PASSIVE HOUSE RETROFITS

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be ex
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+ ALL CONTRIBUTING SUBCONTRACTORS

LESSONS LEARNED: HOW TO SELL THE CONCEPT OF PASSIVE

EXPLAINING AMENITIES TO CLIENTS

MIKE TAUBER PHOTOGRAPHY

Do people care about climate change?

U.N. REPORT FROM THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

*THE PLANET COULD REACH THE TEMPERATURE THRESHOLD THAT WILL SEE THE WORST EFFECTS OF CLIMATE CHANGE AS EARLY AS **2030**. (TIME)*

"I just keep asking myself, 'Why don't I care about this?' Don't get me wrong, I 100% believe in climate change. yet, I'm willing to do absolutely nothing about it."

MICHAEL CHE, WEEKEND UPDATE, SATURDAY NIGHT LIVE. NBC 10/13/2018

Climate Change's Effect on Beer Production

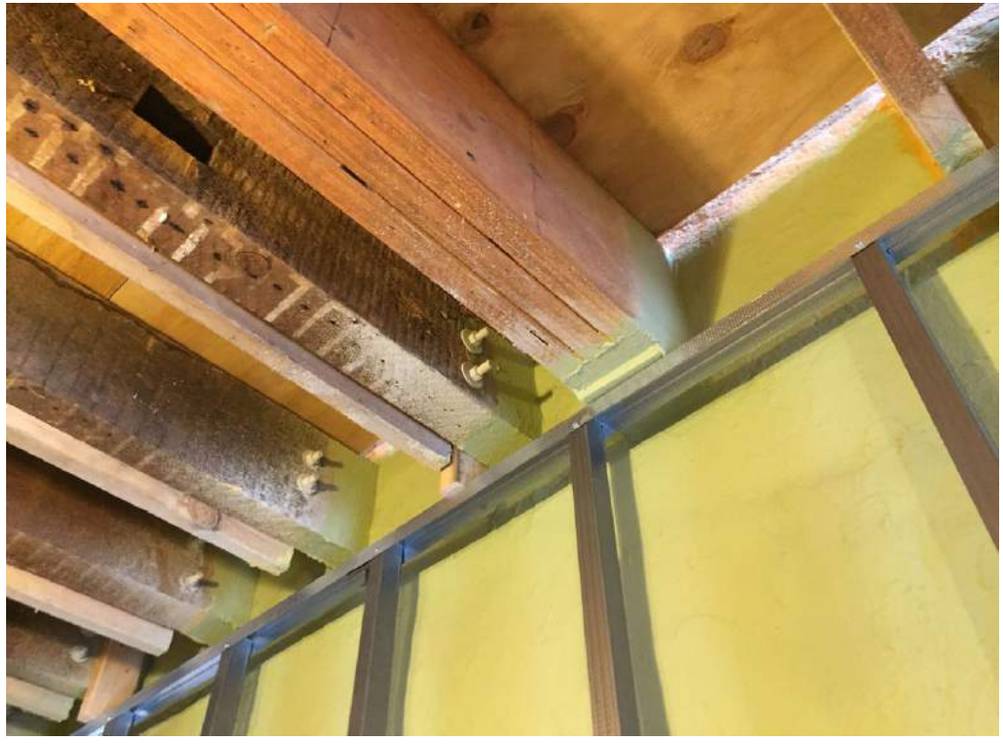
Scientists report that climate change may impact the world's beer supply, and the U.S. faces a potential $1 trillion deficit by 2019.

THE DAILY SHOW WITH TREVOR NOAH, COMEDY CENTRAL. 10/16/2018

WHY CLIENTS CHOOSE PASSIVE: SEALED WALLS

Passive buildings have sealed walls that ***prevent dust, bugs, mice, and unwanted air*** infiltration.

Unknowingly, many of our existing homes get their “fresh air” through hidden crevasses and holes, where bugs and vermin can roam freely.



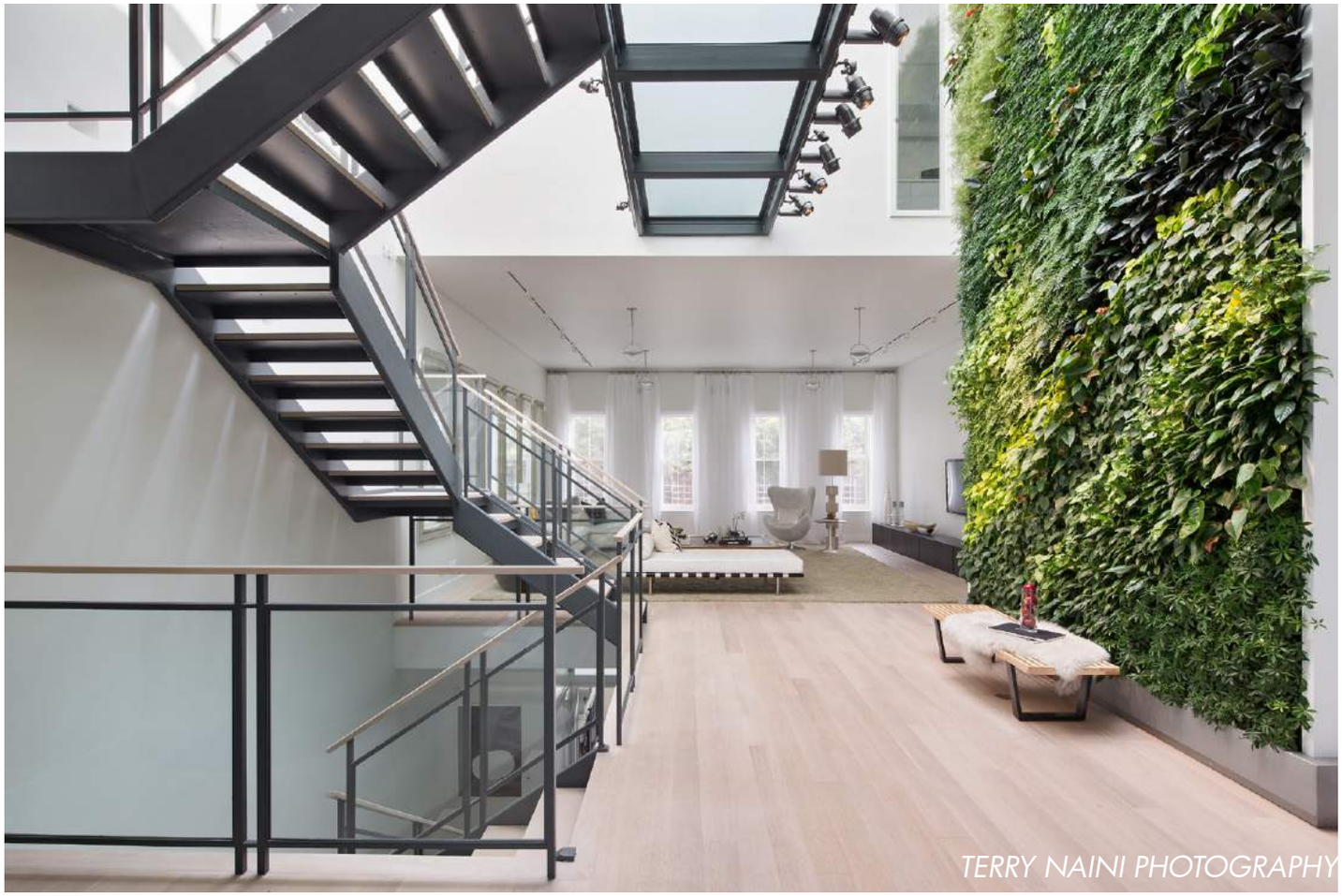
LEFT: TYPICAL TOWNHOUSE FLOOR JOISTS POCKETED INTO THE PARTY WALL.

ABOVE: PASSIVE FLOOR JOISTS ARE WRAPPED BEFORE POCKETED INTO THE SEALED PARTY WALL.

WHY CLIENTS CHOOSE PASSIVE: FRESH AIR

What if you could have filtered *fresh air 24/7?*

Passive house owners can tell the difference in fresh air quality, one of their most appreciated passive elements.



- *No need to open windows for fresh air, (but you still can!) as energy recovery ventilators (ERV) regulate moisture.*
- *ERVs filter air from contamintants and pollution, noticeably alleviating health issues like allergies.*
- *ERVs stabilize humidity levels, especially during the summer.*
- *ERVs are constantly running at a low speed without user interaction, but at a low electricity draw.*

WHY CLIENTS CHOOSE PASSIVE: QUIET HOMES

What if you could *eliminate* almost all *street noise?*

The combination of sealed walls, better insulation, and Passive windows drastically reduce street noise. Quiet spaces no longer need to be at the back of the home.

MIKE TAUBER PHOTOGRAPHY

WHY CLIENTS CHOOSE PASSIVE: WARM HOMES

What if you almost *never needed heat?*

New York City Passive House occupants barely use their heat.
These Brooklyn homeowners had ***not turned on the heat all season,*** and this interior temperature was recorded.

WHY CLIENTS CHOOSE PASSIVE: DESIGN FREEDOM

Passive House allows for more *design freedom.*

Without radiators, soffits, or drafts, ***we no longer have the spatial constraints*** as when designing within a typical townhouse.

WHY CLIENTS CHOOSE PASSIVE: NET ZERO

Passive house is the path to ***net-zero.***

By building a better envelope, a passive house reduces the energy demand and makes net-zero possible with renewable energy sources, like solar panels.

JOHN MUGGENBORG PHOTOGRAPHY

LESSONS LEARNED:
A SUCCESSFUL PROCESS

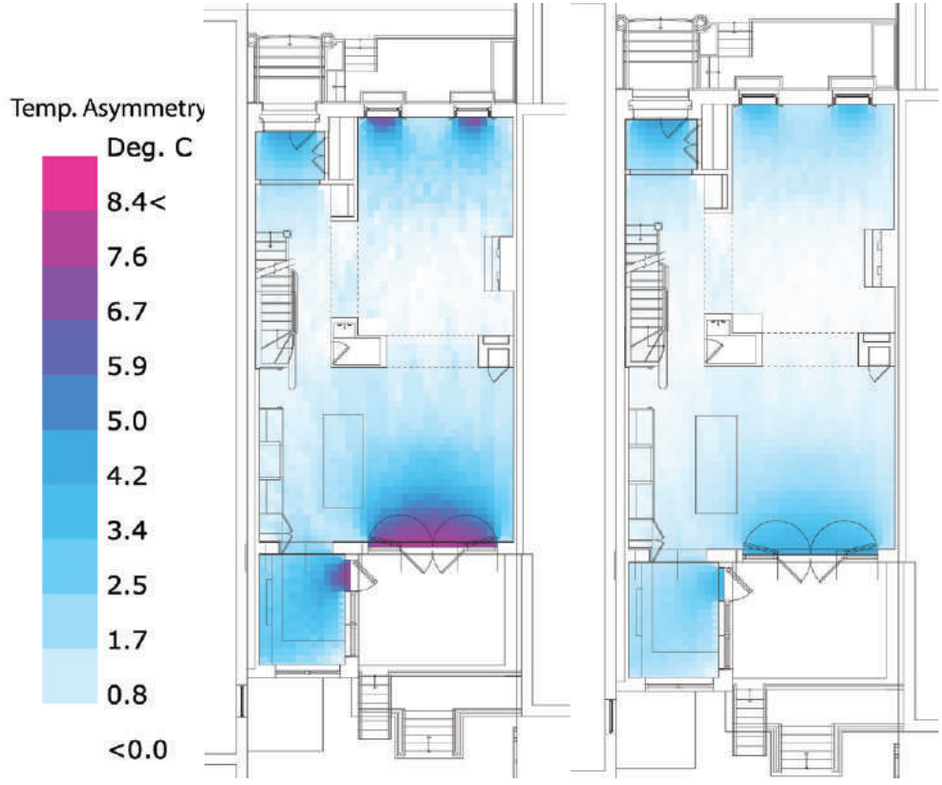
WORKING WITH CONSULTANTS AND CONTRACTORS

WORKING WITH CONSULTANTS

1. Start with your passive consultant before Schematic Design.
   - *Reduce heating load*
   - *Reduce cooling load*
   - *Reduce primary energy load*

2. Help your clients understand passive house concepts and to provide clear options with implications of their decisions.

TYPICAL WINDOWS *PASSIVE WINDOWS*

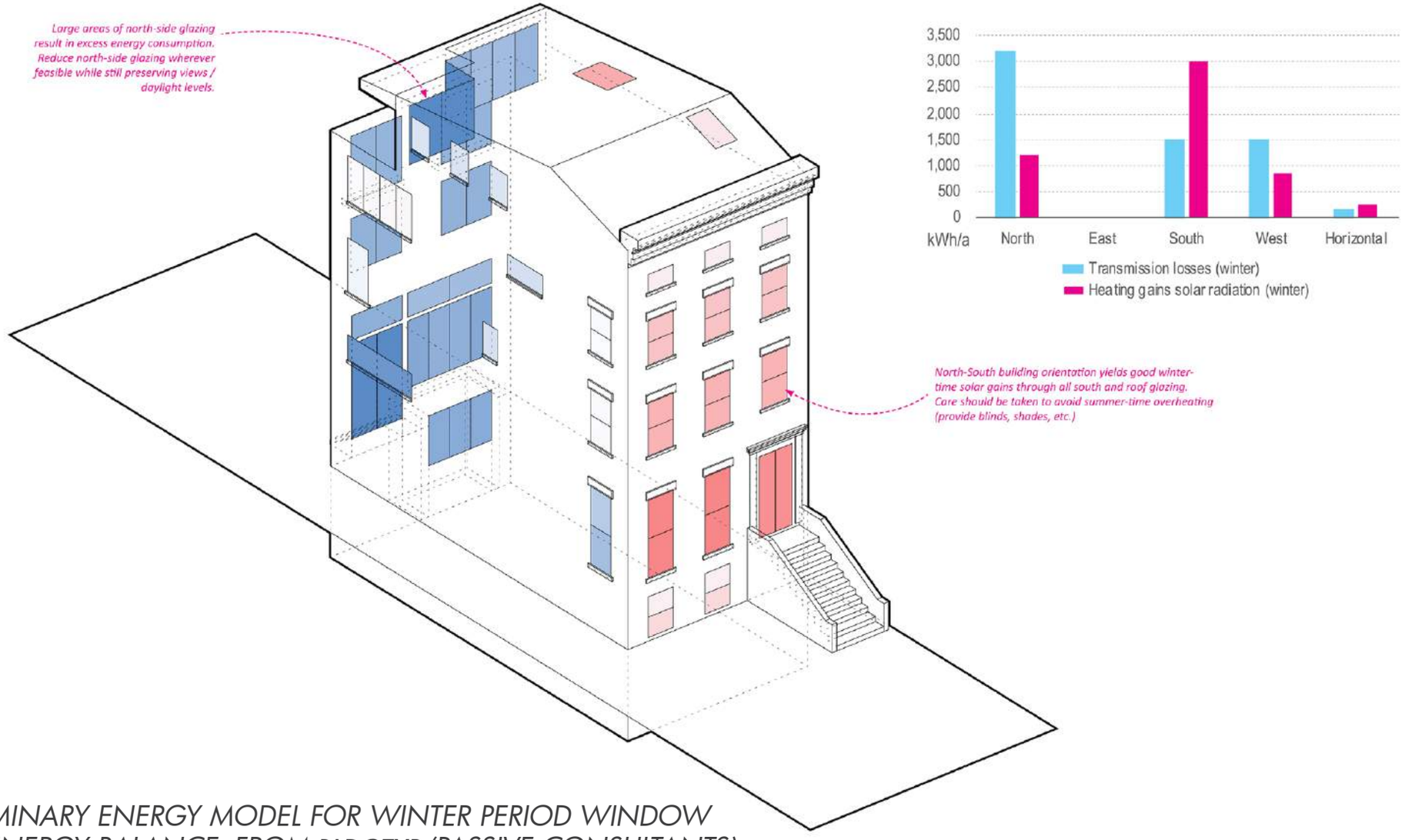


GRAPHICS ARE PART OF A PASSIVE CERTIFICATION PACKAGE, FROM **BLDGTYP** *(PASSIVE CONSULTANTS).*

PETER PEIRCE PHOTOGRAPHY

WORKING WITH CONSULTANTS

3. Pay close attention to shading & cooling.



PRELIMINARY ENERGY MODEL FOR WINTER PERIOD WINDOW NET ENERGY BALANCE, FROM ***BLDGTYP*** *(PASSIVE CONSULTANTS).*

WORKING WITH CONSULTANTS

Throughout Construction:

- Hold frequent walk-throughs to ensure correct implementation of details.
- Do blower door tests often, which test the air-tightness of a building, seeking 0.6 air changes per hour @ 50 pascals pressure (0.6ACH50). In a typical townhouse, around 10.0 ACH50 are common, which means that the mech. systems need to make up for that much heat/cool air.

WORKING WITH CONTRACTORS

Myth: "You need a passive house contractor to be successful."

- None of the contractors we worked with had worked on a passive house, or even heard of the term.
- We required that the site super and G.C. get certified through the passive house tradesperson training at AEA.

You <u>do</u> need a contractor that enjoys building.

AEA HEADQUARTERS & ENERGY MANAGEMENT TRAINING CENTER, BRONX NYC.

WORKING WITH CONTRACTORS

Three essential meetings:

1. Pre-design meeting
2. Pre-construction design meeting
3. Passive house primer meeting on site with subcontractors

IMPORTANCE OF COMMISSIONING & SERVICING

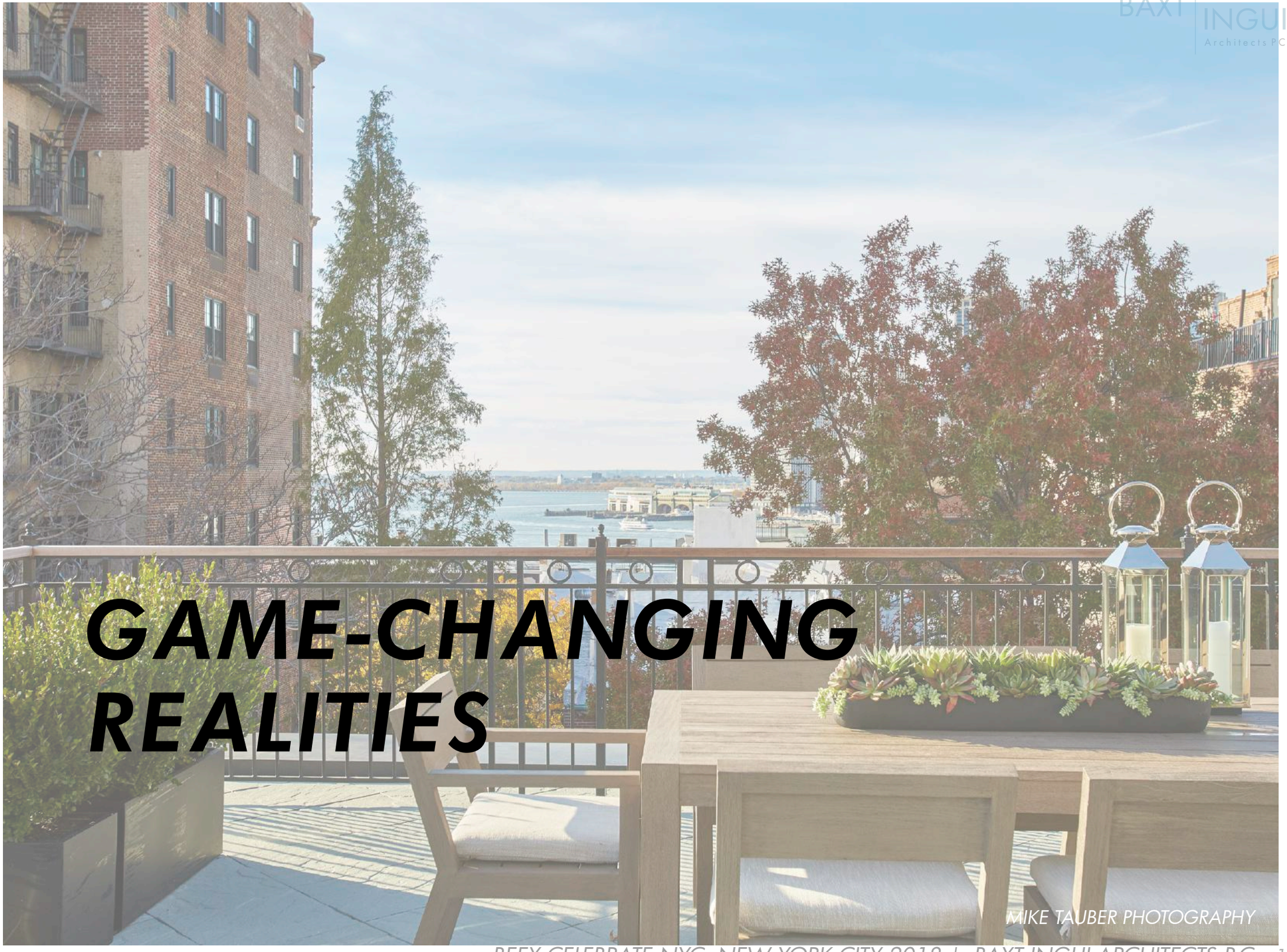
Identify who will:

- Commission
- Service
- Educate client about how the house works, i.e., change typical habits

HRV/ERV UNIT
ZEHNDER

ROUTINE SYSTEM BALANCING
ALEX WILSON, BUILDINGGREEN, INC.

PERFORMANCE MONITORING
WIRELESS SENSOR TAG BY CAO GAGETS LLC, & NETATMO WEATHER-STATION SHOWN.



GAME-CHANGING REALITIES

MIKE TAUBER PHOTOGRAPHY

TYPICAL HEATING SYSTEMS

CHOPPED-OUT PLASTER CROWN FOR PIPE INSTALLATION

HOT EXPOSED PIPE

PLENTY OF SPACE, BUT NOT INSULATED

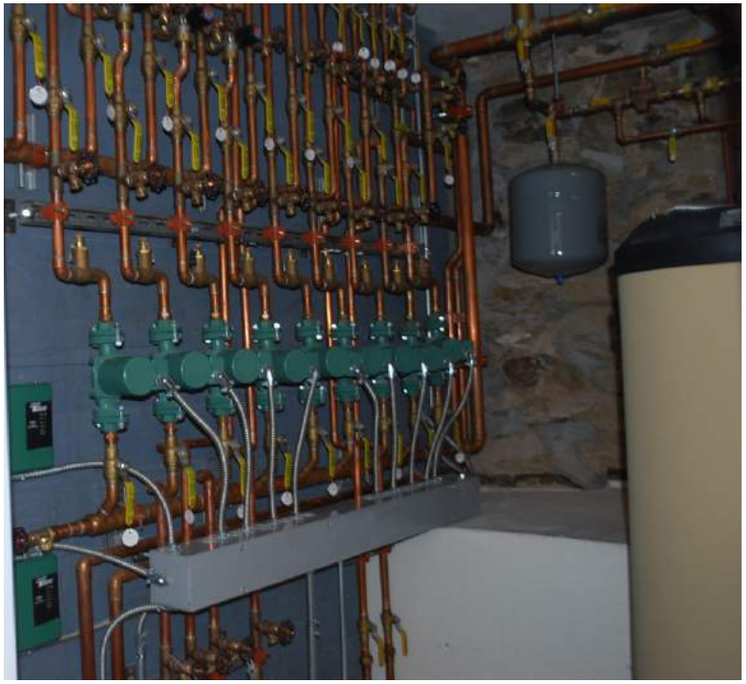
WINDOWS INSTALLED IN A WAY THAT ALLOWS AIR LEAKAGE

RADIATOR IN AN AWKWARD LOCATION WITH A LEAKY VALVE

ROTTING AROUND PIPE THROUGH FINISHED FLOOR

TYPICAL HEATING SYSTEMS

1. MANY OF OUR HOUSES HAVE DECADES-OLD SYSTEMS THAT WERE OVERSIZED, INEFFICIENT BOILERS WITH NO ZONING.



2. THEN WE RESOLVED THIS BY PROVIDING:

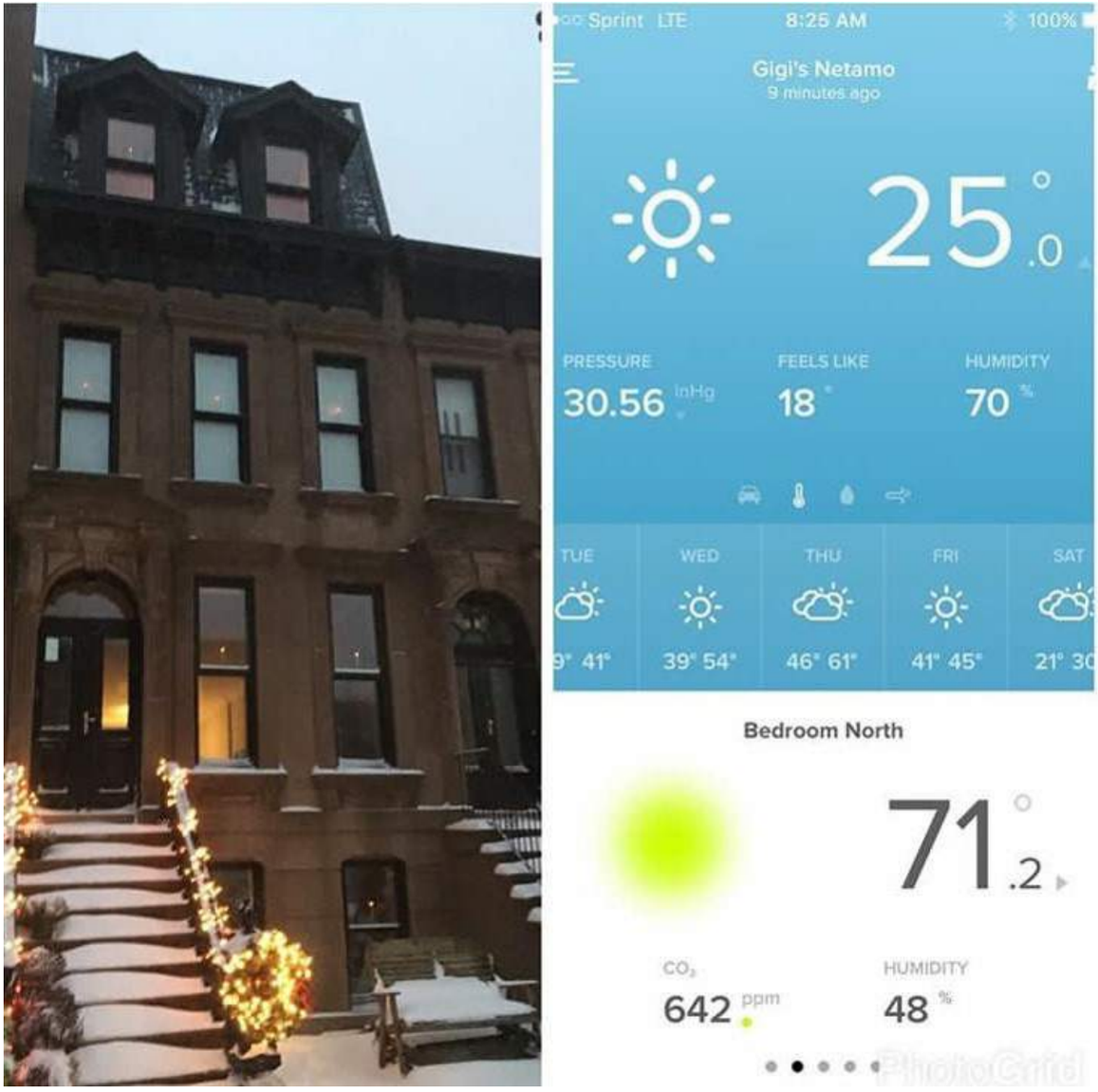
- HIGH-EFFICIENCY BOILERS
- THE ABILITY TO ZONE PER FLOOR/ROOM
- SOME HOMES EVEN HAVE HYDRONIC IN-FLOOR HEATING.

3. THEN WE STARTED TO CONTROL THIS SYSTEM EFFICIENTLY WITH SENSORS & CONTROL SYSTEMS THAT WORKED WITH PHONES & TABLETS.

PASSIVE HEATING SYSTEMS

IN A PASSIVE HOME, YOU DON'T NEED A SEPARATE HEATING SYSTEM.

PASSIVE HEATING SYSTEMS



COST, TIME, & SPACE SAVINGS:

- [x] NO BOILER
- [x] NO MANIFOLDS
- [x] NO FLUE
- [x] SIGNIFICANTLY FEWER THERMOSTATS
- [x] NO ELABORATE CONTROL SYSTEM
- [x] NO RADIATORS
- [x] NO RADIATOR PIPING
- [x] NO NEED FOR IN-FLOOR HEATING

TYPICAL COOLING SYSTEMS

THROUGH-WALL A/C UNITS

SEVERAL ROOFTOP CONDENSING UNITS

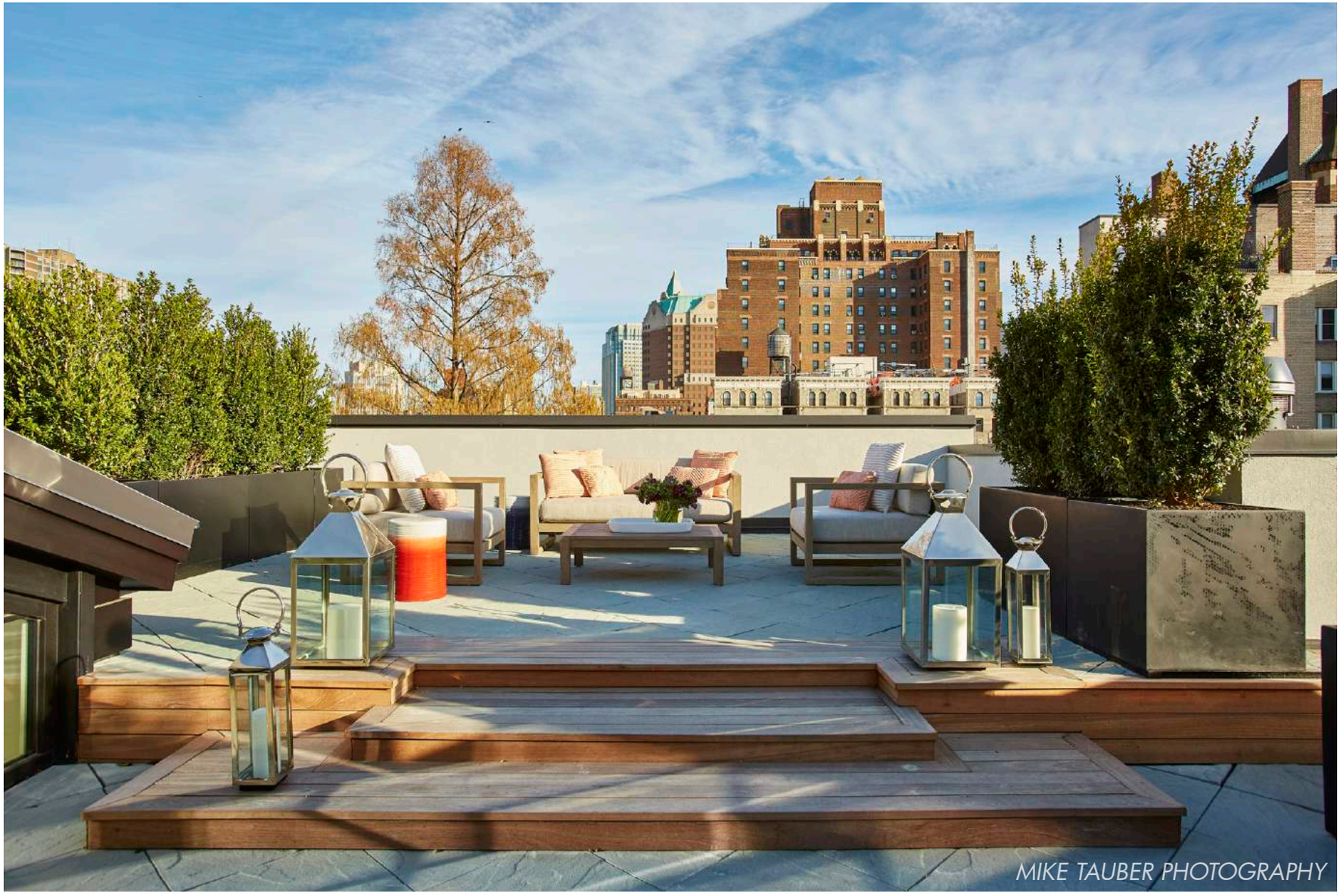
TYPICAL VS. PASSIVE ROOF

PASSIVE HOUSE ROOFTOP MECHANICAL EQUIPMENT

TYPICAL HOUSE ROOFTOP MECHANICAL EQUIPMENT

PASSIVE ROOF

WITH 80-90% LESS MECHANICALS, A ROOF CAN LOOK LIKE THIS.



TYPICAL VS. PASSIVE WINDOWS

PASSIVE HOUSE WINDOWS:

- *CAN BE VISUALLY INDISTINGUISHABLE*
- *CAN BE LANDMARKS APPROVED*
- *FAR OUT-PERFORM TYPICAL WINDOWS*
- *CAN BE COST NEUTRAL*

TYPICAL HOUSE

PASSIVE HOUSE

PASSIVE WINDOWS

PETER PEIRCE PHOTOGRAPHY

PETER PEIRCE PHOTOGRAPHY

ADAM MACCHIA PHOTOGRAPHY

PASSIVE HOUSE WINDOWS INSTALLED IN LANDMARK DISTRICTS.

TYPICAL VS. PASSIVE CELLAR

TYPICAL TOWNHOUSE CELLAR

TYPICAL VS. PASSIVE CELLAR

PASSIVE CELLARS CAN LOOK LIKE THIS AND HAVE FRESH, NON-DAMP AIR.

CLOTHES DRYERS

Heat pump dryers

Whirpool has a full-sized electric heat pump dryer that does not need to be vented, but ***should include an ERV exhaust point in the room.***

JOHN MUGGENBORG PHOTOGRAPHY

LARGE WINDOWS

Walls of glass

They are possible if you are mindful of shading and building orientation.

JOHN MUGGENBORG PHOTOGRAPHY

PETER PEIRCE PHOTOGRAPHY

HISTORIC DETAILS

Passive front door in Landmark/Historic Districts

NEW PASSIVE DOOR, LPC APPROVED

EXISTING HISTORIC DOOR

NEW PASSIVE DOOR

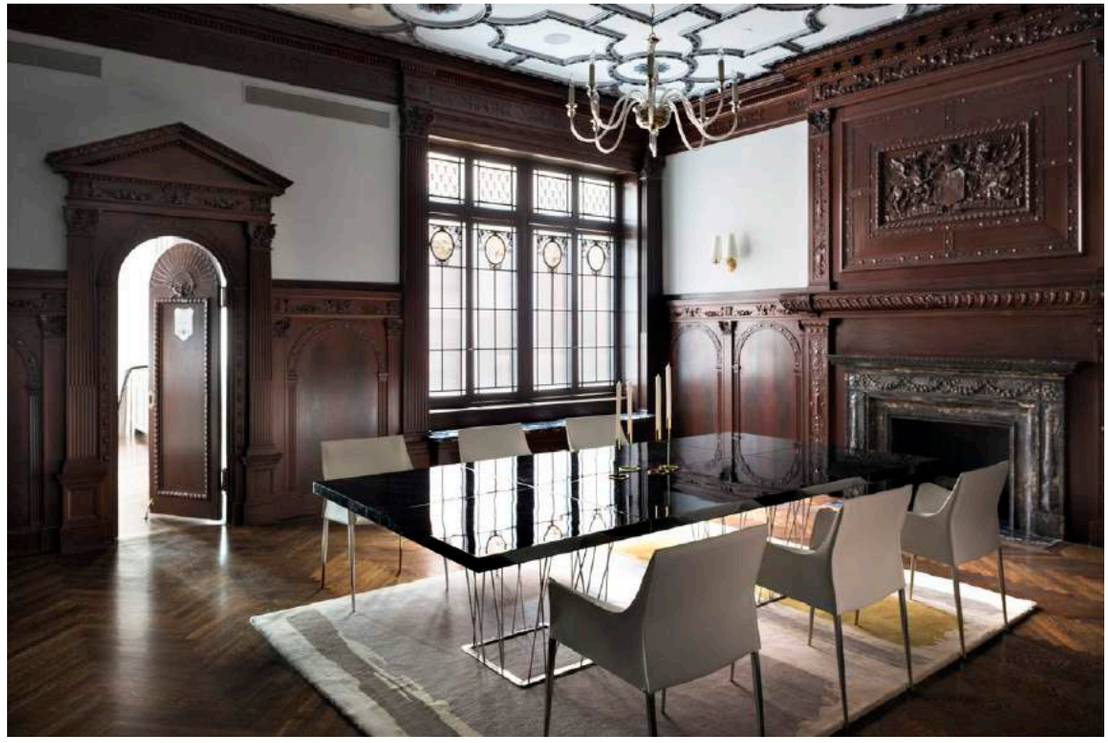
HISTORIC DETAILS

Preserving existing details

You can do a passive house without gutting a space.
Passive windows are a solution to difficult historic openings.

BEFORE

AFTER

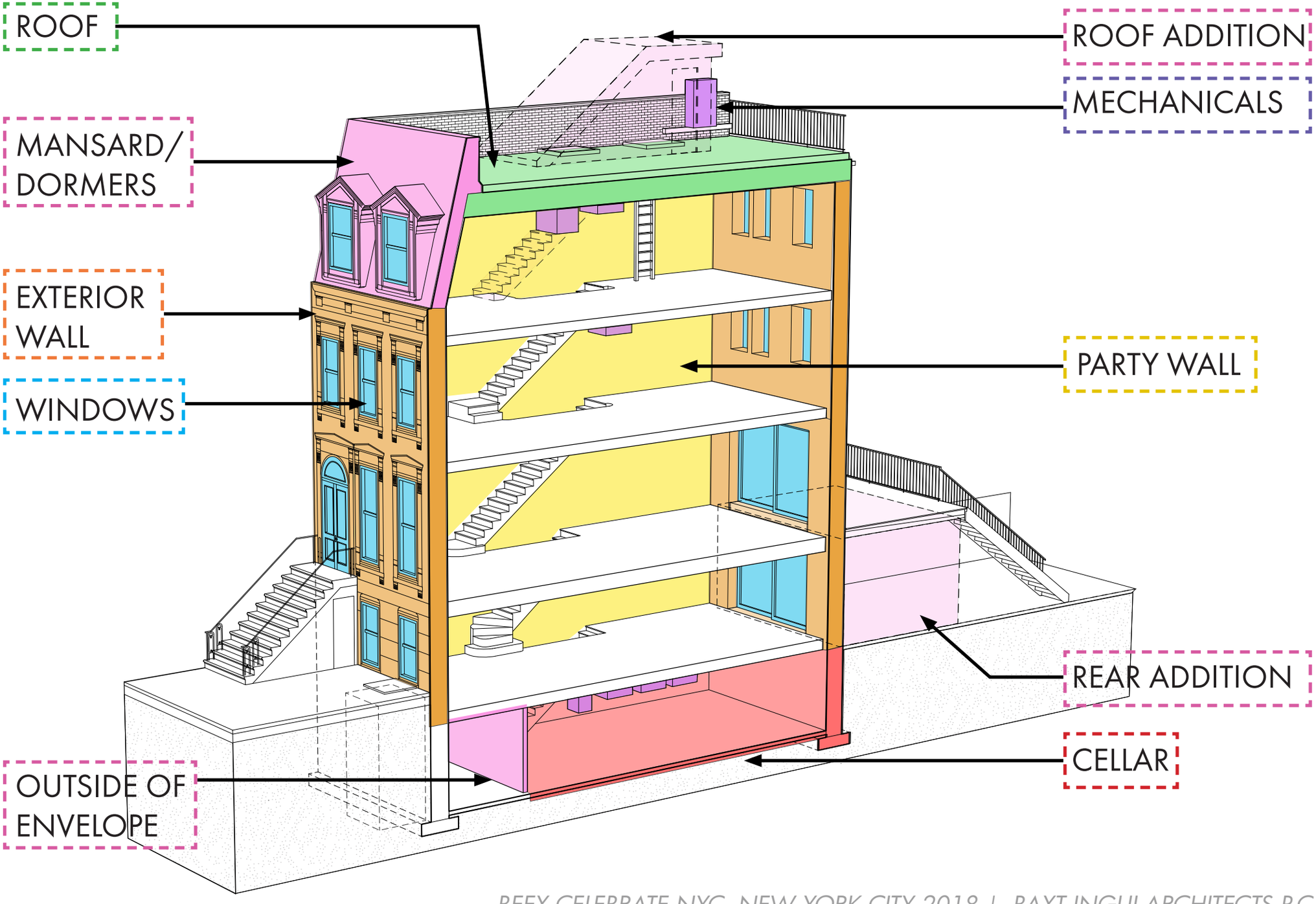


ADAM MACCHIA PHOTOGRAPHY

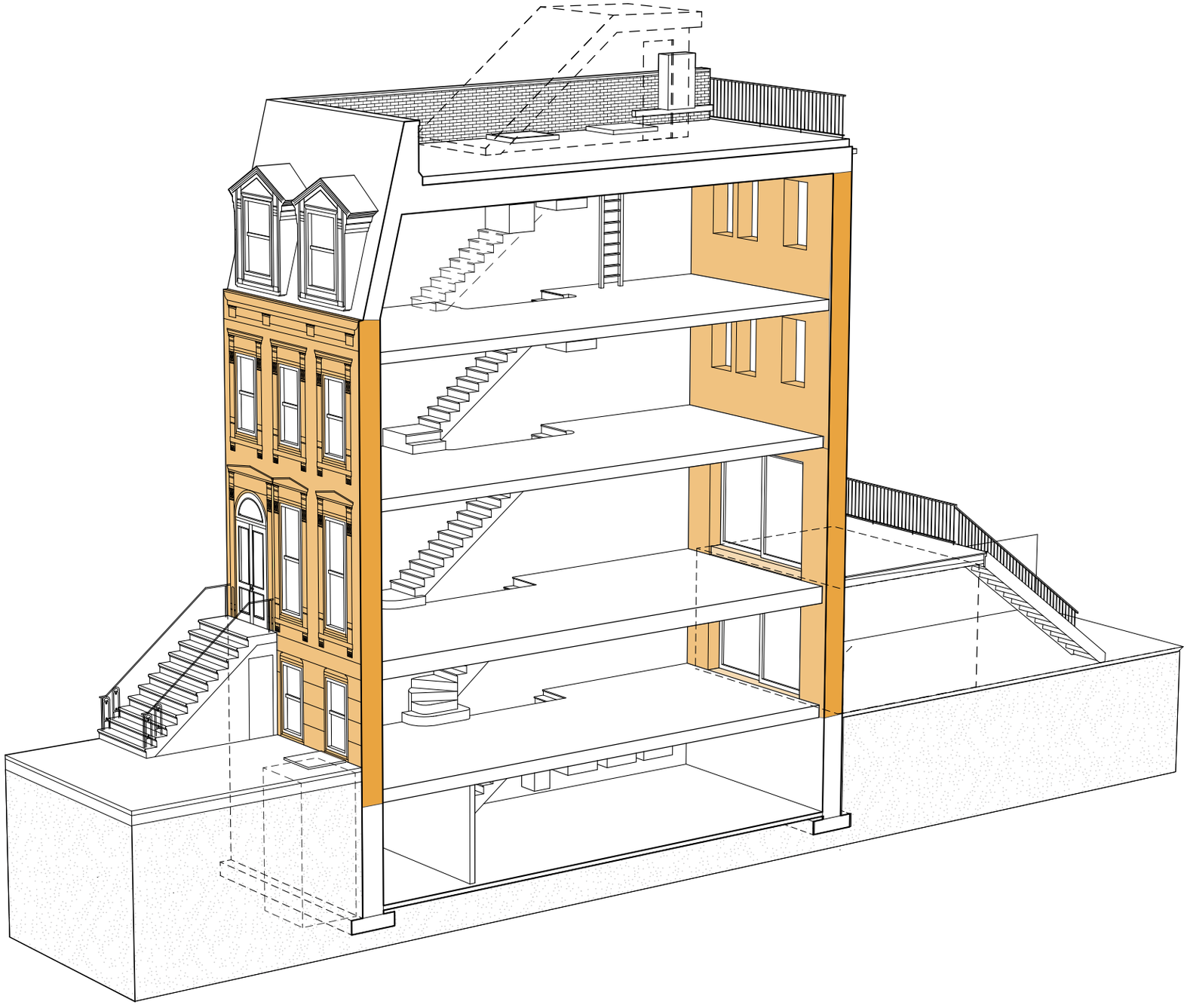
PASSIVE HOUSE CASEMENT WINDOWS WITH RE-APPLIED AND RESTORED STAINED GLASS AT INTERIOR.

PASSIVE CONCEPTS APPLIED

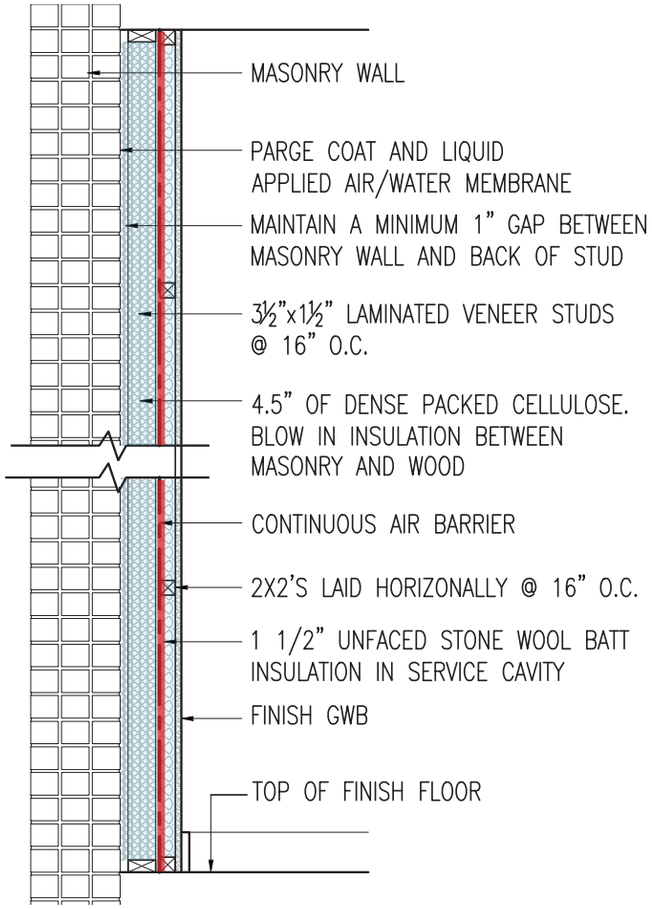
PASSIVE HOUSE:
TOWNHOUSE RETROFIT
BROOKLYN, NY


ROOF
MANSARD/
DORMERS
EXTERIOR
WALL
WINDOWS
OUTSIDE OF
ENVELOPE
ROOF ADDITION
MECHANICALS
PARTY WALL
REAR ADDITION
CELLAR

EXTERIOR WALL



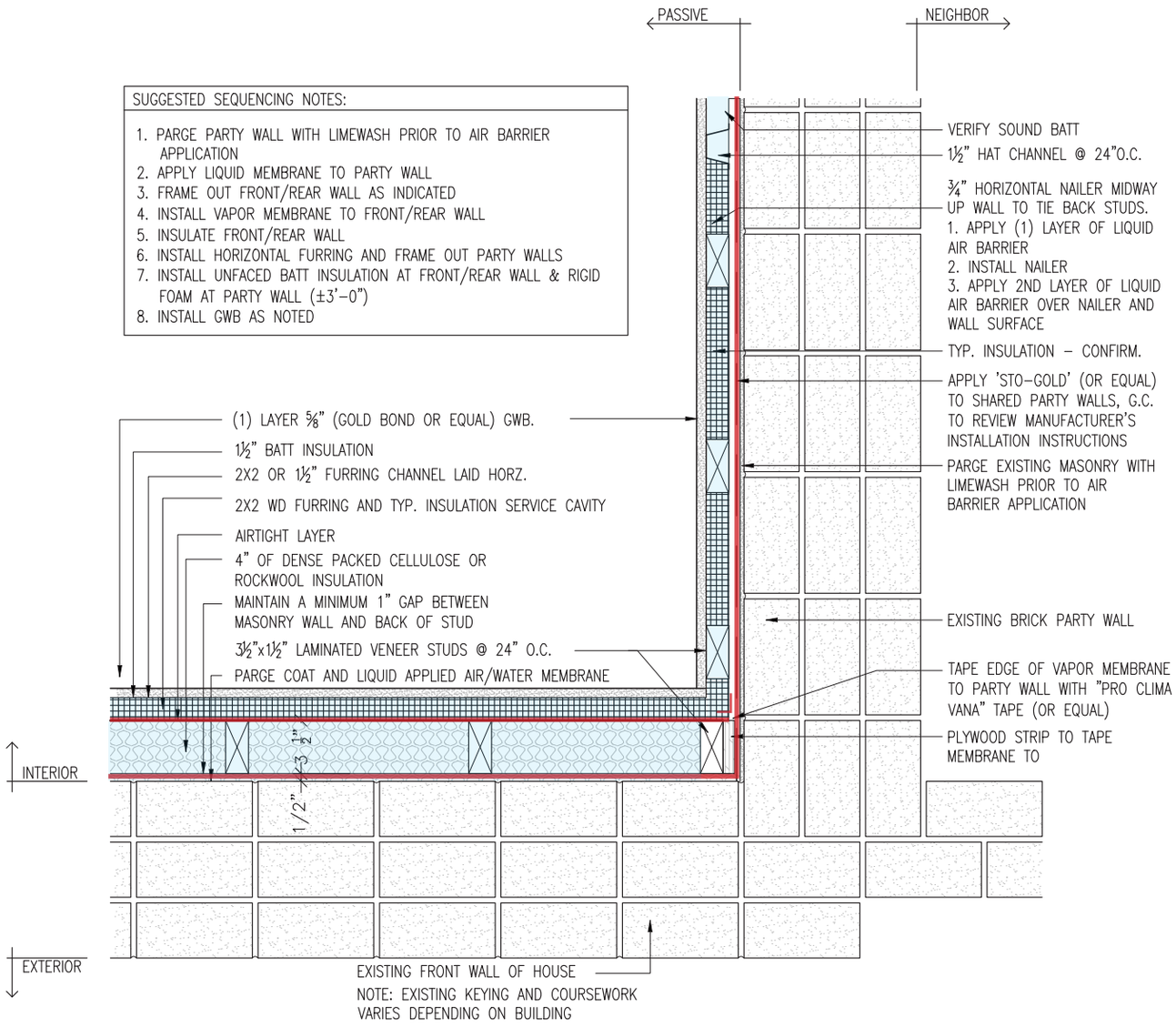
EXTERIOR WALL



SECTION DETAIL, EXTERIOR WALL

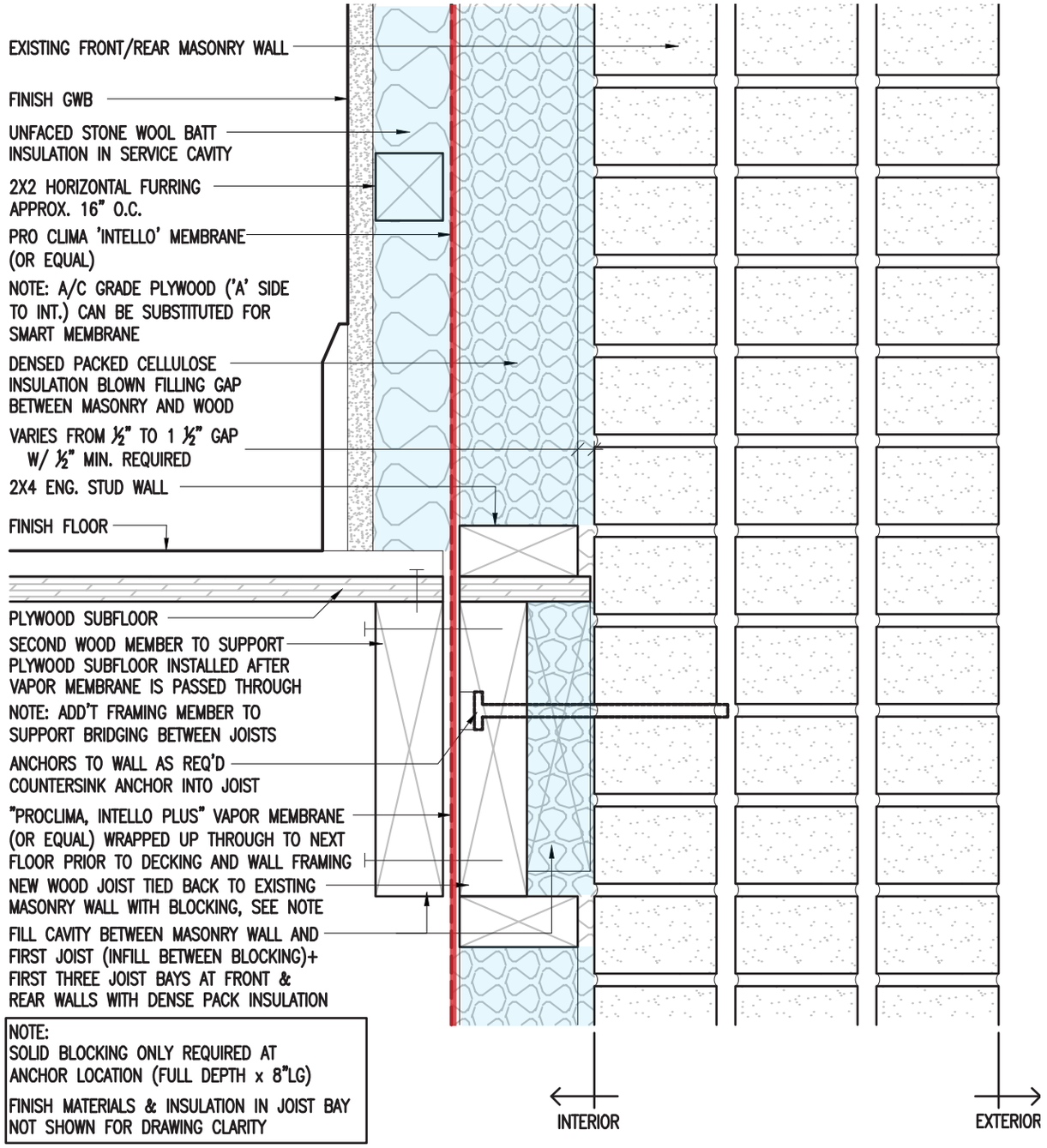
SPRAY-APPLIED ROCKWOOL, R-4 PER INCH (AMERICAN ROCKWOOL)

EXTERIOR WALL



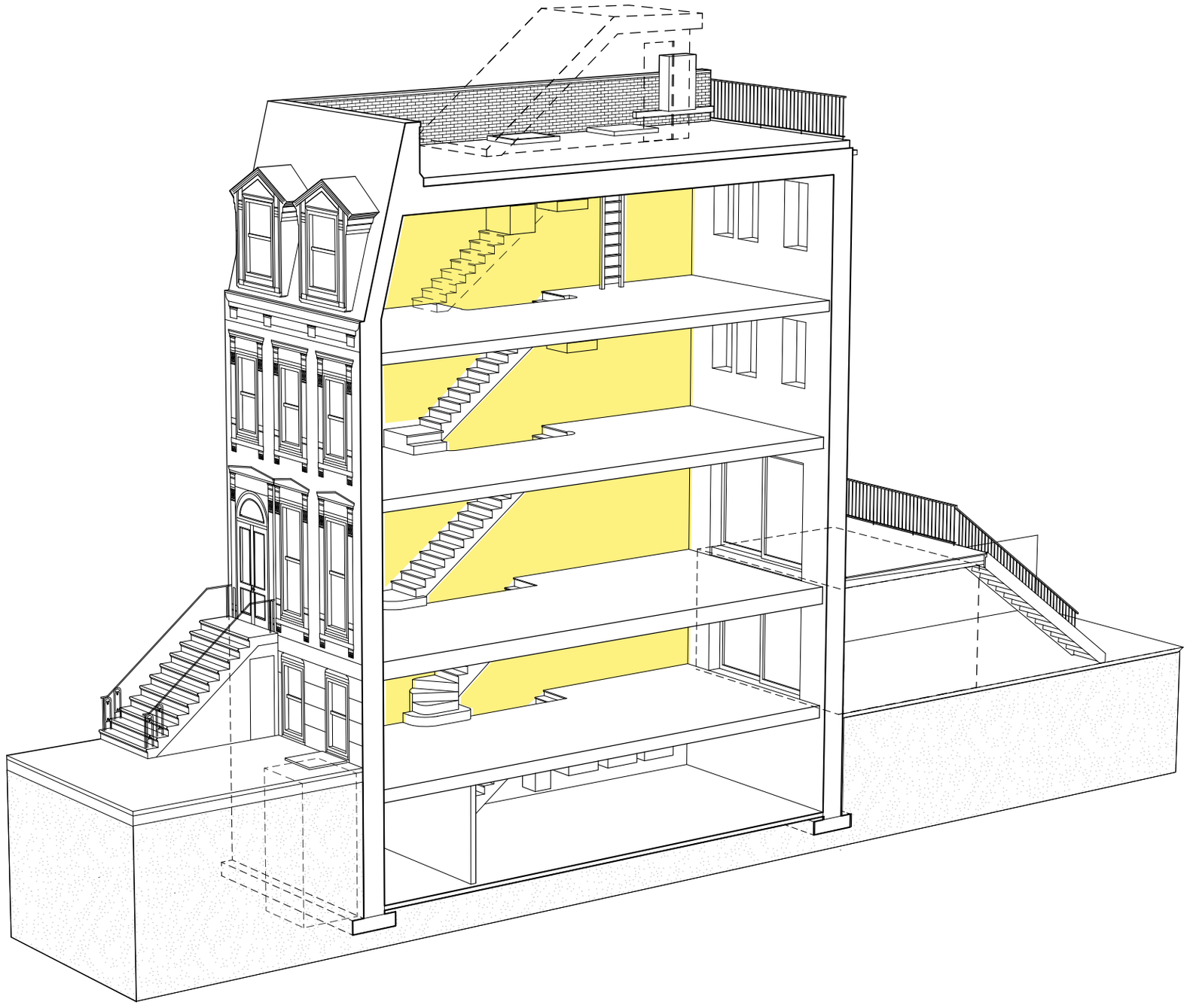
PLAN DETAIL, EXTERIOR WALL / PARTY WALL CORNER

EXTERIOR WALL

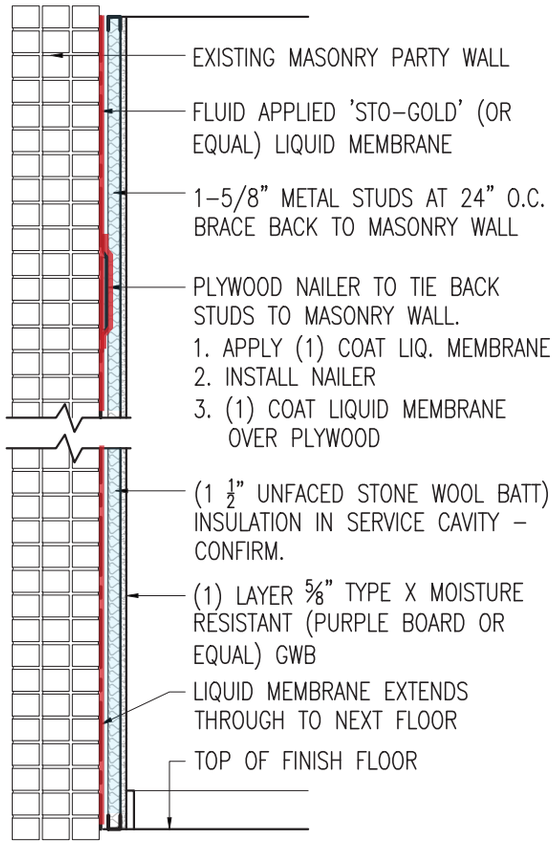


SECTION DETAIL, FLOOR JOIST AT EXTERIOR WALL

PARTY WALL



PARTY WALL



SECTION DETAIL
PARTY WALL ABOVE GRADE

SPRAY STO AND LIME-BASED MORTAR. A PAIR OF SPRAYERS CAN COVER A FLOOR A DAY.

PARTEL BLOWERPROOF LIQUID

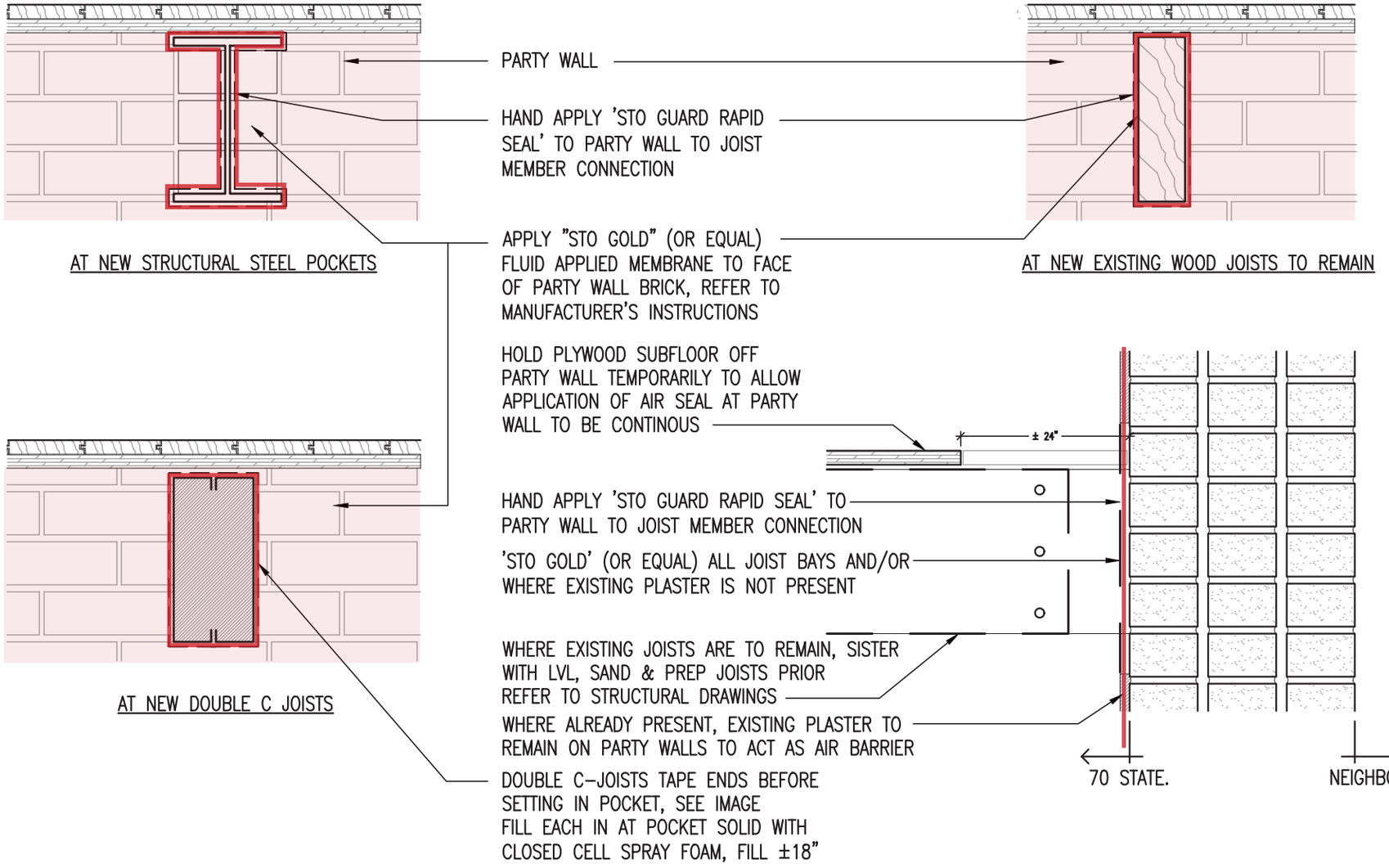
"AIRTIGHT COATING IS SPRAY APPLIED WITH AN AIRLESS PAINTSPRAY MACHINE…IT IS A SMART VAPOR CONTROL MEMBRANE WITH VARIABLE PERMEABILITY." (PARTEL)

Partel
Sustainability Through Technology

BRENNAN BRENNAN
INSULATION AND AIRTIGHTNESS

SPRAY APPLICATION BY PARTEL & BRENNAN BRENNAN

PARTY WALL

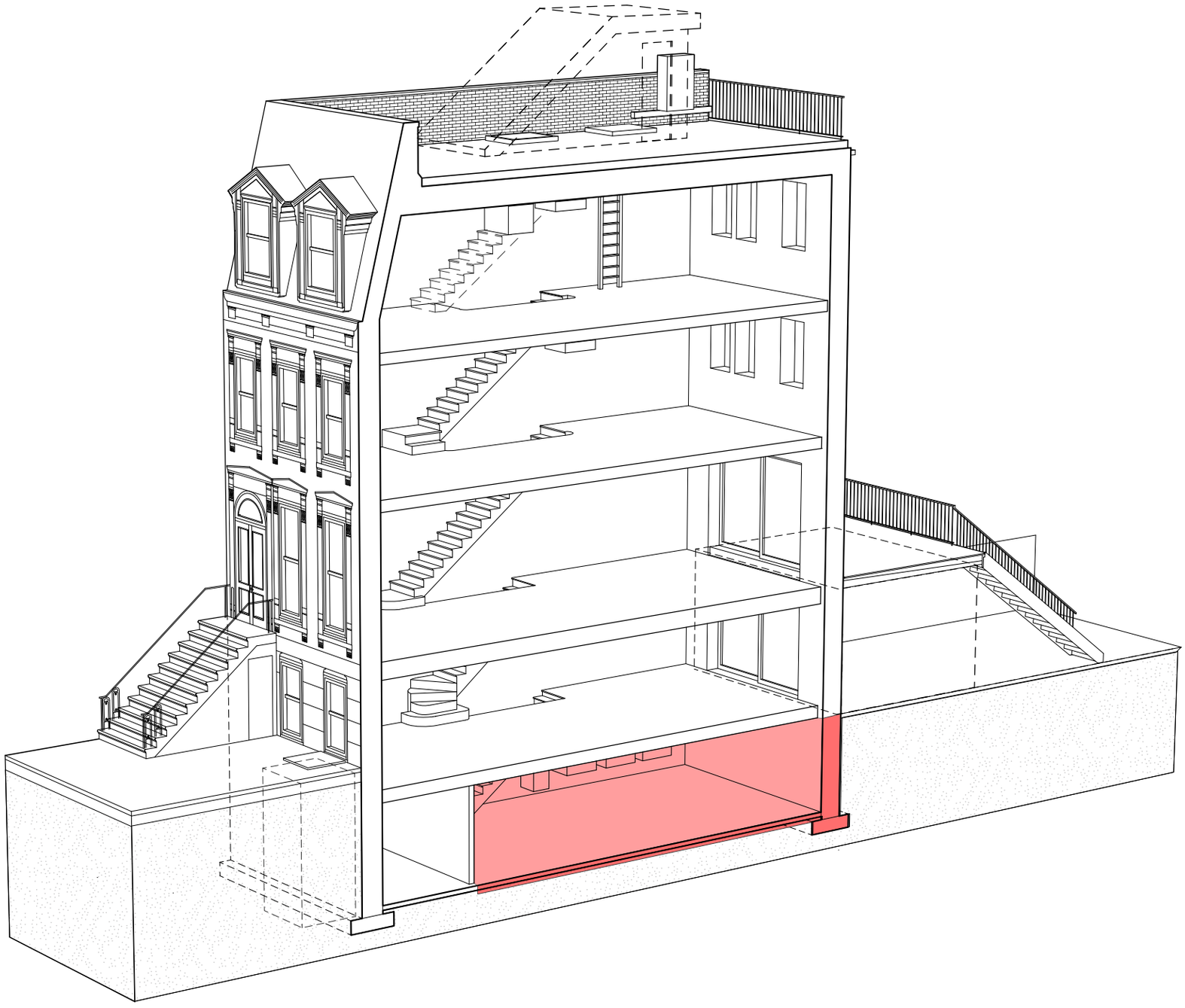


AIR SEALING AT PARTY WALL JOISTS

PRE-WRAPPED FLOOR JOISTS, TO BE PLACED IN JOIST POCKETS.

PARTY WALL

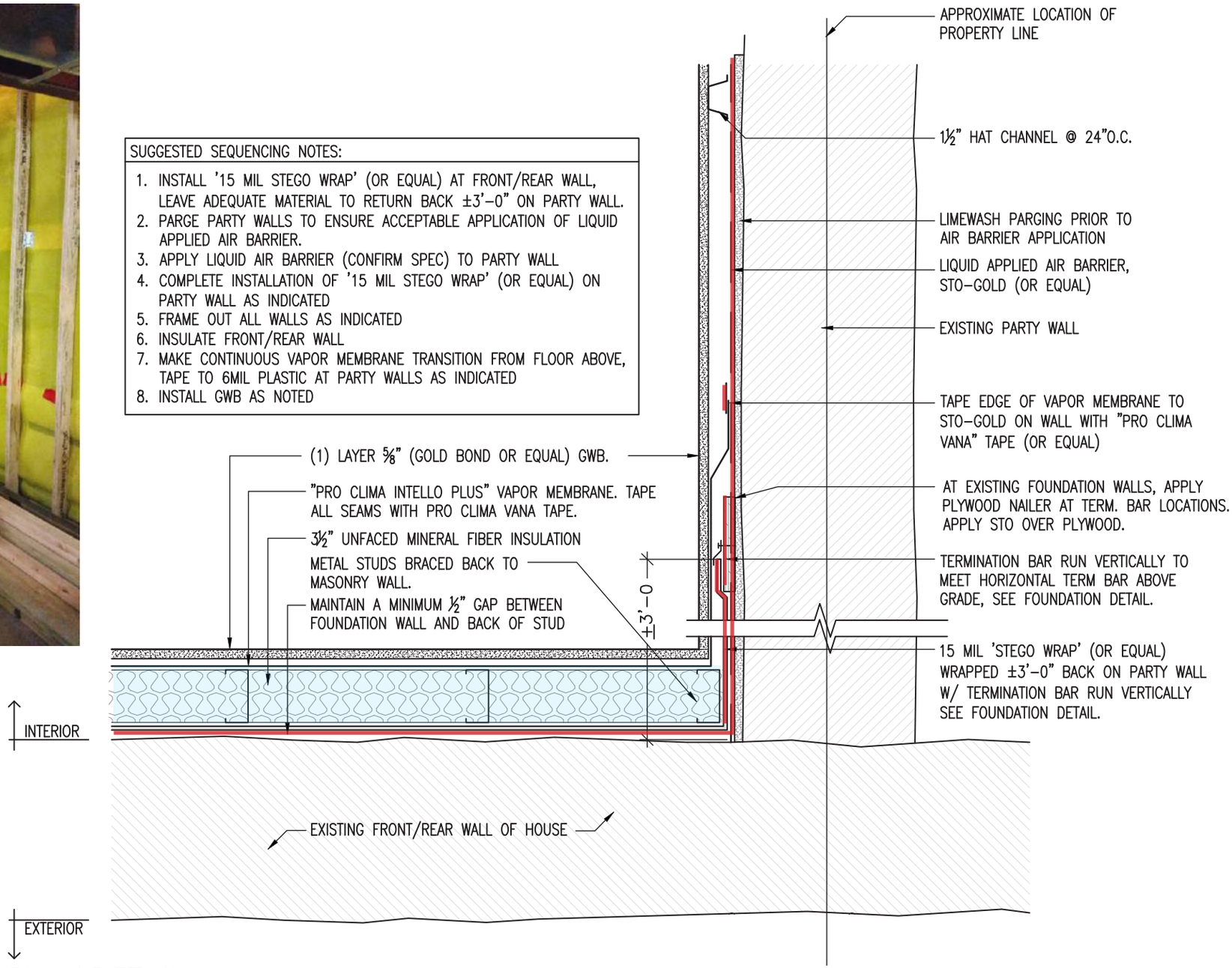
CELLAR



CELLAR PARTY WALL, BELOW GRADE

SUGGESTED SEQUENCING NOTES:

1. INSTALL '15 MIL STEGO WRAP' (OR EQUAL) AT FRONT/REAR WALL, LEAVE ADEQUATE MATERIAL TO RETURN BACK ±3'–0" ON PARTY WALL.
2. PARGE PARTY WALLS TO ENSURE ACCEPTABLE APPLICATION OF LIQUID APPLIED AIR BARRIER.
3. APPLY LIQUID AIR BARRIER (CONFIRM SPEC) TO PARTY WALL
4. COMPLETE INSTALLATION OF '15 MIL STEGO WRAP' (OR EQUAL) ON PARTY WALL AS INDICATED
5. FRAME OUT ALL WALLS AS INDICATED
6. INSULATE FRONT/REAR WALL
7. MAKE CONTINUOUS VAPOR MEMBRANE TRANSITION FROM FLOOR ABOVE, TAPE TO 6MIL PLASTIC AT PARTY WALLS AS INDICATED
8. INSTALL GWB AS NOTED

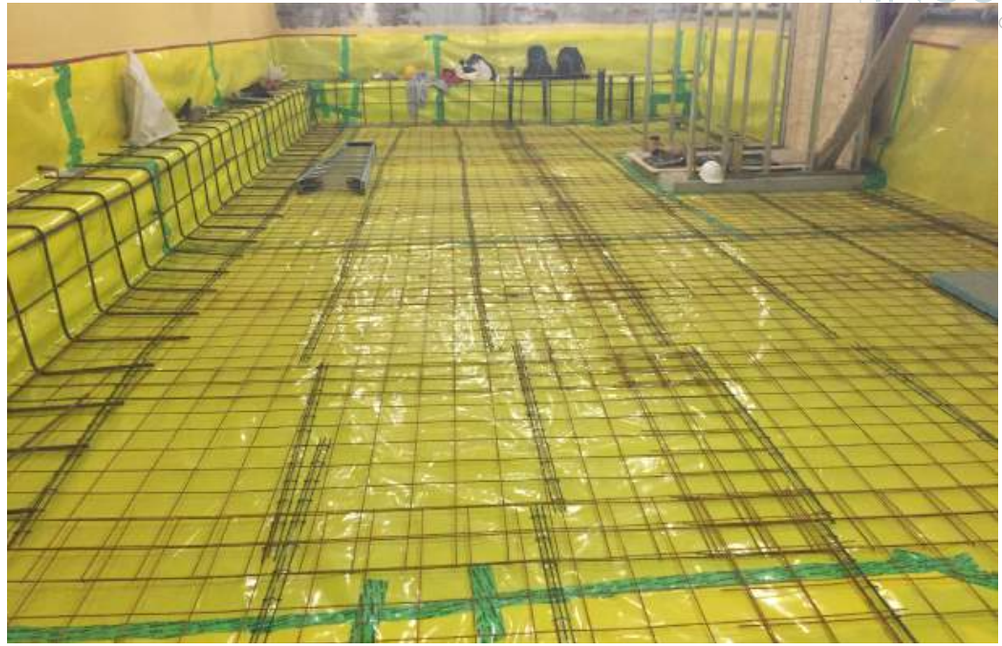


PLAN DETAIL
PARTY WALL /EXTERIOR CORNER, BELOW GRADE

CELLAR

CELLAR

UNDER-SLAB INSULATION

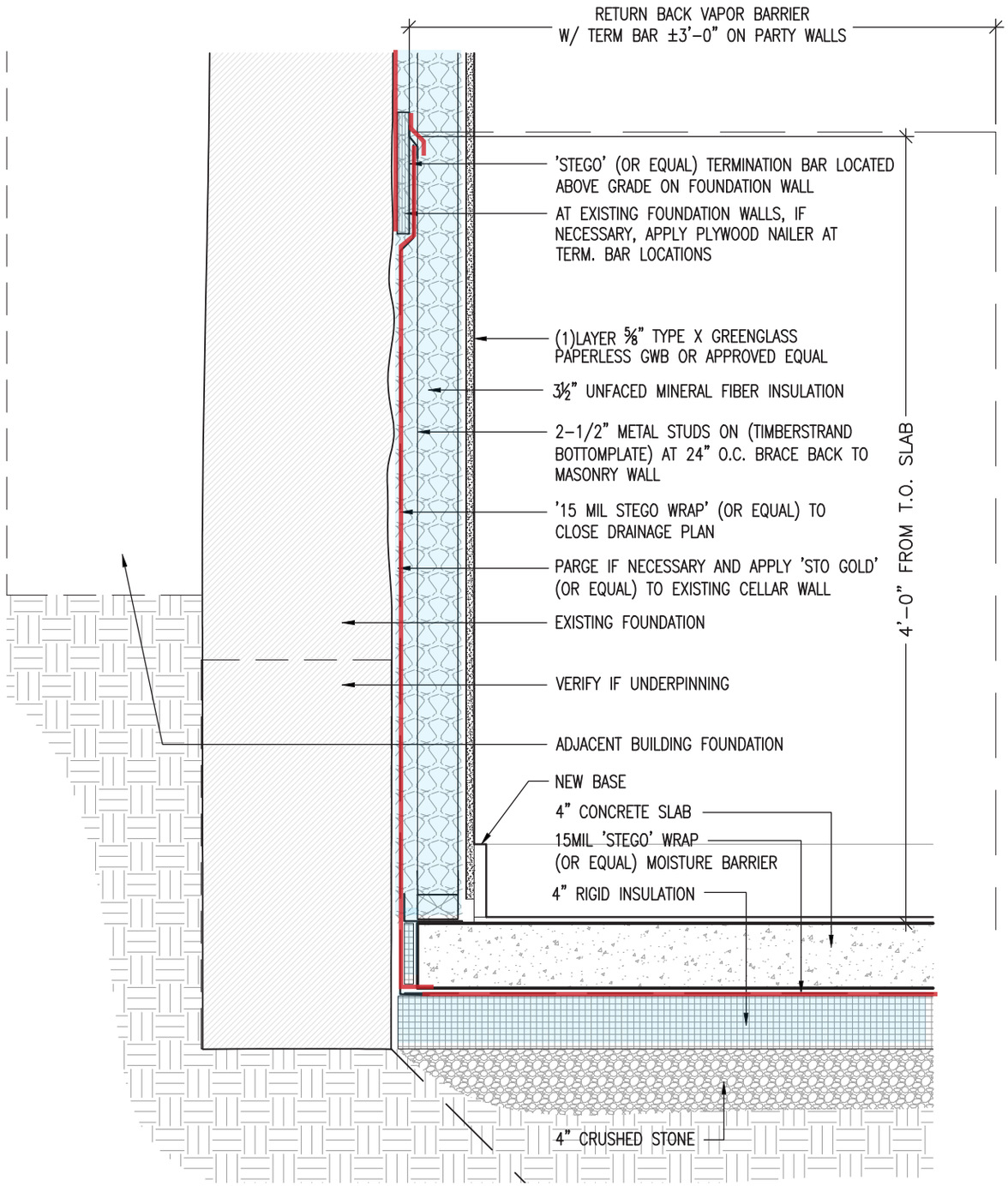


LAYOUT OF REBAR

TERMINATION BAR AND STEGO MASTIC DETAIL AT PARTY WALL

CONCRETE SLAB FILL

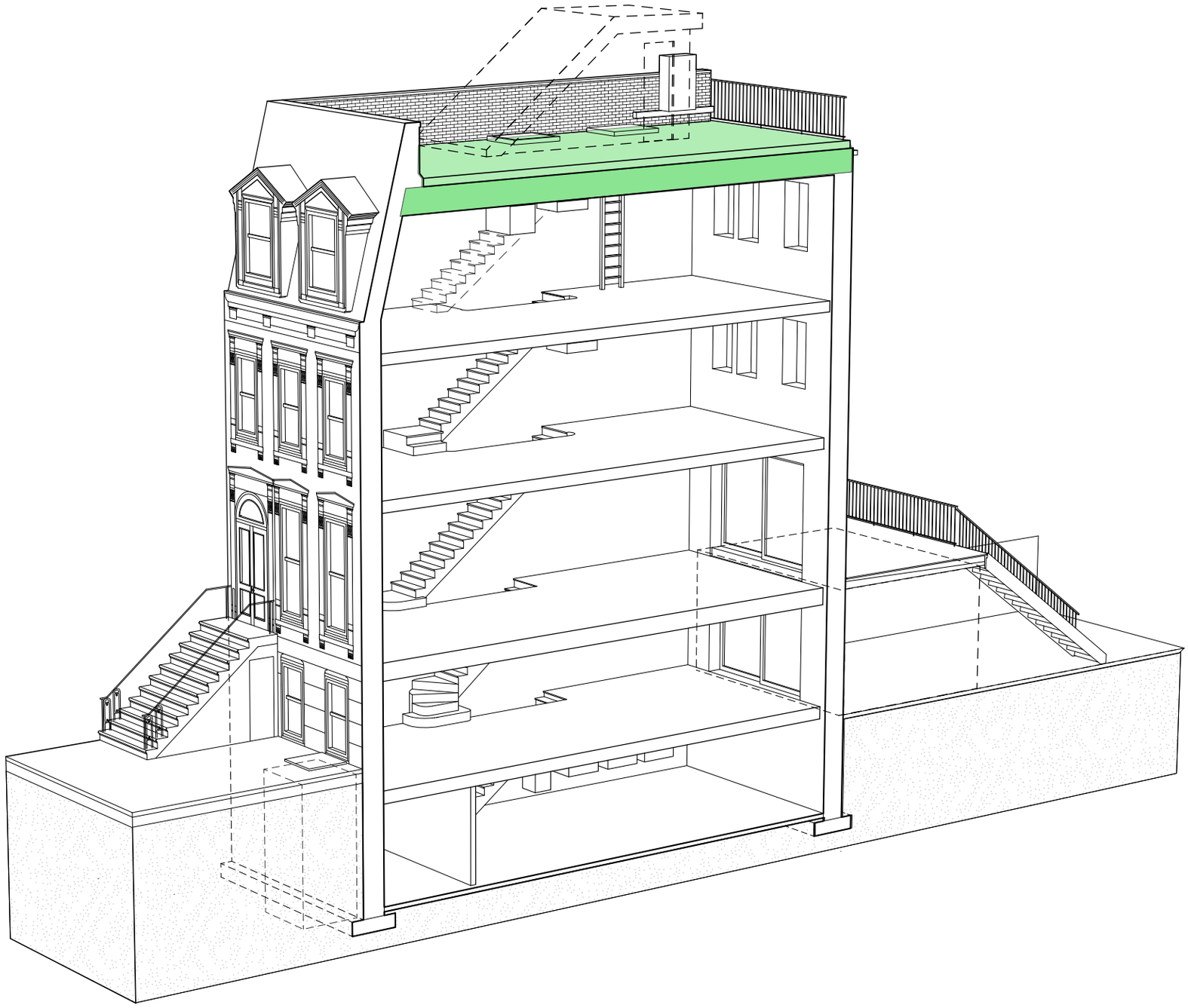
CELLAR

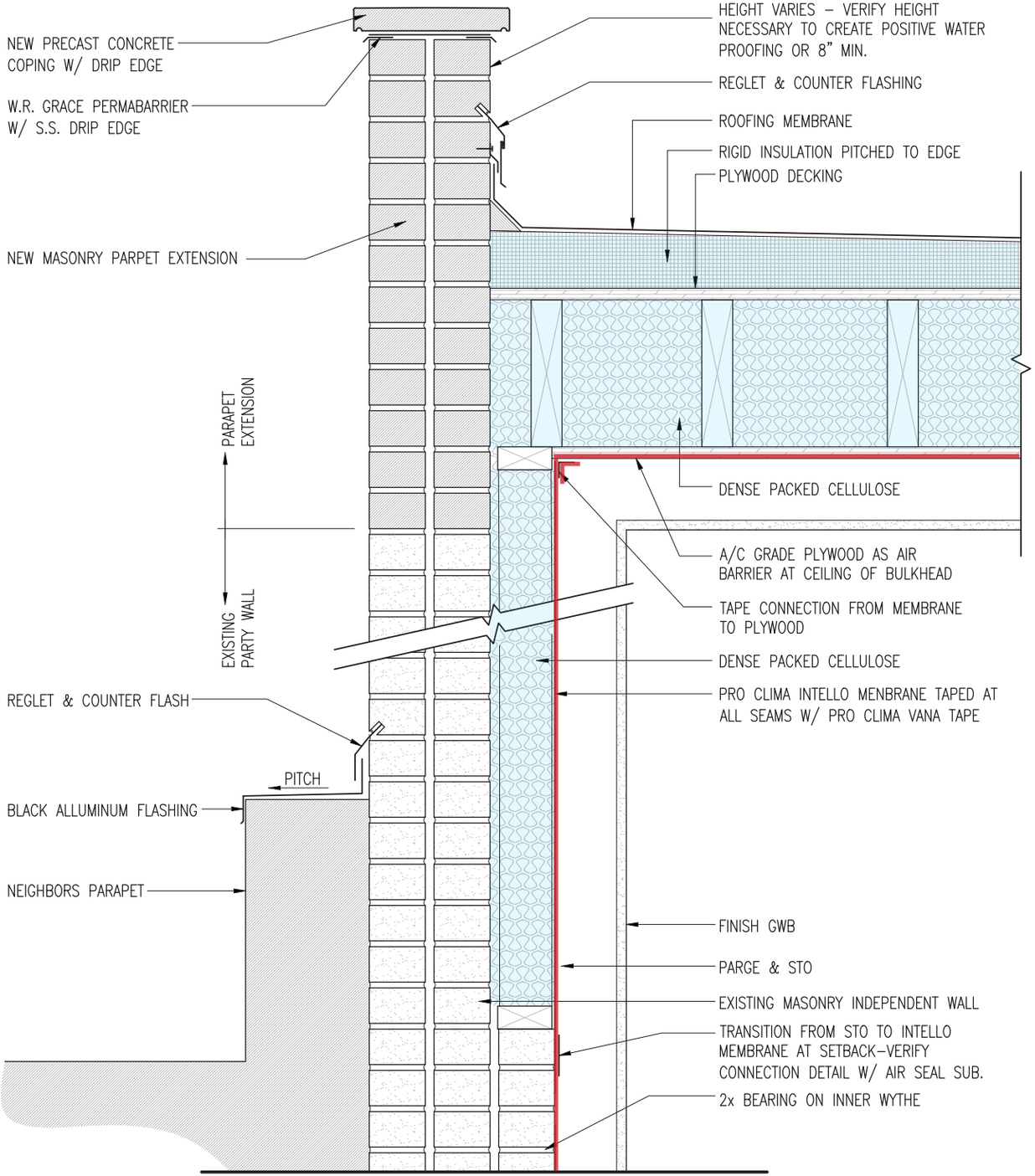


SECTION DETAIL

EXTERIOR OR PARTY WALL / CELLAR SLAB

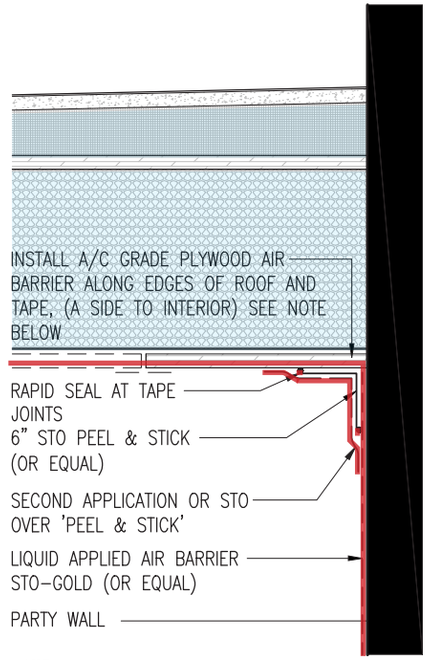
ROOF





SECTION DETAIL

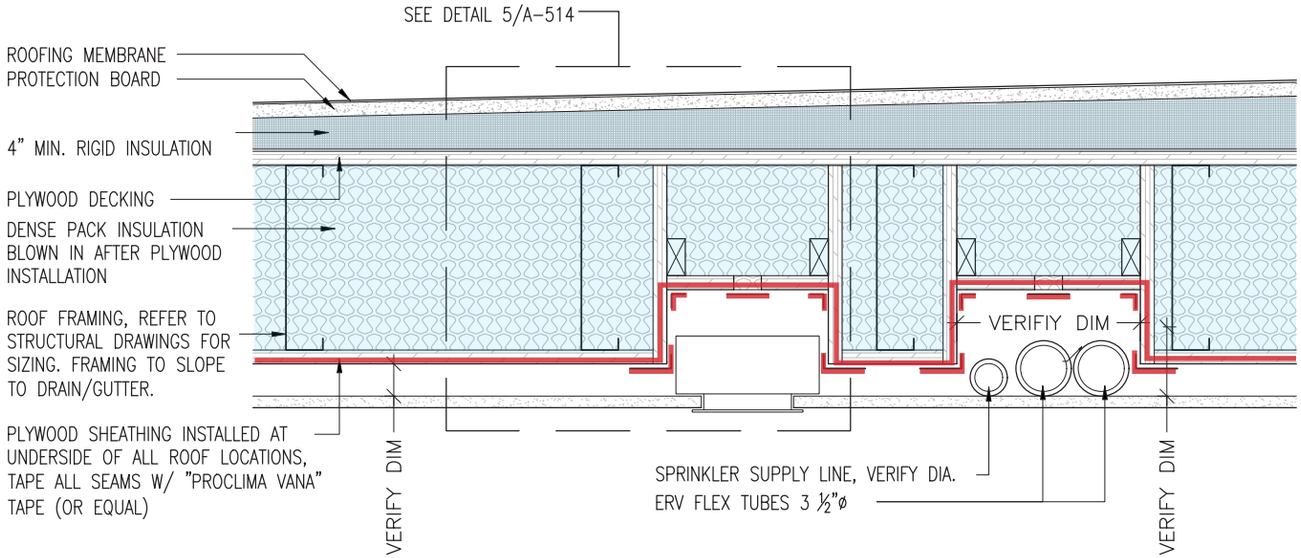
ROOF W/ EXTERIOR WALL



NOTE:
THIS ENSURES INTERIOR PARTITIONS ON PERIMETER CAN BE FRAMED W/O INTERUPTION FROM INSULATION & PASSIVE ENVELOPE INSTALLATION

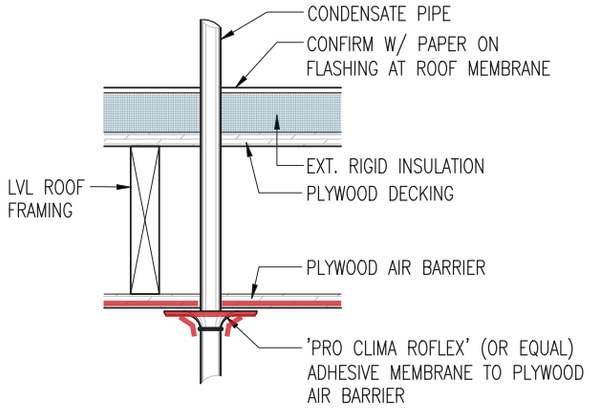
SECTION DETAIL

ROOF/PARTY WALL, NEIGHBOR'S ROOF AT SAME OR HIGHER LEVEL



SECTION DETAIL

BOX OUT AS NECESSARY

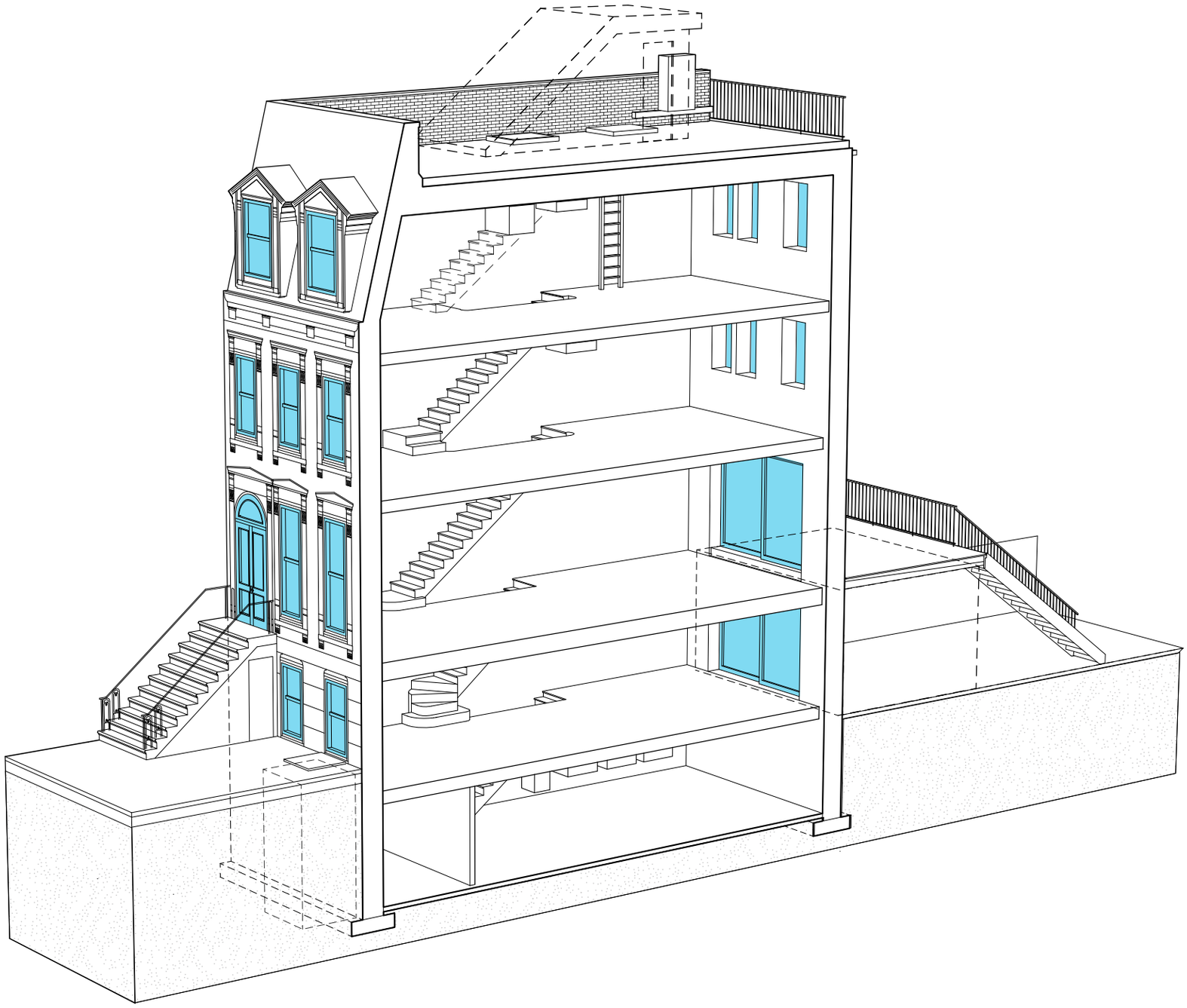


SECTION DIAGRAM
ROOF PENETRATION

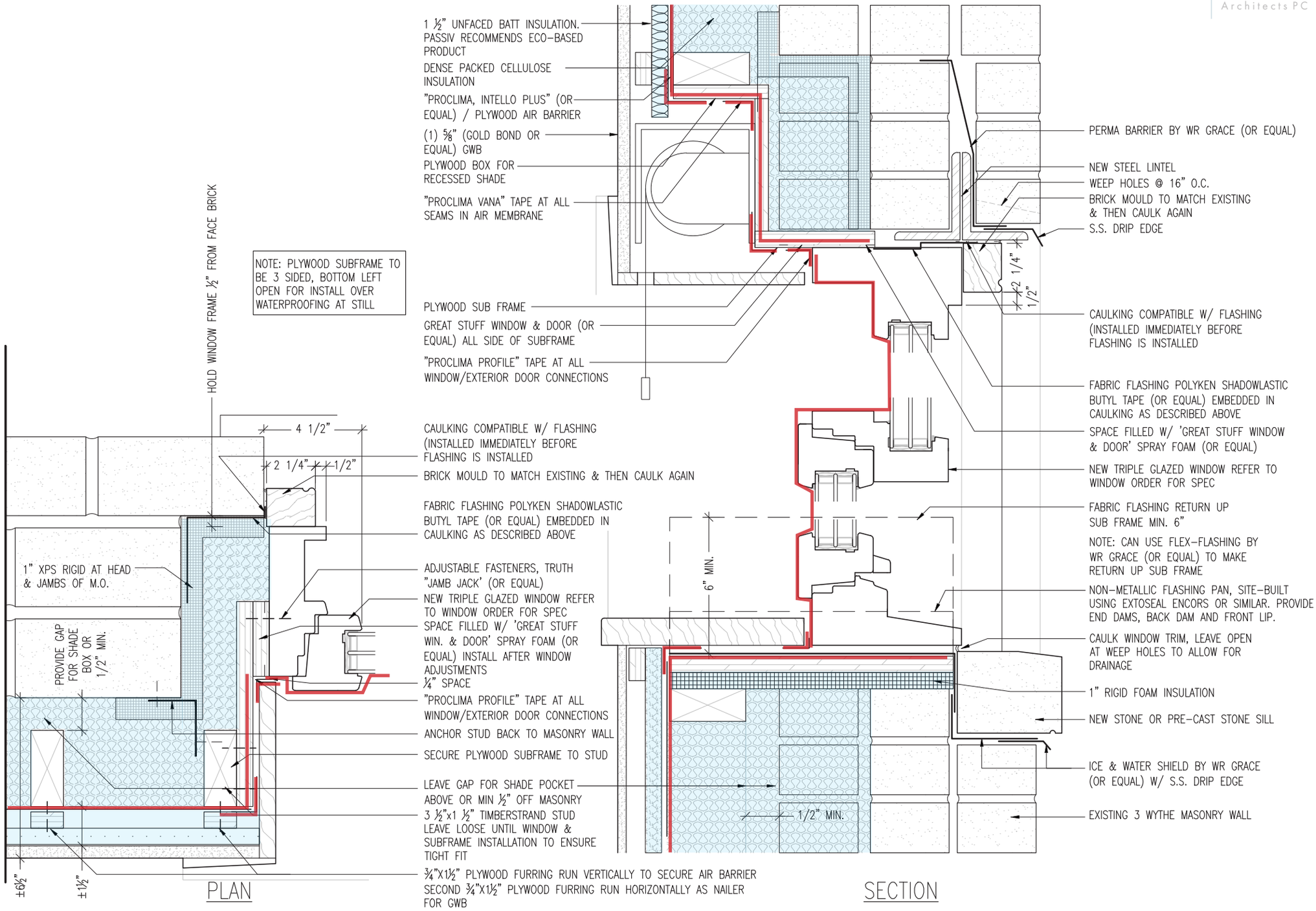
ROOF

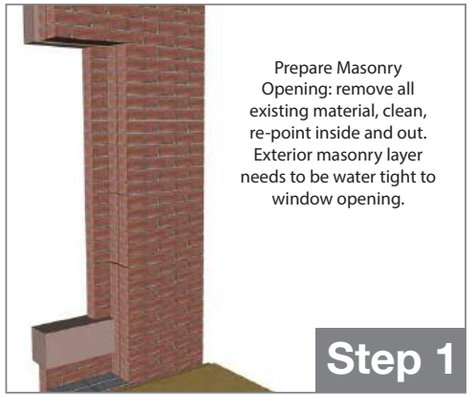
ROOF

WINDOWS



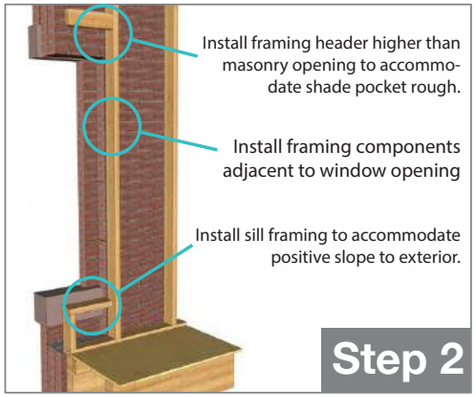
WINDOWS


1 ½" UNFACED BATT INSULATION. PASSIV RECOMMENDS ECO-BASED PRODUCT
DENSE PACKED CELLULOSE INSULATION
"PROCLIMA, INTELLO PLUS" (OR EQUAL) / PLYWOOD AIR BARRIER
(1) 5/8" (GOLD BOND OR EQUAL) GWB
PLYWOOD BOX FOR RECESSED SHADE
"PROCLIMA VANA" TAPE AT ALL SEAMS IN AIR MEMBRANE
PERMA BARRIER BY WR GRACE (OR EQUAL)
NEW STEEL LINTEL
WEEP HOLES @ 16" O.C.
BRICK MOULD TO MATCH EXISTING & THEN CAULK AGAIN
S.S. DRIP EDGE
2 1/4"
1/2"
NOTE: PLYWOOD SUBFRAME TO BE 3 SIDED, BOTTOM LEFT OPEN FOR INSTALL OVER WATERPROOFING AT STILL
PLYWOOD SUB FRAME
GREAT STUFF WINDOW & DOOR (OR EQUAL) ALL SIDE OF SUBFRAME
"PROCLIMA PROFILE" TAPE AT ALL WINDOW/EXTERIOR DOOR CONNECTIONS
CAULKING COMPATIBLE W/ FLASHING (INSTALLED IMMEDIATELY BEFORE FLASHING IS INSTALLED
FABRIC FLASHING POLYKEN SHADOWLASTIC BUTYL TAPE (OR EQUAL) EMBEDDED IN CAULKING AS DESCRIBED ABOVE
SPACE FILLED W/ 'GREAT STUFF WINDOW & DOOR' SPRAY FOAM (OR EQUAL)
NEW TRIPLE GLAZED WINDOW REFER TO WINDOW ORDER FOR SPEC
FABRIC FLASHING RETURN UP SUB FRAME MIN. 6"
NOTE: CAN USE FLEX-FLASHING BY WR GRACE (OR EQUAL) TO MAKE RETURN UP SUB FRAME
NON-METALLIC FLASHING PAN, SITE-BUILT USING EXTOSEAL ENCORS OR SIMILAR. PROVIDE END DAMS, BACK DAM AND FRONT LIP.
CAULK WINDOW TRIM, LEAVE OPEN AT WEEP HOLES TO ALLOW FOR DRAINAGE
1" RIGID FOAM INSULATION
NEW STONE OR PRE-CAST STONE SILL
ICE & WATER SHIELD BY WR GRACE (OR EQUAL) W/ S.S. DRIP EDGE
EXISTING 3 WYTHE MASONRY WALL
6" MIN.
1/2" MIN.
SECTION
HOLD WINDOW FRAME ½" FROM FACE BRICK
4 1/2"
2 1/4"
1/2"
CAULKING COMPATIBLE W/ FLASHING (INSTALLED IMMEDIATELY BEFORE FLASHING IS INSTALLED
BRICK MOULD TO MATCH EXISTING & THEN CAULK AGAIN
FABRIC FLASHING POLYKEN SHADOWLASTIC BUTYL TAPE (OR EQUAL) EMBEDDED IN CAULKING AS DESCRIBED ABOVE
1" XPS RIGID AT HEAD & JAMBS OF M.O.
ADJUSTABLE FASTENERS, TRUTH "JAMB JACK' (OR EQUAL)
NEW TRIPLE GLAZED WINDOW REFER TO WINDOW ORDER FOR SPEC
SPACE FILLED W/ 'GREAT STUFF WIN. & DOOR' SPRAY FOAM (OR EQUAL) INSTALL AFTER WINDOW ADJUSTMENTS
¼" SPACE
"PROCLIMA PROFILE" TAPE AT ALL WINDOW/EXTERIOR DOOR CONNECTIONS
ANCHOR STUD BACK TO MASONRY WALL
SECURE PLYWOOD SUBFRAME TO STUD
PROVIDE GAP FOR SHADE BOX OR 1/2" MIN.
LEAVE GAP FOR SHADE POCKET ABOVE OR MIN ½" OFF MASONRY
3 ½"x1 ½" TIMBERSTRAND STUD LEAVE LOOSE UNTIL WINDOW & SUBFRAME INSTALLATION TO ENSURE TIGHT FIT
¾"X1½" PLYWOOD FURRING RUN VERTICALLY TO SECURE AIR BARRIER
SECOND ¾"X1½" PLYWOOD FURRING RUN HORIZONTALLY AS NAILER FOR GWB
±6½"
±1½"
PLAN



Prepare Masonry Opening: remove all existing material, clean, re-point inside and out. Exterior masonry layer needs to be water tight to window opening.

Step 1

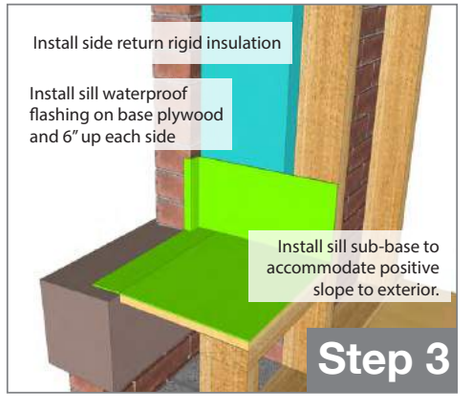


Install framing header higher than masonry opening to accommodate shade pocket rough.

Install framing components adjacent to window opening

Install sill framing to accommodate positive slope to exterior.

Step 2



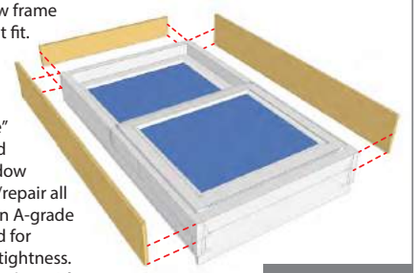
Install side return rigid insulation

Install sill waterproof flashing on base plywood and 6" up each side

Install sill sub-base to accommodate positive slope to exterior.

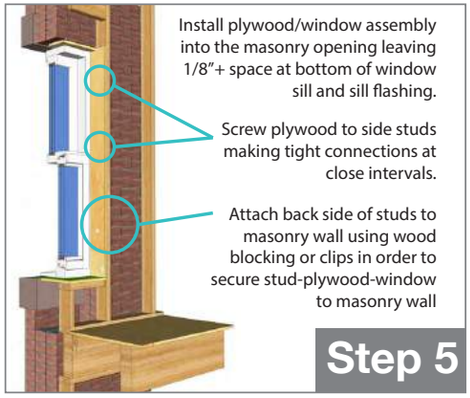
Step 3

Glue-n-screw 3/4" AC-grade plywood strips to top and sides of window frame ensuring a tight fit.



Orient "A-grade" side of plywood facing the window frame and seal/repair all imperfections in A-grade side of plywood for continuous air tightness. *(Refer to project plan set for specific section details)*

Step 4

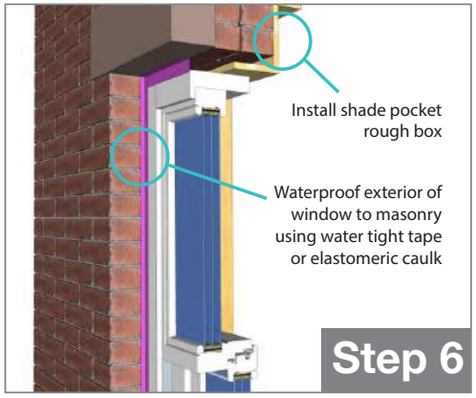


Install plywood/window assembly into the masonry opening leaving 1/8"+ space at bottom of window sill and sill flashing.

Screw plywood to side studs making tight connections at close intervals.

Attach back side of studs to masonry wall using wood blocking or clips in order to secure stud-plywood-window to masonry wall

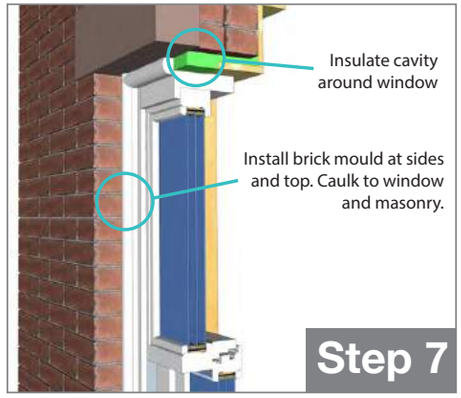
Step 5



Install shade pocket rough box

Waterproof exterior of window to masonry using water tight tape or elastomeric caulk

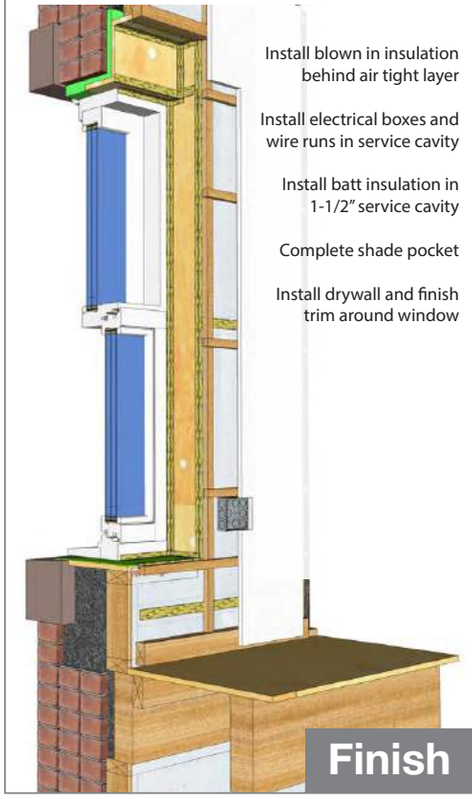
Step 6



Insulate cavity around window

Install brick mould at sides and top. Caulk to window and masonry.

Step 7



Install blown in insulation behind air tight layer

Install electrical boxes and wire runs in service cavity

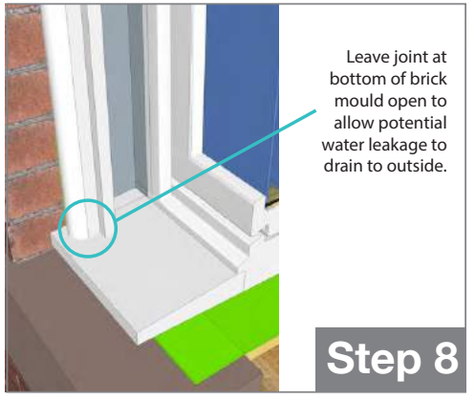
Install batt insulation in 1-1/2" service cavity

Complete shade pocket

Install drywall and finish trim around window

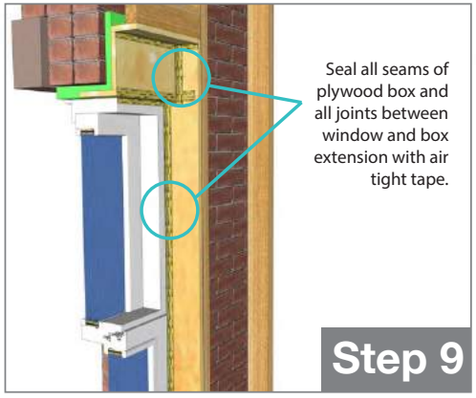
Finish

fentrend



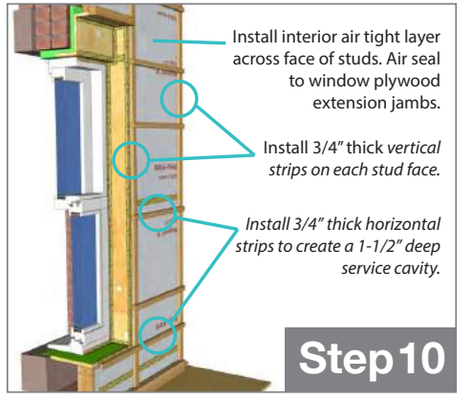
Leave joint at bottom of brick mould open to allow potential water leakage to drain to outside.

Step 8



Seal all seams of plywood box and all joints between window and box extension with air tight tape.

Step 9



Install interior air tight layer across face of studs. Air seal to window plywood extension jambs.

Install 3/4" thick *vertical strips on each stud face.*

Install 3/4" thick horizontal strips to create a 1-1/2" deep service cavity.

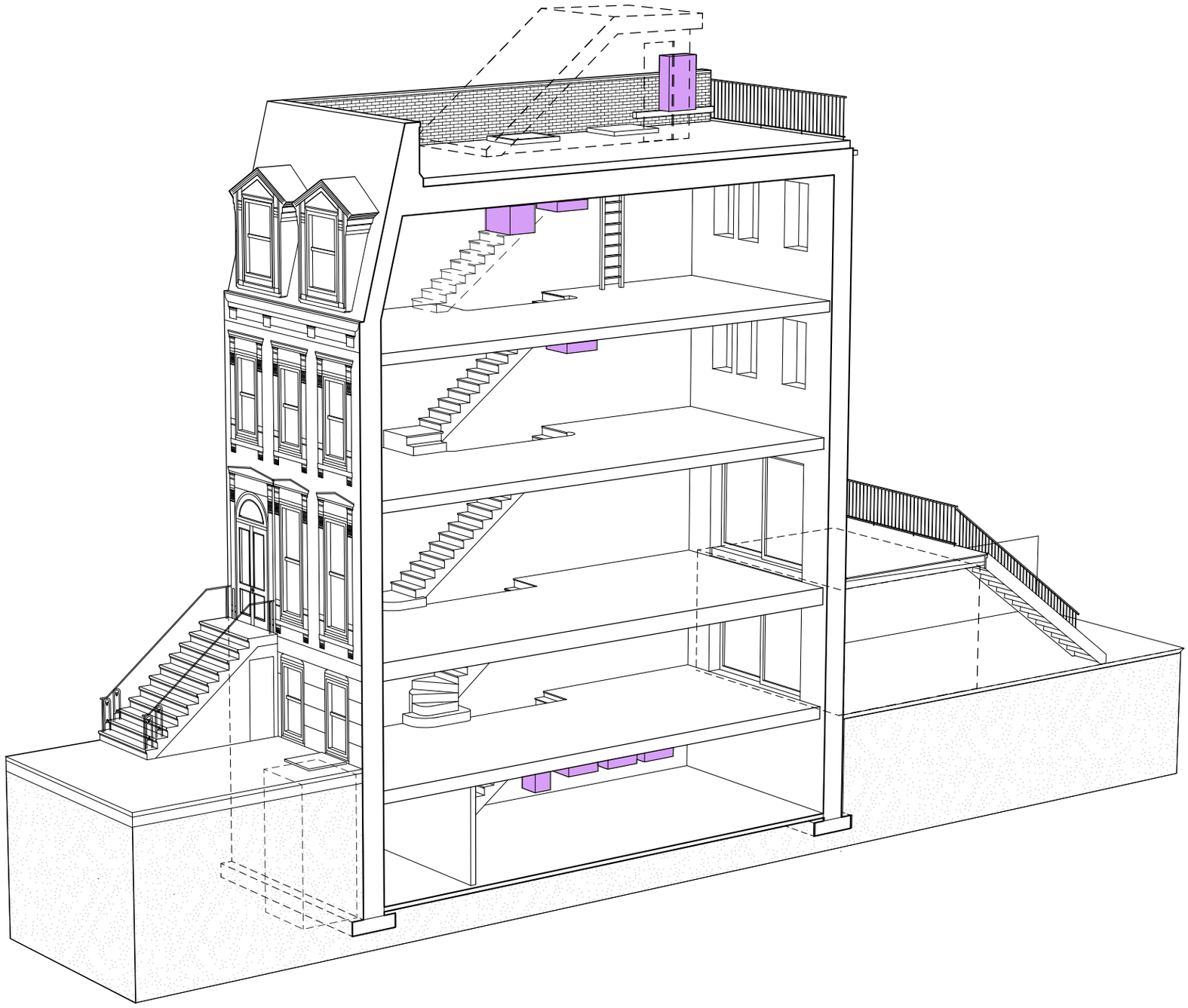
Step 10

WINDOWS

WINDOWS

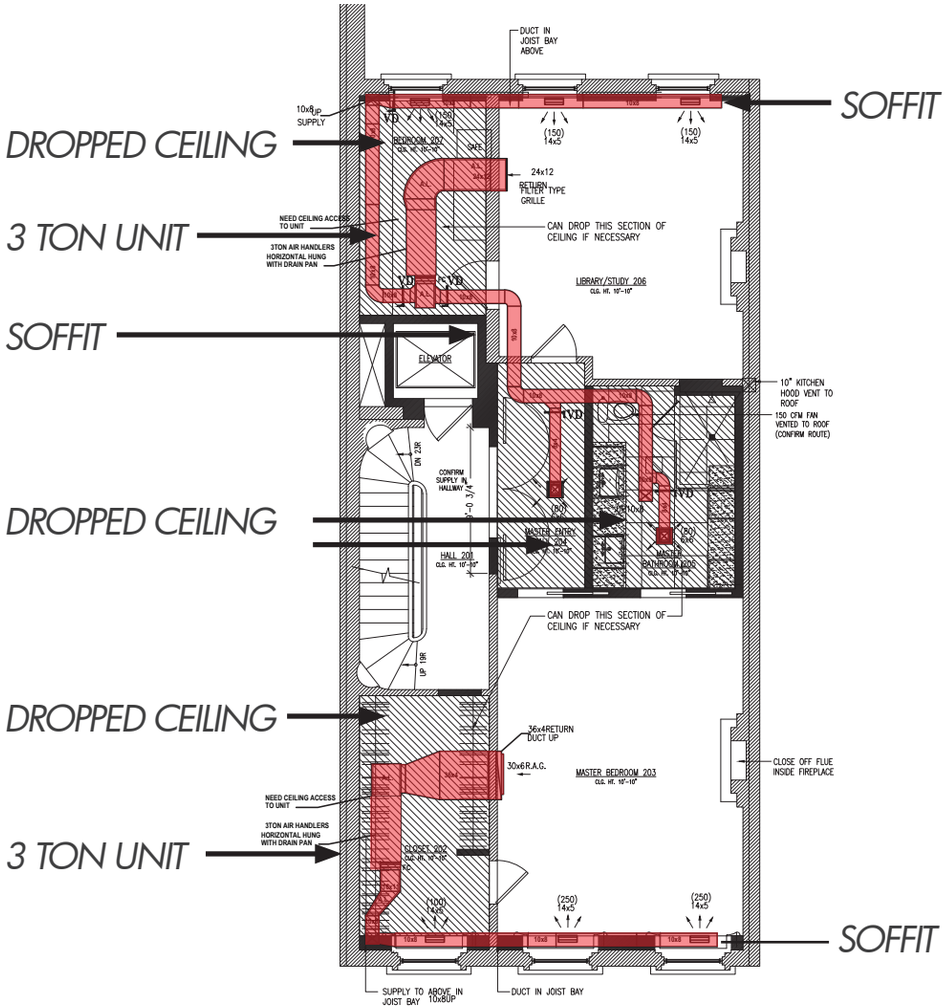
WINDOW INSTALLATION WITH SIGA TAPE & M2 CONTRACTING.

MECHANICAL



MECHANICAL

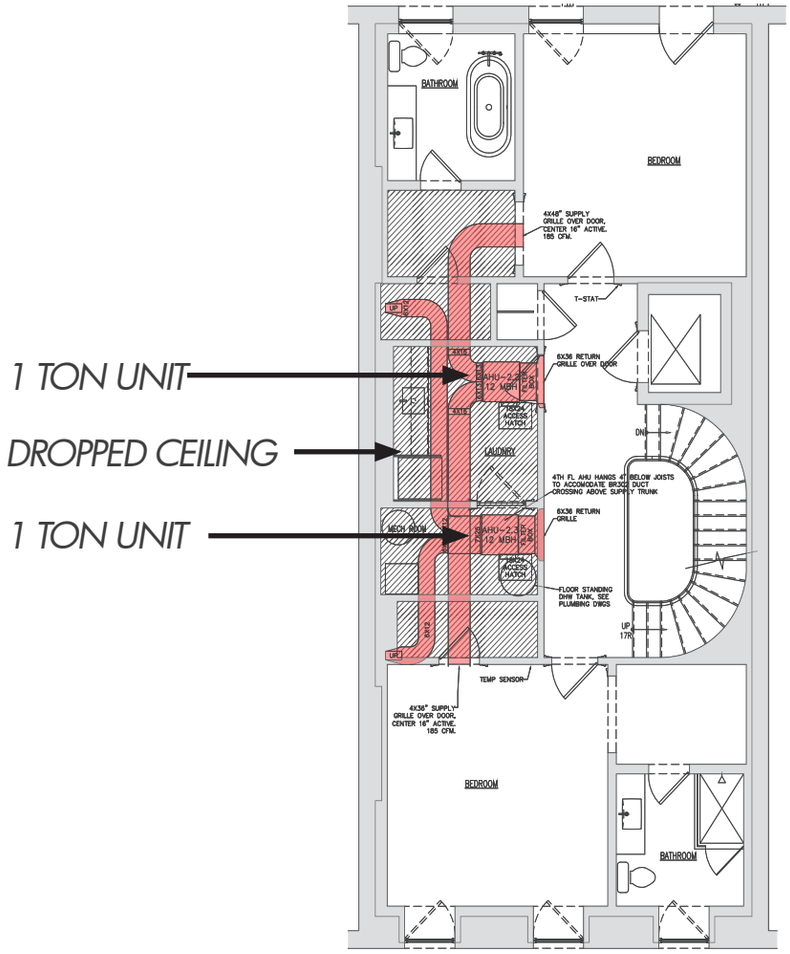
TYPICAL NON-PASSIVE HOUSE TOWNHOUSE MECHANICALS



TYPICALLY REQUIRES:

- *DROPPED CEILINGS, SOFFITS*
- *HEAT TO FRONT AND REAR ROOMS*

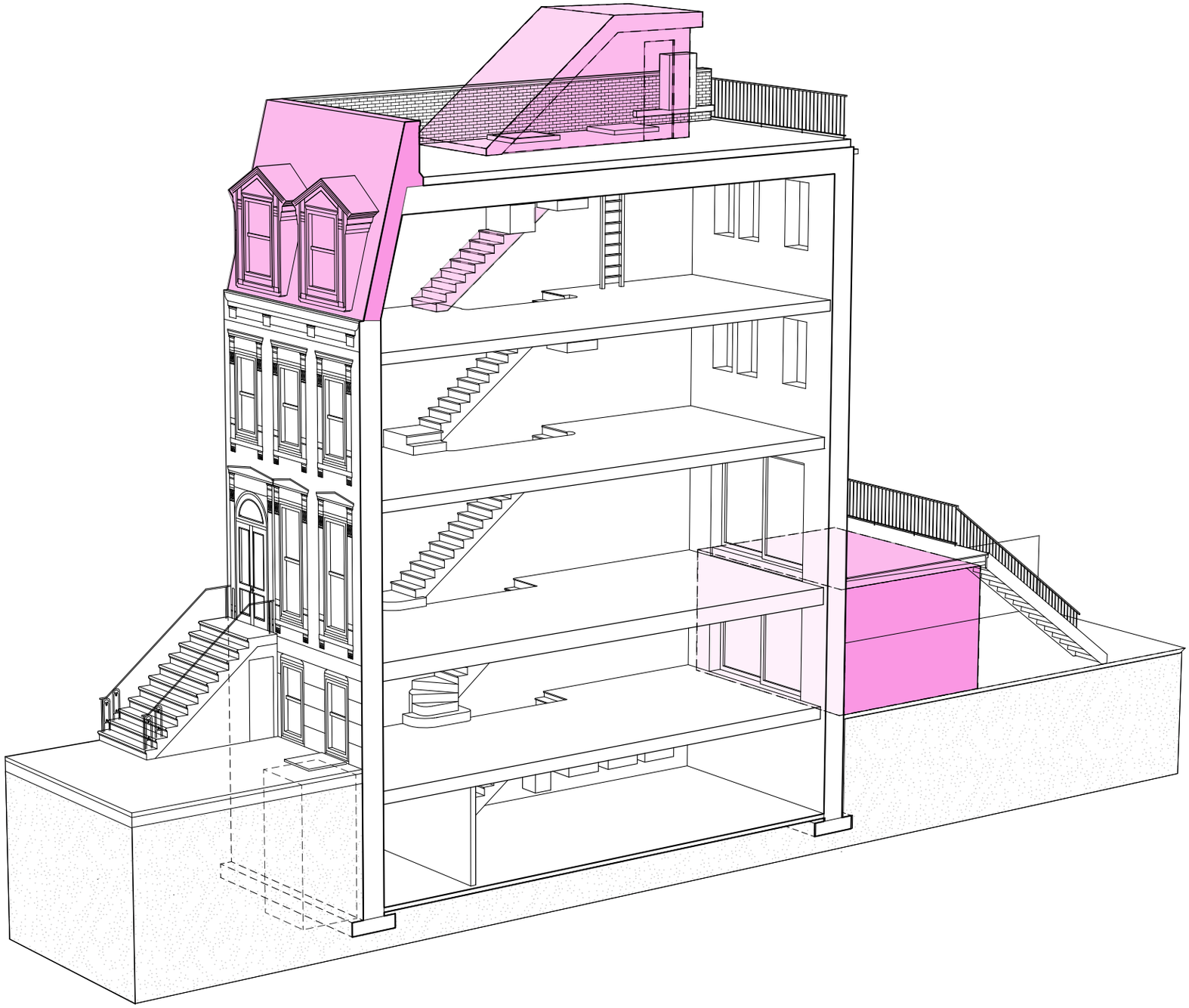
TYPICAL PASSIVE HOUSE TOWNHOUSE MECHANICALS



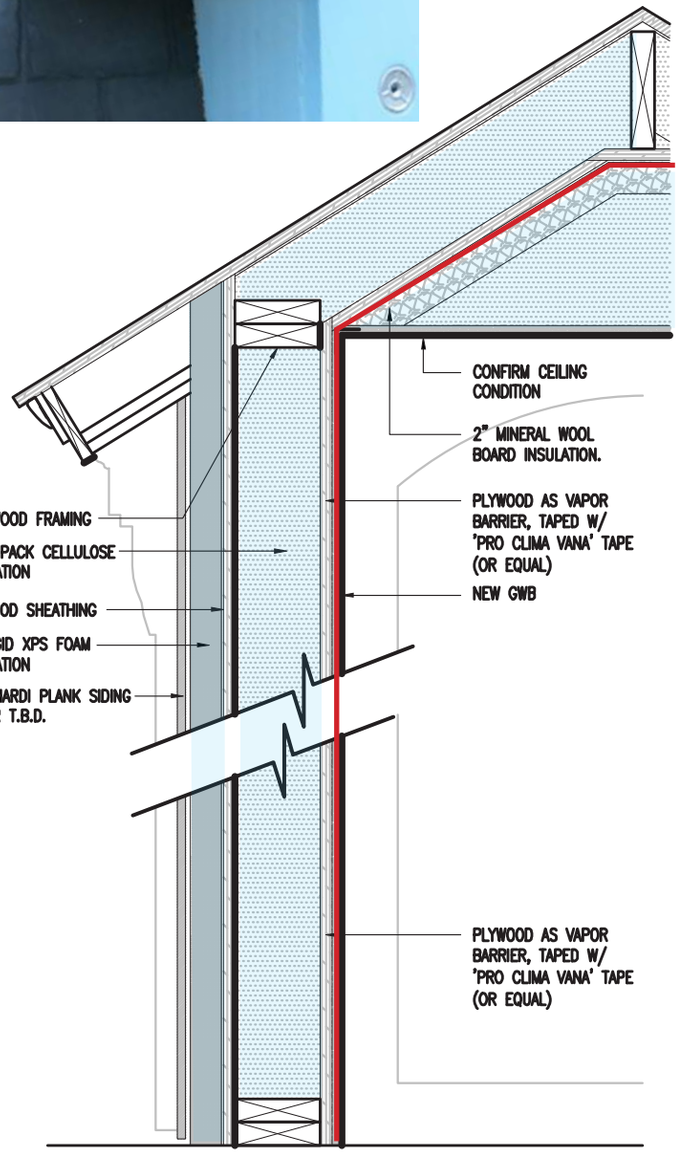
- *SIMPLER DUCTWORK*
- *SMALLER MECHANICALS*
- *CLEARER FRONT/REAR ROOMS*

MECHANICAL

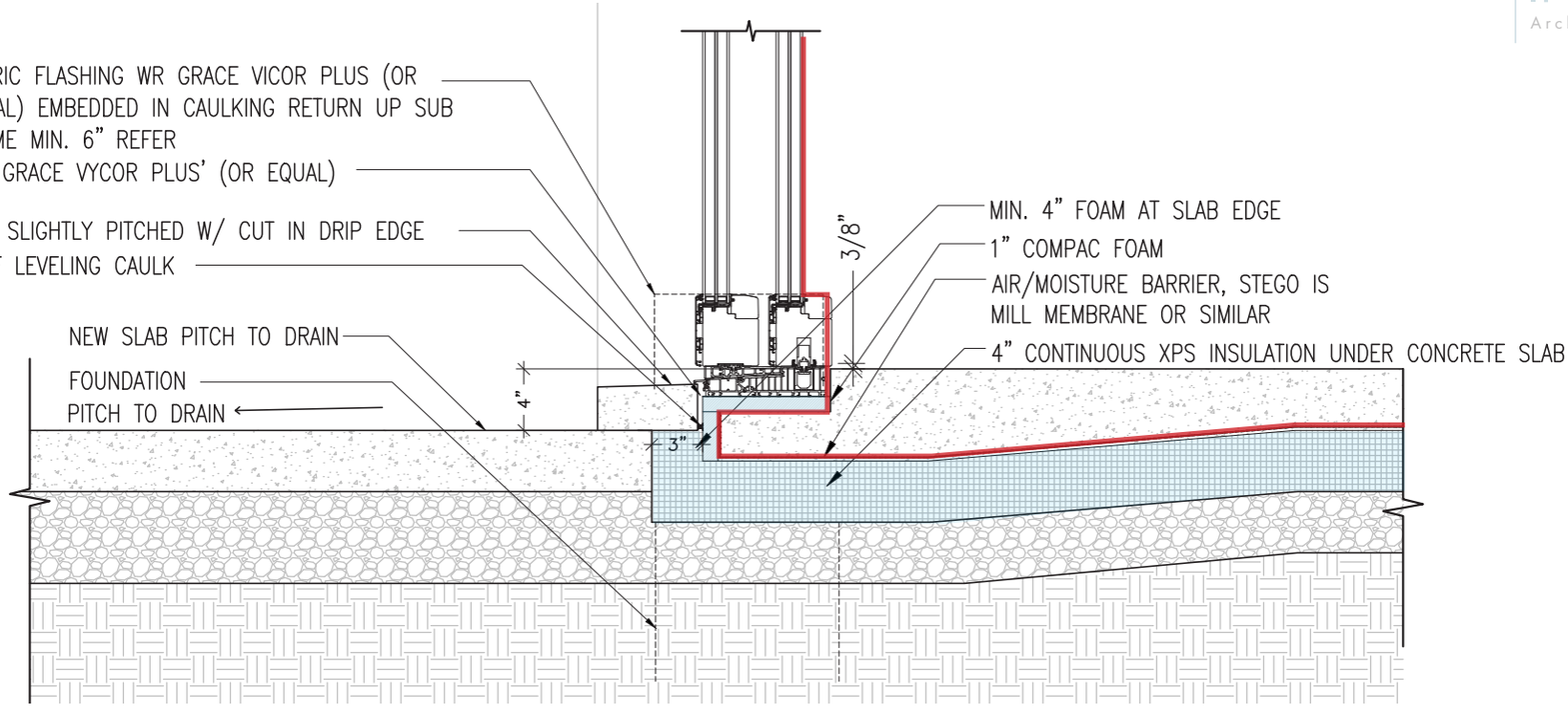
SPECIAL CONDITIONS



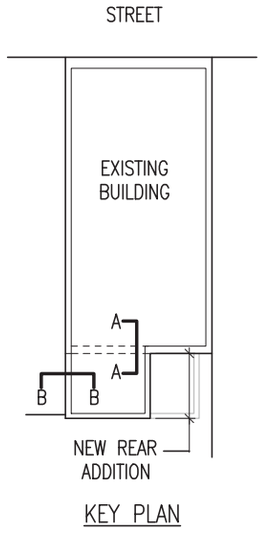
NEW MANSARD / DORMERS



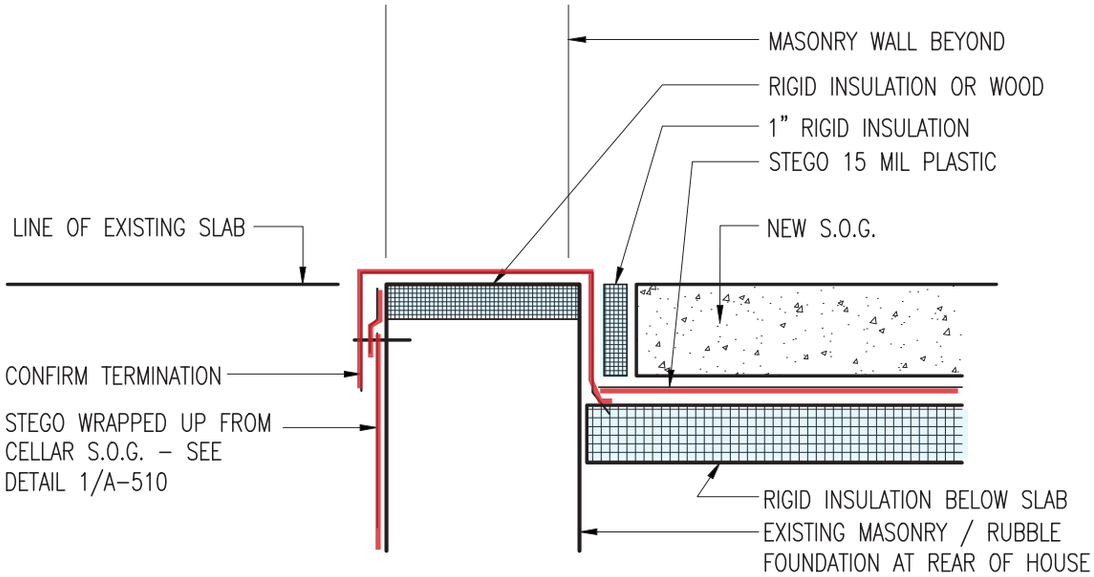
SECTION DETAIL
DORMER & MANSARD



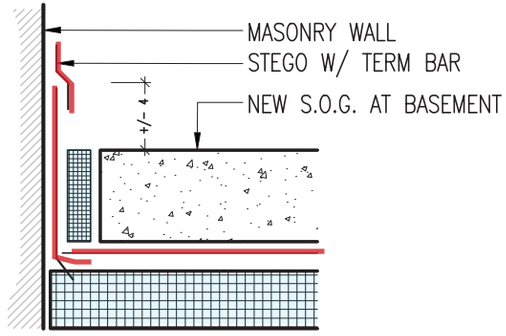
SECTION DETAIL: REAR ADDITION
NEW BASEMENT W/ SLAB ON GRADE



KEY PLAN



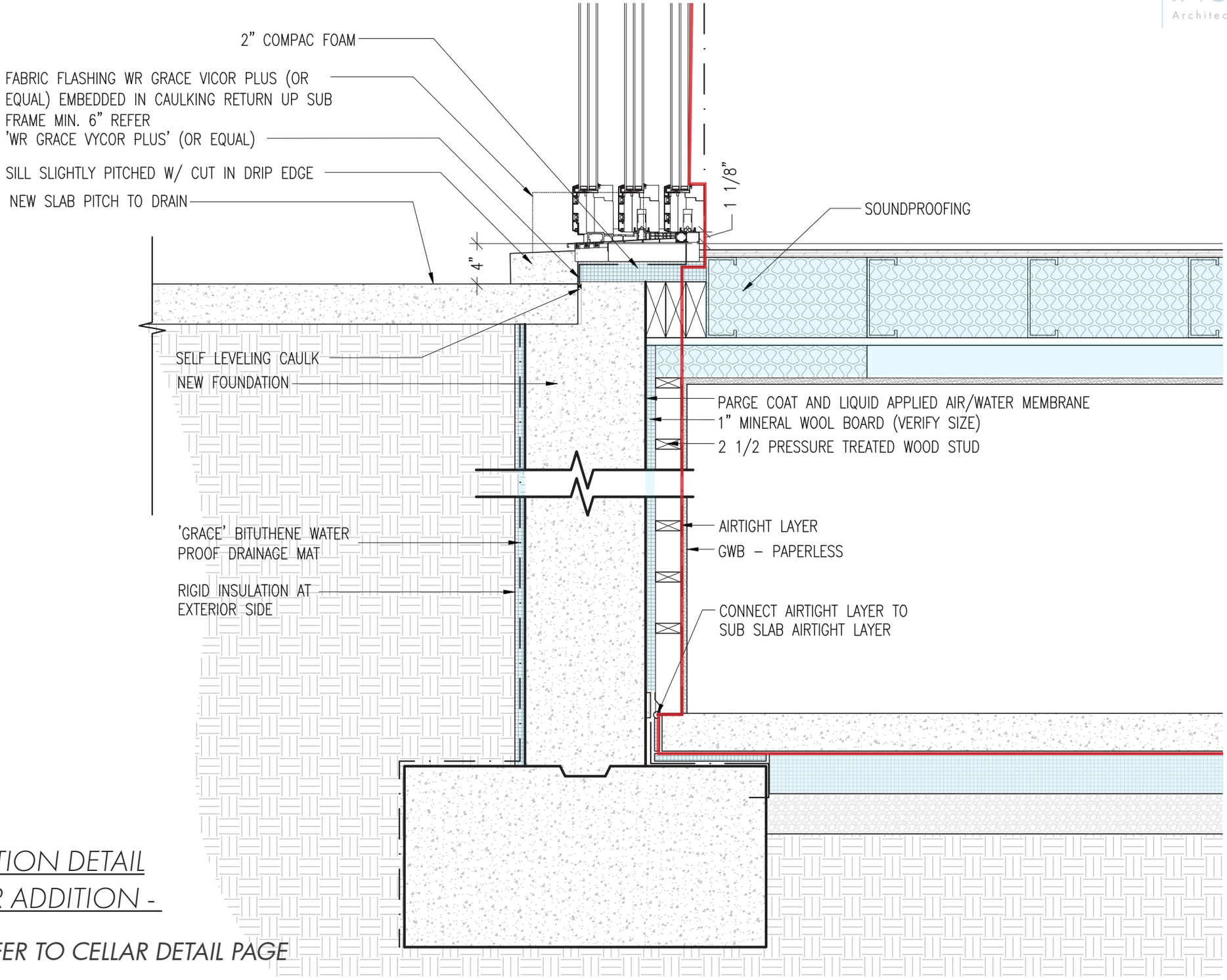
SECTION A



SECTION B

DIAGRAM: NEW SLAB ON GRADE CONNECTION

SPECIAL ADDITIONS - REAR ADDITIONS

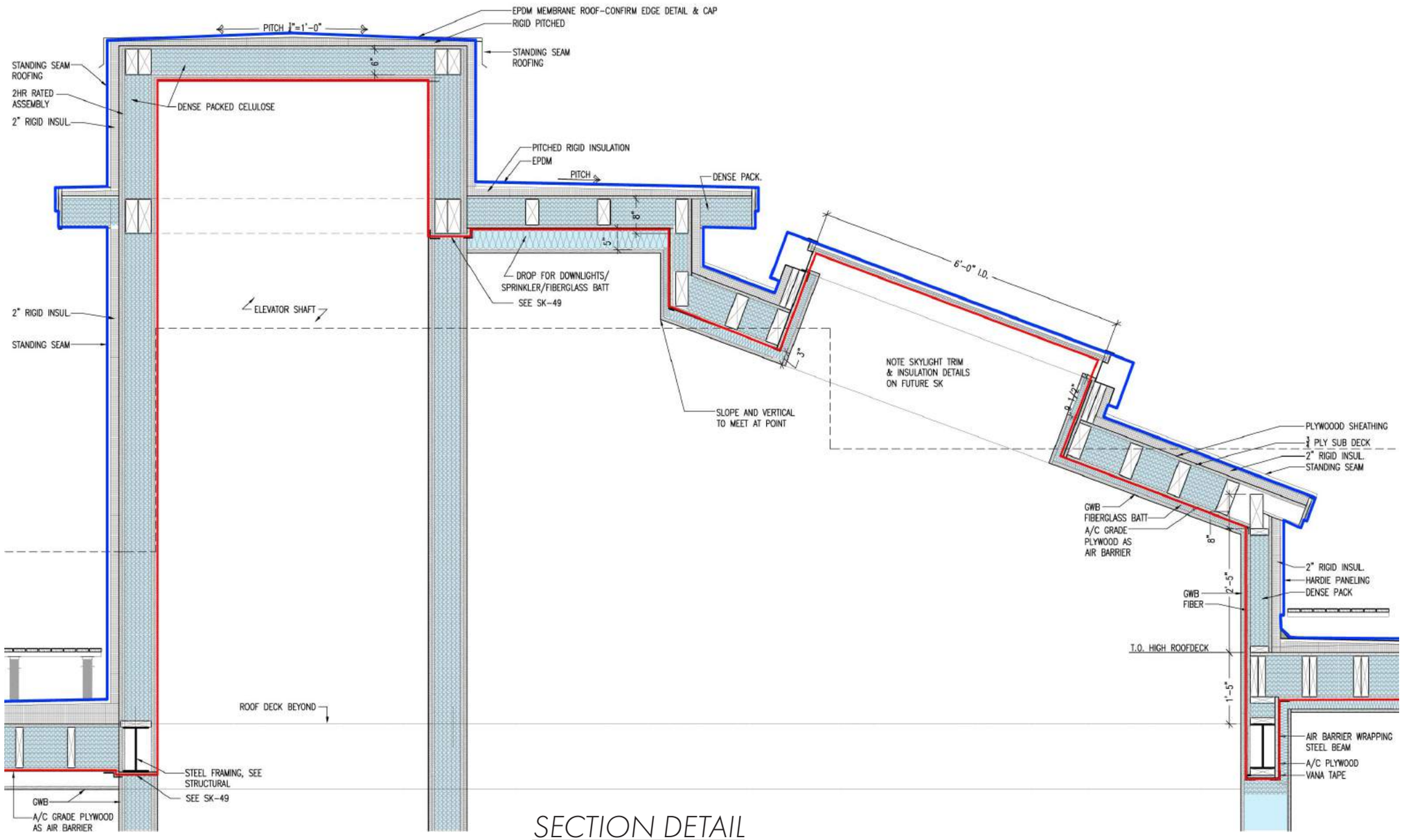


SECTION DETAIL
REAR ADDITION -

+ REFER TO CELLAR DETAIL PAGE

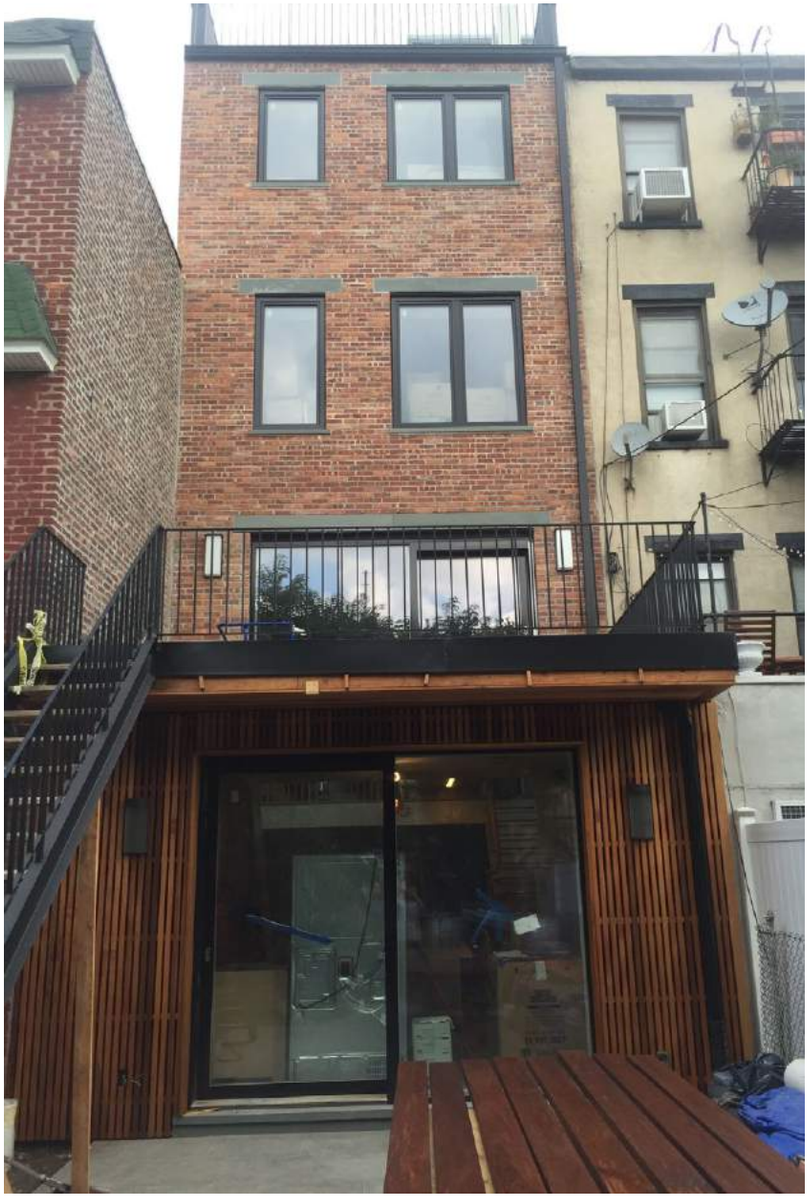
SPECIAL ADDITIONS - ROOF ADDITIONS

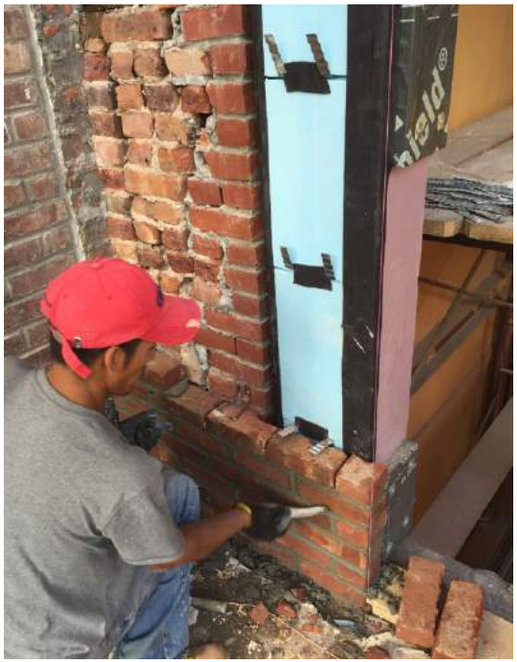
SPECIAL ADDITIONS - ROOF ADDITIONS



SECTION DETAIL
ELEVATOR & STAIR BULKHEAD

SPECIAL CONDITIONS - LARGE MASONRY OPENING





PROVIDING INSULATION WHERE STEEL WAS REQURIED FOR LARGE MASONRY OPENINGS.

COMPLETED PROJECTS

COMPLETED CERTIFIED PASSIVE PROJECTS

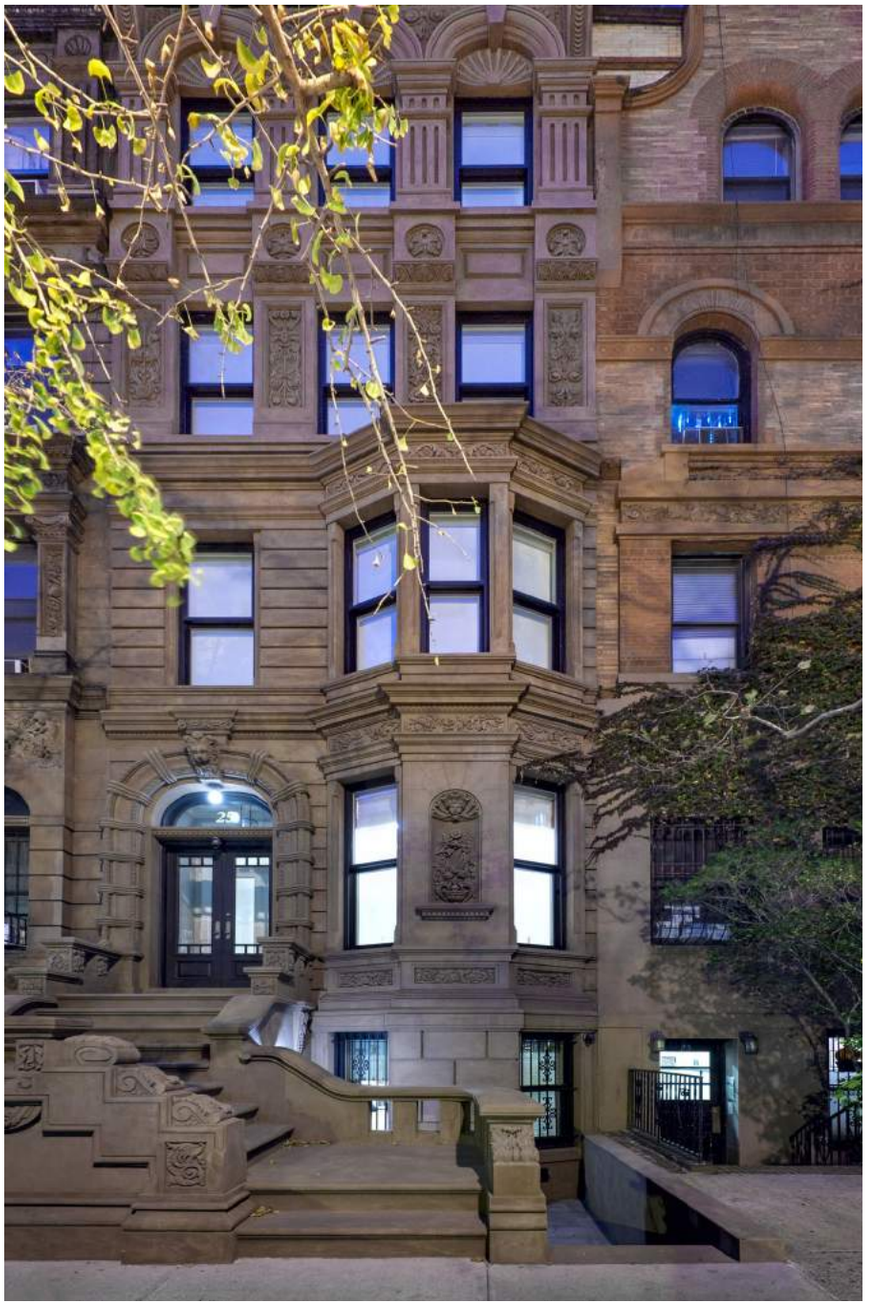
MANHATTAN
UPPER WEST SIDE

BROOKLYN
CARROLL GARDENS

BROOKLYN
BROOKLYN HEIGHTS

BROOKLYN
BROOKLYN HEIGHTS

UPPER WEST SIDE, MANHATTAN



- *1ST PASSIVE HOUSE IN MANHATTAN*
- *LEED PLATINUM*

TAFFERA FINE BUILDINGS AND FINISHES INC.

PETER PEIRCE PHOTOGRAPHY

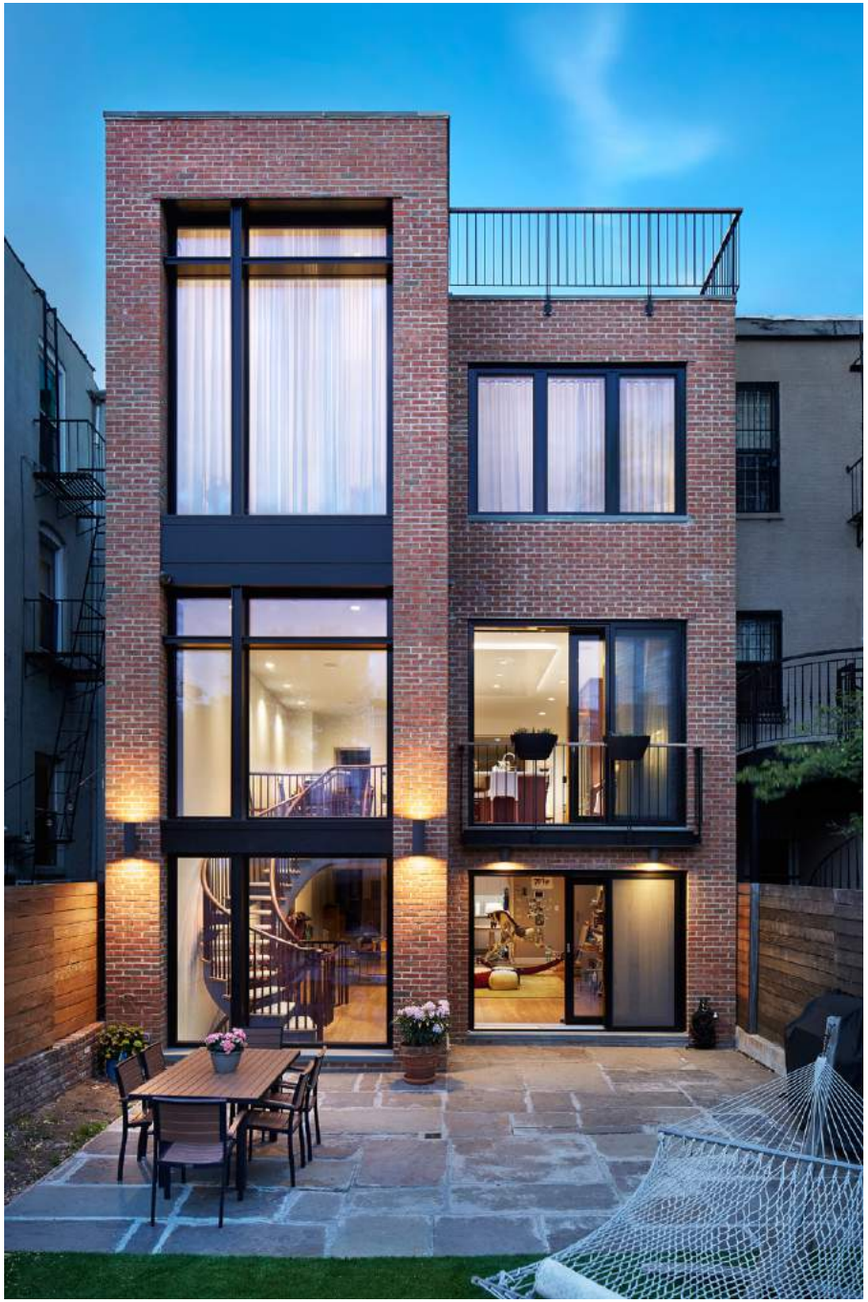
BROOKLYN HEIGHTS, BROOKLYN

KLEEN CONSTRUCTION

1ST PASSIVE HOUSE IN
A LANDMARK DISTRICT

PETER PEIRCE PHOTOGRAPHY

CARROLL GARDENS, BROOKLYN

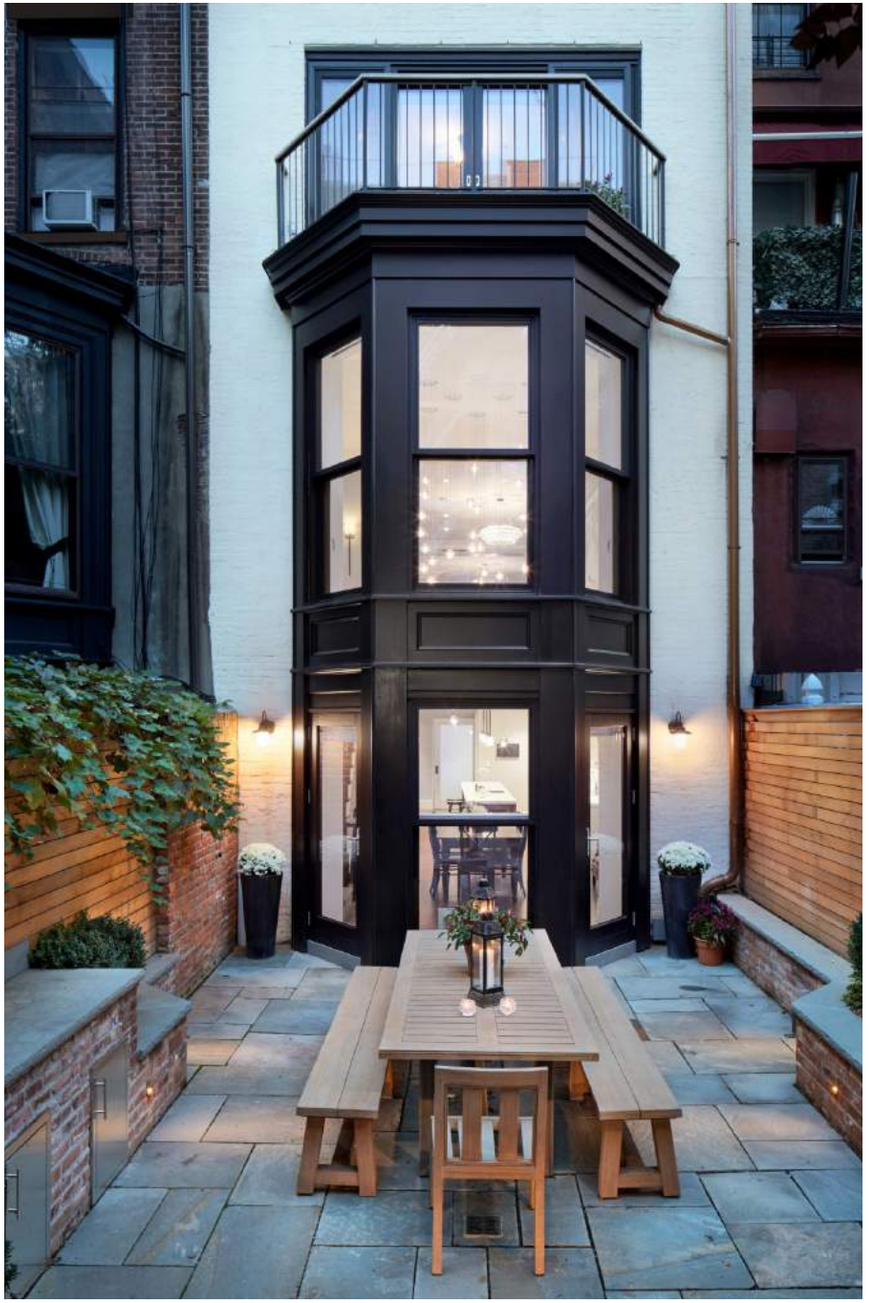


PJOE CONSTRUCTION

1ST PASSIVE PLUS IN THE U.S.

JOHN MUGGENBORG PHOTOGRAPHY

BROOKLYN HEIGHTS, BROOKLYN



- *ROOF DECK*
- *LPC APPROVED BAY*

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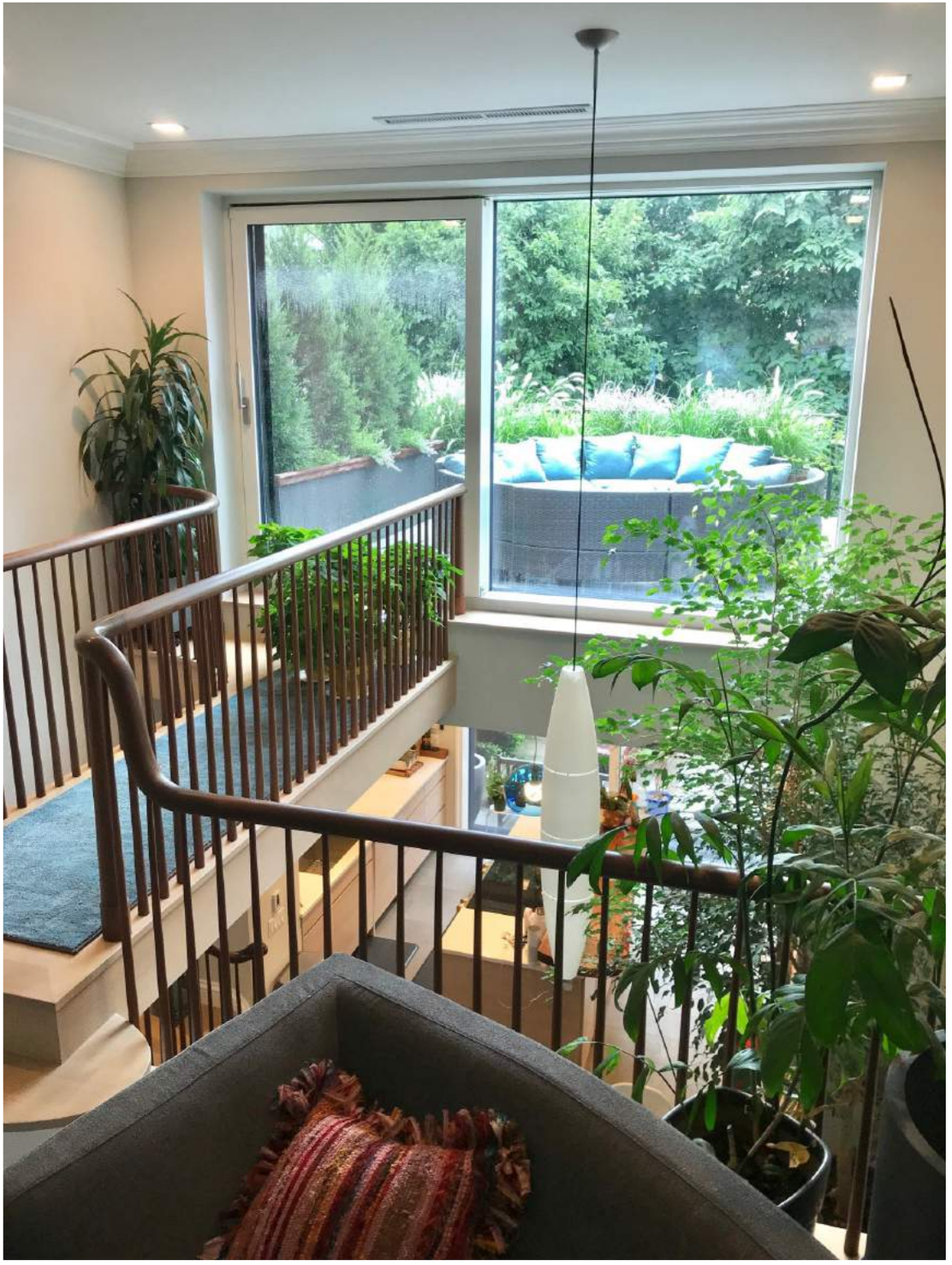

M2 CONTRACTING

THANK YOU.

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