

Dave Dunkak Eco-Roof Report
November, 2013

Project Overview

In 2006 I worked with designers to remodel a previous home and it was from them I first heard of eco-roofs. When I visited the passive solar house they designed and built for themselves (they did not have an eco-roof) and experienced the energy efficiency of their home, I knew I wanted to design my own energy efficient home.

I purchased a lot in the fall of 2007 but because of the economic challenges of 2008, I delayed building. In the Winter of 2011-2012 I decided to move forward. I hired Al Stone (of Al Stone Remodeling & Design LLC) to design and build. We briefly considered making a house that fit in with the neighborhood but I quickly decided to go for a house with a flat roof. Of the many reasons for this choice, highest on the list was what a flat roof would afford -- the opportunity for an eco-roof.

Again, I'd never heard of eco-roofs before 2007. But after renting a home from 2009 to 2013 that was horribly inefficient (hot in summer, cold in winter), I had to try something different. I was enthusiastic for an eco-roof no matter what. The Bureau of Environmental Services eco-roof incentive program proved to be a massive boost. Not only for going forward with the roof of the house but BES's program inspired us to design the roof of the garage to allow for an eco-roof, as well.

We broke ground in October, 2012 and planted the roof with ten varieties of sedums in early September, 2013.

Details

Once Al and I decided upon the design, including a "flat" surface for an eco-roof, he employed his architect and engineers to draw up plans for a stout structure with strong framing.

The roof structure is comprised of:

- ¾ inch CDX Plywood on a 12 inch on-center truss
- TPO single layer roofing Membrane on top of a venting mat
- Drainage "superdrain" from Superseal Construction Products LTD
- 4" of soil designed for roof tops from Phillips soil products in Canby Oregon
- 250 pounds of Sedums
- There's also a two foot border of basalt rock for drainage

The roof is not flat. There is a curve through the middle of the main surface that creates slopes for water drainage. To further promote drainage, Al Stone created "crickets" -- embankments that direct water to the drains.

Successes

Al Stone spoke with professors at Portland State University to inquire if a student might want to help with the eco-roof. Ben Deines answered the call and became our design consultant. Ben is currently a student in PSU's architecture program. His thesis project is focused on eco-roofs and other vegetated architecture.

Al Stone and Ben Deines found suppliers like Phillips Soil, with help from the BES staff and from their web site. Phillips Soil blended the soil/pumice mix at their yard. Al found Barkdusters who would pick up the 25 yards of soil from Phillips. Using a six inch hose, Barkdusters blew the mixture onto the roof cleanly and quickly. This solved numerous logistical problems for us -- namely getting the mixed soil on the roof while saving us time and labor.

The soil mixture was "shot" on the roof in August, 2013. Within a couple days I noticed a change in the temperature inside the house, reflected in the thermostat, compared to the same hours from days previous, under similar conditions. While temps didn't drop by ten degrees, the interior was

noticeably cooler. And now, as Fall and Winter approach, I'm confident the eco-roof helps insulate the house (cooler in the summer, warmer in the winter) while requiring less energy to create such conditions. I can't wait to see the relationship that evolves between the house and the sedums as they grow and fill out the area on the roof.

The sedums! Three weeks or so later Ben Deines and I spread the sedum cuttings, I went up with Al Stone to check on the plants. They are beautiful, hearty little creatures! The ones we actually planted in the dirt by hand thrived almost immediately. The others grew tiny root systems and took to the soil mixture and look super healthy. We were actually giddy to see how well they were doing. Some had even flowered. I was happy and relieved since I had no reference for what to expect. The sedums even attached themselves to the lava rock that outlines the roof. Ben Deines says that by spring the sedums should be thriving and in full bloom. Two months after spreading the cuttings on the roof, they are thriving.

Lessons Learned

Al Stone reached out to many people within the Portland community and asked many questions about an eco-roof. In due time he was able to work out a program for the roof. Al said that the project came together easily once he became comfortable with the product choices.

There are obvious challenges that come with an eco-roof, but if care is taken, with proper preparation and attention to detail, as Al approached this project, from a customer's point of view, it's surprising how easily everything came together to create an exciting, living, eco-roof.

People are simultaneously excited and somewhat mistrusting of so much weight, especially from soil and soil-retaining water, on a roof and want to see what everything looks like and are keen to know how it all works. They're just as interested in the sedums, however, as they are in the possibility of structural damage. Planning for safe and easy access to the Eco-roof is something I wish I'd considered while designing the project.

Also, I didn't want the plants to be seen from the street for fear that neighbors or passersby wouldn't want to see the plants or might think it's weird. Based on all the feedback I've received, I was one hundred percent wrong about this assumption. Everybody from whom I've heard wants to see the plants as well as visit with them. They are beautiful and fun, indeed.

We could've planted the roof as early as July but due to a combination of logistics and the desire to conserve water, we waited until September to spread the sedum cuttings. We still had to set up a sprinkler system to keep them moist to help them grow roots during a week's worth of 90* weather. We were told spring and fall were the best times to plant. I can confirm the reasoning for this.

Eco-roof Cost (for 2,500 sq. ft. of roof)

- Additional Insurance	\$ 50.00
- Additional Labor	\$ 1,765.00
- Roofing Membrane	\$15,875.00
- Metal Flashing	\$ 4,380.00
- Superseal Drainage Mat	\$ 2,833.33
- Drain Covers	\$ 150.00
- Lava Rock and Drain Rock	\$ 375.00
- Roof Soil	\$ 1,155.00
- Roof Soil Installation	\$ 1,275.00
- 250 lbs. of sedum	\$ 2,125.00
- Ben Deines' Consultation	\$ 240.00

Total **\$30,223.33**

According to Al Stone, the difference in cost between an eco-roof and a traditional roof is an additional cost of about \$6.00 per Sq. ft. to accommodate for planting the roof (2,500 sq ft).

Resources for the Eco-roof

Bureau of Environmental Services (in many ways!)

Barkdusters

1700 W 4th Plain Blvd
Vancouver, WA 98660
(360) 253-6579
<http://www.bardusters.com>

Western Pacific Roofing LLC

(503) 659-7663
8145 SE 6th Ave, Portland, OR 97202
www.westpacroofing.com

Phillips Soil Products

Phillips Soil Products, Inc
26050 S Highway 170
Canby, OR 97013
Phone: (503) 266-4700
Web: Phillipsoil.com

SUPERSEAL Construction Products Ltd.

PO Box 61646 Brookwood RPO
Langley, BC, V3A 8C8
(P) 1-800-571-1877
(F) 1-604-856-2447 (new)

Al Stone

www.alstoneremodeling.com
alfredstonedesign@msn.com
1793 Mapleleaf rd
Lake Oswego OR 97034
(503) 997-1051
CCB#175549

Blooming Nursery, Inc. (for 250 pounds of sedum cuttings)
www.bloomingnursery.com

Ben Deines

(541) 554-9813
E-mail: bdeines@pdx.edu



Al Stone - October, 2012



Al Stone and Dan Thomas discussing "crickets"



Roofing Membrane



Chris Jones & Paul Lyshaug build the lava rock borders to contain the soil



Barkduster "shooting" the soil blend on the roof



More soil



Isn't it purty!



The slanted roof



Ben Deines - One month of spreading, early October, 2013



Thank you, BES!!!