BUILDINGENERGY BOSTON

Working Smarter Not Harder:
The Power of Teamwork in Multifamily PH Projects

Michelle Apigian, ICON Architecture
Moses Cordeiro, Dellbrook JKS
James Petersen, Peterson Engineering
Zoe Weinrobe, 2Life Communities
Ashley Wisse, New Ecology

Curated by Nick Pittman and Keihly Moore

Northeast Sustainable Energy Association (NESEA) | March 21, 2025

NESEA Conference
March 21, 2025

Working Smarter Not Harder: The Power of Teamwork in Multifamily Passive House Projects

Learning Objectives

1. Understand the diverse perspectives and priorities of various Passive House project team members.
2. Clearly identify the roles and responsibilities of each Passive House project team member.
3. Describe the complexities of collaborating effectively on multifamily Passive House projects.
4. Adapt the presented approach to address challenges on your projects and achieve Passive House certification.

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March 21, 2025

Panelist Introductions

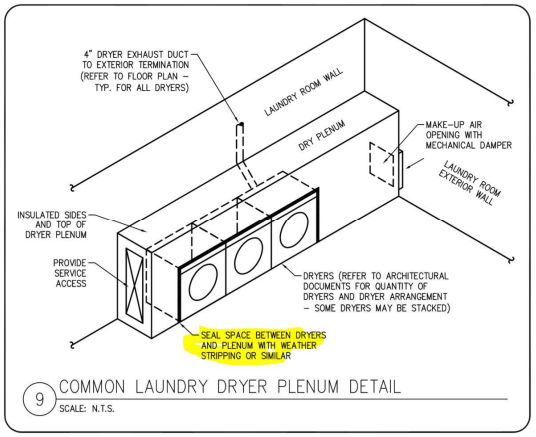
Owner/Developer

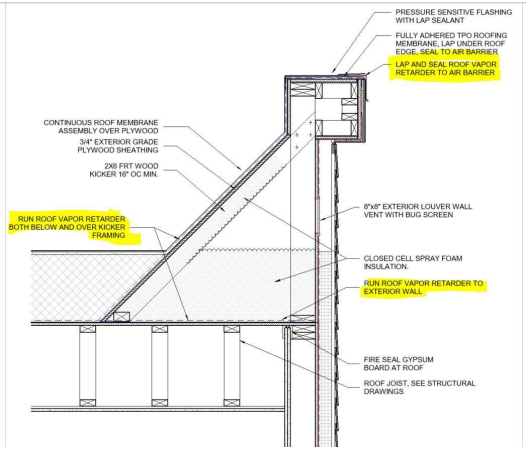
Zoe Weinrobe

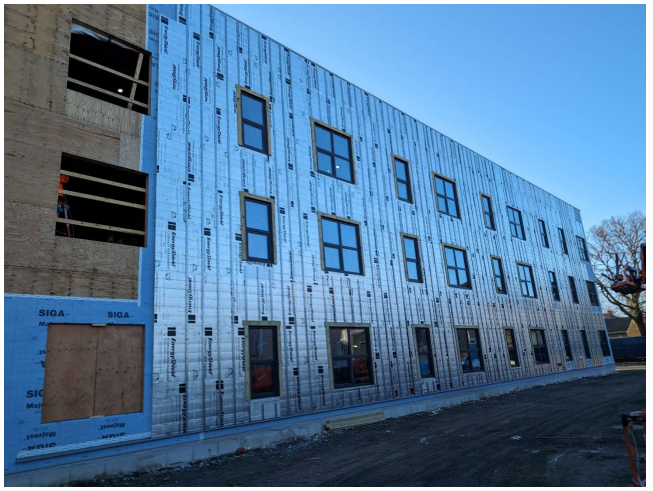
Chief of Real Estate

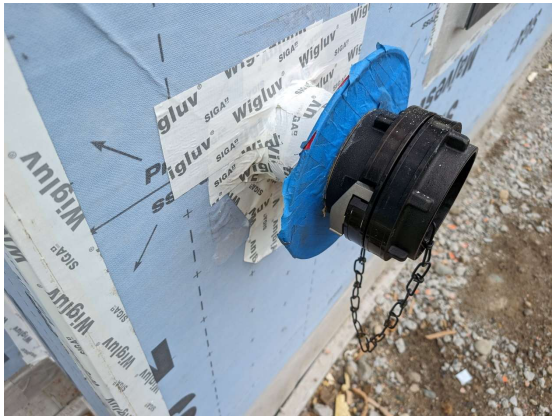
2Life Communities


5
7
6
8


4" DRYER EXHAUST DUCT TO EXTERIOR TERMINATION (REFER TO FLOOR PLAN – TYP. FOR ALL DRYERS)
LAUNDRY ROOM WALL
DRY PLENUM
MAKE–UP AIR OPENING WITH MECHANICAL DAMPER
LAUNDRY ROOM EXTERIOR WALL
INSULATED SIDES AND TOP OF DRYER PLENUM
PROVIDE SERVICE ACCESS
DRYERS (REFER TO ARCHITECTURAL DOCUMENTS FOR QUANTITY OF DRYERS AND DRYER ARRANGEMENT – SOME DRYERS MAY BE STACKED)
SEAL SPACE BETWEEN DRYERS AND PLENUM WITH WEATHER STRIPPING OR SIMILAR
9 COMMON LAUNDRY DRYER PLENUM DETAIL
SCALE: N.T.S.


PRESSURE SENSITIVE FLASHING WITH LAP SEALANT
FULLY ADHERED TPO ROOFING MEMBRANE, LAP UNDER ROOF EDGE, SEAL TO AIR BARRIER
LAP AND SEAL ROOF VAPOR RETARDER TO AIR BARRIER
CONTINUOUS ROOF MEMBRANE ASSEMBLY OVER PLYWOOD
3/4" EXTERIOR GRADE PLYWOOD SHEATHING
2X6 FRT WOOD KICKER 16" OC MIN.
RUN ROOF VAPOR RETARDER BOTH BELOW AND OVER KICKER FRAMING
8"x8" EXTERIOR LOUVER WALL VENT WITH BUG SCREEN
CLOSED CELL SPRAY FOAM INSULATION.
RUN ROOF VAPOR RETARDER TO EXTERIOR WALL
FIRE SEAL GYPSUM BOARD AT ROOF
ROOF JOIST, SEE STRUCTURAL DRAWINGS


SIGA
SIGA


Wigluv
SIGA

Architect

Michelle Apigian

Managing Principal

ICON ARCHITECTURE

CPHC

DESIGN

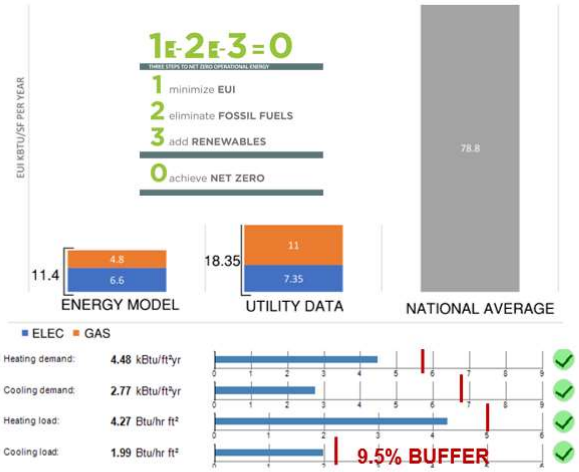
- ❑ Orientation
- ❑ Surface to Volume
- ❑ Envelope
- ❑ Systems

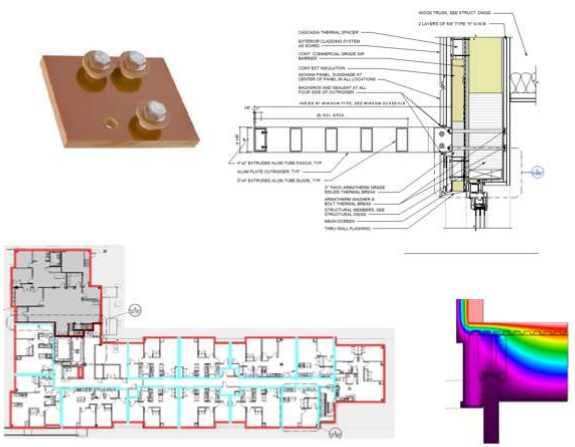
DOCUMENT

- ❑ Boundary
- ❑ Continuity
- ❑ Systems
- ❑ Details by trade

BUILD

- ❑ Schedule + Sequence
- ❑ Mockups
- ❑ Testing
- ❑ Commissioning





COMMUNICATION

MEP/FP

James Petersen

Principal

Petersen Engineering, Inc.

P.E.

MEP/FP

1. Verified air barrier => low infiltration in H/C load calc
2. Thermal barrier knowledge => higher R-values in H/C load calculations
3. Simple building forms => downsized and simplified HVAC
4. A good enclosure provides comfort => reduced burden on heating system to provide comfort
5. Open communications => a truly integrative design process
6. Integrated enclosures with HVAC => good outcomes in numerous ways

General Contractor

Moses Cordeiro

Senior Superintendent

Dellbrook JKS

General Contractor

PASSIVE HOUSE GUIDE

Division: 7 Thermal + Moisture

Weather Resistant Barrier

- Ensure no bubbling, fish mouths, and rips
- Clean and adhered tape
- Carefully sealed penetratior
- All panel gaps are greater th
  with backer rod before tape
- Place thermal pads where r
- On the ZIP systems all nail p
  must be sealed

PASSIVE HOUSE GUIDE

Division: 1 - General Requirements

Training and Mock- up

- Foundation VB and insulation training – after relevant trades have been bought and the foreman of each relevant trade has been assigned.
- Mockup inspection is a critically important step; include in all estimates.
- Final product should be perfect to establish
  ect's trades.

  during install

PASSIVE HOUSE GUIDE

Testing and Closeout

- Confirm with the HVAC team that they are prepared to complete the attached example of ENERGY STAR MFNC HVAC Functional testing report
- Early on and throughout the project DBJKS will need to fill out the Building Efficiency Resources – Sampling Project Application for the PHIUS team.

Sustainability Consultant

Ashley Wisse

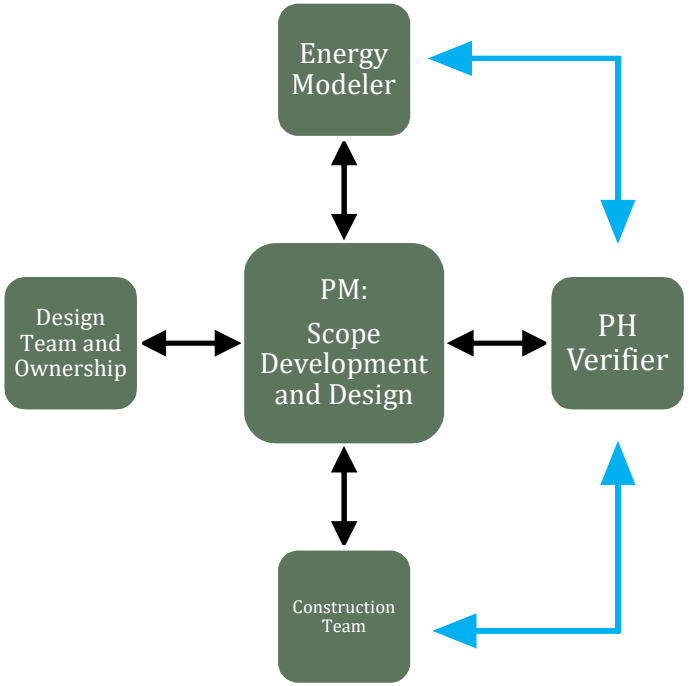
Director of Green Building Services

New Ecology, Inc.

CPHC, CPHB

Balancing Certifications & Requirements

Passive House Certification Process



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Integrated Project Team: Tools & Coordination

Phius Design Best Practices: WUFI Modeling Inputs and Uses

Geometry	
Interior Conditioned Floor Area (iCFA)	129,926
Net Volume	1,184,935
Envelope Area	126,551
Average Window-to-Wall Ratio	20%

Renewable Generation	Units	
Solar PV (capacity)	kW	0
Solar PV (annual generation)	kWh/yr	0
Solar PV (coincident generation)	kWh/yr	0

Exterior Envelope	Units	
Roof	R	50
Above Grade Exterior Wall	R (effective)	21
Slab	R	16
Below Grade Exterior Wall	R	11
Exterior Floor	R	30
Adiabatic Wall/Floor	R	1
Fixed Windows	U (Whole Window)	0.15
	SHGC (Center-of-Glass)	0.40
Operable Windows	U (Whole Window)	0.17
	SHGC (Center-of-Glass)	0.40
Storefront	U (Whole Window)	0.40
	SHGC (Center-of-Glass)	0.40
Glass Doors	U (Whole Window)	0.57
	SHGC (Center-of-Glass)	0.40
Opaque Door	R	2.4

Ventilation	Units	
Dryer Exhaust	cfm	220
ERV Ventilation	cfm	11,558
ERV Power	W/cfm	1.2
ERV Recovery Efficiency	%	80%

Roles & Responsibilities

Passive House Roles and Responsibilities Matrix

Project: PROJECT NAME, CITY, STATE

Owner: CLIENT

Phase	CLIENT Owner	ARCHITECT Architect	SUSTAINABILITY CONSULTANT CPHC, PHIUS+ Verifier, HERS Rater	MEP MEP Engineer	GC General Contractor	CxA Commissioning Agent	PHIUS
Feasibility Study							
Register project with utility rebate program, provide feasibility contract			X				
Create SD drawing set with geometry, baseline MEP assumptions		X		X			
Develop preliminary WUFI Passive energy model and report			X				
Feasibility review meeting	X	X	X	X			
Project Set-up							
Request PHIUS+ Certification Contract			X				
Review and sign PHIUS+ Certification Contract	X						
Payment sent by check or by PayPal link	X						
Register project into PHIUS project database, set up DropBox folders			X				
Complete Verifier Letter of Intent			X				
Pre-Certification							
Develop and manage WUFI Passive energy modeling, ongoing			X				
Complete HERS energy model to generate a preliminary HERS Index Score for ENERGY STAR MFNC, submit to HERS provider for verification and preliminary HERS Certificates			X				
ENERGY STAR MFNC Design Checklist			X				
ENERGY STAR MFNC HVAC Design Checklist				X			
Coordinate and integrate feedback from energy modeling into project drawings		X		X			
Perform review and feedback during design for PHIUS, ENERGY STAR, EPA Indoor airPLUS, and DOE ZERH requirements			X				

Roles & Responsibilities

ENERGY STAR Multifamily New Construction
National HVAC Functional Testing Checklist [1], Version 1 / 1.1 /1.2 (Rev.04)

Not applicable to most projects	Manufacturer's Rep
TAB Contractor	New Ecology
Commissioning Agent	HVAC Sub

Revised 02/15/2024

5.1 Installation Checks			
5.1.1 Zone thermostat (or remote zone temperature sensor) in dwelling units, within the zone being served.	☐	☐	☐
5.2 Functional Testing			
5.2.1 Measured zone temperature is within 5°F of zone temperature displayed on thermostat or sensor.	☐	☐	☐
5.2.2 System turns on when there is a call for heat and heating is provided. System turns off when the heating setpoint has been met. [7]	☐	☐	☐
If N/A, select the reason: ☐ due to high ambient temperature OR ☐ equipment lock-out	-	-	-
5.2.3 System turns on when there is a call for cooling and cooling is provided. System turns off when the cooling setpoint has been met. [7]	☐	☐	☐
If N/A, select the reason: ☐ due to low ambient temperature OR ☐ equipment lock-out	-	-	-
5.2.4 Where OA inlets are connected to the dwelling unit HVAC system, a motorized damper is installed that closes when there is no call for ventilation or when fan is off.	☐	☐	☐
6. Shared VRF Outdoor Units - This section must be completed for commercial-grade VRF outdoor units serving multiple dwelling units or common spaces.		**FT Agent Verified [1]**	**N/A**
6.1 Installation Checks			
6.1.1 Pressure testing on refrigerant piping has been completed for this system. (indicate exact test in / test out pressure (psig) / time (hours)): ____ / ____ / ____		-	☐
6.1.2 Vacuum testing has been completed. (indicate exact test in / test out pressure (psig) / time (hours)): ____ / ____ / ____		-	☐
6.1.3 Refrigerant line lengths and height differences have been recorded from as-built shop drawings or field measured, and documentation of the measurement is available, if requested.		☐	☐
6.1.4 Indicate required additional charge amount (lbs): ____		-	☐

Construction Phase: Submittal Review Coordination

1. Direct distribution from online platforms (Procore, Newforma, etc.)
2. Submittal Comments Procotol – timing, method of organization of comments, how to indicate high-priority items.
3. CPHC must review all submittals – information can be hidden!
4. Document, Document, Document!

Construction Phase: Submittal Review Coordination

PRODUCT DATA SUBMITTAL - SUSTAINABLE ATTRIBUTES REPORTING FORM

THIS FORM IS REQUIRED TO BE SUBMITTED *WITH Product Data Submittals*

You must include backup documentation such as *SPECIFIC* Product Data Sheets, Cut Sheets, Product Specific Letter from Manufacturer, etc. DO NOT INCLUDE GENERIC MARKETING MATERIAL

PROJECT NAME: _____

SUBCONTRACTOR: _____

Specification Section: _____ Submittal Number: _____

				Materials and Resources Information							
Project Product Data				***EPDs***	***Sourcing of Raw Materials***				***Material Ingredients***		
	REQUIRED for ALL Products in Specs CSI Divisions 3-10, 31 Foundations, 32 Paving, 32 Site Improvements, 32 Plantings & VOCs in 22, 23								Declare.		
	Product Name/Model	Manufacturer, City, State	Product Costs[1] (only exclude install labor) ($)	Product Specific (PS) or Industry Wide (IW) Environmental Product Declaration (EPD)[2]?	FSC Certified[4] Wood Products? (%)	Post-Consumer Recycled Content[5] (%)	Pre-Consumer Recycled Content[6] (%)	3rd-party verified Manufacturer Corporate Sustainability Report?	Delclare Label with ingredient disclosure greater than 1000 ppm?	Fully Declared HPD to 1000 ppm Declaration[3] included?	C2C version (2.1.1 or 3.0) Level of Certification
Ex.	ABC Product	ABC. Inc.	$ XX,XXX	PS / IW	%	%	%	Yes / No	Yes / No	Yes / No	Yes / No

Construction Phase: Submittal Review Coordination

Date Reviewed	Submittal Number	Submittal Title	Sabrina Comments (LEED)	Spencer Comments (Phius)	Paul / Mark Comments
1/24/23	#1A_237200-3.0	BLDG 1A - Energy Recovery Ventilator (ERV-1,ERV-2,ERV-3, and ERV-4)	ventilation prereq flow rates (7.5 cfm / 100 square feet, ERV exhaust at ~3.5 cfm / 100 square feet)	equipment for ERV 4 (serving a garage I would assume), and CO2 detector in exhaust intake - LEED credit?	
1/25/23	#1A_033000-5.1	BLDG 1B - Garage to 2nd Floor SOG & SOMD Shop Drawings	N/A	NA SL question: is there anything in the SOG submittals we would ever look for under PH, or is it something that has to be evaluated on site when looking at the vapor barrier?	I have taken a look at the SOG and SOMG shop drawings for 1B and I don't have any feedback to add. As we all learn, we may have additional items to note or offer feedback
1/25/23	#1A_033000-4.1	BLDG 1A - Ground & 2nd Floor SOMD Shop Drawings	N/A	NA	
1/25/23	#1A_033000-3.1	BLDG 1A - SOG Shop Drawings	N/A	NA	I am not able to see the actual submittal document on Procore on 1/25/2023
1/25/23	#1A_078410-1.1	BLDG 1A/ 1B - Plumbing Firestopping	I found separate submittals for SpecSeal LCI Sealant and Pensil 300 Sealant, and neither seem to meet CA Section 01350. They're both used for firestopping in floor assemblies. Does this mean we can't get the point for EQ Low-Emitting Products: Adhesives and Sealants? **Frank to check; if it's rejected already, we can share our comments like: "when it comes back, we hope the CA Section 01350 will be met"**	Had to resubmit firestopping, wanted only one manufacturer, I don't see a new one	I think this submittal already had a comment on it from Kevin Collins.
1/25/23	#1A_237200-004.0	BLDG 1A - Energy Recovery Ventilator (ERV-5 and 6)	Originally had MERV 8 filters written for the OA side of the ERV, but there's an edited note identifying that they have to be MERV 13.	ECM and MERV 8/13 filters, ES compliant	If this submittal matches the design drawings, then I think we have no objection.
1/25/23	#1A_084410-1.0	BLDG 1A-1B Curtain Wall Pressure Plate System	N/A; fiberglass plate isn't recycled material so not eligible for MR Environmentally Preferable Products		FS Note - I would like to make sure that this item is for use in 1A only. I don't know whe this will be used, and would like to confirm.
1/31/23	#1A_088000-2.0	BLDG 1A-1B Storefront Glass (Solarban 60) Product Data	Note: forwarded from Steve for us to review N/A	Winter U-0.24, Summer U-0.22, SHGC-0.39 Roughly matches storefront examples in WUFI model report, is there anything else that needs to be confirmed?	Phius Design Cert Feedback form shows U-glass of 0.29. This submittal shows U-value 0.24 and SHGC of 0.39. **New Ecology has no objections**
1/31/23	#1A_088000-1.0	BLDG 1A-1B Window Film Product Data	Note: forwarded from Steve for us to review N/A	SHGCs for film at .48, .46, and .44 depending on thickness, how does this influence window assemblies?	New Ecology would like to ask what this material is intended to do, and where it will be used on the project.
1/31/23	#1A_084110-1.0	BLDG 1A Exterior Storefront Shop Drawings	Tremco Spectrem 1&2 has Greenguard Gold certification which means it meets CA Section 01350.	sealants are only recommended for indoor airplus	
1/31/23	#1A_084110-2.0	BLDG 1B Exterior Storefront Shop Drawings	Tremco Spectrem 1&2 has Greenguard Gold certification which means it meets CA Section 01350.		Building 1B was Phius Design Certified with Kawneer 451UT and Kawneer Insulpour 50 materials. Please provide CRF rating and u-values for materials to be used on MH1B. 1 will need specific materials to be Phius certified.
1/31/23	#1A_081210-1.0	BLDG 1A-1B Interior Aluminum Frames Product Data	N/A		
1/31/23	#1A_081210-2.0	BLDG 1A Interior Aluminum Frame Shop Drawings	N/A		
1/31/23	#1A_081210-3.0	BLDG 1B Interior Aluminum Frame Shop Drawings	N/A		
1/31/23	#1A_084110-3.0	BLDG 1A-1B Exterior Aluminum Storefront and Entrances Product Data	N/A		Building 1B was Phius Design Certified with Kawneer 451UT and Kawneer Insulpour 50 materials. Please provide CRF rating and u-values for materials to be used on MH1B. Please show compliance with 084110-3 section J. 1B will need specific materials to be Phius certified.
1/31/23	#1A_323000-2.0	BLDG 1A/1B - Steel Bollards	N/A		
1/31/23	#1A_142100-5.0	BLDG 1A - Elevator 1 & 2 Revised Power Confirmation Letter (VE)	N/A		
1/31/23	#1A_142100-6.0	BLDG 1B - Elevator 1, 2 & 3 Revised Power Confirmation Letter (VE)	N/A		
1/31/23	#1A_085310-3.0	BLDG 1A/1B - Window Install Qualification	N/A		
1/31/23	#1A_085310-1.2	BLDG 1A - UPVC Windows	N/A		On page 1 of the Building 1A shop drawings there is a box checked that this is not a LEE project. We note for the record that Building 1A is a LEED project.
1/31/23	#1A_085310-2.1	BLDG 1B - UPVC Windows (Revised for Record)	N/A		

Construction Site Coordination

217		MEP Coordination				
322		**Passive Inspections Building E**				
323		ERV's / HVAC				
324		Zip Sheathing / Envelope				
325		Roof Membrane				
326		Draft Seal / Firestopping				
		losed Cell Insulation				
		sulation				
		/indows / Doors				
330		Blower Door Pre-Test				
331		Blower Door				
332		Compartmentalization				
333		**Passive Inspections Building D**				
334		ERV's / HVAC				
335		Zip Sheathing / Envelope				
336		Roof Membrane				
337		Draft Seal / Firestopping	1 d	Fri 4/		
338		Closed Cell Insulation	1 d	Thu		
339		Insulation	1 d	Thu		
340		Windows / Doors	1 d	Fri 3/		
341		Blower Door Pre-Test	1 d	Tue		
342		Blower Door	1 d	Mon		
343		Compartmentalization				

Mock-Ups?
NEI would like to observe mock-up installations and testing, if available

5-7 days per building

Glen Brook Way (Phase 2) Buildings D and E
Project # 22-0007

363		Waterproofing, Backfill Foundation Walls	10 d	Thu 10/13/22	Wed 10/26/22	W
364		Prep & Place Slab on Grade		Thu 11/17/22	Wed 11/23/22	T
365		**Site Utilities**		**Wed 10/5/22**	**Fri 4/14/23**	**W**
366		Install Site Utilities	30 d	Wed 10/5/22	Wed 11/16/22	W
367		Install Gas Meters	10 d	Mon 4/3/23	Fri 4/14/23	
368	**60 days**	**Structure**	**79 d**	**Wed 10/5/22**	**Thu 2/2/23**	**W**
369		**CMU Shaft**	**15 d**	**Wed 10/5/22**	**Wed 10/26/22**	**W**
370		Install CMU Shaft	15 d	Wed 10/5/22	Wed 10/26/22	W
371		**Framing**	**45 d**	**Thu 12/1/22**	**Thu 2/2/23**	
372		Frame - Level 1 Walls	d	Thu 12/1/22	Fri 12/9/22	
373		Frame - Level 2 Floors	d	Mon 12/12/22	Mon 12/19/22	M
374		Install Stairs	15 d	Mon 12/12/22	Fri 12/30/22	M
375		Frame - Level 2 Walls	7 d	Tue 12/20/22	Wed 12/28/22	T
376		Frame - Level 3 Floors	6 d	Thu 12/29/22	Thu 1/5/23	T
377		Frame - Level 3 Walls	7 d	Fri 1/6/23	Tue 1/17/23	
378		Frame - Roof and Sheathing	12 d	Wed 1/18/23	Thu 2/2/23	

NEI Inspection - Slab Insulation

NEI Training for Framing and Envelope Subs

415	Rough in Electrical Boxes, Conduit				
416	**Level 3 Fit out**	**91 d**	**Mon 3/20/23**	**Thu 7/27/23**	
417	Electrical, Low Voltage and F.A. complete rough	10 d	Mon 3/20/23	Fri 3/31/23	
418	Remaining HVAC Rough, insulation	10 d	Mon 3/20/23	Fri 3/31/23	
419	Remaining Plumbing Rough	10 d	Mon 3/20/23	Fri 3/31/23	
420	Install Sprinklers	10 d	Mon 3/20/23	Fri 3/31/23	
421	MEP Inspections	2 d	Mon 4/3/23	Tue 4/4/23	
422	Remaining Pre-rock and Fire stopping		Wed 4/5/23	Fri 4/7/23	
423	Building Department inspection	1 d	Mon 4/10/23	Mon 4/10/23	
424	Insulation and Vapor Barrier		4/11/23	Wed 4/12/23	
425	Insulation Inspection		4/13/23	Thu 4/13/23	
426	Hang GWB		Fri 4/14/23	Wed 4/26/23	
427	Finish Tape, Sand and ready f		Thu 4/20/23	Mon 5/1/23	
428	Install Tile in Bathrooms		Fri 4/21/23	Tue 5/2/23	
429	Prime Ceilings and Walls	5 d	Tue 5/2/23	Mon 5/8/23	

NEI midpoint duct testing prior to covering

NEI HVAC Insulation Inspection - before covered

NEI air sealing inspection

NEI Inspection of first available section of insulation, prior to closure

NEI Midpoint Compartmentalization Testing of First Available Unit(s)

Soft Cost Reduction and Team Efficiencies

1. Teamwork is the key to removing built-in overages and increased scope fees for duplicative work, repetitive discussions, etc.

2. Simplicity in Design is the heart of efficiency

3. ...to be continued in the next Panel Discussion.

NESEA Conference
March 21, 2025

Panel Discussion

Panel Discussion

1. What are some outcomes of poor communication that you have experienced on a Phius project?
2. What is your preferred form of communication on a Phius project?
3. How can future project team members better support your role in a Phius project?
4. What is the biggest lesson that you and your team learned from a recent Phius Project?
5. What are some (1-2) visible improvements in teamwork and related outcomes since your first Phius project?

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Questions from the Audience

Zoe Weinrobe
Chief of Real Estate
2Life Communities
zweinrobe@2lifecommunities.org

Michelle Apigian
Managing Principal
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