

Historic Pine Street Passive House

Philadelphia, PA

Multifamily

Retrofit

PHI Database ID#: 7427

Certification Goal:



Status: **Pending**

In construction phase

Size: 5,200 FT² TFA with Four Units

Description: This project is a Passive House retrofit of a historic 4 unit residential rowhouse apartment.

DOE Climate Zone: 4a

Team:

Owner:

Laura Blau & Paul Thompson

Architect/Designer:

BluPath Design

www.blupath.us

Laura Blau AIA, Paul Thompson AIA,

Kevin Davey, Intern

PH Consultant:

BluPath Design

www.blupath.us

Laura Blau, CPHD

Builder:

Laura Blau, CPHB

GreenSteps, LLC

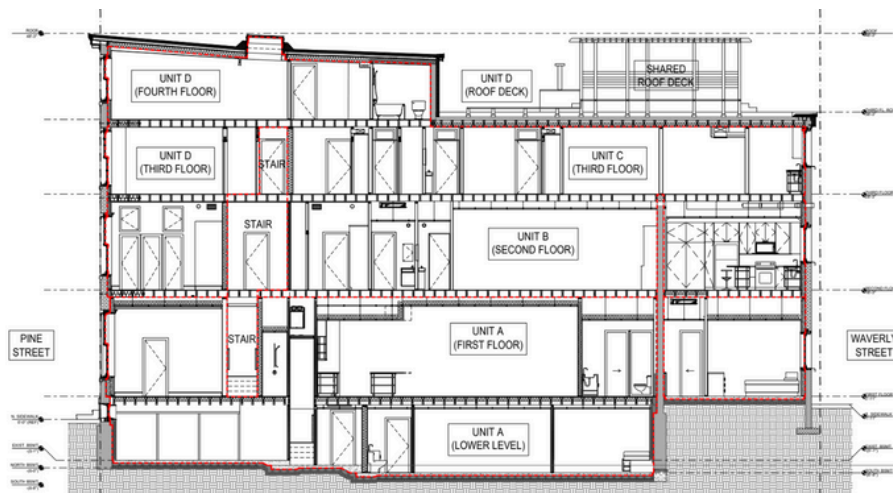
Other:

Kent Leslie, Architect

Amy Rivera, PE Structural Engineer



1722 Pine was built in 1845 as a single-family residence. The 1700 block of Pine Street is one of the few streets with a continuous cornice line for its 20 adjoining homes, indicating that a single developer built the entire block. In 1922, the 77-year-old home received its first major renovation, converting it into three apartments above a professional ground-floor office. In 2016, 96 years later, Laura and Paul began the second major renovation. The single-pane 1920s deteriorated windows were cold and drafty, with diminished function. The apartments were tired, knob and tube wiring needed replacing, and only one unit was air-conditioned. The time was right for a major renovation.



The renovation goals were to maintain the historic character while meeting Passive House Step-by-Step principles and setting a precedent for renovating landmark masonry structures. The owners began an intensive renovation, underpinning the basement and converting the first-floor therapist offices to a bi-level owner's apartment and professional office, reconfiguring the upper units with additional bathrooms, larger modern kitchens, and upgraded finishes. They removed the gas service and converted it to an all-electric building with new mechanical, electrical, and plumbing systems.

Thermal Envelope

Ground:

4" concrete + 15 mil vapor barrier + 5" EPS recycled insulation

Walls:

Existing 2-3 wythe brick + existing plaster + 4" DP cellulose + smart air barrier + 2x3 service cavity + 1/2" drywall

Roof:

Upper Roof: Existing roofing + existing 7 1/4" rigid insulation + existing 3/4" roof sheathing + 5 1/2"-7 1/2" mineral wool insulation + 1" furring + 1/2" drywall

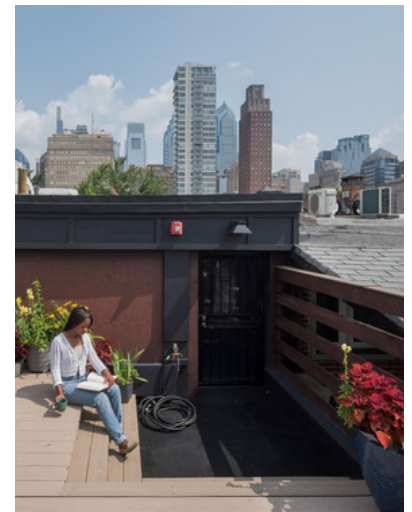
Lower Roof: New TPO roofing + 7" recycled rigid insulation + taped Zip roof sheathing + 6-15" DP cellulose + mixed existing and new drywall ceiling.

Windows & Doors:

PH certified triple pane simulated double hung tilt turn windows, PH cert. triple pane lift slide patio door, PH cert. insulated panel swing doors

Shading Strategies:

Interior blinds only, no exterior shading (Philadelphia Historical Commission Restriction)



The project is located in the Rittenhouse-Fitler Historic District, and the building permit required approval from the Philadelphia Historical Commission. While Laura and Paul shepherded the first use of simulated double-hung Passive House quality windows through approvals, they were denied the ability to protect the rear facade's failing, poor-quality brick walls with an exterior insulation system. They appealed and won a landmark decision using the Pennsylvania Environmental Bill of Rights and subsequently received the Historical Commission's unanimous approval.

Mechanical Systems:

Ventilation:

ERV

Heating:

Ducted and console heat pump

Cooling/Dehumidification:

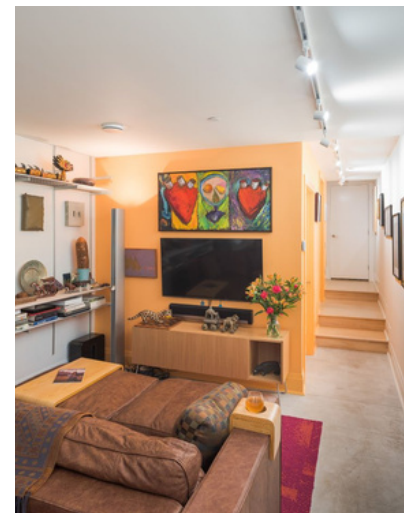
Ducted and console heat pump

Domestic Hot Water:

Hybrid heat pump electric HWH with smart circulation loop pump, on-demand HWH at upper kitchens/laundry

Onsite Renewable Energy:

Solar PV panel ready



The project achieves low utilization energy and lower embodied energy by avoiding foam and using recycled rigid insulation for roof and under-slab locations. Elsewhere, cellulose above-grade and mineral wool below-grade insulation was installed.

The owners' Unit A is designed to meet EnerPHit's performance. The upper apartments apply the EnerPHit Step-by-Step approach to phased improvements. EnerPHit recognizes the complexities and practical constraints of retrofits compared to new construction, allowing a slightly relaxed airtightness standard, and acknowledges numerous limitations, such as orientation, limited access, existing materials, past renovations, local codes, and preservation restrictions.

PHPP Values

Climate: Warm-temperate	Cooling & Dehumidification Demand: 4.92 kBtu/ft2/yr
Airtightness: 1.0 ACH	Cooling Load: 4.40 kBtu/hft2
Annual Heating Demand: 5.29 kBtu/ft2/yr	PE Demand: 22.53 kWh/m2a
Heating Load: 4.97 Btu/hft2	PER Demand: 11.23 kBtu/ft2yr