BUILDINGENERGY NYC

A Successful Approach to Achieving Passive House at Scale

Michael Ingui, Baxt Ingui
John Mitchell, Building-Type LLC
Andrew Fishman, SMR Craftworks

Curated by Gwen McLaughlin (NYSERDA) and
Paul Cosway (Energy Machines)

Northeast Sustainable Energy Association (NESEA)
September 15, 2022

NESEA
NORTHEAST SUSTAINABLE ENERGY ASSOCIATION

A Successful Approach to Achieving Passive House at Scale

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TEAM

MICHAEL INGUI, WILL CONNER, MARY GILMARTIN, ASHLEY GRIFFITH, Baxt Ingui Architects
ANDREW FISHMAN, SMR CRAFTWORKS, General Contractor
CRAMER SILWORTH, BAUKRAFT ENGINEERING, Mechanical
JOHN MITCHELL, BLDTYP, Passive House Consultants

BAXT INGUI ARCHITECTS

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CARROLL GARDENS
PASSIVE PLUS HOUSE

COMPLETED PASSIVE HOUSES

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BROOKLYN HEIGHTS,
BROOKLYN NYC

CARROLL GARDENS,
BROOKLYN NYC

BROOKLYN HEIGHTS,
BROOKLYN NYC

BROOKLYN HEIGHTS,
BROOKLYN NYC

UPPER WEST SIDE,
MANHATTAN NYC

UPPER WEST SIDE,
MANHATTAN NYC

CARROLL GARDENS,
BROOKLYN NYC

BROOKLYN HEIGHTS,
BROOKLYN NYC

BROOKLYN HEIGHTS,
BROOKLYN NYC

BROOKLYN HEIGHTS,
BROOKLYN NYC

COBBLE HILL,
BROOKLYN NYC

CARROLL GARDENS,
BROOKLYN NYC

CARROLL GARDENS
PASSIVE PLUS HOUSE

A SYSTEMATIC APPROACH TO COST-EFFECTIVE CARBON NEUTRAL BUILDINGS

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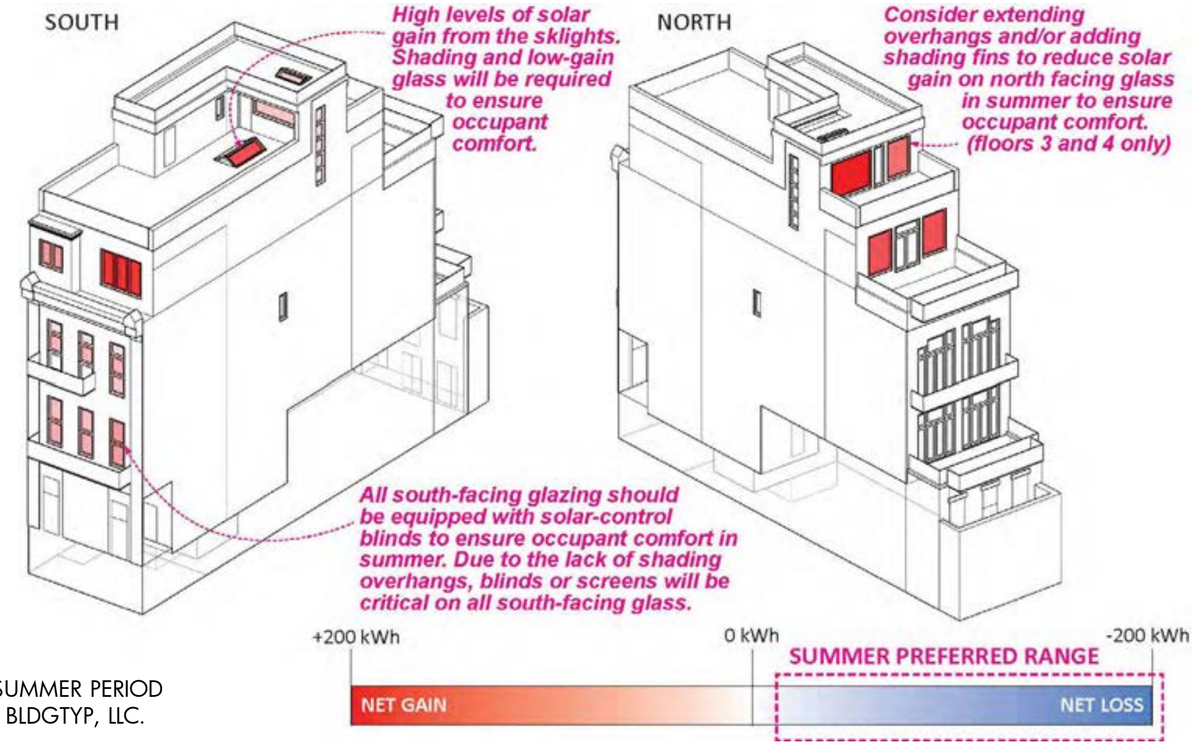
BAXT INGUI'S SYSTEMATIC APPROACH INCLUDES THESE CRITICAL STEPS:

1. Educating the client on passive house in an effective way.
2. Involving the passive house consultant before or during schematic design.
3. Start the certification process with your certification body early and harness their feedback as early as possible.
4. Select and involve a contractor as early as possible, and get them and their team certified/trained.
5. Hold weekly meetings.
6. Use the blower door as a tool.
7. Openly share knowledge & receive feedback with the community.



SCHEMATIC DESIGN PHASE ENERGY MODEL OF SUMMER PERIOD WINDOW NET ENERGY BALANCE. COURTESY OF BLDGTYP, LLC.

THE TEAM

BAXT | INGUI
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Michael Ingui
Partner
Baxt Ingui Architects

Will Conner
Project Manager
Baxt Ingui Architects

Mary Gilmartin
Technician
Baxt Ingui Architects

John Mitchell
Passive House Consultant
bldgtyp

Andrew Fishman
General Contractor
SMR Craftworks

Cramer Silkworth
Mechanical Engineer
Baukraft Engineering

CHANCE TO FULLY RENOVATE A BUILDING IS VERY RARE

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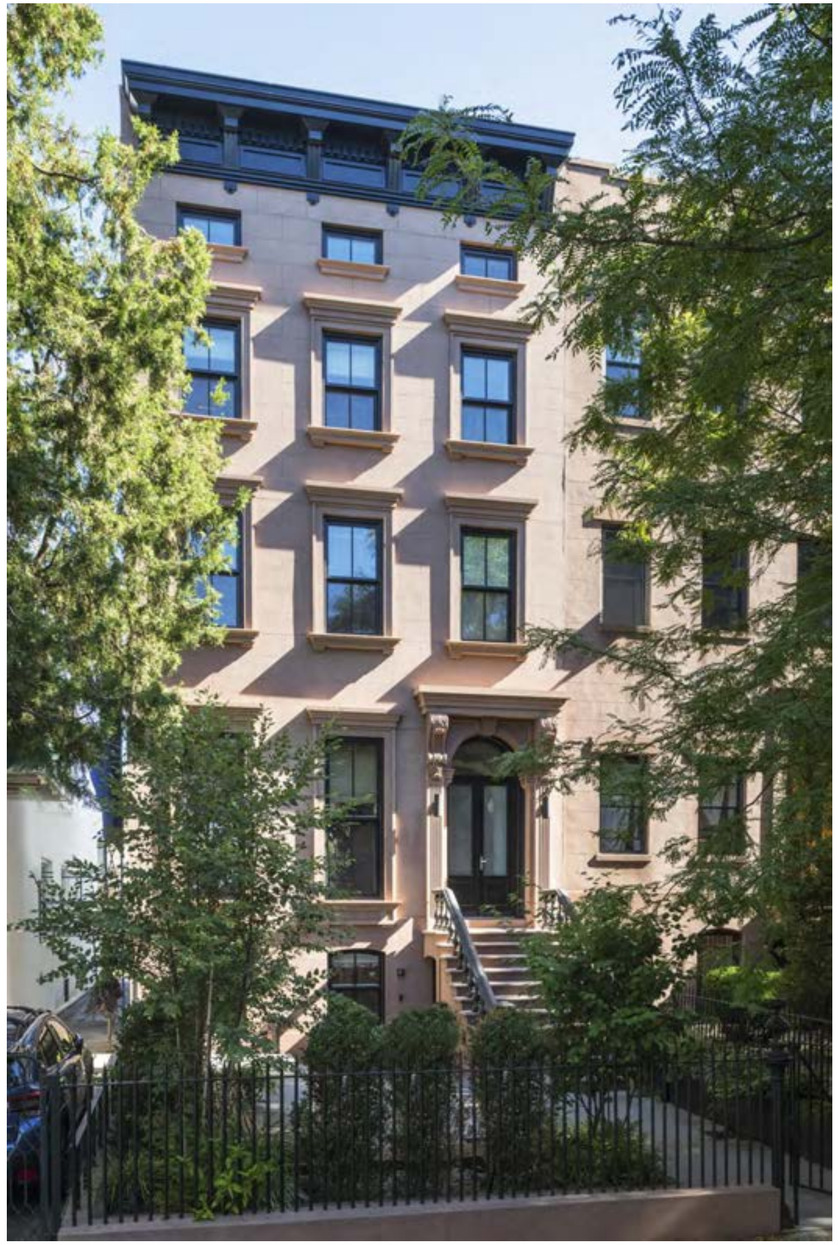
1.

When we renovate 100-year-old buildings, we design them to last another 100 years.

1.



1. FRONT FAÇADE BEFORE
2. FRONT FAÇADE AFTER

CARROLL GARDENS
PASSIVE PLUS HOUSE

CHANCE TO FULLY RENOVATE A BUILDING IS VERY RARE

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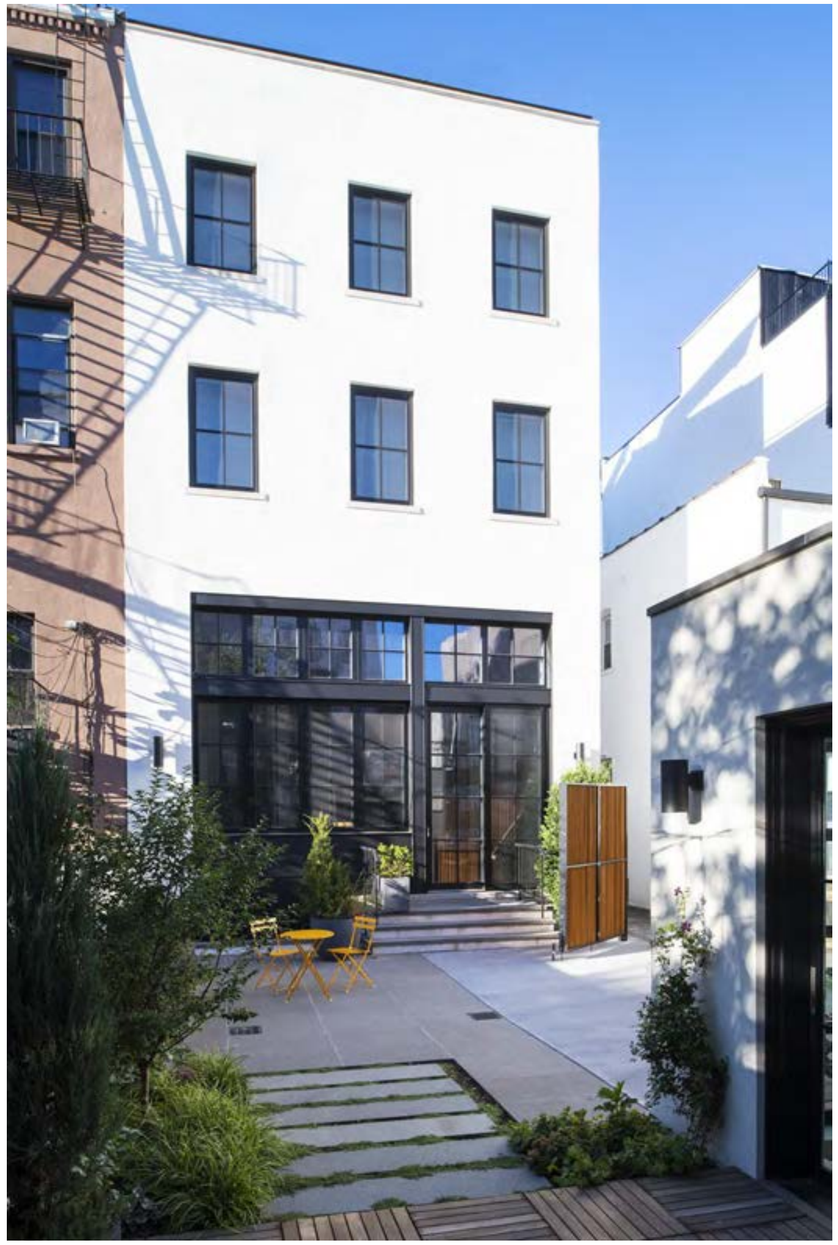

When we renovate 100-year-old buildings, we design them to last another 100 years.

1. REAR FAÇADE BEFORE
2. REAR FAÇADE AFTER

CARROLL GARDENS
PASSIVE PLUS HOUSE

THE PROJECT: HEALTHY HOME FOR A FAMILY

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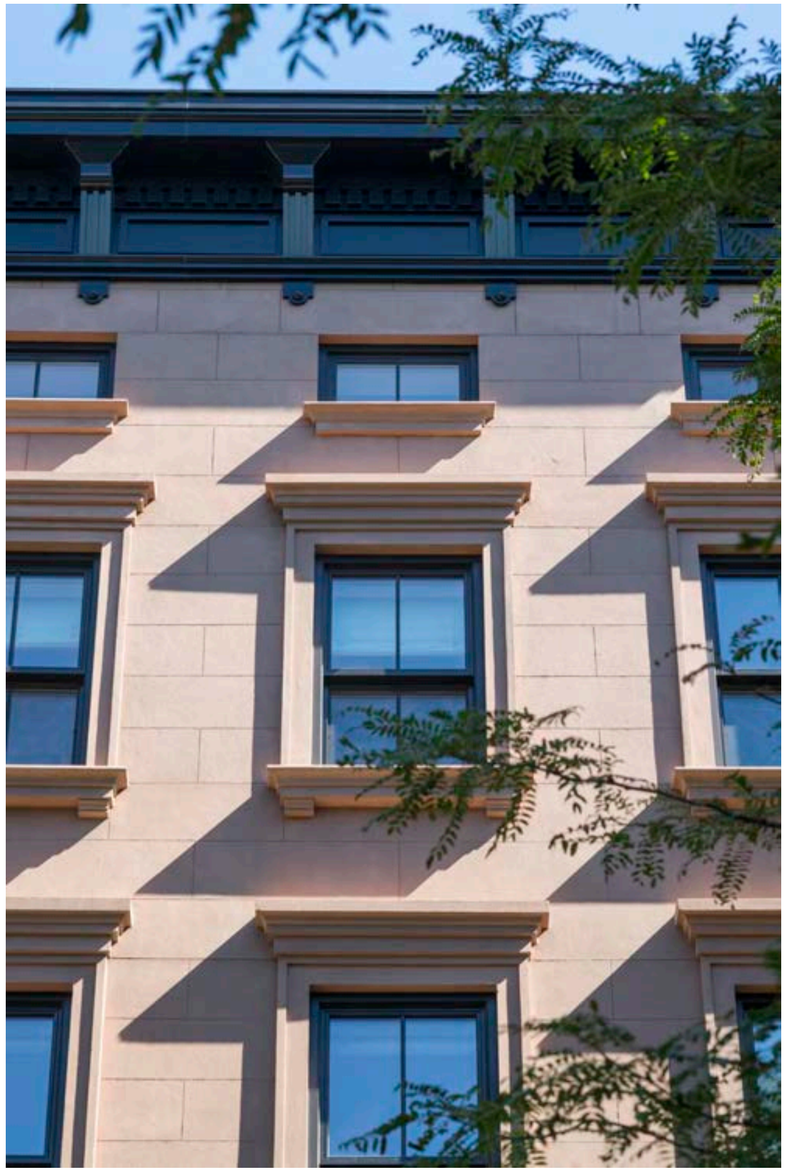

CARROLL GARDENS
PASSIVE PLUS HOUSE

THE PROJECT: REAR GARAGE

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CARROLL GARDENS
PASSIVE PLUS HOUSE

BUILDING SECTION

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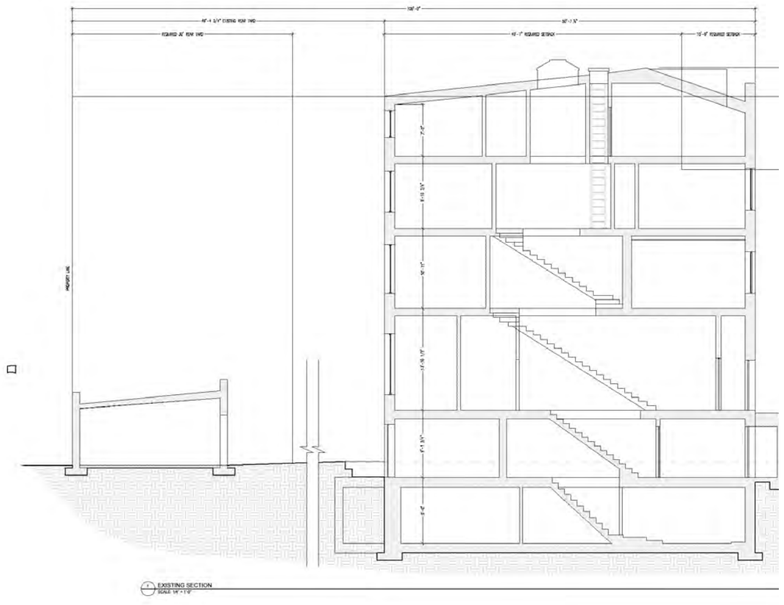
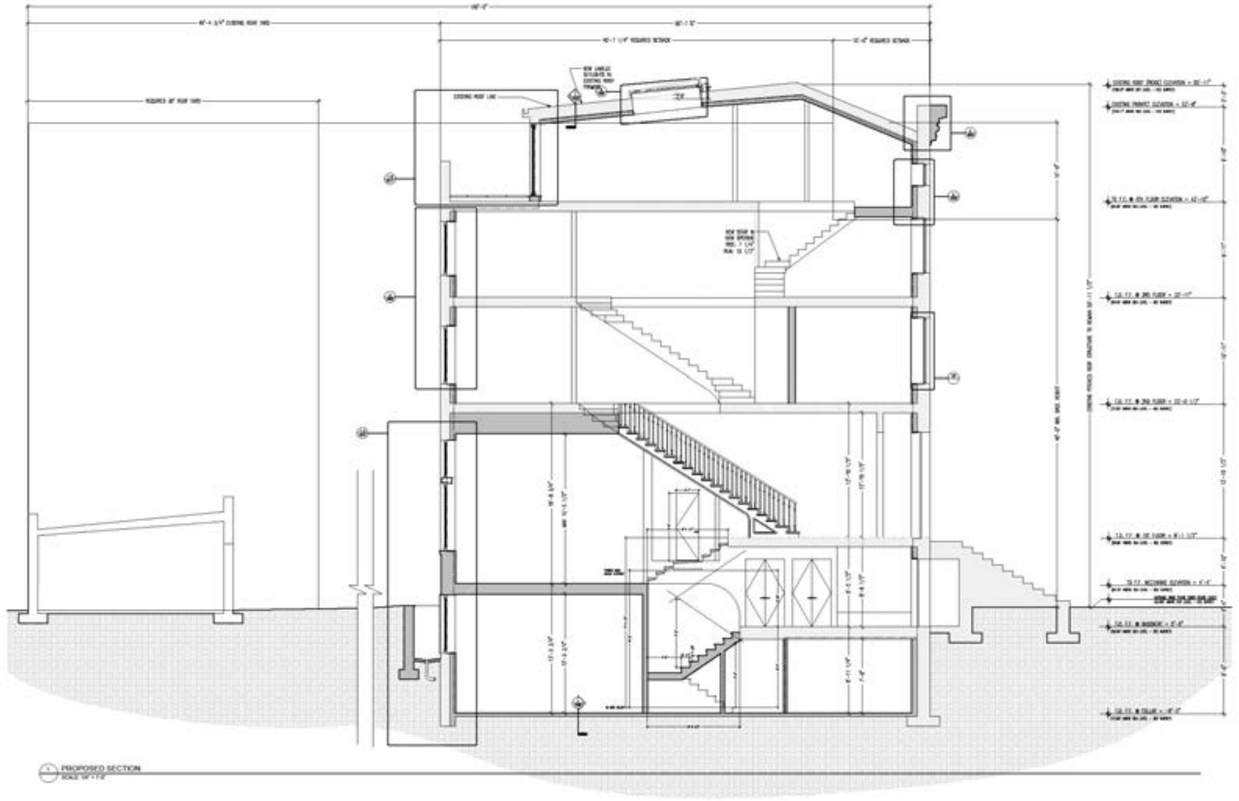


EXISTING SECTION
SCALE: 1/4" = 1'-0"



PROPOSED SECTION
SCALE: 1/4" = 1'-0"

CARROLL GARDENS
PASSIVE PLUS HOUSE

THE PROJECT

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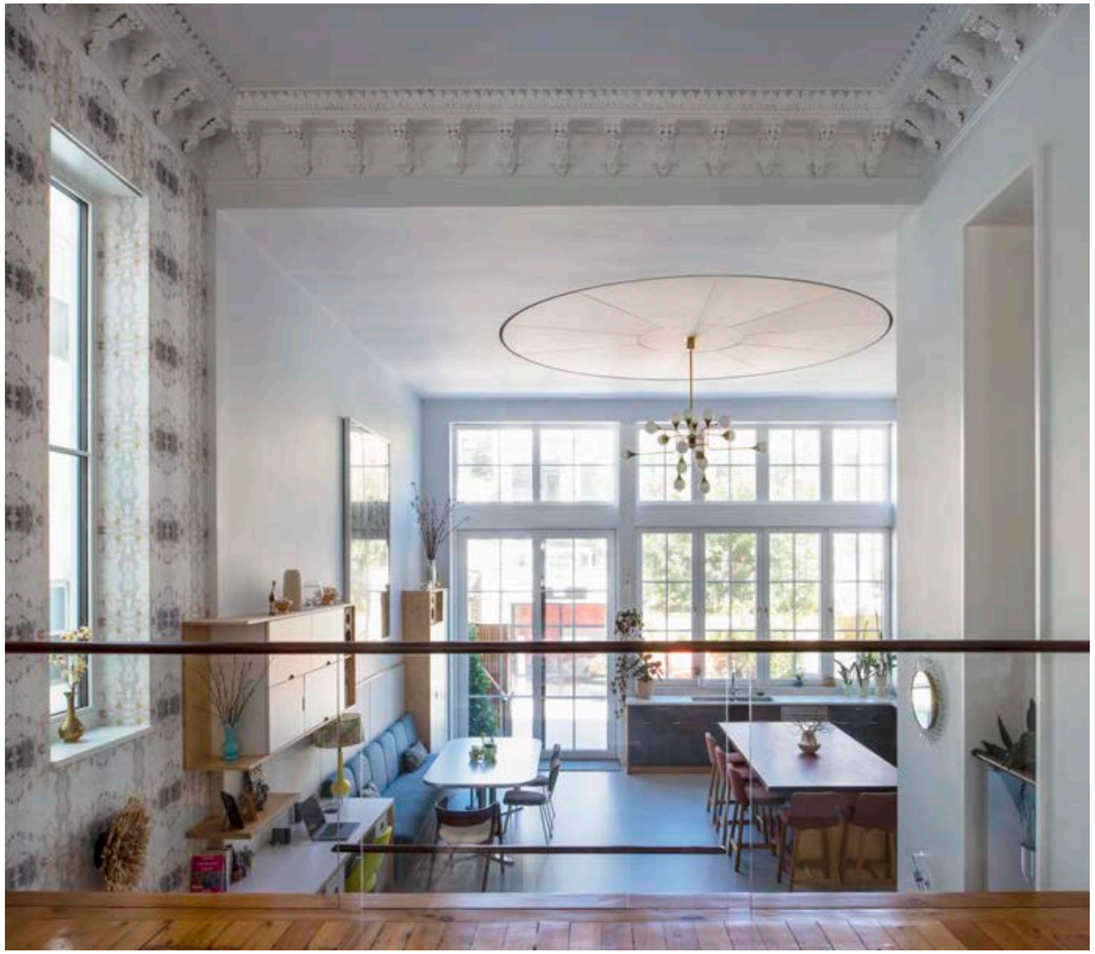

CARROLL GARDENS
PASSIVE PLUS HOUSE

CREATING AN OPEN, LIGHT-FILLED HOME

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CARROLL GARDENS
PASSIVE PLUS HOUSE

BEFORE & AFTER: ENTRYWAY

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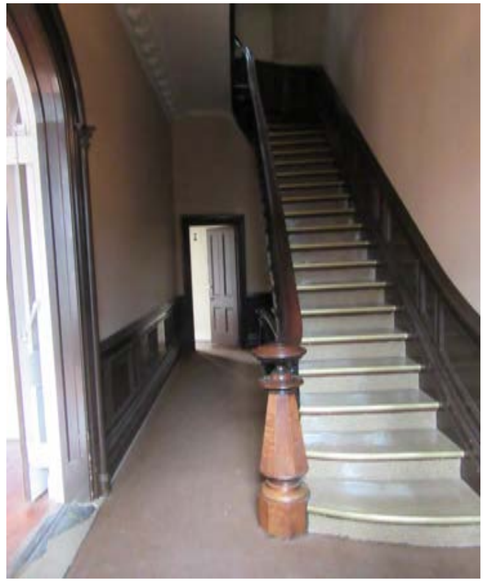

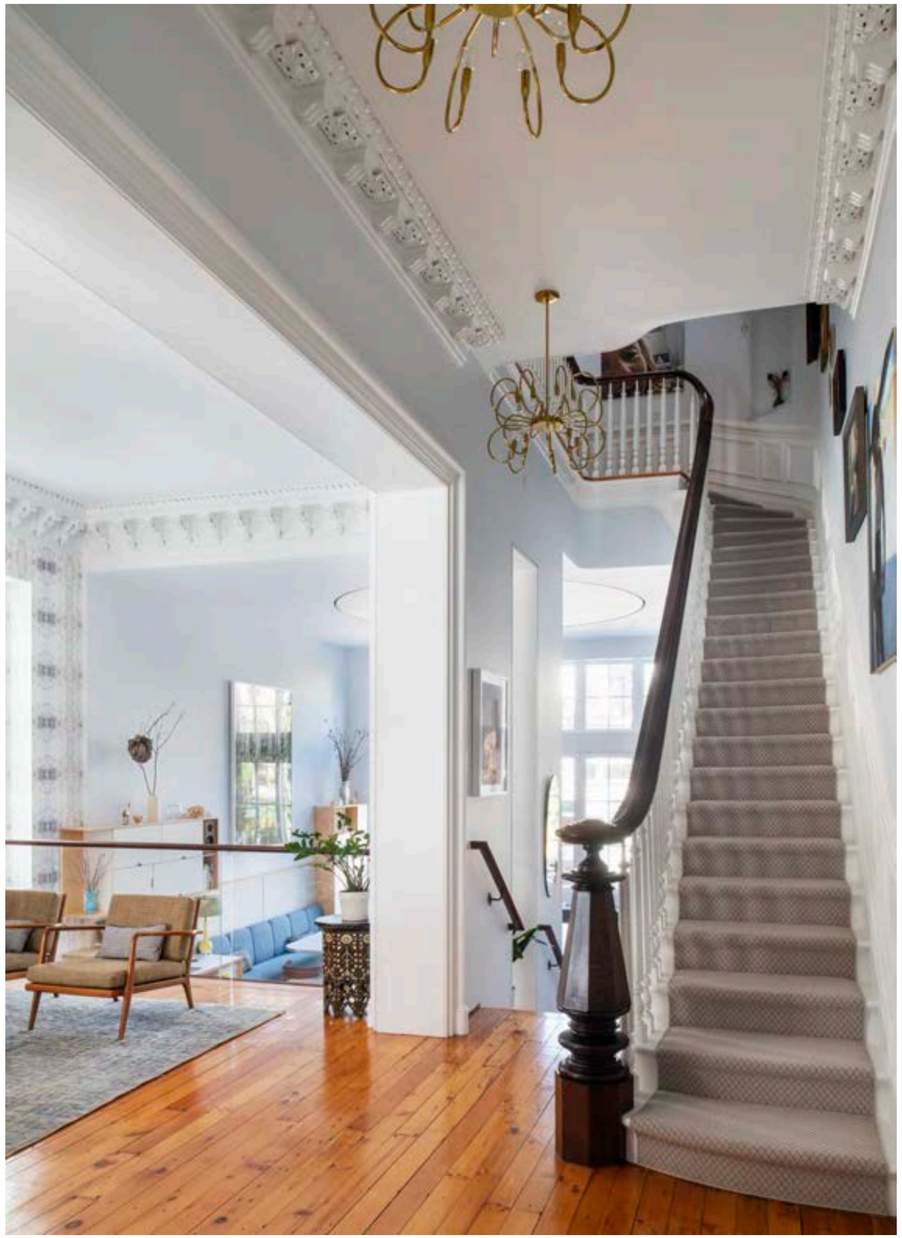

CARROLL GARDENS
PASSIVE PLUS HOUSE

AIR SEALING STRATEGY BOTTOM TO TOP: CELLAR

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1.

3.

2.

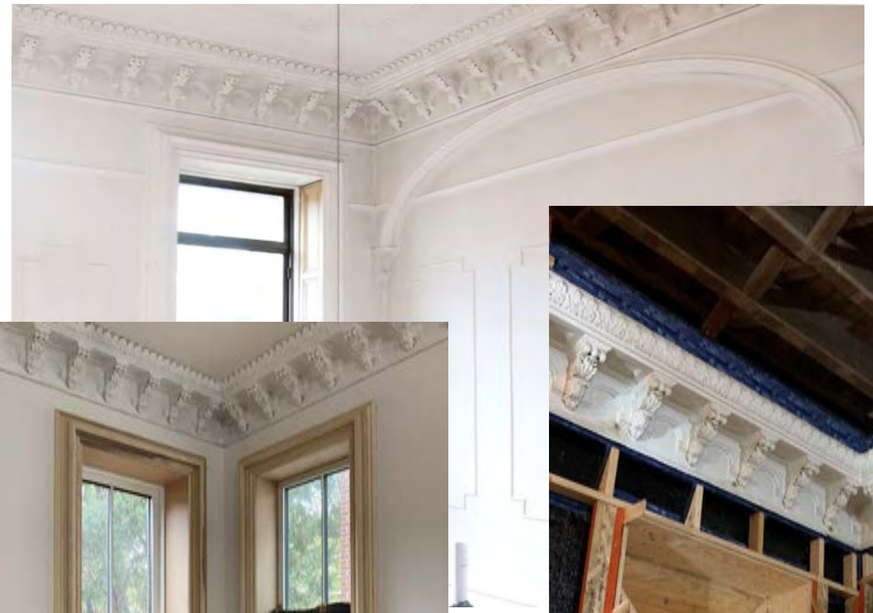
4.

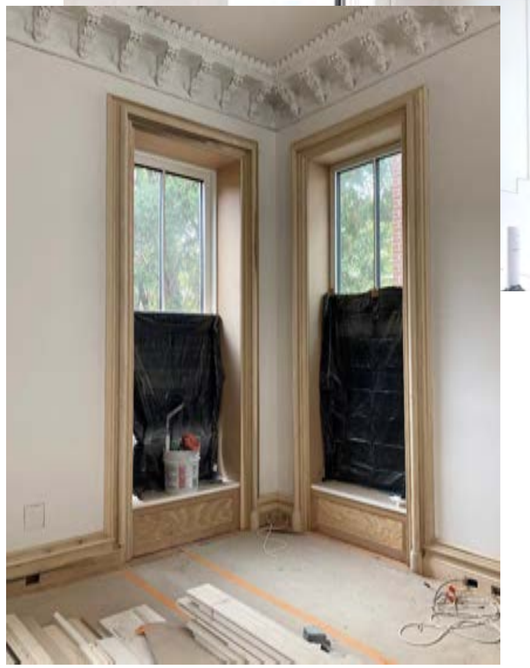
1. CELLAR BEFORE
2. CELLAR HVAC INTAKE AND ORIGINAL BOILER
3. CELLAR DURING CONSTRUCTION
4. CELLAR WITH STEGO WRAPS

CARROLL GARDENS
PASSIVE PLUS HOUSE

AIR SEALING STRATEGY BOTTOM TO TOP: CORNER WINDOWS

BAXT INGUI Architects PC





2.

1.

3.

4.

1. CELLAR PLAN
2. FIRST FLOOR PLAN
3. CELLAR COMMUNITY CENTER AREA = 1113 SF
4. FIRST FLOOR COMMUNITY CENTER AREA = 1400 SF

CARROLL GARDENS
PASSIVE PLUS HOUSE

AIR SEALING STRATEGY BOTTOM TO TOP: CROWN MOLDING

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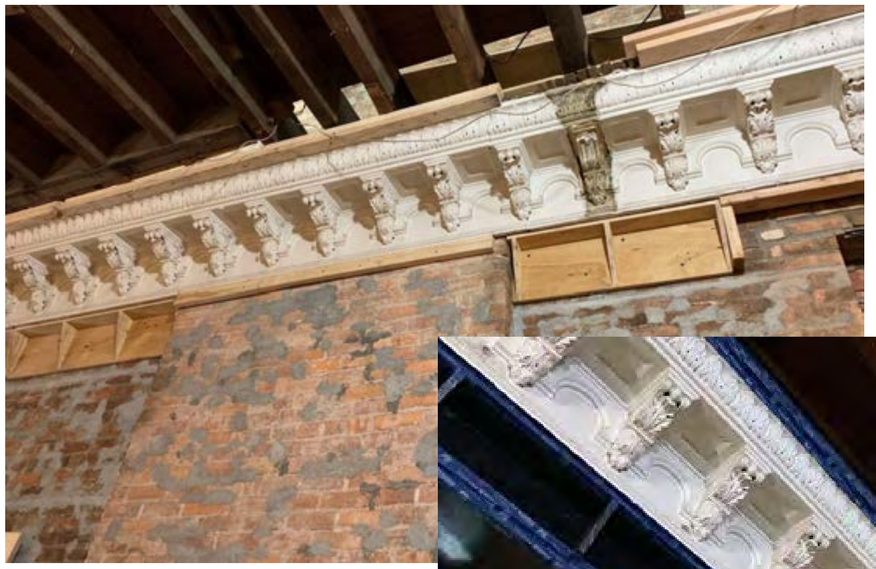
1.

2.



3.

4.

5.

1. EXISTING CROWN
2. CROWN SUPPORTED AND WALL SPOT POINTED
3. LIQUID-APPLIED AIRTIGHT MEMBRANE
4. SMART MEMBRANE ADHERED TO CROWN
5. FINISHED PARLOR CROWN

CARROLL GARDENS PASSIVE PLUS HOUSE

AIR SEALING STRATEGY BOTTOM TO TOP: STAIRCASE

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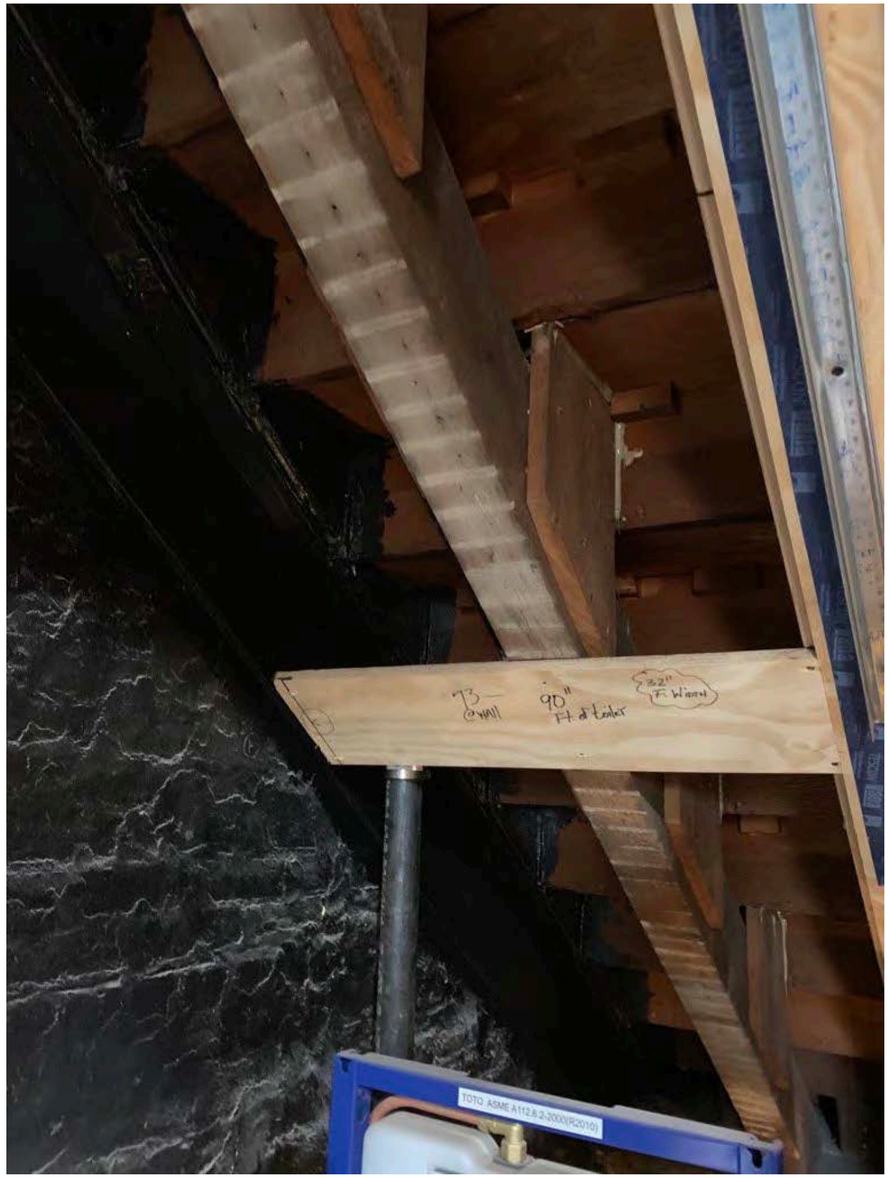

1.

3.

2.

1. LIQUID APPLIED AIRTIGHT MEMBRANE UNDER STAIRCASE
2. ENTRY STAIR BEFORE
3. ENTRY STAIR AFTER

CARROLL GARDENS
PASSIVE PLUS HOUSE

AIR SEALING STRATEGY BOTTOM TO TOP: ATTIC

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1.

3.

2.

4.

1. ATTIC BEFORE
2. FRAMING OUT NEW ROOF DECK
3. WINDOWS INSTALLED'
4. FINISHED ATTIC

CARROLL GARDENS
PASSIVE PLUS HOUSE

SCALING RETROFITS...

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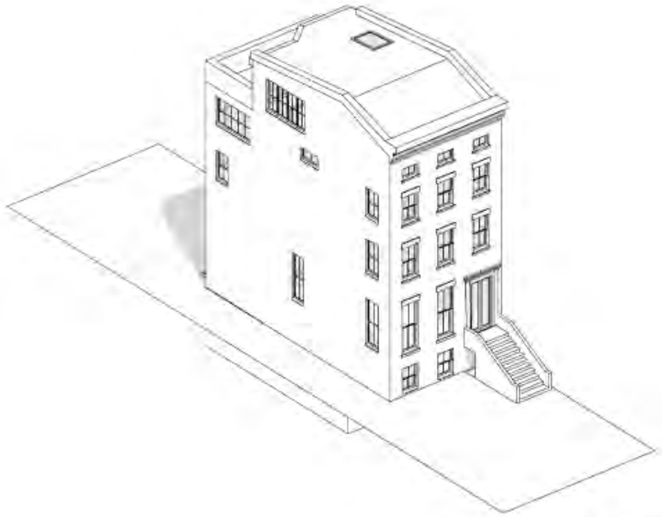

21 1st Place
Thermal Bridging Catalog
April 7, 2021

prepared by
bldgtyp llc
Certified Passive House Designers(PHI)

DERISKS PASSIVE HOUSE FOR ARCHITECTS,

AND FOR BUILDERS,

ENSURING SUCCESS FOR PASSIVE HOUSE PROJECTS!

CARROLL GARDENS
PASSIVE PLUS HOUSE

LEARNING FROM YOUR PEERS

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CONTRACTOR COLLECTIVE

STUDENT WALKTHROUGHS

MECHANICAL AND VENTILATION STRATEGY

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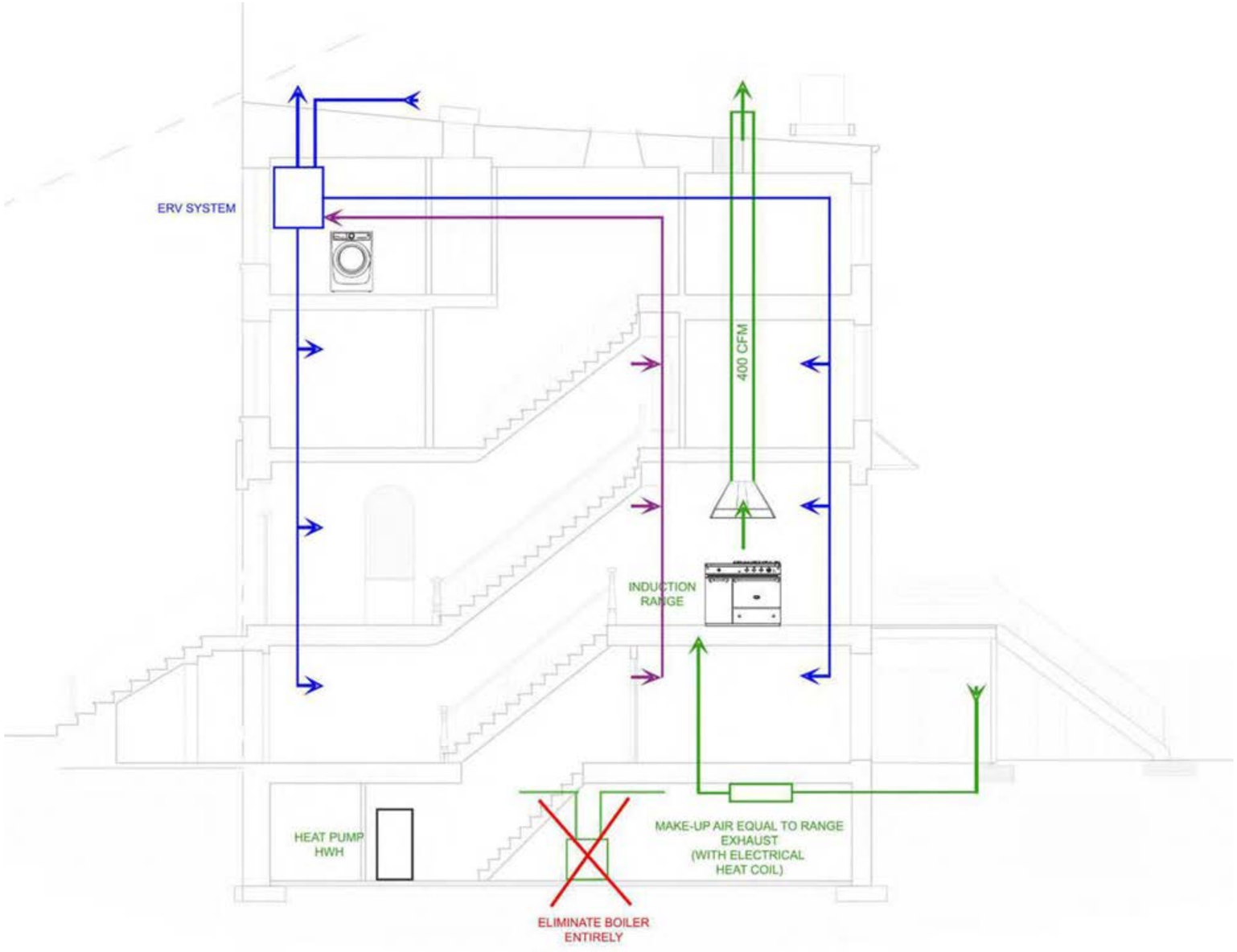

CARROLL GARDENS
PASSIVE PLUS HOUSE

THE TEAM

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SMR Craftworks

Cramer Silkworth
Mechanical Engineer
Baukraft Engineering

IDENTIFY CHALLENGES EARLY AND STRATEGIZE WITH WHOLE TEAM

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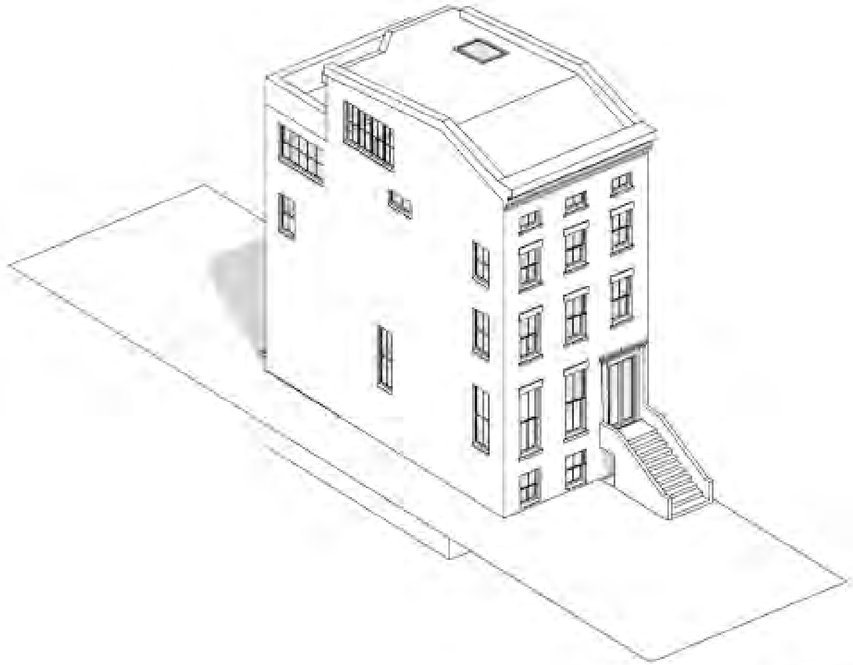

21 1st Place

Thermal Bridging Catalog

April 7, 2021

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CARROLL GARDENS
PASSIVE PLUS HOUSE

STANDARDIZED APPROACH

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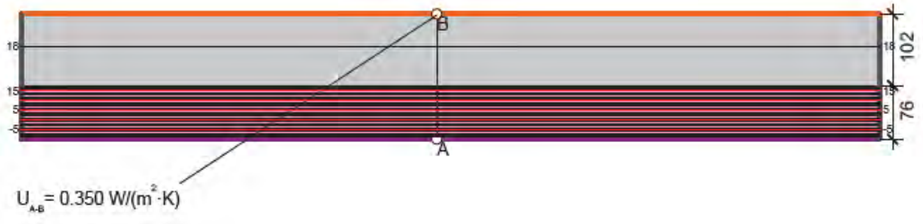
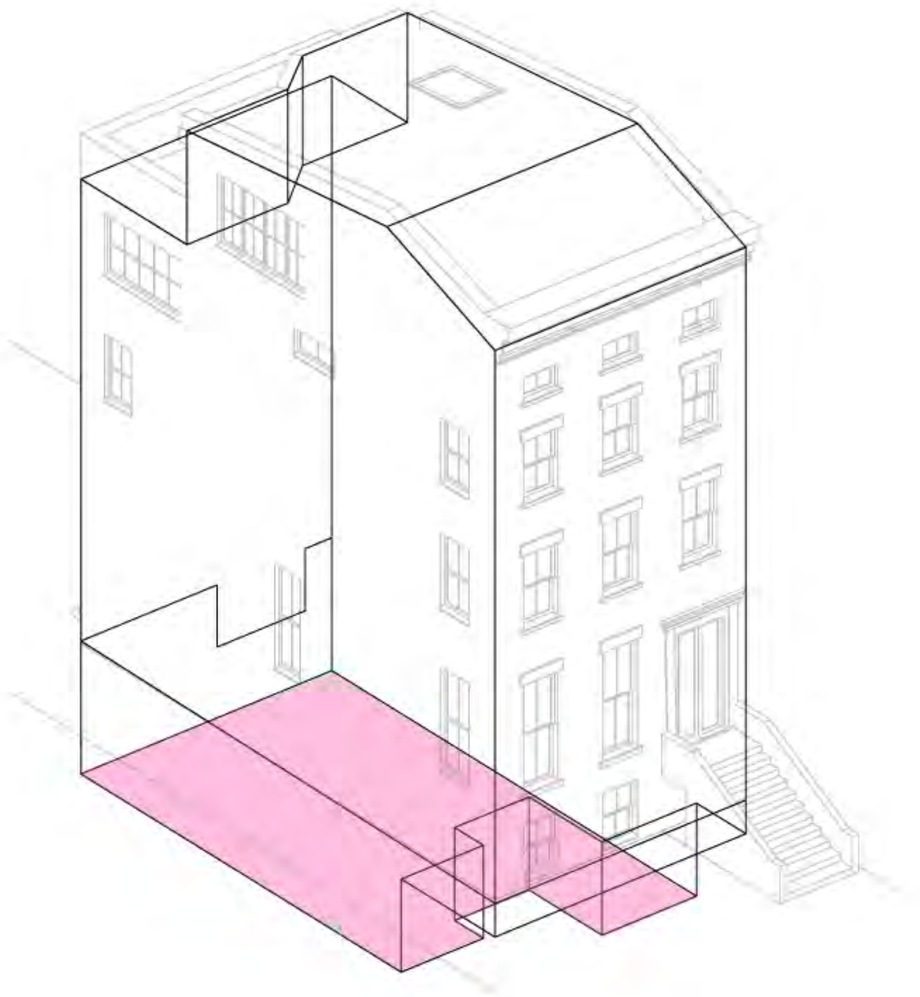


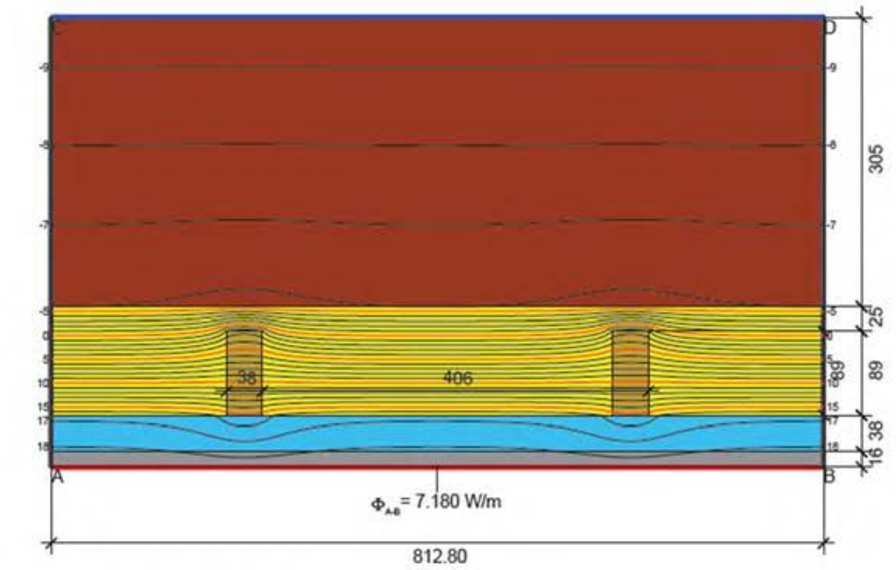
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Exterior, no HT		-10.000		
Interior, heat flux, downwards		20.000	0.170	
Symmetry/Model section	0.000			

Material	λ[W/(m·K)]	ε
Concrete (Lightly Reinforced) [R-0.06/in]	2.300	0.900
XPS, [R-5.0/in]	0.029	0.900



CARROLL GARDENS
PASSIVE PLUS HOUSE

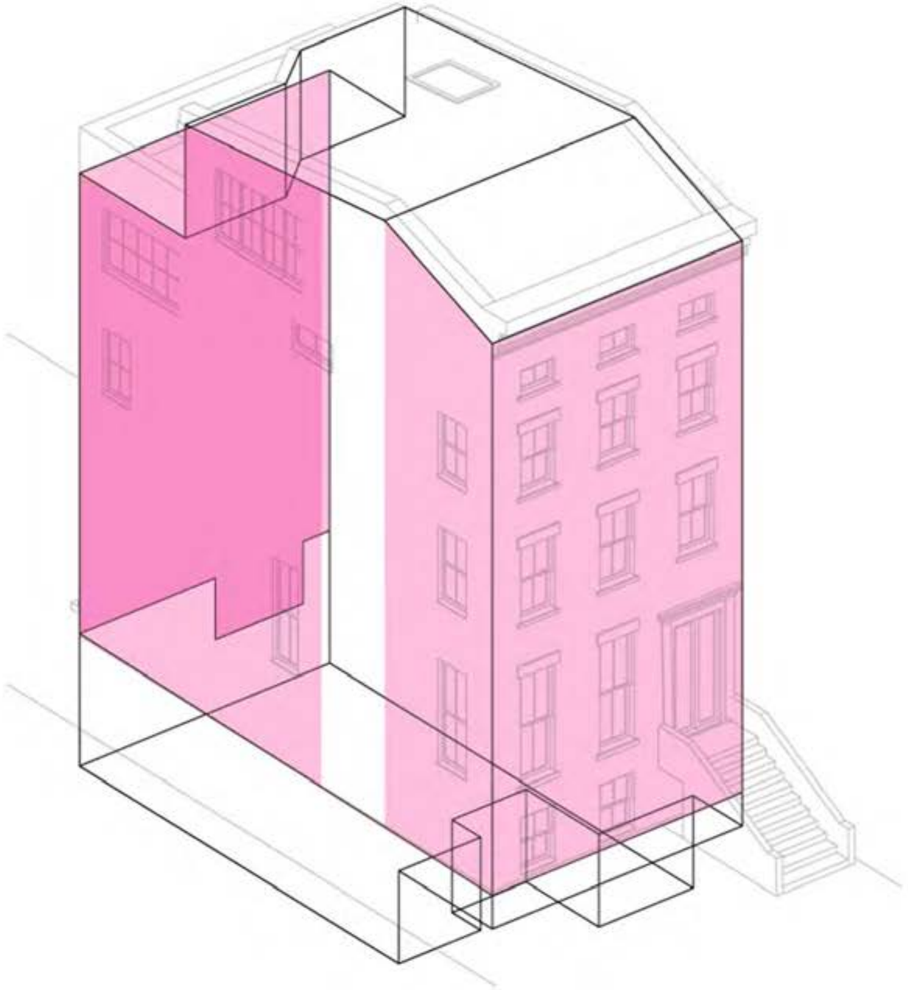
STANDARDIZED APPROACH



$$U_{w;A-B} = \frac{\Phi}{\Delta T \cdot b} = 0.294\ W/(m^2 \cdot K)$$

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Exterior, normal		-10.000	0.040	
Interior, normal, horizontal		20.000	0.130	
Symmetry/Model section	0.000			

Material	λ[W/(m·K)]	ε
Brick (Common) [R-0.2/in]	0.720	0.900
Cellulose (Densipack) [R-3.7/in]	0.040	0.900
GWB (Typ) [R-0.85/in]	0.170	0.900
Wd Furring [2x2 16in OC] no Insulation [R-1.01/in]	0.213	0.900
Wood, Coniferous (Softwood) [R-1.03/in]	0.140	0.900



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CARROLL GARDENS
PASSIVE PLUS HOUSE

STANDARDIZED APPROACH

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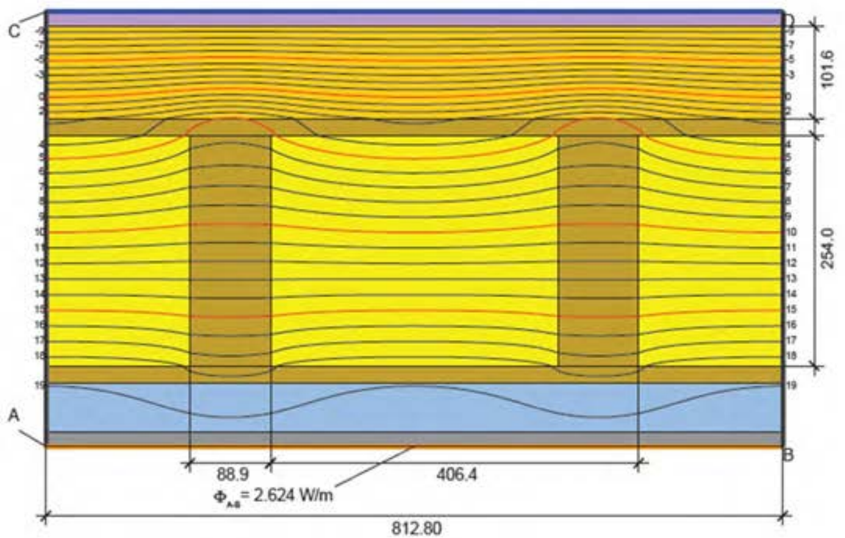
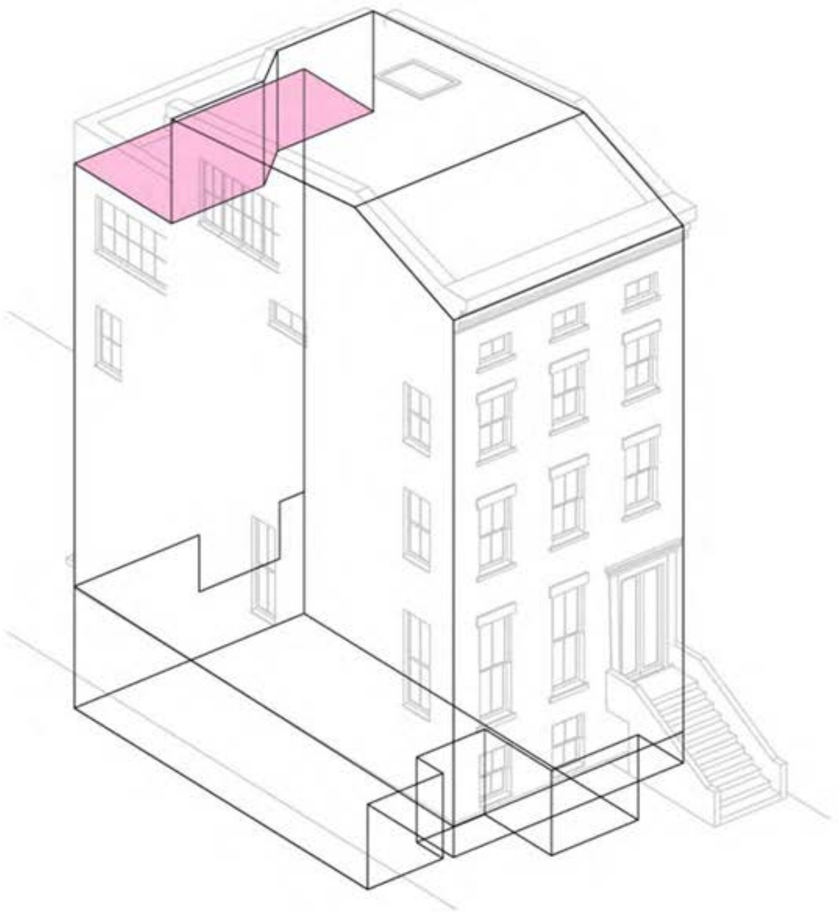


$$U_{eq\,A\text{-}B} = \frac{\Phi}{\Delta T \cdot b} = \frac{2.624}{30.000 \cdot 0.813} = 0.108\ W/(m^2 \cdot K)$$

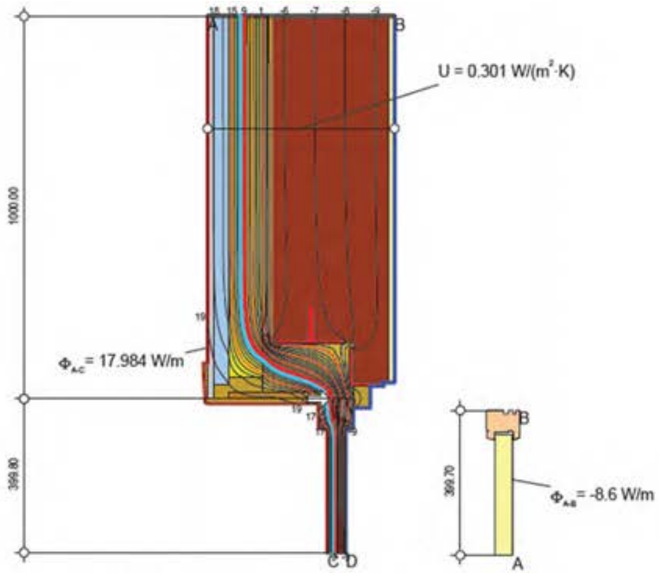
Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Exterior, normal		-10.000	0.040	
Interior, heat flux, upwards		20.000	0.100	
Symmetry/Model section	0.000			

Material	λ[W/(m·K)]	ε
Air layer, unventilated, horizontal, thickness: 50 mm	0.278	0.900
Cellulose (Denspack) [R-3.7/in]	0.040	0.900
GWB (Typ) [R-0.85/in]	0.170	0.900
GWB (USG Securock) [R-1/in]	1.000	0.900
Plywood (Typ) [R-1.2/in]	0.119	0.900
Polyisocyanurate Board [R-6/in]	0.024	0.900
Wood, Coniferous (Softwood) [R-1.03/in]	0.140	0.900



CARROLL GARDENS
PASSIVE PLUS HOUSE

STANDARDIZED APPROACH

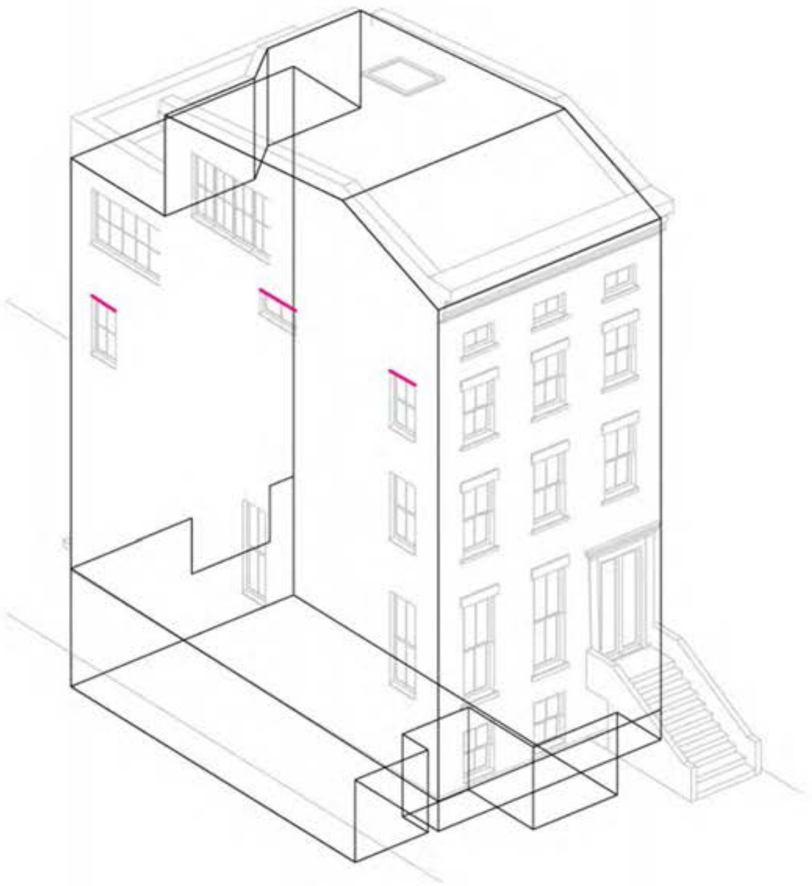


$$\Psi_{A\text{-}B\text{-}C\text{-}D} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - \frac{\Phi_2}{\Delta T} = \frac{17.984}{30.000} - 0.301 \cdot 1.000 - \frac{8.555}{30.000} = 0.014 \text{ W/(m·K)}$$

Boundary Condition	q[W/m²]	θ[°C]	R[(m²·K)/W]	ε
Exterior, normal		-10.000	0.040	
Interior, normal, horizontal		20.000	0.130	
Symmetry/Model section	0.000			

Material	λ[W/(m·K)]	ε
Air layer, unventilated, horizontal, thickness: 40 mm	0.222	0.900
Brick (Common) [R-0.2/in]	0.720	0.900
Cellulose (Denspack) [R-3.7/in]	0.040	0.900
GWB (Typ) [R-0.85/in]	0.170	0.900
HandiFoam E84 [R-6/in]	0.024	0.900
Panel	0.035	0.900
Plywood (Typ) [R-1.2/in]	0.119	0.900
Steel (Rolled, Ground) [R-0.0029/in]	49.999	0.600
Stucco [R-0.2/in]	0.722	0.900
Wd Stud, Cellulose, 16in OC [R-2.93/in]	0.049	0.900
Wood, Coniferous (Softwood) [R-1.03/in]	0.140	0.900
Zola Elastomeric Foam, Flexible	0.050	0.900
Zola Lodgepole Pine	0.110	0.900
Zola Silicone	0.350	0.900
Unventilated air cavity *		

* Simplified approach



STANDARDIZED APPROACH TO TRICKY DETAILS

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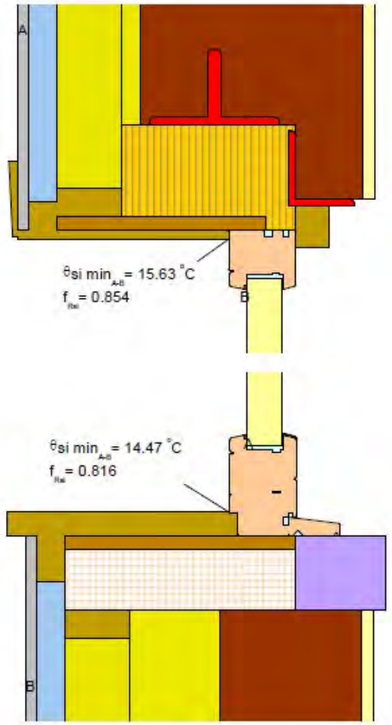

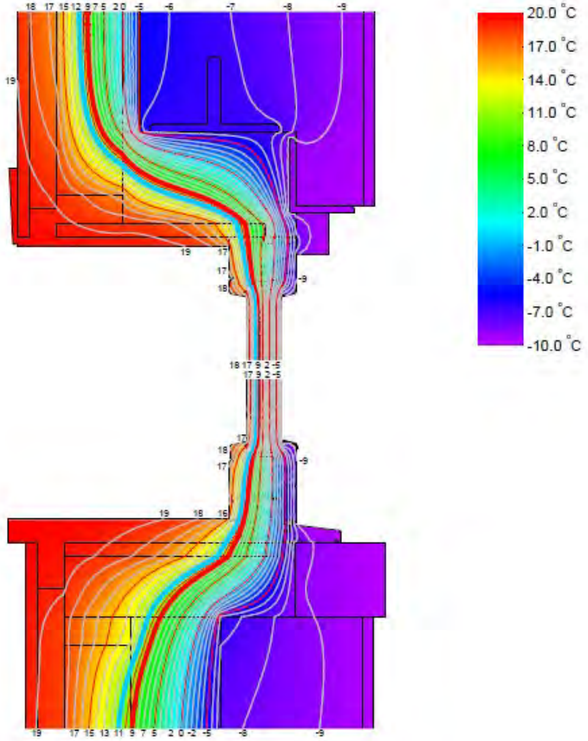

CARROLL GARDENS
PASSIVE PLUS HOUSE

STANDARDIZED APPROACH TO TRICKY DETAILS

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CARROLL GARDENS
PASSIVE PLUS HOUSE

STILL SOME CUSTOM DETAILS... BUT NOT MANY!

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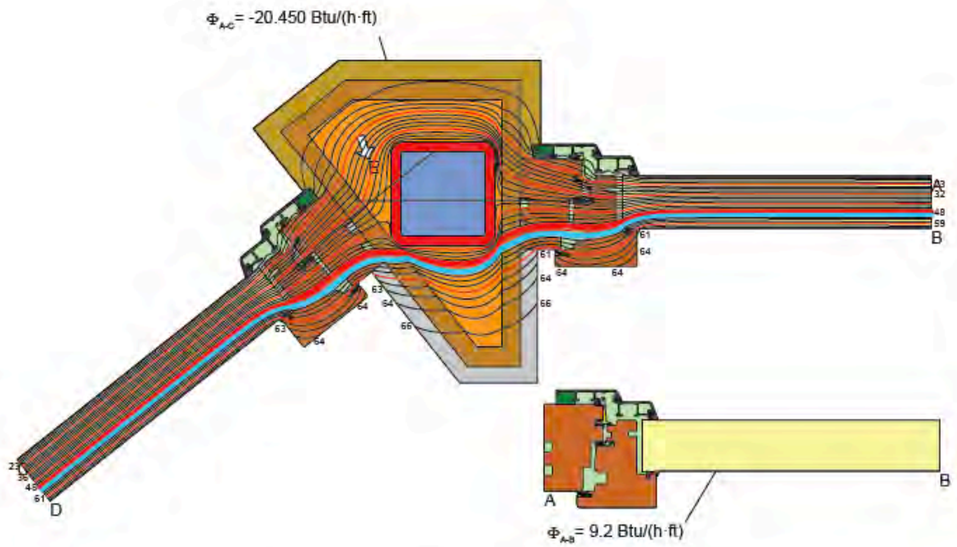
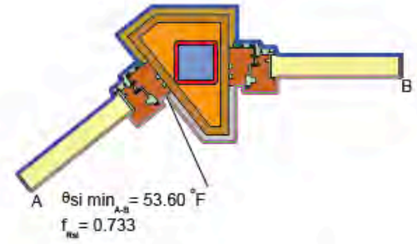


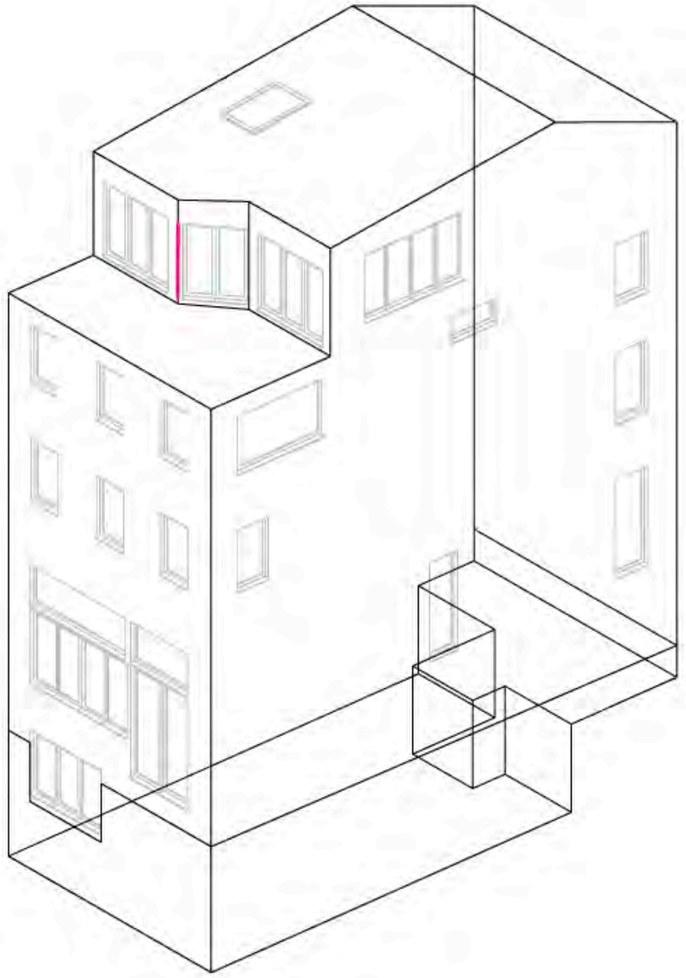
$$\Psi_{A\text{-}B\text{-}C,*} = \frac{\Phi}{\Delta T} - \frac{\Phi_1}{\Delta T} - \frac{\Phi_2}{\Delta T} = \frac{19.663}{30.000} - \frac{8.823}{30.000} - \frac{8.823}{30.000} = 0.067\ \text{W/(m·K)} = 0.039\ \text{Btu/(h·ft·F)}$$



Boundary Condition	q[Btu/(h·ft²)]	θ[°F]	h[Btu/(h·ft²·F)]	ε
Exterior, normal		14.000	4.403	
Interior, normal, horizontal		68.000	1.355	
Symmetry/Model section	0.000			

Material	λ[Btu/(h·ft·F)]	ε
Air layer, unventilated, horizontal, thickness: 65 mm	0.273	
Aluminum Alloys (Anodized)	92.445	0.800
Ethylene Propylene Diene Monomer (EPDM)	0.144	0.900
GWB (Typ) [R-0.85/in]	0.098	0.900
Panel	0.020	
Plywood (Typ) [R-1.2/in]	0.069	0.900
Redwood, Cedar, Hemlock, Douglas Fir, White Fir, Cypress	0.064	0.900
Silicone	0.202	0.900
Steel (Rolled, Ground) [R-0.0029/in]	28.889	0.600
Wood, Coniferous (Softwood) [R-1.03/in]	0.061	0.900
ccSPF [R-6.5/in]	0.013	0.900
Frame Cavity - CEN Simplified *		
Frame cavity - CEN slightly ventilated *		
* Simplified approach		

Boundary Condition	q[Btu/(h·ft²)]	θ[°F]	h[Btu/(h·ft²·F)]	ε
Exterior, normal		14.000	4.403	
Interior, fRsi		68.000	0.704	
Symmetry/Model section	0.000			



CARROLL GARDENS
PASSIVE PLUS HOUSE

SEQUENCING YOUR PROJECT

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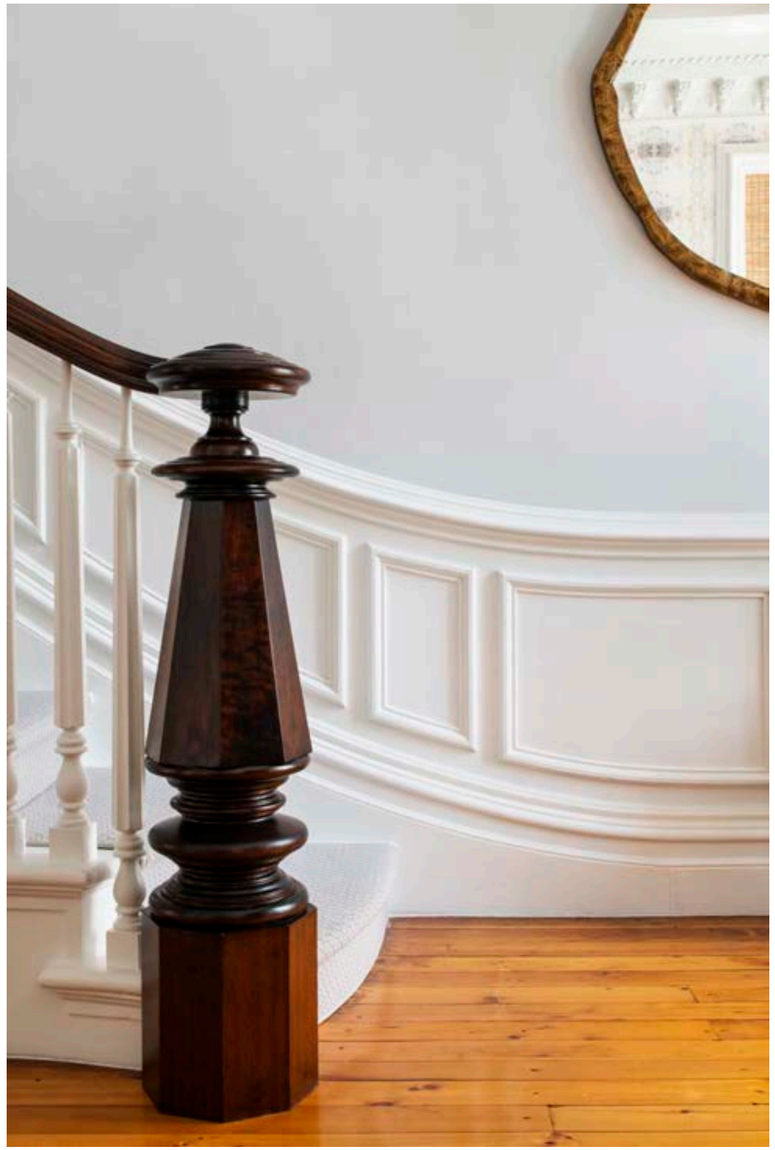

CARROLL GARDENS
PASSIVE PLUS HOUSE

EDUCATING YOUR TEAM, CONTRACTOR CERTIFICATION, KICKOFF

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CARROLL GARDENS
PASSIVE PLUS HOUSE

SEQUENCING YOUR PROJECT: PARLOR CROWN

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CLOCKWISE FROM TOP LEFT

1. CROWN SUPPORTED AND WALL SPOT POINTED
2. LIQUID-APPLIED AIRTIGHT MEMBRANE
3. SMART MEMBRANE ADHERED TO CROWN
4. FINISHED PARLOR CROWN
5. PARLOR CROWN BEFORE
6. PART OF PARLOR CROWN TAKEN DOWN

CARROLL GARDENS PASSIVE PLUS HOUSE

SEQUENCING YOUR PROJECT: STAIRCASE

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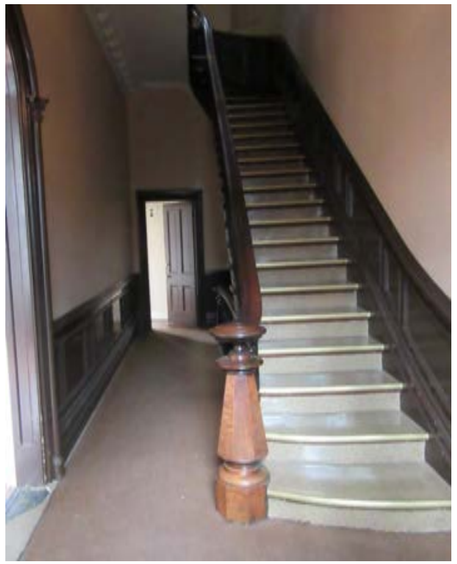

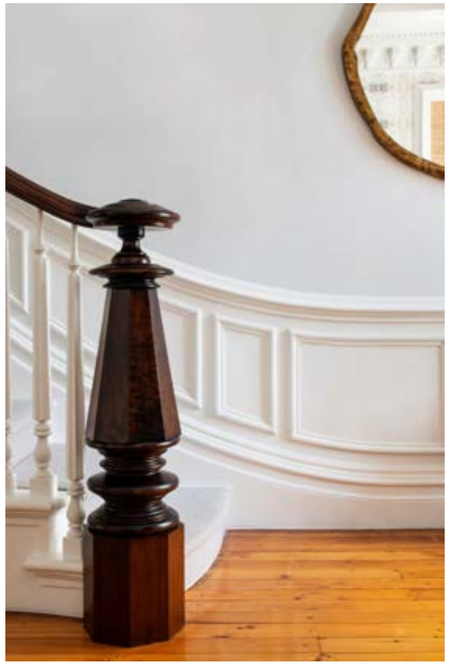

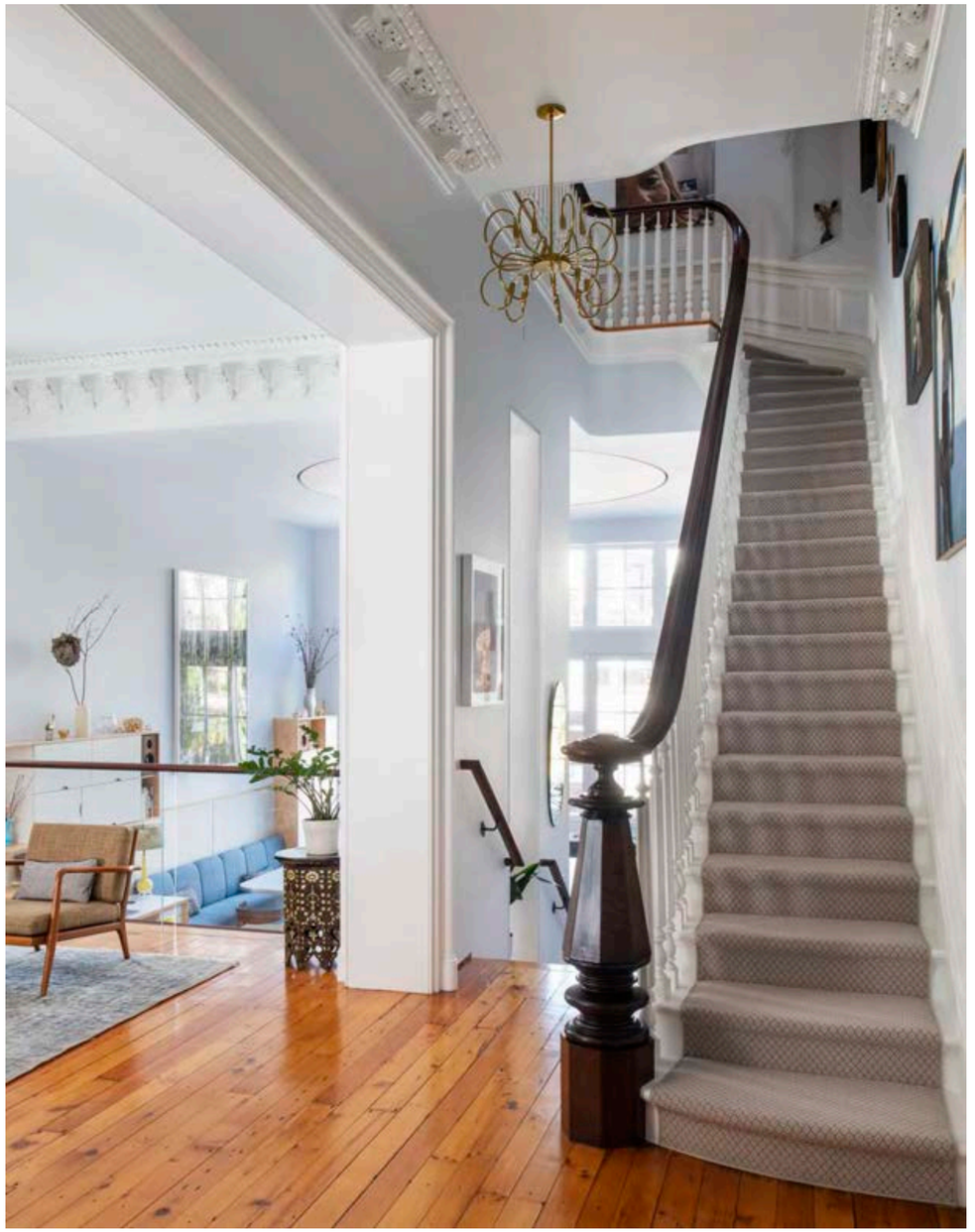

CLOCKWISE FROM TOP LEFT

1. ORIGINAL STAIRCASE
2. AIR SEALING AND ERV DUCTS BELOW STAIRCASE
3. FINISHED ENTRYWAY
4. FINISHED NEWEL POST
5. NEWEL POST RESTORATION

CARROLL GARDENS
PASSIVE PLUS HOUSE

SEQUENCING YOUR PROJECT: WOOD FLOORING

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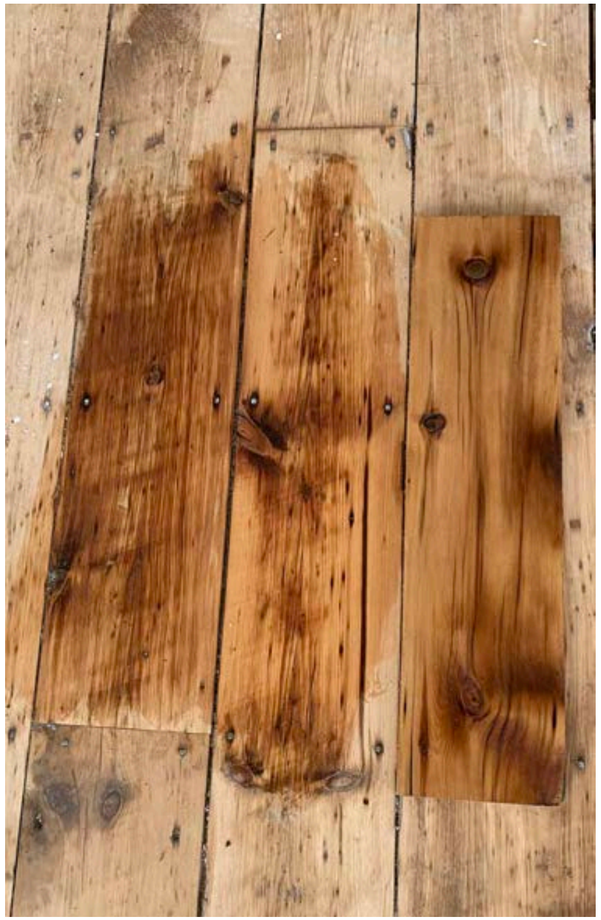

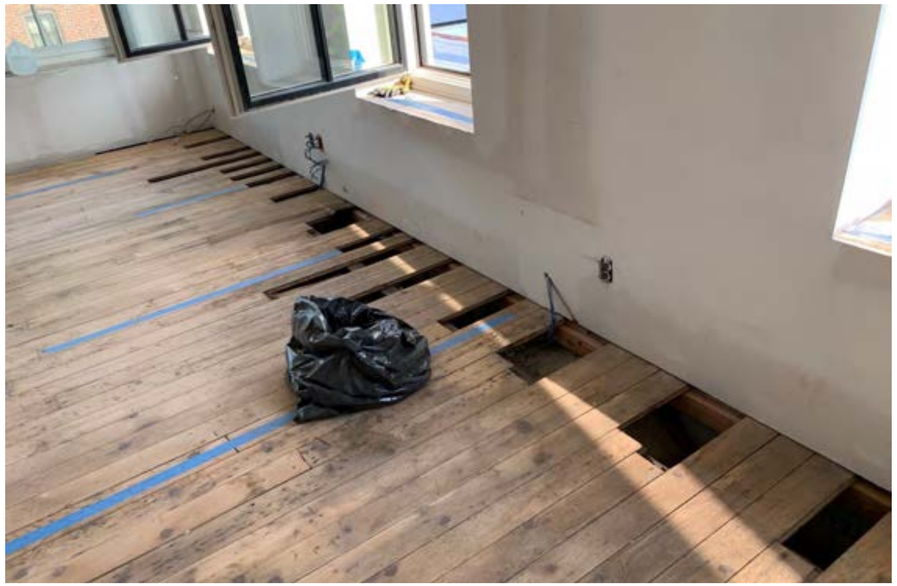

CARROLL GARDENS
PASSIVE PLUS HOUSE

SEQUENCING YOUR PROJECT: STRUCTURE

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CARROLL GARDENS
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RE-EDUCATING CONSTRUCTION WORKERS: TRAINING

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TRAINING NEW CONTRACTORS IS IMPORTANT, BUT EQUALLY, IF NOT MORESO, IS RE-TRAINING CONTRACTORS WHO HAVE BEEN IN THE BUSINESS FOR YEARS.

CODE REQUIREMENTS: LOCAL LAW 97 AND BEYOND

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CODE IMPROVMENTS WILL HELP LEVEL THE PLAYING FIELD.
LARGE SCALE CLIMATE ACTION IS BEST ACHIEVED THROUGH MUNICIPAL ACTION.

PRODUCT AVAILABILLITY AND EVOLUTION

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THANK YOU!

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SMR CRAFTWORKS

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baukraft ENGINEERING BETTER HOMES