

Something Grows on the Roof of the Alice Paul Residence Hall

By Lars Rasmussen, Gardener

On the new Alice Paul Residence Hall, some three stories above the busy Chester Road, grows a green roof. Although it's aesthetically pleasing to the lucky resident students who view its seasonal changing beauty, there are scientific and beneficial reasons as to why green roofs are increasingly being put to use. Swarthmore College is using "green technology" in new construction to conserve energy and limit the effects of storm water runoff, although the majority of green roof technology was developed in Germany over the last 30 years.

So what exactly is a green roof and why can it be so beneficial? Green roofs are either "intensive" or "extensive." An intensive roof usually includes a fairly thick growing media of a foot or more and may contain trees and shrubs. Much more common and what is used on the Alice Paul project is the extensive type. Extensive green roofs usually include a thin layer of soil media and a vegetative cover over a synthetic membrane that will protect the roof. The vegetation needs to be adaptable to moisture and drought. Because of its depth, an extensive roof cannot include shrubs and trees, but more adaptable succulent-type plants like sedums. The Alice Paul planting is composed of 6 varieties of sedums, 8 varieties of other perennials, and 3 types of grasses (see plant listing). An extensive green roof can save up to 10% on air conditioning expenses when compared with a flat black roof. In urban situations, rainwater runs off because of increasing amounts of impervious surface. This runoff typically enters storm water drains at a high volume over a short time. This runoff causes major negative erosive affects on local waterways such as the Crum Creek. A green roof can help retain 50-90% of a rainfall depending on the amount of rain. While an average black roof may last 10 years, a green roof is expected to last 30 years or more because it protects the roof membrane from ultraviolet light and moderates temperature extremes.

Jeff Jabco, director of grounds, worked with green roof designers Jorg Breuning and Peter Philippi of Green Roof Service on the plan for a 5,100 sq. ft. extensive roof. Peter and Jorg found a supplier for soil that would meet the needs of the plants and the design. The material is Solite®, a trade name for heat expanded shale, whose company is owned by a Swarthmore College graduate. Solite® is the same material found in the *Sporobolus* infiltration beds at the new Science Center. The Solite® was mixed with organic matter at a soil mixing facility in Avondale, Pennsylvania.

Before installation could begin, the roof needed to be checked for leaks. I volunteered to help a technician on a hot July afternoon. I wetted the roof and he tested with a probe in each hand, reading a meter, while an electrical current was sent across the surface! Now I understood why so few had volunteered! The current would dip between the probes if a hole was present. It was actually a very safe and accurate process that located two small holes that were promptly fixed before installing the green roof.

After passing the leak test, installation began on August 4, 2004. Michael Furbish and the crew of the Furbish Co. of Baltimore installed the roof. A crane was used to raise all of the membrane material, Solite®, and plants to the roof. Engineering students installed temperature probes to monitor various levels in different locations. The membrane was rolled over the white PVC covered roof and then large bags of Solite® were lifted and spread out to a 4-inch thickness. The design included 6 raised beds, mounded a foot deep

with the same Solite® and soil mixture. The mounds enabled grasses and other perennials to be included because of the additional media depth. The grasses and perennials for these mounds came in plugs and small containers. The 6 types of sedums were harvested as 4 to 6 inch cuttings, mixed together, and then chopped into smaller pieces. They were spread evenly over the main roof area by hand. Jorg and Peter assured us the sedums would soon root if kept moist from the start. The smaller leaf-types rooted first and most took hold, although the plants hardly looked impressive in early winter. Growth really took off in early spring! The combination of sedum foliage and flower color was beautiful and full of bees. The mounded beds grew well; the *Allium*, *Dianthus*, *Delosperma*, and *Talinum* all flowered beautifully. The grasses grew well and gave the garden motion and structure. Now the roof is about 75% vegetated! I have noticed much natural activity on the roof. I have seen bees, butterflies, dragonflies, grasshoppers, praying mantis, mourning doves, and many other birds.

In regards to maintenance, cuttings were taken from larger established clumps of sedums in the spring and fall to fill in the bare areas. Pelletized organic matter was also spread over the whole roof in the spring, particularly targeting the mounded beds. Weeding has been minimal until this past summer when a spreading *Euphorbia* appeared between plants and open areas. Areas were weeded and the sedums are filling in from the new cuttings. Since conditions have been dry this summer, the new cuttings and raised beds have required supplemental watering.

The Arboretum installed a small green roof on a utility shed behind Papazian Hall in fall 2002, which is fully covered by thriving sedums. The college is so pleased with the green roof on Alice Paul; there may be future opportunities for green roofs on new and existing buildings on campus. For more information on green roof technology, visit <http://horticulture.psu.edu> (Penn State's website on green roof research) or www.cityofchicago.org/environment (Chicago's website on green roofs installed on city hall and elsewhere in the city).

Plants on the green roof:

Extensive area:

Sedum album

Sedum album 'Murale'

Sedum reflexum (syn. *Sedum rupestre*)

Sedum sexangulare

Sedum spurium 'Fuldaglut'

Sedum spurium 'Roseum'

Raised mounds:

Allium schoenoprasum

Allium cernuum

Aster alpinus 'Dunkle Schöne'

Delosperma 'Kelaidis'

Dianthus arenarius

Dianthus carthusianorum

Dianthus deltoides 'Brilliant'
Talinum calycinum

Grasses on raised mounds:

Bouteloua curtipendula
Calamagrostis xacutiflora 'Karl Foerster'
Sporobolus heterolepis

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