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Project Summary

- Project Type: Institutional
- Ecoroof Type: Extensive
- Soil Depth: 4”
- Total Roof Square Feet: 1930
- Ecoroof Square Feet: 910
- Total Project Cost: $147,542
- Ecoroof Cost per square foot: $43
- Installation Date: May 2011

Project Team

Oregon Health & Science University
   Owner
   Michael Mackin, Project Coordinator

Snyder Roofing
   General Contractor
   Michael Schilling, Project Manager

kpff Consulting Engineers
   Engineer
   Jeff Huddleston, P.E. Structural Engineer

ORANGEWALLstudios LLC
   Architect
   Gary Hartill, Project Architect

TERRA. fluxus
   Landscape Architect
   Jason King

Teufel Landscape
   Landscape Contractor
   Frank Barbour, Senior Project Manager
Project Description

From the hospital inpatient units to the dental clinics, OHSU serves the community seeing more than 800,000 visits each year. In addition, OHSU has become Portland’s largest employer with the majority of the 13,542 employees working on the Marquam Hill Campus. With 36 major buildings on 118 acres overlooking Portland combined with a culture of healing, teaching and discovery brought together, it’s no wonder the Marquam Hill Campus is the perfect grounds to pursue new solutions for the built environment to benefit the greater community. So when an old roof was being considered for replacement, the idea of an eco-roof surfaced. The ecoroof would help:

- Mitigate storm water run-off
- Provide natural healing views
- Serve as added insulation, reducing heating needs in the winter and cooling loads in the summer
- Increase the service life of functional roofing
- And many other additional benefits

Concurrently the City of Portland’s Bureau of Environmental Services rolled out their Gray to Green Initiative, offering a $5 a square foot Ecoroof Grant for re-roofing projects, which was just enough of an incentive for the OHSU team to move forward with the ecoroof option.

This roof is located between the main hospital and the Hatfield Research Center and is visible from above on all four sides by patients, visitors and staff. This roof posed a couple of unique challenges for an ecoroof but due to its prime visibility location, it would be a project enjoyed by many. The first challenge was that the roof provides the only access to the MRI magnet that is replaced every couple of years and so a portion of the roof needed to remain pavers. The second challenge is that there is large condensate downspout that produces runoff to the drain on the other side of the roof. To meet this second challenge, the team designed an imitation “stream” feature that mimics the condensate route across the roof but won’t actively manage the runoff.
Existing Conditions

Photo Credit: Jason King, Terrafluxus

Roof Structure
The structural analysis revealed it would hold about 4” of light weight soil media.

New Ecoroof
The ecoroof was designed for low-maintenance and aesthetic views from the surrounding buildings. Weight analysis results allow for approximately 4” of lightweight growing medium for ecoroof plantings. With brief southern exposure, this extensive ecoroof has drought-tolerant, shade loving sedums, including ferns and strawberries, to mitigate storm water run-off and provide additive insulation qualities while extending the lifespan of the roofing membrane and increase the aesthetic experience for many.
Roof Assembly

**Drain Mat**
Carlisle G4 Composite Drainage Mat (acts as root barrier)

**Roof Membrane**
Carlisle 90 mil EPDM fully adhered roof system with coverboard

**Insulation**
2” DOW 60 psi Plazamate extruded polystyrene (acts as protection board as well)

**Edging**
Permaloc 4” Geoedge

**Gravel / Pavers**
Washed round river rock; Precast Concrete Paver Blue Tumbled Glass
Ecoroof Assembly

Soil
Phillips Soil – Intensive Mix B-4

Plants
Sedum album ‘Orange Ice’
Sedum acre ‘Aurea’
Sedum oreganum
Sedum pachyclados
Sedum sexangulare
Sedum spathifolium
Sedum tetractinum ‘Coral Reef’

Sedum spurium var. album
Superbum
Sedum spurium ‘Fuldaglut’
Sedum mexicanum
Fragaria chiloensis
Polystichum munitum
Eriophyllum lanatum
Veronica liwaensis
Planting Plan

Irrigation Plan

Hunter MP Rotator – Spray Rotors
OHSU Role

Budget / Cost

Total project cost was $151,193.70

- $119,321 for General Contractor (79% of total cost)
  - $39,146 for ecoroof portion ($43/SF @ 47% of total SF)
    - $5,464 for ecoroof plants
    - $33,682 for components
  - $80,175 for reroofing portion ($41.50/SF @ 100% of total SF)
- $11,945 for Professional Services (10% of total budget)
- $19,927.70 for Owner’s Project Management (11% of total budget)

Maintenance Plan

The Project Manual included a maintenance schedule and plan for OHSU’s Grounds Department.
Lessons Learned

The aesthetic design of this roof was a high priority due to the fact of its visibility by patients, visitors and staff. This roof provided some unique challenges that both inspired and constrained the design. The first being that the western side required pavers for MRI access and the second was management the runoff from the condensate drain. In order to retain continuity from pavers to eco, the eco-portion mimicked the pattern of the pavers. The runoff from the condensate drain had the appearance of a creek so the design incorporated a creek mimicking the natural flow of the runoff across the roof. The “creek” does not actively regulate the water discharge but instead suggests at a natural phenomenon.

Our end cost per square foot is much higher than a typical reroof of a commercial building. We expected an increase in cost due to the ecoroof portion but were pretty surprised to see it come out at $43 a square foot but only on 47% of the roof. Part of this increased cost can be attributed to the extensive edging used to make the ecoroof grid. The base cost per square foot of reroofing was the real surprise, coming in around $41.50 a square foot. However we do recognize that work in general is more expensive on the Marquam Hill Campus because access can be very difficult for limited physical space and time. All in all, we expected an increase in cost but not this high and will reevaluate how we approach ecoroofs in the future.