

Green Roof Fact Sheet



The 4000 square foot green roof at the Phillips Eco-Enterprise Center (PEEC) was installed in 2004 through the combined effort of LHB., inc, Kestrel Design, American Hydrotech, The Green Institute, and volunteers. Designed as a semi-intensive demonstration roof, the PEEC green roof is accessible to the public and is seen daily by hundreds of passengers on the Hiawatha Metro Transit Line. The green roof consists of extensive beds of native bluff-prairie grasses that sit among four intensive rows of succulent sedum species. The sedum rows provide a high-performance, low-soil, vegetation layer, while the grass beds give tribute to the native Midwestern prairie. The combination of the two types of vegetation creates a lush habitat for wildlife while providing a peaceful atmosphere for visitors and employees.



Type: Semi-Intensive Area: 4000 sq ft
Soil Depth: 2 to 6 in. Accessibility: Public
Year Built: 2004

Benefits

Storm Water

- Stores and filters water as it passes through the plants, soil, and green roof membrane

Quantity

- * Holds approximately 2.5 gal/ft² or 10,000 gallons
- * 72,000 gallons (29 inches) fall on the roof annually
- * Total rainwater storage: >50% of annual rainfall or approx. 36,000 gal/yr

Quality

- * Captures nutrients and heavy metals
- * Reduces peak flow, which helps prevent erosion downstream, rate by 74-85%

Energy

- Reflects/absorbs up to 90% of the total solar radiation
- Plants and soil cool the building through evapo-transpiration while dry soil itself provides additional insulation benefit
- Increases thermal insulation (R-value)
 - * R-28 for green roof system
 - Insulation layer(20)+Soil(6)+Plants(2)
 - * R-22 for adjacent black-top roof
- Reduces energy loss through roof by 27%

Airborne Particles

- Captures dust and particles from combustion and wind dispersion: 165 lbs/yr

Carbon Emissions

- Reduces the amount of energy required to treat storm water and heat building
- Prevents the release of 2.14 lbs of Carbon for each KWh of electricity that is saved from a coal-burning power plant

Urban Heat Island Effect

- High concentrations of impervious surfaces result in the annual temperature differences in urban and rural areas: between 1.8-5.4°F
- Reduces the surrounding air temperature through shading and evaporation
- Stays cooler than a black top roof which can be 90° F hotter than the air temperature

Wildlife Habitat

- Creates 4000 sq ft of habitat for birds and insects that is safe from ground predators and human disturbance

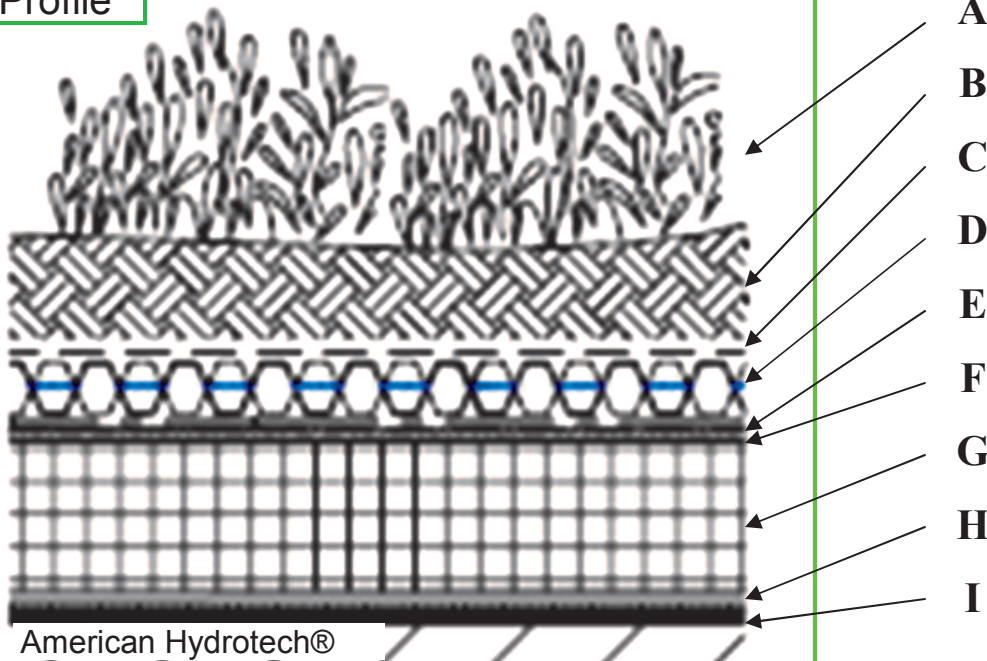
Lifetime/Cost

- Protects the roof membrane from harmful UV radiation and extreme temperature variations that lead to roof deterioration
 - * Standard roofs cost \$4-10/ft² and need a more expensive replacement every 12 yrs
 - * Green roofs cost \$10-25/ft² and will last for over 30 years

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Profile



- A:** Plants – Bluff Grass Prairie / Sedum Mix – Native Mississippi River bluff species, sedums
R-VALUE: $\sim 2 \text{ ft}^2 \cdot \text{hr} \cdot ^\circ\text{F}/\text{Btu}$
- B:** Soil – Plaisted Intensive Soil – 60% expanded shale, 20% sand, 20% organic
R-VALUE: $\sim 1 \text{ ft}^2 \cdot \text{hr} \cdot ^\circ\text{F}/\text{Btu}$ per in. RETENTION: 2.28 gal/ft²
- C:** Filter – SystemFilter™ – Non-woven, geotextile filter sheet, polypropylene fibers
- D:** Water Retention/Drainage – Floradrain™ 60 – recycled molded polyethylene
FLOW RATE: 28 gal/min/ft width. RETENTION: 0.1 gal/ft²
- E:** Water Retention – Moisture Mat™ – high-quality, recycled, non-rotting, polypropylene fibers
THICKNESS: 3/16in. RETENTION: 0.13 gal/ft²
- F:** Air Layer – Hydrodrain™ AL – 3-D, crush-proof core, non-woven, punched filter fabric.
- G:** Insulation – Styrofoam™ – 4 in. closed cell, rigid plastic, extruded polystyrene foam insulation.
R-VALUE: $20 \text{ ft}^2 \cdot \text{hr} \cdot ^\circ\text{F}/\text{Btu}$
- H:** Root Barrier – Hydroflex™RB – heavy-duty, rubberized asphalt
THICKNESS: 0.160 in (160mils)
- I:** Roofing Membrane – Monolithic Membrane 6125EV™ – hot-applied rubberized asphalt
THICKNESS: 0.18 in. standard, 0.215 in. w/ fabric enforcement

Additional Resources

- Minnesota Green Roofs Council, <http://www.mngreenroofs.org/>
- Green Roofs for Healthy Cities, <http://www.greenroofs.org/>
- EPA, <http://www.epa.gov/hiri/resources/pdf/GreenRoofsCompendium.pdf>
- City of Portland, <http://www.portlandonline.com/BES/index.cfm?c=44422>
- Penn State University, <http://horticulture.psu.edu/cms/greenroofcenter/>
- Michigan State University, <http://www.hrt.msu.edu/greenroof/>