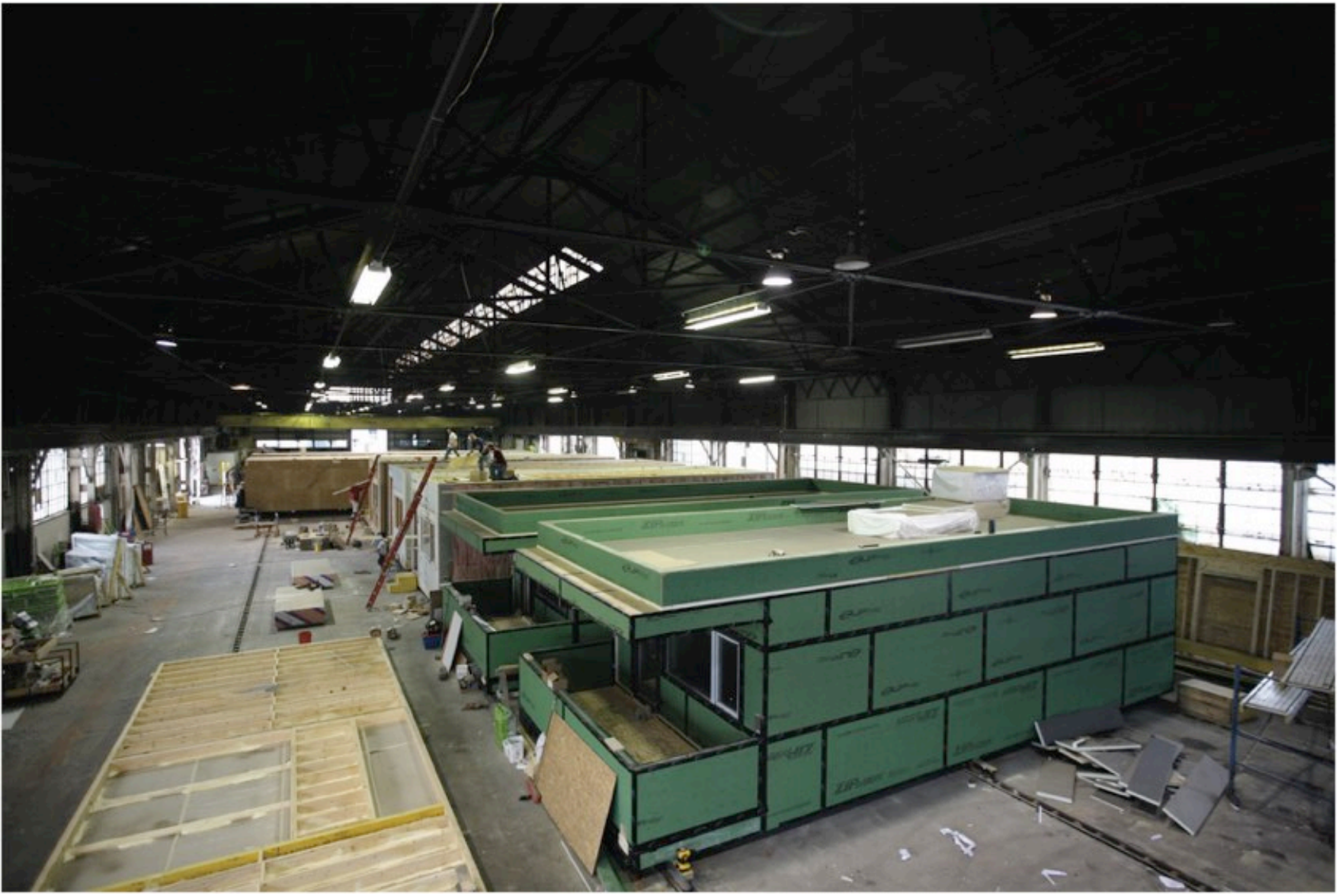
VERNAL EQUINOX 50'



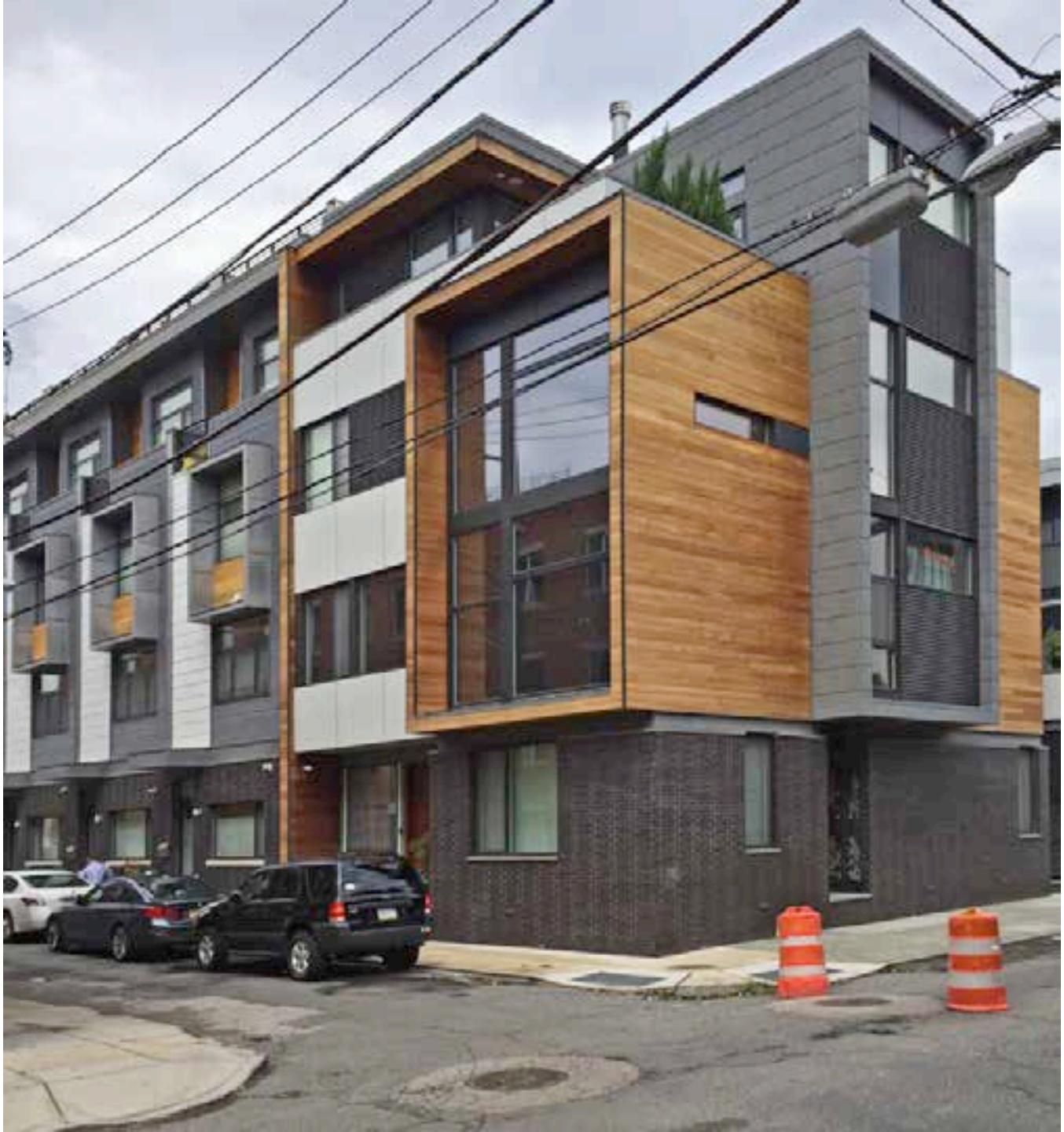
VERNAL EQUINOX 50'




SUMMER SUN
WINTER SUN
solar electric
solar hot water



BODINE STREET
GEORGE ST



MaGrann

ASSOCIATES

ENERGY/BUILDING CONSULTANTS & ENGINEERS

One Crescent Drive • Philadelphia, PA 19112 • 1-888-MAGRANN • www.magrann.com

New Jersey • Pennsylvania • Kentucky • Ohio

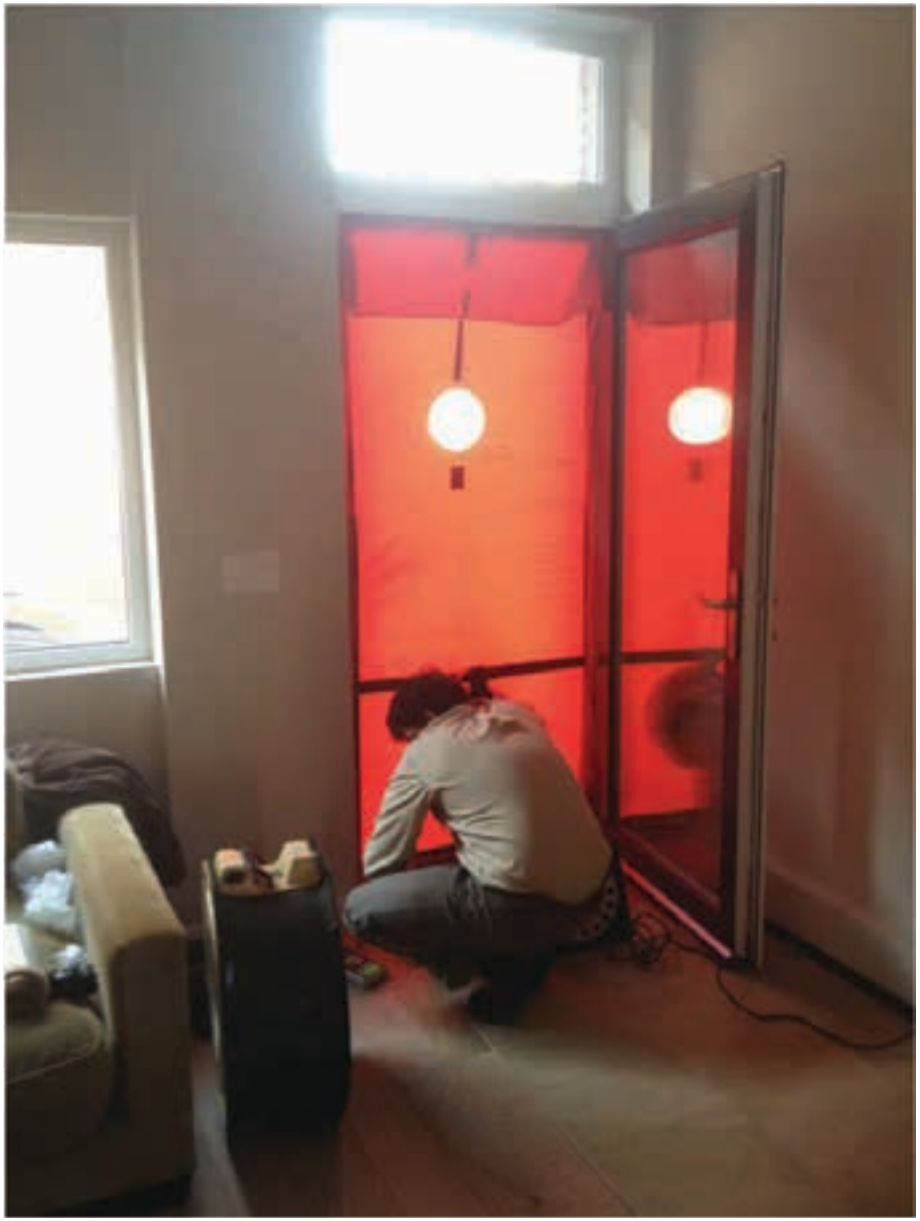
BUILDING LEAKAGE TEST COMPARISON

Test #1		Test #2	
Test File:	Depressurization File	Test File:	Pressurization File
Date of Test:	7/5/2012	Date of Test:	7/5/2012
Customer:	Onion Flats, LLC 111 West Norris Street Philadelphia, Pennsylvania 19122	Customer:	Onion Flats
Phone:	215-783-5091		

Test Results

	Test #1	Test #2	Change	Percent
1. Airflow at 50 Pascals:	293 CFM	201 CFM	-92 CFM	-31.4 %
	0.48 ACH	0.33 ACH	-0.15 ACH	-31.4 %

FINAL AIRFLOW **.49 ACH 50**



** 12 Months of Measured Data*

Address	TFA sf	12 Months kWh Total	PV kWh	NET	COST $/Yr
235 George	1908	13,088	4172	8916	$1079 $90/m
Typical Code Building		40,068	68% BETTER		$4407 $367/m

CAPITAL FLATS : 3 PHASES, 42 UNITS, 18 YEARS

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CAPITAL FLATS : 3 PHASES, 42 UNITS, 18 YEARS

CAPITAL FLATS (The Factory) : Phase 1 2001

CAPITAL FLATS (The Factory) : Phase 1 2001

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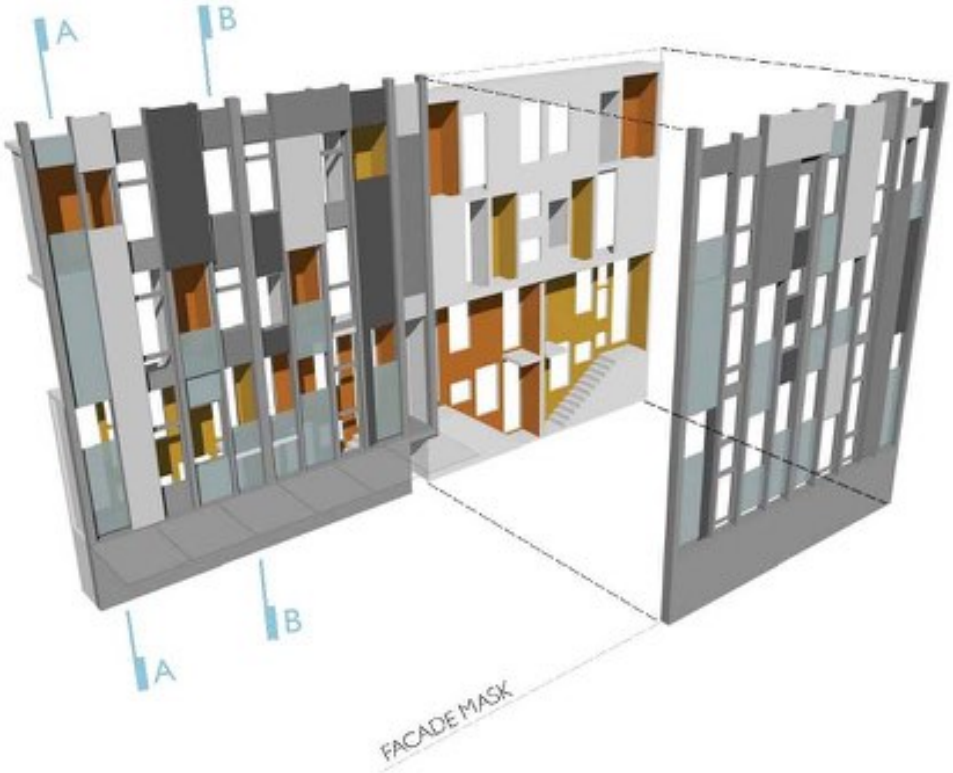
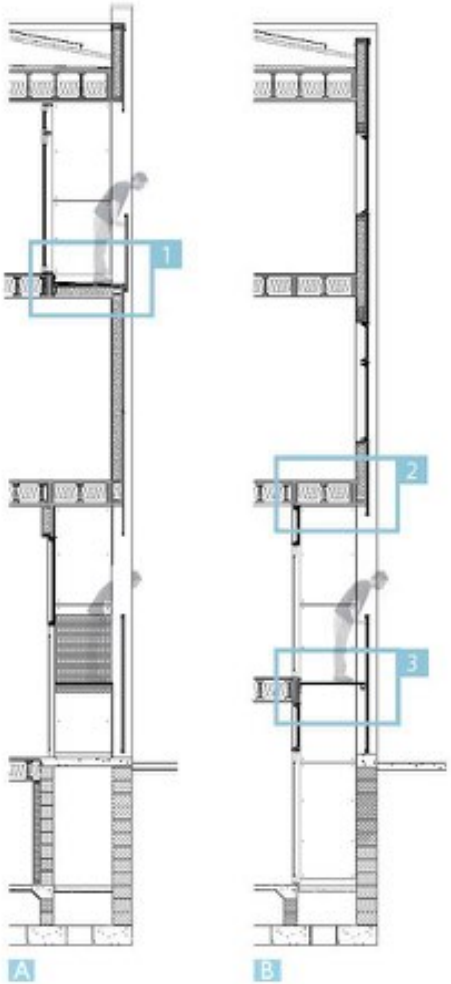
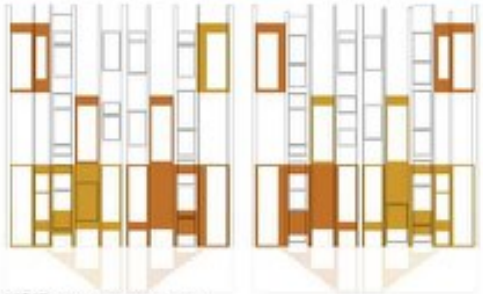
THIN FLATS

CAPITAL FLATS (Thin Flats) : Phase 2 2008

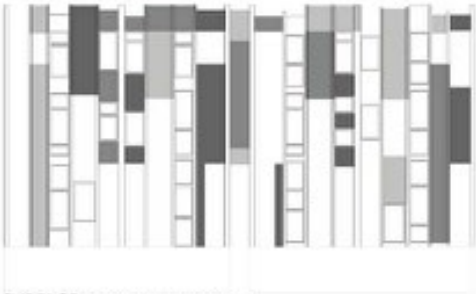
CAPITAL FLATS (Thin Flats) : Phase 2 2008



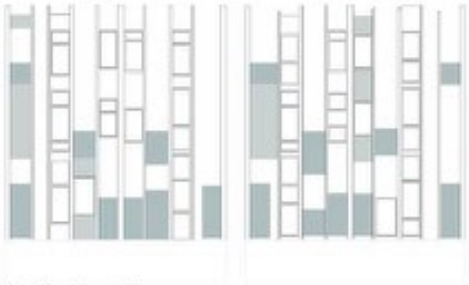




VOID: polychrome trespa panel



SURFACE: monochrome trespa panel



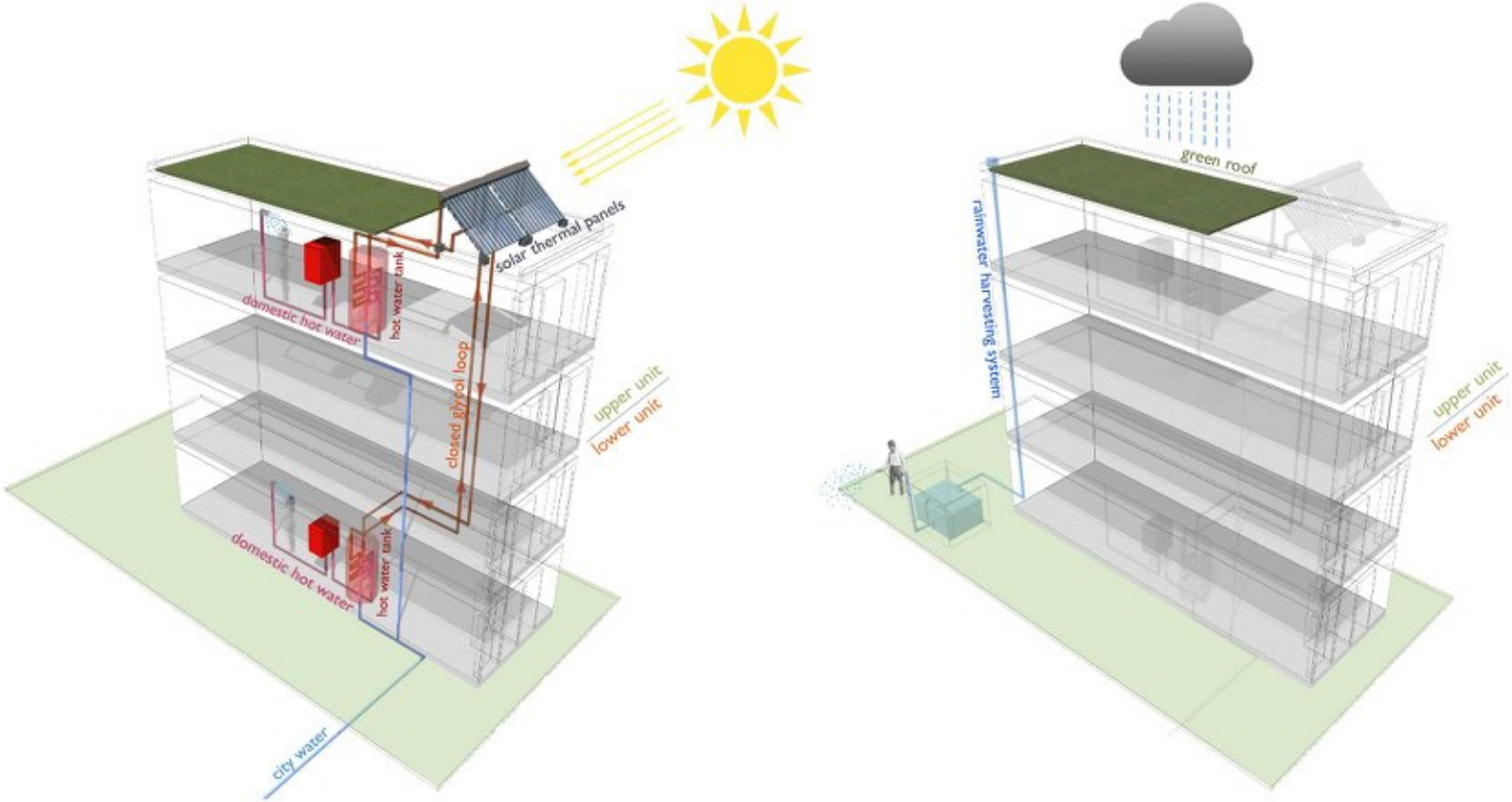
VEIL: translucent glass

CAPITAL FLATS (Thin Flats) : Phase 2 2008

Opening Day, September 14, 2008

CAPITAL FLATS (Thin Flats) : Phase 2 2008

CAPITAL FLATS (Thin Flats) : Phase 2 2008



CAPITAL FLATS (Thin Flats) : Phase 2 2008

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CAPITAL FLATS : 3 PHASES, 42 UNITS, 18 YEARS

2 PRESSING ISSUES THE BATTERY SET OUT TO ADDRESS

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1. LOCAL - GENTRIFICATION: “Attainable Housing”

2 PRESSING ISSUES THE BATTERY SET OUT TO ADDRESS

1. *LOCAL - GENTRIFICATION: "Attainable Housing"*
   - *AVERAGE RENT in NL for 1 bed: $1500/month + utilities*

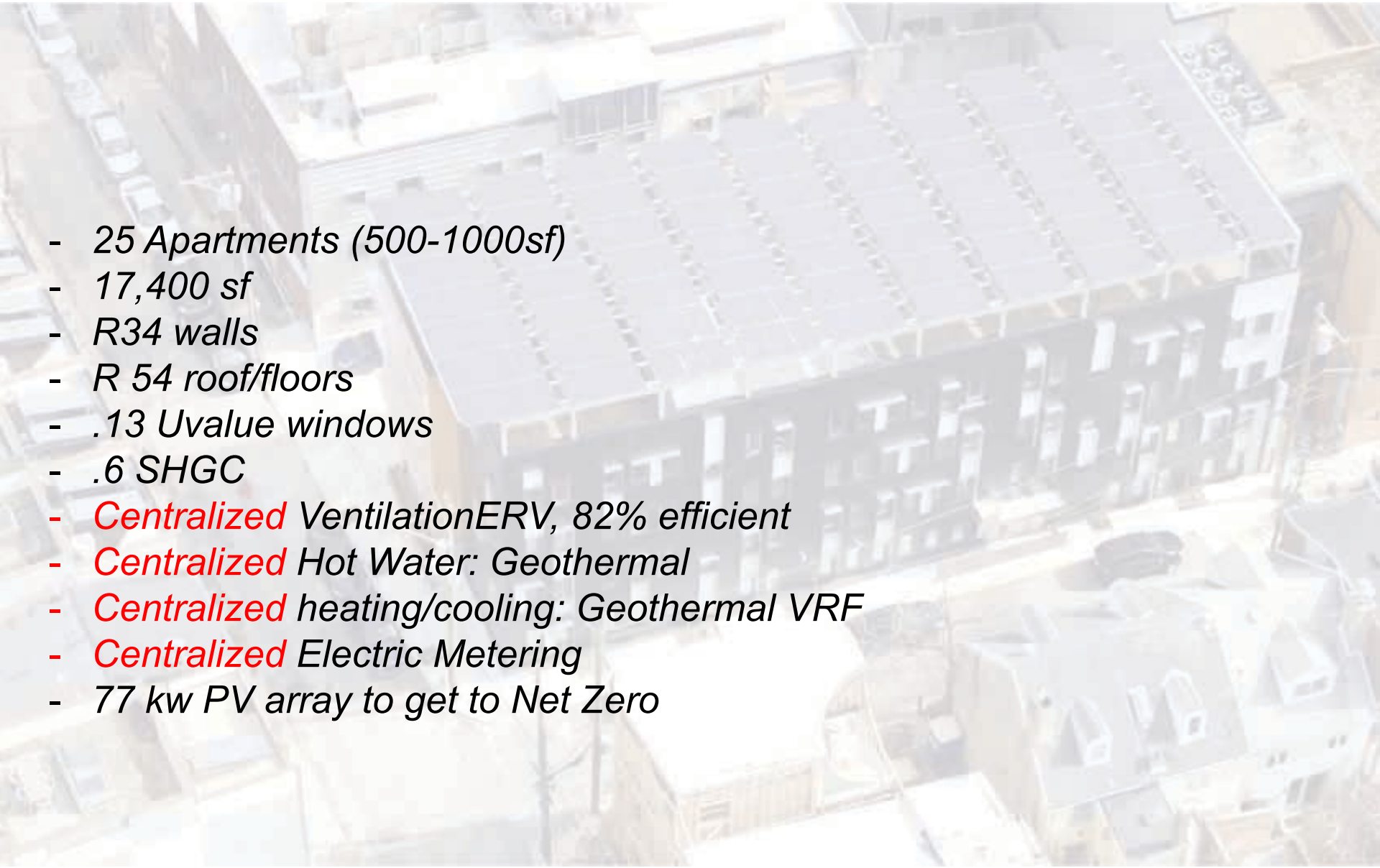
2 PRESSING ISSUES THE BATTERY SET OUT TO ADDRESS

1. *LOCAL - GENTRIFICATION: "Attainable Housing"*
   - *AVERAGE RENT in NL for 1 bed: $1500/month + utilities*
   - *THE BATTERY rent for 1 bed : $1375/month INCLUDES utilities*

2 PRESSING ISSUES THE BATTERY SET OUT TO ADDRESS

1. *LOCAL - GENTRIFICATION: "Attainable Housing"*
   - *AVERAGE RENT in NL for 1 bed: $1500/month + utilities*
   - *THE BATTERY rent for 1 bed : $1375/month INCLUDES utilities*

2. *GLOBAL – CLIMATE CHANGE: Zeroing out building's role*



- *25 Apartments (500-1000sf)*
- *17,400 sf*
- *R34 walls*
- *R 54 roof/floors*
- *.13 Uvalue windows*
- *.6 SHGC*
- *Centralized VentilationERV, 82% efficient*
- *Centralized Hot Water: Geothermal*
- *Centralized heating/cooling: Geothermal VRF*
- *Centralized Electric Metering*
- *77 kw PV array to get to Net Zero*

PHASE 3: THE BATTERY 2017

PHIUS
Passive House Institute US

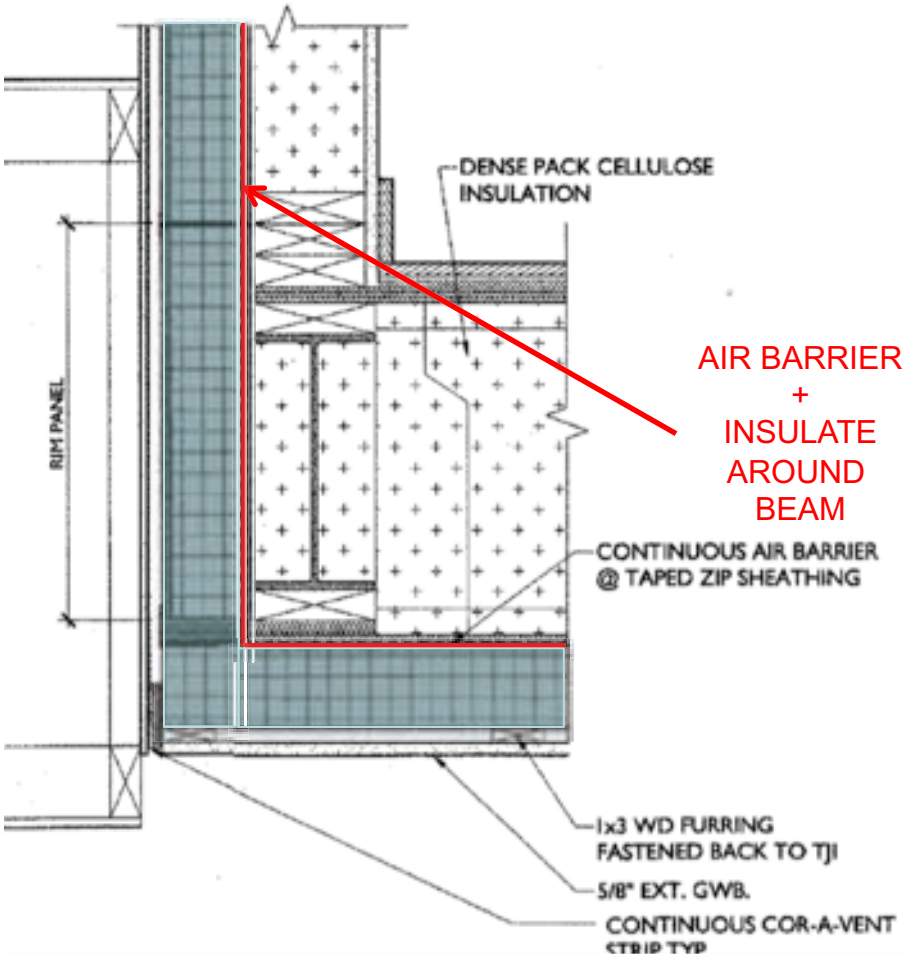
863

STOP
VOLVO

STOP

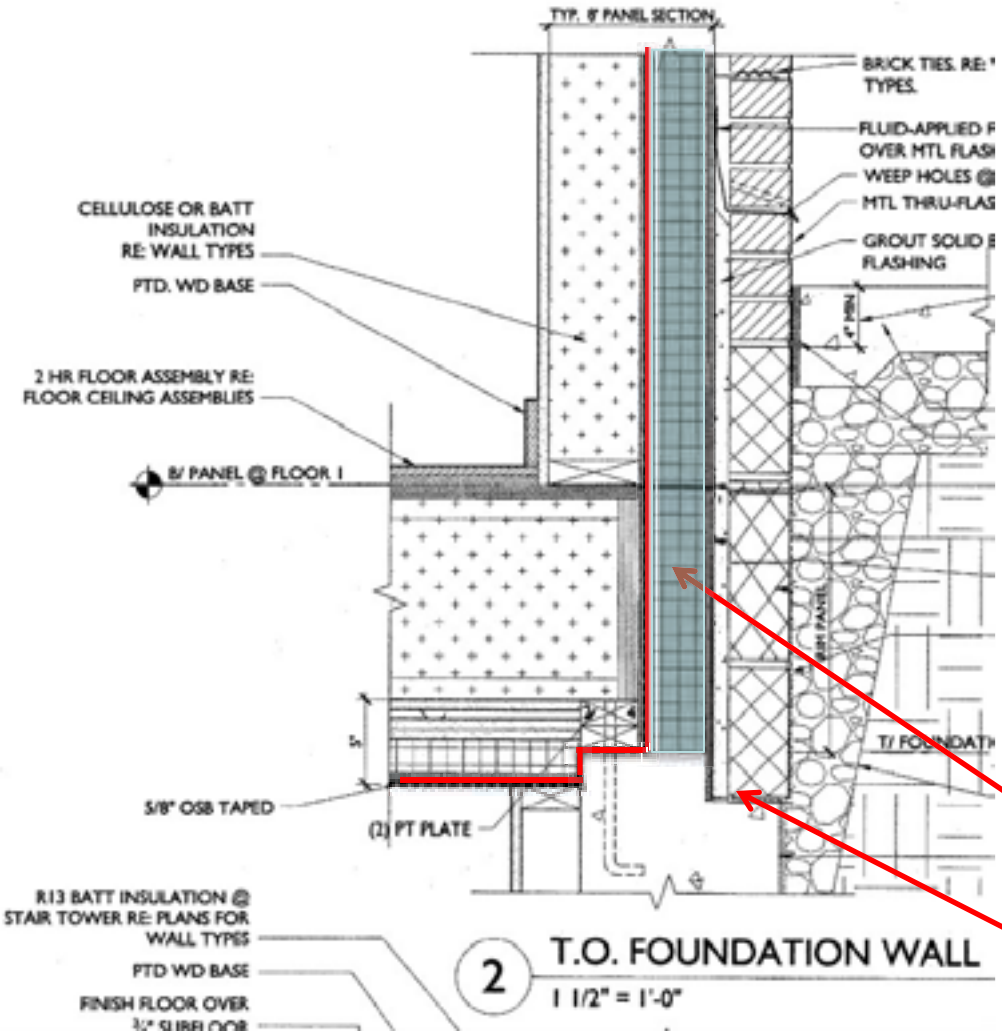
STOP

Thermal
Break

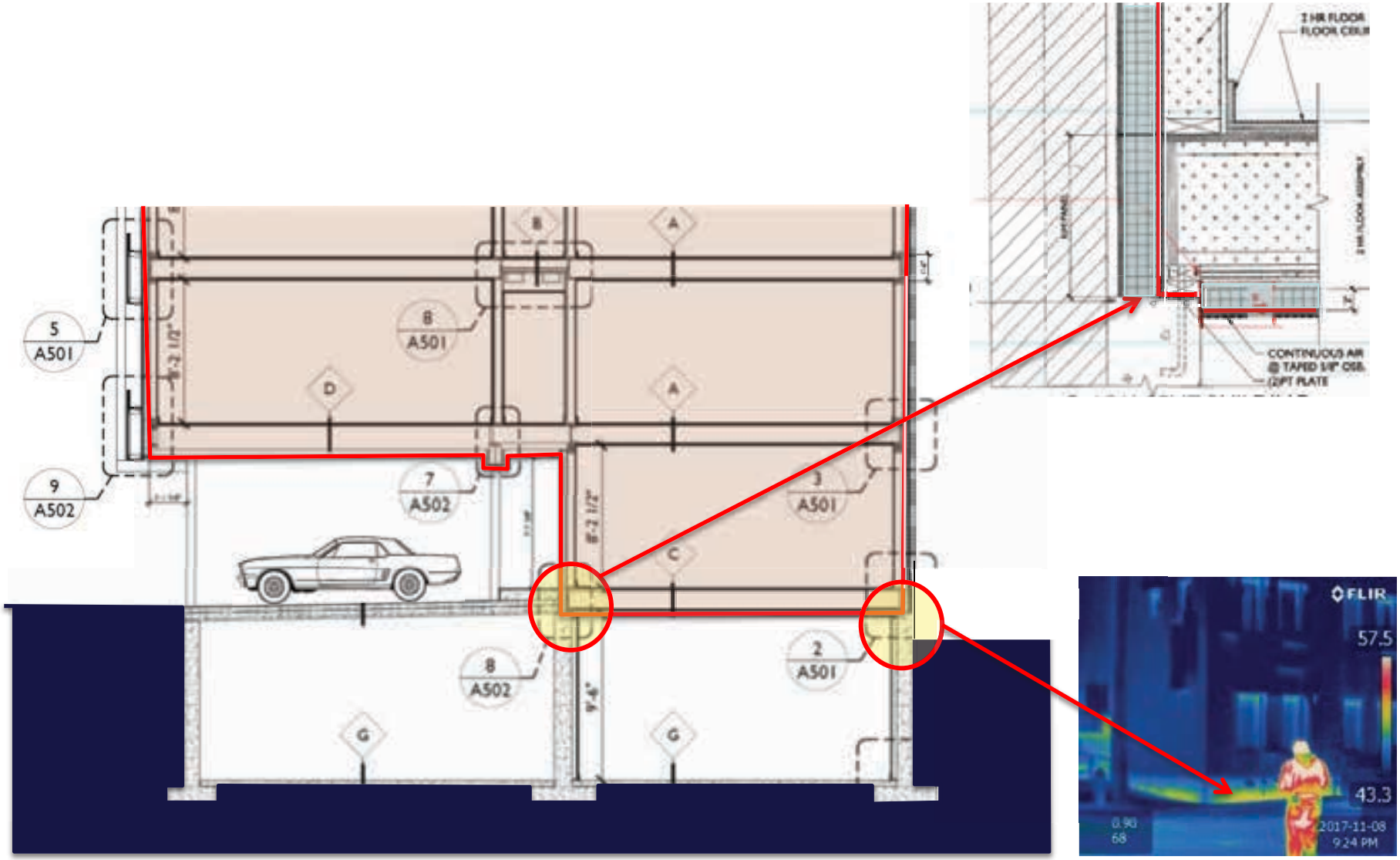


AIR BARRIER
+
INSULATE
AROUND
BEAM

3.5” OF EPS
BRICK LEDGE


TYP. 8' PANEL SECTION
BRICK TIES. RE:
TYPES.
FLUID-APPLIED
OVER MTL FLASH
WEEP HOLES @
MTL THRU-FLAS
GROUT SOLID
FLASHING
CELLULOSE OR BATT
INSULATION
RE: WALL TYPES
PTD. WD BASE
2 HR FLOOR ASSEMBLY RE:
FLOOR CEILING ASSEMBLIES
B/ PANEL @ FLOOR 1
5/8" OSB TAPED
(2) PT PLATE
R13 BATT INSULATION @
STAIR TOWER RE: PLANS FOR
WALL TYPES
PTD WD BASE
FINISH FLOOR OVER
2
T.O. FOUNDATION WALL
1 1/2" = 1'-0"

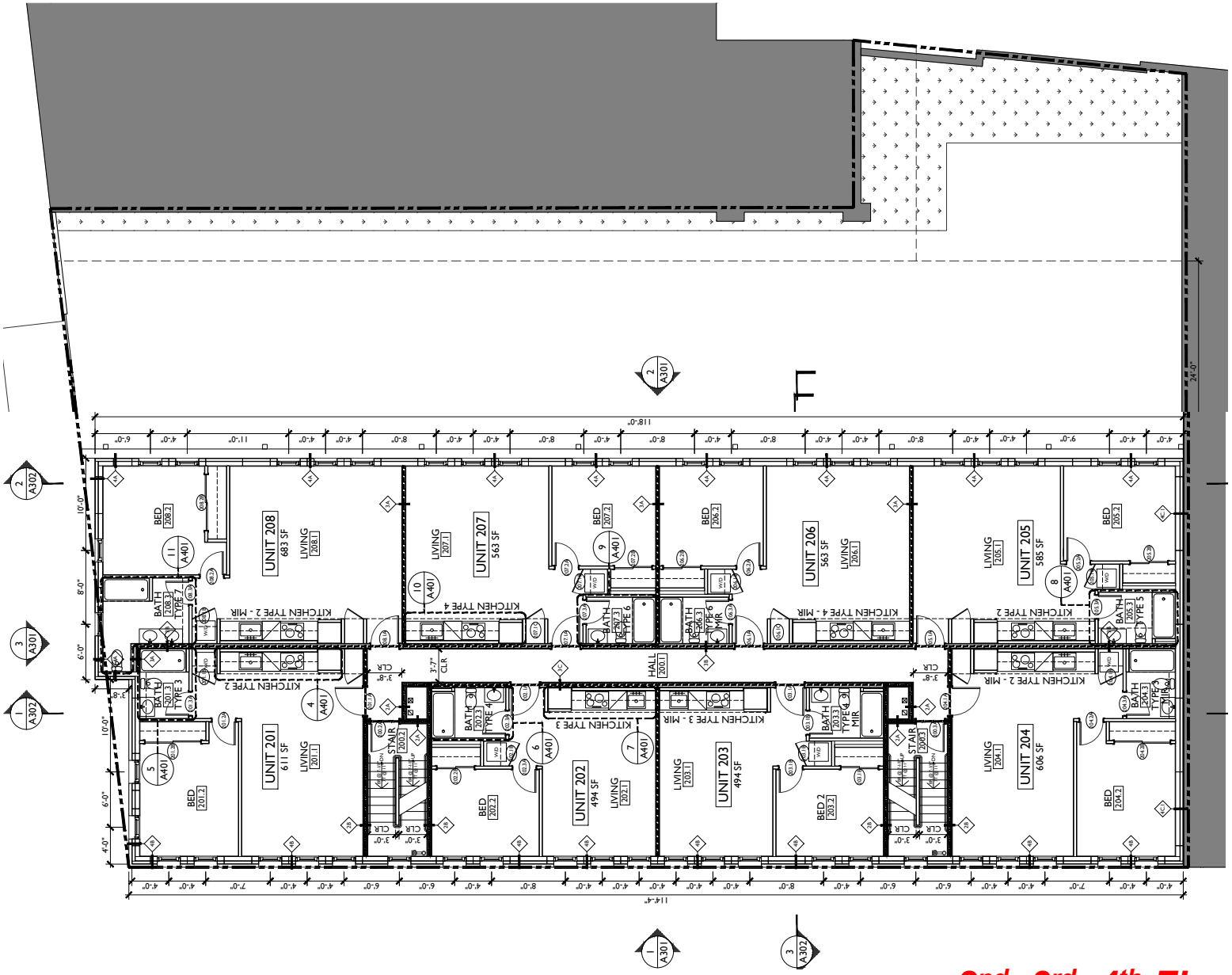
3.5" OF EPS
BRICK LEDGE



BASEMENT OUTSIDE THERMAL ENVELOP

UNIT 11
529 SF
BED
BATH
LIVING
STAIR
103
UNIT 12
LIVING
BED
BATH
LOBBY
STAIR
103
UNIT 13
532 SF
LIVING
BED
BATH
CONCRETE WALKWAY
CERAMIC TILE FLOOR
CERAMIC TILE FLOOR
A401
114'-4"
24'-0"
18'-0"
20'-0"
3'-6"
30' WIDE - LEGALLY OPEN
7' - 16' - 7'
PARKING
NO PARKING

1st Floor

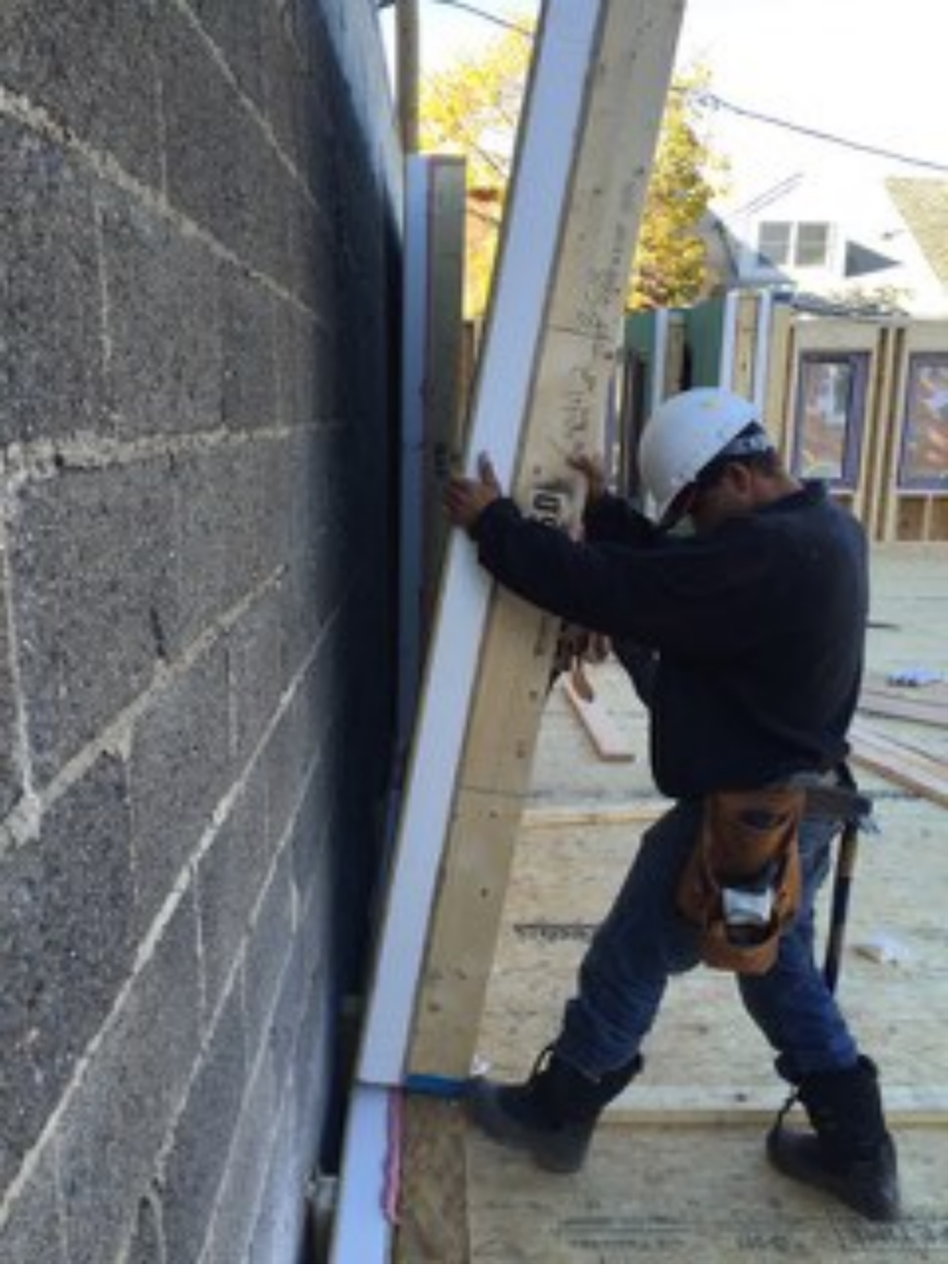


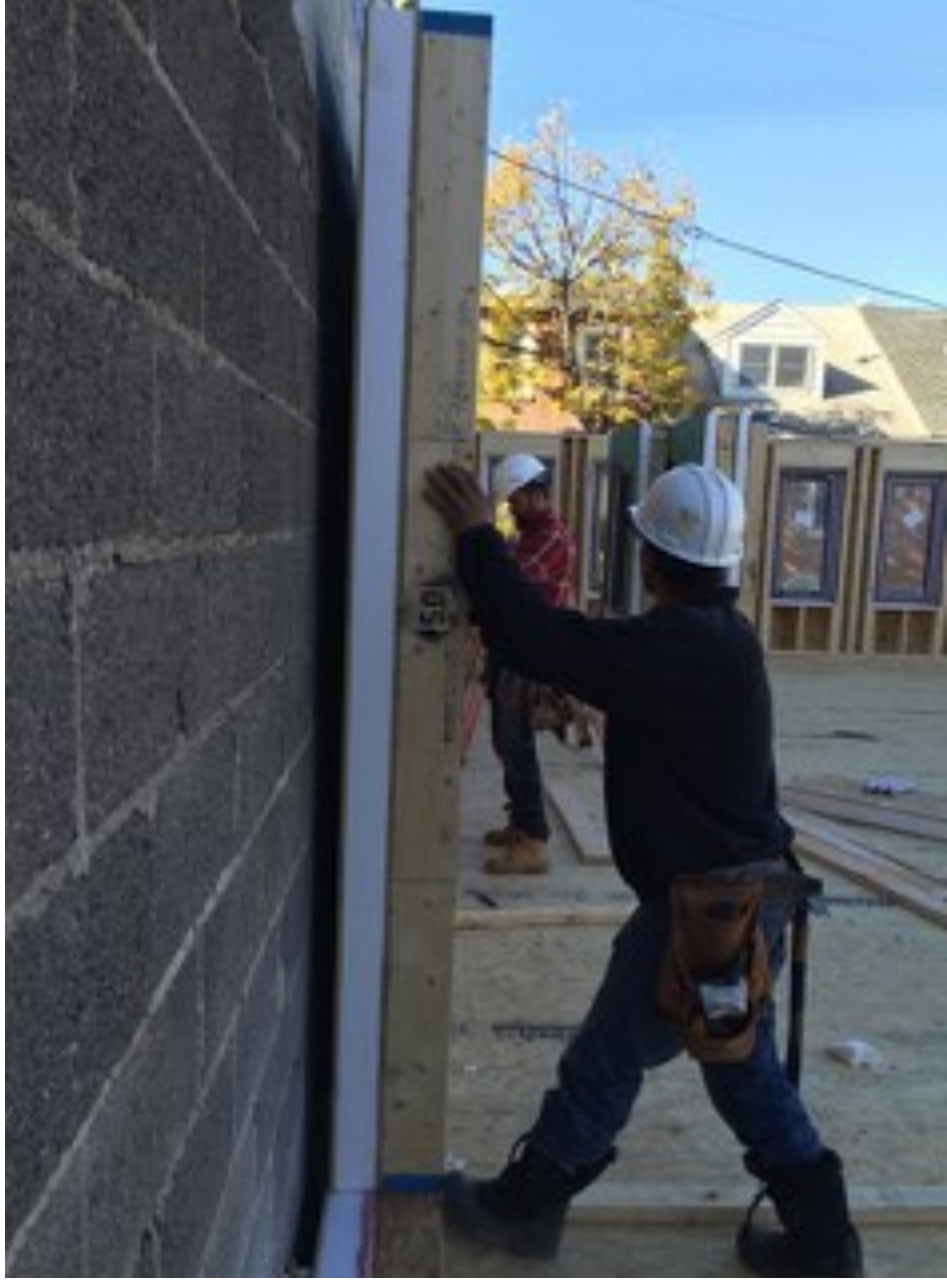
2nd, 3rd, 4th Floors

2nd, 3rd, 4th Floors

WEEK 1

WEEK 1





WEEK 1

WEEK 2

WEEK 2

WEEK 2

WEEK 2

WEEK 3

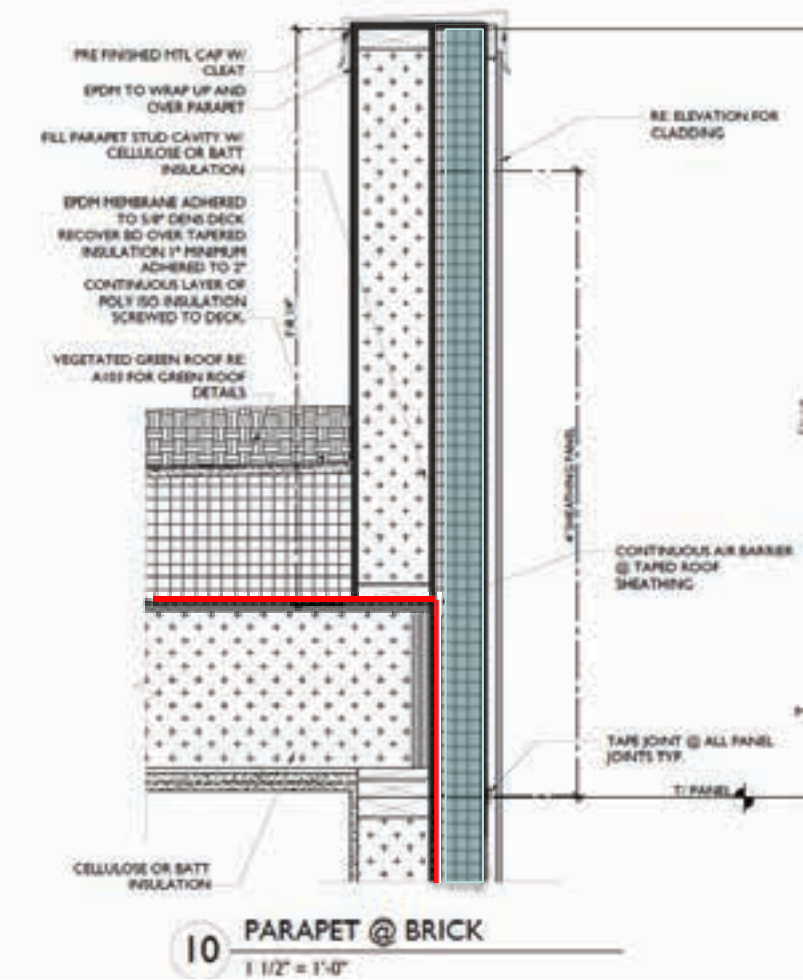
WEEK 3

WEEK 4

WEEK 4

WEEK 5: ROOF

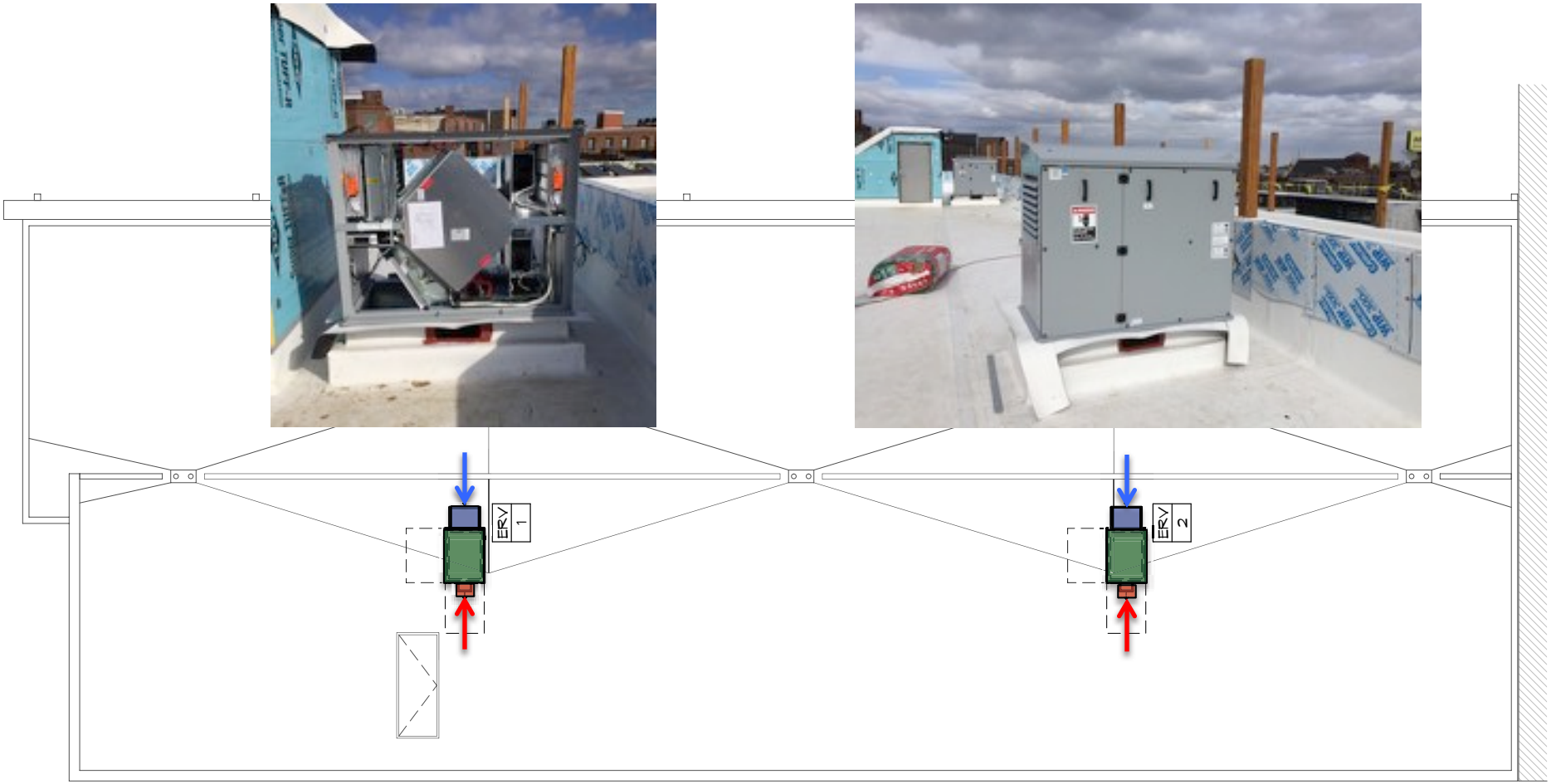
WEEK 5: ROOF


PRE FINISHED MTL CAP W/ CLEAT
EPDM TO WRAP UP AND OVER PARAPET
FILL PARAPET STUD CAVITY W/ CELLULOSE OR BATT INSULATION
EPDM MEMBRANE ADHERED TO 5/8" DENS DECK RECOVER BD OVER TAPERED INSULATION 1" MINIMUM ADHERED TO 2" CONTINUOUS LAYER OF POLY ISO INSULATION SCREWED TO DECK
VEGETATED GREEN ROOF RE: A103 FOR GREEN ROOF DETAILS
RE: ELEVATION FOR CLADDING
CONTINUOUS AIR BARRIER @ TAPED ROOF SHEATHING
TAPE JOINT @ ALL PANEL JOINTS TYP.
T/ PARAPET
CELLULOSE OR BATT INSULATION
10
PARAPET @ BRICK
1 1/2" = 1'-0"

WEEK 5: ROOF

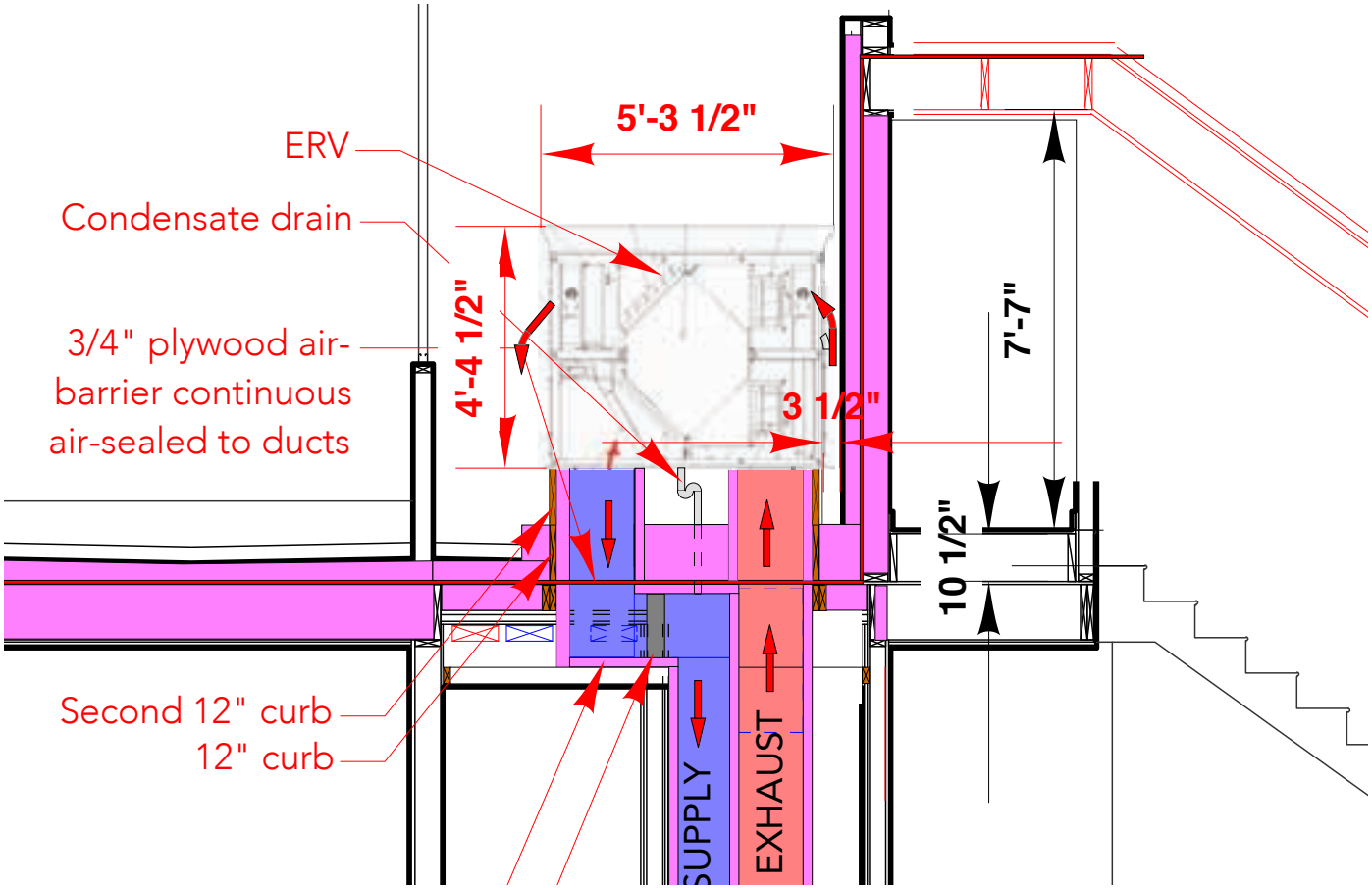
WEEK 5: ROOF

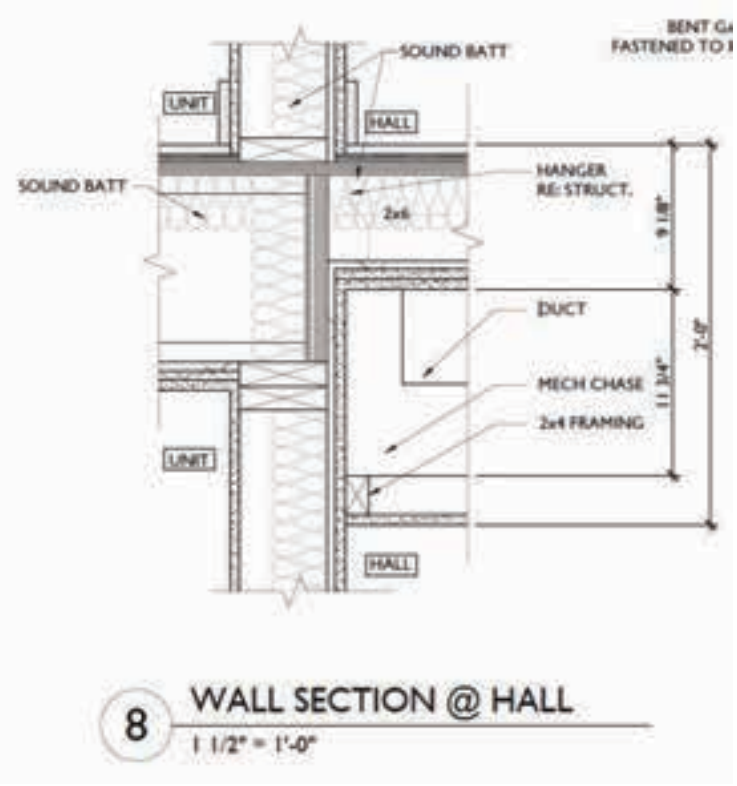
WEEK 5: ROOF

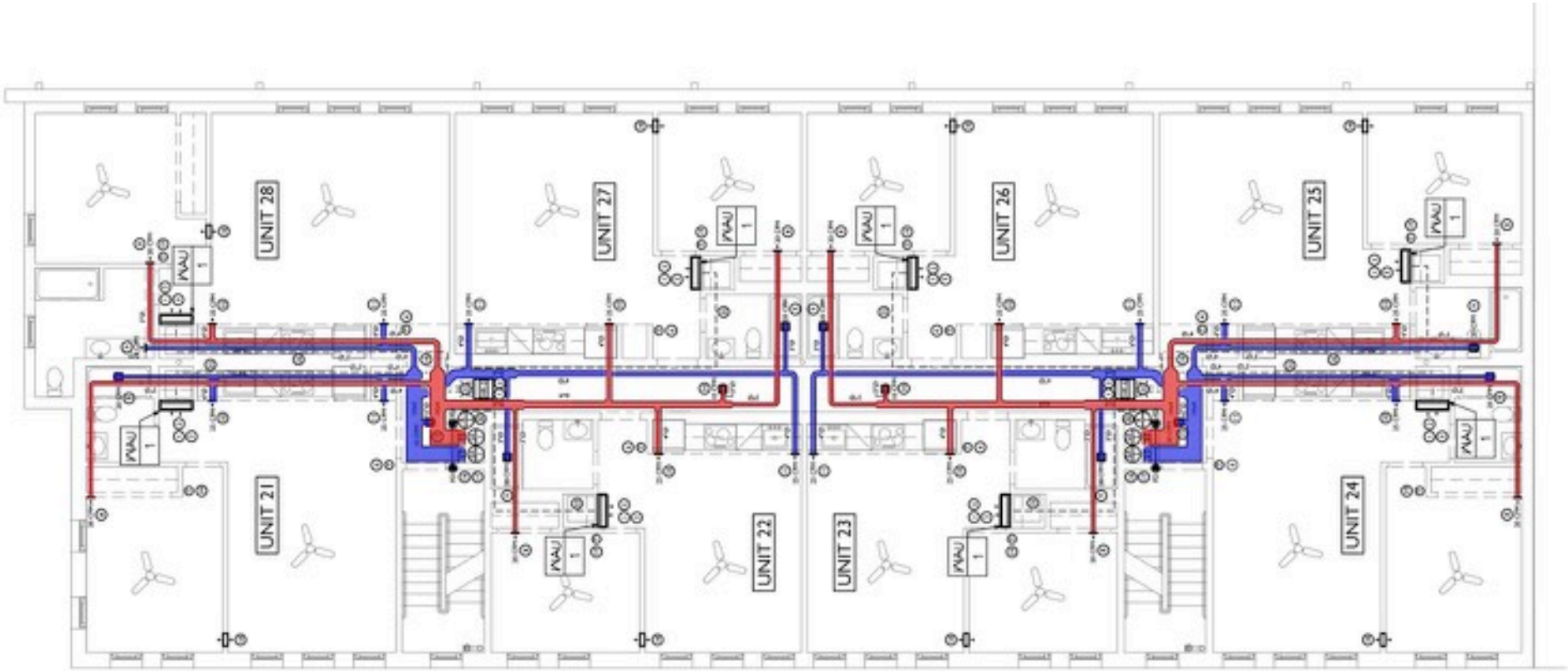


Roof

Balanced/Centralized Ventilation, 2 Ventacity 2000cfm ERVs


ERV
Condensate drain
3/4" plywood air-barrier continuous air-sealed to ducts
Second 12" curb
12" curb
5'-3 1/2"
4'-4 1/2"
3 1/2"
7'-7"
10 1/2"
SUPPLY
EXHAUST


SOUND BATT
UNIT
HALL
SOUND BATT
HANGER
RE: STRUCT.
2x6
DUCT
MECH CHASE
2x4 FRAMING
UNIT
HALL
8
WALL SECTION @ HALL
1 1/2" = 1'-0"



2nd-4th Floors

Balanced/Centralized Ventilation, 2 Ventacity 2000cfm ERVs

WEEK 5: ROOF: FLOOD TEST FOR GREEN ROOF

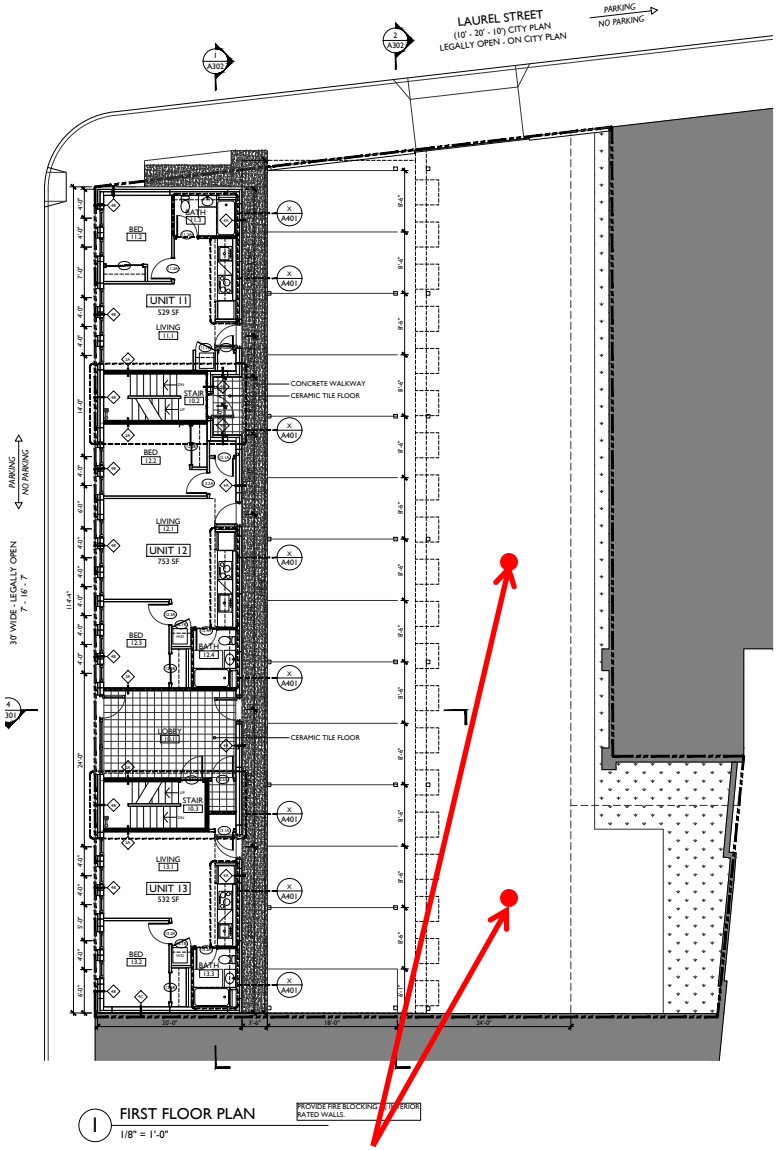
A1
D1
WIP 300
WIP 300
WIP 300

Bluesk

HAWCOCK
LAUREL ST
ONION FLATS

HANCOCK
LAUREL ST

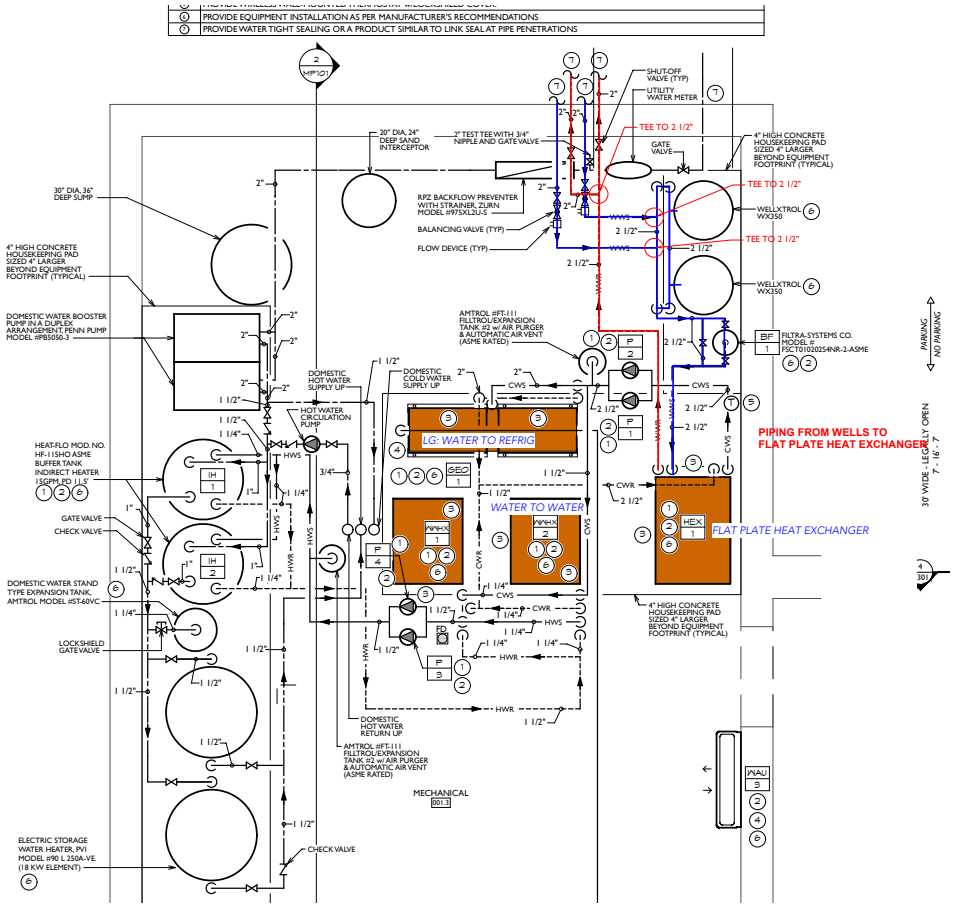
GEOTHERMAL

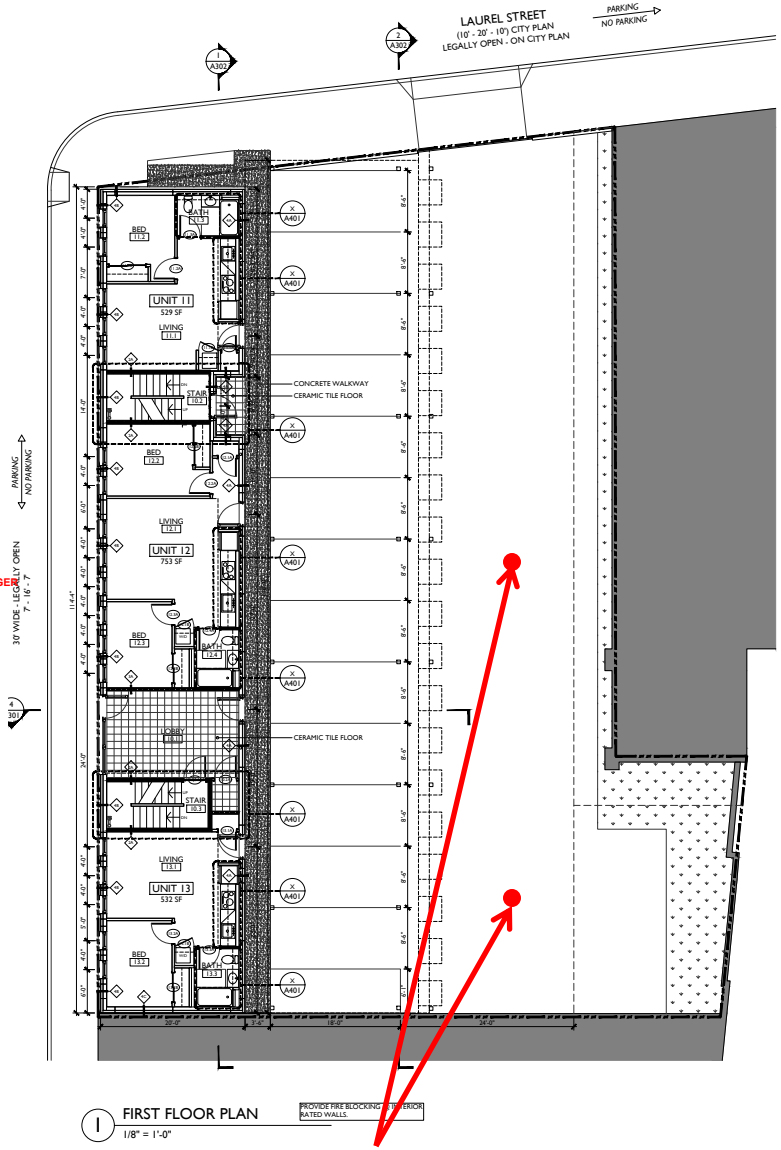


1 FIRST FLOOR PLAN
1/8" = 1'-0"

2 – 1000' deep Standing Column Geothermal Wells
ALL heating/cooling and domestic hot water for ALL 25 apartments

PHASE 3: THE BATTERY 2017



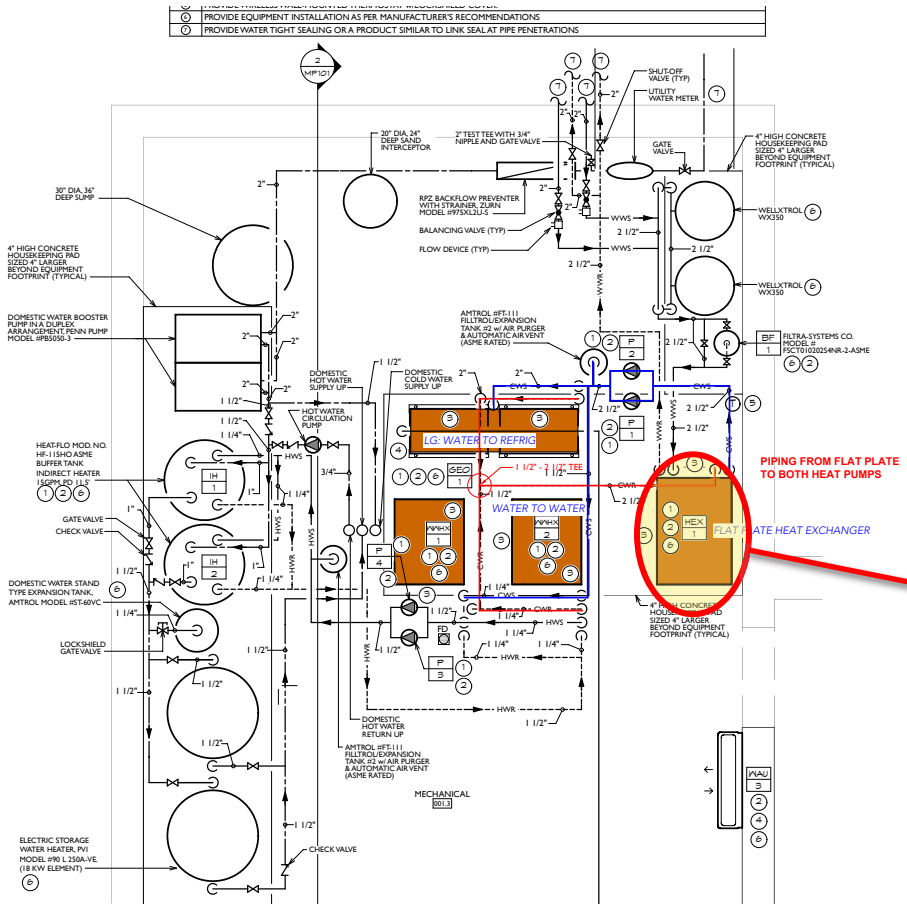


BASEMENT MECHANICAL ROOM

2 – 1000' deep Standing Column Geothermal Wells
ALL heating/cooling and domestic hot water for ALL 25 apartments

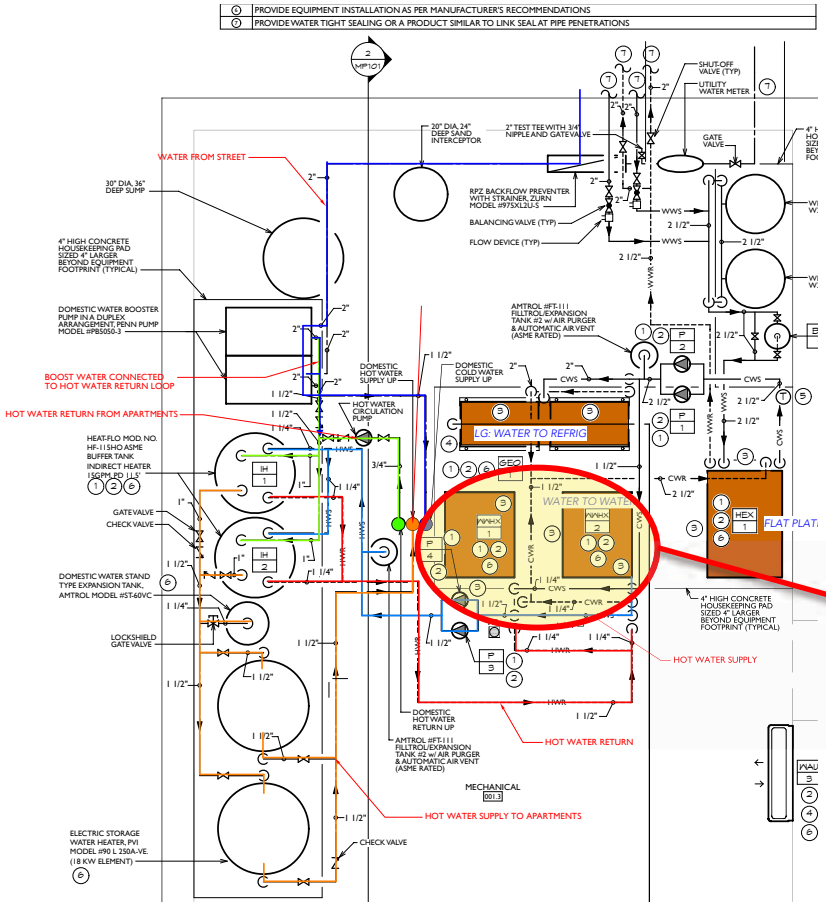
PHASE 3: THE BATTERY 2017

FLAT PLATE HEAT EXCHANGER



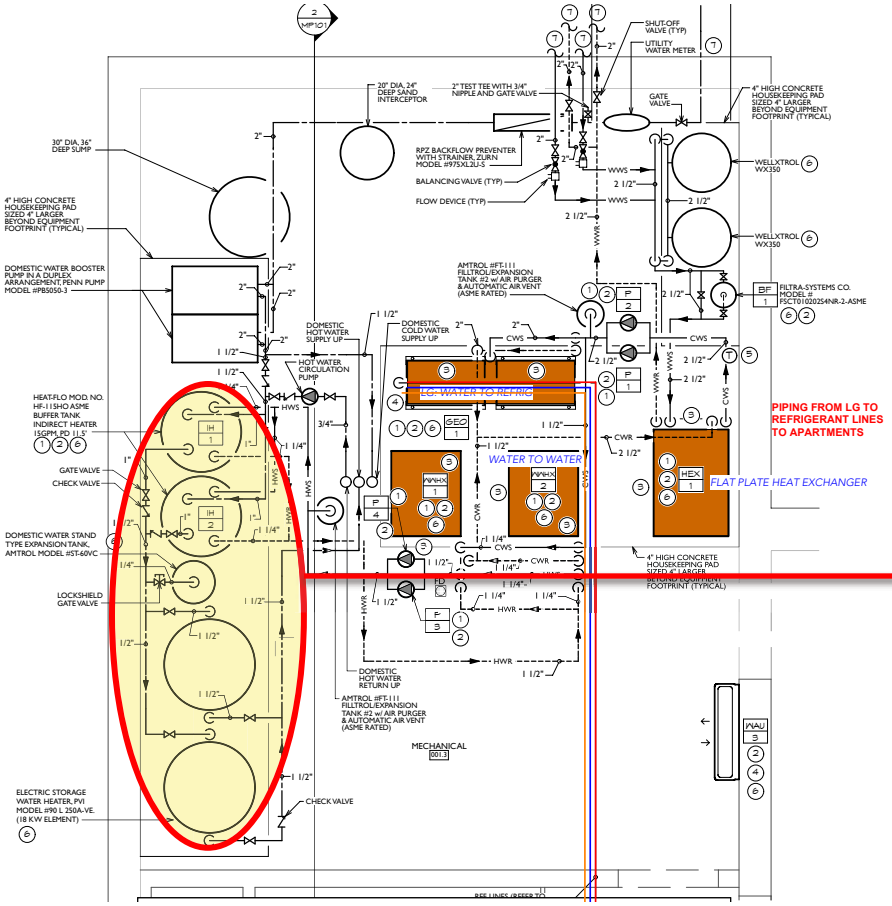
PHASE 3: THE BATTERY 2017

WATER TO WATER HEAT PUMPS



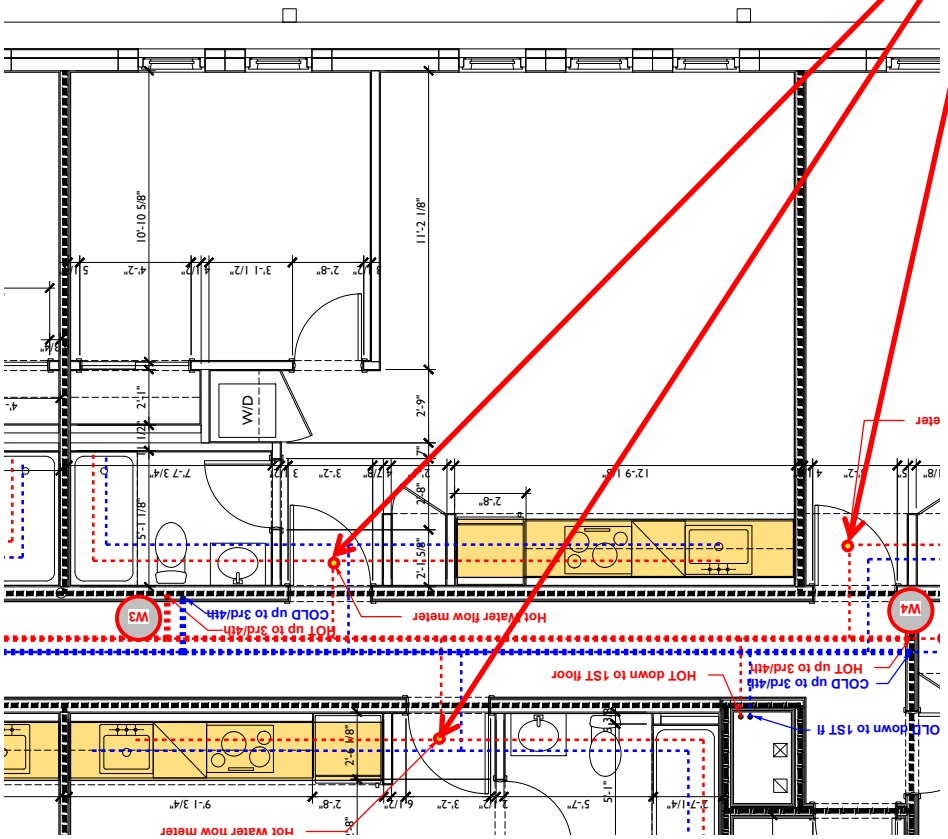
PHASE 3: THE BATTERY 2017

DHW STORAGE TANKS



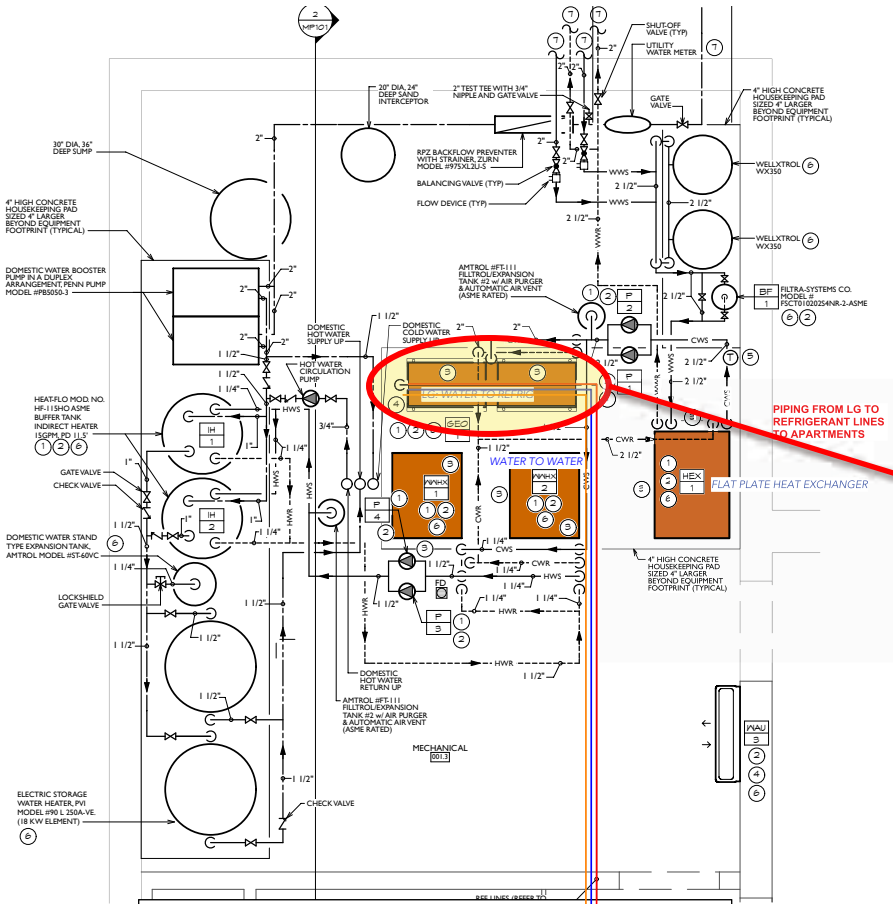
PHASE 3: THE BATTERY 2017

HOT WATER FLOW METER PER APARTMENT



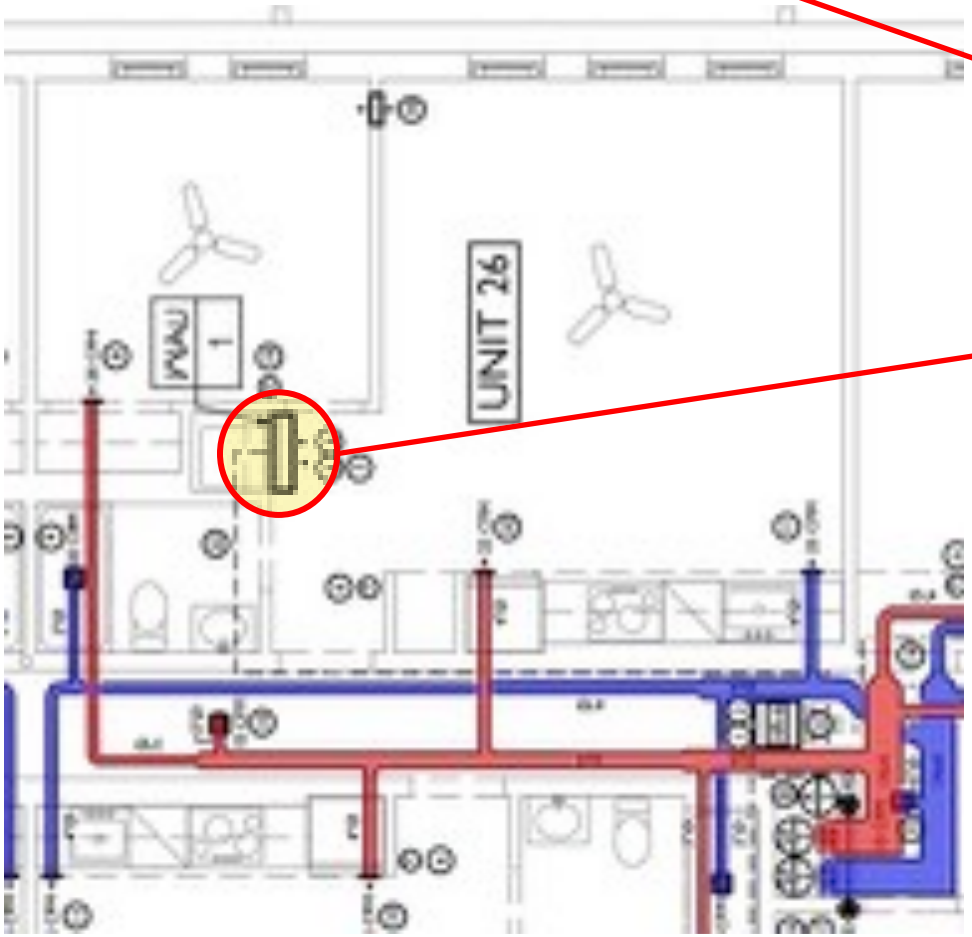
PHASE 3: THE BATTERY 2017

WATER TO REFRIGERANT VRF HEAT PUMPS



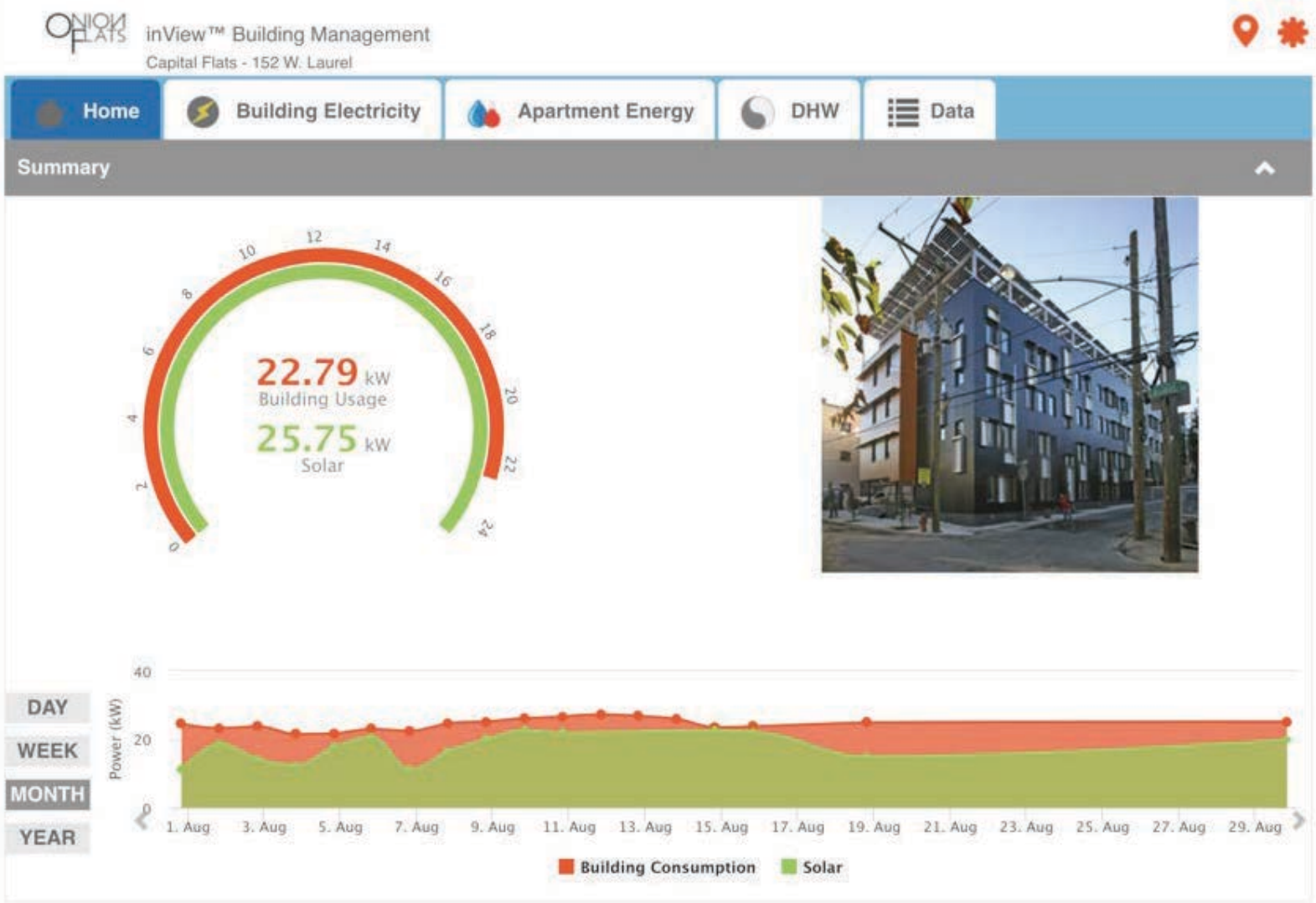
PHASE 3: THE BATTERY 2017

OPEN TRANSOM TO BEDROOM



Ductless Evaporator located next to open transom and intentionally located above laundry for easy connection of condensate drain

PHASE 3: THE BATTERY 2017



MONITORING VS METERING

FINAL BLOWER DOOR TEST
Sept 29, 2017
.53 ACH50

PHASE 3: THE BATTERY 2017

PHASE 3: THE BATTERY 2017

PHASE 3: THE BATTERY *Meeting the Energy Budget*

PHASE 3: THE BATTERY *Cautionary YELLOW!!!*

PHASE 3: THE BATTERY *BLOWING the Energy Budget!!*

PHASE 3: THE BATTERY *Who's Who????*

PHASE 3: THE BATTERY *A beautiful night sky*

The Passive House Institute US Awards

The Designation of

PHIUS+ 2015 CERTIFIED PROJECT

No. 1414

Capital Flats II

152-158 W. Laurel Street
Philadelphia, PA 19123

Onion Flats
PROJECT OWNER

April 10, 2018
DATE

Tim McDonald | Kara Haggerty Wilson
CEM/CP

Onion Flats Architecture
ARCHITECT

Onion Flats Construction
CONSTRUCTION

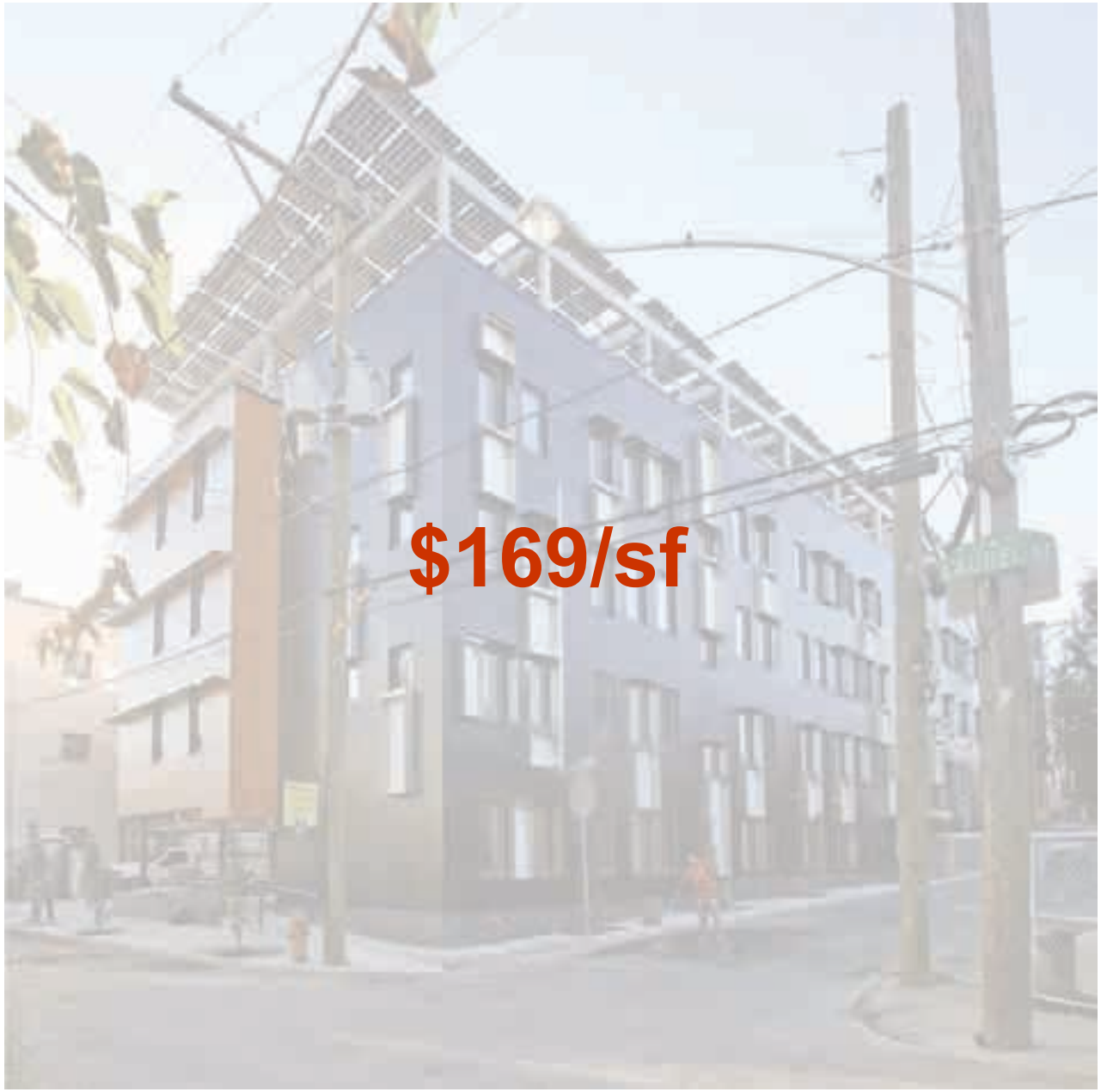
Neil Goldman
ON-SITE VERIFICATION

• INTERIOR CONDITIONED FLOOR AREA	16,782	ft^2
• ANNUAL HEATING DEMAND	3.0	$kBTU/ft^2yr$
• ANNUAL COOLING DEMAND	6.2	$kBTU/ft^2yr$
• PEAK HEATING LOAD	3.3	BTU/ft^2hr
• PEAK COOLING LOAD	2.8	BTU/ft^2hr
• AIR-TIGHTNESS TEST RESULTS	0.05	$CFM50/ft^2$
• SOURCE ENERGY	4,766	kWh/person.yr
• SITE ENERGY USE INDEX (EUI)	17.0	$kBTU/ft^2yr$

Executive Director

PHIUS
Passive House Institute US

PHASE 3: THE BATTERY 2017



PHASE 3: THE BATTERY 2017

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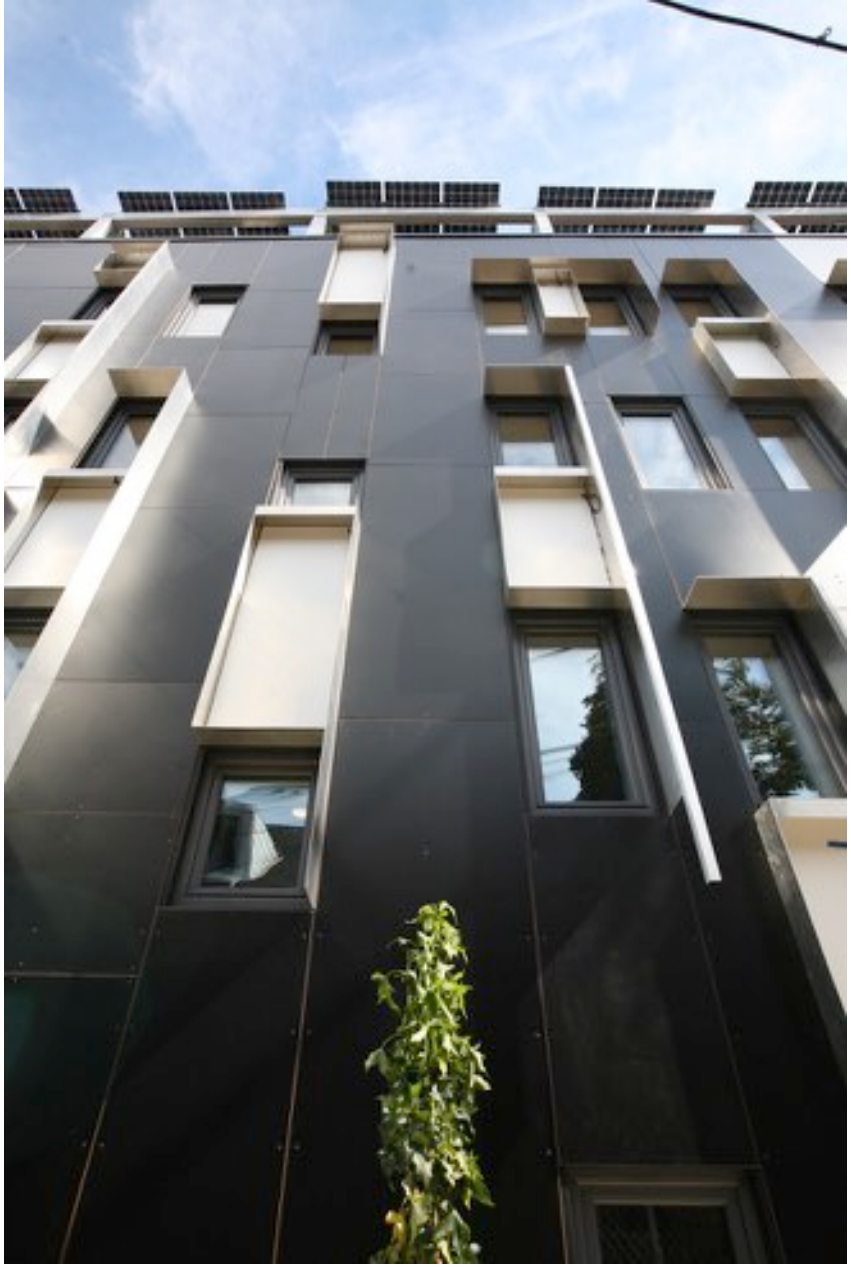

PHASE 3: THE BATTERY 2017

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Passive House verification

PHIUS
Passive House Institute US

Building:	Capital Flats II
Street Address:	152-158 W Laurel Street / 935-937 N Hancock Street
City, State, Zip:	Philadelphia, PA
Country:	USA
Building type:	apartment building
Climate:	PHILA INT AP PA — Altitude of building site (feet above sea level): 17
Home owner / Client:	
Street Address:	
City, State, Zip:	
Architecture:	Onion Flats | Architecture
Street Address:	111 W Norris Street
City, State, Zip:	Philadelphia, PA 19122
Mechanical system:	
Street Address:	
City, State, Zip:	

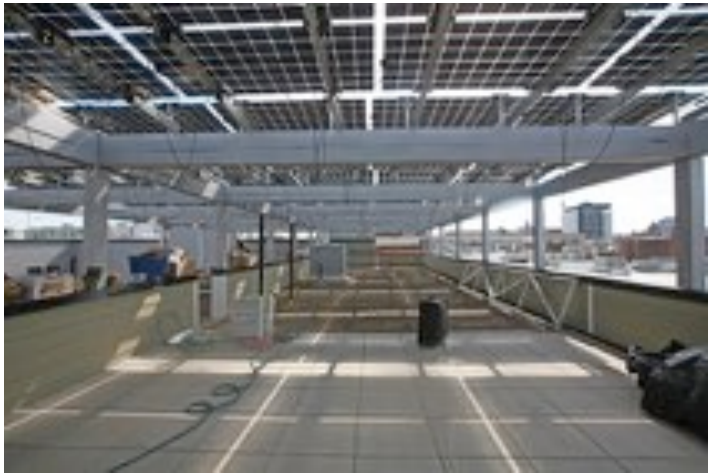
Year of construction:	2016		Interior temperature winter:	68.0	°F	Enclosed volume V_e ft³: 128293
No. of dwelling units:	25		Interior temperature summer:	77.0	°F	Mechanical cooling: x
No. of occupants:	53.0		Internal heat sources winter:	1.40	BTU/h.ft²	
Spec. capacity:	11	BTU/F per ft² TFA	Ditto summer:	1.72	BTU/h.ft²	

Specific building demands with reference to the treated floor area

					Requirements	Fulfilled?*
	Treated floor area	16782	ft²			
Space heating	Heating demand	2.35	kBTU/(ft²yr)	52% of	4.50 kBTU/(ft²yr)	yes
	Heating load	2.97	BTU/(hr.ft²)	71% of	4.20 BTU/(hr.ft²)	yes
Space cooling	Overall specif. space cooling demand	6.11	kBTU/(ft²yr)	98% of	6.26 kBTU/(ft²yr)	yes
	Cooling load	2.75	BTU/(hr.ft²)	59% of	4.70 BTU/(hr.ft²)	yes
	Frequency of overheating (> 77 °F)		%		-	-
Primary energy	Heating, cooling, auxiliary electricity, dehumidification, DHW, lighting, electrical appliances	45.2	kBTU/(ft²yr)	68% of	66.8 kBTU/(ft²yr)	yes
	DHW, space heating and auxiliary electricity	24.6	kBTU/(ft²yr)		-	-
	Specific primary energy reduction through solar electricity		kBTU/(ft²yr)		-	-
Airtightness	Pressurization test result n_{50}	0.53	1/h		0.53 1/h	yes

* empty field: data missing; '-': no requirement

Passive House? yes



210 mods x 370 watts = 77 kW system

PHIUS+ 2015 Multi-Family Calculator	
*Results in green	
$iCFA_{TOTAL}$ (ft²)	16,782

PV Utilization	
Site electricity (kWh/yr)	84085
Output from PV Watts (kWh/yr)	98554
http://pvwatts.nrel.gov	
Annual PV Output/Annual Electricity Demand	1.17
Utilization fraction from utilization curve	0.334
Primary Energy offset by PV (kBTU/ft²yr)	21.15

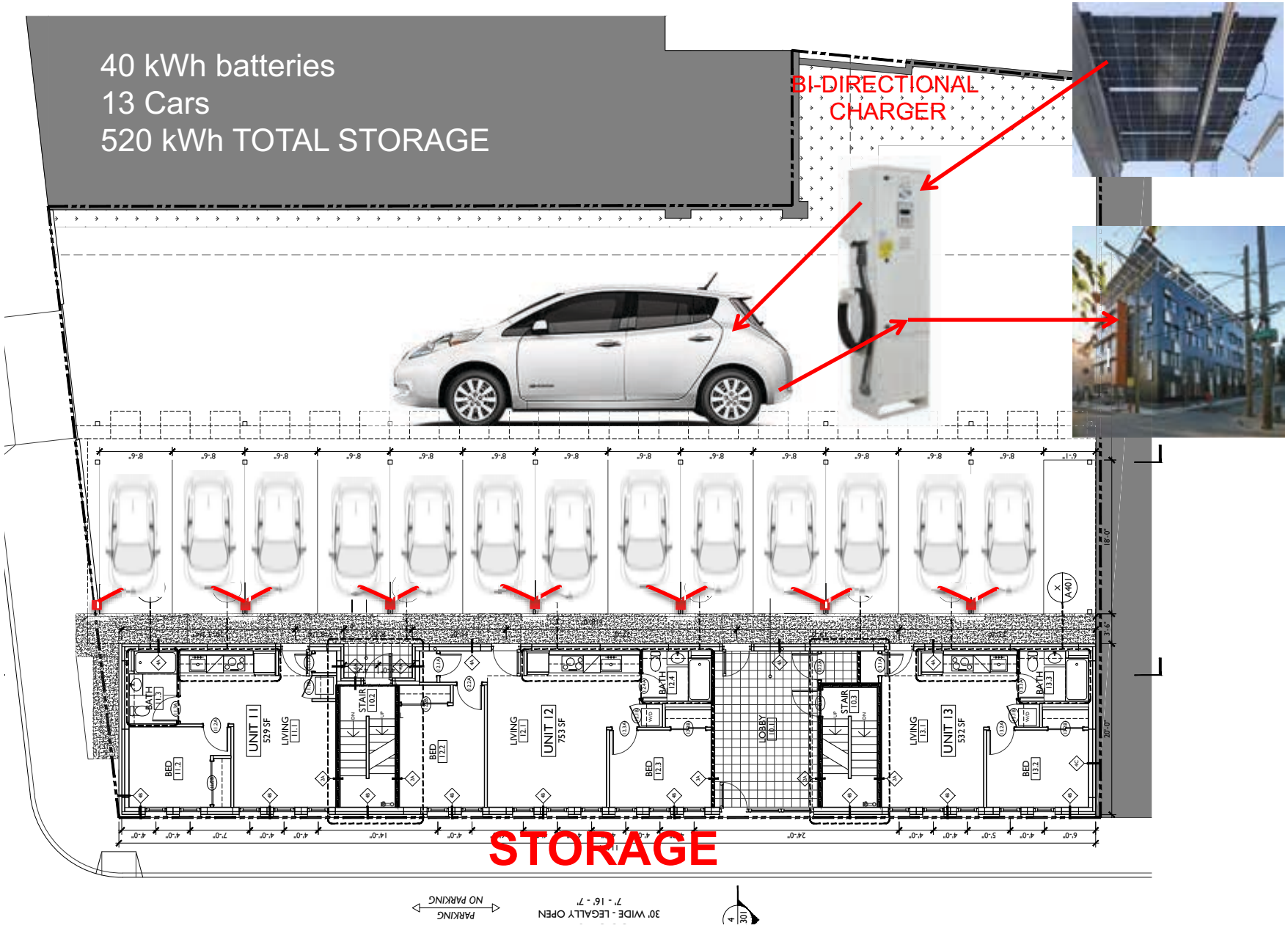
Primary Energy
45 kBTU/sf/yr

Site Energy: 84,085 kWh/yr
Output from PV: 98,554 kWh/yr

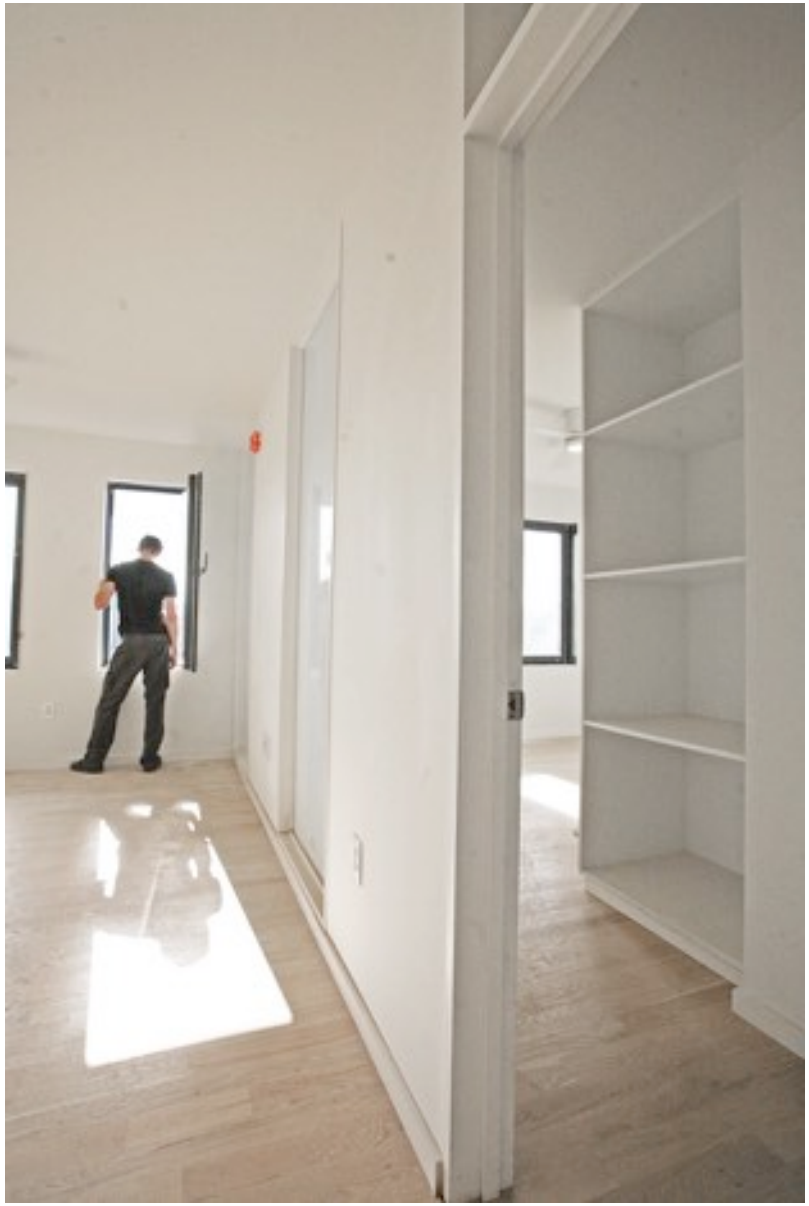
PHASE 3: THE BATTERY 2017

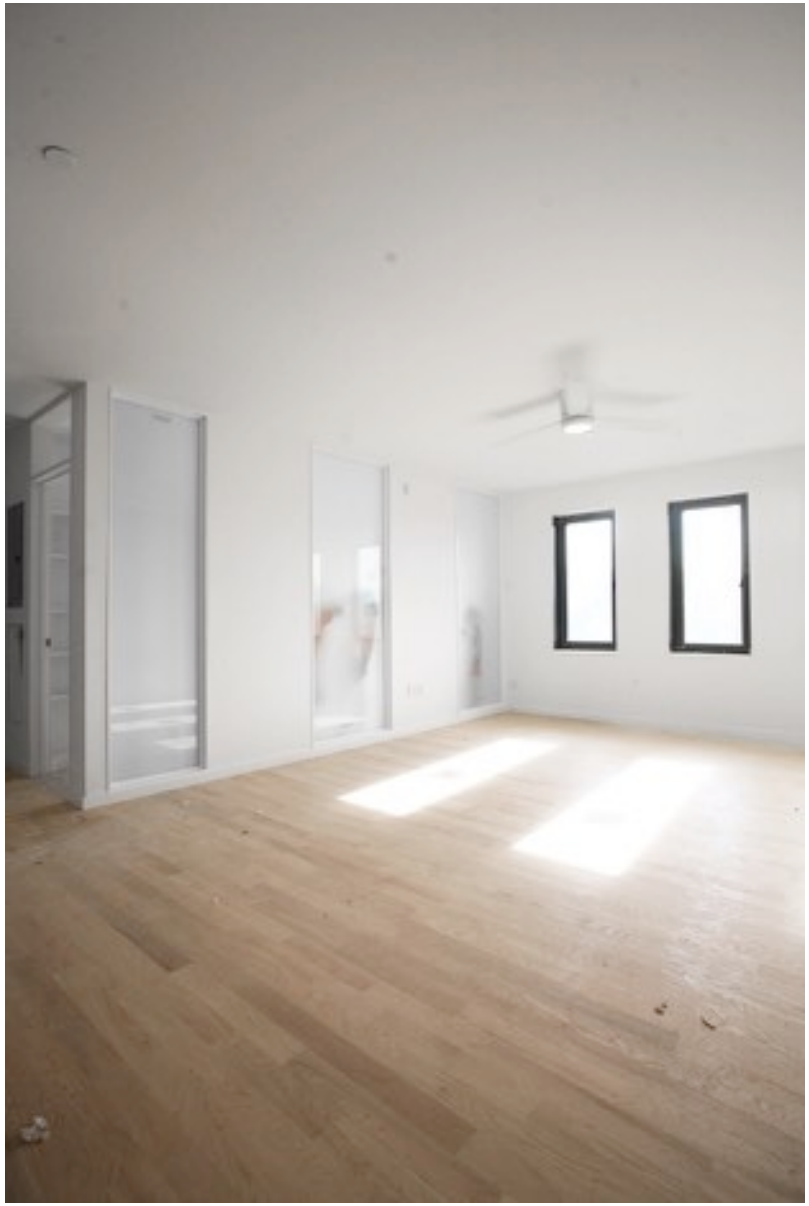
NET-POSITIVE!

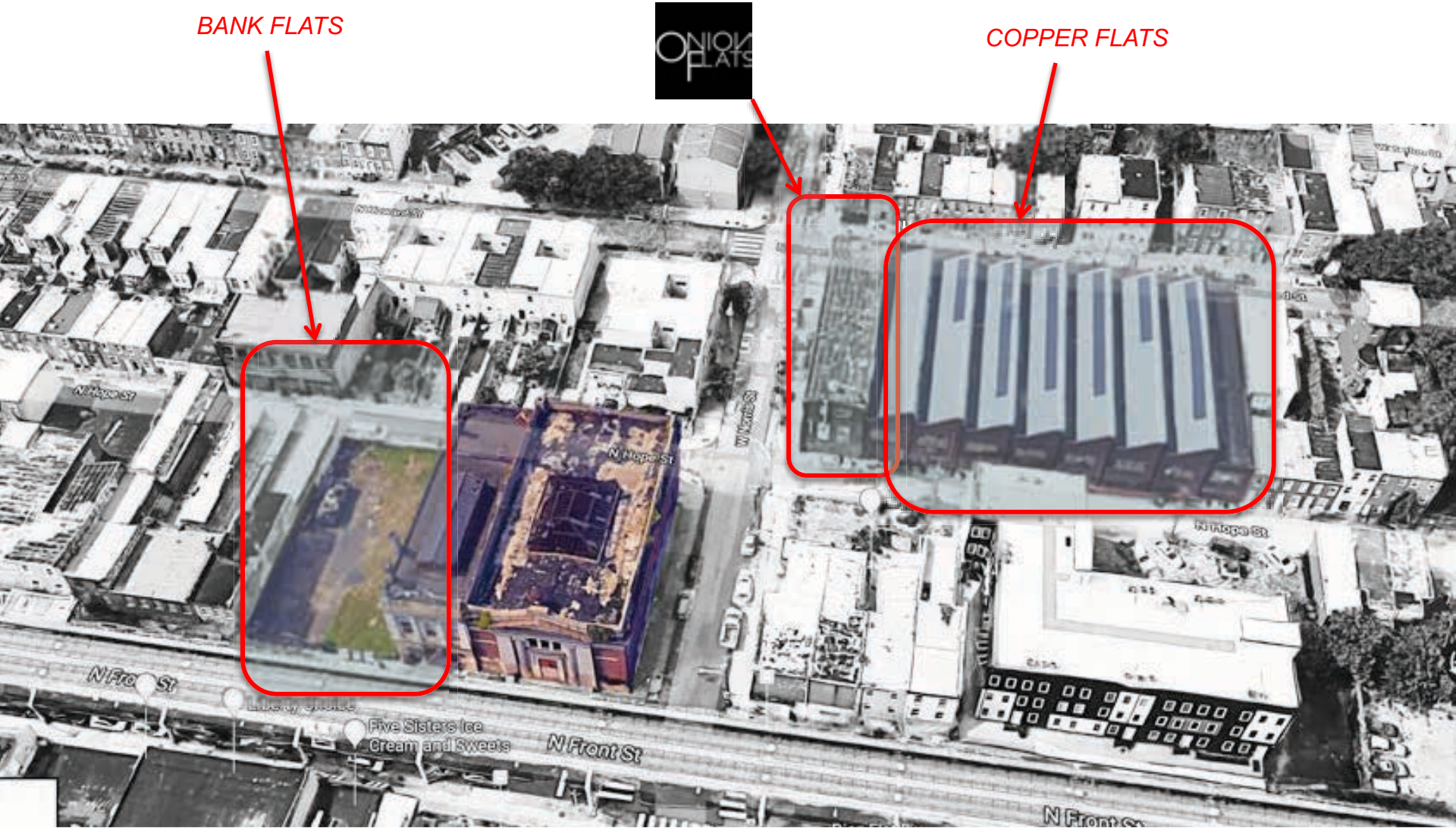
40 kWh batteries
13 Cars
520 kWh TOTAL STORAGE



PHIUS
Passive House Institute US

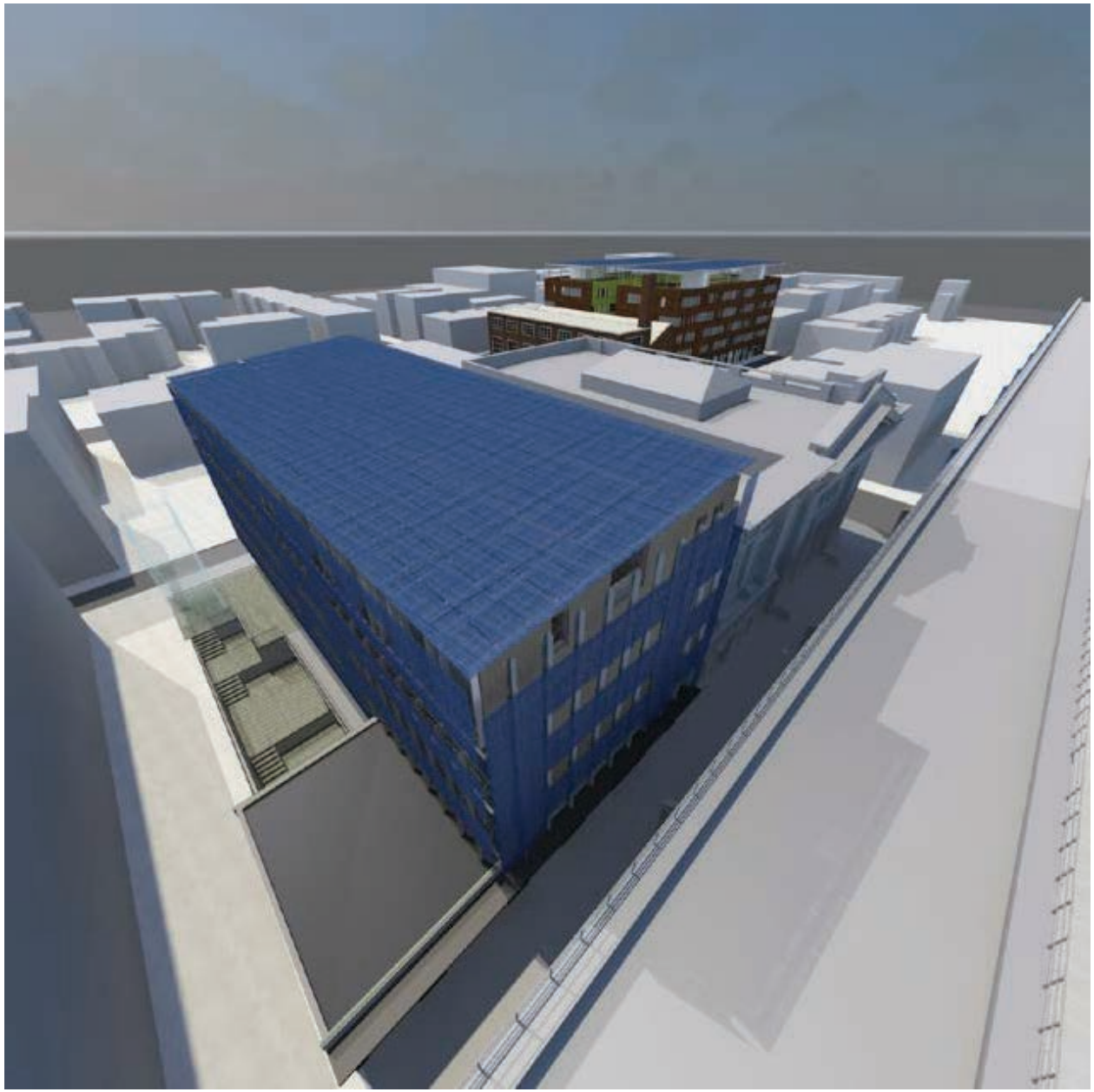






BANK FLATS 2019: 28 units and retail

COPPPER FLATS 2020: 88 units



BANK FLATS 2019: 28 units and retail

COPPPER FLATS 2020: 88 units

- *28 Apartments (300-500sf)*
- *24,141 sf*
- *R34 walls, Buildsmart system*
- *R 54 roof/floors*
- *.2 Uvalue windows DOUBLE PANE*
- *.28 SHGC*
- *DE-Centralized VentilationERV*
- *SEMI-DE-Centralized Hot Water*
- *DE-Centralized heating/cooling*
- *Centralized Electric Metering*
- *174 kw PV array to get to Net POSITIVE Energy*

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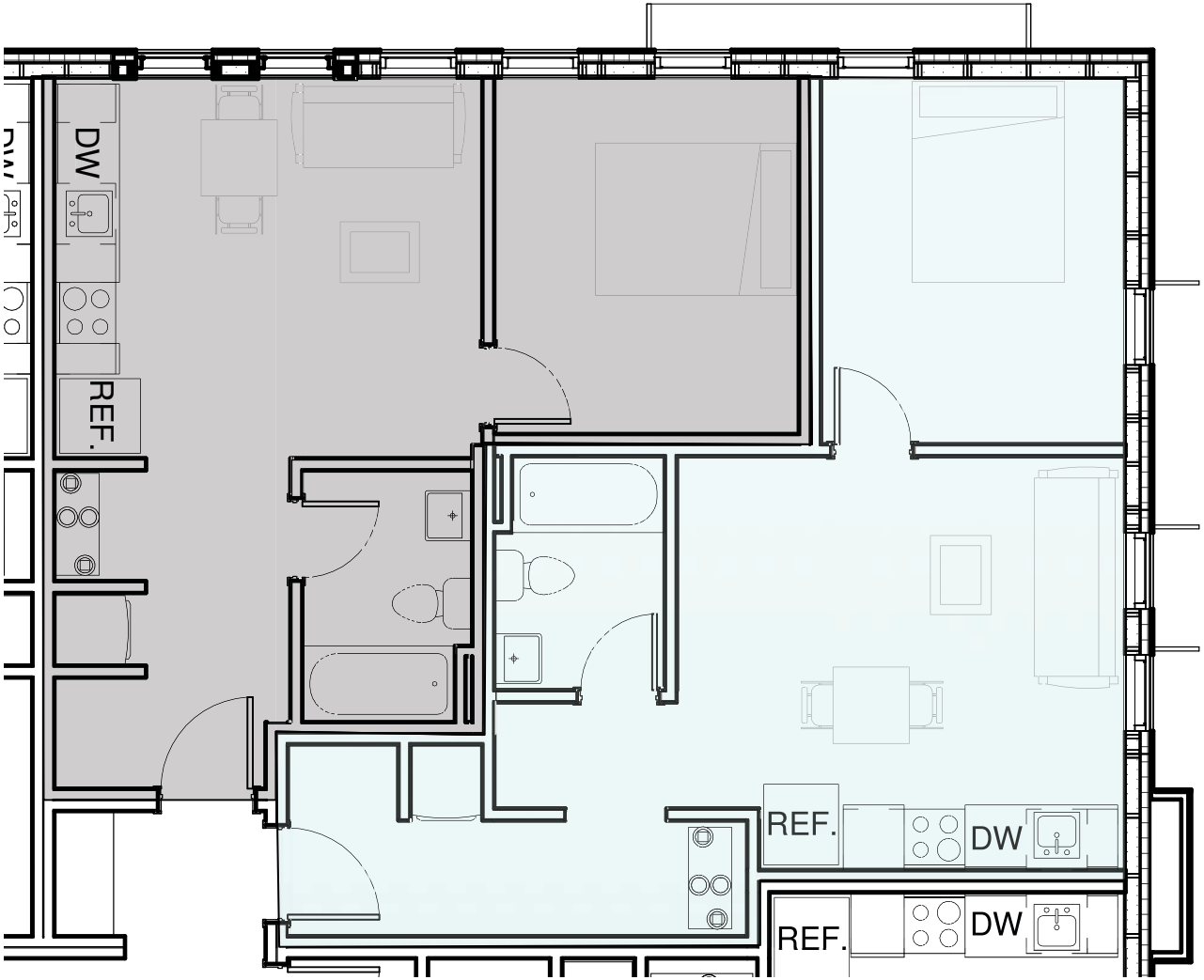
BANK FLATS 2019: 28 units and retail

Terraced garden
Commercial
MECHANICAL
MECHANICAL
MECHANICAL
MECH. RM
POTENTIAL
KITCHEN
300 SF
CORRIDOR
MENS TOILET RM
WOMENS TOILET RM
LIFT
JAN. CL.
STR-1
STR-2
TOILET RM
UP
DN
4' - 6"
11' - 0"
5' - 0"
5' - 0"
0'
A-100
A-302
N

BASEMENT

2
A-301
3
A-301
2
A-303
1.1
2.1
2.2
2ND-4TH FLOORS
Unit 207
APT 407
BEDROOM
REF.
DW
SHWR
BATHRM
Unit 208
APT 408
Unit 206
APT 406
BEDROOM
Unit 205
APT 405
BEDROOM
Unit 204
APT 404
BEDROOM
Unit 203
APT 403
BEDROOM
Unit 202
APT 402
BEDROOM
Unit 201
APT 401
STR-2
DN
CORR
MECH.
STR-1
DN
UP
3
A-303
1
A-301
1
2
3
N

Original 450sf, 1-bed unit



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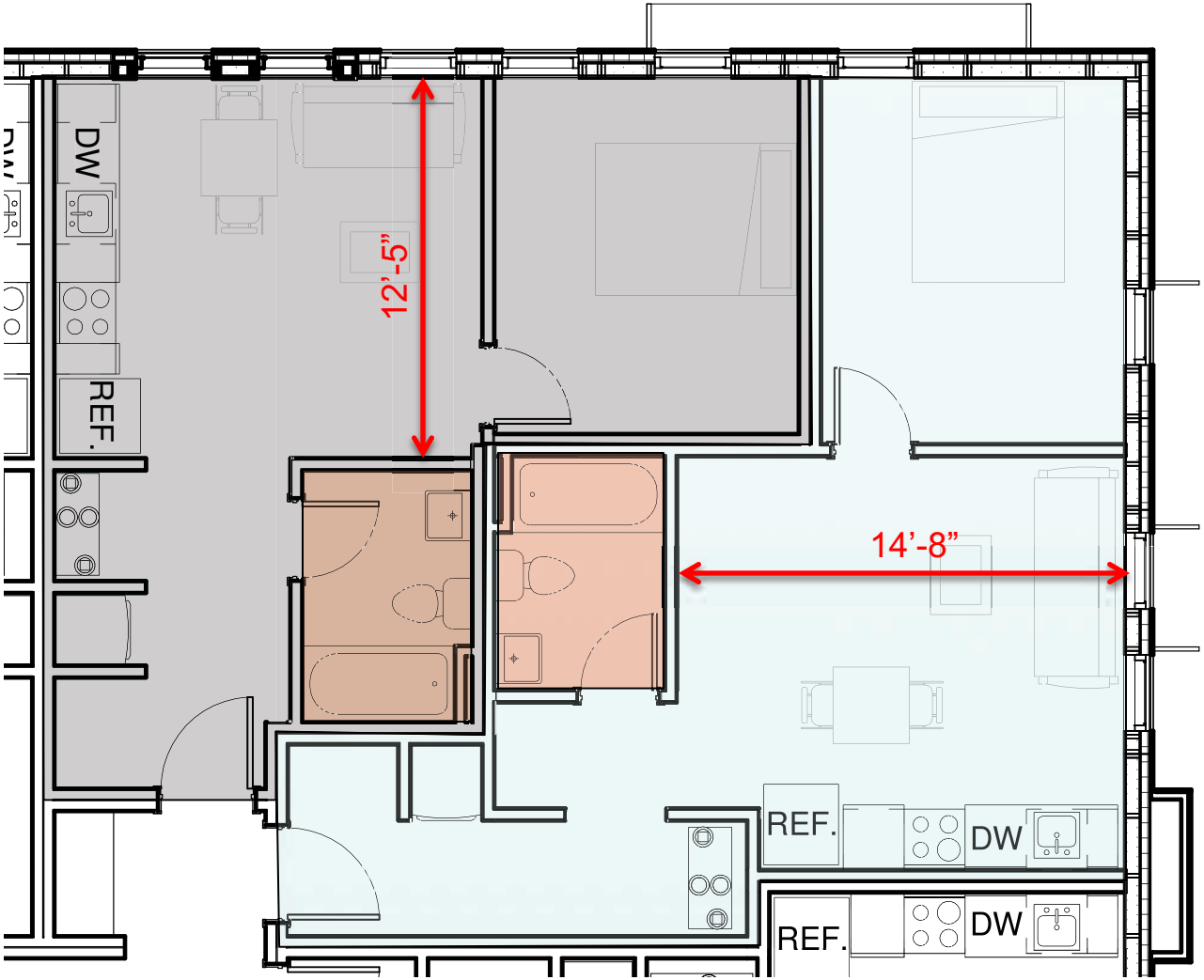
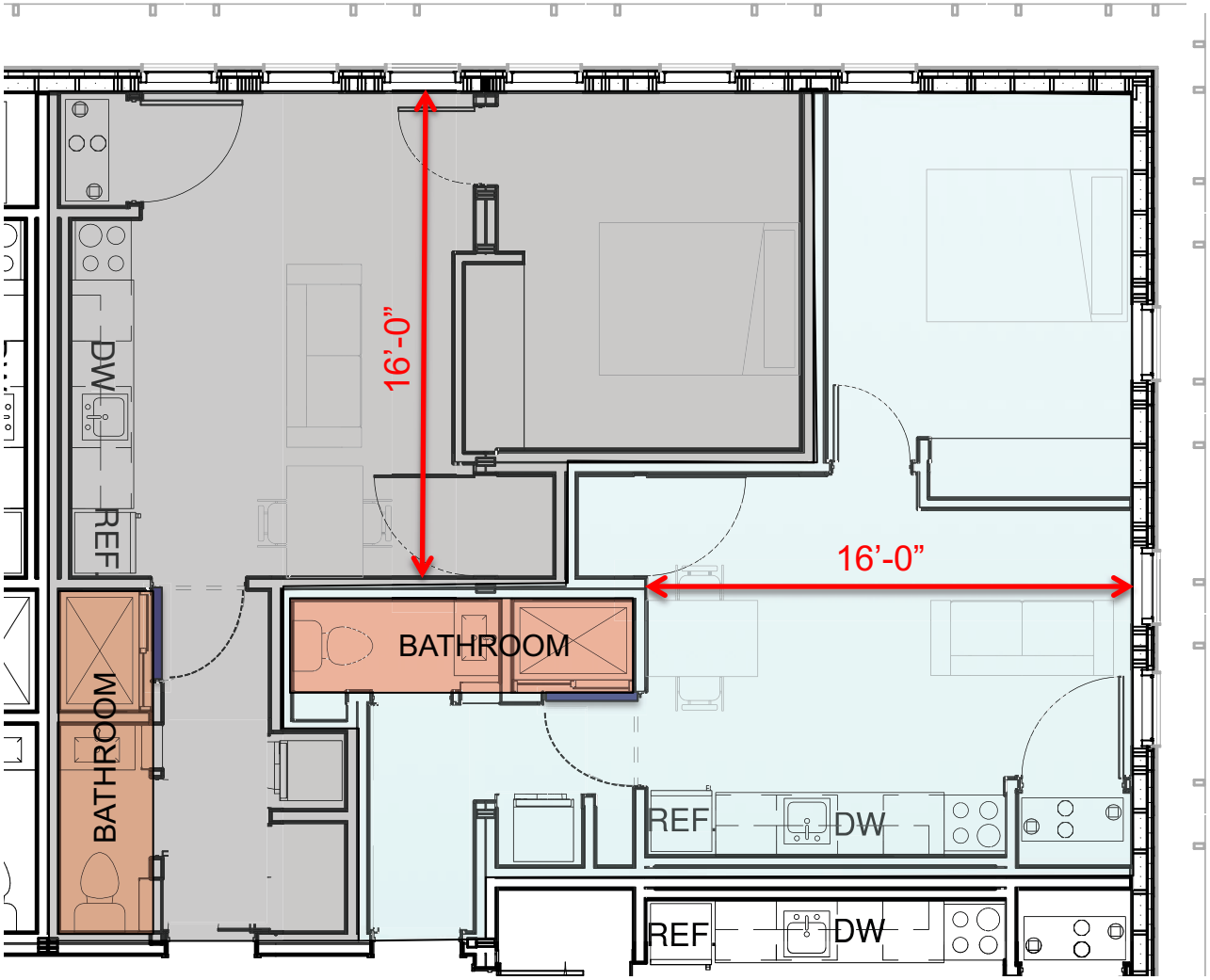
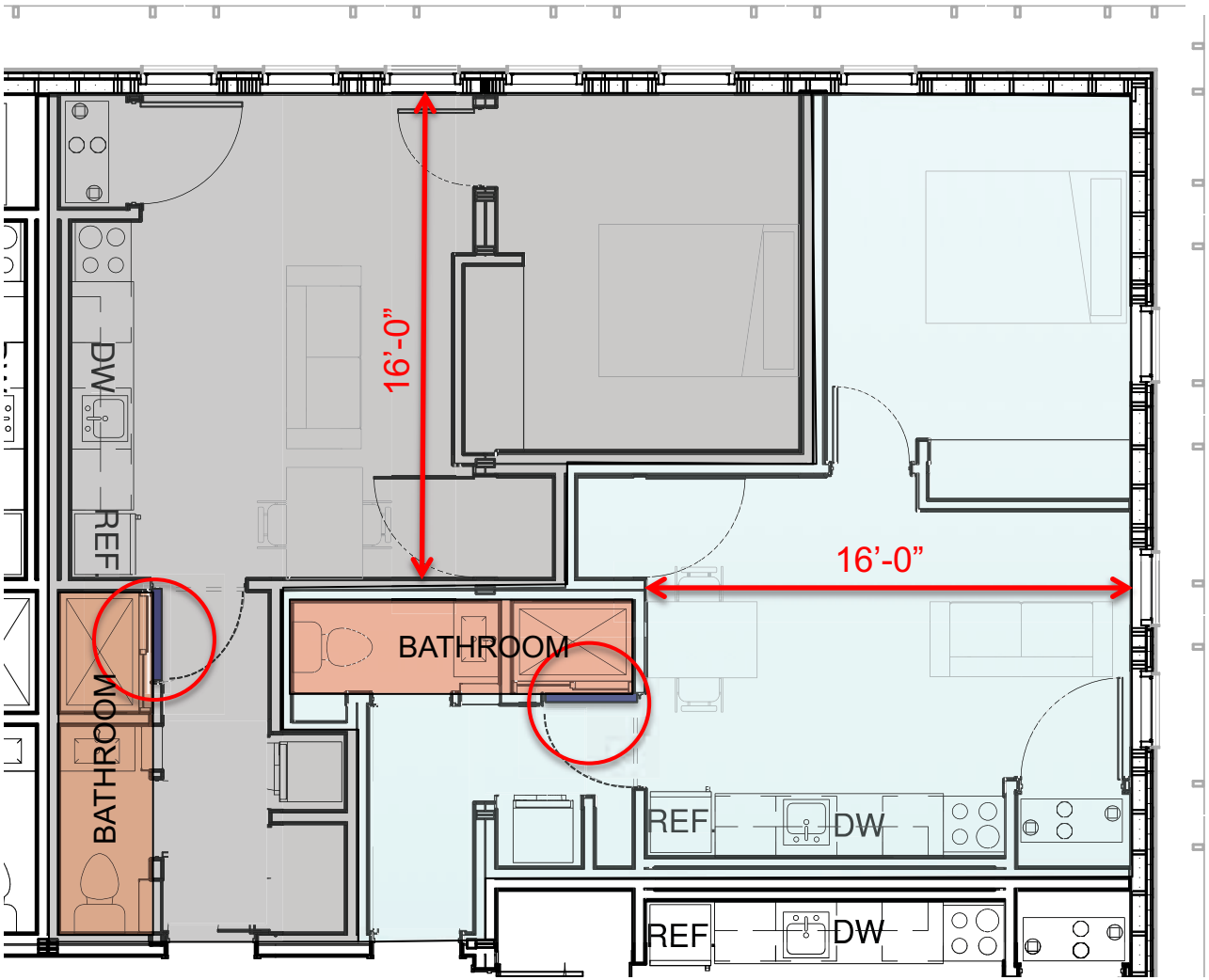


NEW 450sf, 1-bed unit



Marcel Duchamp's door at Rue Larrey
that is both open and closed
1927

NEW 450sf, 1-bed unit



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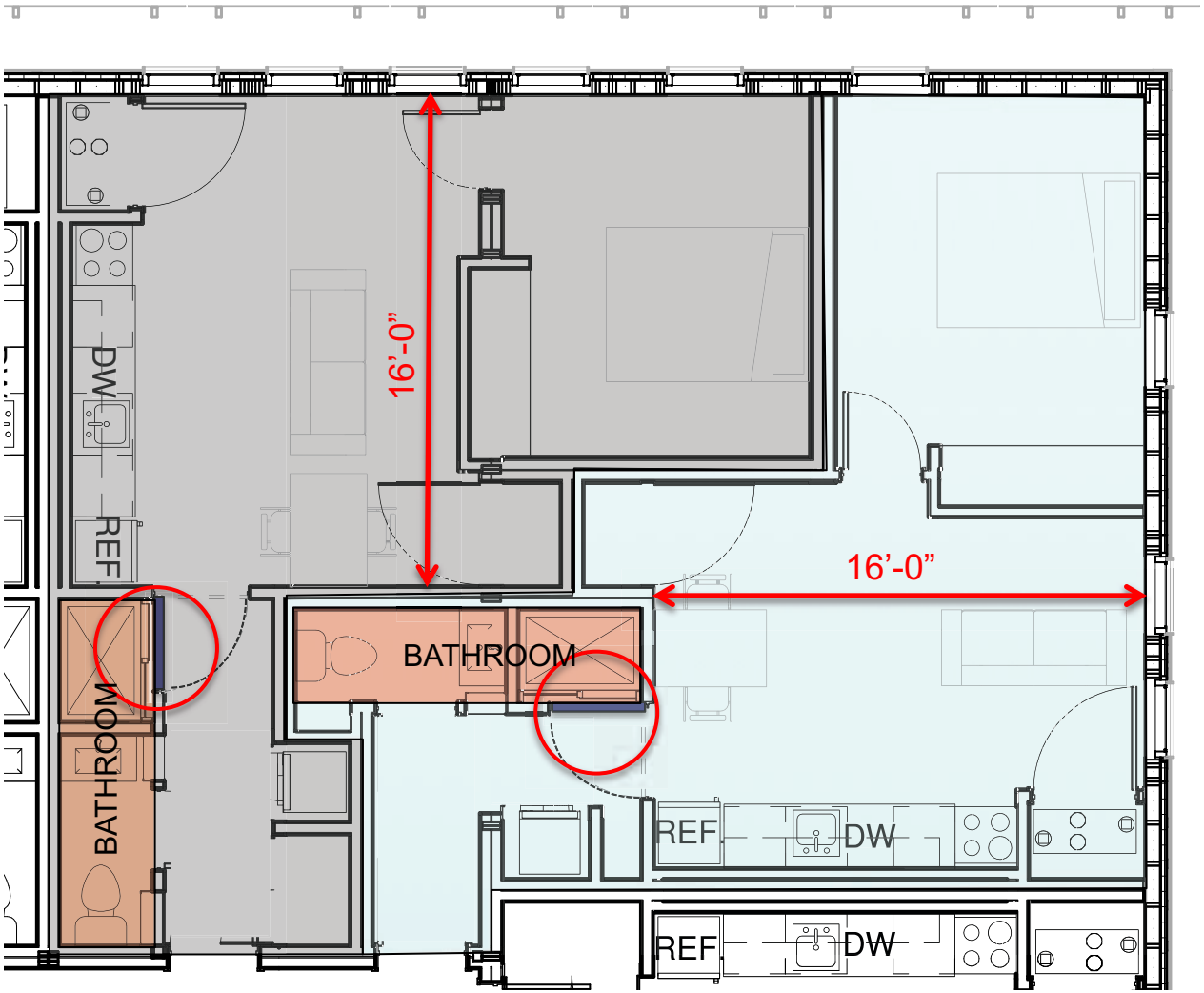

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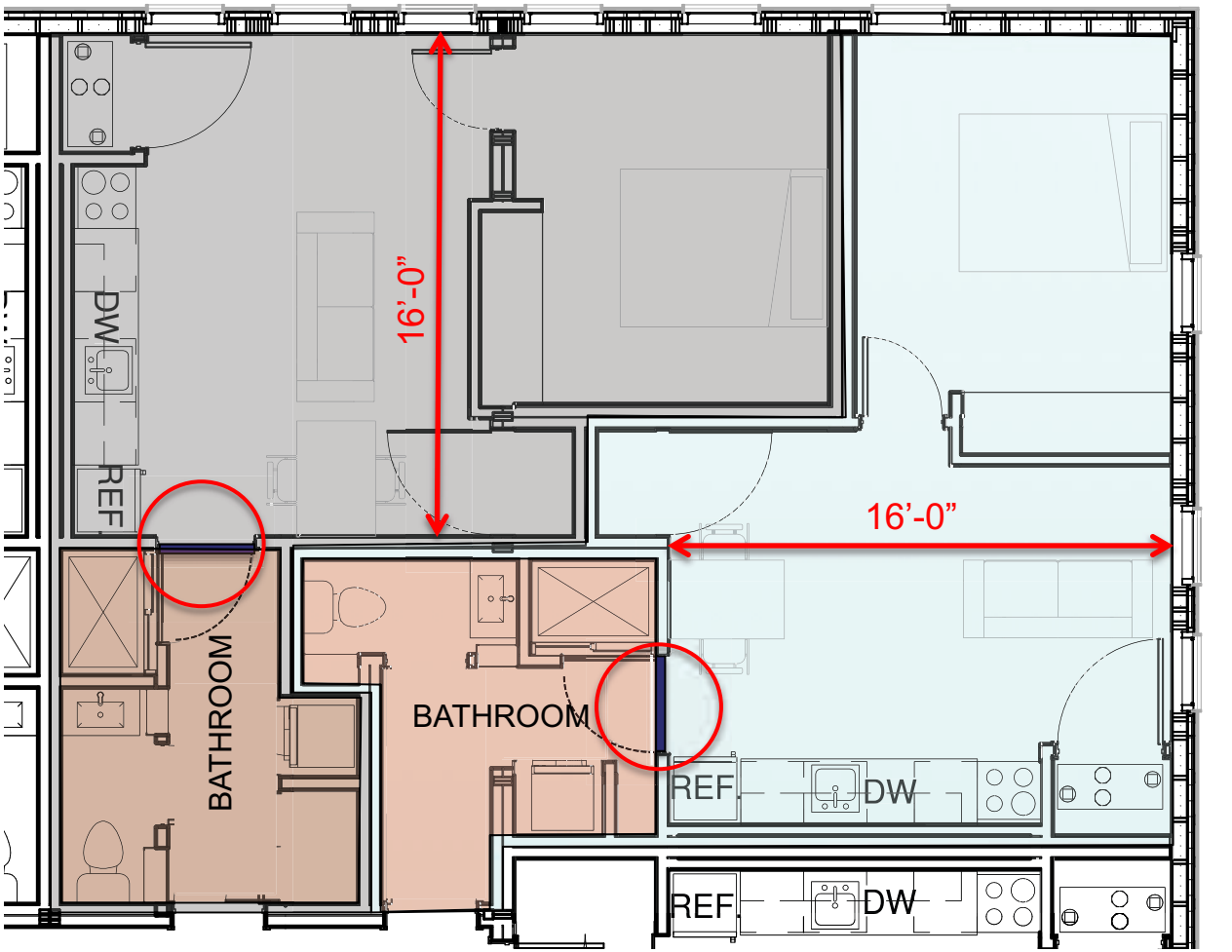
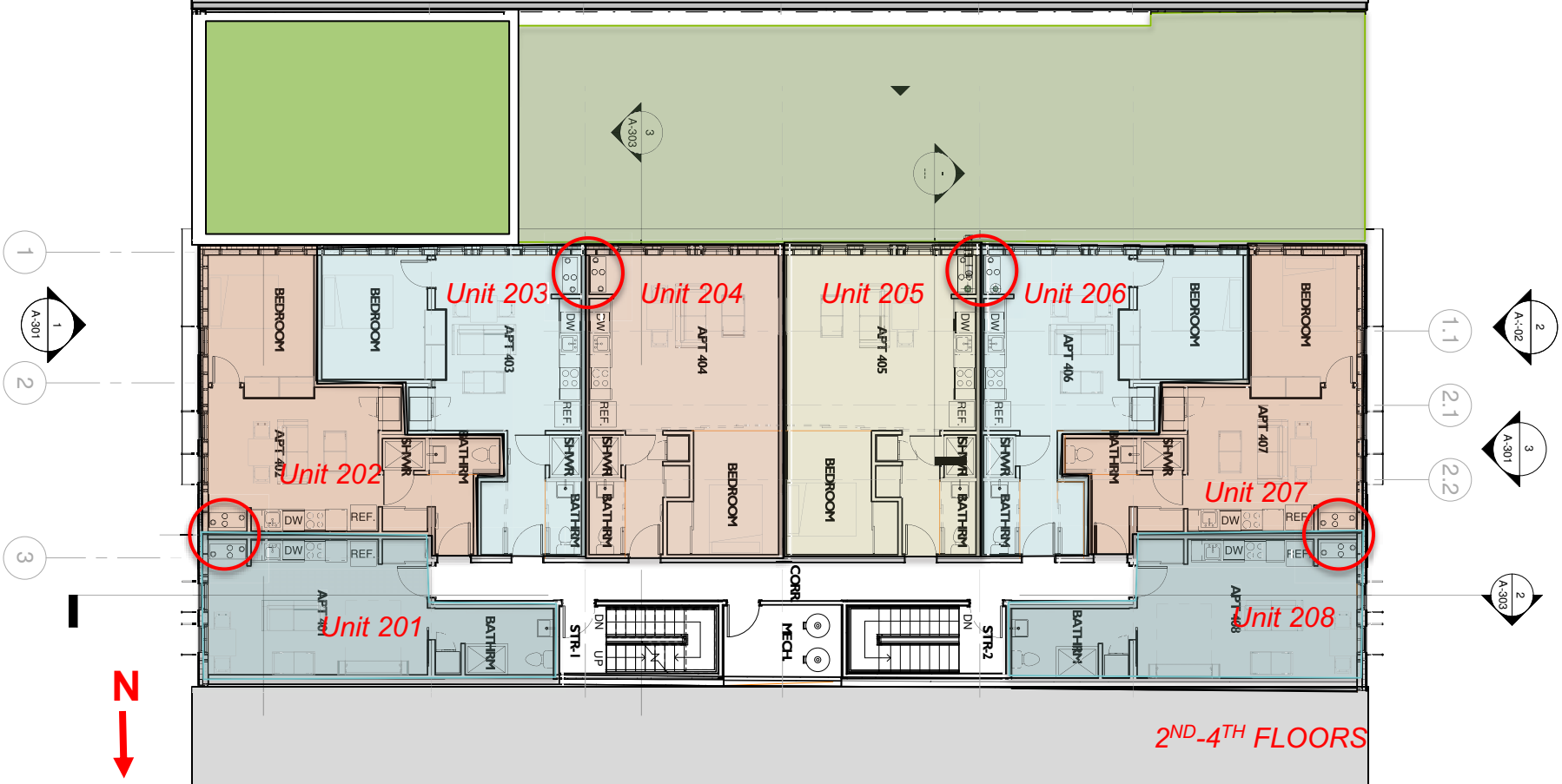


HEATING, COOLING, VENTILATION

MINOTAIR

- *Decentralized*
- *Combination ERV, heating, cooling, dehumidification*
- *Condenser self-contained*
- *No separate HVAC needed for hallways*



2ND-4TH FLOORS

HEATING, COOLING, VENTILATION

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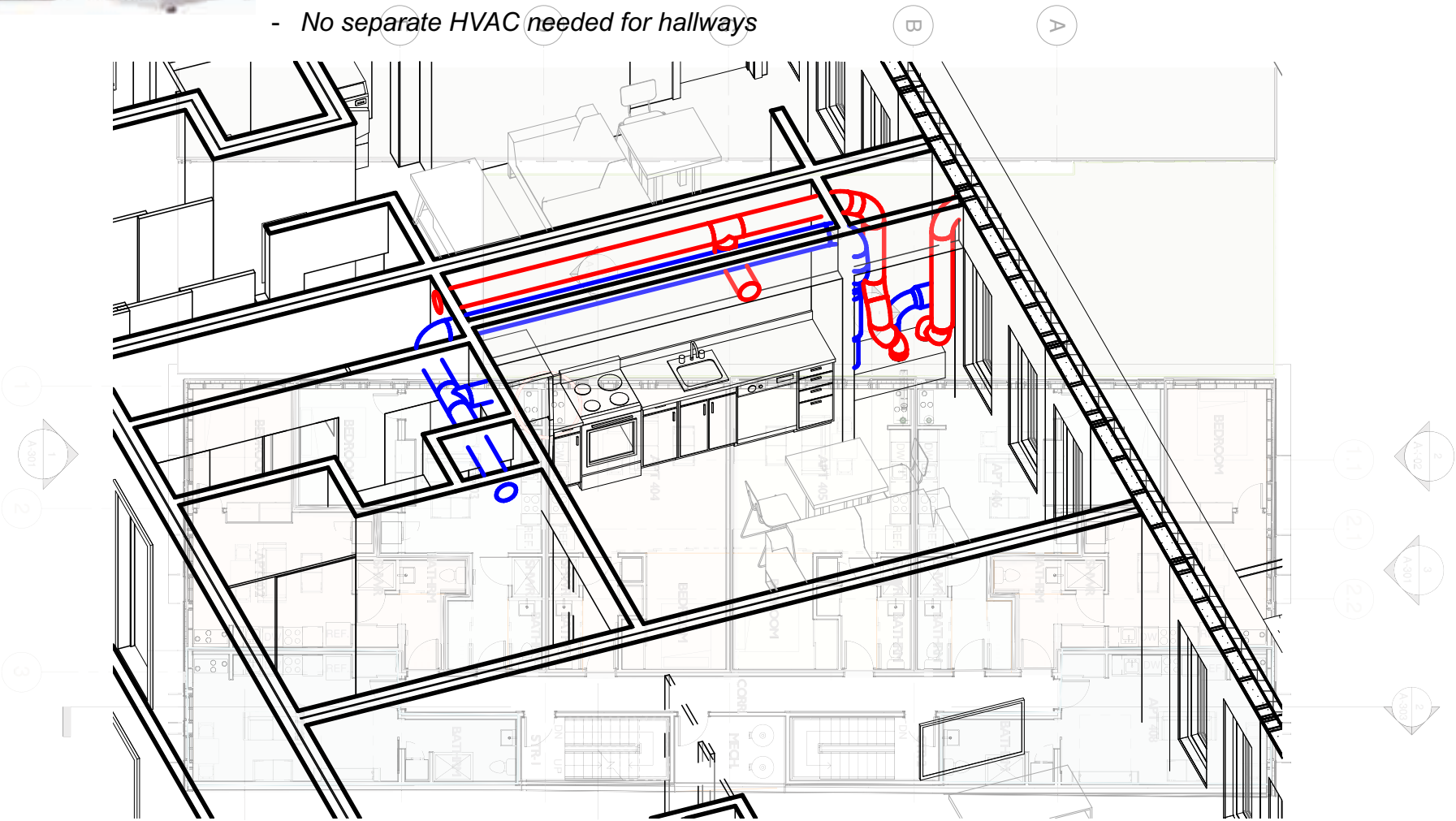

DUCTING STRAGETY

BANK FLATS 2018: 28 units and retail

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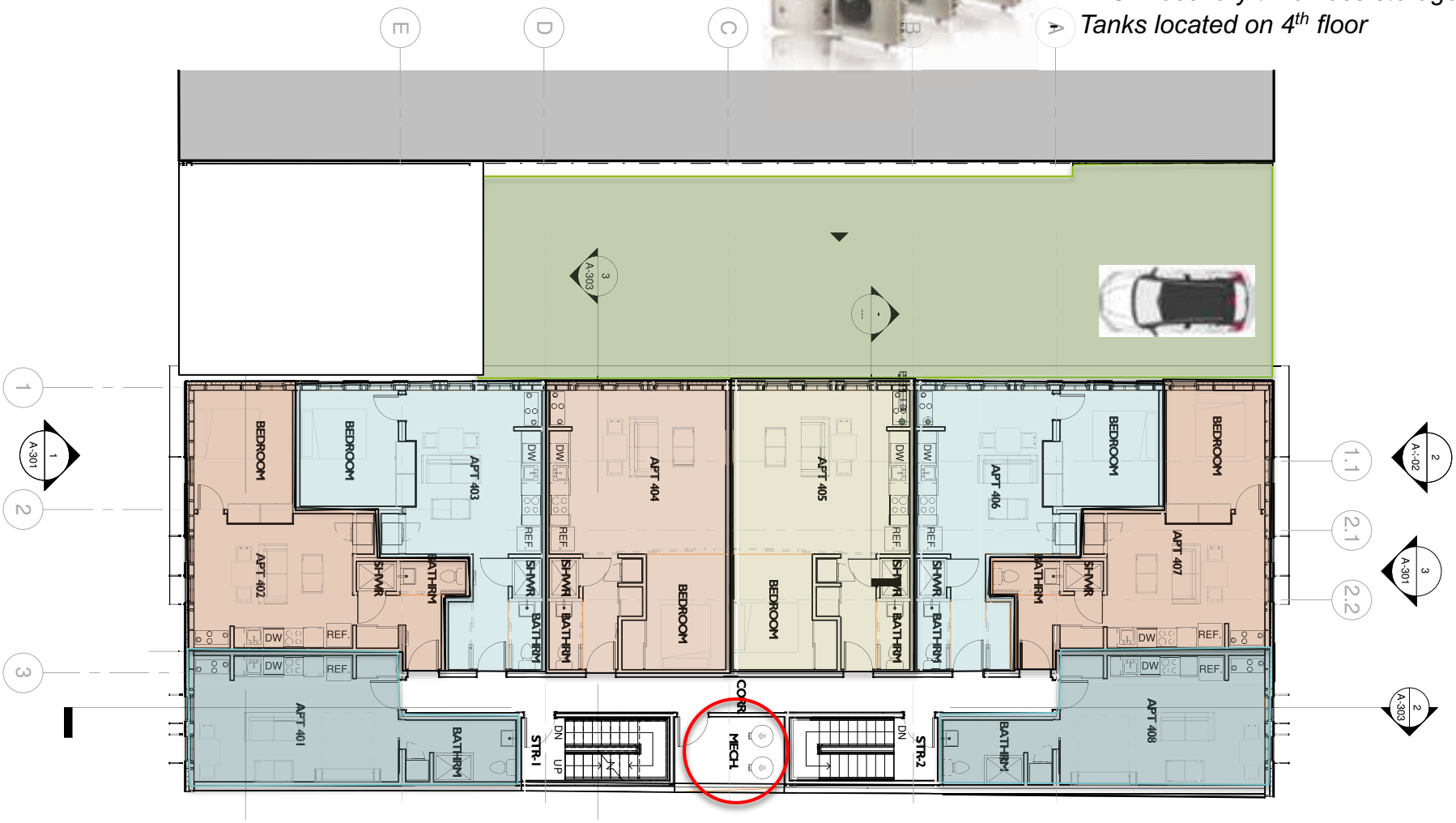
HOT WATER

SANDEN

- *SEMI- Decentralized*
- *Heat pumps on roof*
- *FAST recovery time: less storage*
- *Tanks located on 4th floor*



2ND-4TH FLOORS

BANK FLATS 2018: 28 units and retail

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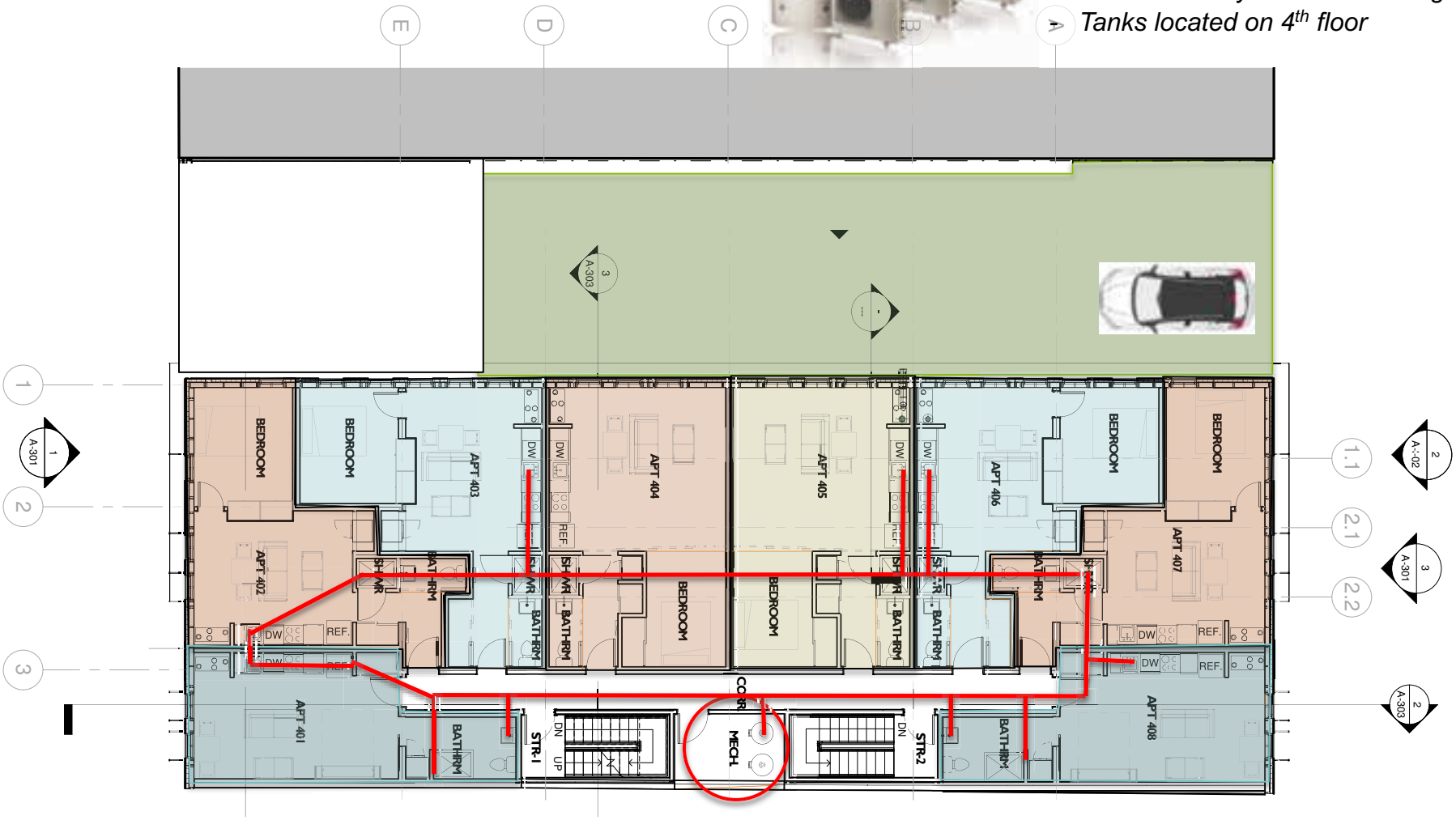
- *FAST recovery time: less storage*
- *Tanks located on 4th floor*

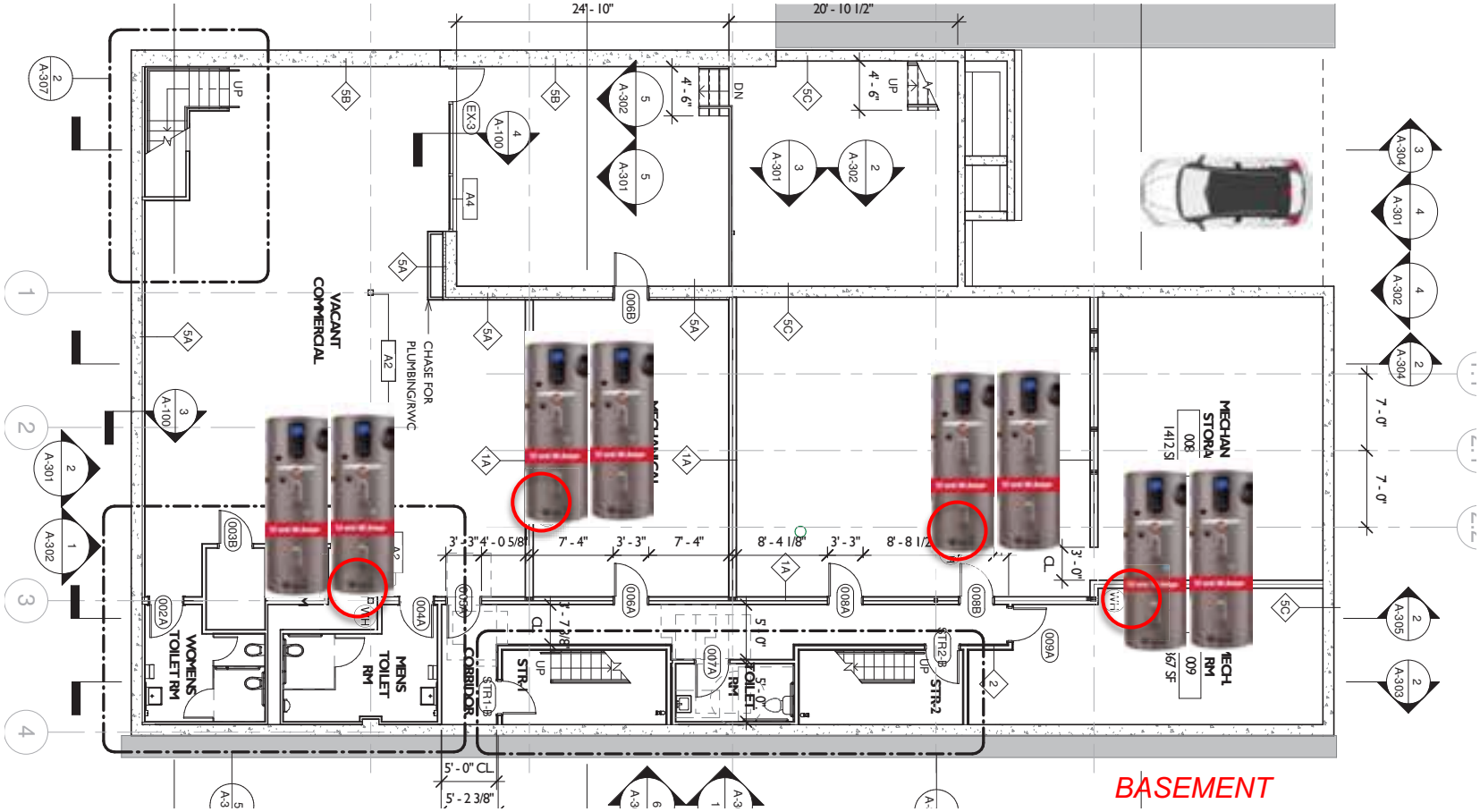


2ND-4TH FLOORS

BANK FLATS 2018: 28 units and retail

RHEEM HPWH

- ½ PRICE!!
- ½" the piping/heat loss
- Located in basement
- Free cooling/dehumidification basement
- No heat pumps on roof
- Proven technology

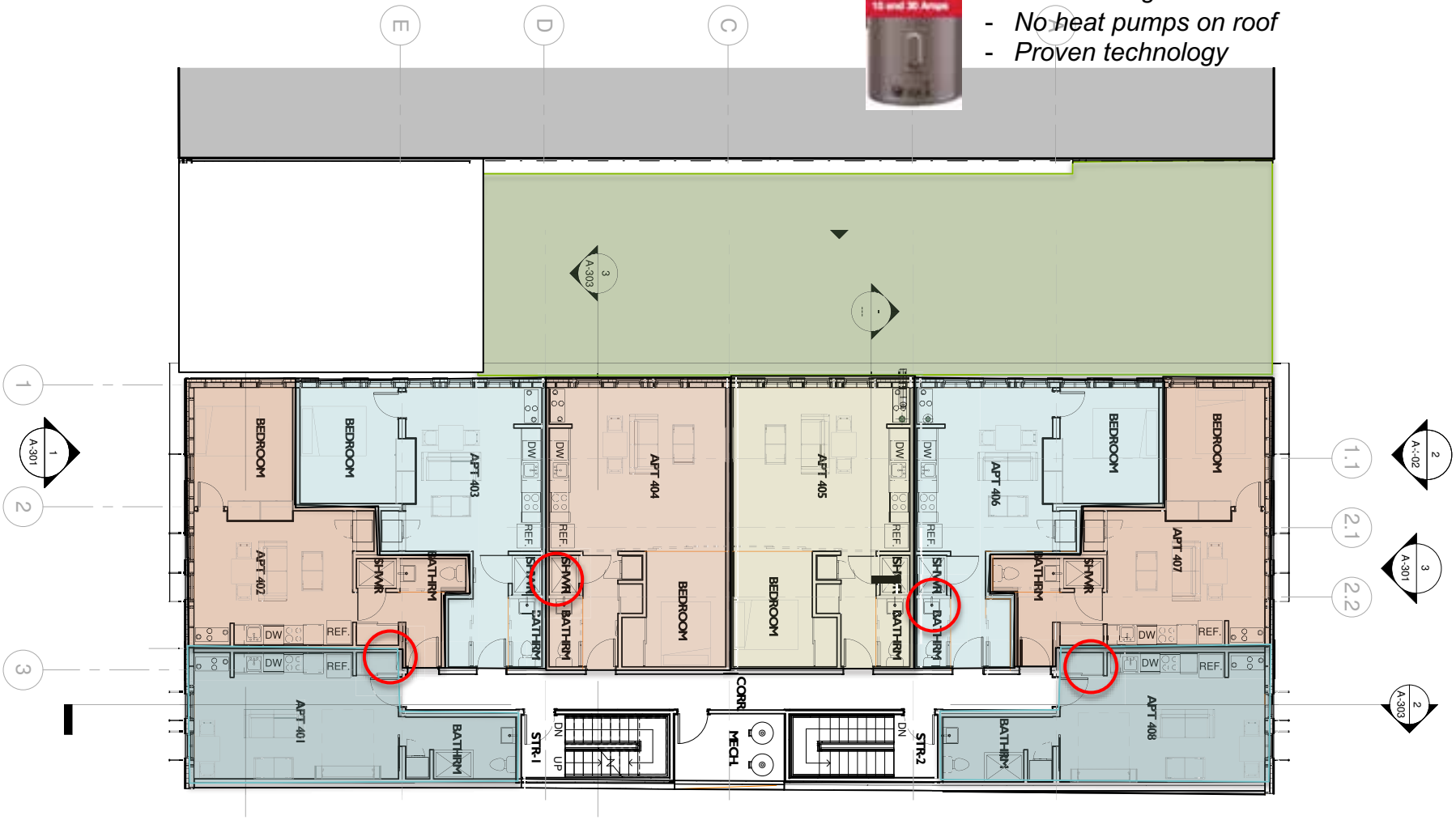


BASEMENT

BANK FLATS 2018: 28 units and retail

RHEEM HPWH

- ½ PRICE!!
- ½" the piping/heat loss
- Located in basement
- Free cooling/dehumidification basement
- No heat pumps on roof
- Proven technology



2ND -4TH FLOORS

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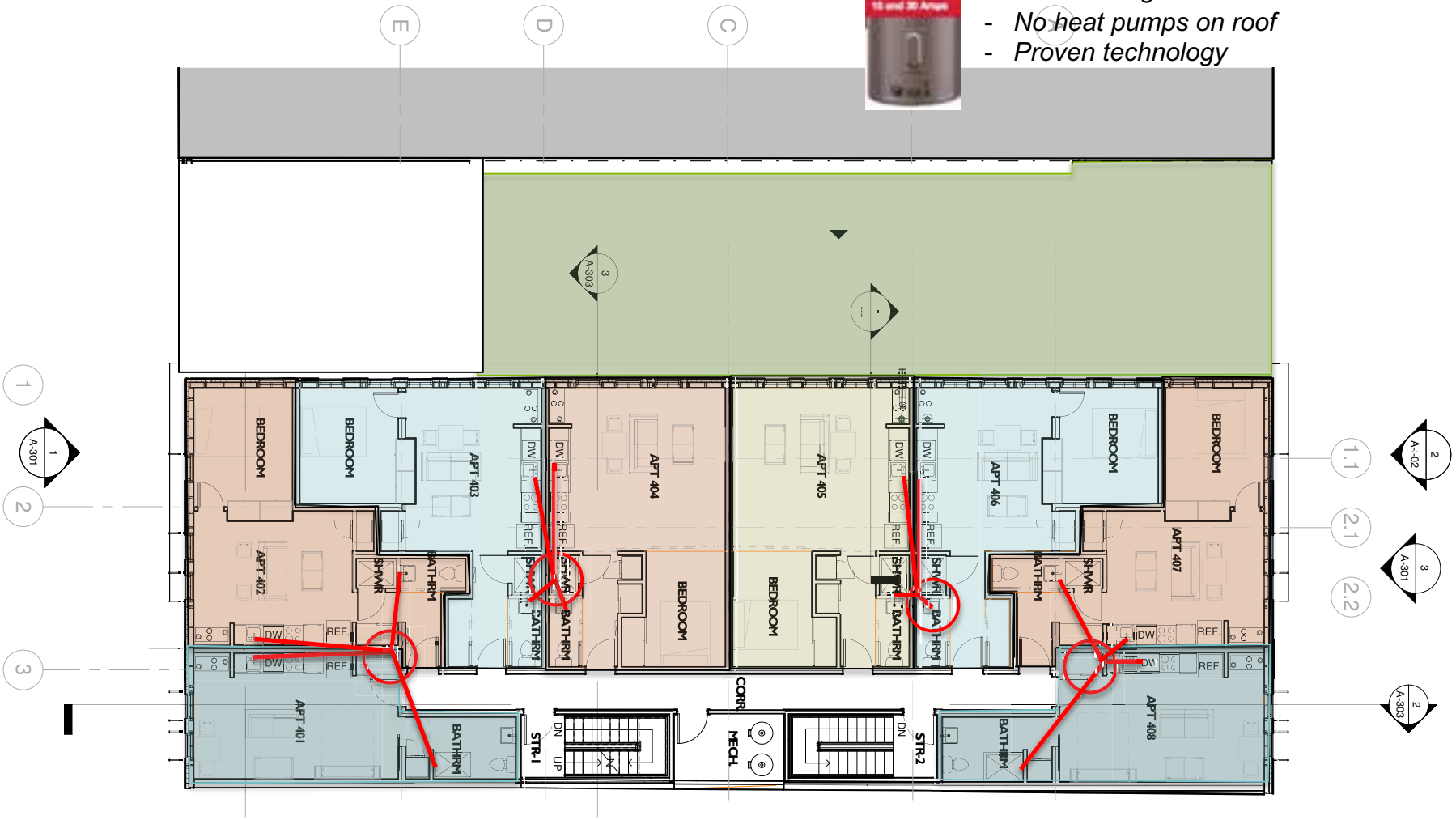
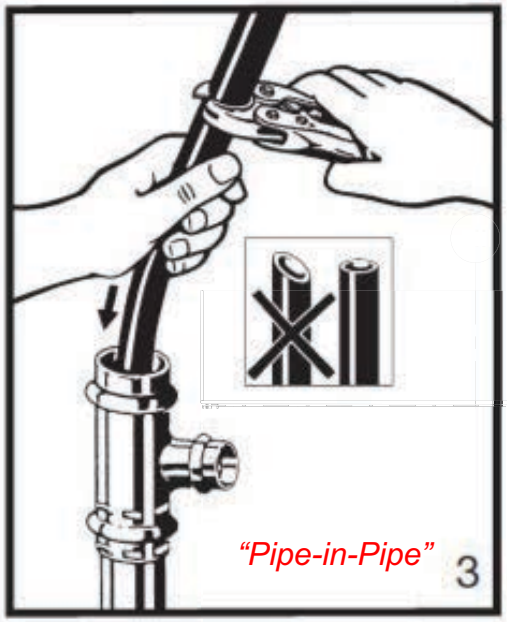
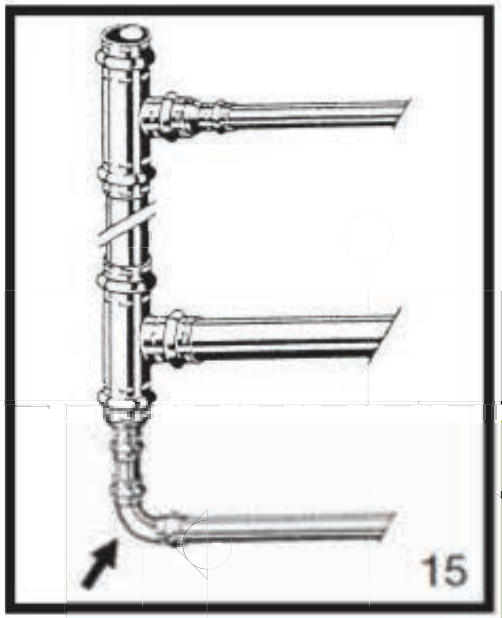


2ND -4TH FLOORS

BANK FLATS 2018: 28 units and retail





RHEEM HPWH

- *½ PRICE!!*
- *½" the piping/heat loss*
- *Located in basement*
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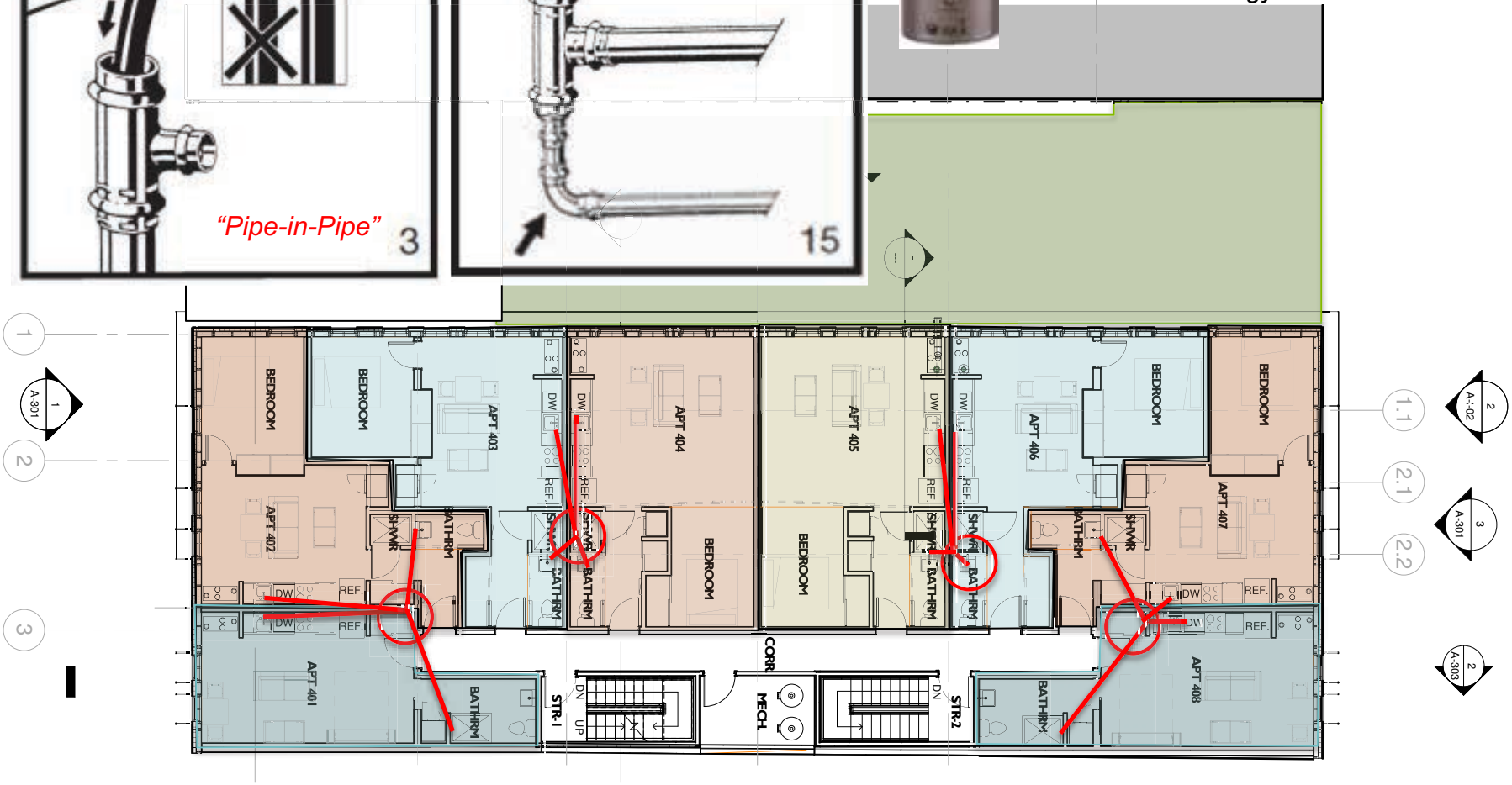
- *No heat pumps on roof*
- *Proven technology*



2ND -4TH FLOORS

BANK FLATS 2018: 28 units and retail

BANK FLATS 2019: 28 units and retail: Foundation

BANK FLATS 2019: 28 units and retail: Foundation

BANK FLATS 2019: 28 units and retail: 1st Fl framing

BANK FLATS 2019: 28 units and retail: Buildsmart panelization

BANK FLATS 2019: 28 units and retail: Buildsmart panelization

BANK FLATS 2019: 28 units and retail: One week per floor

BANK FLATS 2019: 28 units and retail: Roof

BANK FLATS 2019: 28 units and retail: Roof

BANK FLATS 2019: 28 units and retail: Roof

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BANK FLATS 2019: 28 units and retail: Roof

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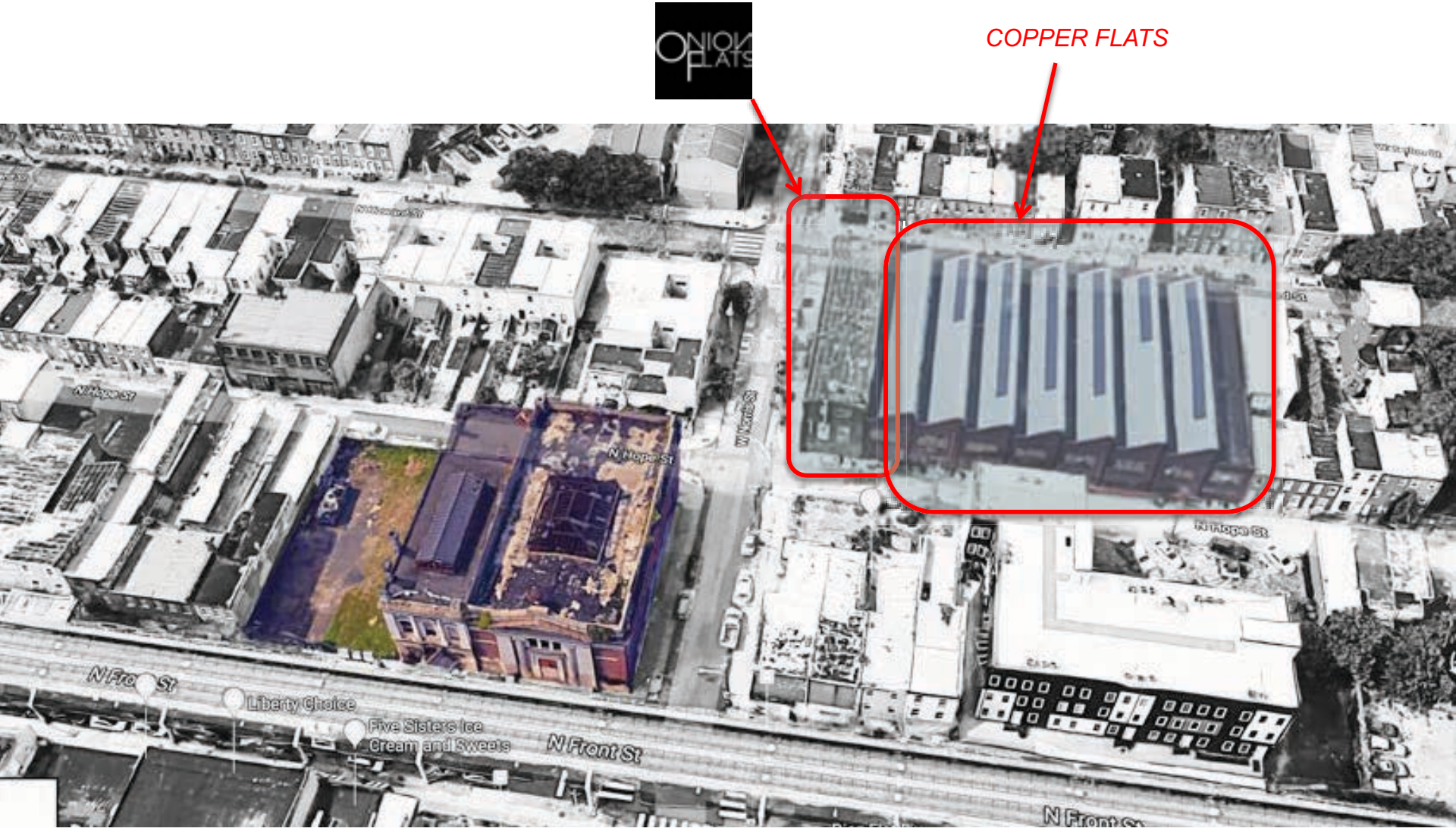


COPPER FLATS 2020: 88 units

VIEW FROM W. NORRIS LOOKING NORTH ON N. HOWARD STREET (PROPOSED)

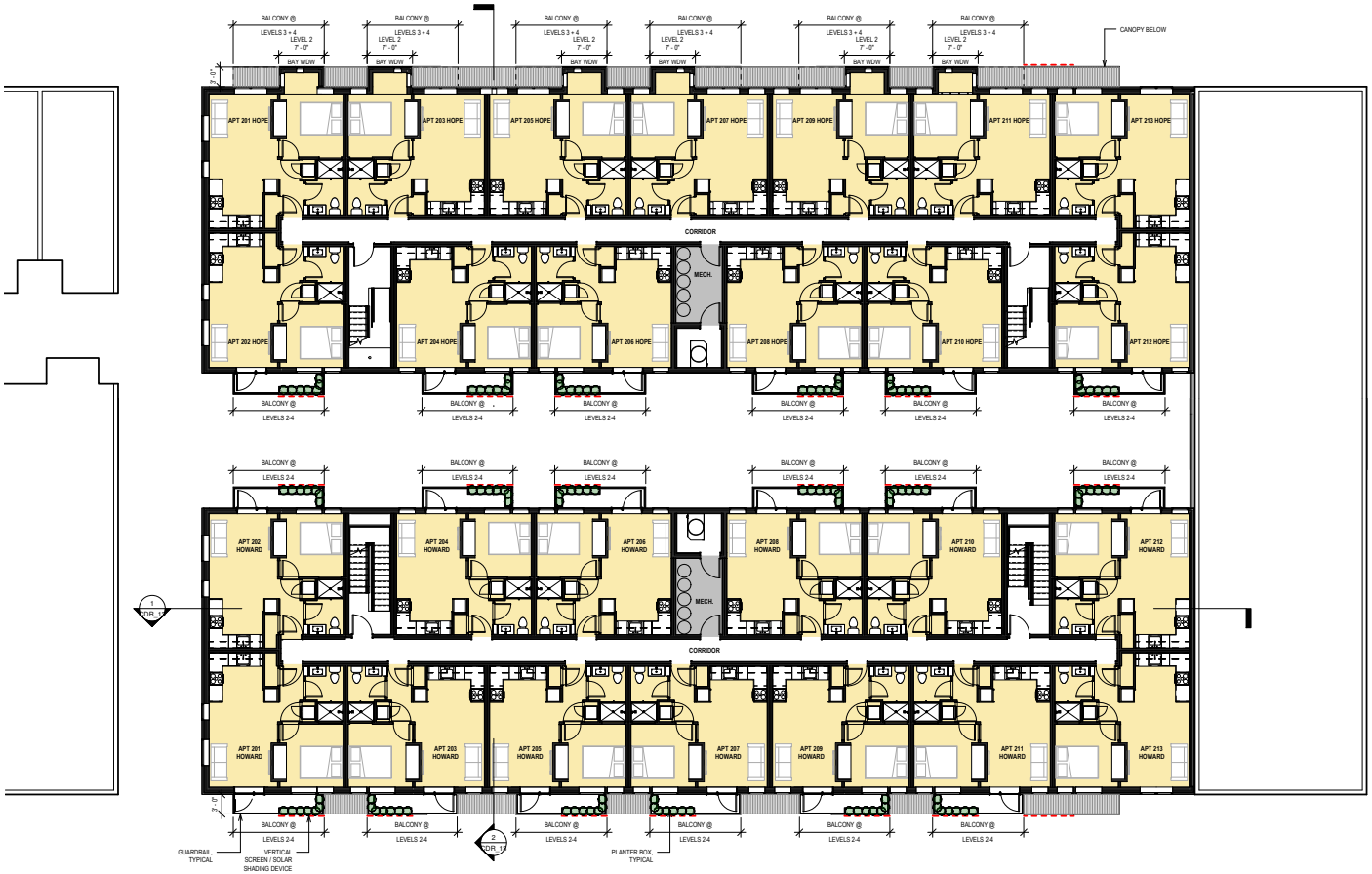
COPPER FLATS 2020: 88 units

LEVEL 1 UNIT COUNT	
UNIT TYPE	QTY
ARTIST STUDIO (HOPE)	4
ARTIST STUDIO (HOWARD)	4
STUDIO APARTMENT (HOPE)	1
STUDIO APARTMENT (HOWARD)	1
Grand total: 10	10

PARKING COUNT	
TYPE	QTY
ADA VAN ACCESSIBLE PARKING SPACE	2
ELECTRIC VEHICLE PARKING SPACE	2
TYPICAL PARKING SPACE	22
Grand total: 26	

1 GROUND FLOOR PLAN
1/8" = 1'-0"

COPPER FLATS 2020: 88 units



LEVEL 2 UNIT COUNT	
UNIT TYPE	QTY
1 BEDROOM APARTMENT (HOPE)	13
1 BEDROOM APARTMENT (HOWARD)	13
Grand total: 26	26

LEVEL 3 UNIT COUNT	
UNIT TYPE	QTY
1 BEDROOM APARTMENT (HOPE)	13
1 BEDROOM APARTMENT (HOWARD)	13
Grand total: 26	26

LEVEL 4 UNIT COUNT	
UNIT TYPE	QTY
1 BEDROOM APARTMENT (HOPE)	13
1 BEDROOM APARTMENT (HOWARD)	13
Grand total: 26	

VERTICAL SCREEN / SOLAR SHADING DEVICE

CANOPY @ LEVEL 2 FLOOR LEVEL

RESIDENTIAL DWELLING UNIT

SHARED SPACE / CIRCULATION

MECHANICAL / STORAGE

1 TYPICAL FLOOR PLAN, LEVELS 2-4
1/8" = 1'-0"

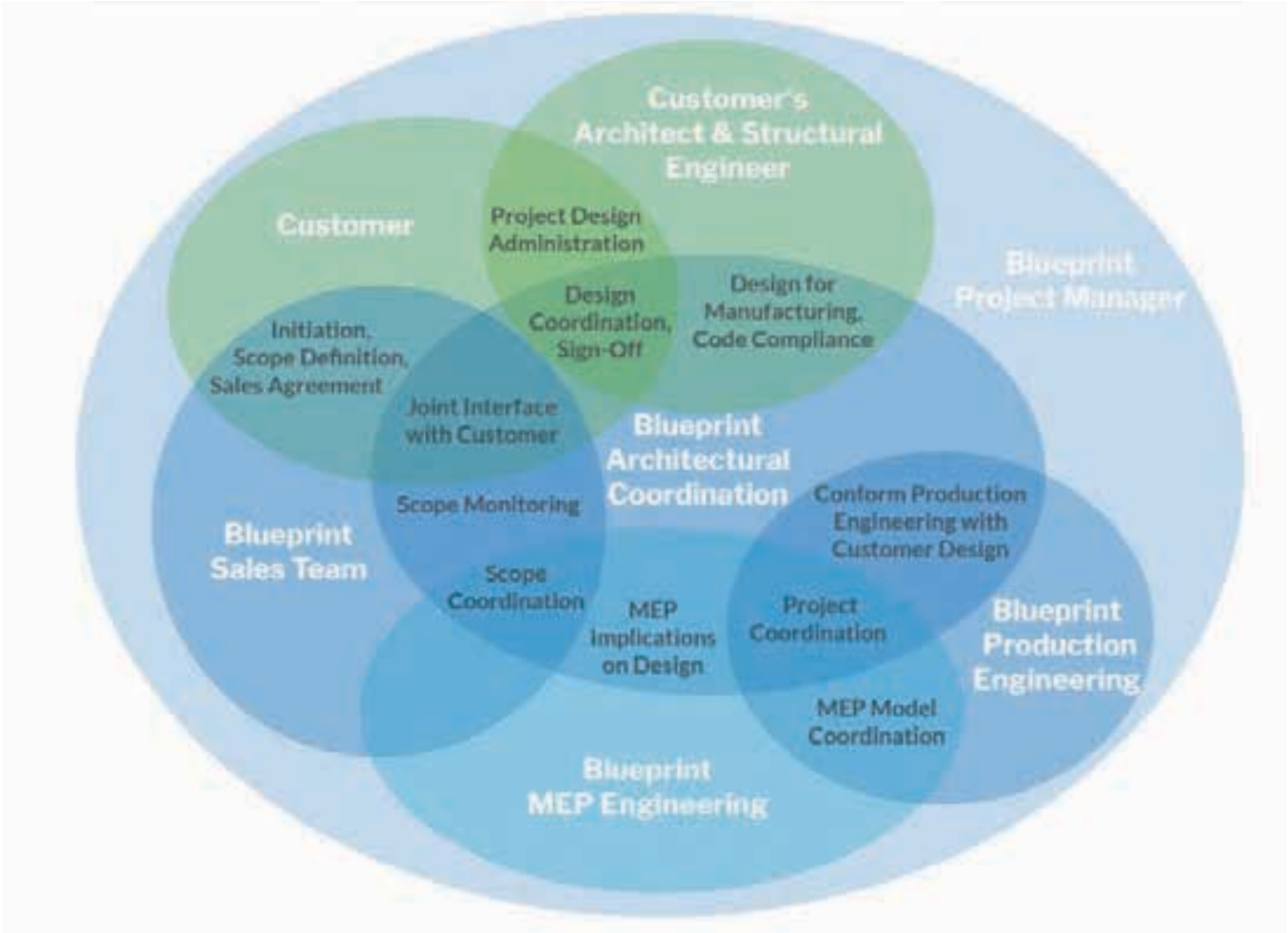
COPPER FLATS 2020: 88 units

blueprint robotics

THE BLUEPRINT METHOD

COPPER FLATS 2020: 88 units

blueprint robotics



COPPER FLATS 2020: 88 units

blueprint robotics

COPPER FLATS 2020: 88 units

blueprint robotics

COPPER FLATS 2020: 88 units

BELFIELD HOMES

PHILADELPHIA, PENNSYLVANIA 19141

ONION FLATS

NON-PROFIT COMMUNITY ORGANIZATION

RAISE OF HOPE

PHILADELPHIA REDEVELOPMENT AUTHORITY

UNIT ROOF LVL

0 4 8 16

UNIT PLAN LVL 3

0 4 8 16

UNIT PLAN LVL 2

0 4 8 16

UNIT PLAN LVL 1

0 4 8 16

FIRST

CERTIFIED

PASSIVE HOUSE
IN
PENNSYLVANIA

START: APRIL 20, 2012

CERTIFICATE OF OCCUPANCY: JULY 20, 2012

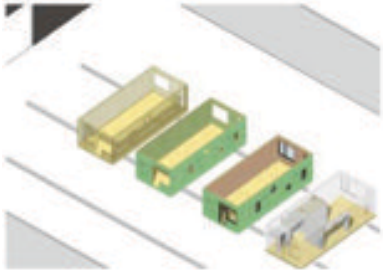
Certified Passive House
Passive House Institute

RECIPIENT OF THE
2014 INTERNATIONAL
PASSIVE HOUSE AWARD

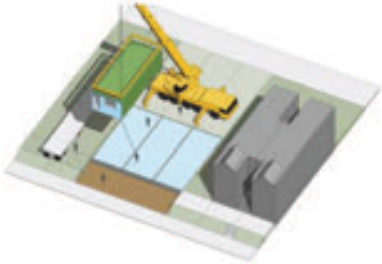
PHIUS
Passive House Institute US

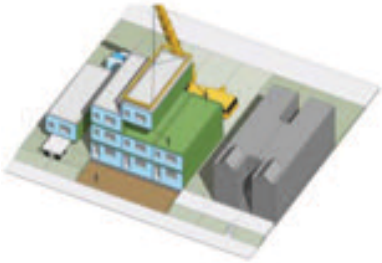
SECOND PLACE WINNER
2015 PHIUS AWARD
"AFFORDABLE HOUSING"

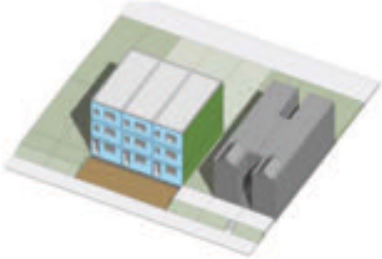
2013
AIA
HONOR AWARD



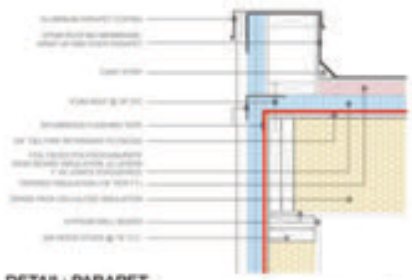
FACTORY BUILD



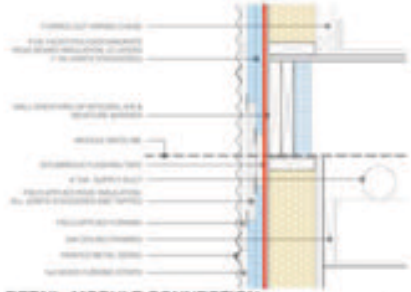




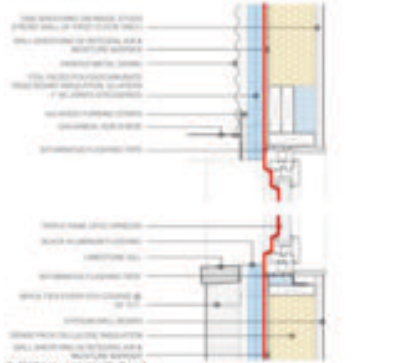
SITE ASSEMBLE



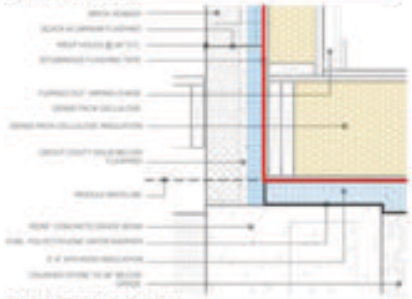
DETAIL: PARAPET



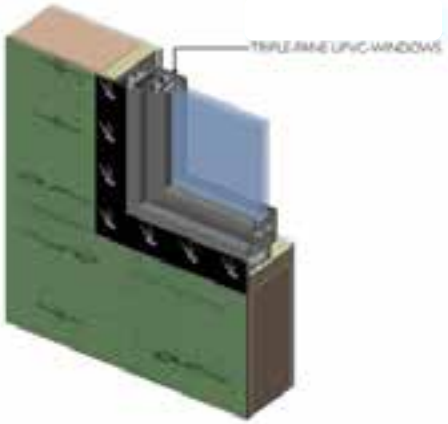
DETAIL: MODULE CONNECTION

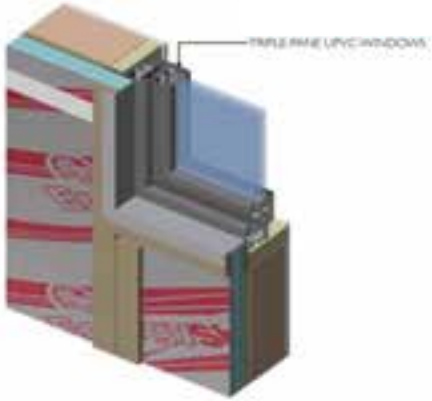


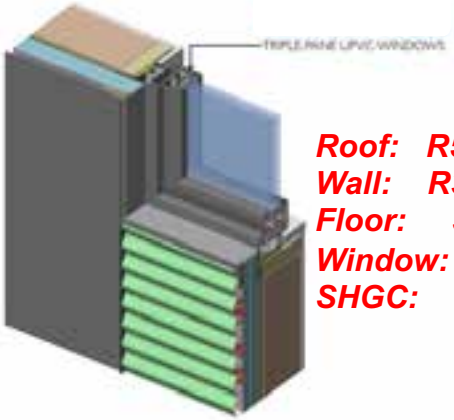
DETAIL: WINDOW



DETAIL: FOUNDATION







Roof: R52.3
Wall: R33.6
Floor: 58.4
Window: .11
SHGC: .63

ENERGY/BUILDING CONSULTANTS & ENGINEERS
One Crescent Drive • Philadelphia, PA 19112 • 1-888-MAGRANN • www.magrann.com
New Jersey • Pennsylvania • Kentucky • Ohio

BUILDING LEAKAGE TEST COMPARISON

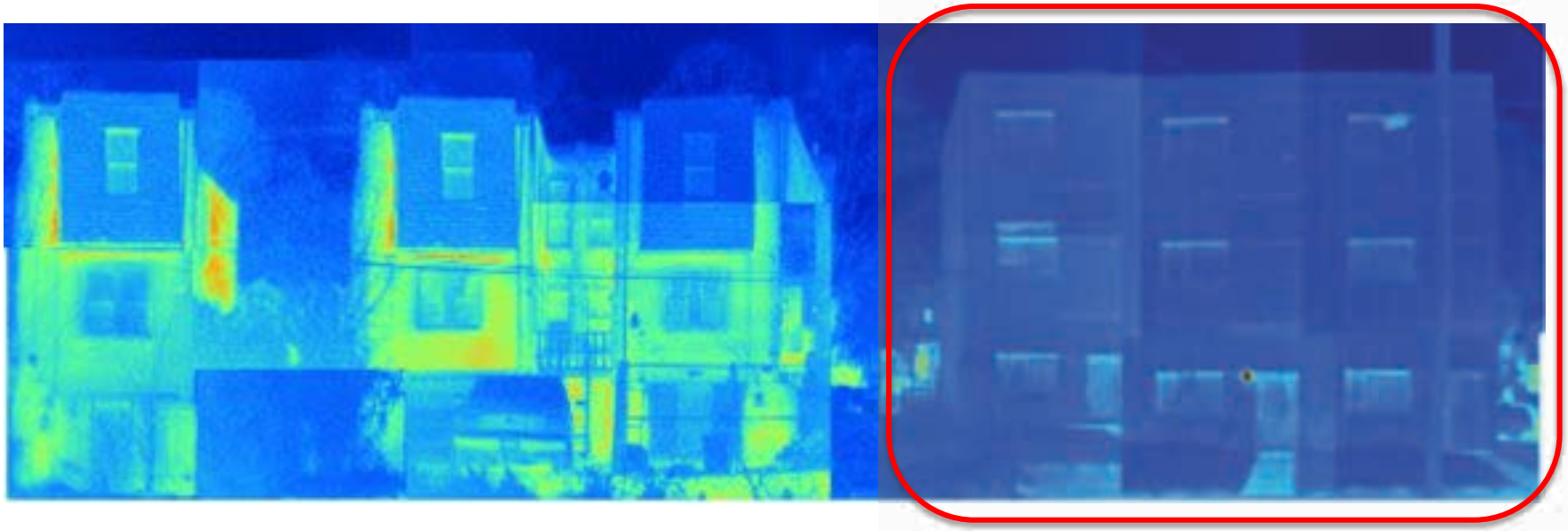
Test #1		Test #2	
Test File:	Depressurization File	Test File:	Pressurization File
Date of Test:	7/5/2012	Date of Test:	7/5/2012
Customer:	Onion Flats, LLC 111 West Norris Street Philadelphia, Pennsylvania 19122	Customer:	Onion Flats
Phone:	215-783-5591		

Test Results

	Test #1	Test #2	Change	Percent
1. Airflow at 50 Pascals:	293 CFM	201 CFM	-92 CFM	-31.4 %
	0.48 ACH	0.33 ACH	-0.15 ACH	-31.4 %

FINAL AIRFLOW: **0.405 ACH 50**

PASSIVE HOUSE MAX **0.6 ACH 50**



CONSTRUCTION COSTS

	PER UNIT	PROJECT TOTAL
GENERAL CONDITIONS	$1,500	$4,500
EXCAVATION & GRADING	$3,000	$9,000
FOUNDATIONS	$7,000	$21,000
HELICAL PIERS	$6,500	$19,500
SITE UTILITIES (WATER / SEWER / ELECTRIC)	$10,000	$30,000
SOLAR PV (5 KW PER HOUSE - 15KW TOTAL)	$15,000	$45,000
TOTAL SITE WORK	$43,000	$129,000
FRAMING / INSULATION / SHEETROCK / PAINT	$50,250	$150,750
EXT. WINDOWS & DOORS	$9,850	$29,550
MECHANICAL SYSTEM	$8,500	$25,500
PLUMBING & SPRINKLERS	$9,500	$28,500
ELECTRICAL	$5,500	$16,500
CABINETRY / COUNTERTOPS	$5,500	$16,500
APPLIANCES	$6,200	$18,600
HARDARE & FINISHES	$9,300	$27,900
EXTERIOR CLADDING	$4,500	$13,500
E-MONITORING	$1,900	$5,700
LABOR / INSPECTIONS / OH-P / DELIVERY / INSTALL	$95,000	$285,000
TOTAL MODULAR	$206,000	$618,000.00
MODULAR COST PER SQFT		$107.00 SF
TOTAL HARD COSTS	$249,000	$747,000.00
COST PER SQFT (1920 SQFT x 3 HOMES = 5760 SQFT)		$129.69

PHFA

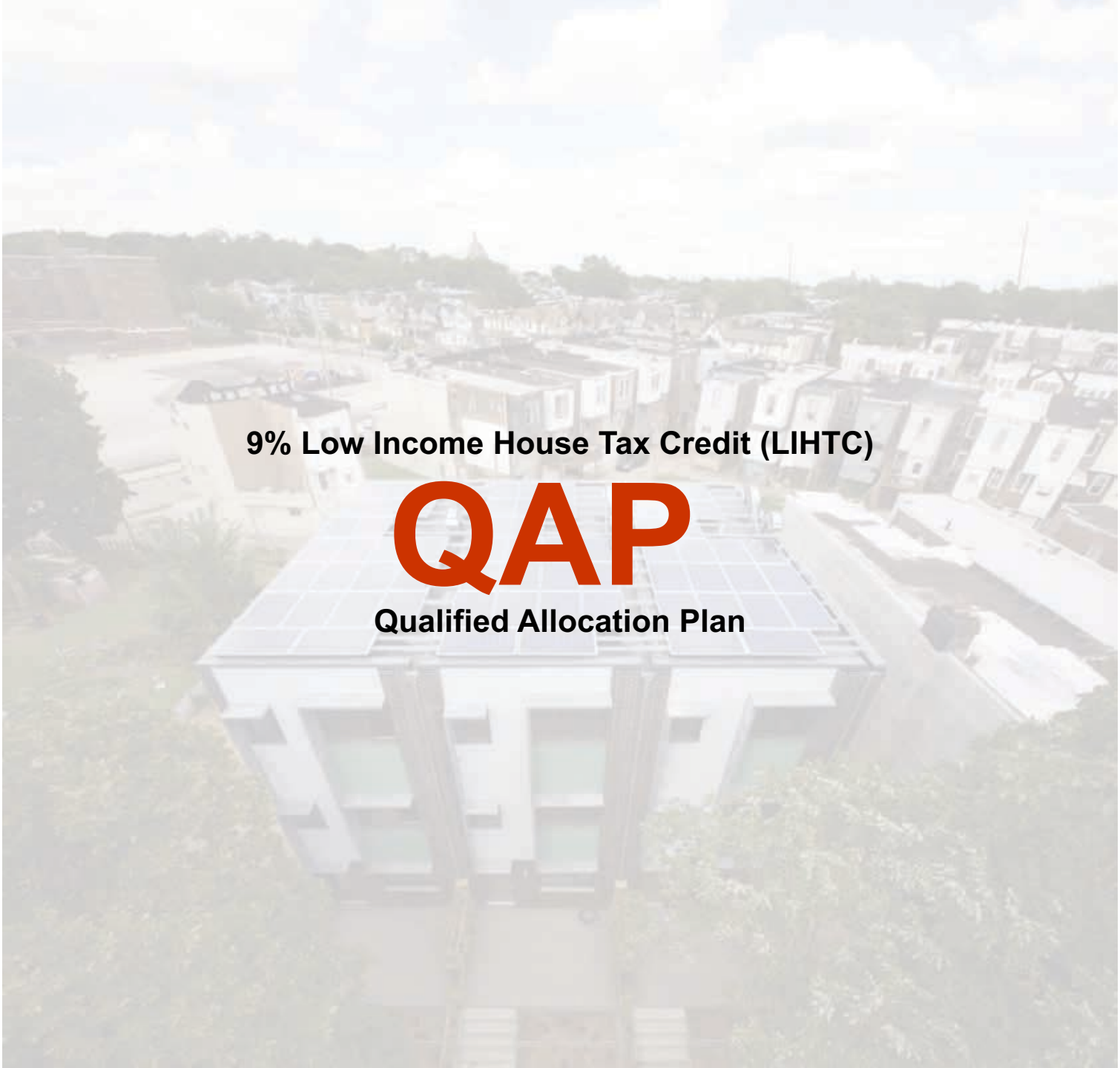
PENNSYLVANIA HOUSING FINANCE AGENCY

MAKE ALL AFFORDABLE HOUSING NET-ZERO-ENERGY-CAPABLE BY 2030

USE PASSIVE HOUSE AS THE TOOL

THE NEW GRAVITY PROJECT

HOW?



9% Low Income House Tax Credit (LIHTC)

QAP

Qualified Allocation Plan

POINTS-BASED SYSTEM

Total points	**120**
Community and Economic Impact	**30**
- Underserved Areas	
- Senior Occupancy Developments	
- Preservation	
Development Characteristics	**25**
- Smart Site Selection	
- Enterprise Green Communities	
Resident Population and Services	**50**
- Income and Rent Targeting	
- Designated Populations and Supportive Services	
- Accessible Units	
- Large Families	
Development Process	**15**
- Noncompliance	
- Ability to Proceed	
Development Cost Savings	**10**

POINTS-BASED SYSTEM

Total points	**130**
Community and Economic Impact	**30**
- Underserved Areas	
- Senior Occupancy Developments	
- Preservation	
Development Characteristics	**25**
- Smart Site Selection	
- Enterprise Green Communities	
- **PASSIVE HOUSE**	**10**
Resident Population and Services	**50**
- Income and Rent Targeting	
- Designated Populations and Supportive Services	
- Accessible Units	
- Large Families	
Development Process	**15**
- Noncompliance	
- Ability to Proceed	
Development Cost Savings	**10**

THE PHFA PROJECT

OCT 2014

"PASSIVE HOUSE points" introduced to PHFA 2015 QAP

FEB 2015

85 Multi-family project applications were received

JUNE 2015

39 projects awarded funding

38% applied as Passive House projects

8 Passive House Projects awarded funding

422 new Passive House/Net-Zero-Energy-Capable units in PA

$COST$ "Negligibly different" from NON-PH projects

THE PHFA PROJECT

Construction Cost Summary from PHFA Applications

2015 Costs

	Proj. No.	County	Climate Zone	Units (by BR Qty) 0	1	2	3	4+	Total Units	Bldg. Area	Constr. $	$ /Unit	$/SF
Single Family / Townhouse	SF-1	Franklin	5A			33	21		54	70,218	7,051,522	130,584	100
	SF-2	Schuylkill	5A		3	9	5		17	21,151	2,238,725	131,690	106
	SF-3	Philadelphia	4A		5	19	31	5	60	79,795	9,363,626	156,060	117
	SF-4	Allegheny	5A			26	19		45	63,548	8,863,631	196,970	117
	SF-5	Lycoming	5A		16	34			50	66,147	8,141,437	162,829	123
	SF-6	Bradford	5A		10	24	16		50	62,956	7,964,823	159,296	127
	SF-7	Centre	5A			20	20		40	53,652	7,523,233	188,081	140
	SF-8	Lebanon	5A			46	16		62	84,168	11,742,459	189,395	140
	SF-9	Bradford	5A		2	26	12		40	59,954	8,369,296	209,232	140
	SF-10	Butler	5A		3	39	18		60	67,904	9,827,275	163,788	145
	SF-11	Erie	5A			9	34		43	53,454	7,870,669	183,039	147
	SF-12	Dauphin	5A		3	3	25	4	35	61,504	9,192,750	262,650	149
	SF-13	Berks	5A		22	20	16		58	62,097	9,305,340	160,437	150
	SF-14	Franklin	5A		7	25	24		56	77,469	11,791,991	210,571	152
	SF-15	Luzerne	5A		26	15	15		56	56,250	8,968,491	160,152	159
	SF-16	Union	5A		5	12	8	6	31	43,868	7,071,066	228,099	161
	SF-17	Chester	4A		48	12			60	58,349	9,809,238	163,487	168
	SF-18	Allegheny	5A		4	30	18		52	77,351	12,979,386	249,604	168
	SF-19	Berks	5A		10	21	11		42	57,722	9,785,000	232,976	170
	SF-20	Montgomery	4A		16	24	15		55	61,480	11,113,700	202,067	181
	SF-21	Delaware	4A		8	34	14		56	65,790	12,184,074	217,573	185
	SF-22	Philadelphia	4A			17	16	2	35	45,476	8,905,240	254,435	196
	SF-23	Allegheny	5A		14	9			23	28,205	5,552,583	241,417	197
	SF-24	Westmoreland	5A		28	8			36	43,872	8,331,567	231,432	245
	SF-25	Philadelphia	4A		10	19	11		40	46,757	11,453,809	286,345	245
Adaptive Reuse	AR-1	Lehigh	5A		34	4	11		49	65,339	6,392,809	130,465	98
	AR-2	Erie	5A		29	16			45	53,021	6,152,972	136,733	116
	AR-3	Philadelphia	4A	12	54				66	77,975	9,751,707	147,753	125
	AR-4	Allegheny	5A	2	49	4			55	65,577	9,514,764	172,996	145
	AR-5	Delaware	4A		53				53	51,690	8,030,480	151,518	155
	AR-6	Philadelphia	4A		44				44	49,406	8,361,579	190,036	169
	AR-7	Montgomery	4A		33	3	7		43	55,832	9,468,816	220,205	170
	AR-8	Philadelphia	4A			28	10		38	53,840	9,515,893	250,418	177
	AR-9	Dauphin	5A	5	17	6			28	45,434	8,075,064	288,395	178
	AR-10	Allegheny	5A		33	3			36	50,664	9,436,523	262,126	186
	AR-11	Philadelphia	4A		46				46	56,478	10,795,027	234,675	191
	AR-12	Philadelphia	4A		27	10			37	48,768	9,658,098	261,030	198
	AR-13	Philadelphia	4A		30	21			51	62,509	13,609,683	266,857	218
	AR-14	Washington	4A		17	7			24	35,299	7,856,113	327,338	223
	AR-15	Philadelphia	4A		62				62	70,991	25,995,741	419,286	366
Multi-Story / Elevator	MS-1	Northumberland	5A		35				35	40,397	4,276,084	122,174	106
	MS-2	Dauphin	5A		22	14	14		50	88,314	10,055,562	201,111	114
	MS-3	Dauphin	5A		18	59			77	92,000	10,668,511	138,552	116
	MS-4	Lancaster	5A		46	6			52	71,758	8,456,719	162,629	118
	MS-5	Blair	5A		33	20			53	82,070	9,727,007	183,528	119
	MS-6	Chester	4A		46	15			61	76,340	9,638,964	158,016	126
	MS-7	Lancaster	5A		13	39	26		78	88,910	11,681,226	149,759	131
	MS-8	Clearfield	6A		24	6			30	42,254	5,551,584	185,053	131
	MS-9	Indiana	5A		40				40	36,743	4,898,995	122,475	133
	MS-10	Bradford	5A		50	6			56	57,817	7,738,172	138,182	134
	MS-11	Cambria	5A		32	11			43	44,887	6,341,616	147,479	141
	MS-12	Dauphin	5A		38	16			54	58,335	8,201,250	151,875	141
	MS-13	Mifflin	5A		30	4			34	39,447	5,559,187	163,506	141
	MS-14	Fayette	5A		12	12			24	29,586	4,192,325	174,680	142
	MS-15	Allegheny	5A		24	12	13		49	67,340	9,698,634	197,931	144
	MS-16	Lackawanna	5A		44	4			48	49,460	7,159,738	149,161	145
	MS-17	Lehigh	5A		54	7			61	63,949	9,318,159	152,757	146
	MS-18	Centre	5A		37	11			48	57,959	8,490,644	176,888	146
	MS-19	Chester	4A		41	3	5		49	54,287	8,007,477	163,418	148
	MS-20	Fayette	5A		21	3			24	36,064	5,407,359	225,307	150
	MS-21	Chester	4A		61	3			64	70,083	10,557,500	164,961	151
	MS-22	Allegheny	5A		54	12			66	70,689	10,787,052	163,440	153
	MS-23	Allegheny	5A		40	6			46	58,617	9,134,790	198,582	156
	MS-24	Wayne	6A		36	4			40	40,959	6,460,530	161,513	158
	MS-25	Centre	5A			12			12	16,796	2,683,900	223,658	160
	MS-26	Beaver	5A		40	12			52	55,361	9,468,440	182,085	171
	MS-27	Lancaster	5A		51				51	51,500	8,871,635	173,954	172
	MS-28	Allegheny	5A		52	8			60	66,733	11,716,729	195,279	176
	MS-29	Montgomery	4A		40	4			44	44,687	8,202,314	186,416	184
	MS-30	Montgomery	4A		50				50	42,265	8,029,015	160,580	190
	MS-31	Crawford	5A		36	4			40	38,953	7,490,675	187,267	192
	MS-32	Philadelpia	4A		9	8	7		24	31,220	6,031,050	251,294	193
	MS-33	Westmoreland	5A		47				47	49,080	9,825,224	209,047	200
	MS-34	Philadelphia	4A		58	4			62	56,120	11,262,762	181,657	201
	MS-35	Philadelphia	4A	60					60	57,672	11,915,227	198,587	207
	MS-36	Philadelphia	4A		20	4			24	26,284	5,523,620	230,151	210
	MS-37	Philadelphia	4A		34	11			45	42,523	8,964,723	199,216	211
	MS-38	Philadelphia	4A		52				52	50,275	10,703,403	205,835	213
	MS-39	Philadelphia	4A		39	11			50	53,416	11,371,112	227,422	213
	MS-40	Philadelphia	4A		45	5			50	55,099	11,747,269	234,945	213
	MS-41	Philadelphia	4A		24				24	24,284	5,194,462	216,436	214
	MS-42	Philadelphia	4A		45				45	46,754	10,118,014	224,845	216
	MS-43	Philadelphia	4A		53				53	50,312	10,900,733	205,674	217
	MS-44	Philadelphia	4A		54				54	48,965	10,664,381	197,489	218
	MS-45	Philadelphia	4A	88					88	79,650	18,005,791	204,611	226

THE PHFA PROJECT

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THE PHFA PROJECT

St, John Nueman
Phila, PA
52 Units

Wynne
Phila, PA
51 Units

Sacred Heart
Allentown, PA
61 Units

WhiteHall
Spring City, PA
49 Units

Hillcrest
Pittsburgh, PA
65 Units

Washington Square
Townhomes
Chambersburg, Pa
54 Units

Mann Edge
Lewistown, Pa
34 Units

7 Passive House Projects *COMPLETED*

THE NEW GRAVITY PROJECT

Construction Cost Change from Application to Construction Completion					
Proj. No.	Total Units	Residt'l Bldg. Area	$/SF @ Applic	$/SF @ Cost Cert	% Change
2015-443	51	62,509	$ 218	$ 186	-15%
2015-431	52	43,868	$ 296	$ 287	-3%
2015-436	23	28,205	$ 197	$ 193	-2%
2015-608	40	40,959	$ 158	$ 157	-1%
2015-810	35	61,504	$ 149	$ 149	-1%
2015-419	28	45,434	$ 178	$ 178	0%
2015-809	37	48,768	$ 198	$ 199	1%
2015-612	31	43,868	$ 161	$ 162	1%
2015-804	88	79,650	$ 226	$ 228	1%
2015-416	66	70,689	$ 153	$ 155	2%
2015-466	40	53,652	$ 140	$ 144	3%
2015-619	34	39,447	$ 141	$ 145	3%
2015-806	49	54,287	$ 148	$ 151	3%
2015-445	50	55,099	$ 220	$ 226	3%
2015-439	53	51,690	$ 155	$ 163	5%
2015-448	44	49,406	$ 169	$ 177	5%
2015-449	61	63,949	$ 149	$ 157	5%
2015-616	24	36,064	$ 150	$ 160	7%
2015-620	53	82,070	$ 119	$ 129	8%
2015-807	43	55,832	$ 170	$ 185	9%
2015-614	45	53,021	$ 116	$ 128	10%
2015-440	52	50,275	$ 213	$ 233	10%
2015-415	56	56,250	$ 159	$ 176	10%
2015-610	54	70,218	$ 100	$ 111	11%
2015-467	45	63,548	$ 139	$ 154	11%
2015-459	12	16,796	$ 160	$ 181	13%

NON-PASSIVE HOUSE

Application
$171 SF

PASSIVE HOUSE

Application
$161 SF

THE NEW GRAVITY PROJECT

Construction Cost Change from Application to Construction Completion					
Proj. No.	Total Units	Residt'l Bldg. Area	$/SF @ Applic	$/SF @ Cost Cert	% Change
2015-443	51	62,509	$ 218	$ 186	-15%
2015-431	52	43,868	$ 296	$ 287	-3%
2015-436	23	28,205	$ 197	$ 193	-2%
2015-608	40	40,959	$ 158	$ 157	-1%
2015-810	35	61,504	$ 149	$ 149	-1%
2015-419	28	45,434	$ 178	$ 178	0%
2015-809	37	48,768	$ 198	$ 199	1%
2015-612	31	43,868	$ 161	$ 162	1%
2015-804	88	79,650	$ 226	$ 228	1%
2015-416	66	70,689	$ 153	$ 155	2%
2015-466	40	53,652	$ 140	$ 144	3%
2015-619	34	39,447	$ 141	$ 145	3%
2015-806	49	54,287	$ 148	$ 151	3%
2015-445	50	55,099	$ 220	$ 226	3%
2015-439	53	51,690	$ 155	$ 163	5%
2015-448	44	49,406	$ 169	$ 177	5%
2015-449	61	63,949	$ 149	$ 157	5%
2015-616	24	36,064	$ 150	$ 160	7%
2015-620	53	82,070	$ 119	$ 129	8%
2015-807	43	55,832	$ 170	$ 185	9%
2015-614	45	53,021	$ 116	$ 128	10%
2015-440	52	50,275	$ 213	$ 233	10%
2015-415	56	56,250	$ 159	$ 176	10%
2015-610	54	70,218	$ 100	$ 111	11%
2015-467	45	63,548	$ 139	$ 154	11%
2015-459	12	16,796	$ 160	$ 181	13%

NON-PASSIVE HOUSE

Application
$171 SF

Completion
$176 SF
3% Higher

PASSIVE HOUSE

Application
$161 SF

Completion
$168 SF
4% Higher

**NOTE 3-5% Contingency added to budgets after application*

THE PHFA PROJECT

Construction Cost Summary for PHFA 2016 Applications

	Proj. No.	County	Climate Zone	Units by BR Qty 0	1	2	3	4+	Total Units	Resid. Bldg. Area	Resid. Constr. $	$ / Unit	$ / SF
Single Family / Townhouse	SF-01	Dauphin	5A		14	16	15	15	60	99,625	10,419,031	173,651	105
	SF-02	Lebanon	5A		9	32	14		55	78,627	8,446,000	153,564	107
	SF-03	Lycoming	5A		20	40			60	82,730	9,436,382	157,273	114
	SF-04	Columbia	5A			7	17		24	48,499	5,669,777	236,241	117
	SF-05	Philadelphia	4A		5	19	31	5	60	79,795	9,739,093	162,318	122
	SF-06	Wyoming	5A			30	12		42	72,100	9,168,380	218,295	127
	SF-07	Erie	5A		8	20	18		46	85,819	10,964,900	238,367	128
	SF-08	Lancaster	5A		6	33	21		60	78,825	10,259,118	170,985	130
	SF-09	Cumberland	5A			18	34		52	75,275	9,921,606	190,800	132
	SF-10	Centre	5A		6	24	18		48	75,737	10,193,457	212,364	135
	SF-11	Lehigh	5A		19	27	16		62	71,254	9,631,860	155,353	135
	SF-12	Lancaster	5A		41	79	18		138	154,370	21,137,388	153,169	137
	SF-13	Erie	5A			9	31		40	53,454	7,870,669	196,767	147
	SF-14	Montgomery	4A			19	29		48	59,976	8,858,000	184,542	148
	SF-15	Lebanon	5A			49	13		62	82,974	12,349,192	199,181	149
	SF-16	Cumberland	5A			10	30	10	50	72,707	10,865,524	217,310	149
	SF-17	Schuylkill	5A		1	11	5		17	21,544	3,225,548	189,738	150
	SF-18	Berks	5A		10	21	11		42	57,722	8,755,000	208,452	152
	SF-19	Berks	5A		22	20	16		58	62,097	9,440,383	162,765	152
	SF-20	Franklin	5A		6	21	21		48	66,583	10,404,256	216,755	156
	SF-21	Lehigh	5A		9	15	20	4	48	53,333	8,377,963	174,541	157
	SF-22	Chester	4A		19	18	11		48	58,541	9,248,927	192,686	158
	SF-23	Cumberland	5A		5	22	8		35	44,186	7,656,200	218,749	173
	SF-24	Montgomery	4A		8	21	15	6	50	65,907	11,589,411	231,788	176
	SF-25	Allegheny	5A		35	16	14		65	87,255	15,376,648	236,564	176
	SF-26	Delaware	4A		8	34	14		56	65,212	11,914,849	212,765	183
	SF-27	Philadelphia	4A			17	16	2	35	45,476	9,441,620	269,761	208
	SF-28	Armstrong	5A			24			24	28,812	6,017,450	250,727	209
	SF-29	Philadelphia	4A			28	14		42	47,964	10,022,268	238,625	209
	SF-30	Philadelphia	4A		11	10	11		32	31,619	6,732,433	210,389	213
	SF-31	Philadelphia	4A		8	19	24	4	55	66,383	19,011,723	345,668	286
	SF-32	Philadelphia	4A	45					45	23,302	7,408,602	164,636	318
Adaptive Reuse Bldgs.	AR-01	Monroe	5A		36	4			40	54,215	5,753,672	143,842	106
	AR-02	Luzerne	5A	6	54	2			62	88,489	9,900,711	159,689	112
	AR-03	Philadelphia	4A	12	54				66	77,978	10,123,117	153,381	130
	AR-04	Allegheny	5A		33	8			41	70,409	9,181,888	223,948	130
	AR-05	Butler	5A		44	18			62	73,114	10,046,992	162,048	137
	AR-06	Washington	5A		24				24	41,046	6,169,663	257,069	150
	AR-07	Allegheny	5A	2	49	4			55	65,190	10,592,039	192,583	162
	AR-08	Delaware	4A		50				50	50,548	8,727,828	174,557	173
	AR-09	Philadelphia	4A		60				60	65,041	11,803,992	196,733	181
	AR-10	Philadelphia	4A		74				74	93,285	20,223,060	273,285	217
	AR-11	Philadelphia	4A	20	37				57	63,960	14,005,881	245,717	219
	AR-12	Perry	5A		28	3			31	36,152	8,548,665	275,763	236

Multi-Story / Elevator Buildings	MS-01	Berks	5A		40	20			60	62,149	7,432,636	123,877	120
	MS-02	Tioga	6A		34	6			40	48,735	5,999,734	149,993	123
	MS-03	Dauphin	5A		35	2			37	43,964	5,421,065	146,515	123
	MS-04	Bradford	5A		38	12	6		56	63,768	8,446,000	150,821	132
	MS-05	Lancaster	5A		46	6			52	92,370	12,565,629	241,647	136
	MS-06	Fayette	5A		12	12			24	28,904	3,942,323	164,263	136
	MS-07	Cambria	5A		32	11			43	49,491	6,879,001	159,977	139
	MS-08	Clearfield	6A		24	6			30	41,915	5,855,263	195,175	140
	MS-09	Chester	4A		56	3			59	64,180	9,033,100	153,103	141
	MS-10	Centre	5A		16	34			50	60,912	8,666,068	173,321	142
	MS-11	Clinton	5A		28	4			32	37,454	5,333,806	166,681	142
	MS-12	Allegheny	5A		24	12	13		49	67,340	9,698,634	197,931	144
	MS-13	Luzerne	5A		32	3			35	44,543	6,503,636	185,818	146
	MS-14	Dauphin	5A		20				20	19,157	2,803,860	140,193	146
	MS-15	Butler	5A		68				68	66,845	9,821,302	144,431	147
	MS-16	Westmoreland	5A		15	13	8		36	46,095	6,855,424	190,428	149
	MS-17	Lackawanna	5A		12	12	8	4	36	50,019	7,560,000	210,000	151
	MS-18	Northumberland	5A		32				32	38,240	5,789,694	180,928	151
	MS-19	Centre	5A		37	11			48	57,959	8,781,136	182,940	152
	MS-20	Lackawanna	5A		44	4			48	49,460	7,493,999	156,125	152
	MS-21	Allegheny	5A		30	34			64	69,605	10,837,117	169,330	156
	MS-22	Dauphin	5A		43	11			54	51,319	8,411,465	155,768	164
	MS-23	Montgomery	4A		60				60	58,681	9,643,959	160,733	164
	MS-24	Adams	5A		39	4			43	50,532	8,515,443	198,034	169
	MS-25	Clarion	5A		48				48	53,668	9,090,720	189,390	169
	MS-26	Allegheny	5A		40	6			46	56,969	10,124,143	220,090	178
	MS-27	Allegheny	5A		28	8			36	42,500	7,582,274	210,619	178
	MS-28	Chester	4A		47	13			60	61,551	10,982,435	183,041	178
	MS-29	Delaware	4A		38	3			41	47,797	8,539,207	208,273	179
	MS-30	Allegheny	5A		52	8			60	63,861	11,647,354	194,123	182
	MS-31	Philadelphia	4A		37	44			81	93,000	17,635,125	217,718	190
	MS-32	Crawford	5A		36	4			40	38,953	7,552,475	188,812	194
	MS-33	Westmoreland	5A		47				47	49,080	9,801,657	208,546	200
	MS-34	Bucks	4A		56	10			66	61,576	12,448,922	188,620	202
	MS-35	Lycoming	5A		23	11			34	35,437	7,169,151	210,857	202
	MS-36	Philadelphia	4A		61				61	60,137	12,416,322	203,546	206
	MS-37	Bradford	5A		40	10			50	56,580	11,852,026	237,041	209
	MS-38	Philadelphia	4A		58	4			62	57,653	12,079,768	194,835	210
	MS-39	Philadelphia	4A		52				52	46,619	9,903,739	190,457	212
	MS-40	Philadelphia	4A	60					60	56,672	12,174,301	202,905	215
	MS-41	Philadelphia	4A		45				45	48,351	10,464,750	232,550	216
	MS-42	Montgomery	4A		50				50	42,265	9,236,729	184,735	219
	MS-43	Allegheny	5A		29	4			33	37,592	8,284,054	251,032	220
	MS-44	Philadelphia	4A		46	4			50	46,640	10,701,164	214,023	229
	MS-45	Philadelphia	4A		53				53	50,312	11,711,200	220,966	233
	MS-46	Philadelphia	4A		34	11			45	42,520	10,560,747	234,683	248
	MS-47	Philadelphia	4A		24				24	24,284	6,040,593	251,691	249
	MS-48	Philadelphia	4A		60				60	65,340	17,249,402	287,490	264
	MS-49	Luzerne	5A		36				36	27,296	7,653,000	212,583	280
	MS-50	Philadelphia	4A		48				48	46,000	12,915,822	269,080	281

YEAR 2 *of* ***The PHFA Project****: A NATIONAL Net-Zero-Energy Initiative by* **2030**

2016

THE PHFA PROJECT

Pennsylvania

94 Projects applied, 27 as Passive House projects

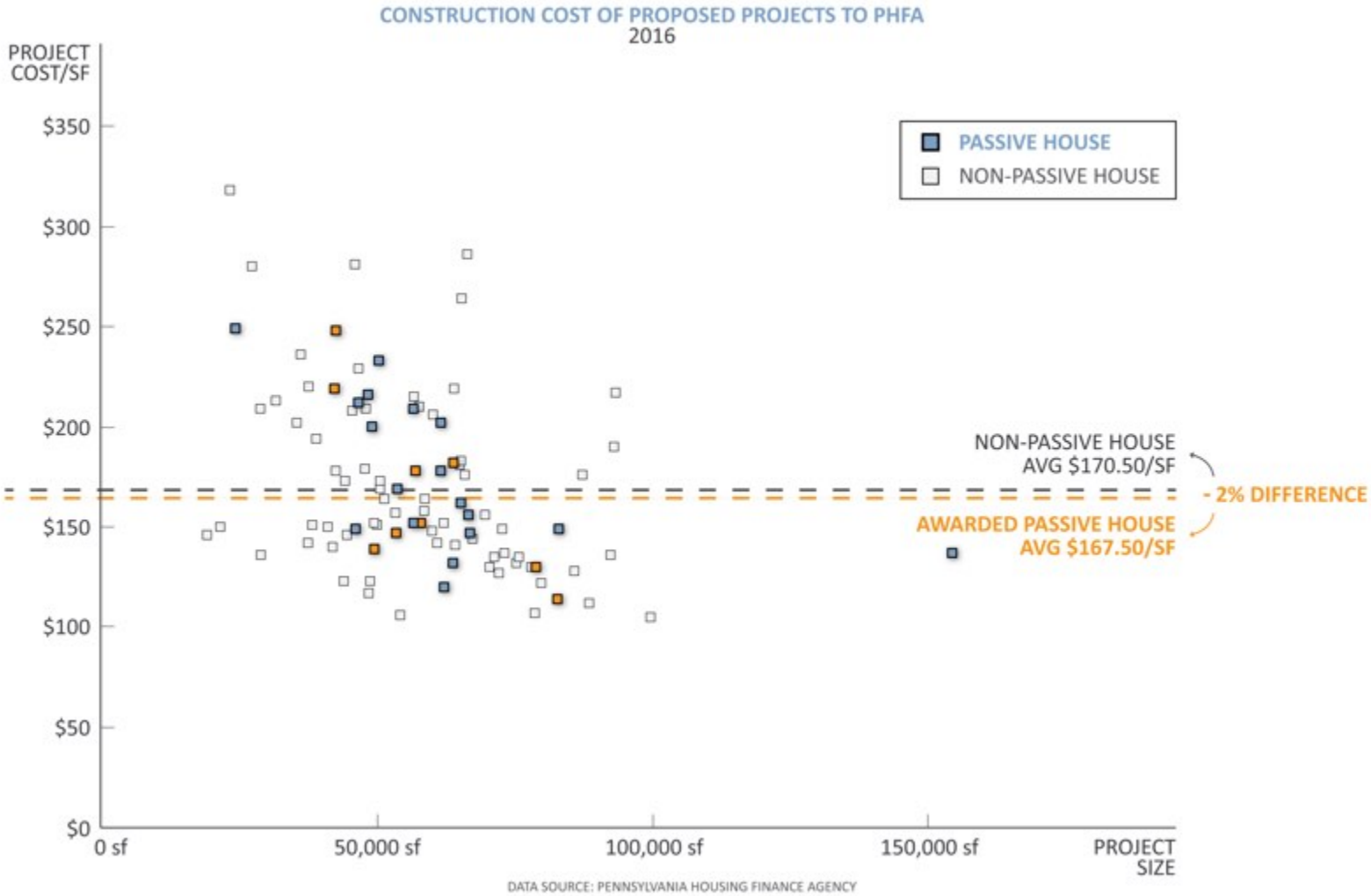
10 PH projects awarded *7*

33 NON-PH projects awarded *3*

YEAR 2 *of* ***The PHFA Project****: A NATIONAL Net-Zero-Energy Initiative by* ***2030***

2016

THE PHFA PROJECT



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THE NEW GRAVITY PROJECT

Morningside Crossing
Pittsburgh, PA
46 Units

Glassport
Glassport, PA
55 Units

Mt. Lebanon Sr. Housing
Pittsburgh, PA
60 Units

Roxbury Place
Johnstown, PA
43 Units

Westminster @ Windy
Phillipsburg, PA
48 Units

Parade St. Commons
Erie, PA
40 Units

The Willows
Landisville, PA
60 Units

Muncy Green
Muncy, PA
60 Units

Montgomery Park
Norristown, PA
50 Units

Anthony Wayne Senior
Phila, PA
45 Units

10 Passive House Projects *UNDER CONSTRUCTION*

THE NEW GRAVITY PROJECT

Construction Cost Summary of 2018 PHFA Applications

	Ref. No.	County	Climate Zone	Units by BR Qty					Total Units	Resid. Bldg Area	Resid Constr $	$ / Unit	$ / SF
				0	1	2	3	4+					
Single Family / Townhouses	SF-01	York	5A			10	13		23	44,064	4,475,121	194,570	102
	SF-02	Dauphin	5A				22	22	44	66,603	8,409,248	191,119	126
	SF-03	York	5A		6	23	24	3	56	72,013	9,258,025	165,322	129
	SF-04	Berks	5A			24	22		46	66,030	8,557,500	186,033	130
	SF-05	Lebanon	5A		18	26	16		60	76,101	10,333,056	172,218	136
	SF-06	Franklin	5A			7	25		32	54,375	8,150,464	254,702	150
	SF-07	Philadelphia	4A		2	5	11	2	20	29,503	4,490,975	224,549	152
	SF-08	Lackawanna	5A		12	12	8	4	36	50,019	7,805,595	216,822	156
	SF-09	Franklin	5A		6	21	21		48	66,583	10,727,005	223,479	161
	SF-10	Multiple Co's	5A	52					52	52,330	8,909,580	171,338	170
	SF-11	York	5A		18	9	7		34	35,636	6,396,969	188,146	180
	SF-12	Allegheny	5A		47	10			57	48,150	9,106,659	159,766	189
	SF-13	Westmoreland	5A		3	6	9		18	20,489	4,108,548	228,253	201
	SF-14	Allegheny	5A		4	7	9		20	26,198	5,407,155	270,358	206
	SF-15	Armstrong	5A			24			24	29,147	6,230,195	259,591	214
	SF-16	Susquehanna	6A		34	2			36	31,103	7,031,404	195,317	226
	SF-17	Philadelphia	4A			17	16	2	35	45,476	10,281,980	293,771	226
	SF-18	Philadelphia	4A		11	10	12		33	34,388	8,875,449	268,953	258
	SF-19	Philadelphia	4A		28	12			40	46,232	12,214,948	305,374	264
	SF-20	Philadelphia	4A		12	18	11	9	50	71,903	21,367,901	427,358	297

Construction Cost Summary of 2018 PHFA Applications

	Ref. No.	County	Climate Zone	Units by BR Qty					Total Units	Resid. Bldg Area	Resid Constr $	$ / Unit	$ / SF
				0	1	2	3	4+					
	MS-01	Erie	5A			45			45	100,201	8,587,936	190,843	86
	MS-02	Lancaster	5A		44	18			62	76,045	8,306,538	133,976	109
	MS-03	Lancaster	5A		45	15			60	68,993	8,544,047	142,401	124
	MS-04	Cumberland	5A		14	12	16		42	49,581	6,440,993	153,357	130
	MS-05	Berks	5A		45	12			57	59,916	7,892,757	138,469	132
	MS-06	Westmoreland	5A		15	13	8		36	46,095	6,087,669	169,102	132
	MS-07	Fayette	5A		18	18			36	42,820	5,679,247	157,757	133
	MS-08	Dauphin	5A		35	2			37	43,928	5,896,750	159,372	134
	MS-09	Bradford	5A		38	12			56	63,759	8,603,563	153,635	135
	MS-10	Allegheny	5A		30	10			40	54,495	7,335,750	183,394	135
	MS-11	Lancaster	5A		46	6			52	94,440	12,791,060	245,982	135
	MS-12	Centre	5A		16	34			50	60,599	8,371,068	167,421	138
	MS-13	Montgomery	4A		42	14			56	60,166	8,477,023	151,375	141
	MS-14	Luzerne	5A		32	3			35	44,543	6,416,086	183,317	144
Multi-Story / Elevator Buildings	MS-14	Luzerne	5A		32	3			35	44,543	6,416,086	183,317	144
	MS-15	Clinton	5A		28	4			32	37,454	5,470,901	170,966	146
	MS-16	Dauphin	5A		20	29			49	53,976	8,066,609	164,625	149
	MS-17	Washington	5A		21	25			46	53,310	8,000,885	173,932	150
	MS-18	Franklin	5A		36	4			40	54,596	8,326,929	208,173	153
	MS-19	Chester	4A		57	3			60	60,931	9,310,170	155,170	153
	MS-20	Northumberland	5A		32	4			36	43,826	6,998,140	194,393	160
	MS-21	York	5A		16	26	8		50	63,425	10,125,538	202,511	160
	MS-22	Allegheny	5A		27	18	9		54	64,875	10,797,000	199,944	166
	MS-23	Westmoreland	5A		43	4			47	50,680	8,439,569	179,565	167
	MS-24	Clearfield	5A		24	6			30	35,984	6,065,728	202,191	169
	MS-25	Beaver	5A		44	8			52	57,297	9,797,660	188,417	171
	MS-26	Northampton	5A		12	33	15		60	60,212	10,329,351	172,156	172
	MS-27	Montgomery	4A		60				60	61,110	10,869,266	181,154	178
	MS-28	Dauphin	5A		38	11			49	48,638	8,730,738	178,178	180
	MS-29	Montgomery	4A		66	8			74	74,468	13,541,230	182,990	182
	MS-30	Clarion	5A		39	3			42	48,847	8,988,545	214,013	184
	MS-31	Philadelphia	4A		28	13			41	49,625	9,204,879	224,509	185
	MS-32	Lehigh	5A		27	13			40	40,937	7,663,199	191,580	187
	MS-33	Allegheny	5A		31	3	1		35	46,015	8,714,276	248,979	189
	MS-34	Butler	5A		30	13	1		44	50,825	9,697,495	220,398	191
	MS-35	Delaware	4A		58				58	57,365	11,293,126	194,709	197
	MS-36	Bucks	4A		68	1			69	62,844	12,503,344	181,208	199
	MS-37	Delaware	4A		38	3			41	43,515	8,746,409	213,327	201
	MS-38	Blair	5A		43	2			45	47,642	9,595,216	213,227	201
	MS-39	Tioga	5A		34	6			40	32,800	6,591,082	164,777	201
	MS-40	Lycoming	5A		18	6			24	26,749	5,419,721	225,822	203
	MS-41	Philadelphia	4A		44				44	46,306	9,443,528	214,626	204
	MS-42	Philadelphia	4A		52				52	46,619	9,893,465	190,259	212
	MS-43	Crawford	5A		37	2			39	40,256	8,580,594	220,015	213
	MS-44	Allegheny	5A		46				46	48,600	10,405,629	226,209	214
	MS-45	Luzerne	5A		36				36	36,784	8,100,000	225,000	220
	MS-46	Philadelphia	4A		11	11	8		30	39,650	8,957,527	298,584	226
	MS-47	Allegheny	5A		19	13	11		43	41,797	9,558,272	222,285	229
	MS-48	Philadelphia	4A		46	4			50	48,315	11,197,257	223,945	232
	MS-49	Philadelphia	4A	60					60	57,672	13,556,215	225,937	235
	MS-50	Philadelphia	4A		45				45	48,351	11,428,626	253,969	236
	MS-51	Philadelphia	4A		37	10			47	50,527	12,095,152	257,344	239
	MS-52	Philadelphia	4A		32	6	6		44	44,889	10,869,638	247,037	242
	MS-53	Philadelphia	4A		24				24	24,284	6,253,770	260,574	258
	MS-54	Allegheny	5A		30	20			50	37,290	9,905,483	198,110	266
	MS-55	Philadelphia	4A		20	30			50	46,110	12,718,548	254,371	276
	MS-56	Philadelphia	4A		48				48	45,000	14,294,705	297,806	318
	MS-57	Philadelphia	4A		46				46	31,878	11,701,929	254,390	367

YEAR 3-4

2017-18

A NATIONAL Net-Zero-Energy Initiative by 2030

THE NEW GRAVITY PROJECT

Pennsylvania

89 Projects applied, 15 as Passive House projects

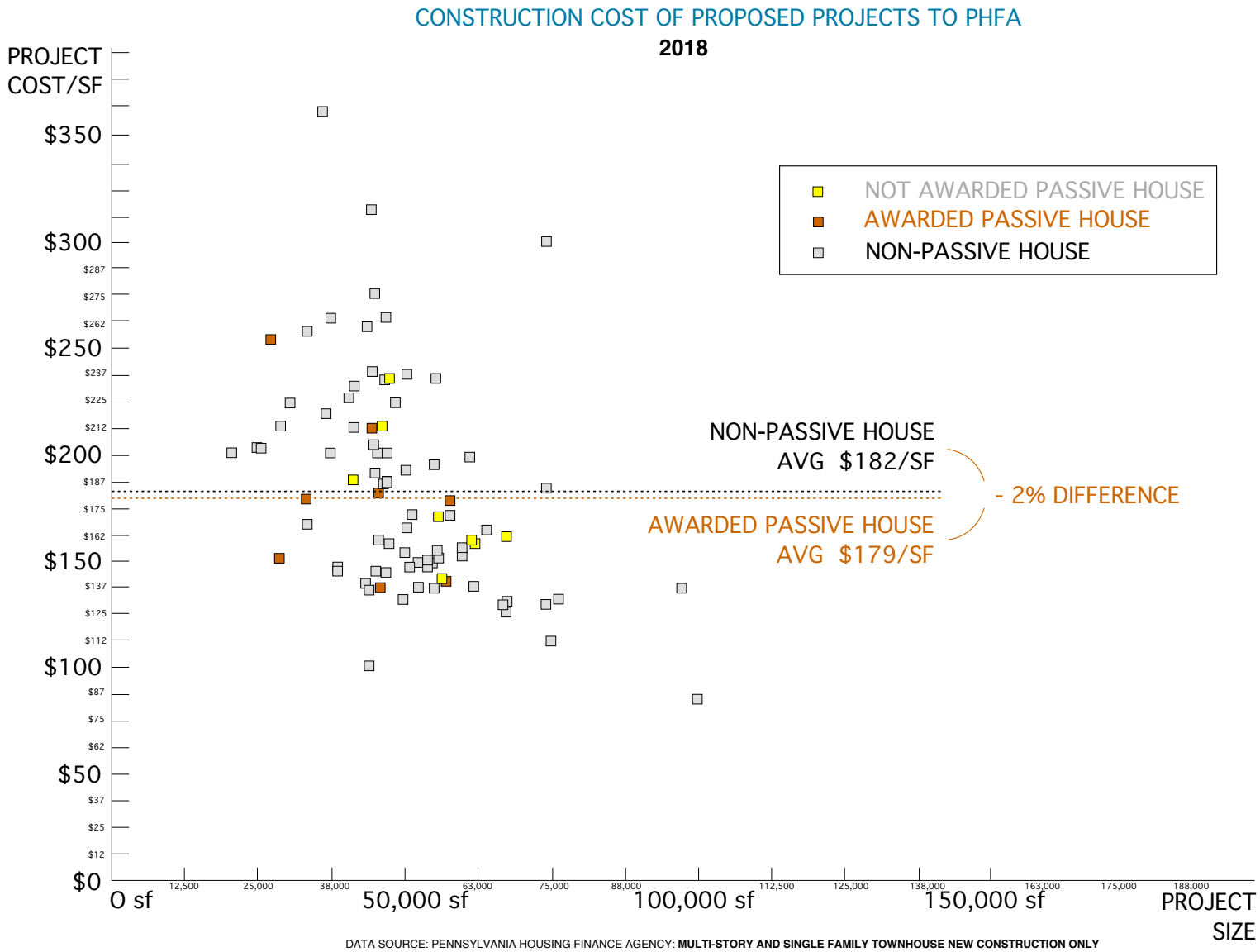
8 PH projects awarded (325 units)

27 NON-PH projects awarded

YEAR 3-4
2017-18

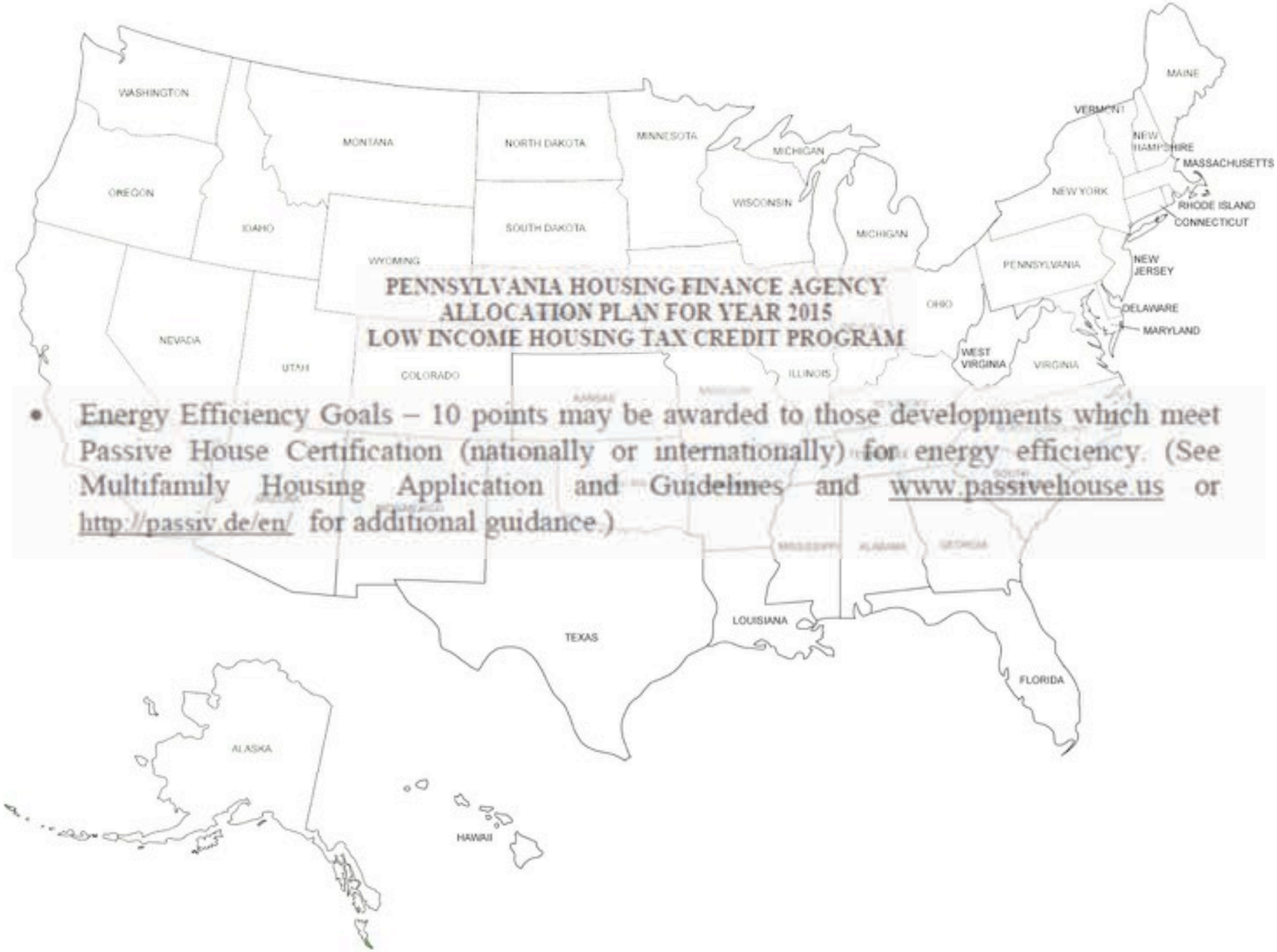
A NATIONAL Net-Zero-Energy Initiative by 2030

THE NEW GRAVITY PROJECT



DATA SOURCE: PENNSYLVANIA HOUSING FINANCE AGENCY: **MULTI-STORY AND SINGLE FAMILY TOWNHOUSE NEW CONSTRUCTION ONLY**

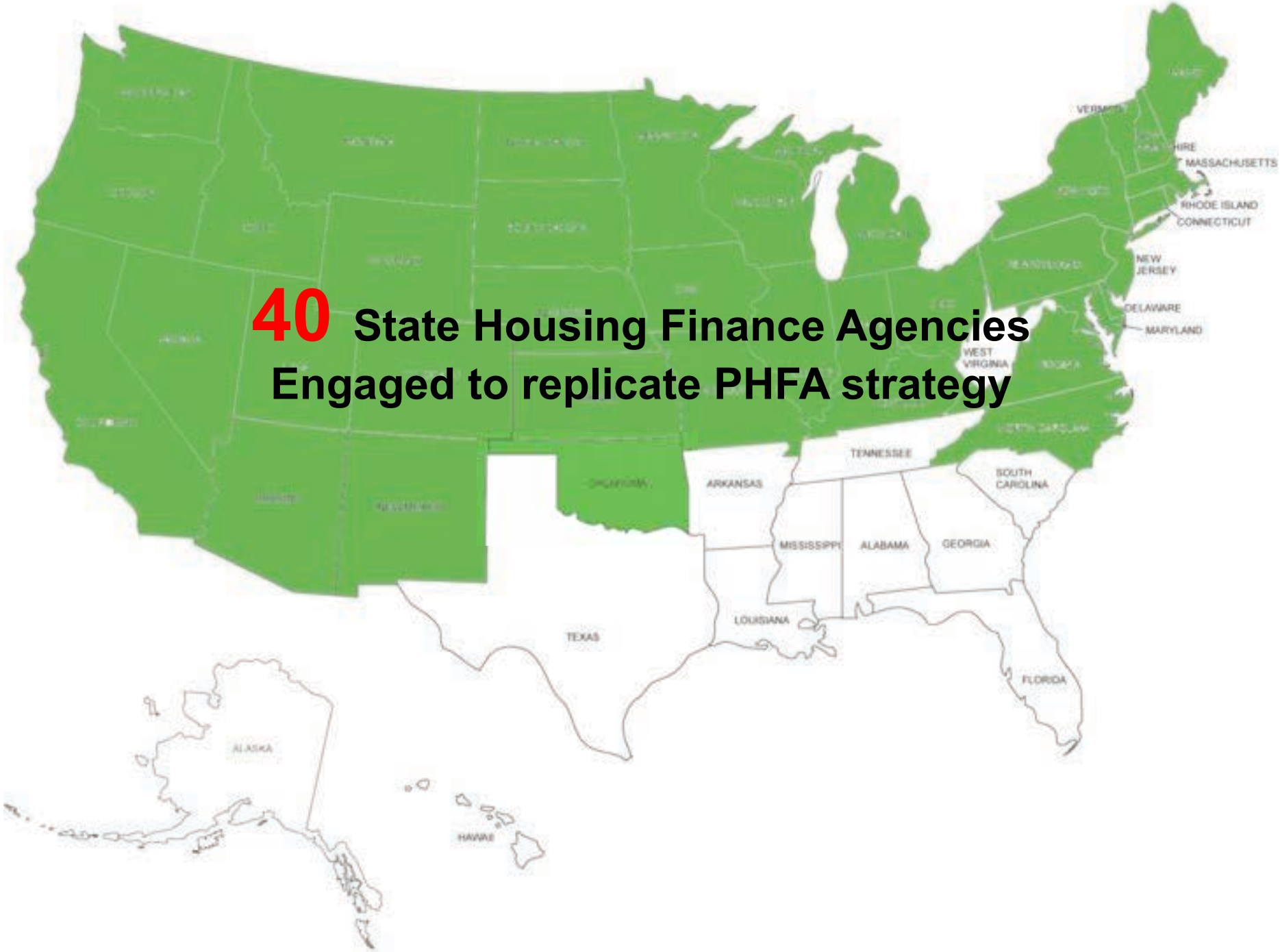
- Energy Efficiency Goals – 10 points may be awarded to those developments which meet Passive House Certification (nationally or internationally) for energy efficiency. (See Multifamily Housing Application and Guidelines and www.passivehouse.us or http://passiv.de/en/ for additional guidance.)



PENNSYLVANIA HOUSING FINANCE AGENCY
ALLOCATION PLAN FOR YEAR 2015
LOW INCOME HOUSING TAX CREDIT PROGRAM

- Energy Efficiency Goals – 10 points may be awarded to those developments which meet Passive House Certification (nationally or internationally) for energy efficiency. (See Multifamily Housing Application and Guidelines and www.passivehouse.us or http://passiv.de/en/ for additional guidance.)

40 State Housing Finance Agencies Engaged to replicate PHFA strategy



40 State Housing Finance Agencies
Engaged to replicate PHFA strategy

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World's Tallest Passive House Breaks Ground on Roosevelt Island

By ALISON GREGOR JUNE 12, 2015

An apartment tower on Roosevelt Island that began construction this month will be the tallest passive-house high-rise in the world when it is completed in 2017, according to the Passive House Institute in Germany. And at about 270,000 square feet, it will also be the largest, said David Kramer, a principal with Hudson Companies, which is developing the building in partnership with Cornell Tech, the applied sciences campus of Cornell University, and the Related Companies.

The tower will rise 270 feet, contain 350 units and house about 330 graduate students, faculty and staff on a new 12-acre campus for Cornell Tech, which has been operating out of temporary facilities in the Google building in Chelsea since 2012. And because the building

Cornell has been broken for a passive house apartment tower on the Cornell Tech campus on Roosevelt Island. New Construction/The New York Times

Development team picked for largest Passive House project in North America

The 24-story curved building would be 70% more efficient than comparable housing in New York City.

A 24-story building with 241 affordable housing units will include a charter school, medical center, cultural spaces, and a supermarket. Image: Dattner Architects

A 24-story, 300,000-sf building that is being dubbed the largest residential Passive House project in North America will rise on the former site of a public school in the Mott Haven section of The Bronx, New York.

What is Passive House?

Case Study: Knickerbocker Commons Affordable Housing

Knickerbocker Commons, one-first mixed-used apartment building designed to Passive House standards in City, United States

Knickerbocker Commons, a six-story residential building containing 24 units of affordable housing, is the country's first new-build apartment building to conform to Passive House design standards. To achieve the zero Passive House standards, which initial cost a doubled-knotted Commons has its own ventilation system and small radiators for heating and weight workflow air conditioning units for cooling. In addition, the building features triple-pane windows and a recognized external shade structure that shade windows from the sun in the summer and maximizes exposure in the winter, according to the project architect, Chris Dunkelberger, the building will use 90 percent less energy than is typically required to heat a New York City apartment building in the winter.

The apartment is located in the Bushwick neighborhood of Brooklyn and was developed through HPD's Low Income Rental Program. Of the 24 units, six units will be rented to households earning up to 30 percent of Area Median Income (AMI), five units will be rented to households earning up to 50 percent of AMI, 12 units will be rented to households earning up to 60 percent of AMI, and one unit will be set aside for a building superintendent. In addition to the residential units, the project includes almost 1,000 square feet of community facility space.

PHIUS

Passive House Institute US

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CONNECTICUT HOUSING FINANCE AUTHORITY

The Key To Affordable Housing

Construction Guidelines: Project Planning & Technical Services Review

2017

2. Sustainable Design:
   a. Plans and Specifications ≥ 40% complete and reflecting Passive House Design and construction measures may be provided. Note that ≥ 40% complete plans and specifications are expected to include all of the necessary requirements described in sections V.C. and D.1. above. In addition, a detailed scope of proposed Passive House design and construction measures, coordinated with section details of the proposed building thermal envelope at key intersections (footings, foundations, slabs, floors, walls, windows, doors, projections/overhangs, roofs, etc.), and a preliminary modeling analysis/output report prepared by a certified Passive House consultant through the Passive House Planning Package (PHPP) as developed by the Passive House Institute (PHI), or through WUFI Passive, as developed by the Passive House Institute United States (PHIUS), must also be provided. It is expected that submissions under the Passive House Design category are "pre-certification-ready"; i.e., all documentation required by PHI or PHIUS to be submitted for pre-certification review must be provided, so that submission for pre-certification review can be made immediately upon notification of an award of tax credits. In order to facilitate Passive House certification by PHI or PHIUS, it is important that the development of final construction drawings be informed and guided by their pre-certification review comments. In addition, all Passive House projects must receive third-party verification of all PHIUS+ requirements during construction, provided by PHIUS+ certified raters, who are not part of the design or construction development team (this requirement applies regardless of which Passive House organization approves the pre-certification). All hard costs shall be reflected in the project cost summary.

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2017 New Hampshire Qualified Allocation Plan

- is involved in or has had other tax credit or Authority-financed projects which have non-compliance issues;
- is or has been non-compliant or otherwise in default with this or any other Authority Program (as determined by the Authority) or with another state housing finance agency; and/or
- has been awarded credits in the past that were subsequently returned or otherwise unused (unless for good cause).

Such determination will be made by the Authority at its sole discretion.

0 to -20 points

15. Development Characteristics
The project design provides for a community room with a minimum of 600 square feet.

5 points

16. Energy Efficient Design and Construction
Project achieves Passive House Certification or meets NGBS silver or higher designation. If the project fails to achieve certification, the Authority will determine if the Design and Construction team made a good-faith effort to achieve certification. If so, no penalty will be imposed. If not, a five-point penalty will be levied against the next application for 9% LIHTCs submitted by the project sponsor.

5 points

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Gilford Village Knolls III, 24 units Senior Housing
FIRST Passive House Affordable housing in NH
Breaks ground in Summer of 2017

Gilford Village Knolls III

Construction on Gilford Village Knolls III will begin in the spring of 2017 and is scheduled to be complete early spring of 2018.

LACLT was hired by the citizens group of Gilford Village Knolls I and II to develop their final phase, an additional 24 units of senior housing in the historic village center of Gilford, NH.

It is widely recognized that the State's population is aging, and that trend will continue for at least the next 20 years as baby boomers age. New Hampshire's senior population nearly doubled between 2010 and 2015, from 178,000 to 323,000 people. As a result, seniors will occupy a growing proportion of the state's housing units, filling one in three units by 2025. Senior housing options in our service area are minimal, and affordable senior housing options are even scarcer. Data shows that Belknap County does not have the housing stock available to accommodate its aging population.

GVK III will be responding to this need adding 24 permanently affordable senior units to the area. Phase I and II of GVK have a waiting list of over 68 households, many of whom will qualify for phase III. GVK III will also be the first affordable housing project in NH to meet the Passive House standards. Through intelligent design the 5 Passive House principles (thermal bridge free design, superior windows, ventilation with heat recovery, quality insulation, and airtight construction) will be met. As a nationally certified Green Organization, this project will also exemplify our comprehensive green standards outlined in our Green Asset Management Manual.

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Gilford Village Knolls III, 24 units Senior Housing
FIRST Passive House Affordable housing in NH

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CREATIVE DESIGN

Developments in all pools that include exceptional design features may earn three points. Partial points will not be awarded. Exceptional elements must be appropriate to the population served. Proposals will receive weighted consideration for their incorporation of any or all of the following exceptional elements:

WEIGHTED VALUE: 1 EACH	WEIGHTED VALUE: 3 EACH	WEIGHTED VALUE: 5 EACH
• Community Garden(s) • Exterior open spaces and paths • Play areas and/or pocket parks • Rain garden or bioswale • Smoke-free campus • Smart thermostats or resident-controlled smart metering • Dual flush toilets throughout • Annual, on-site, free dental and/or vision services • Monthly, staffed Ohio Benefit Bank on-site	• Dedicated fitness center with exercise machines • Dedicated business/work-from-home center • Computer/tablet lending program in lieu of dedicated computer room[8] • Reuse of NIP-funded site acquired from county land bank • Free resident Wi-Fi • DOE Zero Energy Ready Home[9] • Free Medicaid/Medicare billing services • Free access to on-site, licensed physician or nurse practitioner at least once per week.	• On-site renewable energy generation • PHIUS+ Project Certification (Passive House) • DOE Zero Energy Ready Home with renewable energy system • Platinum LEED rating; OR Emerald NGBS ICC 700 National Green Building Standard; OR Exceeding minimum Enterprise Green Communities Criteria by 20 or more points • Gray water system(s) • Dedicated health clinic[7]

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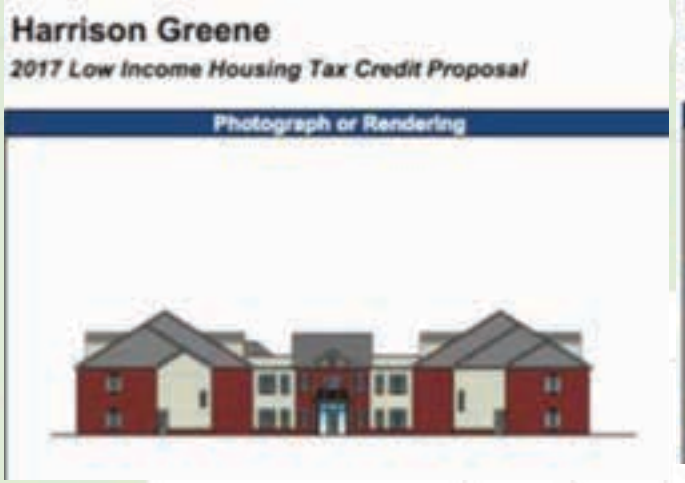

Developer: The WODA Group
Project: 56 units Senior housing
Location: Harrison, Ohio
Architect: PCI Group Inc
Square Footage: 44,372sf
Hard Cost (includes Site): $163/sf

Developer: PIRHL
Project: 36 units workforce housing
Location: Loveland, Ohio
Architect: RDL
Square Footage: 44,820
Hard Cost (includes Site): $157/sf

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ILLINOIS HOUSING DEVELOPMENT AUTHORITY

2016-2017

LOW INCOME HOUSING TAX CREDIT QUALIFIED ALLOCATION PLAN

B) Energy Efficiency and Sustainability

1) Green Initiative Standards

Projects whose architectural design and construction meet or exceed green initiative standards, evidenced through submission of the Scoring - Green Initiatives Certification, available on the Website, can earn up to three (3) points as follows:

Points	Green Initiative
1	• Commit to obtaining EPA Energy Star certification –or- • Minimum 10% improvement for new construction (5% for rehab) above ASHRAE 90.1 2010 proven by a completed energy model, -or- • HERS rating of 75 or lower
2	Commit to obtaining a sustainable building certification from one of the following: • U.S. Green Building Council LEED certification -or- • Enterprise Green Communities 2015 certification -or- • ICC 700 National Green Building Standard certification -or- • Passive House Certification through PHIUS or PHI
3 2) 2) R e h	Meet minimum standards in the Authority Standards for Architectural Planning and Construction indicated for water conserving fixtures; and Commit to obtaining a sustainable building certification from one of the following: • Certification through Living Building Challenge –or- • Alternative certification for a high performance building achieving 'Net Zero Capable' s atus as approved by the Authority.

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MONTANA BOARD OF HOUSING

HOUSING CREDIT PROGRAM

20198 QUALIFIED ALLOCATION PLAN (QAP)

G. Energy, Green Building and Other Initiatives, Goals and Requirements

The following items in Subparagraphs A through K specify voluntary initiatives and goals which MBOH encourages Developers to consider in the planning and development of Projects, as well as certain Project requirements. These items are required only where so indicated by the use of mandatory language (e.g., "must"). Such initiatives, goals and requirements are subject to any further applicable provisions of this QAP.

1. Integrated Design Process and Community Connectivity

Project development and design includes a holistic approach. Processes include neighborhood and community involvement to ensure Project acceptance and enhancement. Integrated design processes ensure higher quality finish Project. Existing neighborhood edges, characteristics, fabric are considered in the Project design. Some considerations may include but are not limited to a community design charrette, incorporating Project into neighborhood fabric, energy modeling, commissioning, infrared testing, etc. (see Required Infrared Testing for Projects Awarded Credits, below).

2. Visitability and Universal Design Principles

Applicants should consider inclusion of visitability and universal design principles in development of the Project. MBOH encourages strong advertising of accessible features when advertising new construction through the Multiple listing services or through MontanaHousingSearch.com.

3. Sustainable Site, Location and Design

The building(s) and Project site, including the surrounding area, provide opportunities for education, alternative transportation, services, and community facilities. This is evidenced, for example, by Projects using existing infrastructure, reusing a building or existing housing, redeveloping a greyfield/brownfield, or developing in an existing neighborhood. Design elements use the site's characteristics and reduce impact on the site allowing for open space and other amenities, such as infill projects, rehabilitating existing building(s), rehabilitating existing housing, providing carpooling opportunities, using well water for landscaping, etc.

4. Passive House Standard

Passive House is a voluntary international building standard developed by the Passive House Institute (PHI), located in Darmstadt, Germany (referred to as the "Passive House Standard"). The Passive House Standard is composed of several strict performance requirements for new building construction. For the renovation of existing buildings, PHI developed a similar if slightly more lenient performance standard. The resulting performance represents a roughly 90% reduction in heating and cooling energy usage and up to a 75% reduction in primary energy usage from existing building stock.

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SOUTH DAKOTA HOUSING DEVELOPMENT AUTHORITY

REQUEST FOR PROPOSAL

RENTAL HOUSING DEVELOPMENT
LOW INCOME HOUSING TAX CREDIT PROGRAM
HOME PROGRAM

FOR

THE DESIGN AND CONSTRUCTION OF A MULTIFAMILY RENTAL HOUSING PROJECT THAT MEETS THE REQUIREMENTS OF MULTIFAMILY PASSIVE BUILDING DESIGN STANDARDS

SOUTH DAKOTA HOUSING DEVELOPMENT AUTHORITY

March 7, 2016

SDHDA Offering Professional Development Trainings to Individuals Interested in the Passive House Standard

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Copper Pass Apartments - a Passive House project

Copper Pass, a South Dakota Housing Development Authority apartment building in Sioux Falls, has been designed to be Passive House Certified. This will make it only the 16th such apartment building in the whole country! Passive building comprises a set of design principles used to attain a rigorous level of energy efficiency. Passive building principles offer the best path to Net Zero and Net Positive buildings by minimizing the amount of energy consumed by the building.

Van De Walle Architects

Work continues on the under-slab work at Copper Pass! The goal of Passive House Certification is to reduce the amount of energy consumed by the building. To achieve that, we want to create an air tight, fully insulated building, which starts at the foundation and floor slab.

Like Comment Share

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PHnw Passive House Northwest

Register Now! | Rates | Thursday Evening Cocktail Hour | Hotel Information

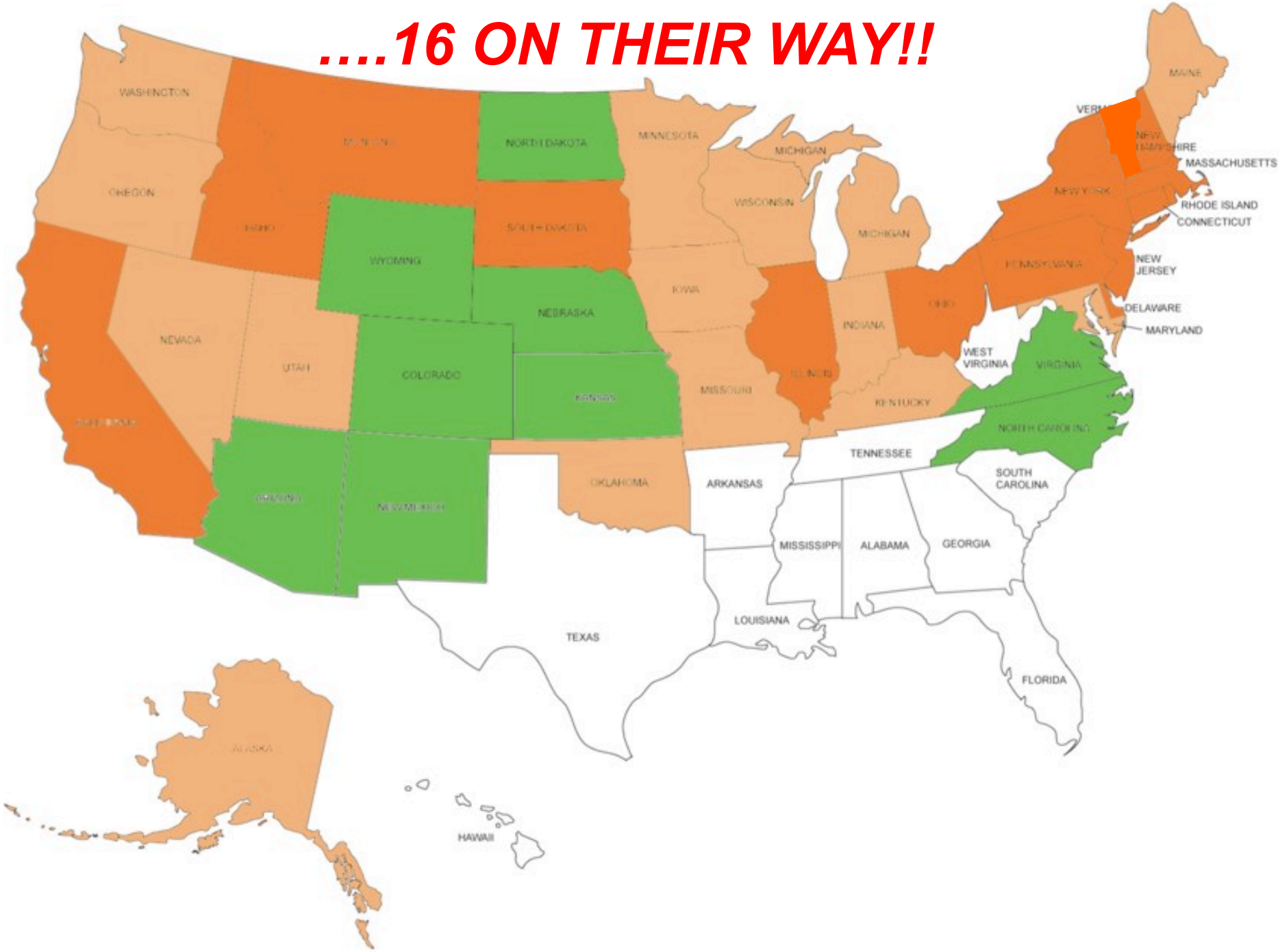
Please join us Friday, October 27th in Boise for the second annual PHnw conference east of the Cascades! We're bringing together regional governments, utilities providers, developers, and the design and construction community to discuss high-performance, low-energy passive house buildings - big and small - within the inland region. This exciting one-day conference will focus on strengthening regional expertise and awareness of passive buildings.

Good Morning:

Mr. Scott Yribar has asked us to pass the following invitation along to our participating and interested parties. Passive Housing is one of the programs that is available for green points under 6.4.13 of the Idaho Qualified Allocation Plan. If you are interested in attending this event, please see the information below.

Diana Baker | Multifamily Program Assistant
Idaho Housing and Finance Association
P.O. Box 7899, Boise, ID 83707-1899
Phone 208-331-4769| DianaB@IHFA.ORG
www.idahohousing.com

….16 ON THEIR WAY!!



….16 ON THEIR WAY!!

….16 ON THEIR WAY!!

MAINE
MASSACHUSETTS
MARYLAND
KENTUCKY

MINNESOTA
IOWA
MONTANA

Village Centre Passive House, Brewer, Maine, 48 units

BANGOR DAILY NEWS

Brewer's 'passive housing' project largest of its kind in US

Courtesy of Community Housing of Maine

A 48-unit passive housing project is in the works at the former State Street School site in Brewer

Bayside Anchor Passive House, Portland, Maine, 45 units

….16 ON THEIR WAY!!

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MICHIGAN
MISSOURI
OKLAHOMA
WISCONSIN
MINNESOTA
IOWA
UTAH
WASHINGTON
OREGON
NEVADA
ALASKA

Passive House for Affordable Housing Forum

January 29, 2018
Passive House design is smart, durable, and can cost-effectively realize substantial long-term savings for the multifamily affordable housing sector.

Hear from:

- Michelle Apigian (ICON Architecture)
- Hank Keating (Trinity Financial)
- Ryan Cassidy (RiseBoro Community Partnership)
- Jesse Thompson (Kaplan Thompson Architects)
- Declan Keefe (Placebolder)

Join Masshousing! Email RSVP@masshousing.com

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LISC Boston and Masshousing

Cosponsored by

Massachusetts Housing Partnership, American Planning Association MA Chapter, Boston Society of Architects, CHAPA, MACDC, MAPC, MassCEC, Mel King Institute, Passive House, MA, and USGBC MA Chapter

WHEN:
Monday, January 29, 2018
1:00pm-3:00pm

WHERE:
Masshousing
1 Beacon Street
Boston, MA 02108

BSA 150

Boston Society of Architects/AIA
BSA Foundation
290 Congress Street, Suite 200
Boston, MA 02210-1024
P 617-391-4000 F 617-951-0845
directions / contact us

Be Passive(haus) Aggressive: Affordable Housing in Massachusetts

00/00/2019 - 12:15 to 13:15

12:15 pm to 1:15 pm

Is it possible to use Passive House principles in affordable housing? The answer is yes. Come hear how new construction affordable housing projects are utilizing Passive House principles to get exemplary energy performance out of buildings. Panelists will highlight two real-world examples and identify how Massachusetts incentives can help push affordable multi-family projects closer to Passive House standards.

This lunch and learn session is sponsored by the Massachusetts Clean Energy Center.

MASSACHUSETTS CLEAN ENERGY CENTER

….16 ON THEIR WAY!!

MAINE
MASSACHUSETTS
MARYLAND
KENTUCKY
INDIANA
MICHIGAN
MISSOURI
OKLAHOMA
WISCONSIN
MINNESOTA
IOWA
UTAH
WASHINGTON
OREGON
NEVADA
ALASKA

Ultra-Efficient, Economical Apartments Now In South Boston Are Part Of 'Big Wave'

July 24, 2017 | By Fred Bever, Maine Public

….16 ON THEIR WAY!!

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OKLAHOMA

Kentucky Housing Corporation

Building a Stronger Kentucky

2016 KENTUCKY AFFORDABLE HOUSING CONFERENCE

Passive House Work in Kentucky and the QAP

Have you heard about Passive House? If not, you will soon as it will likely factor into KHC's 2019 Qualified Allocation Plan (QAP)! Join us for this session where a panel of experts will present information on the existing Passive House consulting and certification experience available in Kentucky; how the concept has been accepted and incorporated in other state's QAPs; and the basic Passive House principles, how they work, and why they are affordable.

WASHINGTON
OREGON
NEVADA
ALASKA

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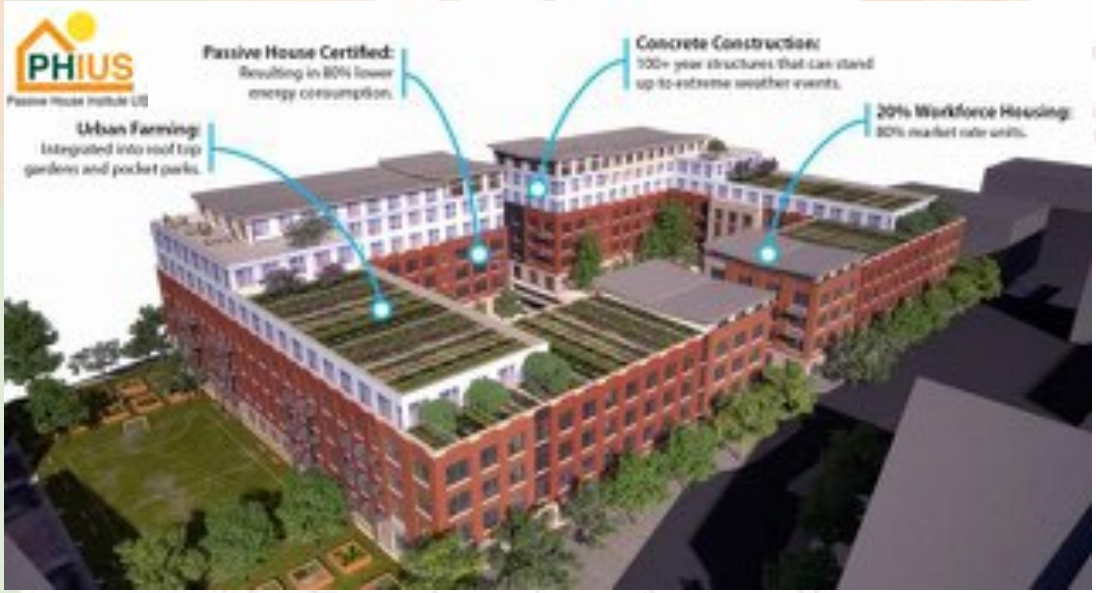

ARNOLD DEVELOPMENT

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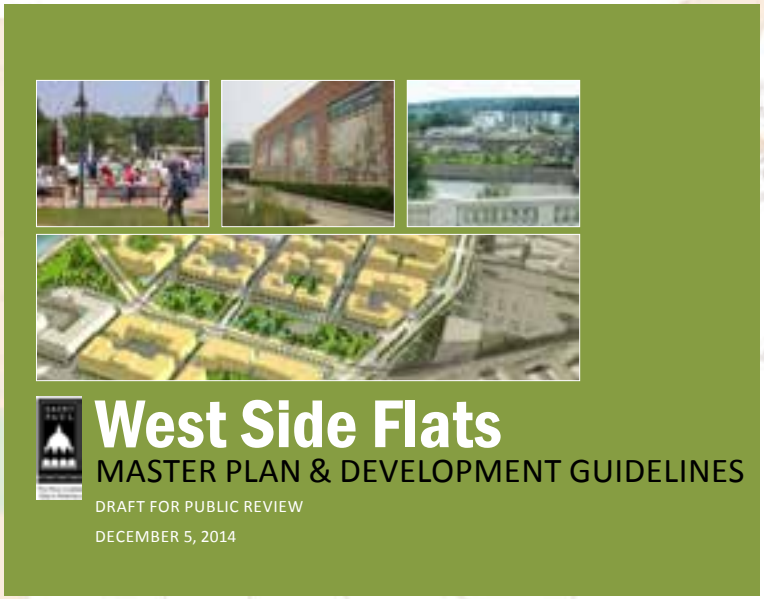

Minnesota Housing Finance Agency

QAP discussions informed by large PH projects

….16 ON THEIR WAY!!

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This Is The Largest Passive House Building In The US

November 19th, 2014 by

PHIUS
Passive House Institute US

DELAWARE VALLEY GREEN BUILDING COUNCIL
2017 NEW GRAVITY HOUSING CONFERENCE

CLIMATE CHANGE AND THE IMPERATIVE OF HIGH PERFORMANCE AFFORDABLE HOUSING

DVGBC
Delaware Valley Green Building Council

GPPHA

AUGUST 3 & 4, 2017 @ TEMPLE UNIVERSITY

Conference specifically focused on BUILT Passive House Affordable housing projects in the US
PRACTICAL, LESSONS LEARNED, COST ANALYSIS INFORMATION SHARING

TIME	AUGUST 3rd SCHEDULE		
7:30 - 8:30	Registration, Breakfast, and Expo		
8:30 - 9:15	Welcome: Alex Dixon, Tim McDonald, Wade Roxbergen, Holly Gleason		
	Track 1	Track 2	Track 3
Session 1 9:30 - 10:30	Orchards at Orenco and Beyond: Finding our way to higher levels of efficiency while managing costs	PHFA Passive House Multi-Family Experience: What makes sense, what doesn't, and recommendations for future implementation	Real World Challenges of Passive House in the Mainstream Market
10:30 - 11:00	Coffee and Expo		
Session 2 11:00 - 11:45	St. John Neumann Place II: Why, how, and would we do it again	Affordable Housing: An oxymoron or realistic expectation?	Affordable Passive House Multi-Family: A report from two pioneer cities
Session 3 11:50 - 12:35	How to Deliver Performance and Value: A method for cost effective high performance construction	Passive House Inspired Affordable Housing: What does the performance data tell us?	Two Architects and Their Stunning Successes with Passive House, Affordable, Multi-Family Housing in Cold, Cloudy New England
12:35 - 1:00	Lunch and Expo		
1:00 - 1:45	Keynote Speaker: Jonathan F.P. Rose (Welcome from Renee Robinson)		
Session 4 2:00 - 2:45	Path to Net Zero Housing from Policy to Practice: Lessons from the District of Columbia	Keeping the Affordability in Affordable Multi-Family Passive House Projects	Strategies for Ventilating Multi-Family Buildings Seeking Multiple Certifications
Session 5 2:50 - 3:35	Using Passive House to Give Old Affordable Housing Retrofits Superior Performance and Increased Occupant Benefits	Habitat for Humanity: Pushing the envelope	Centralized vs. Decentralized Ventilation Throwdown
3:45 - 4:15	Keynote Speaker: Sebastian Moreno-Vacca		
4:30 - 6:00	Happy Hour on Vendor Floor		

TIME	AUGUST 4th SCHEDULE		
7:30 - 8:30	Breakfast on Vendor Floor		
8:30 - 9:15	Keynote Speaker: Lois Arena		
	Track 1	Track 2	Track 3
Session 6 9:20 - 10:20	The PHFA Building Passive House Addition	Measured vs. Modeled Performance of PHFUS Affordable Multi Family Projects	The Distillery Project: A 65-unit passive house retrofit in Boston
Session 7 10:30 - 11:30	Outside the (Big) Box: An example of rural, affordable, multi-family, and non-traditionally financed projects	Affordable Multi-Family Passive House Design and Construction: 68-unit 6 story senior housing	Developing a PHFA Funded LIHTC Project: Passive House benefits while minimizing construction costs
11:30 - 12:00	Coffee and Expo		
Session 8 12:00 - 1:00	The Twin Tab Effect: Six multi-family passive house projects across the country	Whitehall, The PHFA Project, and Prefabrication: One of the magnificent seven ways to elegantly skin a multi family passive house cat	Zero Net Energy Possible Affordable Housing on Martha's Vineyard
1:00 - 1:30	Lunch		
1:30 - 2:15	Keynote Speaker: Zack Semke		
2:15 - 2:30	Closing Remarks		
Tour 1 3:00 - 5:00	Capital II		
Tour 2 3:00 - 5:00	Wynne Theater		
Tour 3 3:00 - 5:00	Saint John Neumann II		

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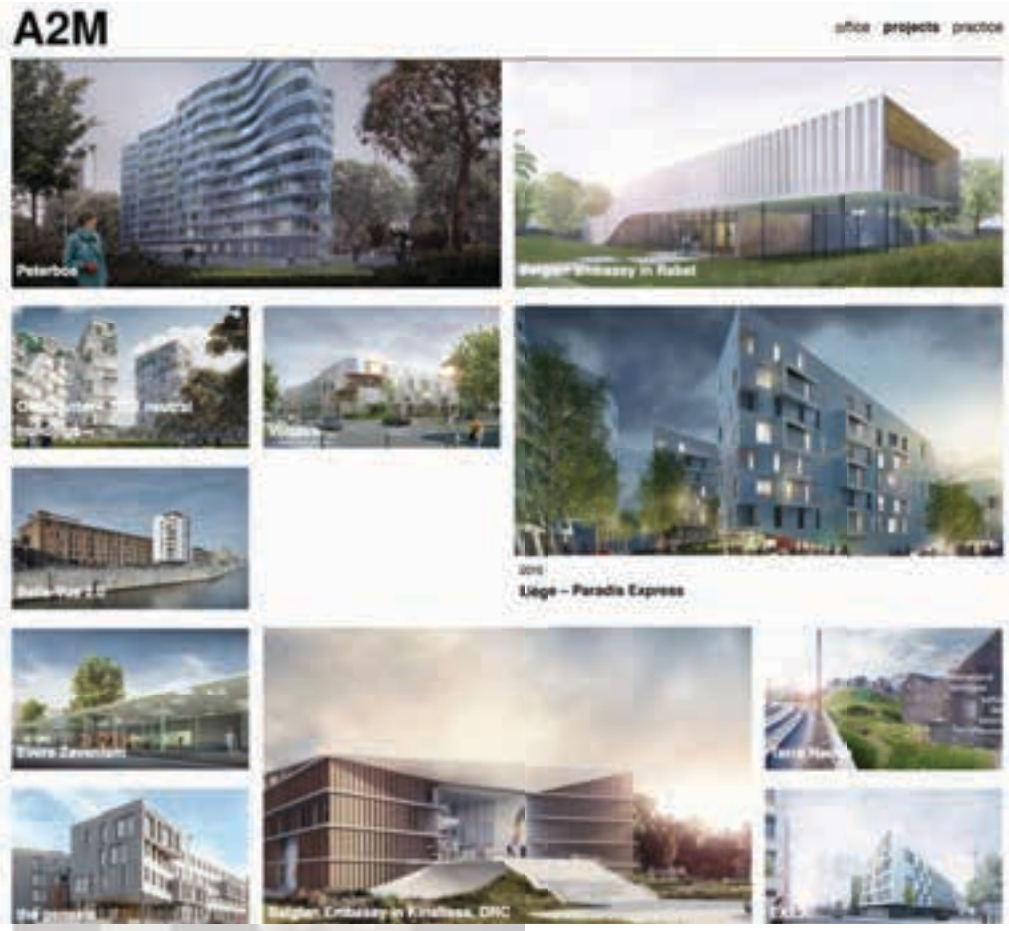

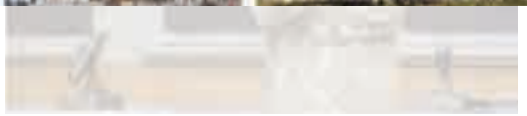

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Affordable East Harlem development will have 655 passive house rentals

The nearly block-large project will bring amenities like a supermarket, YMCA, and health care facility to the neighborhood

BY ZOE ROSENBERG | @ZOE_ROSENBERG | FEB 7, 2017, 9:33AM EST

The development will rise on a block bound by Madison and Park avenues and East 111th and 112th streets. | Handel Architects

Jonathan Rose

Over 40 Projects, mostly BUILT, presented!

- Cost data being collected and compared to “typical” costs from multiple regions
- Performance Data beginning to be collected
- Developing ‘MANUAL’ of cost-effective envelops/systems/strategies for multi-family PH

HABITAT TOWNHOMES
NY
2 units
Habitat/Jordan Dentz
#1: $141,314 per unit
#2: $138,819 per unit

2ND AND DELAWARE
Kansas City, MO
276 Units
Arnold Dev/Galen Staengl
$140/sf ($44.9M)

RETIREMENT RESIDENCE OF GLASSPORT
Glassport, Pa
55 Units
NK/Galen Staengl
$183/sf ($11M)

DISTILLERY
Boston, MA
55 Units
2nd St. Ass: Fred Gordon

ELM PLACE
Burlington, VT
30 Units
DWA/Cathedral Square
$183/sf (1-2% upcharge)

THE ELMS: RETROFIT
Pittsburgh, PA
300 Units
NK/Thoughtful Balance
$15.4 M

1601 BRYN MAWR
Bryn Mawr, PA
16 Units
Renewable Homes/Blue Path
$183/sf ($11M)

MORNINGSIDE CROSSING
Pittsburgh, PA
56 Units
NK/Thoughtful Balance
$167/sf ($9.8M) 6.5% premium

PAX FUTURA: 3700 HUDSON
Seattle, WA
30 Units: 300 sf units
NK/Galen Steangl

PHFA ADDITION
Harrisburg, PA
Commercial Building
Murray/Galen Steangl

BAYSIDE ANCHOR
Portland, Maine
45 Units
Kaplan Thompson/Portland Housing Auth
$156/sf ($5.9M)

NET-ZERO MARTH'S VINEYARD
Martha's Vineyard, MA
55+ Units
South Mountain Co.

WHITEHALL
Spring City, PA
40 Units
Mission First, AC, Onion Flats
$155/sf ($8.1M)

CAPITAL 2
Philadelphia
25 Units
Onion Flats
$159/SF

WYNNE
Philadelphia
51 units
Pennrose/Kitchen
7% over initial costs

ST. JOHN NEUMAN
Philadelphia
52 units
Blackney Hayes/Domus

SACRED HEART
Philadelphia
61 Units
Pennrose/Kitchen
5% over Initial Costs???

DIAMOND PARK: Phase 1
Philadelphia
12 Units
Habitat for Humanity

8 PROJECTS FROM NYC

MULTI-FAMILY: BROOKLY
NYC
20 Units
6 Units
Jordan Dentz
Levey Partnership

CORONA
NYC
68 Unit
HANAC

HILLCREST
Pittsburgh, PA
66 Units
Community Builders/RDL/Sota
$150/sf: 2% above code building

WASHINGTON SQUARE
Chambersburg, PA
54 Units
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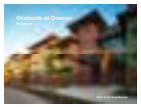
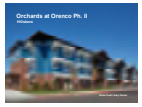
WESTMINSTER PLACE: WINDY HILL VILLAGE II
Phillipsburgh, PA
48 Units
Presbyterian Senior Living
$175sf



ORCHARDS AT ORENCO: Phase 1
Hillsboro, Oregon
57 Units: Phase 1
Walsh Construction
.13 ACH20
Modeled Performance: 22.5 EUI
Measured Performance: 20.9 EUI
$158/sf ($159k/unit), 11% over typical project



ORCHARDS AT ORENCO: Phase 2
Hillsboro, Oregon
58 Units: Phase 2
Walsh Construction
.59 ACH20
Modeled Performance: 22.5 EUI
Measured Performance: Aug 2017
$173sf ($147k/unit), 8% less than Phase 1, 5% premium over typical

WIENBERG COMMONS: RETROFIT
Washington, DC
36 units
THC, Passive to Positive, ZA+D, Hamel Builders

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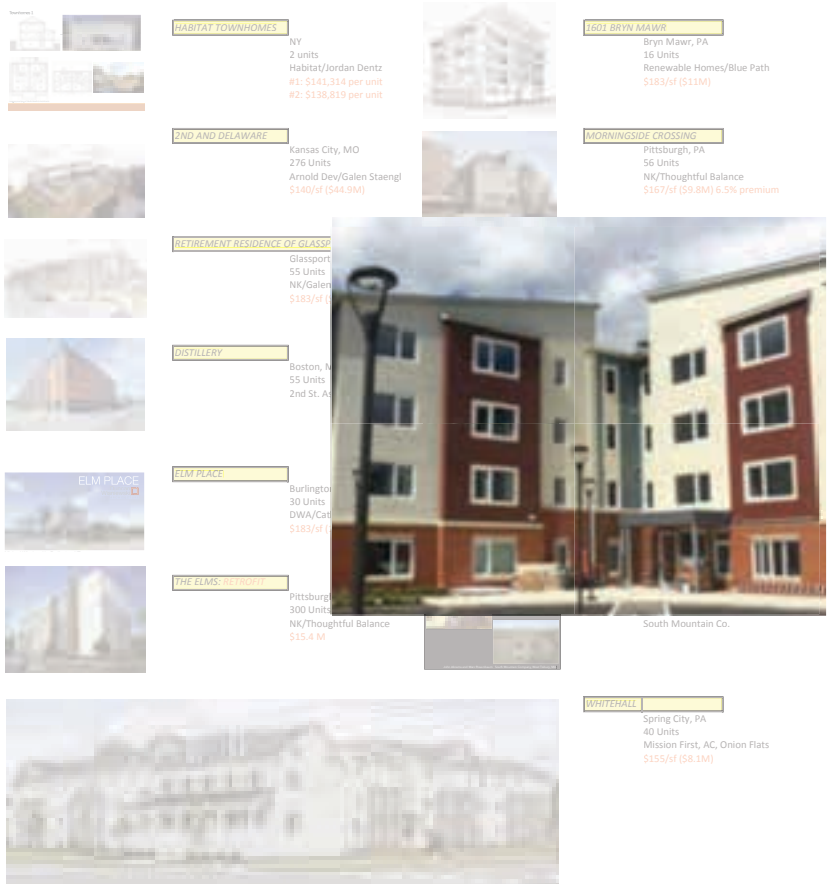

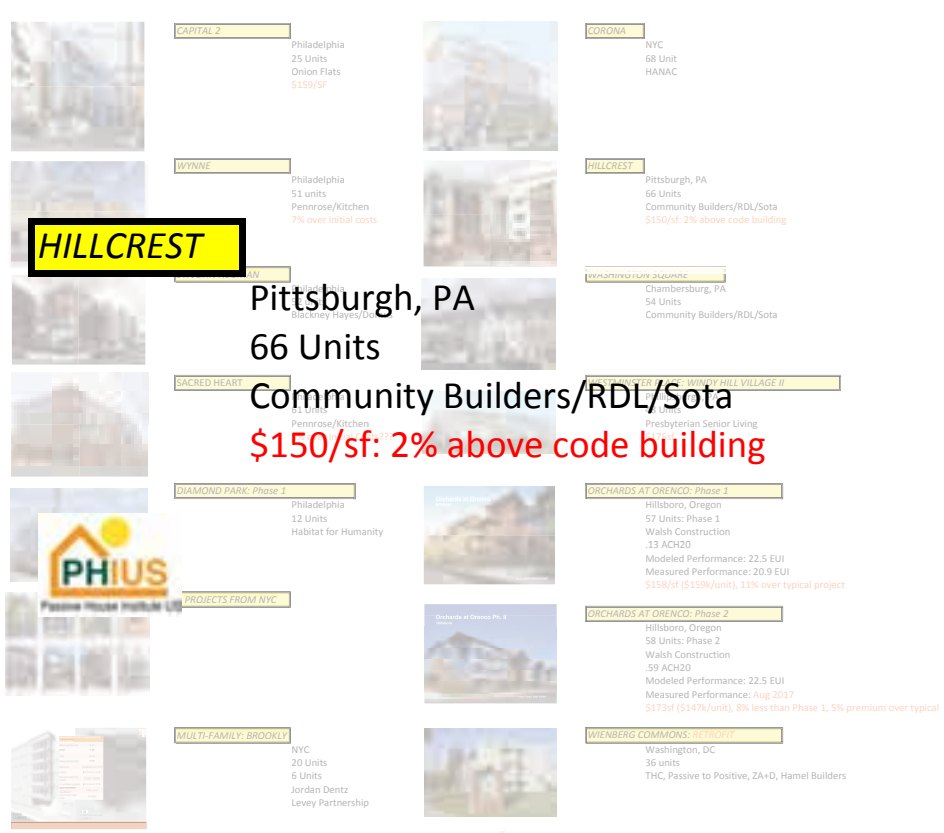

HILLCREST

Pittsburgh, PA

66 Units

Community Builders/RDL/Sota

$150/sf: 2% above code building

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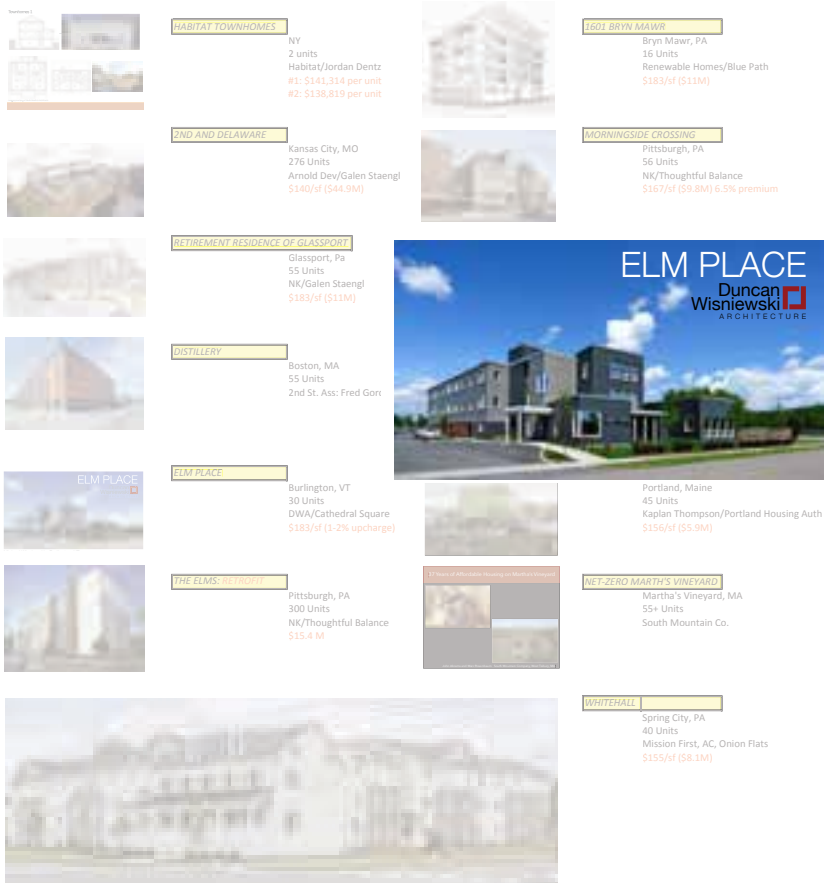

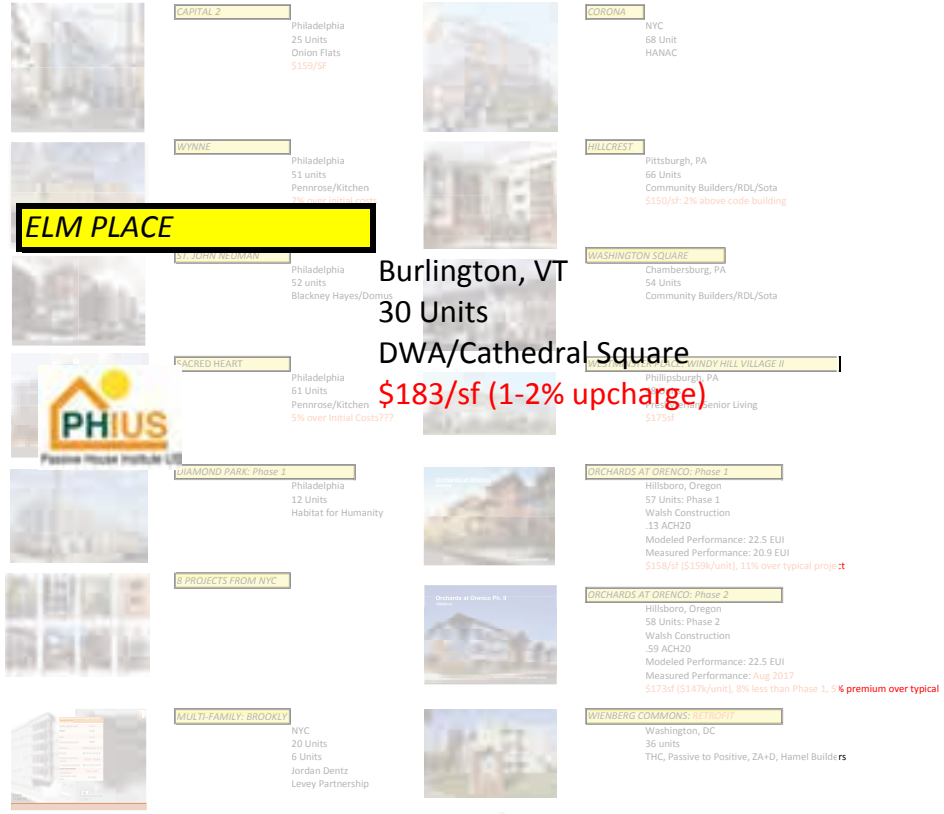

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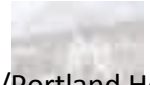

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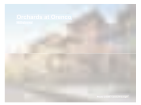

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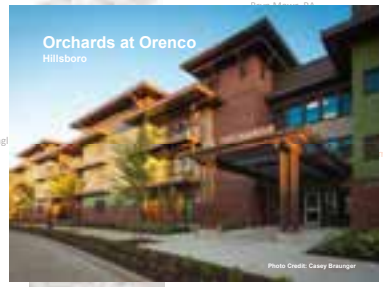

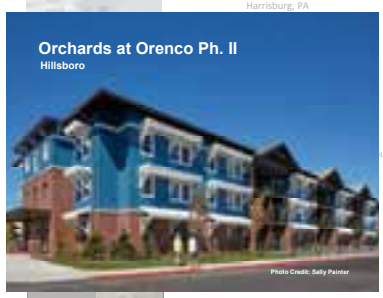

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Modeled Performance: 22.5 EUI
Measured Performance: 20.9 EUI
$158/sf ($159k/unit), 11% over typical project

ORCHARDS AT ORENCO: Phase 2

Hillsboro, Oregon
58 Units: Phase 2
Walsh Construction
.59 ACH20
Modeled Performance: 22.5 EUI
Measured Performance: Aug 2017
$173sf ($147k/unit), 8% less than Phase 1, 5% premium over typical

Over 40 Projects, mostly BUILT, presented!

- *Cost data being collected and compared to "typical" costs from multiple regions*
- *Performance Data beginning to be collected*
- *Developing 'MANUAL' of cost-effective envelops/systems/strategies for multi-family PH*

- *AFFORDABLE + MARKET RATE take aways:*

HABITAT TOWNHOMES
NY
2 units
Habitat/Jordan Dentz
#1: $141,314 per unit
#2: $138,819 per unit

1601 BRYN MAWR
Bryn Mawr, PA
16 Units
Renewable Homes/Blue Path
$183/sf ($11M)

2ND AND DELAWARE
Kansas City, MO
276 Units
Arnold Dev/Galen Staengl

MORNINGSIDE CROSSING
Pittsburgh, PA
56 Units
NK/Thoughtful Balance
$167/sf ($9.8M) 6.5% premium

AFFORDABLE

RETIREMENT RESIDENCE OF GLASSPORT
Glassport, Pa
55 Units
NK/Galen Staengl
$183/sf ($11M)

PAX FUTURA: 3700 HUDSON

WHITEHALL
Spring City, PA
40 Units
Mission First, AC, Onion Flats
$155/sf ($8.1M)
On Budget

DISTILLERY
Boston, MA
55 Units
2nd St. Ass: Fred Gordon

WHITEHALL
Spring City, PA
40 Units
Mission First, AC, Onion Flats
$155/sf ($8.1M)

CAPITAL 2
Philadelphia
25 Units
Onion Flats
$159/SF

CORONA
NYC
68 Unit
HANAC

WYNNE
Philadelphia
51 units
Pennrose/Kitchen
7% over initial costs

HILLCREST
Pittsburgh, PA
66 Units
Community Builders/RDL/Sota
$150/sf: 2% above code building

ST. JOHN NEUMAN
Philadelphia
52 units
Blackney Hayes/Domus

WASHINGTON SQUARE
Chambersburg, PA
54 Units
Community Builders/RDL/Sota

SACRED HEART
Philadelphia
61 Units
Pennrose/Kitchen
5% over Initial Costs???

WESTMINSTER PLACE: WINDY
Phillipsburgh, PA
48 Units
Presbyterian Senior Living
$175sf

DIAMOND PARK: Phase 1
Philadelphia
12 Units
Habitat for Humanity

ORCHARDS AT ORENCO: Phase 1
Hillsboro, Oregon
57 Units: Phase 1
Walsh Construction
.13 ACH20
Modeled Performance: 22.5 EUI
Measured Performance: 20.9 EUI
$158/sf ($159k/unit), 11% over typical project

8 PROJECTS FROM NYC

ORCHARDS AT ORENCO: Phase 2
Hillsboro, Oregon
58 Units: Phase 2
Walsh Construction
.59 ACH20
Modeled Performance: 22.5 EUI
Measured Performance: Aug 2017
$173sf ($147k/unit), 8% less than Phase 1, 5% premium over typical

MULTI-FAMILY: BROOKLY
NYC
20 Units
6 Units
Jordan Dentz
Levey Partnership

WIENBERG COMMONS: RETROFIT
Washington, DC
36 units
THC, Passive to Positive, ZA+D, Hamel Builders

AFFORDABLE HOUSING

AFFORDABLE HOUSING

Architects, Engineers, Builders

AFFORDABLE HOUSING

↑ ↑

Architects, Engineers, Builders

↓ ↓

MARKET-RATE HOUSING

Catalyst for radical and significant transformation of the HOUSING INDUSTRY…..

AFFORDABLE HOUSING

↑ ↑

Architects, Engineers, Builders

↓ ↓

MARKET-RATE HOUSING

RADICAL

AFFORDABLE

SCALABLE

QUESTIONS?

This concludes The American Institute of Architects Continuing Education Systems Course

Timothy McDonald

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