

Using Offsite Construction to Address Affordable Housing

Credits: 1.0 AIA/CES HSW LUs, 1.0 PHD credit, 0.10 ICC credit

MASS TIMBER+SM
OFFSITE CONSTRUCTION CONFERENCE

PRODUCED BY



Forest Economic Advisors

Stuart Lachs
Perkins Eastman



Anthony Shulde
KSG Engineers



Mike Kirby
Signature Building
Systems of Pennsylvania



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

WoodWorks | The Wood Products Council

is a registered provider of AIA-approved continuing education under Provider Number G516. All registered **AIA CES** Providers must comply with the AIA Standards for Continuing Education Programs. Any questions or concerns about this provider or this learning program may be sent to AIA CES (cessupport@aia.org or (800) AIA 3837, Option 3).

This learning program 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.

AIA continuing education credit has been reviewed and approved by **AIA CES**. Learners must complete the entire learning program to receive continuing education credit. AIA continuing education Learning Units earned upon completion of this course will be reported to **AIA CES** for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

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



Course Description

This course will explore how teams can leverage offsite construction to deliver high-quality, affordable housing at scale. Participants will learn how modular approaches support efficient construction, reduce waste, and improve speed to occupancy—without sacrificing sustainability, occupant comfort, or long-term performance. Drawing from real-world projects, this session will provide practical strategies for applying offsite methods to address today's housing challenges through smart, replicable design in urban settings.

Learning Objectives

1. Understand the role of offsite construction in addressing housing affordability.
2. Identify how modular and offsite construction methods can support health, safety, and welfare through improved building quality, reduced construction timelines, and more consistent performance.
3. Learn how early collaboration between the design team and fabricator influences project outcomes.
4. Apply lessons from real-world projects to design and deliver sustainable, scalable, and replicable affordable housing in urban contexts.

Introduction

Anthony Shulde

KSG Engineers

Project Structural Engineers



Mike Kirby

Signature Building Systems

Modular Manufacturer



Stuart Lachs

Perkins Eastman Architects

Project Architect



KSG Engineers – Project Structural Engineers

Anthony Shulde, Principal/Senior Structural Engineer

KSG engineers specializes in structural engineering and civil engineering services, working with architects, project developers, homeowners, and the construction industry throughout the United States. We pride ourselves on being a dynamic team capable of handling a wide range of engineering projects.



Signature Building Systems – Modular Manufacturer

Michael Kirby – Director of Commercial Operations and Engineering for Signature Building Systems

Based in Moosic, PA, Signature Building Systems (SBS) is a recognized leader in the modular construction field as an off-site fabricator of volumetric, three-dimensional building sections – Modules - that are used in conjunction with on-site construction elements, to form residential buildings from Single Family Homes to Multifamily Dwellings.



Perkins Eastman – Project Architects

Stuart Lachs – Principal & Residential Practice Area Leader at Perkins Eastman Architects

Perkins Eastman is a global design practice founded on the belief that design has the power to enhance people's lives. With over 1,000 professionals across 25 multidisciplinary studios worldwide, our Human By Design philosophy places people at the center of every solution.



Background on Client/Project

The **Municipal Housing Authority for the City of Yonkers** (MHACY) owns and manages a wide variety of properties, and administers a Housing Choice Voucher Program, to provide affordable, stable, decent and safe housing opportunities within the City of Yonkers. By creating innovative housing opportunities, MHACY strives to provide quality, sustainable housing and services that will equip residents and participants to succeed.



Project Goals:

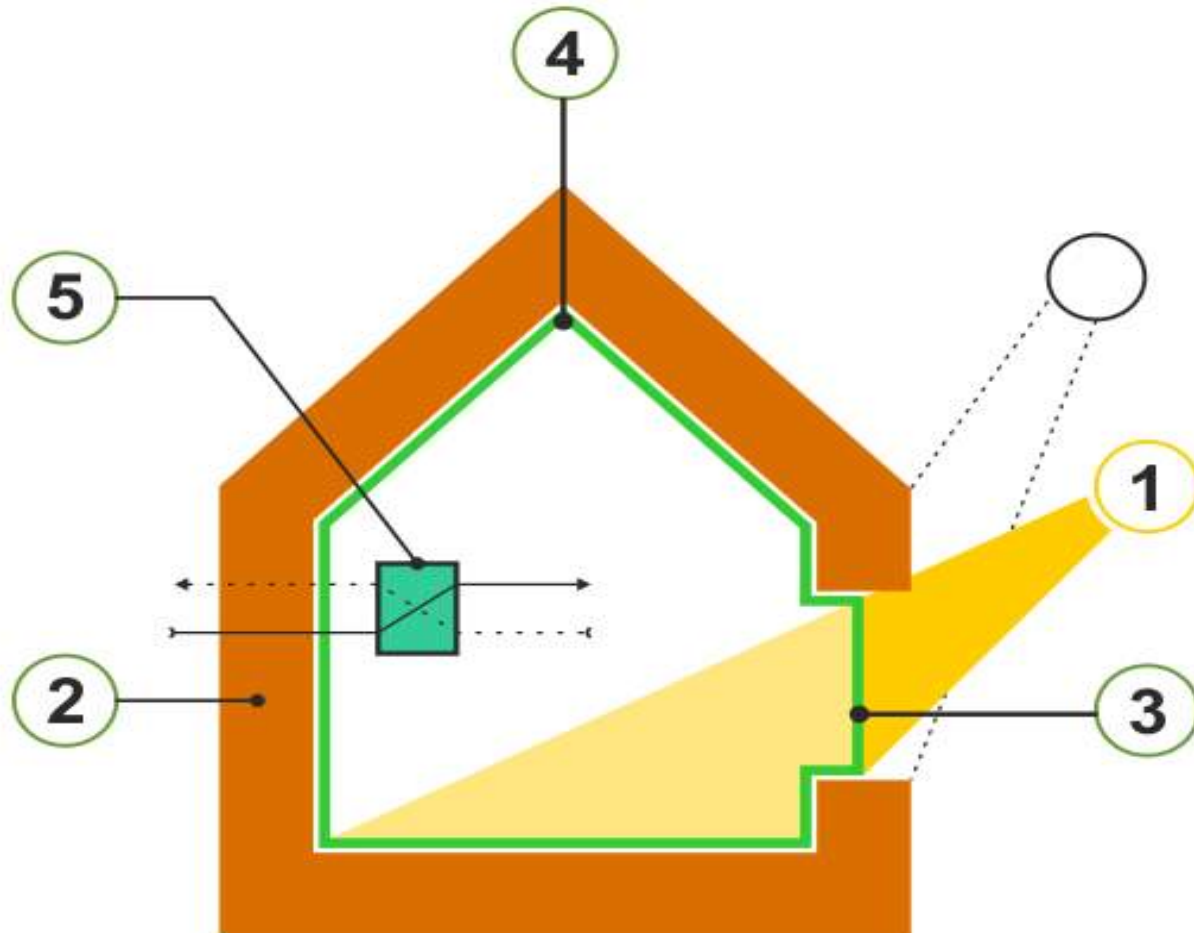
- Attain Passive House Institute United States (PHIUS) standards
 - EPA Energy Star Multi-family new construction
 - DOE Zero Energy Ready Homes (ZERH)
 - EPA Indoor AirPLUS Standards
 - New York State Energy Research and Development Authority's New Construction - Housing Program
 - Enterprise Green Communities
- Address senior housing needs and waiting lists
- Minimize COVID transmission risks for seniors

PROJECT OVERVIEW

- 0.8 acre/35,000± SF site in Yonkers, New York
- 60 1- and 2-bedroom apartments for seniors (62+) at or below 60% AMI
- Four story, wood-frame modular boxes with field constructed walk-out basement
- Passive House (Phius) Certified
- Total project costs approximately \$44 million

					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. & H ₂ O Distrib	Eff. Comps. & H ₂ O Distrib	Eff. Comps. & H ₂ O 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
		Water Management	Water Management	Water Management	Water Management
		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.
		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	 ZERO	 phius CORE	 phius ZERO

Passive House Design Principals



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

Project Timeline

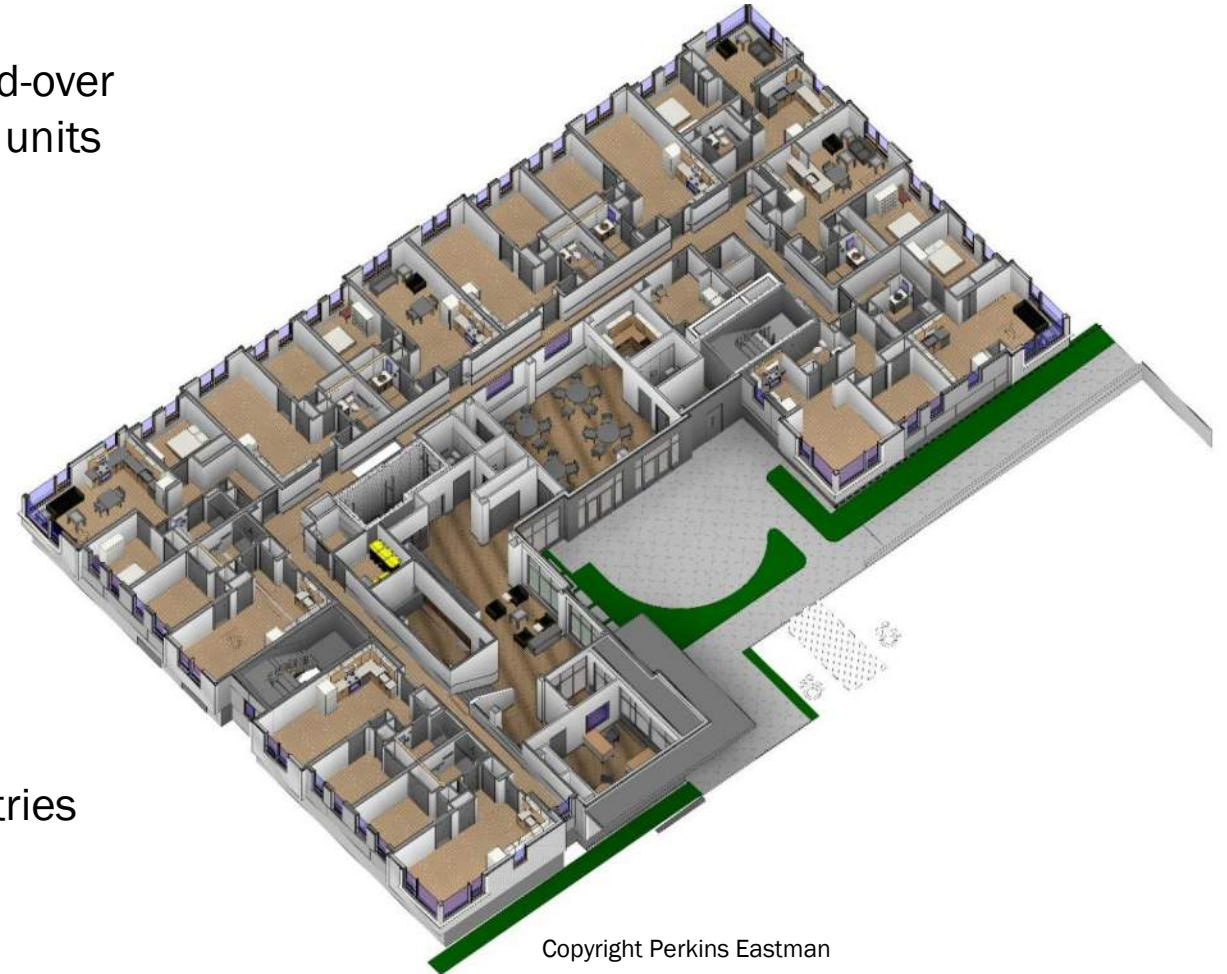
- 2/2019 – Initial Architecture RFP and Award
- 3/2019 – SBS engaged for modular
- 8/2019 – KSG engaged for structure
- 2/2019 – 9/2019 – Initial Concept Design & P+Z approvals
- 2020 – NYS Dept of Housing and Community Renewal funding submissions & Covid
- 2021 – 2nd round of HCR funding submissions
- 3/2022 – Submit for Building Permit to NYS DOS and Yonkers Building Department
- 10/2022 – Groundbreaking
- 7/2023 – Delivery and placement of first modular boxes
- 7/2024 – C of O – Residents move in

Original Site Conditions



Project Program

- 34,848 sf site (0.8 acres)
- Sixty affordable rental apartments for 62-and-over
- Fully-adapted (Type B) and hearing-impaired units
- 60,000 Gross SF building area
- On-site resident parking
- 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



Copyright Perkins Eastman

What is Modular Construction?

Modular construction is a process in which a building is constructed off-site, under controlled plant conditions:

Modular construction uses the same materials and designs to the same codes and standards as conventionally built facilities – but in about half the time. Buildings are produced in “modules” that when put together on site, reflect the identical design intent and specifications of the most sophisticated site-built facility – without compromise.

Construction of modular buildings occurs simultaneously with site work, allowing projects to be completed in half the time of traditional construction.

Reduced Construction Schedule:

Because construction of modular buildings can occur simultaneously with the site and foundation work, projects can be completed 30% to 50% sooner than traditional construction.

Elimination of Weather Delays:

60 - 90% of the construction is completed inside a factory, which mitigates the risk of weather delays. Buildings are occupied sooner, creating a faster return on investment.

Built to Code with Quality Materials:

Modular buildings are built to meet or exceed the same building codes and standards as site-built structures, and the same architect-specified materials used in conventionally constructed buildings are used in modular construction projects – wood, concrete and steel.

Final Building Plans

- One Bedroom Unit
- Two Bedroom Unit
- Circulation
- Common Spaces
- Offices/Admin
- Utilities

- 1 Lobby and Mailroom
- 2 Community Room
- 3 Lounge
- 4 Fitness Room
- 5 Laundry Room
- 6 Bike Storage
- 7 Resident Storage
- 8 Office
- 9 Main Trash Room
- 10 Water Room
- 11 Equipment Storage
- 12 Main Electrical Room



0 5 10 30 ft



Final Building Plans

- One Bedroom Unit
 - Two Bedroom Unit
 - Circulation
 - Common Spaces
 - Offices/Admin
 - Utilities
-
- 1 Lobby and Mailroom
 - 2 Community Room
 - 3 Lounge
 - 4 Fitness Room
 - 5 Laundry Room
 - 6 Bike Storage
 - 7 Resident Storage
 - 8 Office
 - 9 Main Trash Room
 - 10 Water Room
 - 11 Equipment Storage
 - 12 Main Electrical Room
-
- 
- 



Final Building Plans

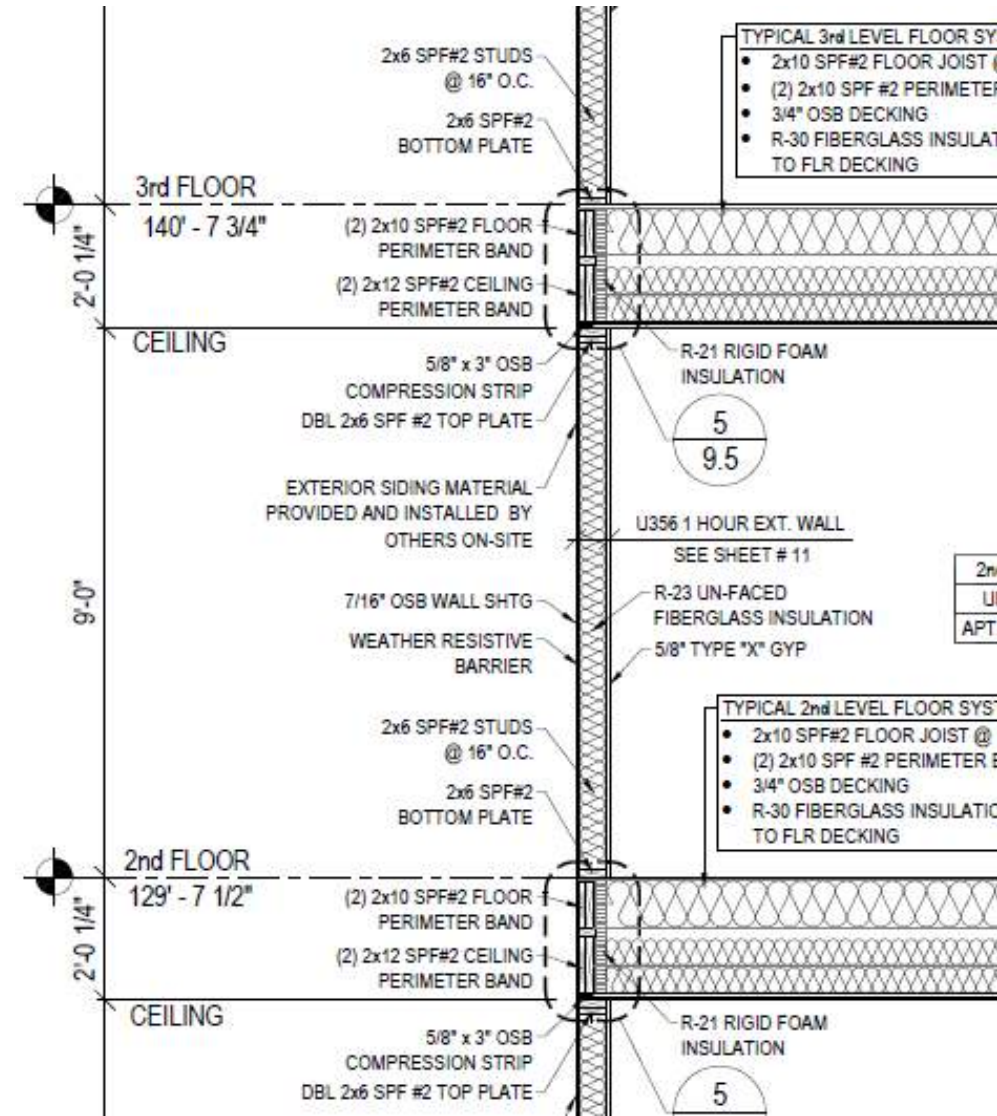
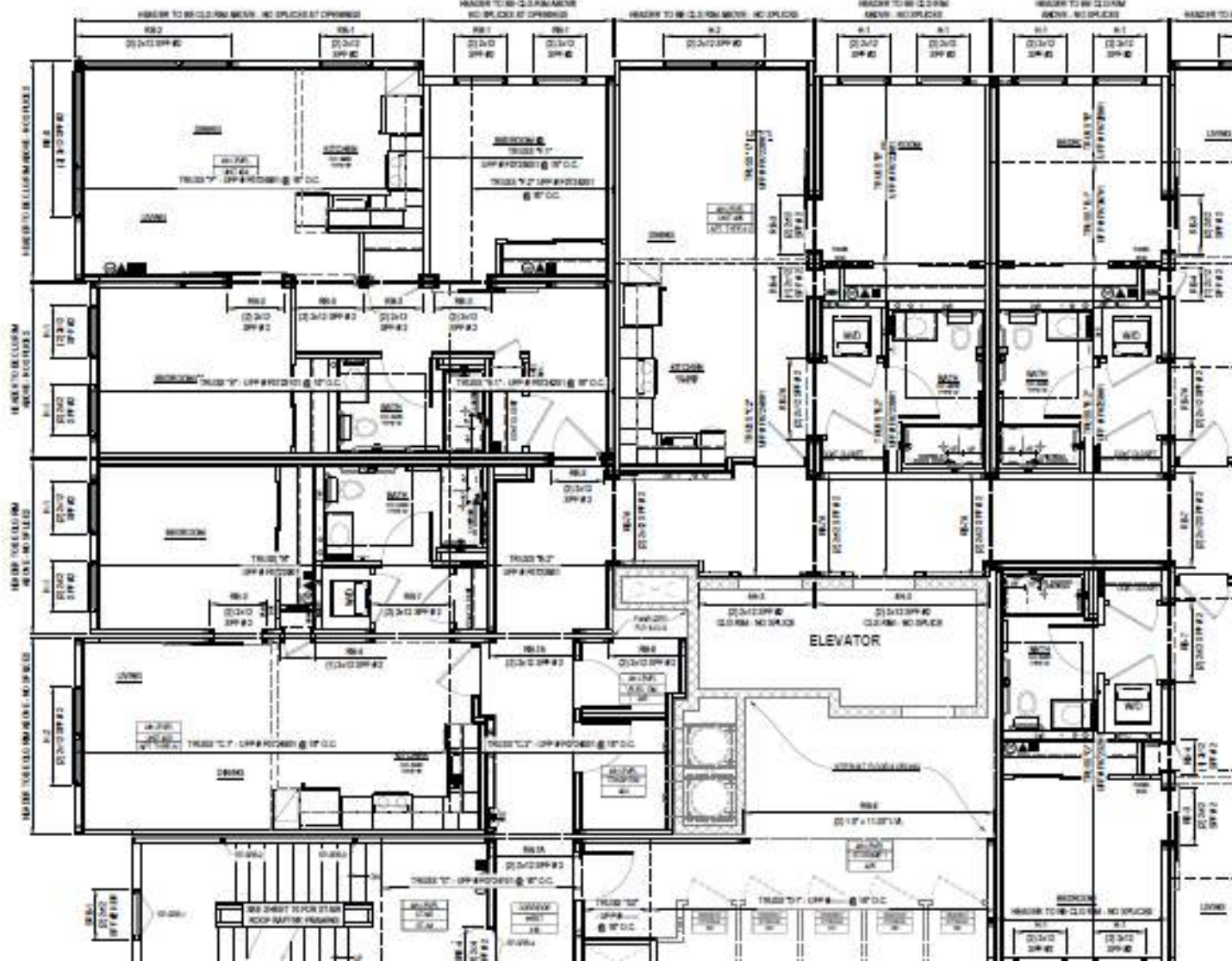
- One Bedroom Unit
- Two Bedroom Unit
- Circulation
- Common Spaces
- Offices/Admin
- Utilities

- 1 Lobby and Mailroom
- 2 Community Room
- 3 Lounge
- 4 Fitness Room
- 5 Laundry Room
- 6 Bike Storage
- 7 Resident Storage
- 8 Office
- 9 Main Trash Room
- 10 Water Room
- 11 Equipment Storage
- 12 Main Electrical Room

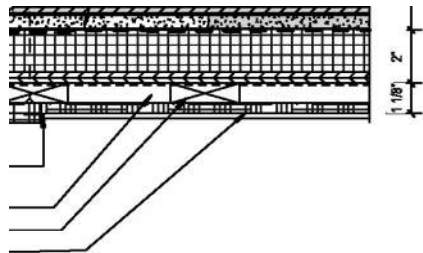


0 5 10 30 ft

Final Building Plans -Structure

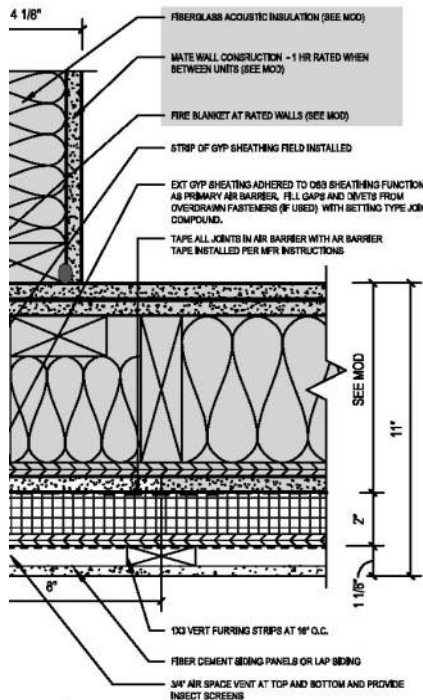


Details

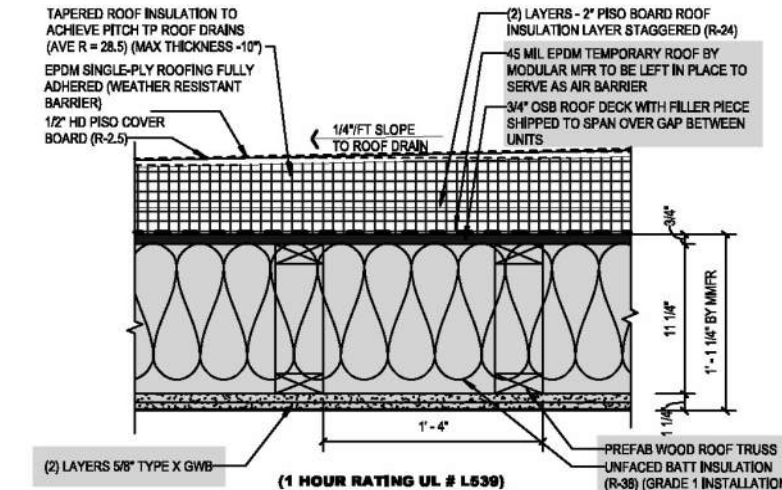
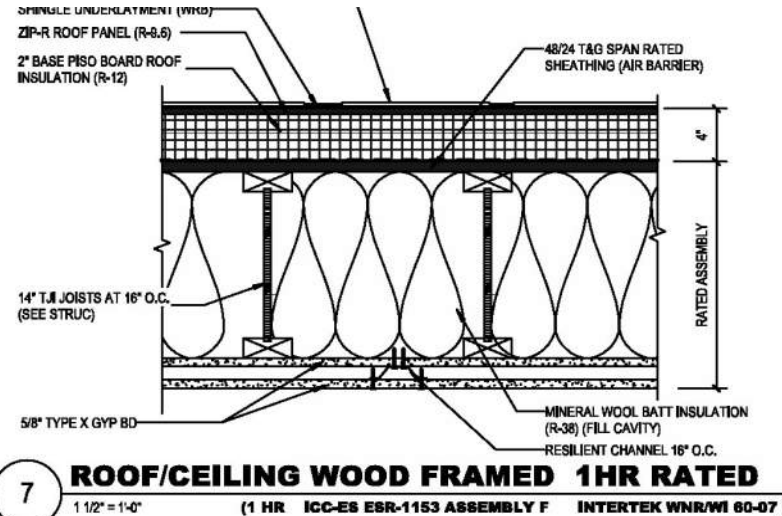


PLAN DETAIL

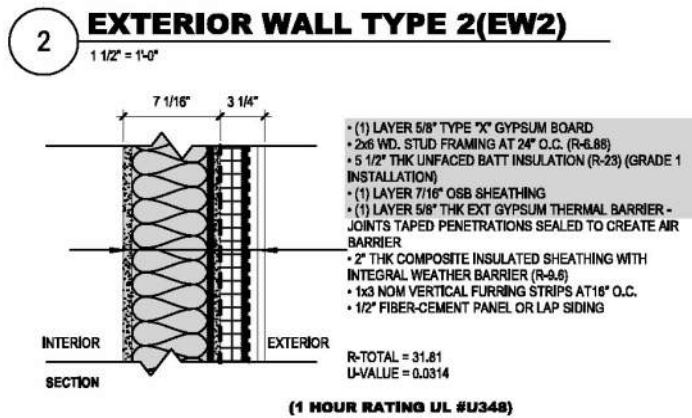
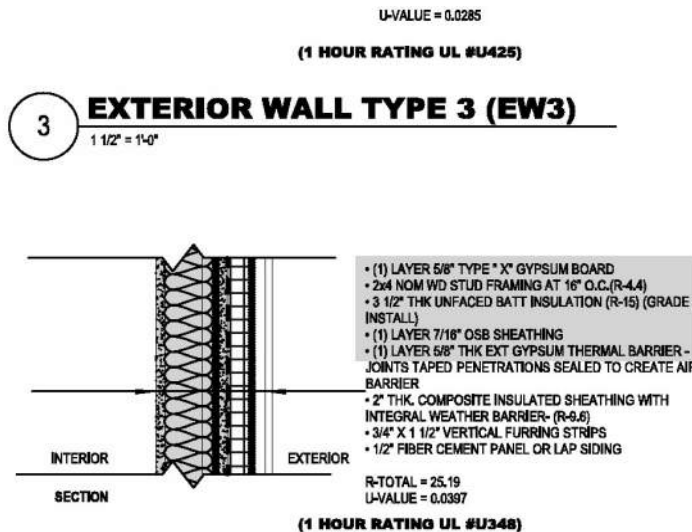
VE



TAIL



ROOF ASSEMBLY 6



EXTERIOR WALL TYPE 1 (EW1)

KIMLEY-HORN OF NEW YORK P.C.
ONE NORTH LEXINGTON AVE.
SUITE 1575,
WHITE PLAINS, NY 10601

Structural:
KEYSTONE STRUCTURAL GROUP, INC
711 DAVIS STREET
SCRANTON, PA 18505
T. (570) 569-2199
C. (570) 498-7355

MEP:
SMITH MILLER ASSOCIATES
38 N MAIN STREET,
PITTSBURGH, PA 15260
T. (570) 299-5865 ext 303
C. (570) 760-9010

Modular Builder
SIGNATURE BUILDING SYSTEMS OF PA, LLC
1004 SPRINGBROOK AVE, MOOSIC, PA 18507
T. (570) 774-1000

PROJECT TITLE:

LA MORA - SENIOR LIVING

23 Mulberry Street Yonkers,
NY 10701
Westchester County

PROJECT No: 79710

DRAWING TITLE:

EXTERIOR WALL TYPES AND TYPICAL DETAILS

SCALE: As indicated

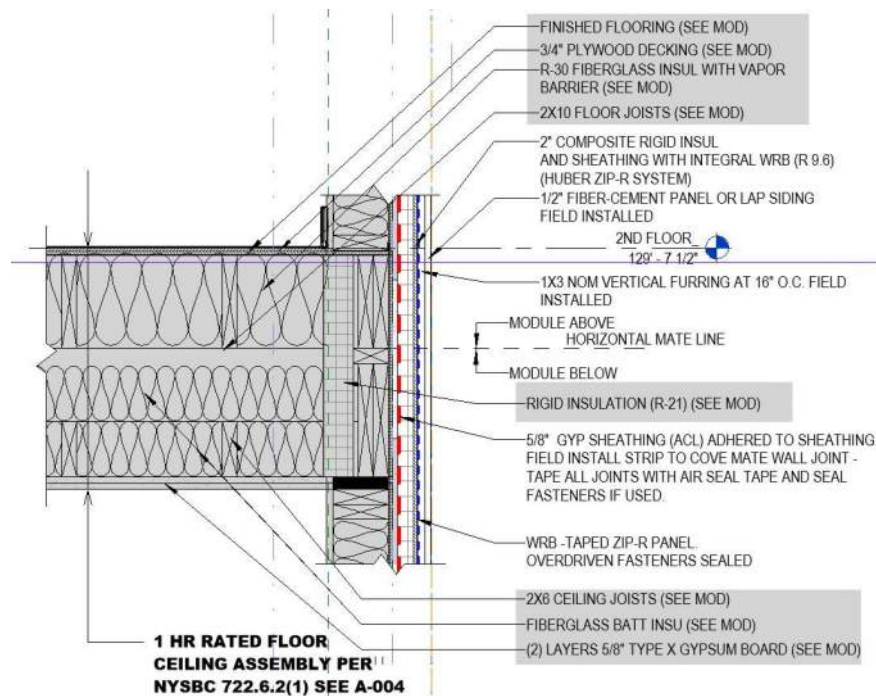
A-002

NYS DEPT. OF STATE SUBMISSION

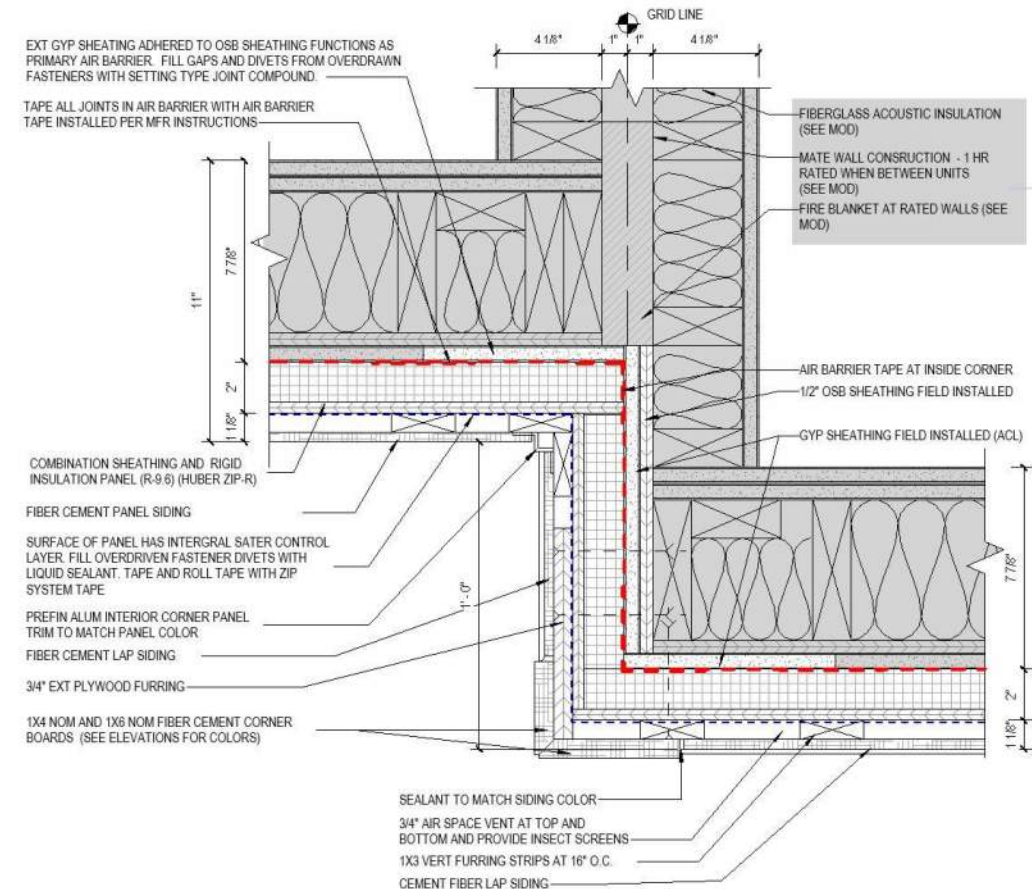
03/11/2022

Passive House specific details

Air-tight construction: detail conditions where boxes join

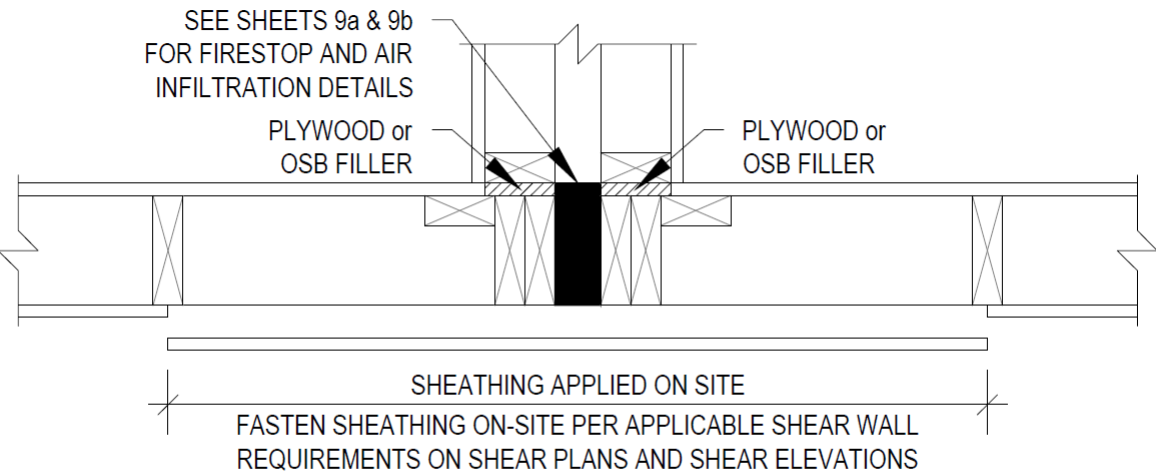


Vertical Mate

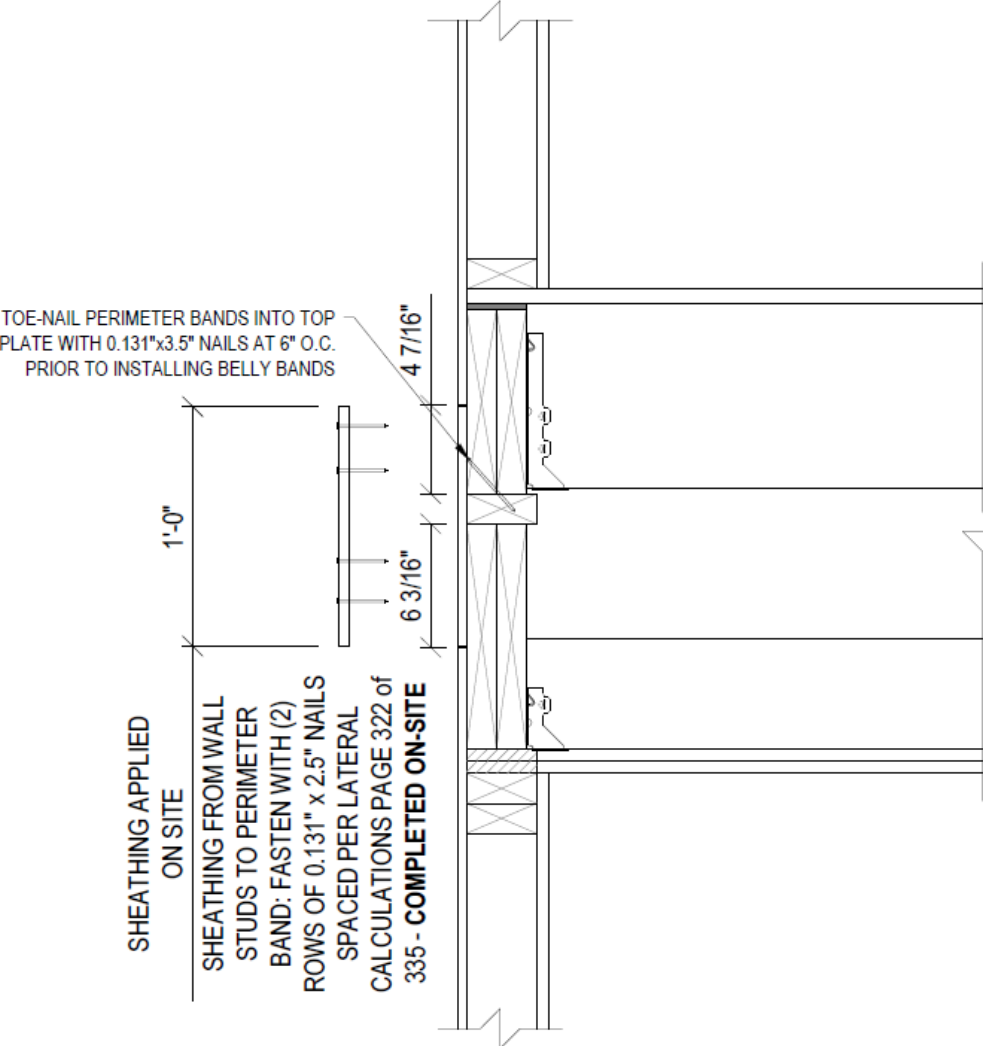
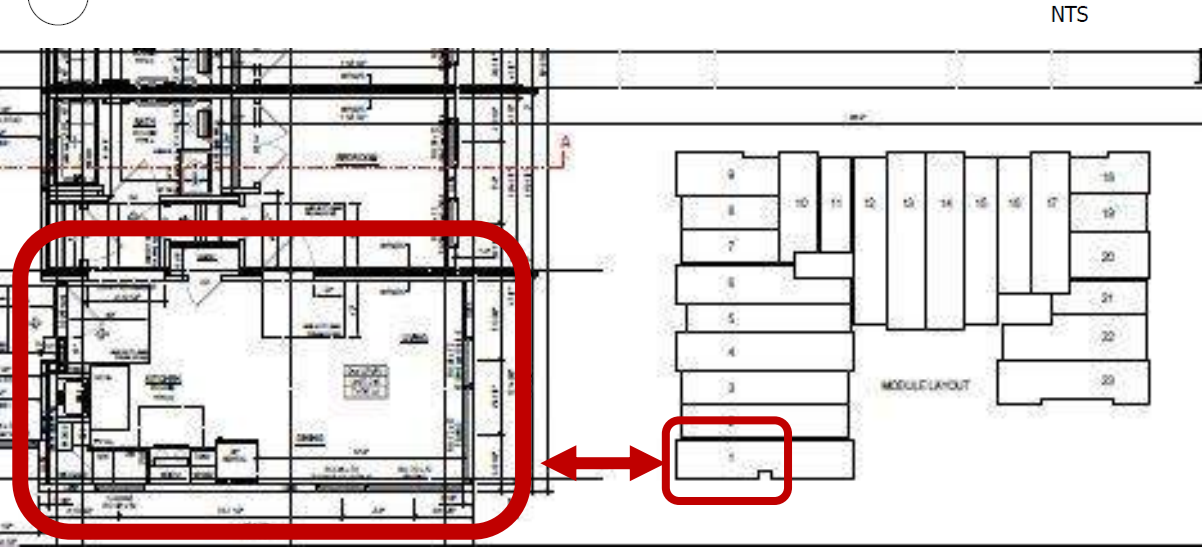


Horizontal Mate

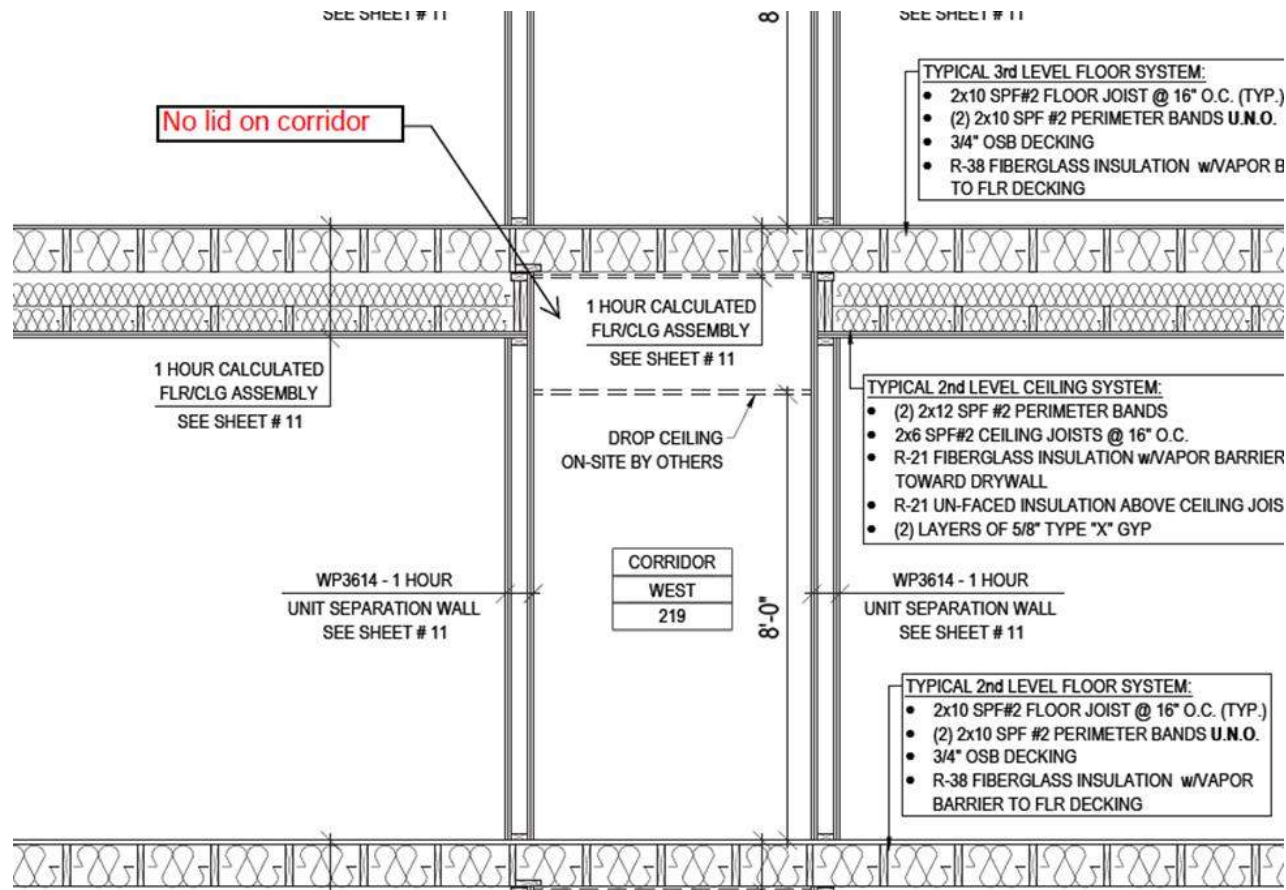
Modular Details



VERTICAL BELLY BAND at MARRIAGE WALLS - SITE INSTALLED



Modular Details



Fabrication



Fabrication



Completed module ready for delivery to jobsite

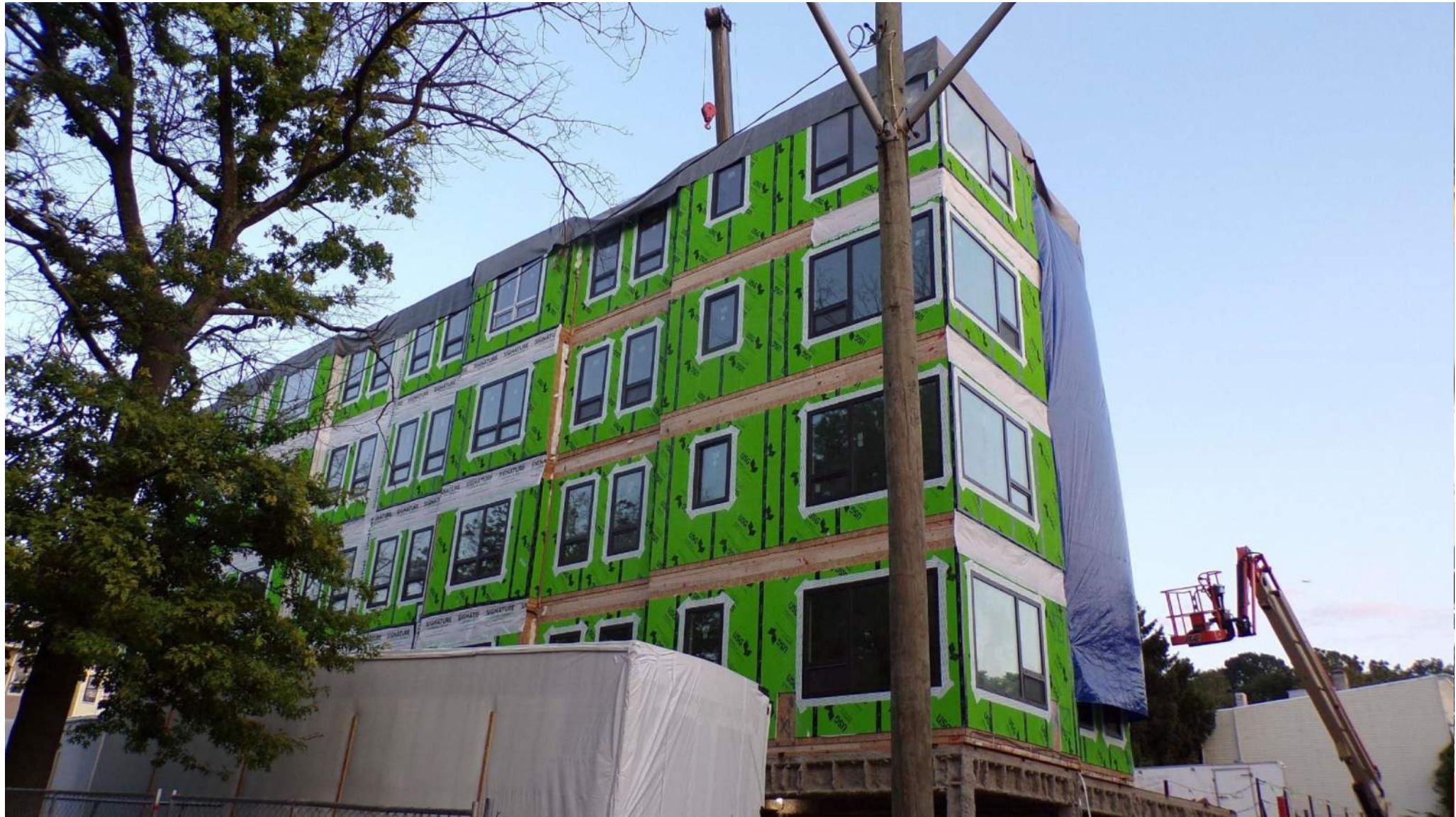


Placement of the boxes

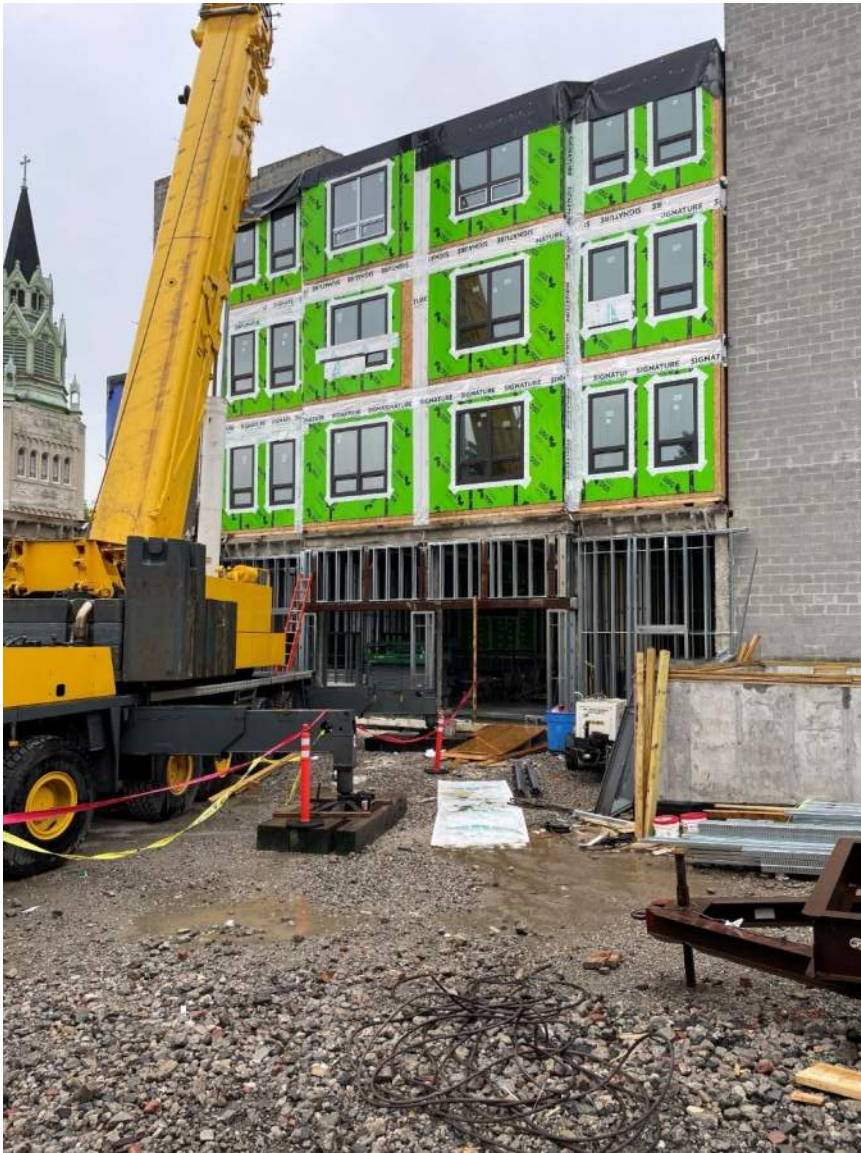
- Wood Frame Boxes sized for transport – 16 ft x 60 ft
- Windows, millwork, finished bathrooms, prime painted walls and ceilings shipped with units.
- 2" gap horizontally and 3" gap vertically required for erection. Must be air-sealed on-site.



Placement of the boxes



Placement of the boxes



Mate joints

Corridors ceilings are left open



Sealing the Mate Joints

- 1** Exposed marriage joints prior to sealing and concealment behind fireproof sheathing (green)



- 2** Typical marriage joint w/air sealing tape over foamed joints



- 3** Typical belly band at podium with Airtight Tape being applied



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



Modules in place



Applying the Exterior Cladding

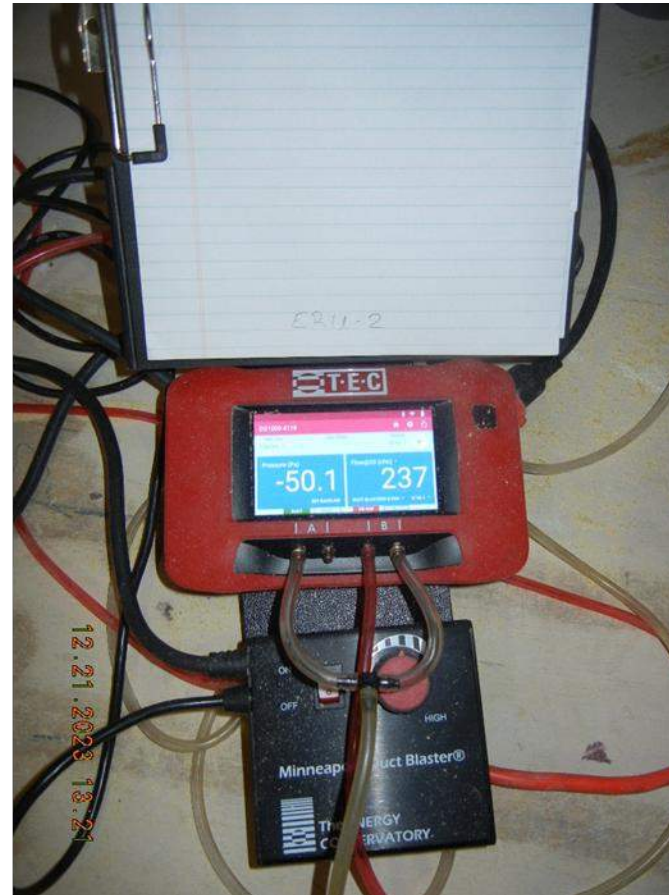


Passive House Features

Pressure testing in progress



Measuring Air Tightness



ERV – Energy Recovery Ventilator



Blower door Testing



Air Tightness Test Results

- 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

T.E.C

THE ENERGY CONSERVATORY

Envelope Leakage Test

Testing Company:

Name: Integral Building + Design

Address: 15 N. Mill Street

Suite 218

Nyack, NY 10980

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%)

Building Volume: 443,142.0 ft³

Coefficient (C): 201.8 (+/- 4.6%)

Correlation Coefficient: 0.99995

Test Standard: RESNET 380 Multi-Point

Test Characteristics: Indoor Temp: 73 °F

Altitude: 121.0 ft

Test Date and Time: 2024-06-06 09:43:45

Effective Leakage Area: 153.4 in²

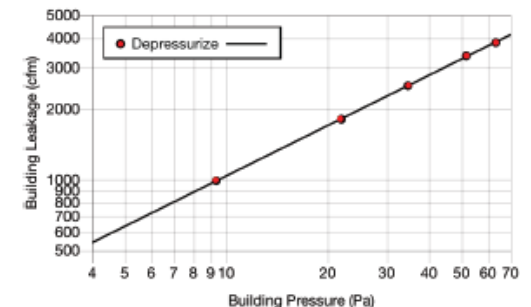
Enclosure Surface Area: 80,903.0 ft²

Exponent (n): 0.711 (+/- 0.013)

Test Mode: Depressurize

Outdoor Temp: 73 °F

Time Average Period: 10 seconds



Phius certification achieved in October 2024



ENTRY CORNER



Photograph by Andrew Ruge. Copyright Perkins Eastman

SOUTH ELEVATION VIEW



Photograph by Andrew Rugge. Copyright Perkins Eastman

MAIN ENTRANCE



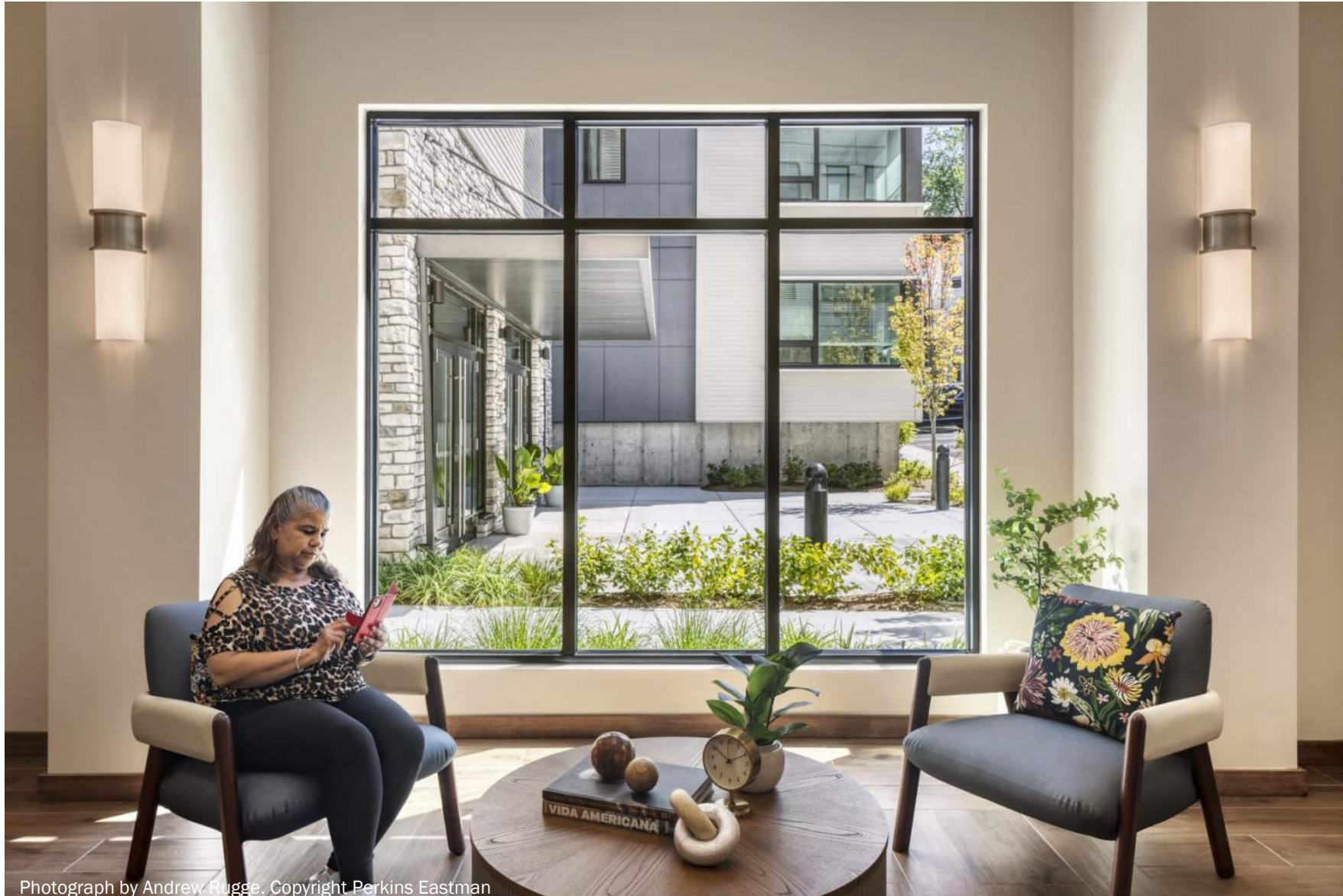
Photograph by Andrew Rugge. Copyright Perkins Eastman

ROOF DECK



Photograph by Andrew Rugge. Copyright Perkins Eastman

RESIDENT LOBBY



Photograph by Andrew Rugge. Copyright Perkins Eastman

CORNER APARTMENT VIEW



Lessons learned



AIA® Document G701® – 2017

Change Order

PROJECT: *(Name and address)*

La Mora Senior Living
23 Mulberry Street
Yonkers, NY 10710

CONTRACT INFORMATION:

Contract For: General Contracting

CHANGE ORDER INFORMATION:

Change Order Number: 007

Date: 06/16/2022

Date: 06/23/2023

OWNER: *(Name and address)*

La Mora LLC
1511 Central Park Avenue
Yonkers, NY 10710

ARCHITECT: *(Name and address)*

Perkins Eastman
677 Washington Boulevard
Stamford, CT 06901

CONTRACTOR: *(Name and address)*

Andron Construction
21 Anderson Lane
Goldens Bridge, NY 10526

LESSONS LEARNED & TAKE-AWAYS

- Work with a team experienced in modular, and ideally, had worked together before.
- Make sure design team understands the capabilities and limitations of modular and incorporates these into the design from the start
- Could this project model be adapted to different contexts or markets? Absolutely!
- What advice would you give other teams starting a modular affordable housing project?
 - Call Us!!!
 - Put the time in to understand modular. Don't try to adapt an existing design to modular. Incorporate modular from the start.
- We learned of the Coltraco Portascanner (submarine technology used for non-destructive testing to detect air leakage)
- It's important for the factory to have their own internal Air boss - for instance we designated an internal person, a former QC inspector, whose role was to inspect and photograph all caulking, air sealing, and taping of the modules at the factory. This internal person worked hand-in-hand with the independent energy auditor who came to inspect.
- Understand the abilities and experience of the labor force on the project. You have all these laborers and trades coming in to do typical work, but now they also have strict and skilled air sealing requirements and may not realize the importance of the most minor item. We had to train our installation crews but again anticipate plumbers, electricians, tin knockers etc. struggle knowing the importance or repercussions of Phius demands.
- Budget time and \$ for a modular prototype. Building two modules to test-fit putting them together before mass production was helpful.
- Have you received feedback from residents or the community that influenced how you approach future work? **“It doesn't look like a modular building”**

QUESTIONS?

This concludes The American
Institute of Architects Continuing
Education Systems Course

Stuart Lachs, AIA, LEED AP

Perkins Eastman

S.Lachs@PerkinsEastman.com

Anthony Shulde, P.E.

KSG Engineers

AShulde@KSGEngineers.com

Mike Kirby

Signature Building Systems of PA

MikeKi@SBSMod.com