

Tree House

Holderness, NH

Single Family Building

New Build

PHI Database ID#: 6906

Certification Goal:



Status: Pre-Certified

Size: 133 M2 TFA with One Unit

Description: This project is a rural lake-front cabin and is the first certified Passive House in New Hampshire.

DOE Climate Zone: 6A

Team:

Architect/Designer:
Alchemy Architects
www.alchemyarch.com

PH Consultant:
TE Studio
testudio.com

Building Physics:
Herz & Lang
herz-lang.de/de

Certifier:
Herz & Lang
herz-lang.de/de

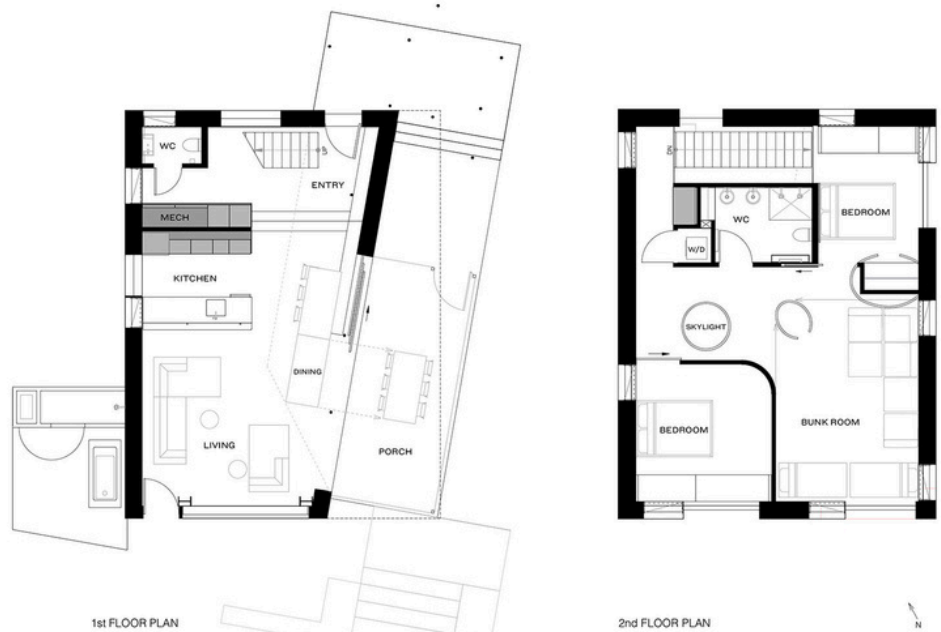
Builder:
Vision Design & Build (contracting)
<http://www.nhbuildingcontractor.com/#/>

Bensonwood (prefabrication)
bensonwood.com



The small house is metaphorically a box of trees carved into the forest next to Squam Lake. About the forest, it is built from the forest, with the health of future forests in mind.

The house is extremely compact to minimize land disturbance and fit within the footprint of a pre-existing house. Sliding partition walls, clever storage, and mechanical niches maximize flexibility and functionality. Overflow sleeping and storage are accommodated in the adjacent, unconditioned Boat House.



Thermal Envelope

Ground:

4" concrete slab on top of 6" EPS foam insulation
Cast in Place Concrete Slab 4" / 102mm
EPS insulation 6" / 152mm
U-value = 0.248W/m2K

Walls:

8" concrete stem wall with 6" EPS foam insulation (0.245)
Cast in Place Concrete 8" / 203mm
EPS Insulation 6" / 152mm
Exterior Coating
U-value = 0.245 W/m2k

Bensonwood PHLEX prefabricated, wood double wall construction - U-value = 0.111 W/m2K

Roof:

Bensonwood prefabricated, wood i-joint construction
White Oak Finished Ceiling 3/4" / 19mm
2x6 service cavity airspace 5.5" / 140mm
Sheathing .5" / 13mm
I-joint filled w/ Dense Packed Cellulose 16" / 406.4mm
Structural Sheathing 5/8" / 16mm
Tapered Polyiso Insulation Average of 2" / 51mm
U-value = 0.083 W/m2K

Windows & Doors:

Tanner Windows, Tanner Lauda Premium Entrance Door, Swiss Fineline, Lamilux Skylight

Shading Strategies:

Automatic Shades by Hella and Skylights automatically controlled by thermostat for smart solar control and natural ventilation

Mechanical Systems:

Ventilation:

Zehnder, ComfoAir Q350 HRV

Heating:

Cold-climate air-source heat-pump system
Mitsubishi

Domestic Hot Water:

Electric-resistance on-demand hot water heater
Rheem RTEX-36 and RTEX-AB7

PHPP Values

Climate:

Cool, temperate

Airtightness:

N50 = 1/h

Annual Heating Demand:

21 kWh/(m2a)

Heating Load:

25 W/m2

Cooling & Dehumidification

Demand:

29 kWh/(m2a)

Cooling Load:

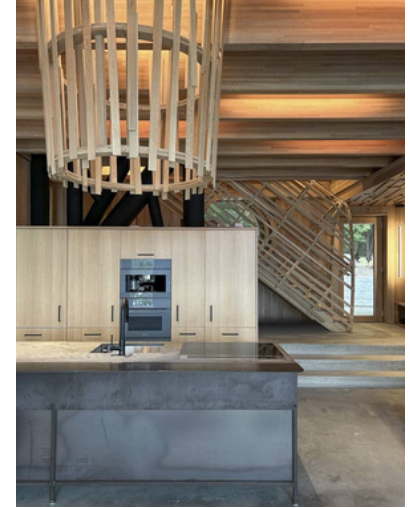
21 W/m2

PE Demand:

130 kWh/(m2a)

PER Demand:

61 kWh/(m2a)



The Passive House envelope is composed of offsite, prefabricated timber-based stud and dense pack cellulose panels. Minimal steel is included both inside and out, and is left unpainted for future recycling. Parametric digitally-fabricated “trees” appear to grow within the oak interior, defining spaces and bringing in light and ventilation.

The living room opens to the lake with a hydraulic actuated glass overhead door. A zero threshold lift/slide door connects the porch to the dining room, allowing the custom table to slide between the two spaces.



The Boat House — lying, growing, built alongside — is similarly about trees, and about boats, about our relationship with forests.

Complex yet quiet, the house embraces technology, but is also layered with craft. It is an exploration of using digital tools to solve diverse design and fabrication problems.