

Thomson Residence Ecoroof Installation
2534 SE 31st Ave, Portland, OR
Total Square footage: 94
Date completed: 4/1/2011

PROJECT REPORT

Overview

In May of 2010 I began a year-long renovation project of a 1926 craftsman-style bungalow in SE Portland. Included in the renovation was the addition of a ~100 sq ft ecoroof, to replace the preexisting front porch roof. The original roof was a high gable roof, which needed to be removed to allow space for a new window in the attic above (Fig. 1). The new roof is a shallow West-slopping shed roof (Fig 2); the structural members (rafters, beams, posts) were specified by the engineer to support the load of a ecoroof.

The structure of the roof was completed in the summer of 2010; the edging, membrane, and flashing were added in the fall. Planting was delayed until Spring on the recommendation of Dan Manning from Ecoroofs Everywhere.

A soil mix of pumice, topsoil, compost and perlite was added in March 2011, followed by plantings of Sedum and Sempervivian species. Abundant rainfall is negating any need for early watering. Once the plants are well established, it is expected that the roof will require only periodic watering during the driest parts of the summer. A hose bib is located near the roof for watering purposes.

Builder/General Contractor: James Thomson (homeowner)
Architect: Michelle Jeresek, Departure
Engineer: Bruce King, BKI

Structural Components

The roof's shape and slope was specified by the architect to match the slope of the dormer addition on the South side. The pitch, approximately 2 in 12, is a suitable slope for ecoroofs. The beam and rafter spacing and sizes were determined by the engineer to support the additional load of an ecoroof (25lbs/sq ft). The roof was sheathed in ½" plywood; a 4 ½' curb was attached to the perimeter to create a basin for the earth and plants.

The plywood was covered with an old carpet to help protect the waterproof membrane from any splinters or sharp corners. Next the roof and curb were lined with a single sheet of EPDM, to create a fully waterproof and seamless basin. Two drains were added at the bottom edge of the roof and connected to downspouts (Fig 7). While the ecoroof will retain a high percentage of rainwater and reduce runoff, it is certain that some water will still drain off, especially during the wettest months of the year.

Soil and Drainage

Around each drain I placed a “basket” of 1/8” wire mesh, (Fig 3) to minimize the possibility of the drains becoming clogged. I then filled the low end of the roof with a channel of pea-gravel approximately 6” wide, to allow water to easily flow into the drains.

I next placed a layer of ¼”-thick Geotextile on top of the EPDM, (Fig 4) to further protect the membrane and allow for improved drainage under the soil.

I chose to mix my own soil mix using pumice, topsoil, compost, and perlite. We mixed the soil on the ground (Fig 5) and lifted it onto the roof in 5 gallon buckets. Altogether the roof holds approximately 1 cubic yard of soil mix, spread about 4” deep.

Plantings and maintenance

The roof was planted with a mix of Sedum and Sempervivian species, acquired from friends. (Fig 6) Once established, these hearty plants will require little watering. I plan to monitor the health of the plants during the hottest parts of the summer and will water as needed. As long as the plants remain healthy, no additional maintenance is needed.

Ecoroof Benefits

Ecoroofs are generally promoted because of their ability to reduce storm-water runoff, provide natural cooling, increase green space, and beautify rooftops. In this location, the ecoroof is replacing a porch roof that drained directly into the sewer system. Thus the overall water runoff of the house will be decreased. Additionally the roof provides a pleasant visible feature from the new upstairs bedroom. Finally, this roof is visible from the street in a high-traffic area, and will hopefully attract others to consider constructing roofs of their own

Materials suppliers and Costs

Design and Engineering:

It is impossible to separate the portion of the total project design and engineering costs that went specifically into the ecoroof. I estimate it as follows;

Design: Michelle Jeresek, Departure. \$400

Engineering: Bruce King, BKI. \$200

Lumber:

It is difficult to determine what the additional lumber costs of the ecoroof were. Because the roof needed to be re-built anyway, the additional cost for the ecoroof is the additional costs of the larger size structural members that are required for the additional load. I estimate this cost to be approximately \$60, or 20%, of the lumber cost.

Supplier: Marley Brown Lumber, 4000 SE Powell. Total lumber costs: \$300

Waterproofing elements:

Membrane: ~120 sqft of EPDM. Supplier: Pondcrafters, 8842 SE Stark st. \$100.

Curb flashing: ~30' of custom metal flashing. Supplier: Do-it-yourself heating, 544 SE 78th Ave. \$126.

Drainage components:

Drainage parts: 2 Shower drains, ABS plastic pipe. Supplier: Home Depot, 10120 SE Washington. \$9

Drainage fabric: ~110 sq.ft. Geotextile ACF West, 8951 SE 76th Ave. \$21.

Pea gravel: Mt. Scott Fuel Co, 6904 SE Foster Rd. \$6.

Soil: I mixed my own soil from pumice, topsoil, compost, and perlite.

Pumice: 1/2 yd. Mt. Scott Fuel Co, 6904 SE Foster Rd. \$22.

Compost: 8 cu.ft. Concentrates, 2613 Southeast 8th Ave. \$12

Perlite: 3 cu.ft. Concentrates, 2613 Southeast 8th Ave. \$15

Plants:

I acquired all of my plants from friends who gave them to me in exchange for work performed. Thus the costs are estimates of what I would have paid had I purchased them.

Sedum sp (including Acre, Album, and Rupstre): ~60 sq.ft. \$100.

Sempervivan sp: ~20 sq. ft. \$35

TOTAL COST: \$737. This does not include any labor costs, which was mostly done by the homeowner.

Lessons learned

Overall this was a fairly simple, straightforward project with few surprises. A few things I would do differently next time:

- 1) Make the overall basin about 1" deeper. The carpet that I used took up at least 1/2" of space, and the EPDM plus drainage fabric probably another 1/2". This reduced the overall room available for soil by about an inch. Another solution would be to use something thinner than carpet under the EPDM.
- 2) Put a walkway down the middle of the roof. It was difficult to plant the roof without trampling plants I had already planted; it would be nice to have at least one walkway to make the planting and watering process easier.
- 3) The large EPDM sheet was a little challenging to work with. While I liked that it was one seamless sheet, next time I might try an option that allowed me to use smaller pieces and seal them together (TPO, for example)

Figures



Fig 1. Original porch roof.



Fig 2. New porch roof.



Fig 3. Drain, wire “basket,” gravel, and Geotextile detail.



Fig 4 Geotextile on EPDM membrane; soil being added.



Fig 5. Mixing the soil on the ground.



Fig 6. Finished roof with plants.

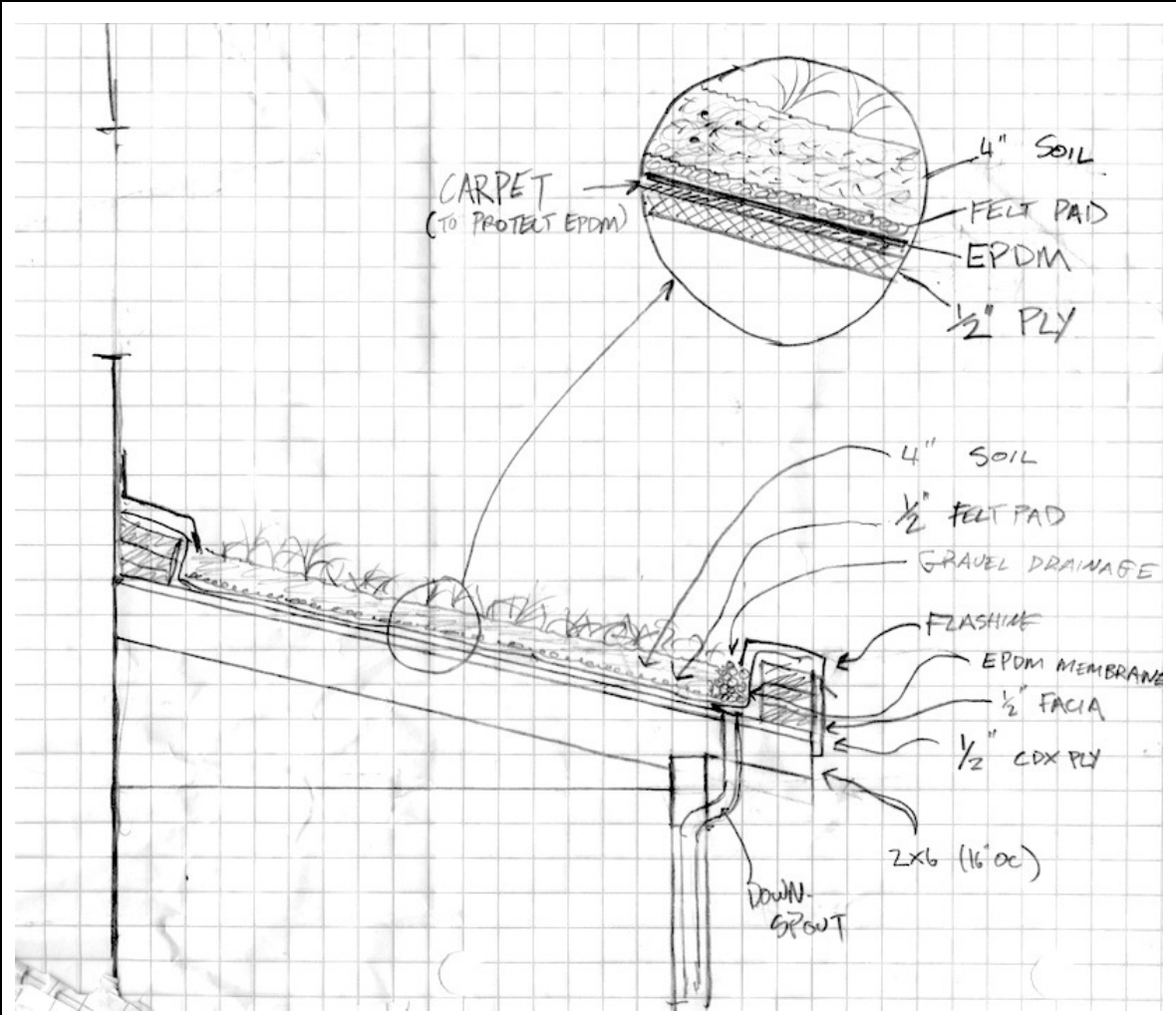


Fig 7. Diagram of roof cross-section.