

Zuniga/Levy Ecoroof Report

PROJECT SUMMARY

Project Address:	301 NE 65 th Avenue, Portland OR
Owners:	Suzanne Zuniga & Jay Levy
Project Type:	Residential retrofit
Size:	388 SF
Technologies:	Extensive ecoroof on 'flat' roof; 3-5 inch deep growing medium
Major Benefits:	<ul style="list-style-type: none">• Manage stormwater• Increase thermal performance of the roof• Increase beauty and appearance of the roof (it is visible from bedroom windows)• Provide urban wildlife habitat• Reduce urban heat island effect and global warming• Extend the life of the roof membrane
Cost:	\$5951.60 including membrane but not framing or decking
Constructed:	June 2007-November 2009

INTRODUCTION

The existing farmhouse was originally built in 1890. The main house has a gable roof, with a one story, flat-roofed addition, on which the ecoroof was installed. The ecoroof was part of a much larger renovation project, thus the length of construction. The ecoroof is visible and easily accessible from windows in two of the second floor bedrooms.

STRUCTURE

The existing roof on the addition was in need of replacement, and when the existing roof structure was exposed, the existing 2 x 4 joists were both inadequate to carry the new loads and too shallow for the desired level of insulation, so instead of sistering or adding joists in between the existing rafters, they were replaced with new 2 x 12's at 16" oc, bolted to a new ledger board attached to the main house framing.

COMPONENTS

The ecoroof is approximately 388 SF. The low end has a 1-foot wide strip of drain rock with an overflow drain and drain box in the corner. There are two vent pipes, from the kitchen and bathroom below. There is a row of ten 2x2 concrete pavers along the building wall, connected to a small pad of 6 pavers in the center. The remainder is vegetated. A hose bib was installed on the building wall at the ecoroof.

- ❖ Structural Roof Support: Replaced existing roof framing with new 2x12 joists at 16" oc, attached to new ledger board bolted to existing house framing. Overhang has 2 x 6 outriggers.



- ❖ Roof Decking: New $\frac{3}{4}$ " plywood decking, screwed and glued and sealed.



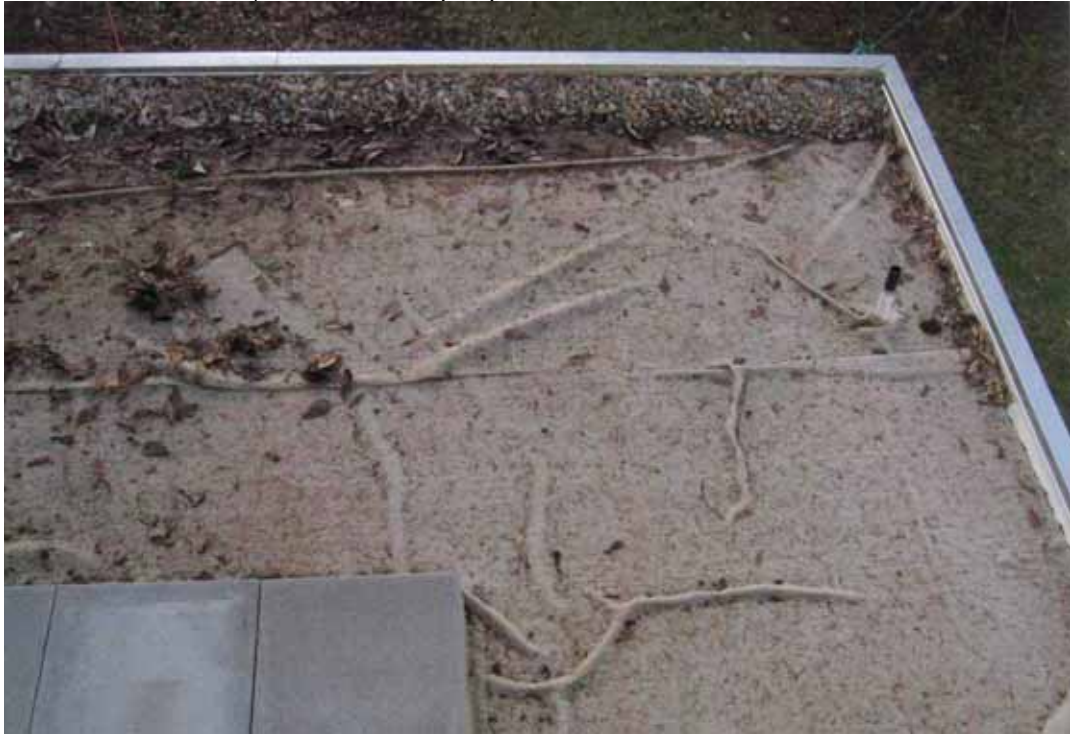
- ❖ Waterproof Membrane: TPO membrane, heat welded.



- ❖ Curb: 2 x Built-up curb with stainless steel cap around perimeter.



- ❖ Drain Mat: Recycled fiber carpet pad.



- ❖ Pavers: 2 x 2 concrete pavers on Trex framing



- ❖ Drain Rock: clean, washed river rock. (Clean of sharp rock particles/dust- not leaves!)



- ❖ Overflow Drain: 4" PVC pipe with metal mesh drainbox



❖ Growing Medium: 3-5" (3 cubic yards) Earthlite Extensive Value Blend.



- ❖ Vegetation: 400 plugs of Sedums, sempervivums, and delosperma; (40) 4" pots of various sedums. See plant list.



- ❖ Irrigation: New hose bib installed at the building wall adjacent to the ecoroof; irrigation, as needed until plants are established and in extended dry periods, by hand, sprinkler, or soaker hose.

DESIGN

The ecoroof was designed by homeowner and architect, Suzanne Zuniga of Suzanne Zuniga Architect, LLC. Structural design and calculations were provided by Tom Baughman of Madden & Baugman Engineering, Inc..

INSTALLATION

The new framing, roof deck, and curb were provided and installed by the General Contractor who built the rest of the project, Tom Champion Builders. The ecoroof membrane, drain mat, drain rock, and pavers were provided and installed by Greg Haines and Dan Manning of Ecoroofs Everywhere. The growing medium was provided by Sunmark Environmental Services, LLC, and installed by the homeowners using 5-gallon paint buckets and a simple pulley. The plant plugs were provided by Koenig & Associates, Inc. shipped via Fed Ex from Swift Greenhouses, Inc. and were installed by the homeowners.

COST

The most expensive component in this ecoroof was the TPO membrane, which would have been needed and installed whether or not there was an ecoroof on top, and, indeed, the ecoroof will extend the life of the membrane, protecting that investment. The perimeter curb with stainless steel cap and concrete pavers on Trex framing were also significant costs, and although there are alternatives that are less expensive, they were chosen for their durability, aesthetics and sustainability. Likewise, plugs are more expensive than seeds or sprigs (cuttings), but the plugs are hardier and more likely to succeed, particularly since this roof was planted in late fall, yet more adaptable to the new growing medium and conditions than 4" pots, which are more expensive still.

ITEM	MATERIAL	LABOR	COST
Ecoroof design & Drawings	Suzanne Zuniga Architect, LLC	Suzanne Zuniga Architect, LLC	Donated (homeowner)
Structural design & calculations	Madden & Baughman Engineering, Inc.	Madden & Baughman Engineering, Inc.	\$450.00
Permit- for new roof framing and hose bib			Unkown- Part of much larger renovation
Hose Bib	Hoffman Hydronics	Hoffman Hydronics	\$185.00
2x Curb w/ stainless steel cap	Tom Champion Builders	Tom Champion Builders	\$845.00
TPO Membrane, drain mat, & drain box	Ecoroofs Everywhere	Ecoroofs Everywhere	\$2705.60

Drain Rock	Ecoroofs Everywhere	Ecoroofs Everywhere	\$136.60
2x2 concrete pavers on Trex framing	Ecoroofs Everywhere	Ecoroofs Everywhere	\$884.40
3 yds ³ Growing Medium	Sunmark Environmental Services, LLC		\$270.00
		3 teenagers and 2 adult volunteers (homeowners)	\$70.00
400 plugs	Koenig & Associates		\$331.36
		1 adult volunteer (homeowner)	
(40) 4" pots	Portland Nursery		\$80.00
		1 adult volunteer (homeowner)	
TOTAL w/ Membrane			\$5951.60
TOTAL w/out membrane			\$3451.60

LANDSCAPE DESIGN

The landscape design was provided by Suzanne Zuniga of Suzanne Zuniga Architect, LLC. The ecoroof is a rectangle that is adjacent to the building wall on one side, with the other three sides open to the yard. The pavers run along the building wall, where there are windows for access, with a small pad in the center for maintenance and enjoyment. The design begins with a double spiral in the center, planted with the two varieties of Dragon's Blood, one red and one tricolor, with concentric rings of each other plant variety radiating outward from the spirals.

PLANT LIST	
Sedum album	50 plugs
Sedum spurium- Dragon's Blood	50 plugs
Sedum hispanicum	50 plugs
Sedum spurium -Dragon's Blood Tricolor	50 plugs
Sedum reflexum- Blue spruce	50 plugs
Sempervivum- Hens & chicks mix	50 plugs
Delosperma nibigenum	100 plugs
Mixed sedums	(40) 4" pots

CARE AND MAINTENANCE

The anticipated maintenance for the ecoroof is minimal. The vegetation will be watered until well established, for the first year or so, however, given the local climate, and that the vegetation was planted in the fall, watering should not be necessary until mid summer, when the plants have had about 8-9 months to get established. After that, they should only need water in extended dry periods in the summer. Likewise, the hardy plugs should be well established by spring, when weeding might be needed.

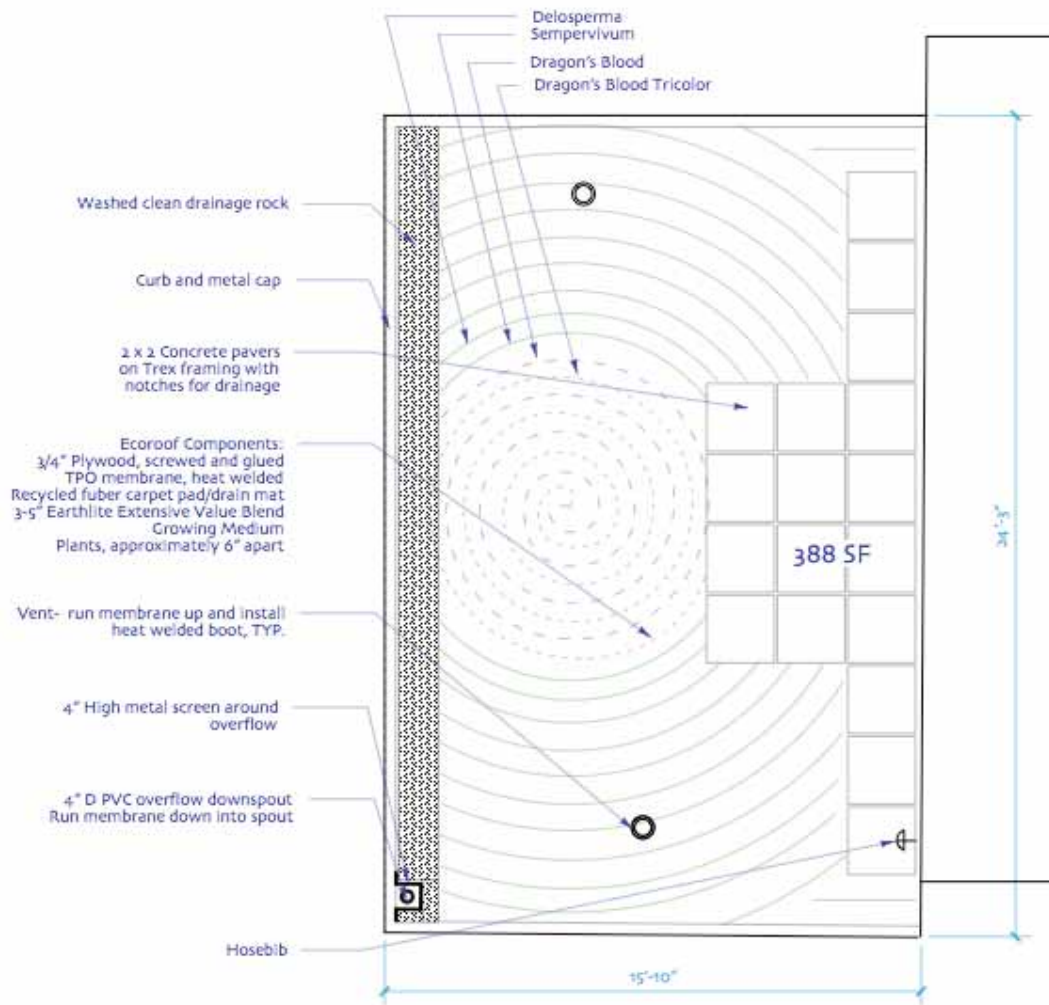
Long term maintenance will include watering, removal of excessive leaves and debris from the ecoroof and overflow drain, weeding, and dead plant replacement as needed, about once a year. The growing media will be top dressed to replace nutrients as needed, about every 4-5 years in the spring.

NOTES

Membrane: The single ply membrane must be installed by an experienced contractor, and most smaller residential builders/contractors do not have experience with single-ply membranes. Ecoroofs Everywhere did an excellent job. It is important to protect the membrane free from anything sharp that might puncture it: crushed rock shards, metal shards, tools, etc., and to provide proper waterproofing details and flashing, particularly at the building wall.

Growing medium: The growing medium contains: Earthlite Vitrified Lightweight Aggregate, Horticultural, Grade Perlite, Recycled Fiber Blend - (shredded hessian cloth and bluegrass straw), Biodigested Compost, Ecolive Mycorrhizal Growth Enhancer, Ecobiotics Microbiological Growth Enhancer. It weighs 27 lbs/ft³ dry and 56 lbs/ft³ saturated. The installation of the growing medium and vegetation was easily accomplished and could be repeated by most homeowners. The pulley and buckets were very efficient. Two adults and 3 teenagers moved the dirt to the roof in two hours.

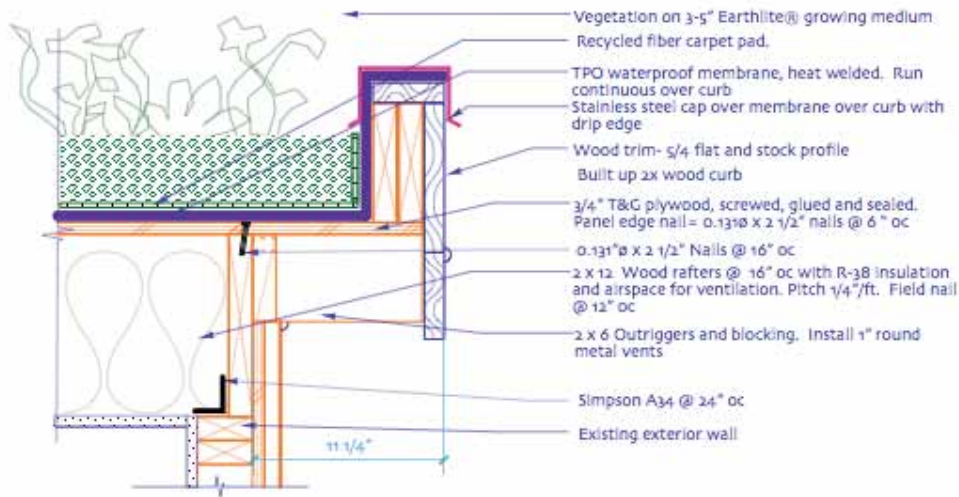
Plants: The plugs were easily brought to the roof since they were shipped in trays in boxes. They were planted by one person in 2 hours with an old fashioned dibbler.



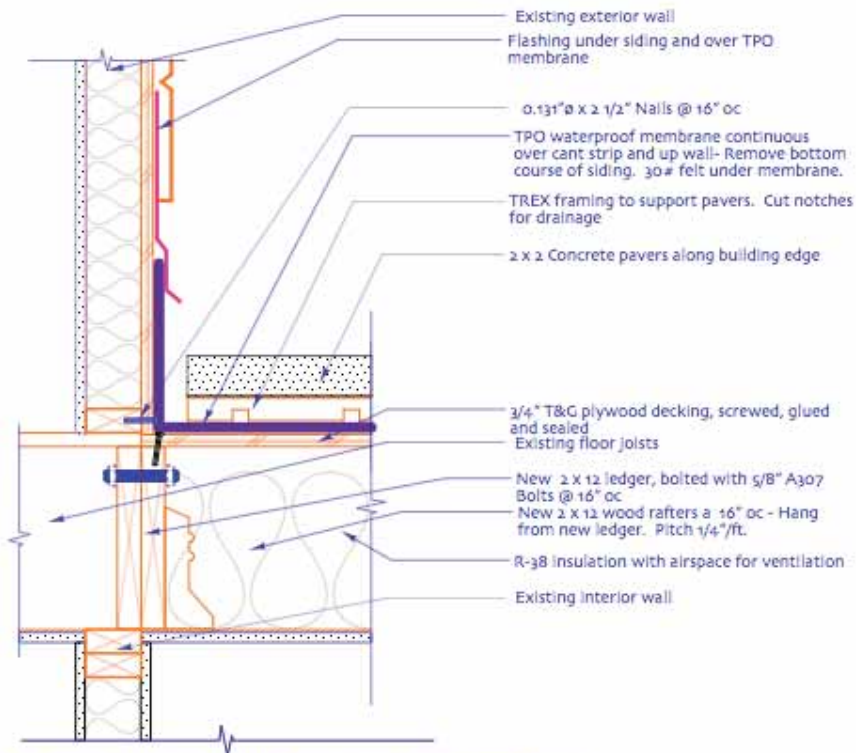
Planting Plan

1. Plugs to be planted 6" apart, in a double spiral starting at the center, with concentric rings radiating out.
2. The double spiral will be planted with the two varieties of Sedum spurium dragons' blood, one in each spiral.
3. The concentric rings will each be planted with a different variety, beginning with the Sempervivum, then Delosperma.

ZUNIGALEVY ECOROOF PLAN



1 Typical Curb @ EcoRoof
 NTS



2 Detail @ Building Wall @ EcoRoof
 NTS

ZUNIGA/LEVY ECOROOF DETAILS