

An architect rebuilds a midcentury wreck into a stylish, energy-smart home for \$90 per sq. ft.

BY JESSE THOMPSON

My wife, Betsy, and I searched for two years before we found the dump of our dreams: a tiny, dirt-cheap, and homely 1960s ranch that was within walking distance of our children's school and was close enough to downtown Portland so that we could ride our bikes to work. Our hope was that we could renovate it into an affordable, stylish, and comfortable home. Our creative vision was strong enough to sense the glimmer of a diamond deep inside that forgotten home on Madeline Street.

The house was heavily distressed, its wiring was illegal and dangerous, and it was considered a menace by the neighbors. It leaked air to beat the band (15 ACH50/4000 cfm50), and the basement flooded every time it rained. The ceilings were a claustrophobic 7 ft. 6 in. high.

Why take this on? Residential architects usually want to build their own house at some point, so we figured, why not now? Plus, our kids were old enough to survive the remodel. As an architect, I thought the house would make a good low-energy-technique test case and a possible prototype for other office efforts at net-zero rehabs.

Don't rush the renovation

We planned the design during our first year in the house, which allowed us to discover the many different aspects of the site. The existing house was just larger than 1100 sq. ft. I knew that expanding the footprint would expand the cost as well, so I followed the dictum of designing up, not out. I planned a compact two-bedroom second floor for the kids and enclosed the breezeway between the garage and the house. In total, I added 850 sq. ft.

When we were ready, Rising Tide Custom Builders started the work in the basement and then proceeded upward. After fixing the drainage problem,

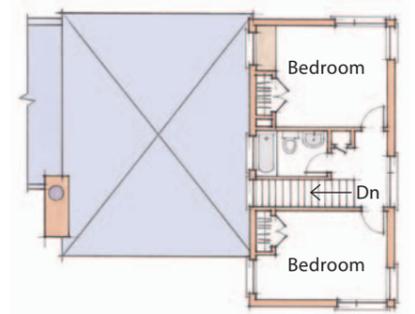
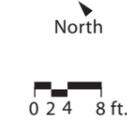
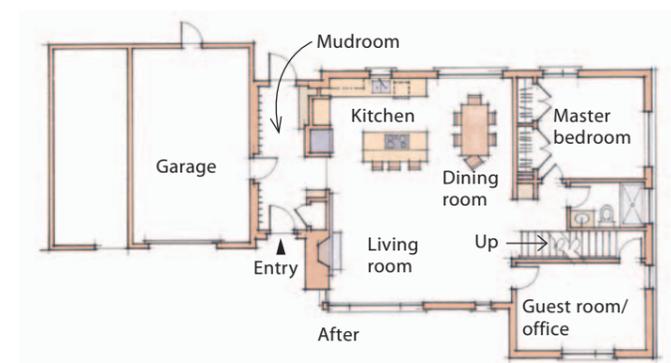
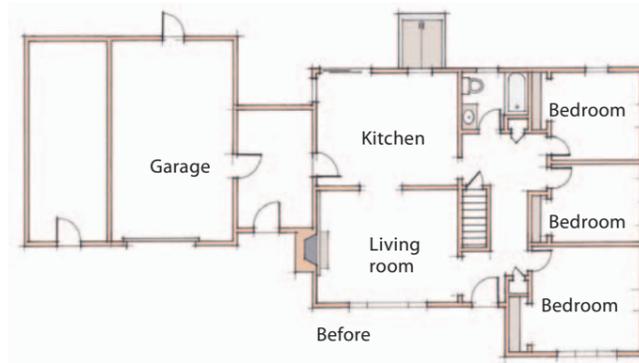


Ranch Transformed, Efficiency Achieved



GOING UP IS BETTER THAN GOING OUT

To save money, the new floor plan was kept to the original footprint. The author gained space by adding a partial second floor that houses two new bedrooms and a bath. Partition walls in the main living area were removed to create a spacious open plan. The only other spatial modification was to air-seal and insulate the breezeway, which became the mudroom.



Clever, low-cost interior



Bones of the wave. The framers used a plywood template to position strapping on the ceiling to support 16-ft. lengths of drywall. The result was an undulating ceiling that flows over the bright, airy kitchen. All appliances were salvage finds and kept costs low.



Open it up. The remodel raised to a curvy 12 ft. the living-room ceiling, which intersects with the kitchen ceiling at a lighted valance. A modern woodstove insert, the home's main heat source, is set into a custom steel surround.

they insulated the basement slab with 2 in. of XPS foam and then poured a new 4-in. slab over the foam. They insulated the foundation walls with 4 in. of XPS and added a gas boiler as a secondary heat source to the woodstove insert.

We moved out of the house when it was time to gut. On the exterior, the crew stripped the siding from the house and removed the roof in two phases. After the second-floor addition was framed and the roof was raised over the kitchen and the living room, the crew sheathed all of the new framing with ZIP System panels for a fast dry-in.

After installing the new windows, the crew covered the old walls with a self-adhesive membrane to protect against air and water infiltration, and they air-sealed the shell as they went. I found a source (insulationdepot.com) for recycled 5½-in. polyiso foam, and I spent about \$2500 to buy enough to cover the entire house. I added to the envelope's

efficiency by switching all the windows to R-5 triple-glazed fiberglass units.

To make sure that we were air-sealing properly, we did three separate blower-door tests during the construction process and ended up with a respectable score of 1.0 ACH50, which is near the Passive House standard. With the new insulation (R-60 on the roof, R-40 in the walls) and a tight envelope, we could reliably heat the house with our woodstove insert and then use the gas boiler as a backup. We installed a heat-

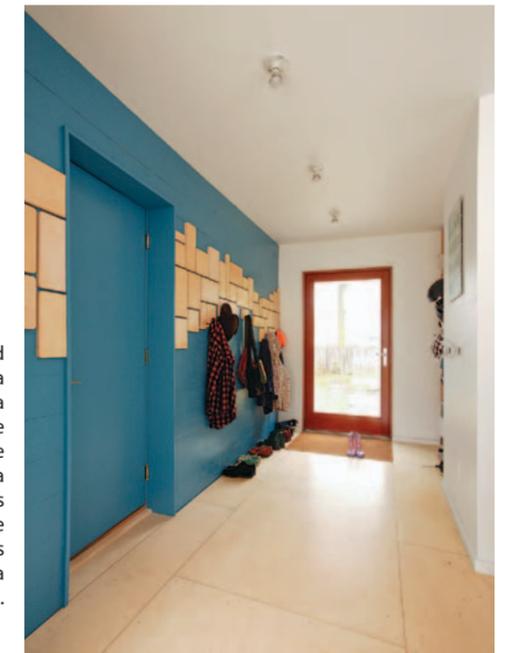
recovery ventilator (HRV) to provide fresh air during the winter.

Here's how we saved money In the end, we spent about \$175,000 total, which breaks down to \$90 per sq. ft. We saved by doing a lot of work ourselves. We were the general contractors, so we controlled the pace of the work and gave ourselves time to plan. Being general contractors also meant that we could manage the subcontractors on their schedule and gather salvaged materials.

SPECS

Bedrooms: 3 • Bathrooms: 2 • Size: 1950 sq. ft.
Remodel cost: \$90 per sq. ft. • Completed: 2012
Location: Portland, Maine
Architect/general contractor: Jesse Thompson
Builder: Rising Tide Custom Builders

New use for an old space. Formerly a breezeway, the area between the house and the garage was enclosed as a mudroom. Offcuts from the maple plywood floors were made into a decorative coatrack.



INSIDE THE NEW WALLS

The author based the exterior-envelope details on the REMOTE (Residential Exterior Membrane Outside-insulation Technique) system developed by the Cold Climate Housing Research Center (CCHRC), which moves the dew point to the sheathing's exterior, increasing the interior insulation's effectiveness. The addition of polyiso foam breaks the thermal bridge and increases the walls' R-value to 40. Rigid foam also was used over the dense-pack cellulose-filled roof assemblies to yield R-60. On the flat portion of the roof, the 2-in.-thick polyiso was waterproofed with EPDM.

2-in.-thick polyiso foam over taped sheathing

Angled roof framed with scissors trusses, insulated with dense-pack cellulose

All 2x4 wall cavities filled with dense-pack cellulose

The 1x2 strapping forms a rain-screen wall.

Hemlock clapboards

Walls covered with 5½-in.-thick polyiso foam

Strapping builds out the flared skirt on the lower part of the wall.

Recycled slate

New walls (2x4s 24 in. on center) and roof sheathed with ZIP System panels and tape

Original wall (2x4s 16 in. on center) stripped to the board sheathing and covered with self-adhesive waterproof membrane

4-in. XPS foam on foundation walls

New 4-in. slab

2-in. XPS foam

Original basement slab

We were able to find some great deals on salvaged appliances, too. The kitchen was outfitted with used fixtures and appliances. A used pedestal sink and tub found their way into one of the bathrooms. For the exterior, we found hemlock clapboards on Craigslist that had been stained the wrong color on one side, and we bought an entire barn roof of slate from a fellow architect who had been storing it for 10 years.

We also invested lots of sweat equity in the house and tackled everything from trash management to insulation and electrical work to slate installation.

Next time, we would do some things differently. We all know that hindsight is clearer than foresight, but it's always helpful to look back to avoid making the same mistakes twice. For example, we spent time shopping around for a refinance loan, which cost us a month on the schedule and meant that we were framing in the snow. Next time, we'll go with a local bank.

Another problem was the recycled exterior foam, which was not as economical as I thought it would be. Because the foam's thickness wasn't consistent, all the rain-screen wall strapping had to be shimmed to make the siding look flat, which was fussy, time-consuming work. If I were to do it again, I'd price out a Larsen truss or I-joint system filled with cellulose.

Finally, I can't recommend using metal jamb clips to install windows. They're a major pain to tape and air-seal, and they get in the way of the drywall and the underside of the windowsills. We could have saved lots of time by just screwing through the jambs into the framing.

Despite our minor regrets, Betsy and I now have a house that has a unique presence in the neighborhood. Anchored by its flared slate base and chimney, and topped with dark clapboards and a metal roof, our house embraces a mix of modern and traditional details. Best of all, it's so well insulated that we can heat the house for an entire winter on two cords of wood and about 200 gal. of propane for hot water and backup heat.

Jesse Thompson is a principal of Kaplan Thompson Architects in Portland, Maine. Photos by Charles Bickford, except where noted.