

New Residence Hall

Fields Hall & Schoenfeldt Hall

University of Portland

5000 N. Willamette Blvd., Portland, Oregon



Project Summary

Project Type:	New Construction – Residence Hall
Technologies:	Green Roof (ecorooft); 1,767 sq. ft (area); 12-14 inch deep growth medium (soil)
Benefits:	Stormwater management Help reduced heat island effect Roof longevity Improvements to interior spaces located above the first floor – the landscaped roofs adds green space to the adjacent dorm rooms and common rooms and enhances the aesthetic appeal of the property.
Costs:	Total project construction cost: \$18.9 million Ecorooft construction cost: \$17,540 BES provided a \$8,835 grant for this project
Constructed:	Overall project: May 2008 – September 2009 Ecorooft portion: May 2009 - July 2009

Introduction

The University of Portland began construction of two new residence halls in the spring of 2008 to help house the projected increased enrollment for the 2009 – 2010 school year. Both halls are located in a common building on the west end of campus proper. It is the universities policy to building green and has implemented a campus requirement to achieve LEED silver certification for all new buildings. With this being the first Residence Hall built in over 10 years, the University wanted to set a higher standard for their campus living.

Stormwater management is a major issue for the university as their campus continues to grow. They want to promote and demonstrate new green technologies for buildings and these ecorooft will not only provide a good demonstration of building technology, but also help minimize the need for additional drywells on campus. The roofs can be viewed from several locations; on the third and fourth floor commons areas and adjacent resident rooms on the second, third and fourth floors.

The goal of this project was to provide common spaces along with resident rooms the opportunity to experience landscaped areas on the upper floors of the building and help with the campus stormwater management. This report is limited to the ecorooft portion of this project.

Stormwater System and Management Goal

The rain falling directly on the green roof will be mostly absorbed by the ecorooft system. Any overflow or unabsorbed water is piped directly to the landscaping surrounding the base of the building. The campus is not connected to the City stormwater system and therefore has to build additional drywells for each new impervious surface. The ecorooft and bio-swale helped to minimize the size and need of additional drywells.

System Components

Planted Roof

- The area of the vegetated portion of the ecoroof is approximately 1,522 square feet. The catchment area is 1,767 square feet including a 12" gravel perimeter.
- External roof drains and overflows daylight to landscape areas below. Any excess water from the landscaped areas is then collected into drywells.

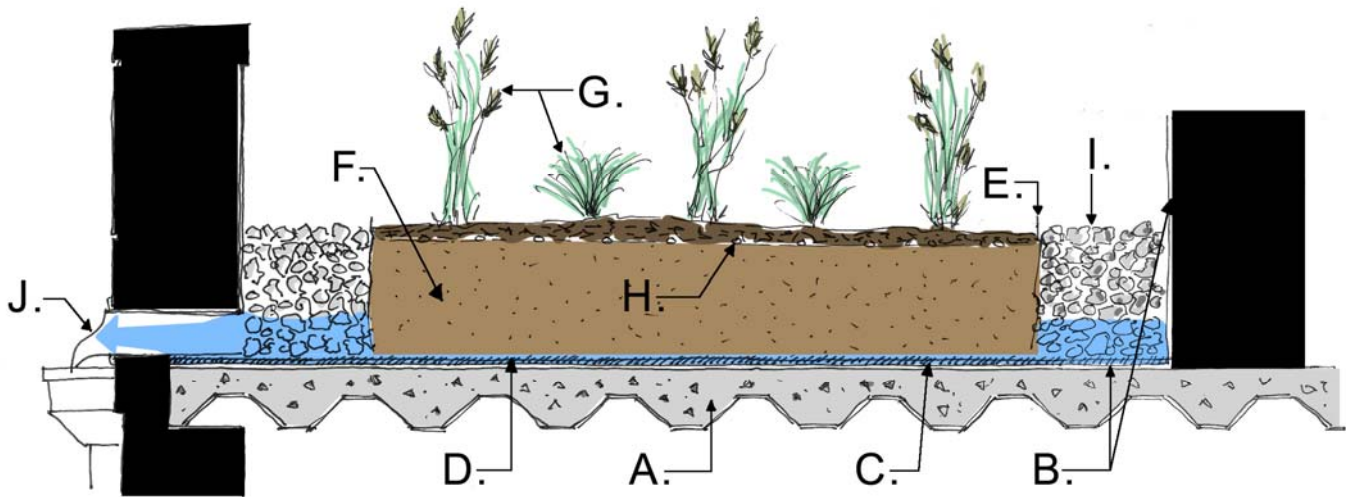


Figure 1. Diagram of the ecoroof system components

- A. Structural Roof support: Low slope concrete over metal deck designed to support a live load of 100 lbs/s.f.
- B. Roofing System: A multi-layered hot rubberized waterproofing membrane (Tremco Tremproof 6100 215 mils) which is fabric-reinforced (Tremco Reemay 2014) and sealed at all joints (Elastomeric Sheeting).
- C. Protection Board & Root Barrier: High Density Root Barrier (Tremco HDPE 40 mils) is placed on top of protection board (Tremco POWERply 80 mils) which is laid over roofing system.
- D. Drainage Layer: (Tremco Tremdrain GR) 1/2" plastic core layer with a top fabric that allows water to pass through while restricting the movement of soil is laid over the Root Barrier.
- E. Stainless steel edging: Retains the soil around the perimeter of the roof and prevents it from entering drains.
- F. Growing Medium: 12-14" intensive low-organic/high-mineral composition soil mix. *See Landscaping section.*
- G. Green Roof Vegetation: *See Landscaping section.*
- H. Drip Irrigation System: Anchored on top of the vegetative mat for ease of access. *See Irrigation section.*
- I. Gravel Ballast: Surrounds perimeter edge of vegetated area.
- J. Roof Drain: Provides overflow drainage for runoff that is not absorbed, evaporated, or evapotranspired.



Additional Information:

The saturated weight of the green roof system is approximately 80.3 pounds per cubic foot.

Landscaping

- Standard intensive green roof soil: a low-organic/high-mineral composition growing mix composed of Screened Sandy Loam, Fiber Life Compost, Soil Life Compost, PNW Pumice and Paper fiber. – Intensive Roof Top Soil by Pro-Grow. The mix is made in Portland.
- 4” potted plants: *Helictotrichon sempervirens* ‘Saphirsprudel’ / *Saphire Fountain Blue Oat Grass*; *Calamagrostis x acutiflora* ‘Karl Forester’.

Irrigation

Estimated gallons of water required during first growing season is up to ½ inch per week.

Targeted water use after established is ¼ inch per week.

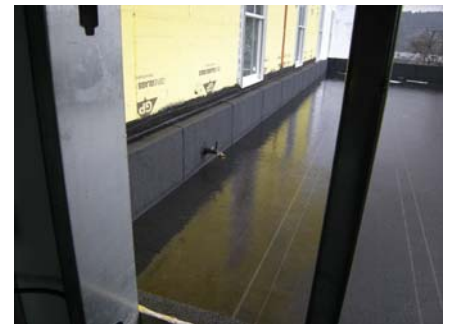
The system includes:

- Drip tubing spaced at 18 inches on center with 0.6 gallon emitters at 12 inches on center.
- Drip irrigation system staked to the top of the vegetative soil along with a mulch topping.

Budget

The final construction cost for installing the ecoroof system was \$17,540. This cost covers all of the construction activities for the vegetated ecoroof; it does not include any design activities. This building was funded from many donations including individuals, foundations and business organizations.

Fields Hall & Schoenfeldt Hall Budget Summary for Ecoroof Construction			
Item	Material	Labor	Total Cost
Soil & Mulch	\$4,443	\$2,735	\$7,178
Drip Irrigation	\$1,962	\$1,299	\$3,261
Rock	\$3,890	\$2,349	\$6,239
Plantings	\$708	\$154	\$862
Ecoroof	\$11,003	\$6,537	\$17,540
Building Construction			\$18,900,000



Testing waterproofing membrane
May 2009

Budget Elements

Non-Construction Activities

The design for the ecoroof portion was done by the Landscape Architect.

Costs for management during construction were part of the overall construction management budget with no additional charges for the ecoroof.

Construction Activities

The activities include general construction and landscaping.

Construction

The budget for construction included harvesting and installing the planted material, forklift to lift the soil, vegetation and rock to the roofs and installation.

Waterproofing was applied directly to the concrete deck and wrapped up and over the parapet.

Landscaping

The landscaping was installed into the 12" – 14" of soil. The irrigation system was then installed along with the bark mulch over the soil. The drip lines were staked on top of the growing medium for easy access and repairs.

Cost Components

Construction

The ecoroof comprised 0.09% of the total construction budget.

Most of the construction cost was associated with installation of the growing medium and rock. Moving all materials onto the roof was easily done with a forklift.

Labor vs. Materials

Labor accounted for about 37% of the ecoroof construction budget. This does not include labor to harvest the plantings or transportation time.

Irrigation

The drip irrigation system accounted for about 18.5% of the construction budget. The irrigation is tied into the site irrigation and the campus system using. Irrigation water is sourced from wells on campus land.

Maintenance and Monitoring

The University of Portland is responsible for maintenance of all facilities on the campus including the ecoroof. The grounds crew was trained on how to care for the planting material and irrigation system by the landscape contractor.

Monitoring and maintaining weeds will be an ongoing process.

Successes and Lessons Learned

Benefits

Multiple Benefits:

- Indoor second thru fourth floor spaces enjoy views of the green roof from both common and private areas.
- The amount of water runoff is significantly less than the roof areas with traditional roofing.
- The soil was mixed locally reducing transportation costs and fuel consumption.

Construction Issues

Overflow through soil without developed plants can lead to staining of the exterior cladding unless precautions are taken to direct the water away from the building.