Object Documentation: Mamaroneck Passive House in Mamaroneck

Projekt-ID: 2629

Project Designer: Andreas M. Benzing / a.m.Benzing architects pllc
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This terraced house was built for a private client in the Village of Mamaroneck. The building is a 2 story wood frame construction with a masonry basement and is oriented 32 Degree east of south. The building is a retrofit and extension of an existing build originally built in 1963.

Special feature: 6.7 kW PV-System on the flat roof area which makes the building near-zero energy.

U-value exterior wall: 0.15 W/(m²K)  PHPP Annual heating demand: 22 kWh/(m²a)
U-value basement: 0.29 W/(m²K)  PHPP primary energy: 117 kWh/(m²a)
U-value terrace roof: 0.10 W/(m²K)  Pressure test n50: 0.67 h⁻¹
U-value roof: 0.12 W/(m²K)  
U-value window: 0.84 W/(m²K)  
Effective heat recovery: 70.9%
1. Description of construction task:
The entire retrofitted building is using the existing footprint and first floor framing of the existing building. The existing roof had to be carefully deconstructed and all asphalt shingles were recycled. An additional second floor was added and the south roof converted into a terrace to take advantage of the south view to the harbor. The entire building was insulated with an additional outside insulation layer and received a vented horizontal cladding.

2. Pictures of the Mamaroneck Passive House:
4. Pictures of the Interior:

**Living room:** open floor plan with a south orientation

**Kitchen:** located on the north / east corner
5. Cross Section:

Section: shows the existing split level which continues to the new second floor. The laundry in the basement is kept outside of the building envelope.

6. Floor Plan

Basement Floor Plan: existing floor plan with modified interior walls.
First Floor Plan: existing floor plan with modified interior walls.

Second Floor Plan: new construction with converted terrace to the south.
7 Detail Slab on Grade:

**Detail above: Basement Slab Detail and Basement Ceiling/Wall Detail**

**Explanation:** Existing basement had a wood framed floor which was removed and replaced with a concrete slab on grade. The concrete slab was insulated with 5 inch of EPS.
8. Details: Exterior Wall

SLOPE MIN. 1/16" OVER 1'-0"

DENSE PACK CELLULOSE, R-3.7

1/2" OSB SHEATHING, TAPE ON ALL JOINTS, AIR-TIGHT LAYER

1/2" THERMAL BARRIER, GYPSUM BOARD

5/8" EXPOSURE 1 OSB SHEATHING, TAPE ON ALL JOINTS, AIR-TIGHT LAYER (ZIP SYSTEM OR SIMILAR)

5" NEOPER INSULATION TYPE VIII, 0.48 LBS/ SQFT, FLAME SPREAD INDEX 25, R-VALUE PER INCH 0.75 (R-4.5 PER INCH), DENSITY 1.15 LBS/ CUBIC FOOT, INSTALL ACCORDING TO MANUFACTURER SPECIFICATIONS

7 1/2" FIBRE CEMENT LAP SIDING, 2.3 LBS/SQFT, HARDIEPLANK HL5, COLOR: LIGHT MIST, INSTALL ACCORDING TO MANUFACTURER SPECIFICATIONS

3 1/2" DENSE PACK CELLULOSE

5/8" EXPOSURE 1 OSB SHEATHING, TAPE ON ALL JOINTS, AIR-TIGHT LAYER

DENSE PACK CELLULOSE, R-3.7

1/2" OSB SHEATHING, TAPE ON ALL JOINTS, AIR-TIGHT LAYER

SPECIAL TAPE ON ALL JOINTS, AIR-TIGHT LAYER

ALUMINUM CUTTER

ALL FACIA, EXTERIOR GRADE
RED WOOD, W/ SEALANT.

3/16" THERMAL BARRIER, GYPSUM BOARD

5/8" OSB SHEATHING, TAPE ON ALL JOINTS, AIR-TIGHT LAYER

1/2" THERMAL BARRIER, GYPSUM BOARD

5/8" OSB SHEATHING, TAPE ON ALL JOINTS, AIR-TIGHT LAYER

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5/8" OSB SHEATHING, TAPE ON ALL JOINTS, AIR-TIGHT LAYER
Detail above: New Exterior Wall Detail
Explanation: Split level terrace detail with flat roof EPDM system and continuous insulation layer which replaced the existing hip roof.

Wall (from inside to outside):
1. 5/8" Sheetrock
2. 2x4 Wood framing @ 16" O.C. with dens pack cellulose insulation, $\lambda$ [W/(mK)] 0.038
3. 5/8" OSB sheathing all seams taped, air-tight layer
4. 5" Rigid insulation, $\lambda$ [W/(mK)] 0.032
5. 3/4" Furring strips, vented gap
6. Fiber cement horizontal siding
9. Details: Roof

**Detail above: New Roof Detail**

Explanation: Detail shows cornice with vented cladding and PV system,

Roof (from inside to outside):

1. 5/8" Sheetrock
2. 5/8" furring strips, installation layer
3. ½" OSB sheathing, all seams taped, air-tight layer, roof OSB layer is connected to wall air-tight layer by special tape
4. Roof joists with dens pack cellulose insulation, $\lambda \ [W/(mK)] 0.038$
5. 5/8" OSB sheathing
6. 1 ½" Rigid insulation, $\lambda \ [W/(mK)] 0.032$
7. 1 ½" Furring strips, vented gap
8. Plywood sheathing
9. Asphalt shingle roof
10. Details: Window

Detail above: Window Detail
Explanation: Connection of window to wall with custom produces aluminum sill and custom screens. The windows are taped to the air-tight layer of the window box which is composed of a liquid applied membrane. The liquid applied membrane connects to the ZIP panel system. Aluminum clad wood window with insulation core (Bieber Window). U-Value Frame, $U_f = 0.76 \text{ W/(m}^2\text{K)}$
Triple pane glazing with laminated outside pane: $g$-Value = 0.56 (south and east); $g$-Value = 0.45 (north and West), $U_g = 0.60 \text{ W/(m}^2\text{K)}$ (center of glass)
11. Air Tight Envelope:

Documents above: Building Leakage Test Report
Explanation: The ZIP system is the air-tight layer for the entire structure. The ZIP panels are taped with a special ZIP tape. The window boxes are treated with a liquid applied membrane which is taped to the window frame. The plywood subfloor is taped and connected to the ZIP wall panels with tapes. The Roof has OSB sheathing with is taped and taped to the Wall ZIP panels.

Picture above: Taped air tight layer of interior OSB roof sheeting.
Explanation: The wall air tight layer is composed of a taped OSB sheeting with connects to the taped plywood subfloor and a taped OSB interior roof sheeting.
12. Ventilation Distribution System

**Basement Floor Plan: Mechanical Plan**

**First Floor Plan: Mechanical Plan**
Explanation: The ventilation system is a Zehnder ERV unit with the comfort distribution system. All duct work is contained inside the building envelop. Each bedroom and living room has a fresh air vent using a 3 inch home run duct to a manifold. Each Bathroom and the kitchen has an exhaust vent using 3 inch home run ducts to a manifold. The ERV is located in the basement close to the building envelope and easy to access for changing the filters.
13. Heat Recovery Unit

*Picture above: Zehnder ComfoAir 550*

Explanation: Effective heat recovery: 70.9%, Electric Efficiency: 0.31 Wh/m³. The ERV is located inside the thermal envelop in the basement. An ERV was specified because of the humidity in the summer period.

14. Heating System

*Picture above: Picture of wall hung interior unit*

Explanation: The heating and cooling system was specified as a ductless Mitsubishi mini split system. The exterior condenser unite is located on the east side which is not visible. The interior wall hung unites are located throughout the building. In addition there is a natural gas stove from Jotul for ambient heat and for resiliency in case of a power outage. The stove has 20,000 Btu/hr heat output and is located in the center of the first floor next to the stairs, the heat is distributed by natural convection and radiation, in addition a small fan integrated into the stove can boost heat distribution. The DHW system is a 80 gal HP-tank from Stiebel Eltron which is located in the basement.
15. Verification

Certificate

Certificate ID: 8864_MosArt_EP_20140404_TOL

Passive House Academy hereby awards the EnerPHit certificate to the following building:

505 Alda Road Mamaroneck NY 10543

Client: Veronique LeBlanc

Architecture & Building Services: a.m.Benzing architects pllc, Andreas Benzing 80 Eighth Avenue Suite 1503 New York NY 10011

General Contractor: North Shore Construction Services INC, Dave Taormina 136 Woodbury Rd Woodbury NY 11797

This building was designed to meet the Passive House component energy retrofit criteria as defined by the Passive House Institute Darmstadt. Given appropriate on-site implementation, this building has the following characteristics:

Building characteristics: Achieved Required

Annual specific space heating demand 22 kWh/(m²a) ≤ 25 kWh/(m²a)

Annual specific primary energy demand for heating, DHW, ventilation and all other electric appliances for standard use 117 kWh/(m²a) ≤ 128 kWh/(m²a)

Airtightness of building envelope V50 as per test result 0.7 h⁻¹ ≤ 1.0 h⁻¹

Mean value of individual building component thermal protection:

Exterior insulation to ambient Thermal transmittance (U-value) 0.14 W/(m²K) ≤ 0.15 W/(m²K)

Exterior insulation to ground Thermal transmittance (U-value) 0.29 W/(m²K) ≤ 0.19 W/(m²K)

Interior insulation to ambient Thermal transmittance (U-value) N/A W/(m²K) ≤ 0.35 W/(m²K)

Interior insulation to ground Thermal transmittance (U-value) N/A W/(m²K) ≤ 0.61 W/(m²K)

Thermal bridges Aₜ Building envelope (window installation excluded) N/A W/(m²K) ≤ 0.80 W/(m²K)

Windows Thermal transmittance Uw,installed 0.84 W/(m²K) ≤ 0.85 W/(m²K)

Exterior doors Thermal transmittance Uw,installed 1.02 W/(m²K) ≤ 0.85 W/(m²K)

Ventilation unit Effective efficiency of heat recovery 75 % ≤ 75 %

Certification criteria met? Space heating demand ✔

Selection of the evaluation method Component quality

certifier: Tomas O’Leary

16. Total Cost: $ 1,400,000.-

17. Building Cost: $ 1,100,000.-

18. Year of Construction: 2013

19. Architectural Design: a.m.Benzing architects pllc

20. Building Service: a.m.Benzing architects pllc


22. Structural Design: John O’Brien Architect

23. Experience: N/A.

24. Publication: http://www.mamaroneckpassivehouse.com