



Plainfield

PASSIVE HOUSE

Plainfield, Massachusetts

For Kent Hicks Construction, evaluating materials, costs, embodied energy, and sustainability is a never-ending process. Although the company feels they have their Passive House building process pretty well dialed in, each project presents some new and interesting challenges. The 1,800-ft² Plainfield Passive House, which they designed and built, is no exception.

The clients were very clear about what they wanted. The architectural style needed to be reminiscent of New England—by way of Ireland and Scotland—stone cottages. However, the inside needed to have an open floor plan, working spaces for two artists easing into retirement, and accommodations for overnight guests. By using a raised-heel scissor truss under a high-pitched roofline, the builder created interior ceiling heights ranging from 9 to more than 13 feet. The taller spaces allowed for a sleeping loft for guests, as well as storage areas above the primary living spaces on the first floor.

A unique feature of the Plainfield house is its mechanical tower, a dedicated floor-to-ceiling mechanical shaft in the center of the house. It includes an electric water heater, the ventilation equipment, and space for a future solar PV inverter. Because of its centralized location, hot water distribution lines are short, guaranteeing rapid hot water delivery and minimizing water waste. It also simplifies ventilation air distribution. Although a heat pump water heater

TEAM

Designer and Builder
Kent Hicks Construction Co.
— kenthicksconstruction.com

Certified Passive House Consultant
DEAP Energy Group
— deapgroup.com

Mechanical Engineer
Right Environments

Advisors
South Mountain Company
— southmountain.com

was considered, it was excluded from the final design because of concerns about noise and its potential impact on the indoor air temperature.

Heating and cooling is provided by a two-head mini-split heat pump. Although one head is probably sufficient to satisfy the loads, two were installed in the kitchen, facing opposite directions, to promote even air distribution and comfort for the two full-time occupants.

For household ventilation, an energy recovery ventilator (ERV) was selected, because of its capacity for dealing with humidity. The builder is a firm believer in the importance of removing cooking particulates and odors, so he installed an exhausting range hood with an active, insulated makeup air system. The double damper exhaust ducting is also insulated.

This cold climate zone calls for packing in insulation all around. The raised heel truss allowed for 30 inches of blown-in cellulose. The 12-inch double wall has four inches of low global-warming-potential, closed-cell spray foam, used to increase air tightness, followed by 8 inches of dense-packed cellulose. The slab-on-grade floor has 8 inches of Type 9 EPS below it, and the frost wall perimeter assembly includes 6 inches of EPS on the outside.

Plainfield Passive House; Photos by Lynne Graves

PRODUCTS

Air/Moisture Control
Pro Clima from 475
— foursevenfive.com

Ventilation
Zehnder America
— zehnderamerica.com

PASSIVE HOUSE METRICS

Heating energy	5.7 kBtu/ft ² /yr	1.7 kWh/ft ² /yr	18 kWh/m ² a
Cooling energy	1.3	0.4	4
Cooling load	40.3	11.8	127
Air leakage	0.6 ACH ₅₀ (design)		

