Factory to Field:
Designing, Building and Verifying Modular Passive Buildings

Anthony Lisanti, CEM CPHC Integral Building and Design/Phius
John Loercher, Northeast Projects / Phius

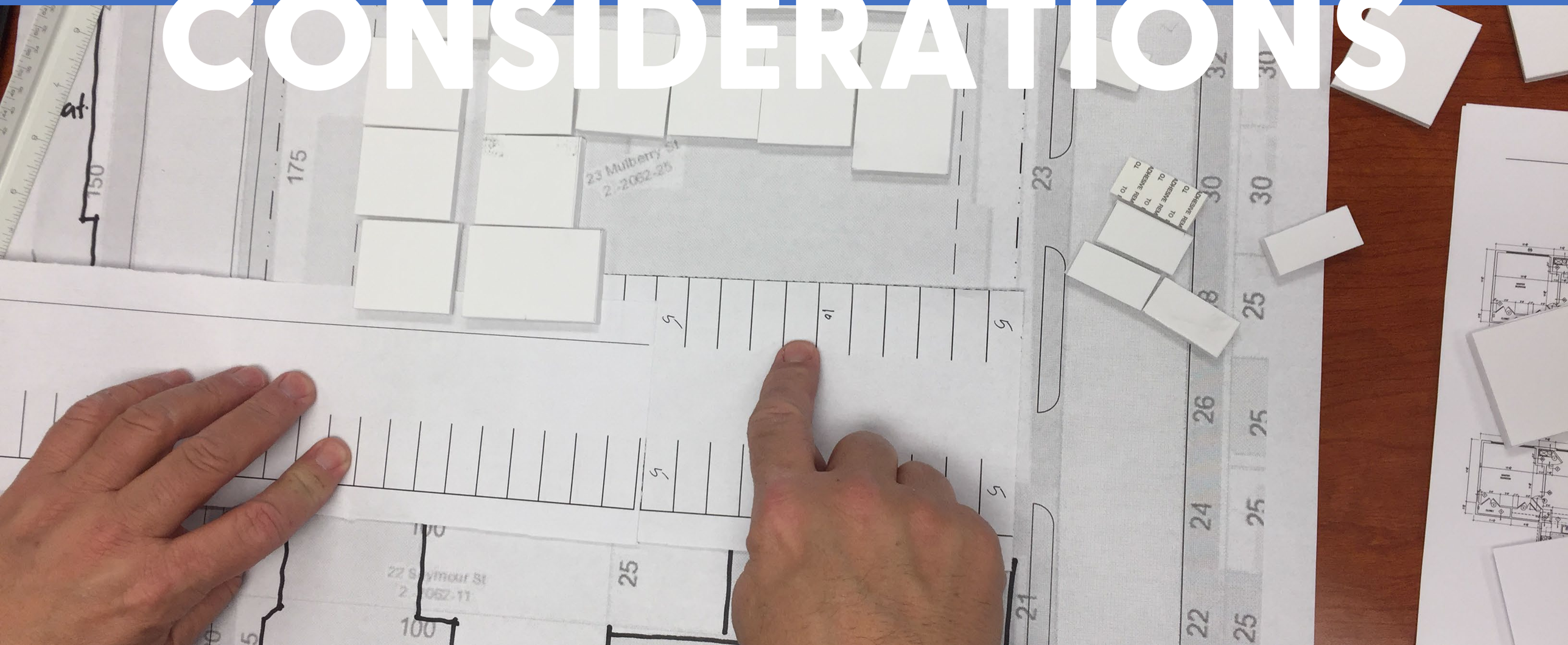
Add'l content provided by:
Stuart Lachs, AIA, LEED AP Perkins Eastman

PERKINS EASTMAN
Human by Design

Modular Multifamily Passive Buildings: Design, Build, and Verify

Photograph by Andrew Rugge. Copyright Perkins Eastman

DESIGN CONSIDERATIONS



ORIGINAL SITE CONDITIONS

- **ORIGINAL SITE CONDITIONS**

FORMER LONGFELLOW SCHOOL – DEMOLISHED CIRCA 2007

FORMER LONGFELLOW SCHOOL – DEMOLISHED CIRCA 2007

SITE AS DELIVERED 2019

THE PLAYERS

MHACY
Municipal Housing Authority for the City of Yonkers

THE fresnel GROUP

PERKINS EASTMAN

smith miller associates
CONSULTING ENGINEERS

NORTHEAST PROJECTS

sta
STEPHEN TILLY, Architect

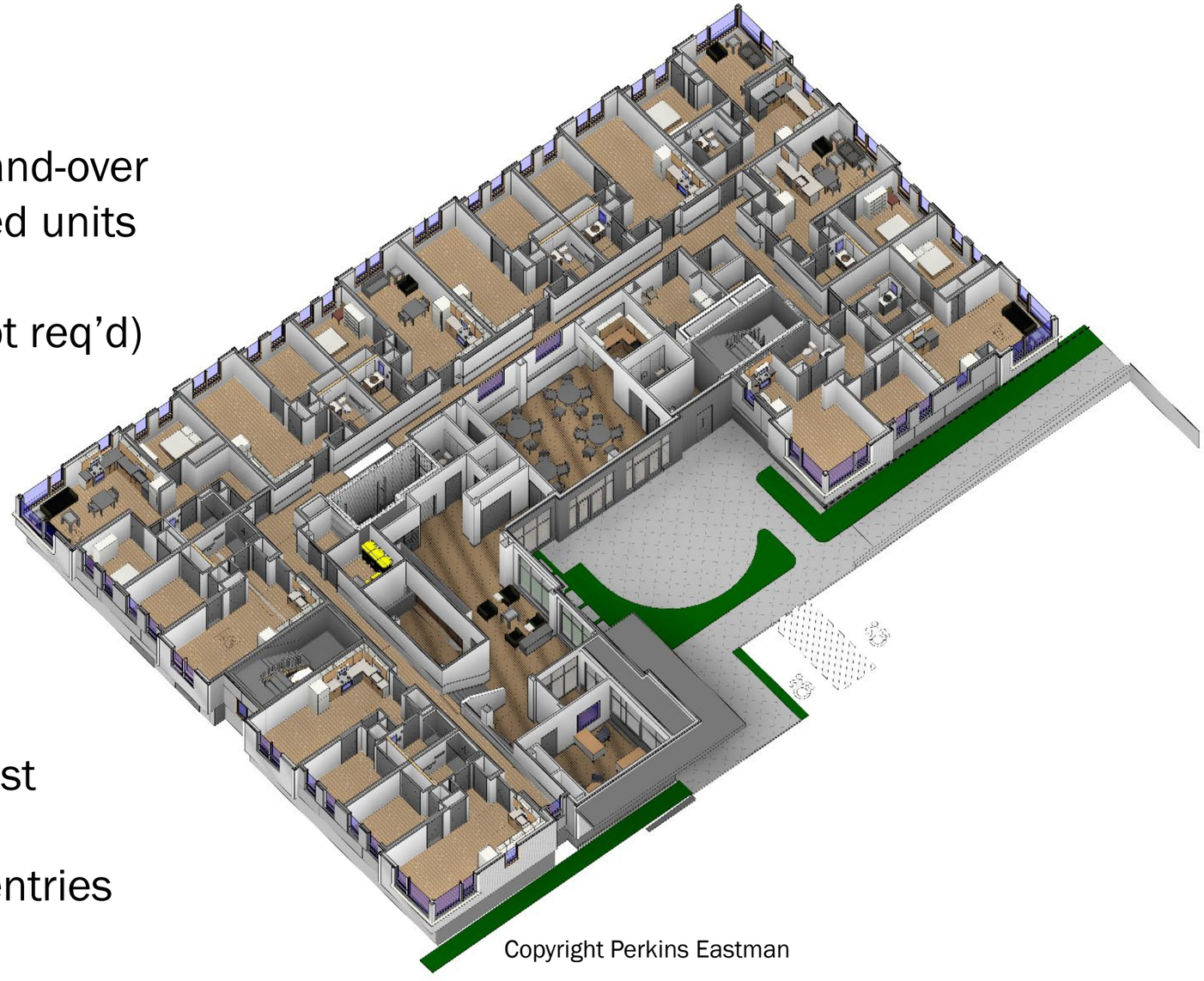
INTEGRAL
BUILDING + DESIGN

andron

SIGNATURE
BUILDING SYSTEMS

Program

- 34,848 sf site (.8 acres)
- Sixty affordable rental apartments for 55-and-over
- Fully-adapted (Type B) and hearing-impaired units
- 60,000 Gross SF building area
- On-site resident parking (1/2 space per apt req'd)
- Community Room with Kitchen
- Two Business Rooms
- Fitness Room
- Landscaped Courtyard
- Landscaped Roof Deck
- Furnished Lobbies on Two Levels
- Central Laundry facilities
- In-unit stacking laundry available on request
- Building-wide WIFI
- Smart locks at entrances and apartment entries
- Resident storage
- Bicycle Storage
- Management Office



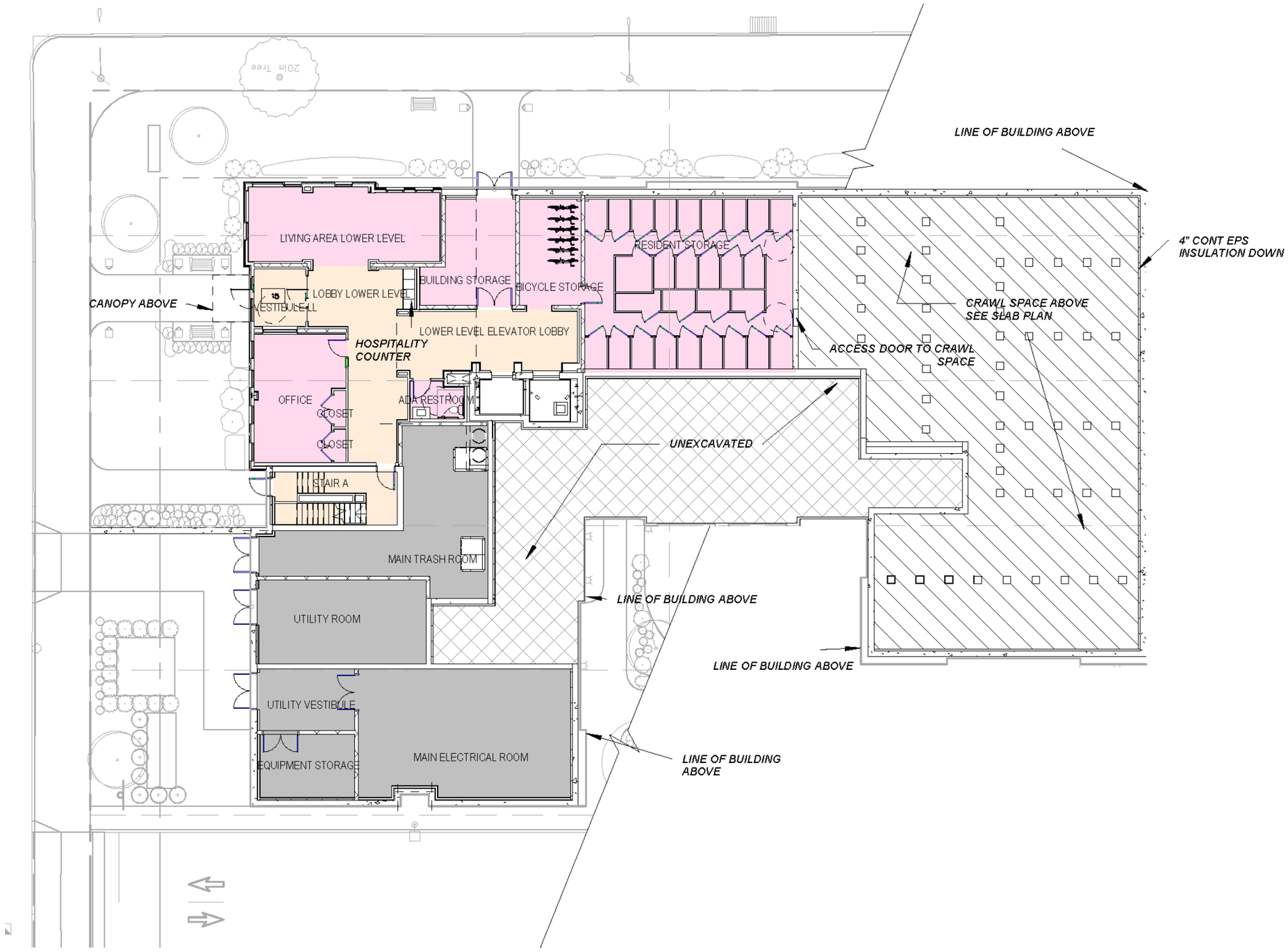
Design Strategy

- Speaks to local vernacular of row-houses and two-family dwellings.
- Parapets create undulating roof line.
- Wall surface undulates to create a sense of depth.
- Provide spaces for gathering to create community.

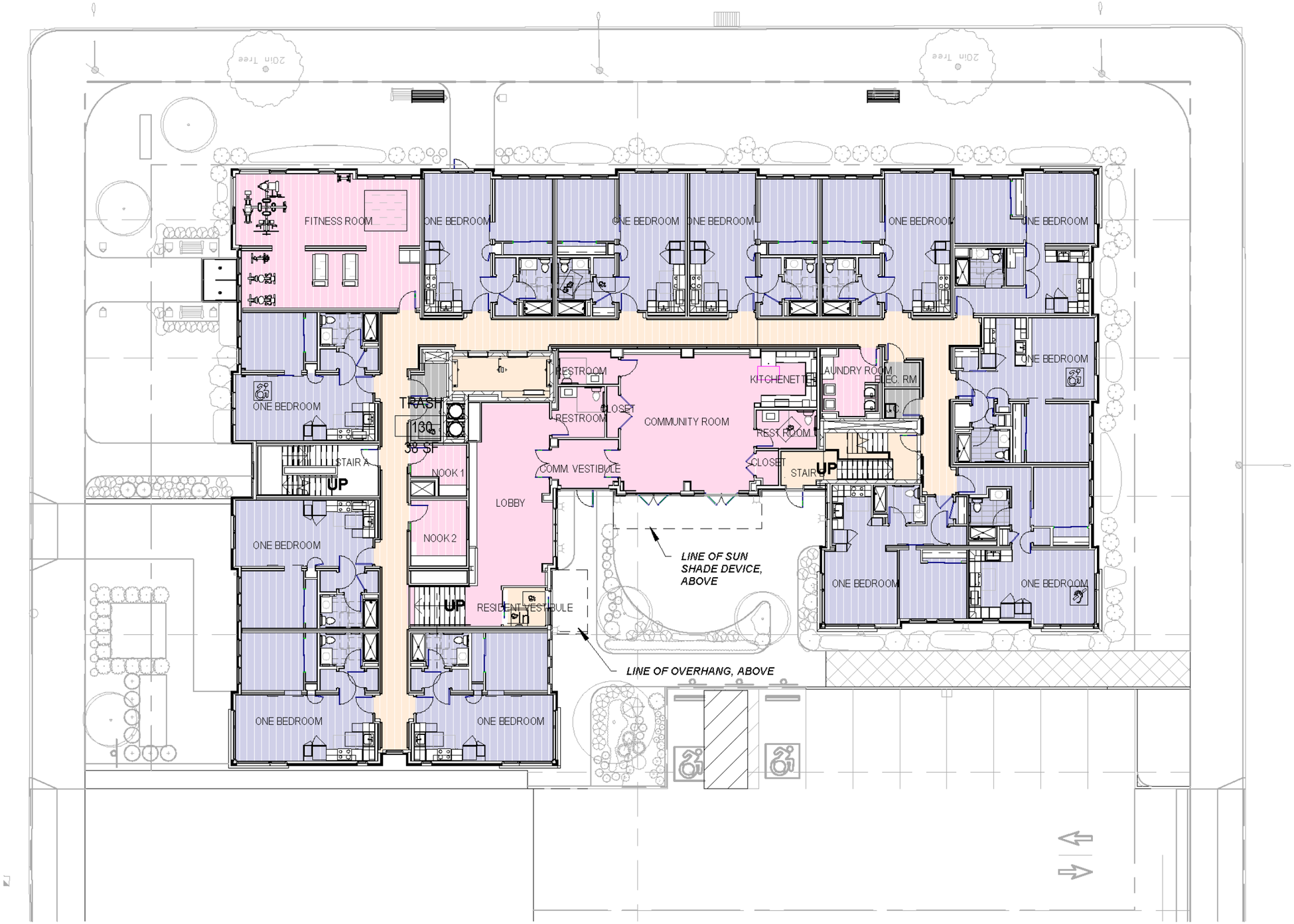
SITE PLAN


TRINITY STREET
SEYMOUR STREET
MULBERRY STREET
PROPOSED 13,477 SF
SENIOR LIVING BUILDING
TERRACE ELEV. = 112.42'
BASEMENT ELEV. = 107.0'

BASEMENT


LINE OF BUILDING ABOVE
4" CONT EPS INSULATION DOWN
LIVING AREA LOWER LEVEL
RESIDENT STORAGE
BUILDING STORAGE
BICYCLE STORAGE
CANOPY ABOVE
LOBBY LOWER LEVEL
VESTIBULE LL
CRAWL SPACE ABOVE SEE SLAB PLAN
LOWER LEVEL ELEVATOR LOBBY
HOSPITALITY COUNTER
ACCESS DOOR TO CRAWL SPACE
OFFICE
CLOSET
CLOSET
ADA RESTROOM
UNEXCAVATED
STAIR A
MAIN TRASH ROOM
LINE OF BUILDING ABOVE
UTILITY ROOM
LINE OF BUILDING ABOVE
UTILITY VESTIBULE
EQUIPMENT STORAGE
MAIN ELECTRICAL ROOM
LINE OF BUILDING ABOVE

FIRST FLOOR


FITNESS ROOM
ONE BEDROOM
ONE BEDROOM
ONE BEDROOM
ONE BEDROOM
ONE BEDROOM
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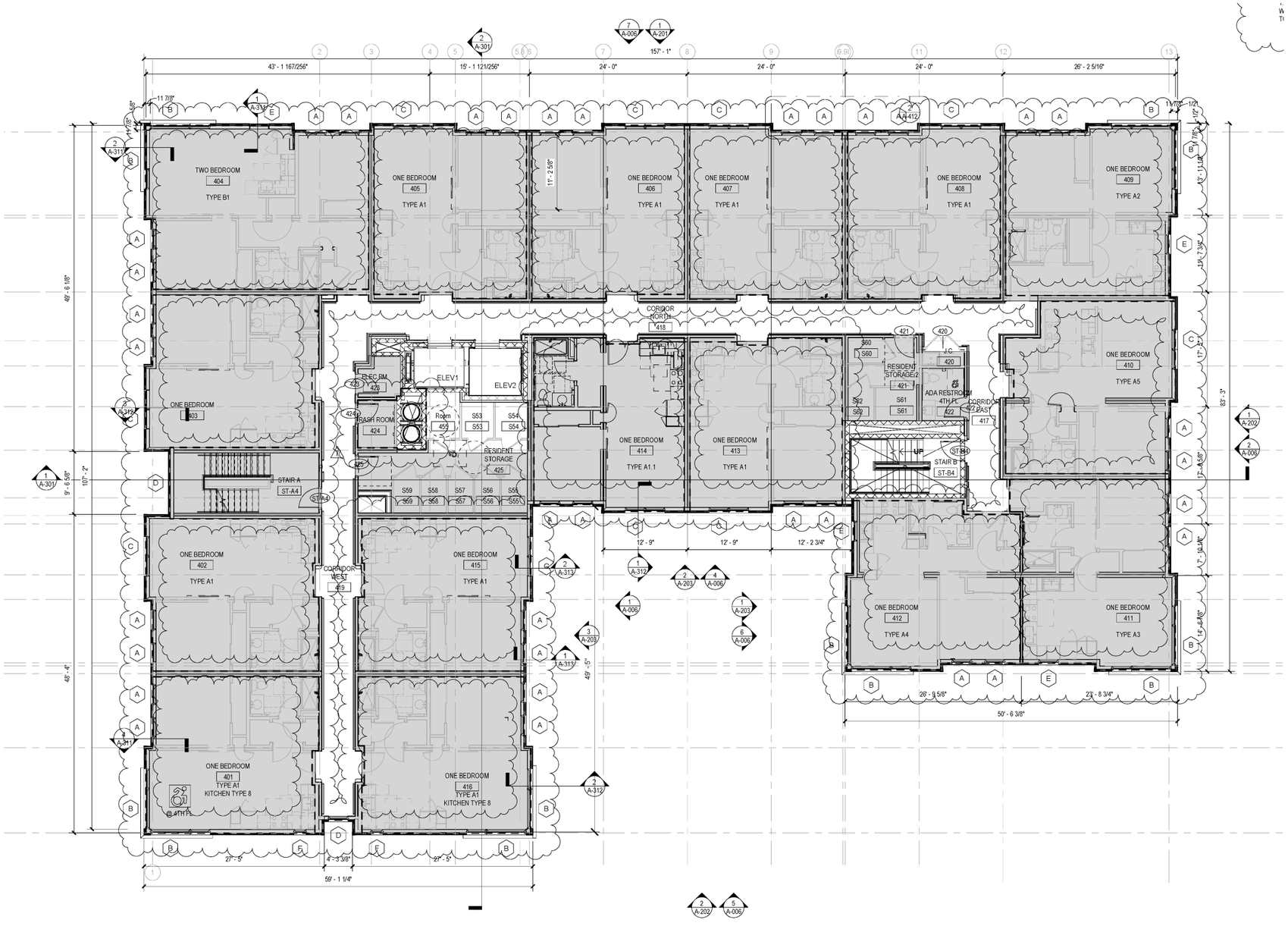
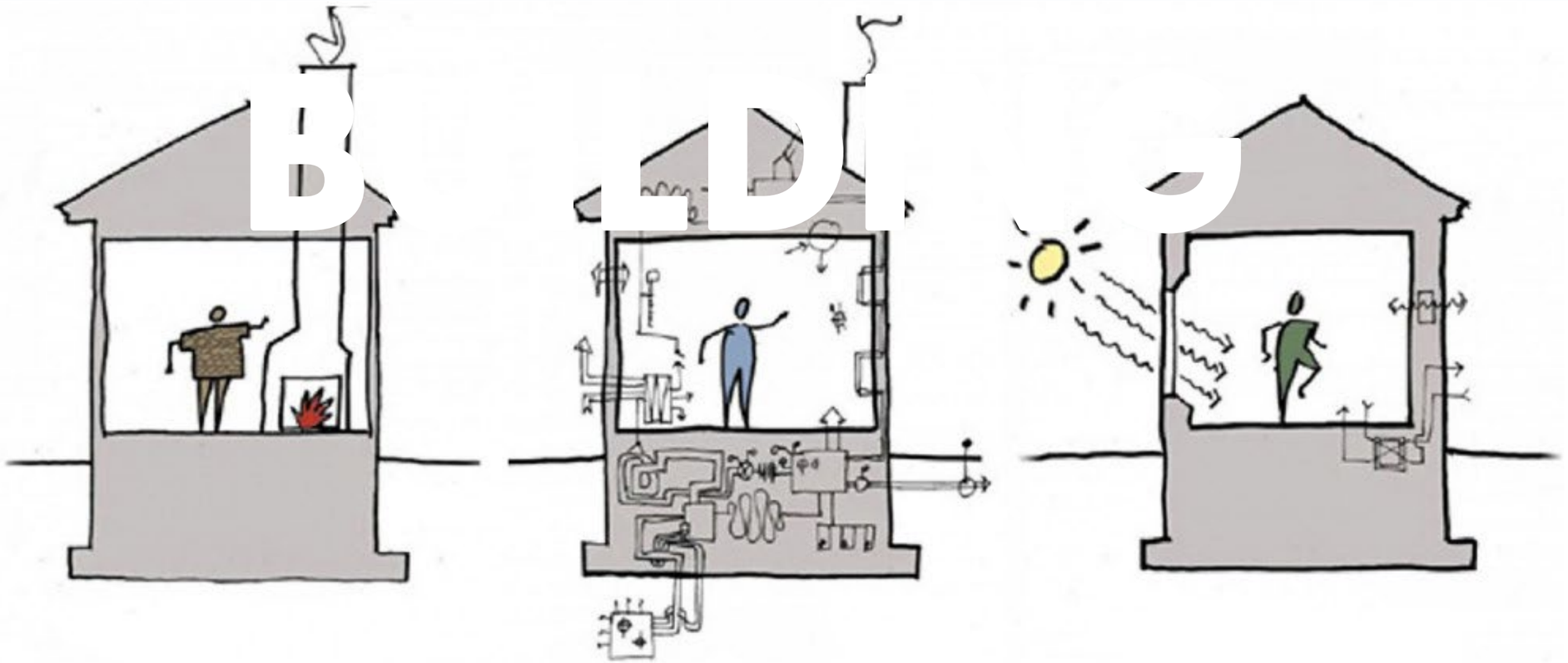
ONE BEDROOM
ONE BEDROOM
ONE BEDROOM
ONE BEDROOM
ONE BEDROOM
ONE BEDROOM
TRASH
130 SF
RESTROOM
CLOSET
RESTROOM
COMMUNITY ROOM
KITCHENETTE
LAUNDRY ROOM
ELEC. RM
REST ROOM
CLOSET
STAIR A
UP
NOOK 1
NOOK 2
COMM. VESTIBULE
LOBBY
STAIR
UP
UP
RESIDENT VESTIBULE
LINE OF SUN SHADE DEVICE, ABOVE
LINE OF OVERHANG, ABOVE

TYPICAL FLOOR



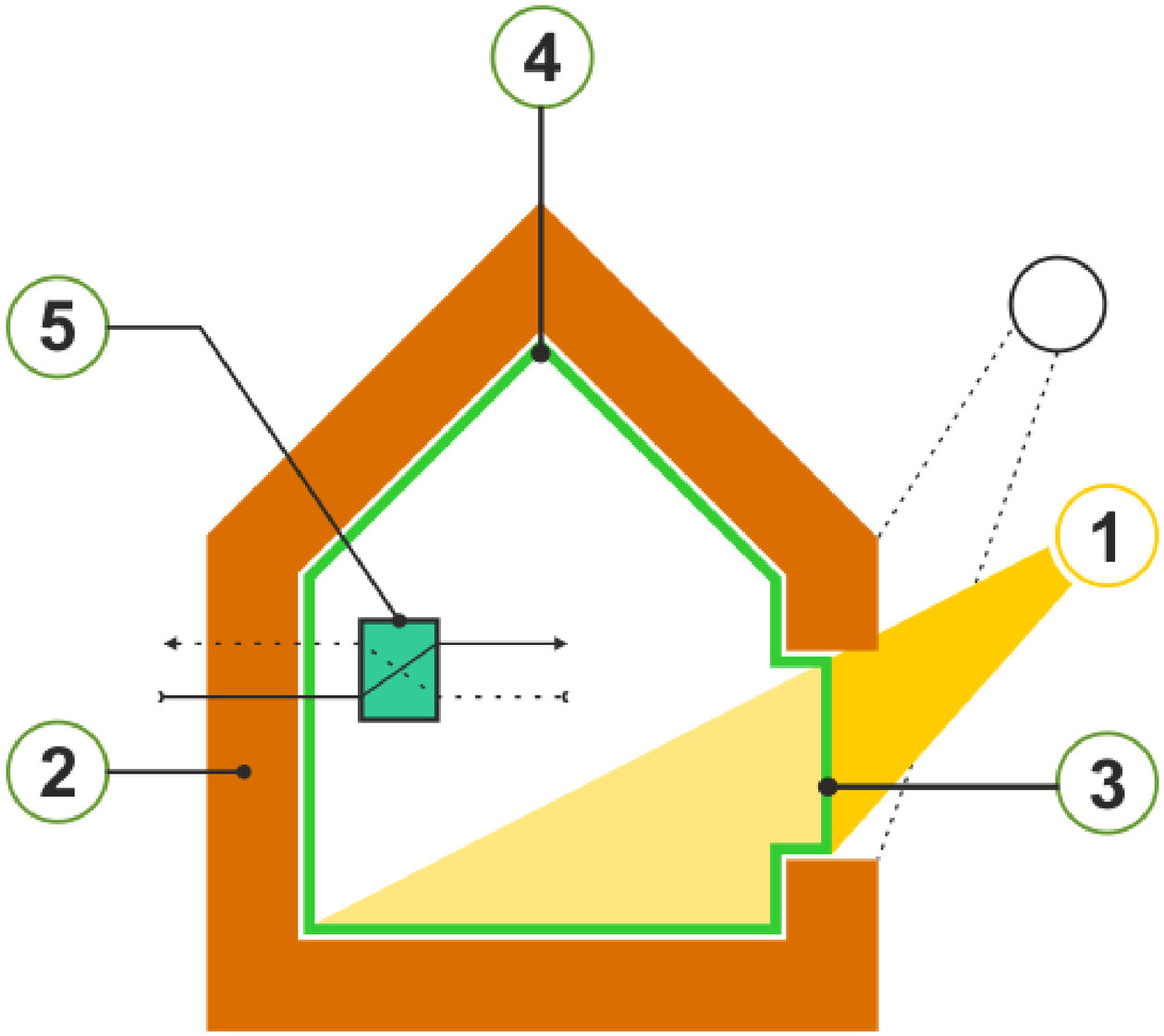
PASSIVE



19th Century 20th Century 21st Century

Image source: Albert, Righter and Tittmann Architects

PASSIVE BUILDING DESIGN PRINCIPALS



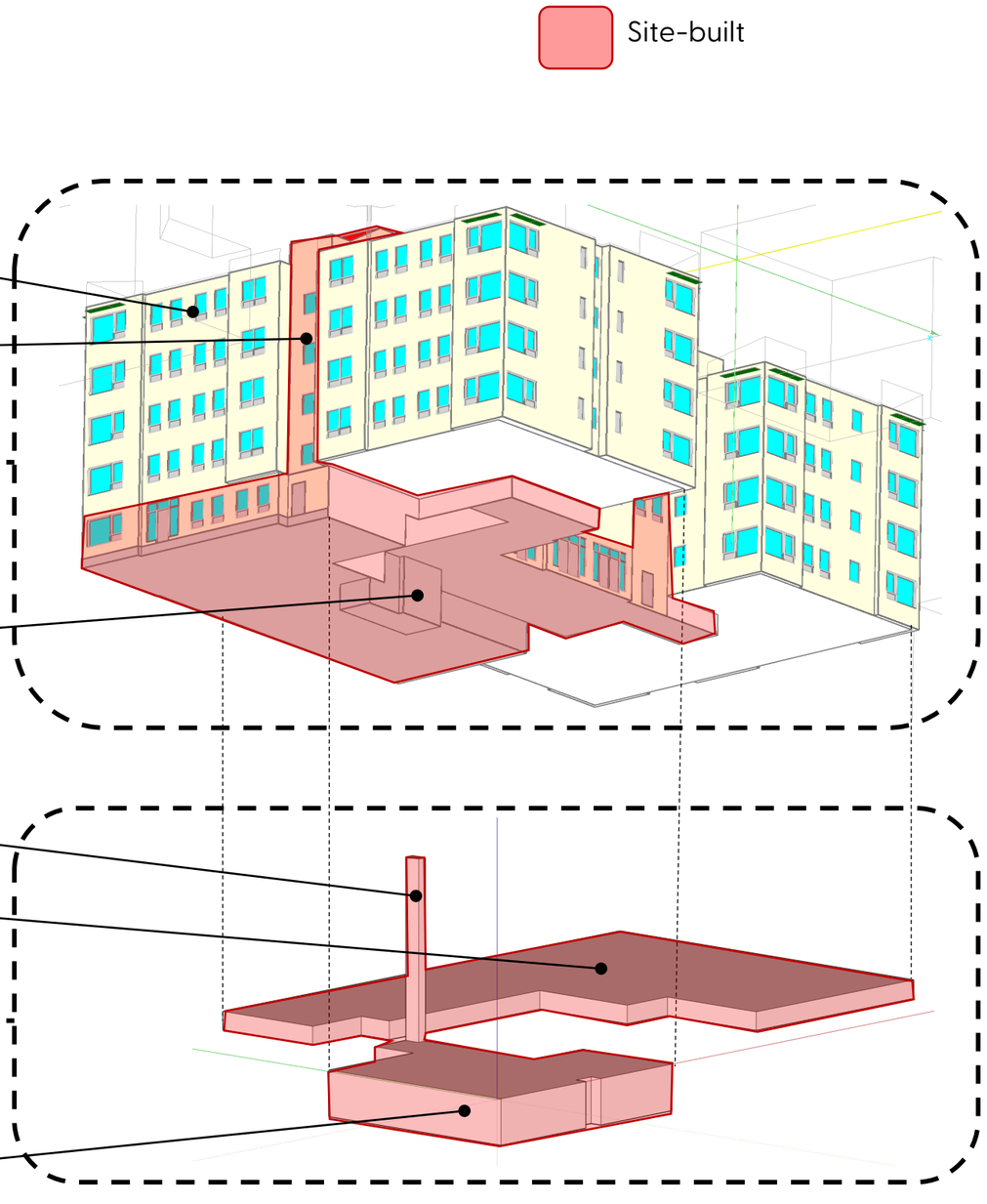
1. Super Insulated Envelope
2. Airtight Construction
3. High-Performance Glazing
4. Eliminate/Reduce Thermal Bridging
5. Energy Recovery Ventilation

Certifications

					Renewable Energy to Get to Zero
				Electrification Readiness	No Fossil-Fuel Combustion On-Site
				Electric Vehicle Readiness	Electric Vehicle Readiness
				Balanced Ventilation HRV/ERV	Balanced Ventilation HRV/ERV
			SOLAR READY Depends on climate	SOLAR READY ALWAYS	SOLAR READY ALWAYS
			Eff. Comps. & H2O Distrib	Eff. Comps. & H_2O Distrib	Eff. Comps. & H_2O Distrib
			EPA Indoor airPLUS VI	EPA Indoor airPLUS VI	EPA Indoor airPLUS VI
			Ducts in Condit. Space	Ducts in Condit. Space	Ducts in Condit. Space
	HVAC QI w/WHV	HVAC QI w/WHV	HVAC QI w/WHV	Micro-load HVAC QI	Micro-load HVAC QI
	Water Management	Water Management	Water Management	Water Management	Water Management
	Independent HERS Verification	Independent HERS Verification	Independent HERS Verification	Independent HERS Verification	Independent HERS Verification
IECC 2012 Enclosure	IECC 2012 Enclosure	IECC 2012 Enclosure	IECC 2015/18 Encl./ES Win.	Ultra-Efficient Enclosure	Ultra-Efficient Enclosure
HERS 70-80	HERS 60-70	HERS 50-60	HERS 35-45	HERS 30-40	HERS < 0
IECC 2012	ENERGY STAR v3	ENERGY STAR v3.1	ZERH	phius CORE	phius ZERO

ENVELOPE: DEFINING PROJECT **BOUNDARIES**

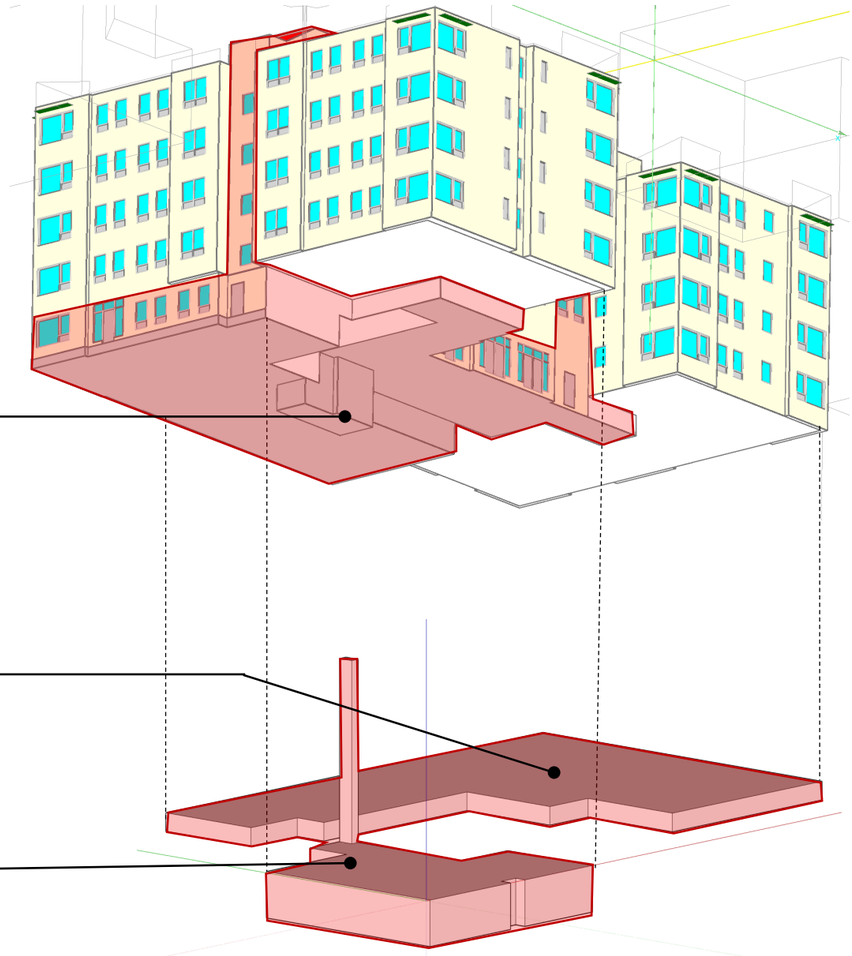
- Site-built elements vs Modular
- Stair wells
- Elevator shafts
- Utility Rooms



‘OUT-OF-ENVELOPE’ SPACES ARE NOT OFF THE HOOK…

EPA Indoor AirPlus

- Foundation Wall / Slab: Code min. insulation (or R5)
- Airtightness
- Space conditioning



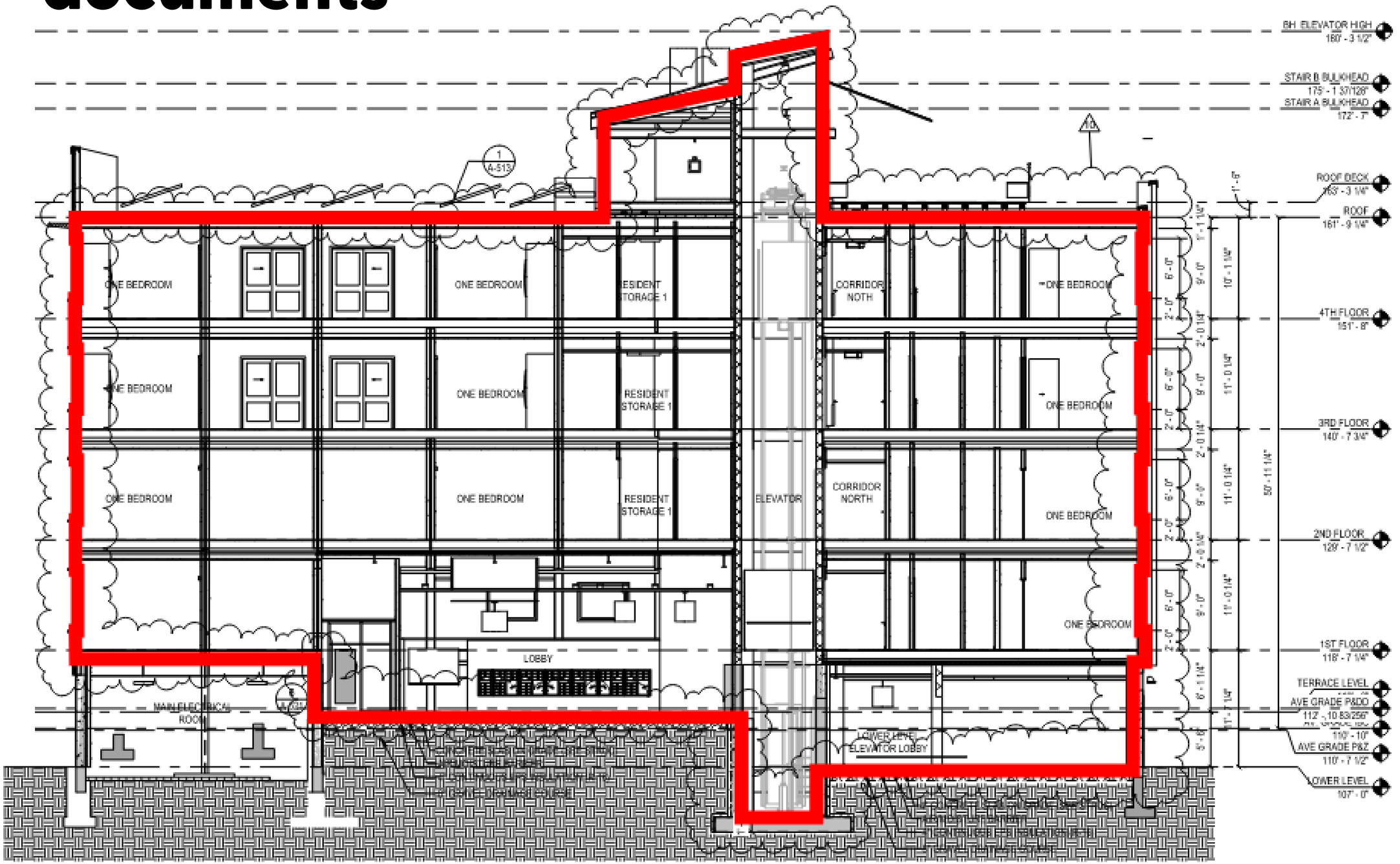
Site-built

Elevator
Inside Phius enclosure
Elevator pit thermal bridging

Crawlspace
Space heating / dehumidification
Pier thermal bridging

Trash chute / Electric room
Space heating / dehumidification
Ventilation

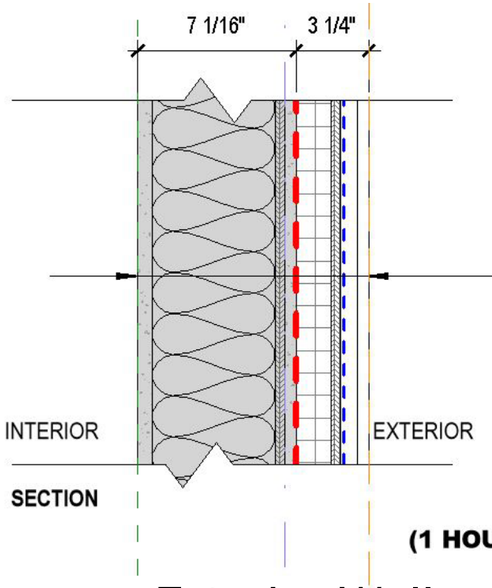
Envelope: identify boundary in documents



2 **NORTH-SOUTH CROSS SECTION**

1/8" = 1'-0"

Envelope: identify boundary in documents

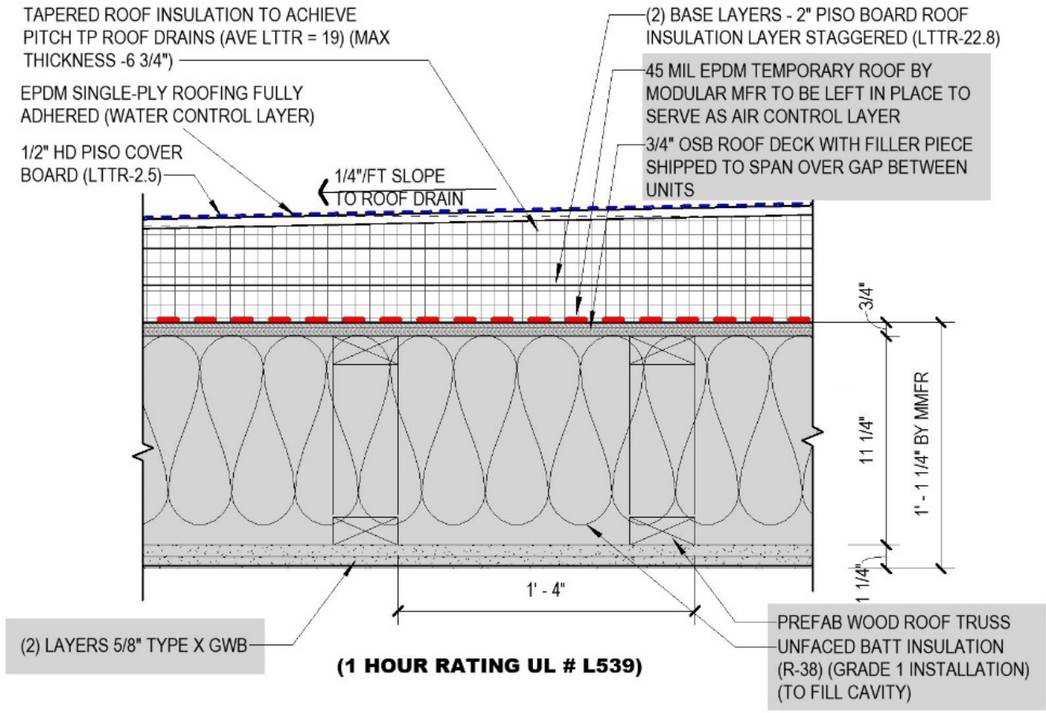


- (1) LAYER 5/8" TYPE "X" GYPSUM BOARD
- 2x6 WD. STUD FRAMING AT 24" O.C. (R-6.88)
- 5 1/2" THK UNFACED BATT INSULATION (R-23) (GRADE 1 INSTALLATION)
- (1) LAYER 7/16" OSB SHEATHING
- (1) LAYER 5/8" THK EXT GYPSUM THERMAL BARRIER - JOINTS TAPED PENETRATIONS SEALED (FUNCTIONS AS AIR CONTROL LAYER)
- 2" THK COMPOSITE INSULATED SHEATHING WITH INTEGRAL WATER CONTROL LAYER (R-9.6)
- 1x3 NOM VERTICAL FURRING STRIPS AT16" O.C.
- 1/2" FIBER-CEMENT PANEL OR LAP SIDING

R-TOTAL = 31.81
U-VALUE = 0.0314

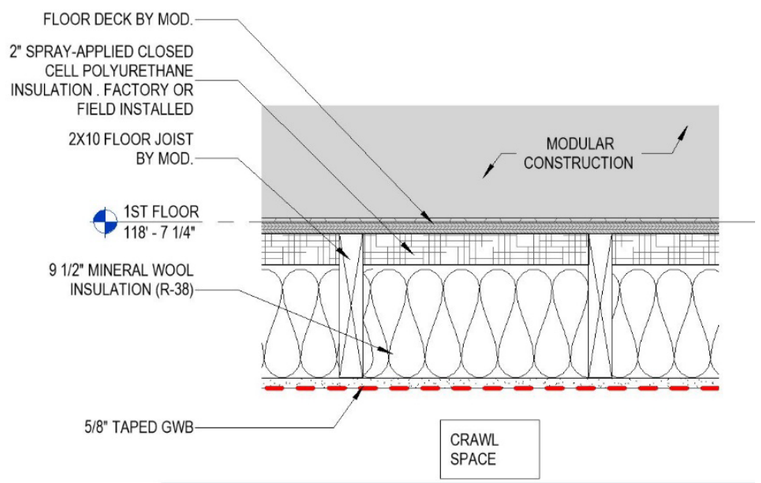
(1 HOUR RATING UL #U348)

Exterior Wall



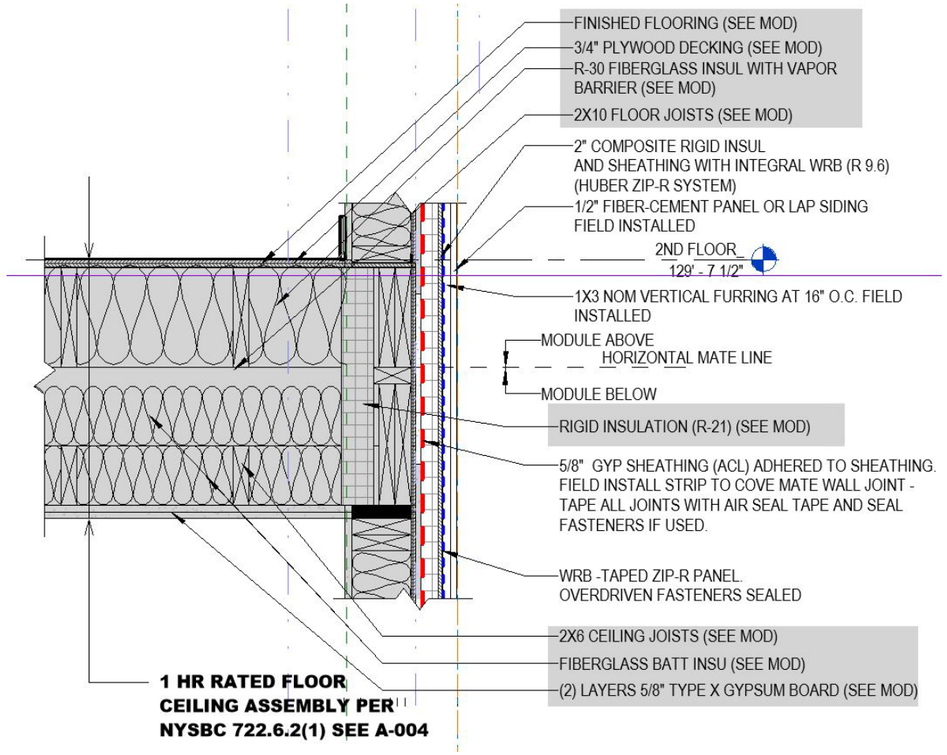
(1 HOUR RATING UL # L539)

Roof

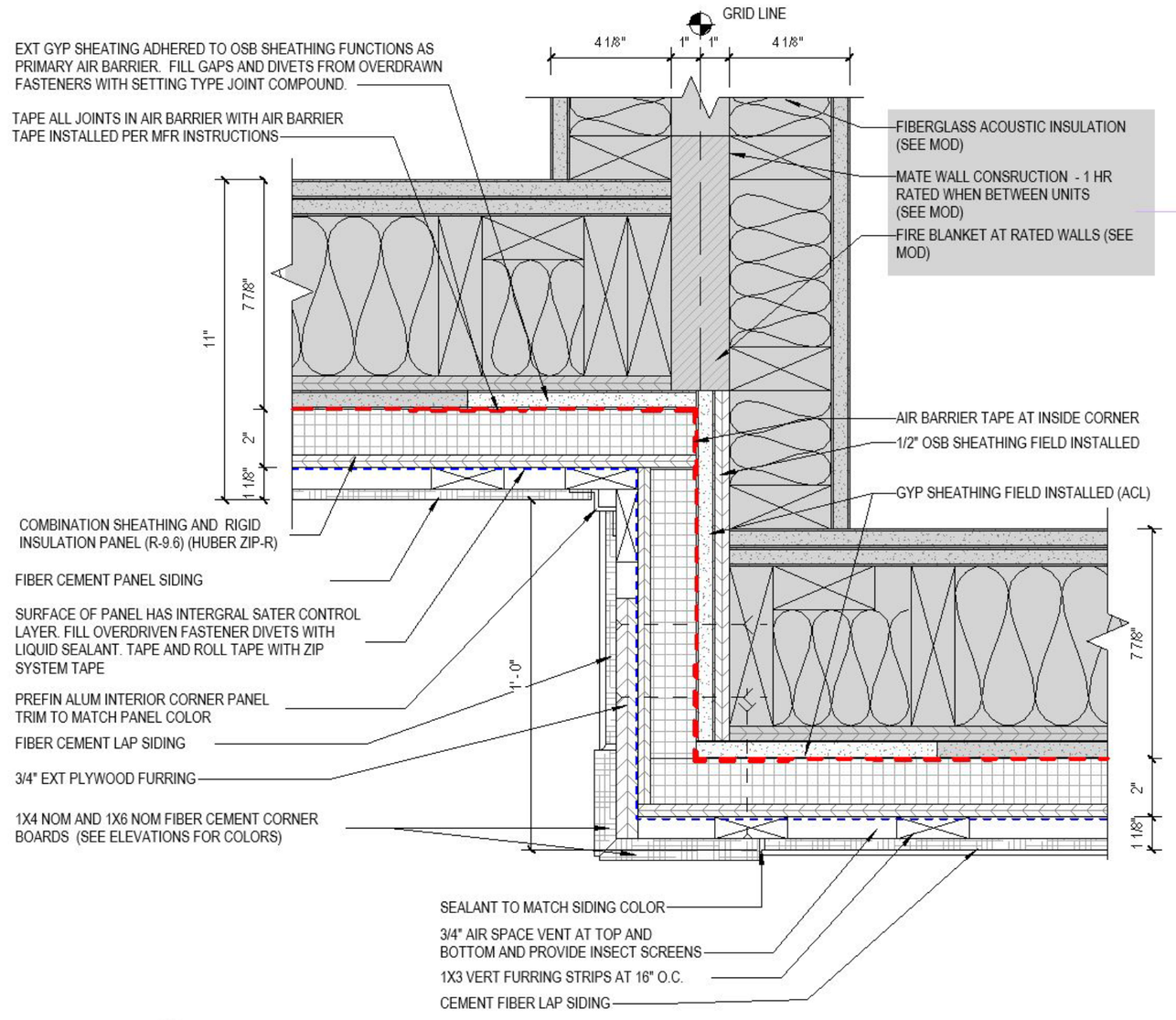


Floor

Air-tight construction: detail conditions where boxes join



Vertical Mate



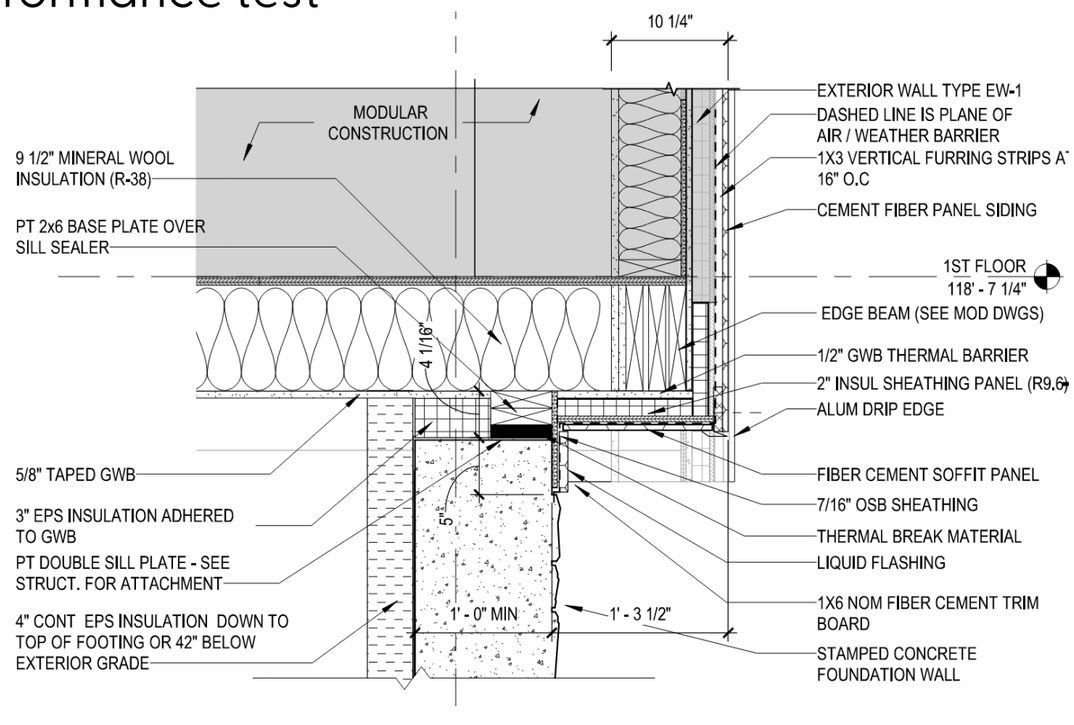
Horizontal Mate

Phius Moisture control guidelines: ‘fluffy’ floors

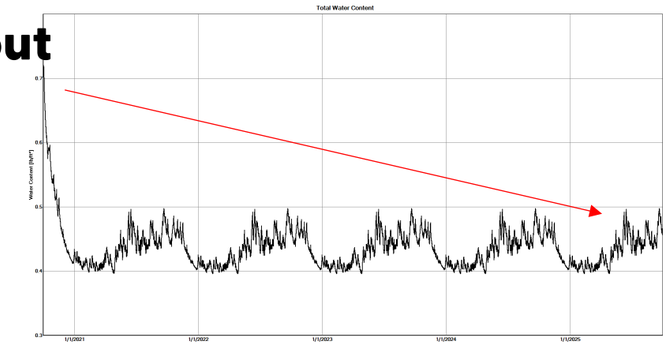
B-4.1 Floors with Vapor Permeable Insulation

If subject to bulk water events from above, subject to meet both requirements:

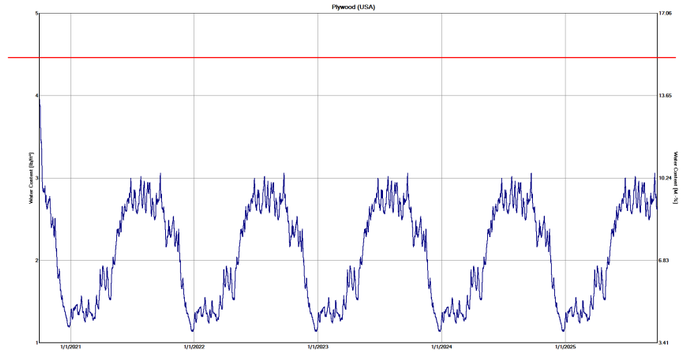
1. Provide water resistant layer above air permeable insulation
2. Limit insulation to 2.5” or pass hygrothermal performance test



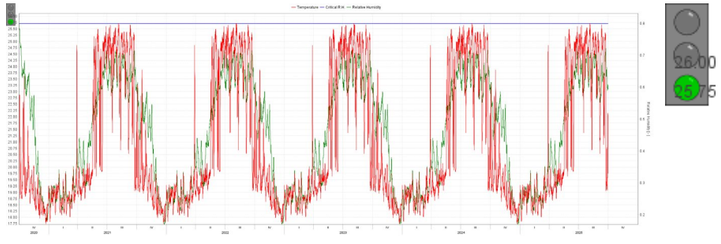
5-year dryout



MC% in condensing layer

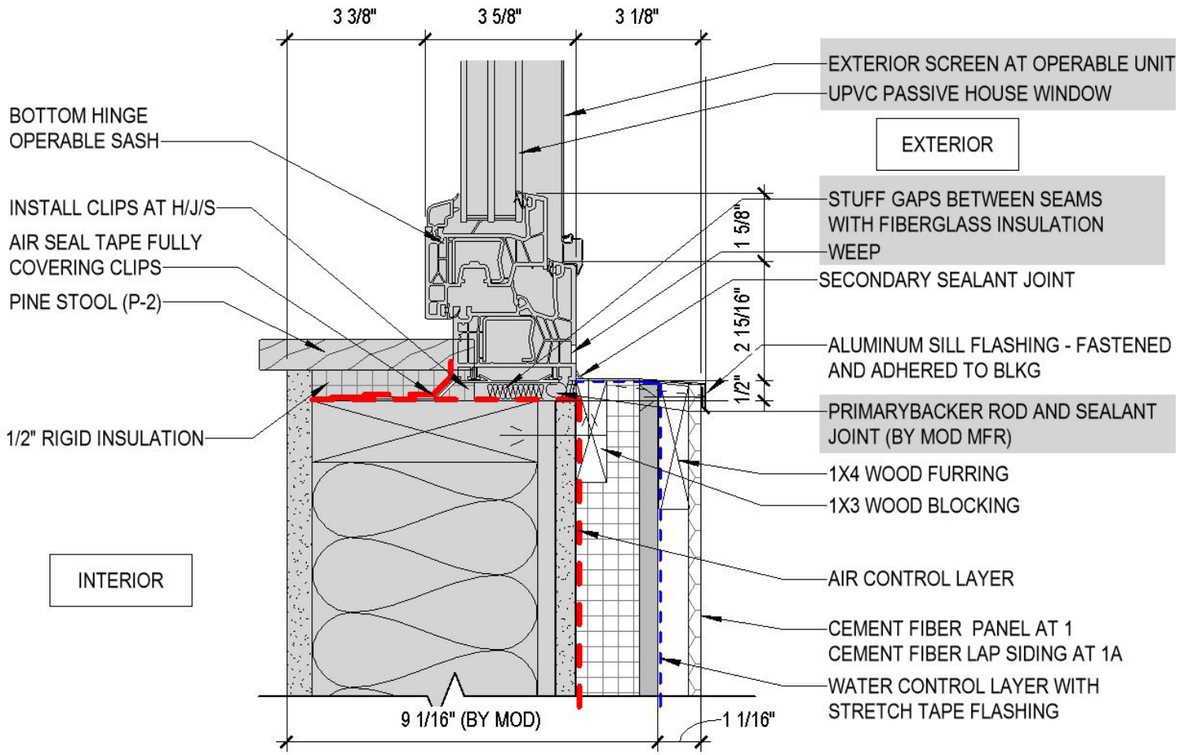


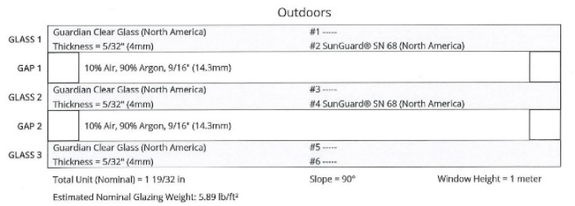
Mold growth (VTT)

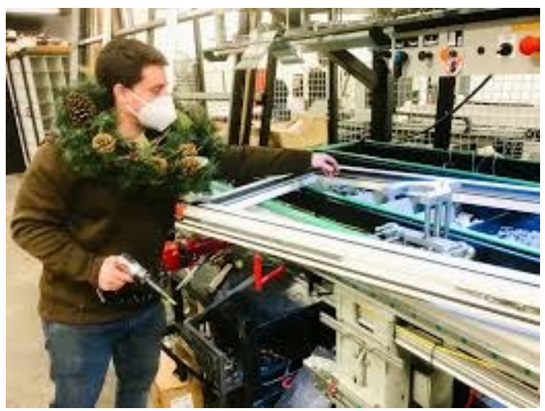


High-performing glazing: windows

- Steel reinforced - UPVC frames.
- American made triple-pane glass by Guardian.
- Thermal transmittance = 0.1482 to 0.1729 Btu/h per square foot °F
- Frame profiles imported from Europe, but fabricated in Ramsey, NJ using robotic equipment.
- Can feed the modular factory during assembly – reduces need for storage.





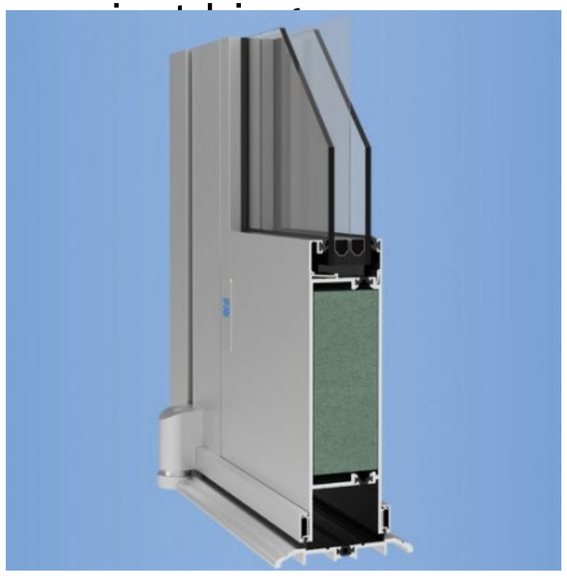


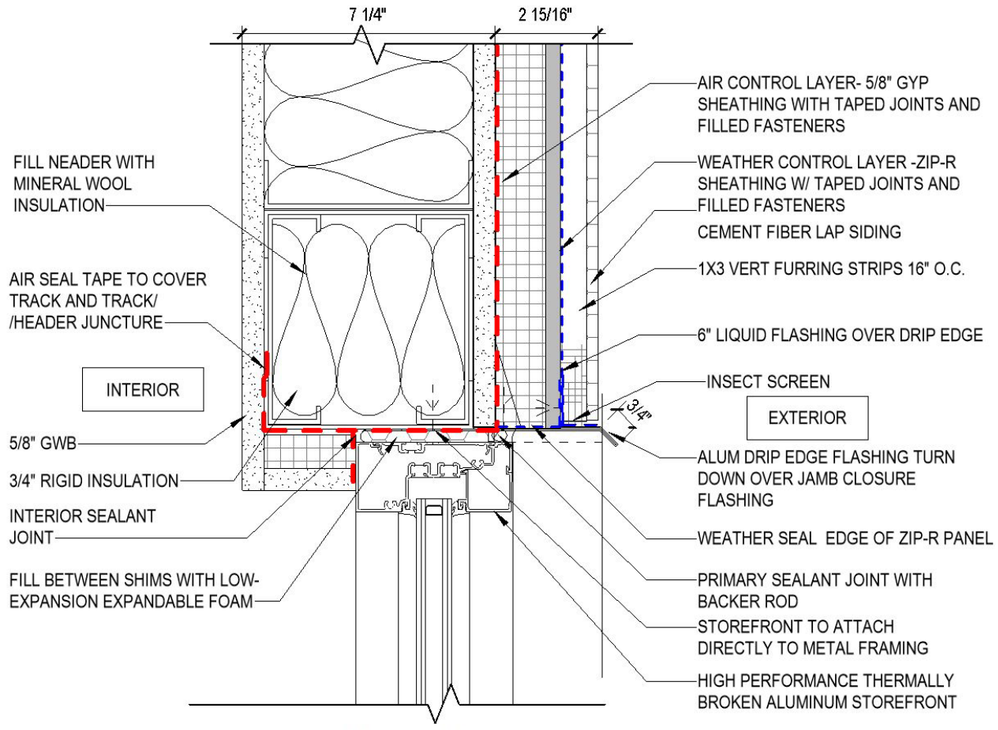
WYTHE WINDOWS

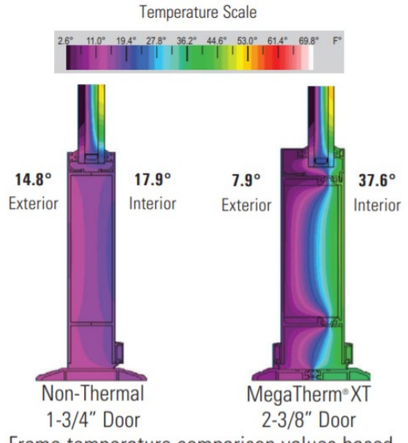
Thermal bridging: Storefront

Terrace Level Amenity Areas

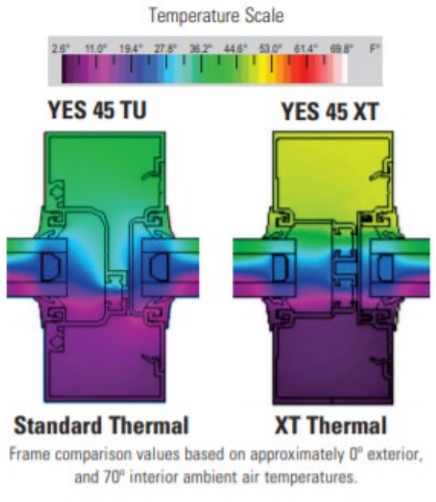
- Snap in pressure fit sealing – lower on-site labor cost
- Thermally Broken Framing and Sill Profiles
- Double-pane insulated glass with Low-E argon filled
- Entrances have thermally-broken panel faces, frames and thresholds; double sweep and self rising





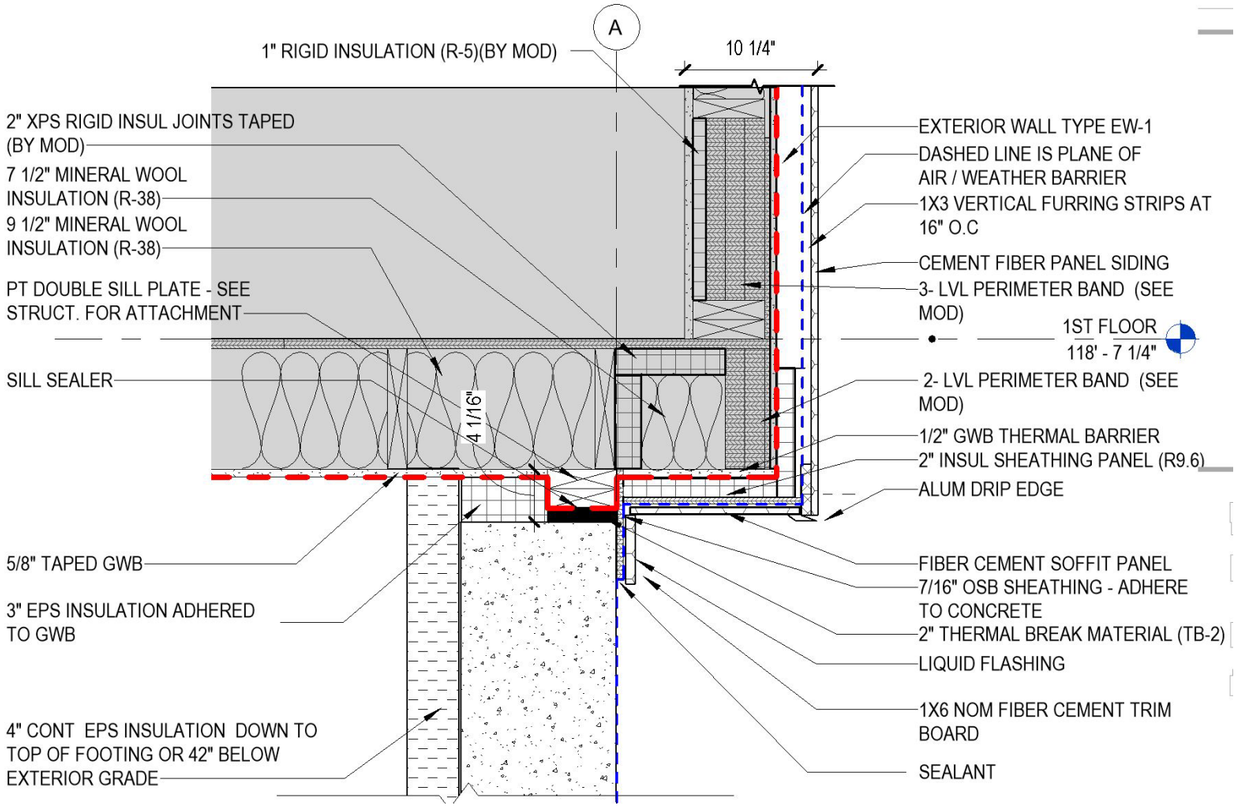


Frame temperature comparison values based on 0° exterior, and 70° interior.

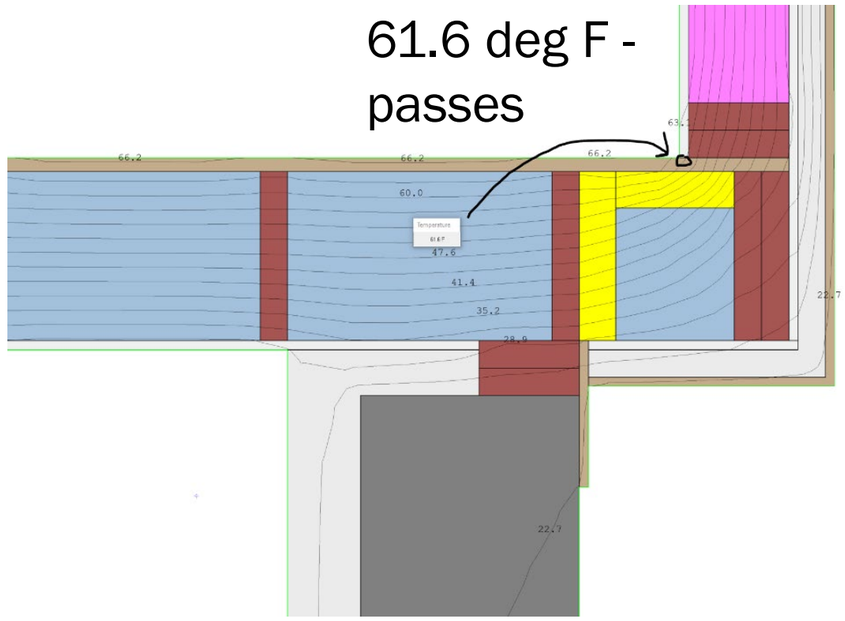


Frame comparison values based on approximately 0° exterior, and 70° interior ambient air temperatures.

Thermal bridging: modular



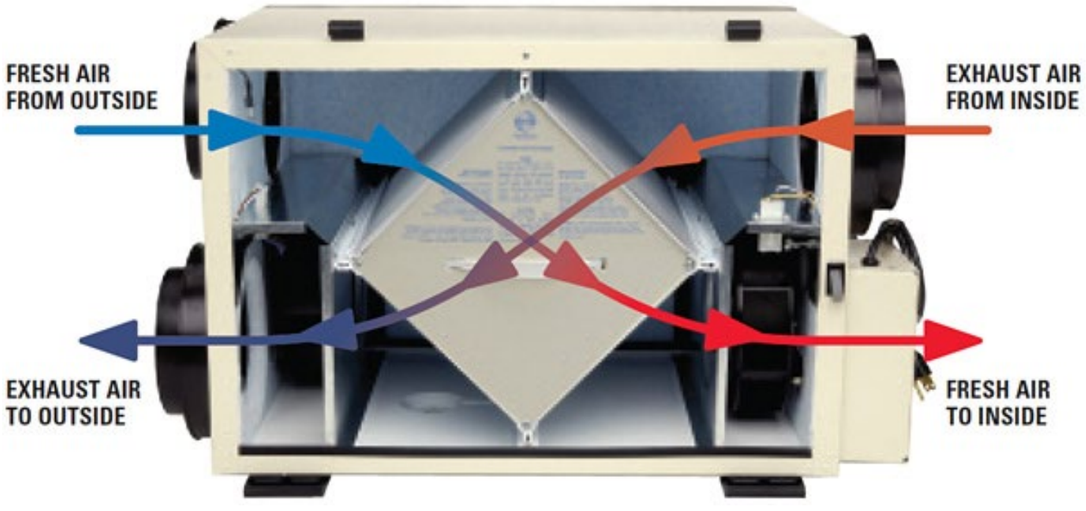
Modular Overhang

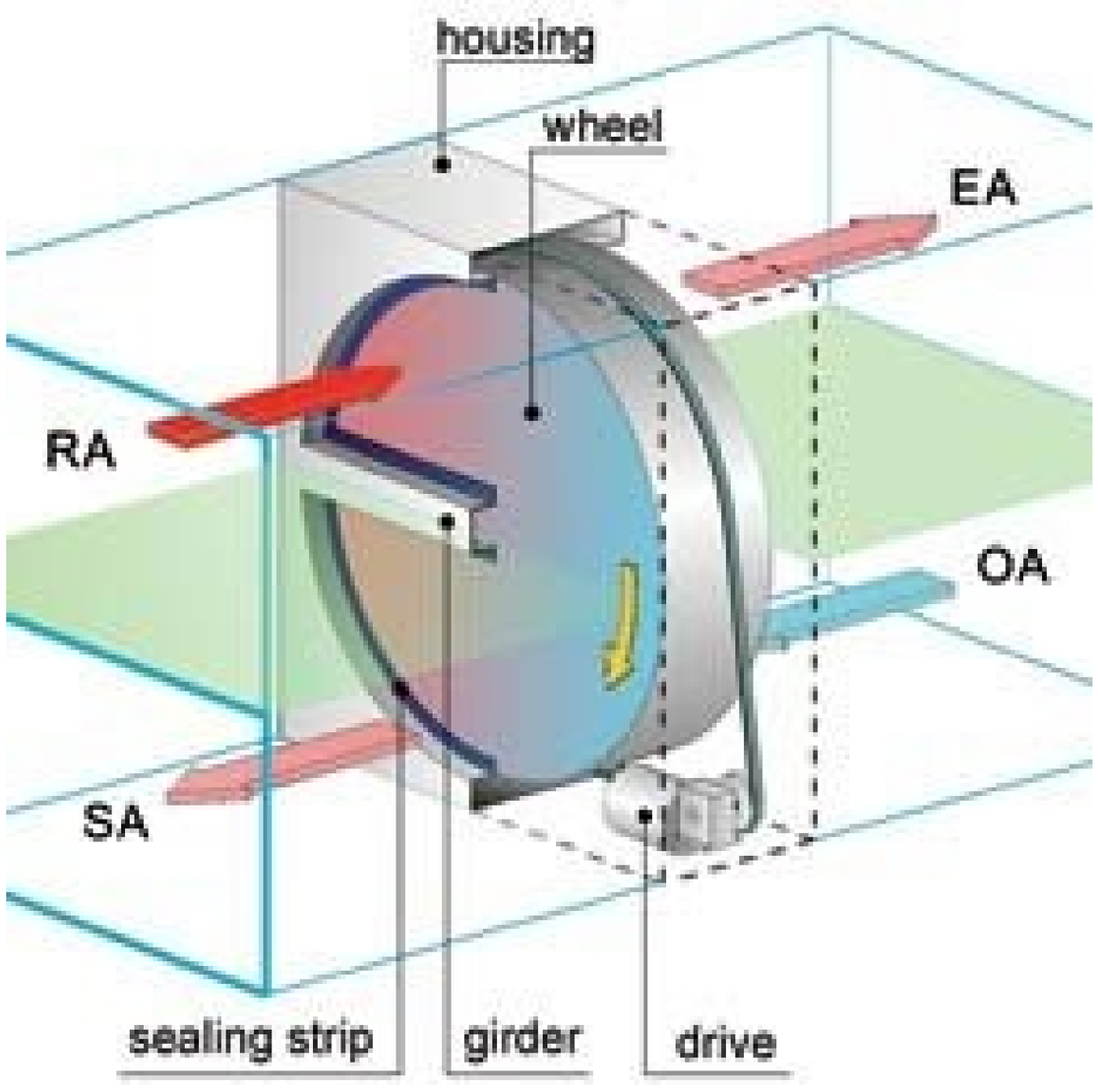


Condensation Risk analysis

Energy recovery ventilation

- Centralized Rooftop Units with Enthalpy Wheel
- Operates 24/7
- Exhausts Kitchen and bathroom
- Supplies to Living Room and Bedrooms
- MERV 13 filtration
- No inter-mixing of air between units – alleviates COVID concern.





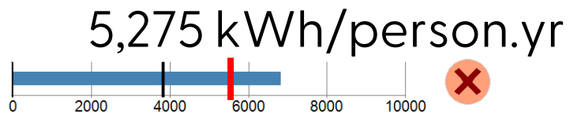
ENERGY RECOVERY VENTILATION

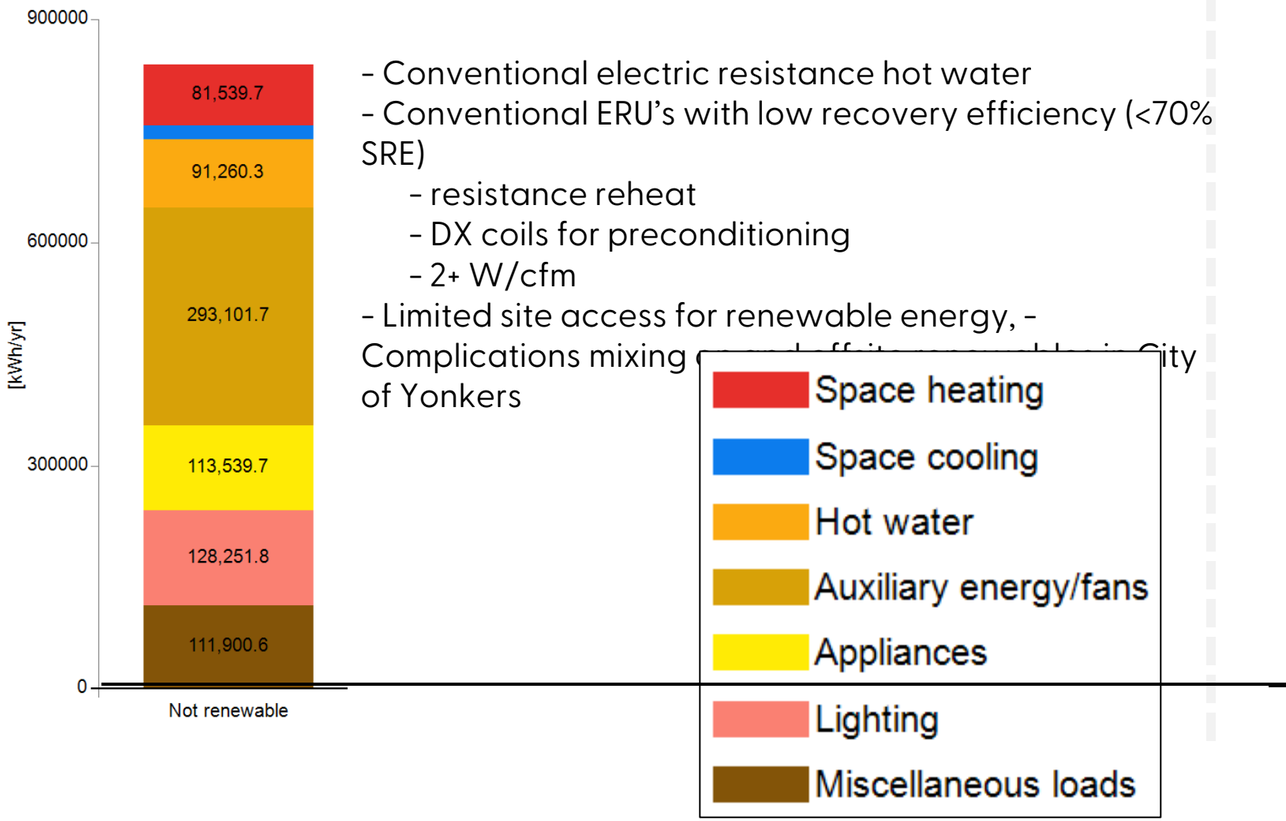
Other passive building considerations: Electric heat-pump Hot water

ORIGINAL FOSSIL-FUEL FREE DESIGN

Source energy

total:	**838,942.02**	kWh/yr
specific:	**6,821**	kWh/Person yr
target:	**3,840**	kWh/Person yr
total:	**2,862,306.46**	kBtu/yr
specific:	53.26	kBtu/ft²yr

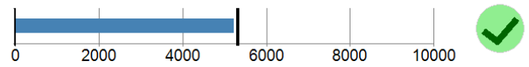


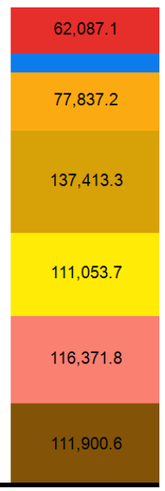


- Conventional electric resistance hot water
- Conventional ERU's with low recovery efficiency (<70% SRE)
  - resistance reheat
  - DX coils for preconditioning
  - 2+ W/cfm
- Limited site access for renewable energy, - Complications mixing on and off-site renewables in City of Yonkers

OPTIMIZED FOSSIL-FUEL FREE DESIGN

total:	**642,193.41**	kWh/yr
specific:	**5,221**	kWh/Person yr
target:	**5,325**	kWh/Person yr
total:	**2,191,038.58**	kBtu/yr
specific:	39.63	kBtu/ft²yr





-24% (ERU efficiency)

-15% (HPWH)

-54% (ERU preheat)

-3% (Appliances)

-10% (Lighting Calcs)

- Heat Pump Hot Water design
- High efficiency ERU
  - .74 W/cfm (measured)
- Refined appliance specifications
- Custom LPD calculations

Other passive building considerations: Electric heat-pump Hot water

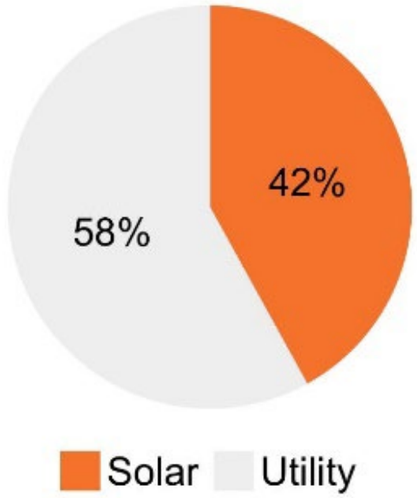
- Hot Water becomes major electrical load
- Exterior Heat pumps greatly improve efficiency from electric resistance water heaters.
- Estimated $20,000/year electrical savings.
- Required to achieve phius/NYSERDA Tier 3.
- New technology at a commercial scale.
- Domestic source – Washington State

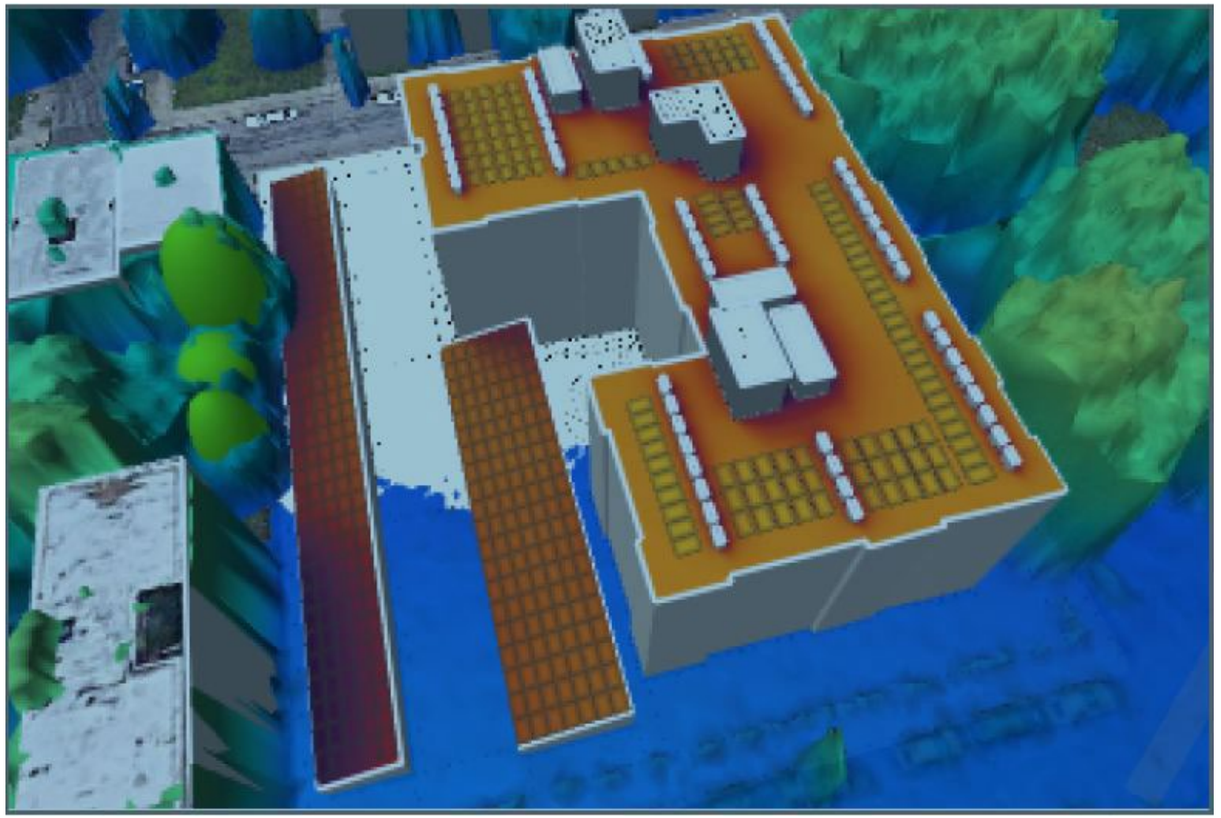
Apartment mechanical system: Split system heat pump

- All electric - two per unit
- One-to one connection
- Field installed
- No ductwork

SOLAR (Photovoltaic)

- Roof and parking canopies considered
- System Size: 140.8 kW
- Yearly Production 137,127kWh – 42% of annual load
- 440 Modules
- Required for Passive House certification - 24,000 kWh/ year.
- Considered, but deferred for future installation when ROI is more reasonable

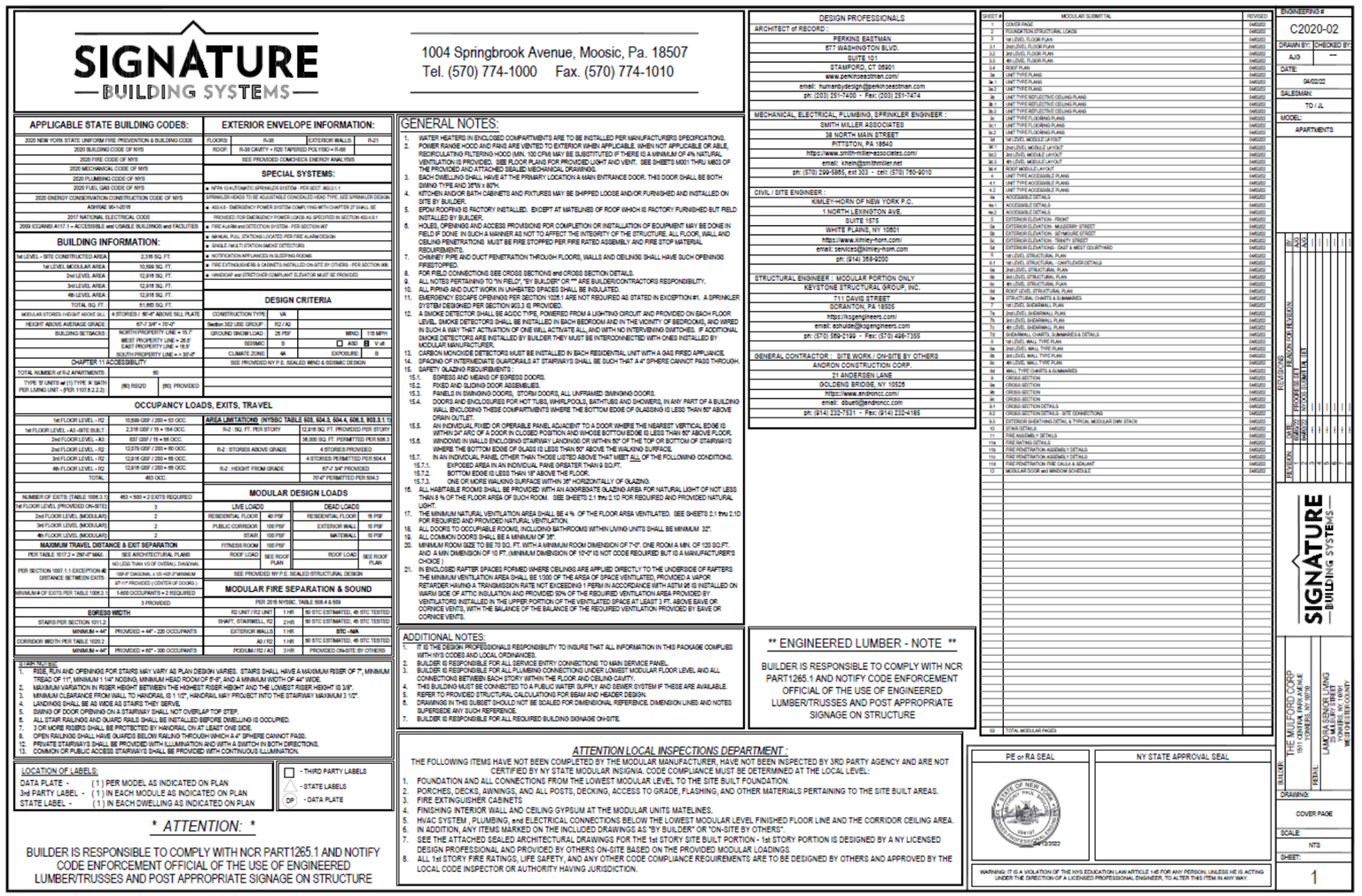




MODULAR

Modular construction

92 Separate boxes
Delivered to the site in two batches (West and East stacks)
Modular Manufacturer is Architect of Record for boxes
Permit review by NYS Department of State
Local authorities only review/approve field-built portions



SIGNATURE BUILDING SYSTEMS

1004 Springbrook Avenue, Moosic, Pa. 18507
Tel. (570) 774-1000 Fax. (570) 774-1010

APPLICABLE STATE BUILDING CODES:

2020 NEW YORK STATE UNIFORM FIRE PREVENTION & BUILDING CODE	
2020 BUILDING CODE OF NYS	
2020 FIRE CODE OF NYS	
2020 MECHANICAL CODE OF NYS	
2020 PLUMBING CODE OF NYS	
2020 FUEL GAS CODE OF NYS	
2020 ENERGY CONSERVATION CONSTRUCTION CODE OF NYS	
ASHRAE 90-1-2016	
2017 NATIONAL ELECTRICAL CODE	
2009 ICC/ANSI A117.1 – ACCESSIBLE and USABLE BUILDINGS and FACILITIES	

BUILDING INFORMATION:

1st LEVEL - SITE CONSTRUCTED AREA	2,318 SQ. FT.
1st LEVEL MODULAR AREA	10,599 SQ. FT.
2nd LEVEL AREA	12,916 SQ. FT.
3rd LEVEL AREA	12,916 SQ. FT.
4th LEVEL AREA	12,916 SQ. FT.
TOTAL SQ. FT.	51,665 SQ. FT.
MODULAR STORIES / HEIGHT ABOVE SILL	4 STORIES / 46'-4" ABOVE SILL PLATE
HEIGHT ABOVE AVERAGE GRADE	67'-2 3/4" < 70'-0"
BUILDING SETBACKS	NORTH PROPERTY LINE = 15.7 WEST PROPERTY LINE = 26.5' EAST PROPERTY LINE = 16.5' SOUTH PROPERTY LINE = > 30'-0"

CHAPTER 11 ACCESSIBILITY

TOTAL NUMBER of R-2 APARTMENTS	80
TYPE 'B' UNITS w/ (1) TYPE 'A' BATH PER LIVING UNIT - (PER 1107.6.2.2.2)	(80) REQ'D (80) PROVIDED

EXTERIOR ENVELOPE INFORMATION:

FLOORS	R-38	EXTERIOR WALLS	R-21
ROOF	R-38 CAVITY + R20 TAPERED POLYISO = R-58		

SEE PROVIDED COMCHECK ENERGY ANALYSIS

SPECIAL SYSTEMS:

- NFPA 13 AUTOMATIC SPRINKLER SYSTEM - PER SECT. 903.3.1.1
- SPRINKLER HEADS TO BE ADJUSTABLE CONCEALED HEAD TYPE, SEE SPRINKLER DESIGN
- 403-4.9 - EMERGENCY POWER SYSTEM COMPLYING WITH CHAPTER 27 SHALL BE PROVIDED FOR EMERGENCY POWER LOADS AS SPECIFIED IN SECTION 403-4.9.1
- FIRE ALARM and DETECTION SYSTEM - PER SECTION 907
- MANUAL PULL STATIONS LOCATED PER FIRE ALARM DESIGN
- SINGLE / MULTI STATION SMOKE DETECTORS
- NOTIFICATION APPLIANCES IN SLEEPING ROOMS
- FIRE EXTINGUISHERS & CABINETS INSTALLED ON-SITE BY OTHERS - PER SECTION 906
- HANDICAP and STRETCHER COMPLIANT ELEVATOR MUST BE PROVIDED

DESIGN CRITERIA

CONSTRUCTION TYPE	VA		
Section 302 USE GROUP	R2 / A3		
GROUND SNOW LOAD	25 PSF	WIND	115 MPH
SEISMIC	B	☐ ASD	☒ V-ult
CLIMATE ZONE	4A	EXPOSURE	B

SEE PROVIDED NY P.E. SEALED WIND & SEISMIC DESIGN

OCCUPANCY LOADS, EXITS, TRAVEL

1st FLOOR LEVEL - R2	10,599 GSF / 200 = 53 OCC.
1st FLOOR LEVEL -A3 -SITE BUILT	2,318 GSF / 15 = 154 OCC.
2nd FLOOR LEVEL - A3	837 GSF / 15 = 56 OCC.
2nd FLOOR LEVEL - R2	12,079 GSF / 200 = 60 OCC.
3rd FLOOR LEVEL - R2	12,916 GSF / 200 = 65 OCC.
4th FLOOR LEVEL - R2	12,916 GSF / 200 = 65 OCC.
TOTAL	453 OCC.
NUMBER OF EXITS (TABLE 1006.3.1)	453 < 500 = 2 EXITS REQUIRED
1st FLOOR LEVEL (PROVIDED ON-SITE)	3
2nd FLOOR LEVEL (MODULAR)	2
3rd FLOOR LEVEL (MODULAR)	2
4th FLOOR LEVEL (MODULAR)	2

MAXIMUM TRAVEL DISTANCE & EXIT SEPARATION

PER TABLE 1017.2 = 250'-0" MAX.	SEE ARCHITECTURAL PLANS
PER SECTION 1007.1.1 EXCEPTION #2 DISTANCE BETWEEN EXITS	NO LESS THAN 1/3 OF OVERALL DIAGONAL 150'-0" DIAGONAL x 1/3 =50'-0" MINIMUM 67'-1" PROVIDED (CENTER OF DOORS)
MINIMUM # OF EXITS PER TABLE 1006.3.1	1-500 OCCUPANTS = 2 REQUIRED
	3 PROVIDED

EGRESS WIDTH

STAIRS PER SECTION 1011.2	
MINIMUM = 44"	PROVIDED = 44" - 220 OCCUPANTS
CORRIDOR WIDTH PER TABLE 1020.2	
MINIMUM = 44"	PROVIDED = 60" - 300 OCCUPANTS

BUILDING SYSTEM NOTES:

1. RISE, RUN and OPENINGS FOR STAIRS MAY VARY AS PLAN DESIGN VARIES. STAIRS SHALL HAVE A MAXIMUM RISER OF 7", MINIMUM TREAD OF 11", MINIMUM 1 1/4" NOSING, MINIMUM HEAD ROOM OF 6'-8", AND A MINIMUM WIDTH OF 44" WIDE.
2. MAXIMUM VARIATION IN RISER HEIGHT BETWEEN THE HIGHEST RISER HEIGHT AND THE LOWEST RISER HEIGHT IS 3/8".
3. MINIMUM CLEARANCE FROM WALL TO HANDRAIL IS 1 1/2", HANDRAIL MAY PROJECT INTO THE STAIRWAY MAXIMUM 3 1/2".
4. LANDINGS SHALL BE AS WIDE AS STAIRS THEY SERVE.
5. SWING OF DOOR OPENING ON A STAIRWAY SHALL NOT OVERLAP TOP STEP.
6. ALL STAIR RAILINGS AND GUARD RAILS SHALL BE INSTALLED BEFORE DWELLING IS OCCUPIED.
7. 3 OR MORE RISERS SHALL BE PROTECTED BY HANDRAIL ON AT LEAST ONE SIDE.
8. OPEN RAILINGS SHALL HAVE GUARDS BELOW RAILING THROUGH WHICH A 4" SPHERE CANNOT PASS.
12. PRIVATE STAIRWAYS SHALL BE PROVIDED WITH ILLUMINATION AND WITH A SWITCH IN BOTH DIRECTIONS.
13. COMMON OR PUBLIC ACCESS STAIRWAYS SHALL BE PROVIDED WITH CONTINUOUS ILLUMINATION.

LOCATION OF LABELS:

DATA PLATE -	(1) PER MODEL AS INDICATED ON PLAN
3rd PARTY LABEL -	(1) IN EACH MODULE AS INDICATED ON PLAN
STATE LABEL -	(1) IN EACH DWELLING AS INDICATED ON PLAN

☐ - THIRD PARTY LABELS
△ - STATE LABELS
DP - DATA PLATE

ATTENTION:

BUILDER IS RESPONSIBLE TO COMPLY WITH NCR PART1265.1 AND NOTIFY CODE ENFORCEMENT OFFICIAL OF THE USE OF ENGINEERED LUMBER/TRUSSES AND POST APPROPRIATE SIGNAGE ON STRUCTURE

GENERAL NOTES:

1. WATER HEATERS IN ENCLOSED COMPARTMENTS ARE TO BE INSTALLED PER MANUFACTURERS SPECIFICATIONS.
2. POWER RANGE HOOD AND FANS ARE VENTED TO EXTERIOR WHEN APPLICABLE. WHEN NOT APPLICABLE OR ABLE, RECIRCULATING FILTERING HOOD (MIN. 100 CFM) MAY BE SUBSTITUTED IF THERE IS A MINIMUM OF 4% NATURAL VENTILATION IS PROVIDED. SEE FLOOR PLANS FOR PROVIDED LIGHT AND VENT. SEE SHEETS M001 THRU M003 OF THE PROVIDED AND ATTACHED SEALED MECHANICAL DRAWINGS.
3. EACH DWELLING SHALL HAVE AT THE PRIMARY LOCATION A MAIN ENTRANCE DOOR. THIS DOOR SHALL BE BOTH SWING TYPE AND 36"W x 80"H.
4. KITCHEN AND/OR BATH CABINETS AND FIXTURES MAY BE SHIPPED LOOSE AND/OR FURNISHED AND INSTALLED ON SITE BY BUILDER.
5. EPDM ROOFING IS FACTORY INSTALLED. EXCEPT AT MATELINES OF ROOF WHICH IS FACTORY FURNISHED BUT FIELD INSTALLED BY BUILDER.
6. HOLES, OPENINGS AND ACCESS PROVISIONS FOR COMPLETION OR INSTALLATION OF EQUIPMENT MAY BE DONE IN FIELD IF DONE IN SUCH A MANNER AS NOT TO AFFECT THE INTEGRITY OF THE STRUCTURE. ALL FLOOR, WALL AND CEILING PENETRATIONS MUST BE FIRE STOPPED PER FIRE RATED ASSEMBLY AND FIRE STOP MATERIAL REQUIREMENTS.
7. CHIMNEY / FIRE AND DUCT PENETRATION THROUGH FLOORS, WALLS AND CEILINGS SHALL HAVE SUCH OPENINGS FIRESTOPPED.
8. FOR FIELD CONNECTIONS SEE CROSS SECTIONS and CROSS SECTION DETAILS.
9. ALL NOTES PERTAINING TO "IN FIELD", "BY BUILDER" OR "" ARE BUILDER/CONTRACTORS RESPONSIBILITY.
10. ALL PIPING AND DUCT WORK IN UNHEATED SPACES SHALL BE INSULATED.
11. EMERGENCY ESCAPE OPENINGS PER SECTION 1026.1 ARE NOT REQUIRED AS STATED IN EXCEPTION #1. A SPRINKLER SYSTEM DESIGNED PER SECTION 903.3 IS PROVIDED.
12. A SMOKE DETECTOR SHALL BE AOIDC TYPE, POWERED FROM A LIGHTING CIRCUIT AND PROVIDED ON EACH FLOOR LEVEL. SMOKE DETECTORS SHALL BE INSTALLED IN EACH BEDROOM AND IN THE VICINITY OF BEDROOMS, AND WIRED IN SUCH A WAY THAT ACTIVATION OF ONE WILL ACTIVATE ALL AND WITH NO INTERVENING SWITCHES. IF ADDITIONAL SMOKE DETECTORS ARE INSTALLED BY BUILDER THEY MUST BE INTERCONNECTED WITH ONES INSTALLED BY MODULAR MANUFACTURER.
13. CARBON MONOXIDE DETECTORS MUST BE INSTALLED IN EACH RESIDENTIAL UNIT WITH A GAS FIRED APPLIANCE.
14. SPACING OF INTERMEDIATE GUARDRAILS AT STAIRWAYS SHALL BE SUCH THAT A 4" SPHERE CANNOT PASS THROUGH.
15. SAFETY GLAZING REQUIREMENTS :
    15.1. EGRESS and MEANS OF EGRESS DOORS.
    15.2. FIXED AND SLIDING DOOR ASSEMBLIES.
    15.3. PANELS IN SWINGING DOORS, STORM DOORS, ALL UNFRAMED SWINGING DOORS.
    15.4. DOORS and ENCLOSURES FOR HOT TUBS, WHIRLPOOLS, BATHTUBS and SHOWERS, IN ANY PART OF A BUILDING WALL ENCLOSING THESE COMPARTMENTS WHERE THE BOTTOM EDGE OF GLASSING IS LESS THAN 60" ABOVE DRAIN OUTLET.
    15.5. AN INDIVIDUAL FIXED OR OPERABLE PANEL ADJACENT TO A DOOR WHERE THE NEAREST VERTICAL EDGE IS WITHIN 24" ARC OF A DOOR IN CLOSED POSITION AND WHOSE BOTTOM EDGE IS LESS THAN 60" ABOVE FLOOR.
    15.6. GLASS IN WALLS ENCLOSING STAIRWAY LANDINGS OR WITHIN 60" OF THE TOP OR BOTTOM OF STAIRWAYS WHERE THE BOTTOM EDGE OF GLASS IS LESS THAN 60" ABOVE THE WALKING SURFACE.
    15.7. IN AN INDIVIDUAL PANEL OTHER THAN THOSE LISTED ABOVE THAT MEET ALL OF THE FOLLOWING CONDITIONS.
    15.7.1. EXPOSED AREA IN AN INDIVIDUAL PANE GREATER THAN 9 SQ.FT.
    15.7.2. BOTTOM EDGE IS LESS THAN 18" ABOVE THE FLOOR.
    15.7.3. ONE OR MORE WALKING SURFACE WITHIN 36" HORIZONTALLY OF GLAZING.
16. ALL HABITABLE ROOMS SHALL BE PROVIDED WITH AN AGGREGATE GLAZING AREA FOR NATURAL LIGHT OF NOT LESS THAN 8 % OF THE FLOOR AREA OF SUCH ROOM. SEE SHEETS 2.1 thru 2.1D FOR REQUIRED AND PROVIDED NATURAL LIGHT.
17. THE MINIMUM NATURAL VENTILATION AREA SHALL BE 4 % OF THE FLOOR AREA VENTILATED. SEE SHEETS 2.1 thru 2.1D FOR REQUIRED AND PROVIDED NATURAL VENTILATION.
18. ALL DOORS TO OCCUPIABLE ROOMS, INCLUDING BATHROOMS WITHIN LIVING UNITS SHALL BE MINIMUM 32".
19. ALL COMMON DOORS SHALL BE A MINIMUM OF 36".
20. MINIMUM ROOM SIZE TO BE 70 SQ. FT. WITH A MINIMUM ROOM DIMENSION OF 7'-0". ONE ROOM A MIN. OF 120 SQ.FT. AND A MIN DIMENSION OF 10 FT. (MINIMUM DIMENSION OF 10'-0" IS NOT CODE REQUIRED BUT IS A MANUFACTURER'S CHOICE)
21. IN ENCLOSED RAFTER SPACES FORMED WHERE CEILINGS ARE APPLIED DIRECTLY TO THE UNDERSIDE OF RAFTERS THE MINIMUM VENTILATION AREA SHALL BE 1/300 OF THE AREA OF SPACE VENTILATED, PROVIDED A VAPOR RETARDER HAVING A TRANSMISSION RATE NOT EXCEEDING 1 PERM IN ACCORDANCE WITH ASTM 96 IS INSTALLED ON WARM SIDE OF ATTIC INSULATION AND PROVIDED 50% OF THE REQUIRED VENTILATION AREA PROVIDED BY VENTILATORS INSTALLED IN THE UPPER PORTION OF THE VENTILATED SPACE AT LEAST 3 FT. ABOVE EAVE OR CORNICE VENTS, WITH THE BALANCE OF THE BALANCE OF THE REQUIRED VENTILATION PROVIDED BY EAVE OR CORNICE VENTS.

MODULAR DESIGN LOADS

LIVE LOADS		DEAD LOADS	
RESIDENTIAL FLOOR	40 PSF	RESIDENTIAL FLOOR	15 PSF
PUBLIC CORRIDOR	100 PSF	EXTERIOR WALL	10 PSF
STAIR	100 PSF	MATEWALL	10 PSF
FITNESS ROOM	100 PSF		
ROOF LOAD	SEE ROOF PLAN	ROOF LOAD	SEE ROOF PLAN

SEE PROVIDED NY P.E. SEALED STRUCTURAL DESIGN

MODULAR FIRE SEPARATION & SOUND

PER 2018 NYSBC, TABLE 508.4 & 509

R2 UNIT / R2 UNIT	1 HR	50 STC ESTIMATED, 45 STC TESTED
SHAFT, STAIRWELL, R2	2 HR	50 STC ESTIMATED, 45 STC TESTED
EXTERIOR WALLS	1 HR	STC - N/A
A3 / R2	1 HR	50 STC ESTIMATED, 45 STC TESTED
PODIUM / R2 / A3	3 HR	PROVIDED ON-SITE BY OTHERS

ADDITIONAL NOTES:

1. IT IS THE DESIGN PROFESSIONALS RESPONSIBILITY TO INSURE THAT ALL INFORMATION IN THIS PACKAGE COMPLIES WITH NYS CODES AND LOCAL ORDINANCES.
2. BUILDER IS RESPONSIBLE FOR ALL SERVICE ENTRY CONNECTIONS TO MAIN SERVICE PANEL.
3. BUILDER IS RESPONSIBLE FOR ALL PLUMBING CONNECTIONS UNDER LOWEST MODULAR FLOOR LEVEL AND ALL CONNECTIONS BETWEEN EACH STORY WITHIN THE FLOOR AND CEILING CAVITY.
4. THIS BUILDING MUST BE CONNECTED TO A PUBLIC WATER SUPPLY AND SEWER SYSTEM IF THESE ARE AVAILABLE.
5. REFER TO PROVIDED STRUCTURAL CALCULATIONS FOR BEAM AND HEADER DESIGN.
6. DRAWINGS IN THIS SUBSET SHOULD NOT BE SCALED FOR DIMENSIONAL REFERENCE. DIMENSION LINES AND NOTES SUPERSEDE ANY SUCH REFERENCE.
7. BUILDER IS RESPONSIBLE FOR ALL REQUIRED BUILDING SIGNAGE ON-SITE.

** ENGINEERED LUMBER - NOTE **

BUILDER IS RESPONSIBLE TO COMPLY WITH NCR PART1265.1 AND NOTIFY CODE ENFORCEMENT OFFICIAL OF THE USE OF ENGINEERED LUMBER/TRUSSES AND POST APPROPRIATE SIGNAGE ON STRUCTURE

ATTENTION LOCAL INSPECTIONS DEPARTMENT :

THE FOLLOWING ITEMS HAVE NOT BEEN COMPLETED BY THE MODULAR MANUFACTURER, HAVE NOT BEEN INSPECTED BY 3RD PARTY AGENCY AND ARE NOT CERTIFIED BY NY STATE MODULAR INSIGNIA. CODE COMPLIANCE MUST BE DETERMINED AT THE LOCAL LEVEL:

1. FOUNDATION AND ALL CONNECTIONS FROM THE LOWEST MODULAR LEVEL TO THE SITE BUILT FOUNDATION.
2. PORCHES, DECKS, AWNINGS, AND ALL POSTS, DECKING, ACCESS TO GRADE, FLASHING, AND OTHER MATERIALS PERTAINING TO THE SITE BUILT AREAS.
3. FIRE EXTINGUISHER CABINETS
4. FINISHING INTERIOR WALL AND CEILING GYPSUM AT THE MODULAR UNITS MATELINES.
5. HVAC SYSTEM , PLUMBING, and ELECTRICAL CONNECTIONS BELOW THE LOWEST MODULAR LEVEL FINISHED FLOOR LINE AND THE CORRIDOR CEILING AREA.
6. IN ADDITION, ANY ITEMS MARKED ON THE INCLUDED DRAWINGS AS "BY BUILDER" OR "ON-SITE BY OTHERS".
7. SEE THE ATTACHED SEALED ARCHITECTURAL DRAWINGS FOR THE 1st STORY SITE BUILT PORTION - 1st STORY PORTION IS DESIGNED BY A NY LICENSED DESIGN PROFESSIONAL AND PROVIDED BY OTHERS ON-SITE BASED ON THE PROVIDED MODULAR LOADINGS
8. ALL 1st STORY FIRE RATINGS, LIFE SAFETY, AND ANY OTHER CODE COMPLIANCE REQUIREMENTS ARE TO BE DESIGNED BY OTHERS AND APPROVED BY THE LOCAL CODE INSPECTOR OR AUTHORITY HAVING JURISDICTION.

DESIGN PROFESSIONALS

ARCHITECT of RECORD :
PERKINS EASTMAN
617 WASHINGTON BLVD.
SUITE 101
STAMFORD, CT 06901
www.perkinseastman.com/
email: humandydesign@perkinseastman.com
ph: (203) 251-7400 - Fax: (203) 251-7474

MECHANICAL, ELECTRICAL, PLUMBING, SPRINKLER ENGINEER :
SMITH MILLER ASSOCIATES
38 NORTH MAIN STREET
PITTSTON, PA 18640
https://www.smith-miller-associates.com/
email: khein@smithmiller.net
ph: (570) 299-5885, ext 203 - cell: (570) 760-9010

CIVIL / SITE ENGINEER :
KIMLEY-HORN OF NEW YORK P.C.
1 NORTH LEXINGTON AVE.
SUITE 1515
WHITE PLAINS, NY 10601
https://www.kimley-horn.com/
email: services@kimley-horn.com
ph: (914) 368-9200

STRUCTURAL ENGINEER : MODULAR PORTION ONLY
KEYSTONE STRUCTURAL GROUP, INC.
711 DAVIS STREET
SCRANTON, PA 18505
https://kgengineers.com/
email: schulde@kgengineers.com
ph: (570) 589-2199 - Fax: (570) 498-7355

GENERAL CONTRACTOR : SITE WORK / ON-SITE BY OTHERS
ANDRON CONSTRUCTION CORP
21 ANDERSEN LANE
GOLDENS BRIDGE, NY 10526
https://www.androncc.com/
email: dbuhl@androncc.com
ph: (914) 232-7531 - Fax: (914) 232-4185

SHEET #	MODULAR SUBMITTAL	REVISED
1	COVER PAGE	04/02/22
2	FOUNDATION STRUCTURAL LOADS	04/02/22
3	1st LEVEL FLOOR PLAN	04/02/22
3.1	2nd LEVEL FLOOR PLAN	04/02/22
3.2	3rd LEVEL FLOOR PLAN	04/02/22
3.3	4th LEVEL FLOOR PLAN	04/02/22
3.4	ROOF PLAN	04/02/22
3a	UNIT TYPE PLANS	04/02/22
3a.1	UNIT TYPE PLANS	04/02/22
3a.2	UNIT TYPE PLANS	04/02/22
3b	UNIT TYPE FLOORING PLANS	04/02/22
3b.1	UNIT TYPE REFLECTIVE CEILING PLANS	04/02/22
3b.2	UNIT TYPE REFLECTIVE CEILING PLANS	04/02/22
3b.3	UNIT TYPE REFLECTIVE CEILING PLANS	04/02/22
3c	UNIT TYPE FLOORING PLANS	04/02/22
3c.1	UNIT TYPE FLOORING PLANS	04/02/22
3c.2	UNIT TYPE FLOORING PLANS	04/02/22
3d	1st LEVEL MODULE LAYOUT	04/02/22
3d.1	2nd LEVEL MODULE LAYOUT	04/02/22
3d.2	3rd LEVEL MODULE LAYOUT	04/02/22
3d.3	4th LEVEL MODULE LAYOUT	04/02/22
3d.4	ROOF MODULE LAYOUT	04/02/22
4	UNIT TYPE ACCESSIBLE PLANS	04/02/22
4.1	UNIT TYPE ACCESSIBLE PLANS	04/02/22
4.2	UNIT TYPE ACCESSIBLE PLANS	04/02/22
4a	ACCESSIBLE DETAILS	04/02/22
4a.1	ACCESSIBLE DETAILS	04/02/22
4a.2	ACCESSIBLE DETAILS	04/02/22
5	EXTERIOR ELEVATION - FRONT	04/02/22
5a	EXTERIOR ELEVATION - MULBERRY STREET	04/02/22
5b	EXTERIOR ELEVATION - SEYMOUR STREET	04/02/22
5c	EXTERIOR ELEVATION - TRINITY STREET	04/02/22
5d	EXTERIOR ELEVATIONS - EAST & WEST COURTYARD	04/02/22
6	1st LEVEL STRUCTURAL PLAN	04/02/22
6.1	1st LEVEL STRUCTURAL - CANTILEVER DETAILS	04/02/22
6a	2nd LEVEL STRUCTURAL PLAN	04/02/22
6b	3rd LEVEL STRUCTURAL PLAN	04/02/22
6c	4th LEVEL STRUCTURAL PLAN	04/02/22
6d	ROOF LEVEL STRUCTURAL PLAN	04/02/22
6e	STRUCTURAL CHARTS & SUMMARIES	04/02/22
7	1st LEVEL SHEARWALL PLAN	04/02/22
7a	2nd LEVEL SHEARWALL PLAN	04/02/22
7b	3rd LEVEL SHEARWALL PLAN	04/02/22
7c	4th LEVEL SHEARWALL PLAN	04/02/22
7d	SHEARWALL CHARTS, SUMMARIES & DETAILS	04/02/22
8	1st LEVEL WALL TYPE PLAN	04/02/22
8a	2nd LEVEL WALL TYPE PLAN	04/02/22
8b	3rd LEVEL WALL TYPE PLAN	04/02/22
8c	4th LEVEL WALL TYPE PLAN	04/02/22
8d	WALL TYPE CHARTS & SUMMARIES	04/02/22
9	CROSS SECTION	04/02/22
9a	CROSS SECTION	04/02/22
9b	CROSS SECTION	04/02/22
9c	CROSS SECTION	04/02/22
9.1	CROSS SECTION DETAILS	04/02/22
9.2	CROSS SECTION DETAILS - SITE CONNECTIONS	04/02/22
9.3	EXTERIOR SHEATHING DETAIL & TYPICAL MODULAR OWN STACK	04/02/22
10	STAIR DETAILS	04/02/22
11	FIRE ASSEMBLY DETAILS	04/02/22
11a	FIRE RATING DETAILS	04/02/22
11b	FIRE PENETRATION ASSEMBLY DETAILS	04/02/22
11c	FIRE PENETRATION ASSEMBLY DETAILS	04/02/22
11d	FIRE PENETRATION TYPE CAULK & SEALANT	04/02/22
12	MODULAR DOOR and WINDOW SCHEDULE	04/02/22
13	TOTAL MODULAR PAGES	04/02/22

ENGINEERING # C2020-02
DRAWN BY: A.D | CHECKED BY: —
DATE: 04/02/22
SALESMAN: TO / JL
MODEL: APARTMENTS

REVISION	DATE	PROVIDE SET FOR REVISION
1	04/02/22	SCHEDULE UPDATE
2	04/02/22	
3	04/02/22	
4	04/02/22	
5	04/02/22	
6	04/02/22	
7	04/02/22	

SIGNATURE BUILDING SYSTEMS

BUILDER: THE MULFORD CORP
591 CHERRY AVENUE
CONKLIN, NY 13748
PERMIT: —

LAMPLIGHTER LIVING
(4 MULBERRY STREET)
CONKLIN, NY 13748
WEST STACK/EAST STACK

PE or RA SEAL

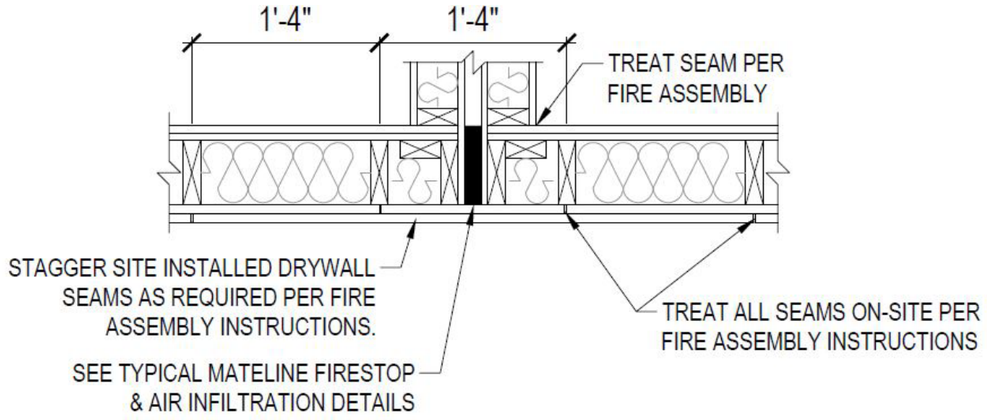
STATE OF NEW YORK — DEPARTMENT OF STATE — 2022

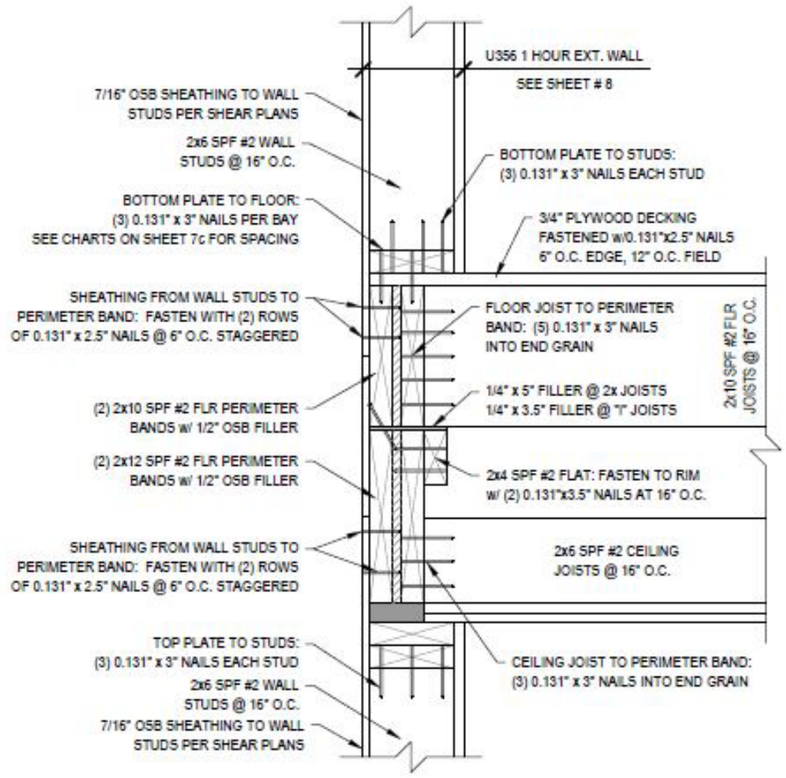
NY STATE APPROVAL SEAL

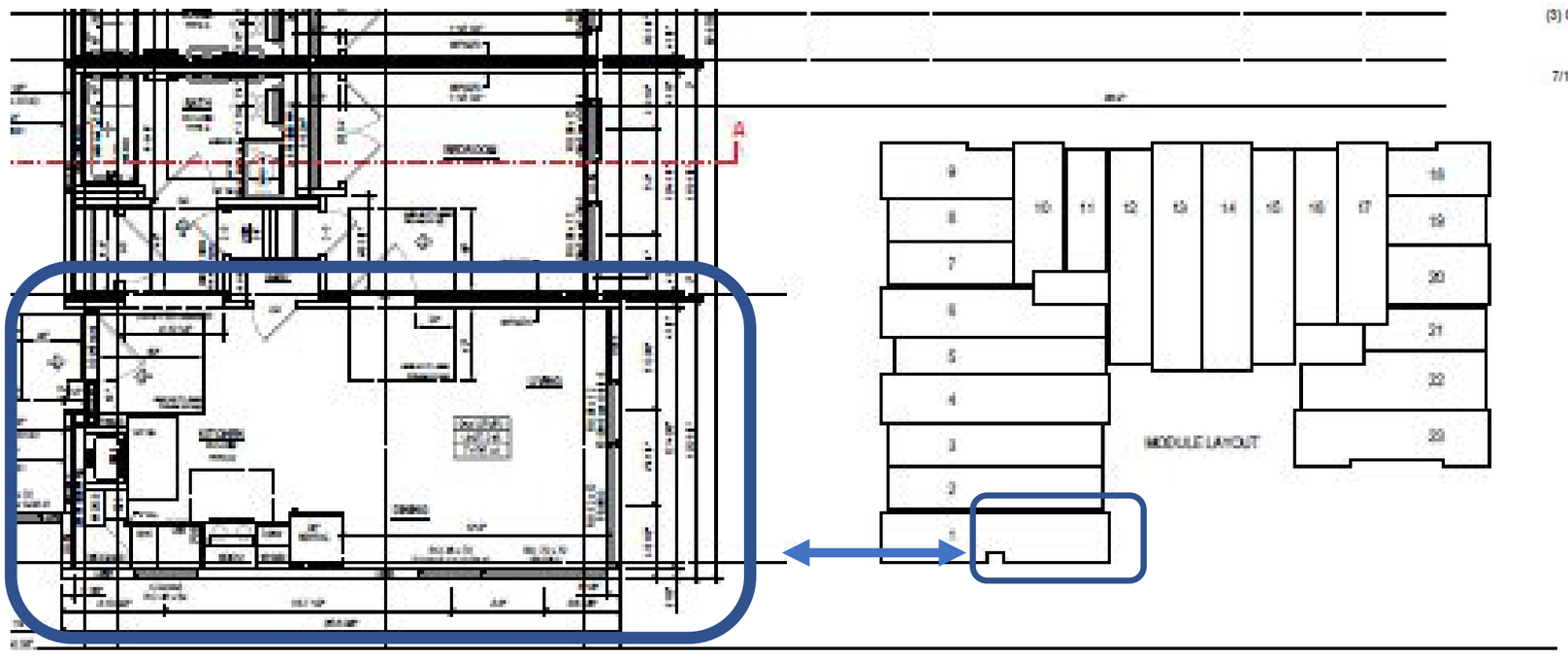
WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

DRAWING: COVER PAGE
SCALE: NTS
SHEET: 1

Modular construction

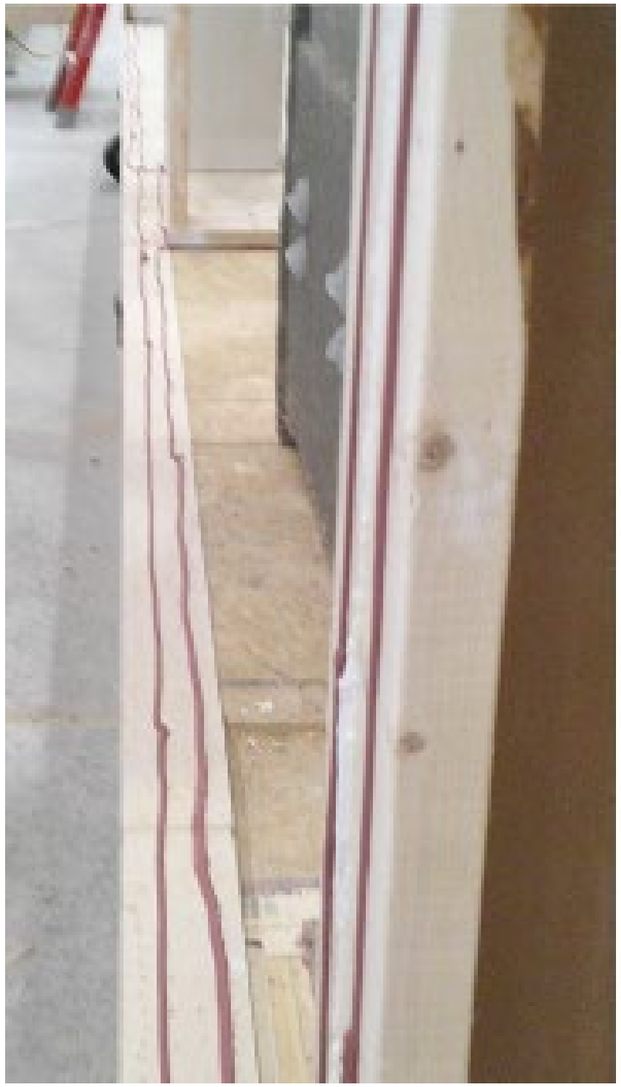






MODULAR: FACTORY FABRICATION

MODULAR: FACTORY FABRICATION



MODULAR: FACTORY FABRICATION

MODULAR: FACTORY FABRICATION

MODULAR: FACTORY FABRICATION

MODULAR: FACTORY FABRICATION

phius Field Verification

- In factory inspections Division of work- Factory vs. Site:

6. **Mate wall gaps were taped for the testing with the exception of the mate line at the floor level as we could not access it and which will provide similar challenges onsite.**

As you can see in photo above there are strips of R13 batt at the perimeter of all mate lines and at each cross-over opening. It is my understanding that this is part of the fire-code and that batts were used in place of Albi Clad (rock wool board) due to dimensional restrictions. Either, alone, will allow air to cross the mate lines. This is not a problem at your ceiling and vertical wall mates but is a problem at your floor mates as you will not have access to these as boxes are swung together. The test numbers shown in this report reflect only the R13 in the floor mate line, so if all else can be replicated onsite you could still achieve passing numbers with just batt in this floor mate line. Despite getting good numbers there was still a significant amount of air moving thru the floor mate line. We discussed adding a traditional gasket above the R13 at the floor level but there was still concern about horizontal dimensions expanding too much. My concern is when setting the boxes, they use a wedging technique which will likely further compromise the floor level R13 strip vs. how we just pushed them together in the plant. There are ways to reinforce this area using expanding foam, copious amounts of caulk, zip tape, but will somewhat depend on the site/set situation and how the floor joists line up with the ceiling joists in box below. Need to be prepared to tackle this onsite with multiple means, but once you can see the site situation it can be figured out quickly.

MODULAR: FACTORY FABRICATION

phius Field Verification

- In factory inspections Division of work- Factory vs. Site:

MODULAR: FACTORY FABRICATION

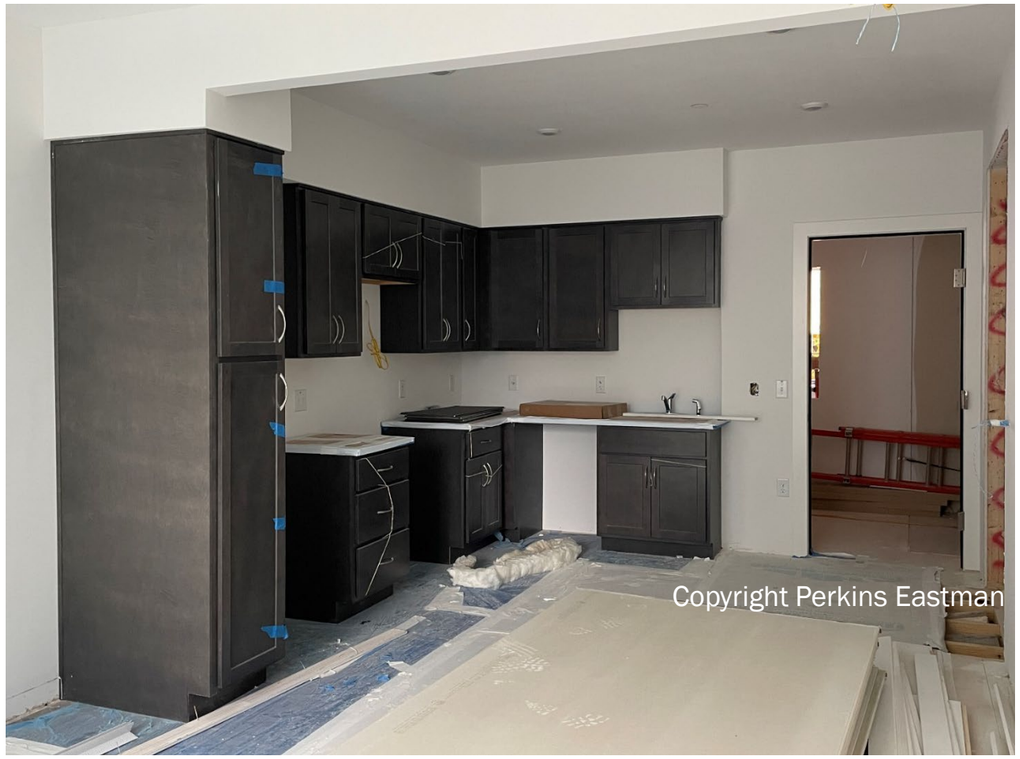
phius Field Verification

- In factory inspections Division of work- Factory vs. Site:

Modular construction

- Wood Frame Boxes sized for transport – 16 ft x 60 ft
- Windows, millwork, finished bathrooms prime painted walls and ceilings shipped with units.
- 2” gap horizontally and 3” gap vertically required for erection. Must be air-sealed on-site.

MODULES ARRIVE ON SITE WITH KITCHEN CABINETS INSTALLED



MODULAR CONSTRUCTION PROGRESS PHOTOS

Copyright Perkins Eastman

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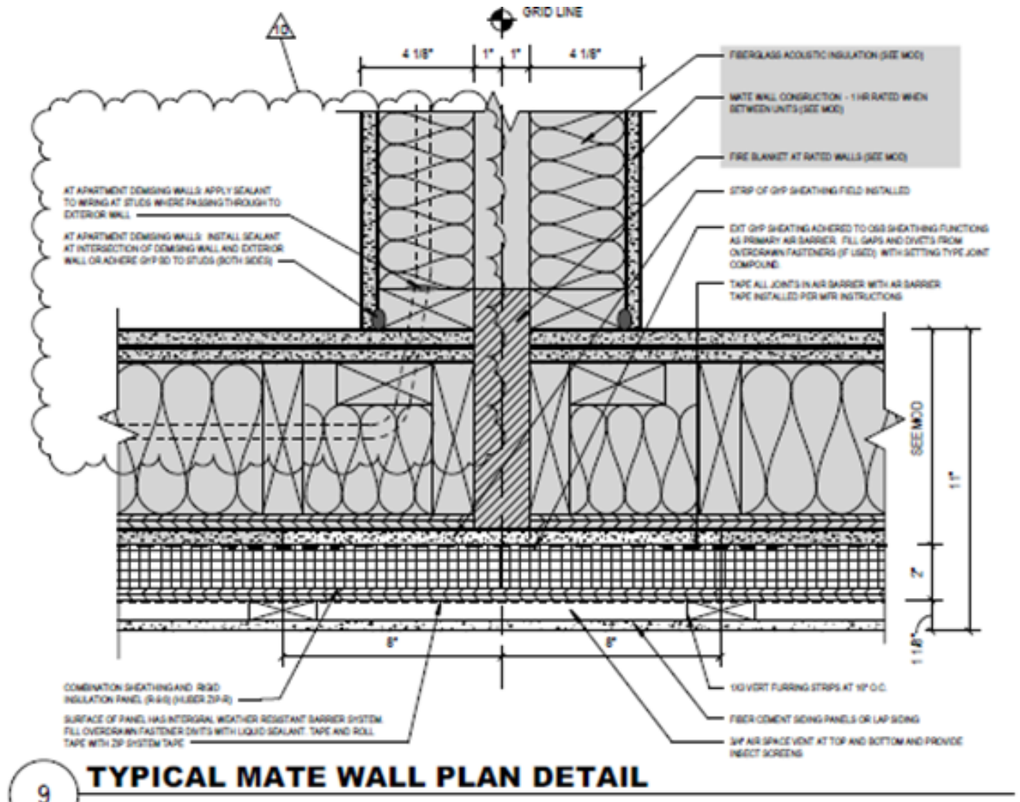
MODULAR CONSTRUCTION PROGRESS PHOTOS

DREAMS VS. REALITY

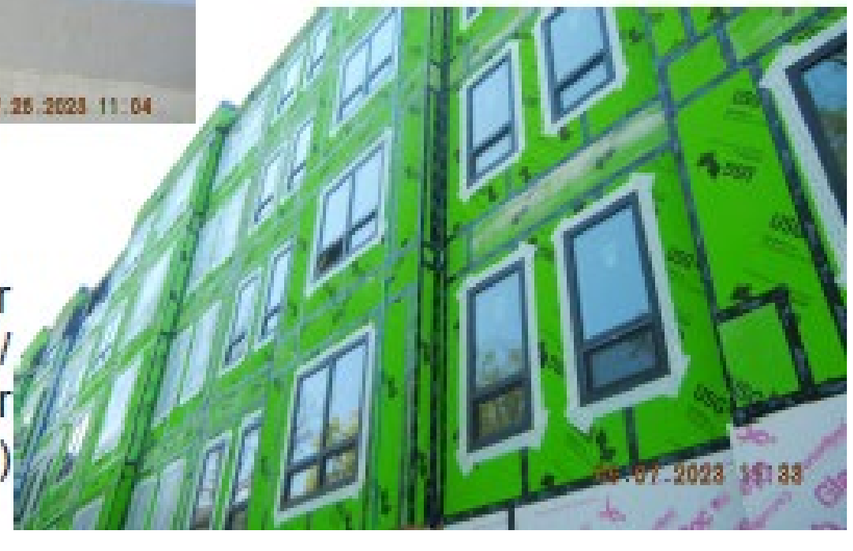


❶ Exposed marriage joints prior to sealing and concealment behind fireproof sheathing (green)

❷ Typical marriage joint w/air sealing tape over foamed joints

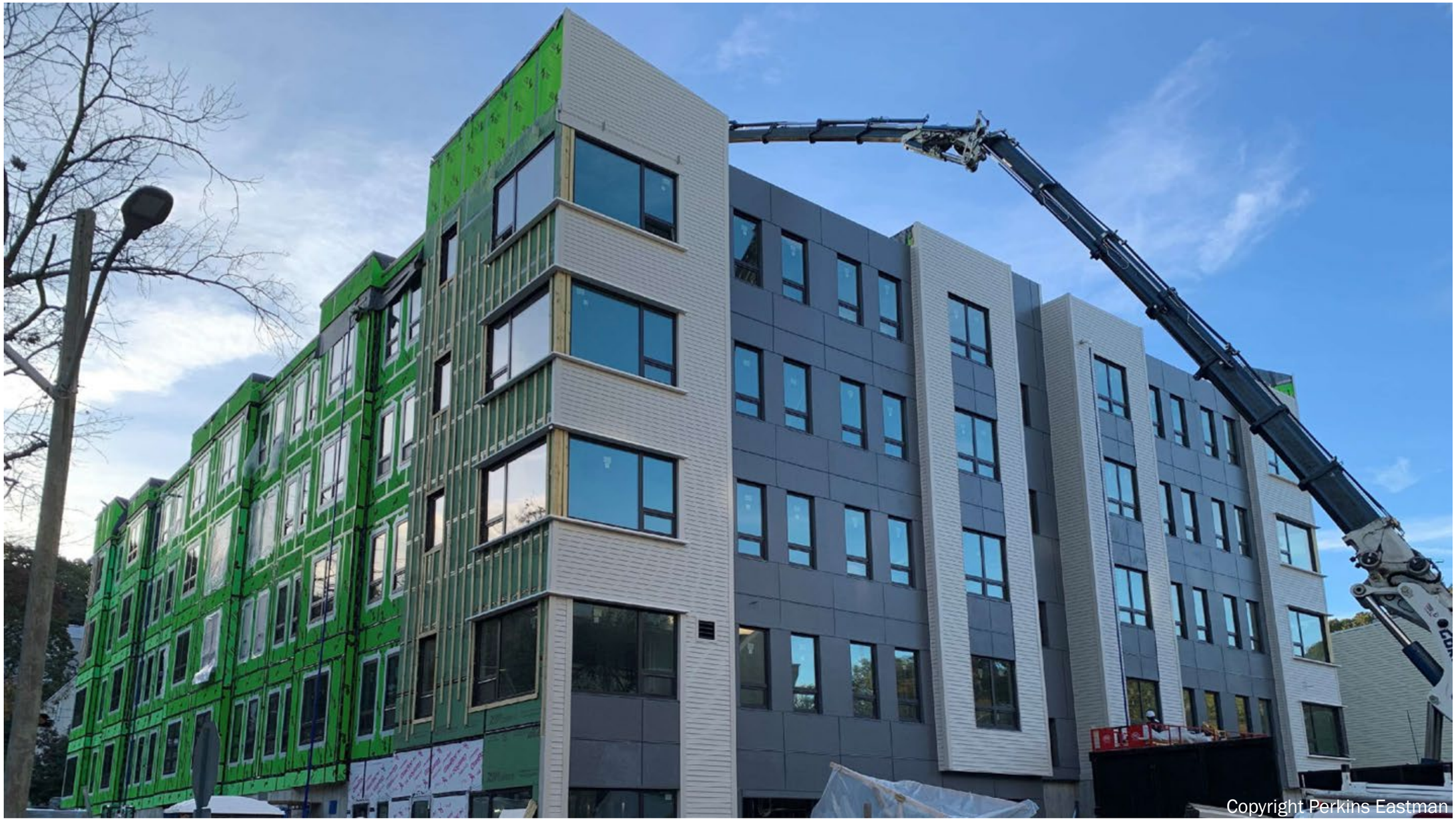
❸ Typical belly band at podium with Airtight Tape being applied

❹ Completed air barrier (prior to ZIP-R cladding / insulation / weather barrier install)



MODULAR CONSTRUCTION PROGRESS PHOTOS

MODULAR CONSTRUCTION PROGRESS PHOTOS



FIELD VERIFICATION

FIELD VERIFICATION: BLOWER DOOR TEST PLAN

FINAL TESTING: WHOLE BUILDING AIR TIGHTNESS TARGET = 3654 CFM @ -50PA

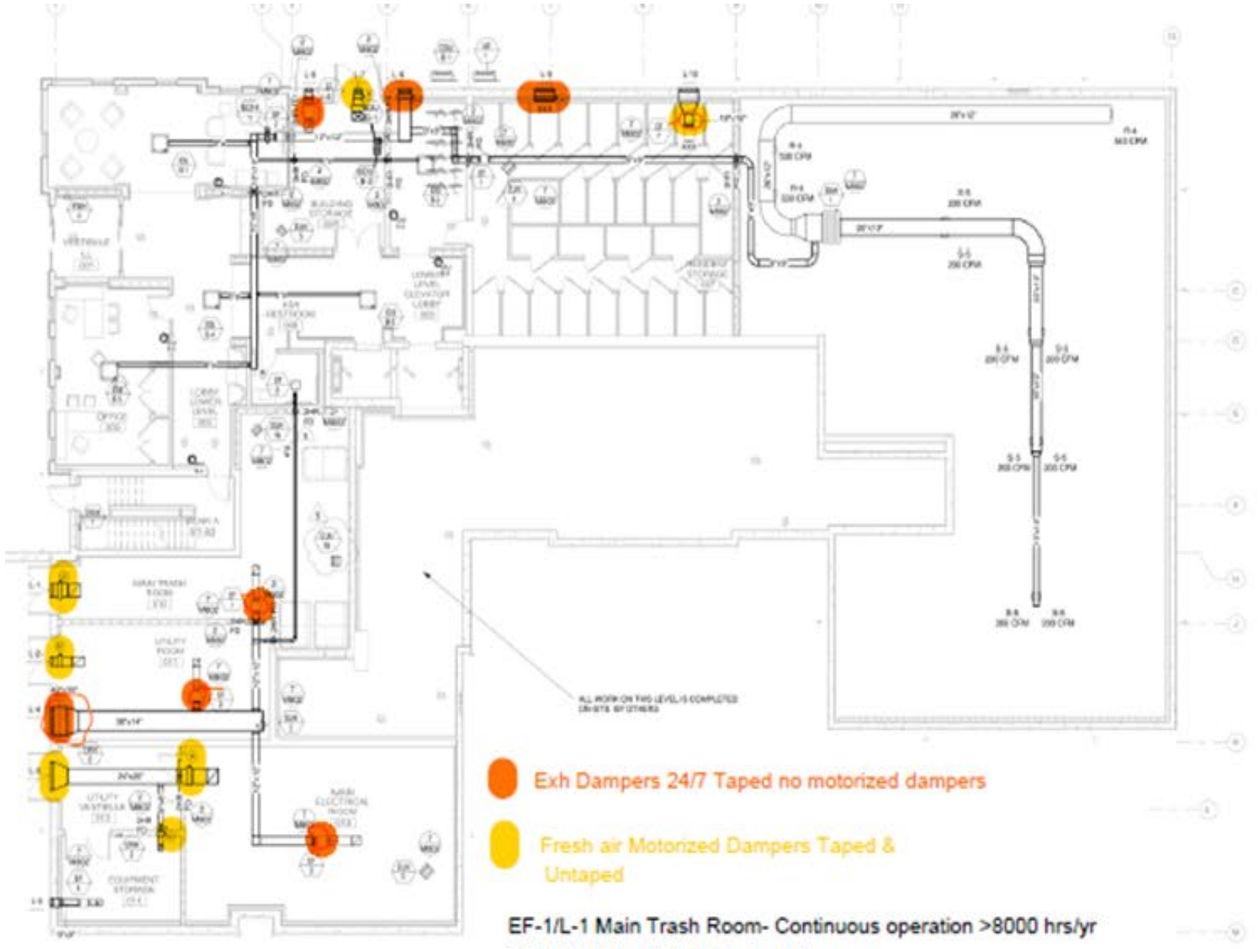
INTEGRAL
BUILDING + DESIGN

Main Office:
231 Main St., Suite 103
PO Box 96, New Paltz, NY 12561
(845) 255-0418

Lower Hudson Valley:
15 N. Mill St., Suite 218
Nyack, NY 10960
(845) 535-3035

PHIUS+ 2021 Whole-Building Testing Plan
LaMora Senior Living
The Mulford Corporation
23 Mulberry Street
Yonkers, NY 10701

Prepared by:
Anthony V. Lisanti CEM, CPHC
Phius Rater/Verifier
Integral Building + Design, Inc.
April 12, 2023



1 MECHANICAL PLAN - DUCTWORK & EQUIPMENT - BASEMENT

Exh Dampers 24/7 Taped no motorized dampers

Fresh air Motorized Dampers Taped & Untaped

EF-1/L-1 Main Trash Room- Continuous operation >8000 hrs/yr
L-3 Utility Vestibule Motorized dampers
EF-2/L-2 Utility Room- thermostatically controlled
EF-3/L-4 Main Elect. Room Thermostatically controlled
EF-4/L-5 Equip't Storage - Thermostatically Controlled
EF-5/L-4 Bathroom- intermittent local switch
EF-6/L-7 Bldg Storage Thermostatically Controlled
SF1 & SF-2/L-6 Continuous operation >8000 hrs/yr

FIELD VERIFICATION: CHASING LEAKS

FIELD VERIFICATION: BLOWER DOOR TESTING & RESULTS

Envelope Leakage Test

THE ENERGY CONSERVATORY

Testing Company:
Name: Integral Building + Design
Address: 15 N. Mill Street
Suite 218
Nyack, NY 10960
Phone: 845 535 3035

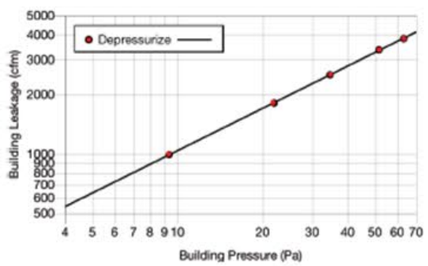
Technician:
Name: Anthony Lisanti CEM, CPHC
Credentials: CEM
CPHC
Phius Rater/Verifier
QAD
Email: tony@integralbuilding.com

Building Information:
Project ID: LaMora Whole Bldg Final
Address: 23 Mulberry St
Yonkers, NY 10701
Year Built: 2024
Geo-Tag Data: Latitude: 40.937088
Longitude: -73.882623
Timestamp: 2024-03-27 10:29:14

Customer Information:
Name: LaMora /Mulford/MHACY
Address: 23 Mulberry St
Yonkers, NY

Measured Leakage: 0.05 CFM50/ft² (Env. Area)
Leakage Target: 0.06 CFM50/ft² (Env. Area)
Compliance with Leakage Target: Pass

Test ID: Depressurization Taped Whole Bldg Test 6-6-24
Purpose of Test: RESNET Multi-Pt Env. Leakage
Measured CFM50: 3,257.4 (+/- 1.2%) Effective Leakage Area: 153.4 in²
Building Volume: 443,142.0 ft³ Enclosure Surface Area: 60,903.0 ft²
Coefficient (C): 201.8 (+/- 4.6%) Exponent (n): 0.711 (+/- 0.013)
Correlation Coefficient: 0.99995
Test Standard: RESNET 380 Multi-Point Test Mode: Depressurize
Test Characteristics: Indoor Temp: 73 °F Outdoor Temp: 73 °F
Altitude: 121.0 ft Time Average Period: 10 seconds
Test Date and Time: 2024-06-06 09:43:45



Envelope Leakage Test

THE ENERGY CONSERVATORY

Testing Company:
Name: Integral Building + Design
Address: 15 N. Mill Street
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Nyack, NY 10960
Phone: 845 535 3035

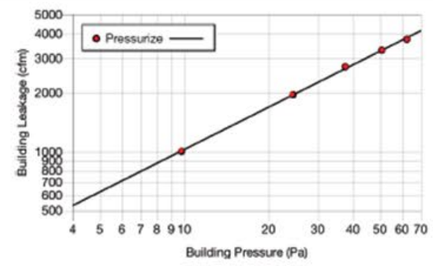
Technician:
Name: Anthony Lisanti CEM, CPHC
Credentials: CEM
CPHC
Phius Rater/Verifier
QAD
Email: tony@integralbuilding.com

Building Information:
Project ID: LaMora Whole Bldg Final
Address: 23 Mulberry St
Yonkers, NY 10701
Year Built: 2024
Geo-Tag Data: Latitude: 40.937088
Longitude: -73.882623
Timestamp: 2024-03-27 10:29:14

Customer Information:
Name: LaMora /Mulford/MHACY
Address: 23 Mulberry St
Yonkers, NY

Measured Leakage: 0.05 CFM50/ft² (Env. Area)
Leakage Target: 0.06 CFM50/ft² (Env. Area)
Compliance with Leakage Target: Pass

Test ID: Pressurization Taped Whole Bldg 6-6-24
Purpose of Test: RESNET Multi-Pt Env. Leakage
Measured CFM50: 3,256.5 (+/- 3.1%) Effective Leakage Area: 150.7 in²
Building Volume: 443,142.0 ft³ Enclosure Surface Area: 60,903.0 ft²
Coefficient (C): 196.2 (+/- 13.5%) Exponent (n): 0.718 (+/- 0.039)
Correlation Coefficient: 0.99957
Test Standard: RESNET 380 Multi-Point Test Mode: Pressurize
Test Characteristics: Indoor Temp: 73 °F Outdoor Temp: 73 °F
Altitude: 121.0 ft Time Average Period: 10 seconds
Test Date and Time: 2024-06-06 09:50:50



WHOLE BUILDING AIR TIGHTNESS - FINAL TESTING

- Whole Building Air Tightness Target = 3654 CFM @ -50 Pa (**0.06 CFM**/SF)
- Test 1 = **0.12 CFM**
- Test 2 = **0.08 CFM**
- Test 3 = **0.07 CFM**
- Final = **0.053 CFM** avg depressurization/pressurization
  0.061 CFM untaped

Envelope Leakage Test

T·E·C THE ENERGY CONSERVATORY

Testing Company:
Name: Integral Building + Design
Address: 15 N. Mill Street
Suite 218
Nyack, NY 10960
Phone: 845 535 3035

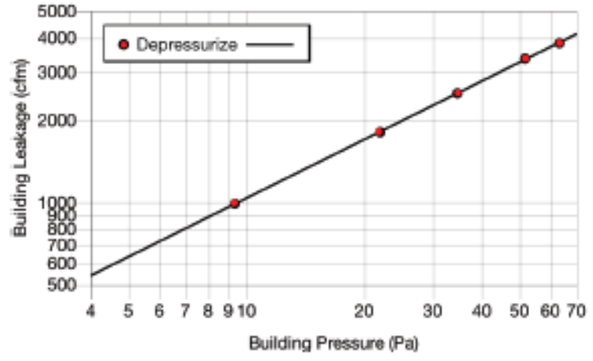
Technician:
Name: Anthony Lisanti CEM, CPHC
Credentials: CEM
CPHC
Phius Rater/Verifier
QAD
Email: tony@integralbuilding.com

Building Information:
Project ID: LaMora Whole Bldg Final
Address: 23 Mulberry St
Yonkers, NY 10701
Year Built: 2024
Geo-Tag Data: Latitude: 40.937088
Longitude: -73.882623
Timestamp: 2024-03-27 10:29:14

Customer Information:
Name: LaMora /Mulford/MHACY
Address: 23 Mulberry St
Yonkers, NY

Measured Leakage: 0.05 CFM50/ft² (Env. Area)
Leakage Target: 0.06 CFM50/ft² (Env. Area)
Compliance with Leakage Target: Pass

Test ID:	Depressurization Taped Whole Bldg Test 6-6-24	
Purpose of Test:	RESNET Multi-Pt Env. Leakage	
Measured CFM50:	3,257.4 (+/- 1.2%)	Effective Leakage Area: 153.4 in²
Building Volume:	443,142.0 ft³	Enclosure Surface Area: 60,903.0 ft²
Coefficient (C):	201.8 (+/- 4.6%)	Exponent (n): 0.711 (+/- 0.013)
Correlation Coefficient:	0.99995	
Test Standard:	RESNET 380 Multi-Point	Test Mode: Depressurize
Test Characteristics:	Indoor Temp: 73 °F	Outdoor Temp: 73 °F
	Altitude: 121.0 ft	Time Average Period: 10 seconds
Test Date and Time:	2024-06-06 09:43:45	



- **Phius Building certification achieved in August 2024**

Phius Awards

LaMora Senior Living

with the designation of a Phius Certified Project

phius CORE

Project Address	23 Mulberry Street Yonkers, New York 10701
Program Version	Phius CORE 2021
Project Number	1887
Certification Date	08/23/2024
Architecture Planning	Perkins Eastman Architects DPC
Building Owner	The Mulford Corporation
Construction Company	Andron Construction Corp./Signature Building
Mechanical Systems Designer	Smith Miller Associates
Lead Phius CPHC®	John Loercher
Secondary Phius CPHC®	Stephen Tilly
Phius Certified Verifier	Anthony Lisanti

Katrin Klingenberg, Executive Director

ENTRY CORNER

Photograph by Andrew Rugge. Copyright Perkins Eastman

SOUTH ELEVATION VIEW

Photograph by Andrew Rugge. Copyright Perkins Eastman

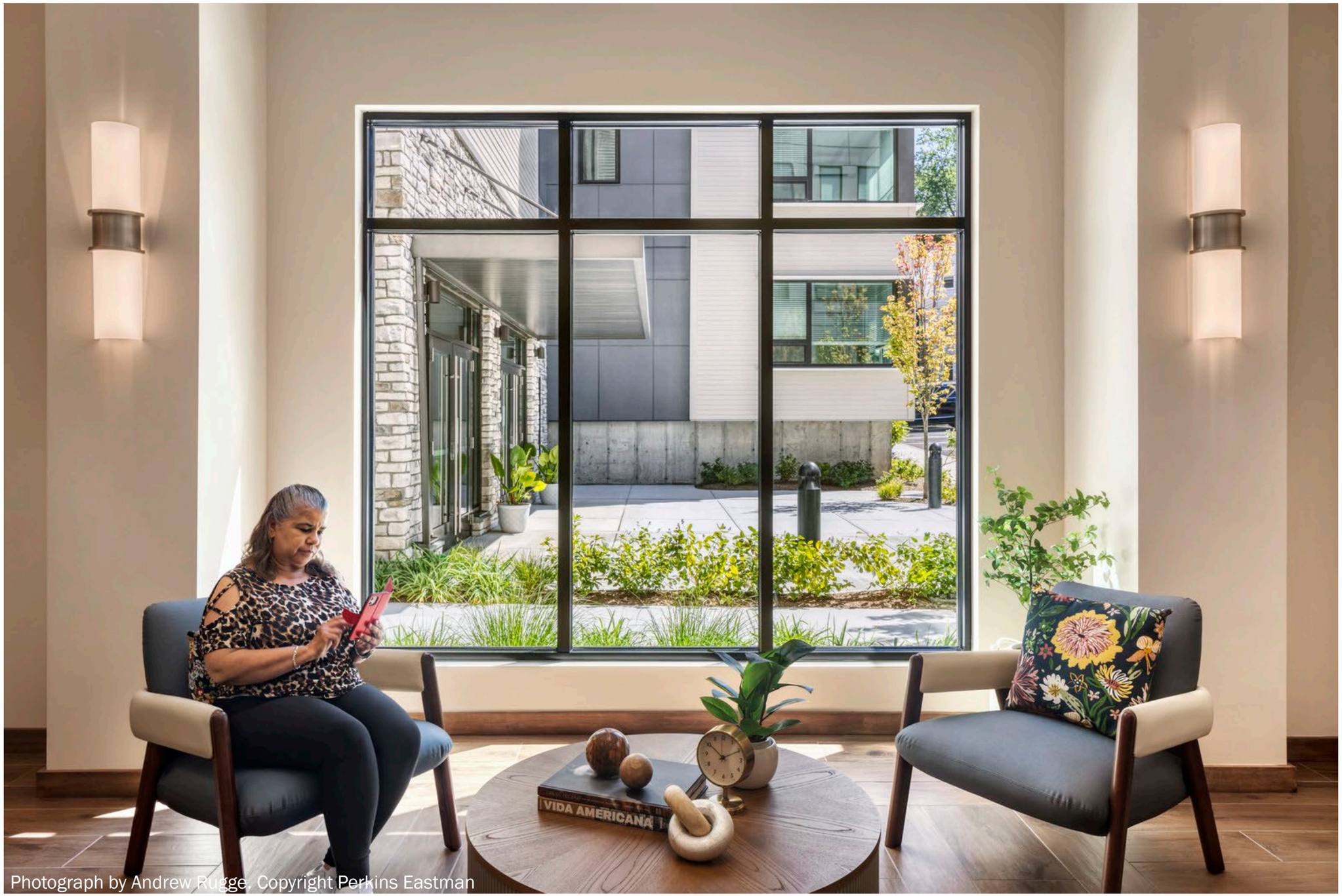
MAIN ENTRANCE

Photograph by Andrew Rugge. Copyright Perkins Eastman

ROOF DECK

Photograph by Andrew Rugge. Copyright Perkins Eastman

RESIDENT LOBBY



Photograph by Andrew Rugge. Copyright Perkins Eastman

CORNER APARTMENT VIEW

Photograph by Andrew Rugge. Copyright Perkins Eastman

LESSONS LEARNED & TAKE-AWAYS

- Better to use consultants who have prior passive building experience
- Allow time in the design schedule for the design team to refine and revise documents based on reviews by the CPHC (i.e. WUFI analysis) – and make sure CHPC performs the reviews on schedule.
- Make sure Phius requirements are well defined in the Construction Documents
- Detail the continuous envelope – make it clear
- Include diagrams – Don’t just rely on plans/sections/details
- Use color to highlight critical membranes and air control layers
- Include required testing (and related scheduling) in Specifications
- Define contractor’s responsibilities regarding passing necessary tests

LESSONS LEARNED & TAKE-AWAYS

- Engage the Rater/Verifier early in the design phase- not after construction scope is completed to ensure co-requisite programs are integrated into the design process
- Optimize building envelope/air barrier design – did we need three layers of sheathing on the bldg.? Possibly minimize layering and maintain the fireproofing qualities with two layers- i.e. eliminate the ZIP- R and the USG Green Board in favor of Rockwool panels with battens over factory applied OSB/Plywood
- Understand the limitations of central ventilation systems – inability to boost airflow, difficulty with air balancing/commissioning
- Redefine Phius boundaries – i.e. including crawl space within Phius envelope.
- Renew effort to optimize how water distribution system i.e.- decrease pipe volume, time-to-to hot, ultimately reducing installation costs.
- Include power monitoring systems in work scope for critical equipment- DWH, back up storage tanks, recirc pumps, ERU's, apartment level consumption for ASHP's, exhaust fans
- There was no comprehensive post construction lessons learned, trading of information to make improved design decisions directly with ownership. The cost of learning was steep- why not leverage that for any future projects?

LESSONS LEARNED & TAKE-AWAYS

- Identify the Phius certified enclosure quickly and with the input of the air-testing agent. Areas of attention in large buildings: trash chutes, laundry rooms, egress stairs and elevator shafts
- Trash chutes - cost benefit analysis between
  1. the detailing required to cut it out of the Phius enclosure
  2. including it in the enclosure and taking the energy hit from ventilation requirements
- Laundry rooms - how will makeup air be provided for direct-exhaust dryers. Does it make sense to cut the laundry room out of the enclosure to reduce heat loss in the rest of the building
- Egress stair / Elevators - how do these connect the Phius enclosure to non-enclosure spaces and what level or airtightness is required for doors, etc.
- Active systems in large buildings have more pump, fan and aux energy that will need to be accounted for - potentially jeopardizing the source energy Phius target
- Insulated floors must adhere to the Certification guidebook appendix B moisture control requirements - generally they must follow the same guidelines as wells, however floors with vapor-open "fluffy" insulation must ALSO pass a bulk-wetting test if 'wet' programs are located above
- Modular construction may require different detailing than stick-built. For instance, the mating joint between floor and ceiling of modular units was double-framed and the connection must be designed to provide air, vapor and thermal continuity when joined onsite