

APPLICATOR

SEALANT, WATERPROOFING & RESTORATION INSTITUTE • SPRING 2012 • 34.1

Guarding the Environment

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Collaborative Access
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A vegetative roof system at the new Coast Guard HQ is a proactive step toward sustainable building design

By Todd Skopic, CSI, CDT, LEED AP

V egetative roof assemblies (VRAs) (also known as vegetative roof systems, VRSs) are sprouting up all over, and 400,000 square feet of roof at the U.S. Coast Guard headquarters in Washington, D.C., is a prime example.

The new consolidated headquarters campus is located on the historic St. Elizabeth's hospital site. Architects have designed the new facility to take advantage of the latest in sustainable building-design practices and technologies to minimize its environmental footprint. Toward that

end, the facility is incorporating VRAs in an effort to become LEED Gold-certified (see boxed information, "What is LEED?" page 8).

Clark Construction Group LLC (Bethesda, Md.) is leading the design/build effort in conjunction with WDG Architecture PLLC (Washington, D.C.). WDG is the architect of record for the roofing, while HOK (Washington, D.C.) is handling the vegetative roofing components. The project includes an 11-story office building that will provide 1.2 million square feet of space for 3,860 employees,

a separate central utility plant and two seven-story parking garages. The whole project is being built into a hillside with elevation variances of up to 120 feet on the 176-acre site.

The three-phase project began last year and remains under construction. Crews completed the roof on the first phase last fall. The expected completion date of the entire first phase is the first quarter of 2013.

Layers of involvement

The waterproofing/roofing system for



Phase one of a three-phase project at the Coast Guard headquarters in Washington, D.C., began last year and remains under construction.

THE GROWTH OF VEGETATED ROOFS

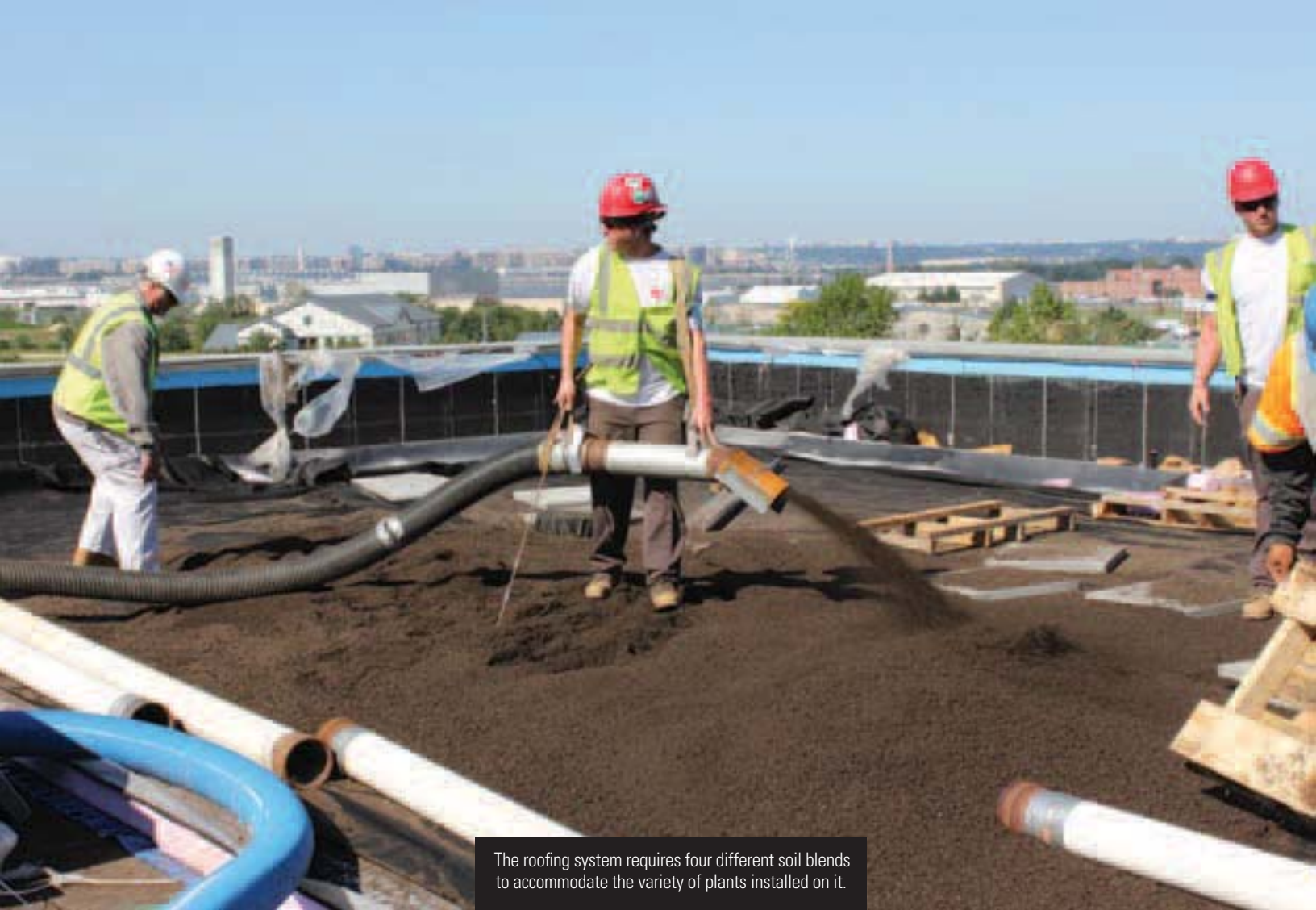
European roofing experts began installing vegetated roof assemblies on industrial and office buildings more than 25 years. Today, the systems are seeing increasing numbers of installations in the United States. The goal of the systems is to control run-off volume, improve air and water quality, and promote energy conservation. Known by a variety of names—such as green roofs, extensive roof gardens and vegetative roof assemblies or systems—the systems also can have aesthetic benefits by incorporating flowers and variegated and textured foliage.

These roofs typically include layers of drainage material and planting media on a high-quality waterproof membrane. These

systems use foliage and a light-weight soil mixture to absorb, filter and detain rainfall. Some of the conditions responsible for the promotion and acceptance of green roofs in Europe, which many American cities face as well, are:

- Widespread implementation of storm-water-related fees or taxes
- Laws requiring mitigation or compensation for the elimination of open space
- Densely populated areas with high real estate values
- Requirements to reduce loads on combined sewer overflow (CSO).





The roofing system requires four different soil blends to accommodate the variety of plants installed on it.

WHAT IS LEED?

LEED stands for Leadership in Energy and Environmental Design. This third-party certification program is a nationally accepted benchmark for the design, construction and operation of high-performance green buildings.

LEED works on a system in which building projects earn LEED points for satisfying specific green-building criteria. The number of points the project earns determines its level of LEED certification, which ranges from the lowest—Certified—to the progressively more stringent certifications of Silver, Gold and Platinum.

Recently, the U.S. federal government increased its minimum requirement for new construction and substantial renovation of federally owned facilities to LEED Gold from LEED Silver.

the Coast Guard project starts with 215 mils of 790-11 hot rubberized asphalt from the Henry Co. (El Segundo, Calif.). WDG's William Pegues said this system was his firm's preferred roofing membrane. "It is a tried-and-true system that we did not have to think twice about," he explained. The original spec for the VRA included a single-source warranty from the primary waterproofing/roofing manufacturer. However, the project team decided to break the warranty up into two with the primary waterproofing/roofing manufacturer responsible for the waterproofing system and the roofing contractor responsible for the vegetative components.

Gordon Contracting (Capitol Heights, Md.) is the roofing contractor on the project. Gordon has experience in installing the vegetative components on several other large projects. However, on this project, the firm subcontracted the supply and

installation of the vegetative roof plants to the Tilson Group (Vienna, Va.).

The project requires four different soil blends due to the variety of plants being used, including shrubs, grasses and sedum. To ensure the load of the growing media (also known as *engineered soil*) met the structural tolerances of the roof structure, project leaders turned to Roofmeadow (Philadelphia), a firm specializing in green-roof design. While maintaining the intent of the design—to support plants that demand a range of pH, moisture, organic matter and nutrient levels—Roofmeadow influenced the specifications to conform with materials and methods specific to the green-roof industry.

Moving media into place

Cranes have hoisted most of the growing media onto the facilities' roofs. In a few instances, due to some crane-schedule conflicts, crews have used pneumatic



Crews installed more than 430,000 plant plugs, 78,000 square feet of sedum mats and 2,000 shrubs on the Coast Guard headquarter's roofing system.

conveyors to upload and distribute the media on the roof.

The plants themselves provided two separate challenges. First, due to the large areas being covered, crews had difficulty completing the installation within the planting season. Ed Snodgrass of Emory Knoll Farms (Street, Md.) was an instrumental consultant to HOK with the plant selection. Brandon Hartz of HOK explained that Snodgrass's expertise helped in two ways. First, he provided recommendations and insight regarding the vast plan from the initial request for proposal (RFP). In doing so, HOK reduced the plant list by one-third, removing plants that would not thrive on the roof. Second, with Snodgrass's knowledge of nurseries and nurserymen, HOK was able to select plants that could actually be grown and supplied to such an *extensive* roof. (Actually the roof is more *semi-intensive*, but that's just semantics.)

While Snodgrass helped reduce the number of plants, that didn't mean that the site didn't still require a vast number of them. Specifically, the project required:

- 430,000 + 3-inch-square by 5-inch-deep plugs
- 78,000 + square feet of sedum mats
- 2,000 1-gallon shrubs in a multitude of species.

The hot D.C. summers also were an issue in ensuring the success of the roofing system. The intense weather requires extensive irrigation during any plants' establishment period, particularly on a roofing system. Thus, Gordon hired an irrigation contractor to install a drip and overhead irrigation system of its own design. (Gordon believed the drip system alone would be insufficient to protect the plants during the summer heat.) The drip system uses gray water from a storm-water

PROJECT LEADERS

- **GENERAL CONTRACTOR:** Clark Construction Group LLC (Bethesda, Md.)
- **ROOFING ARCHITECT:** WDG Architecture PLLC (Washington, D.C.)
- **VEGETATIVE COMPONENTS ARCHITECT:** HOK (Washington, D.C.)
- **ROOFING CONTRACTOR:** Gordon Contracting (Capitol Heights, Md.)
- **LANDSCAPING SUBCONTRACTOR:** Tilson Group (Vienna, Va.)
- **PRIMARY SUPPLIERS:** Henry Co. (El Segundo, Calif.), Sempergreen (Stevensburg, Va.)



This Coast Guard's advanced roofing system will help the project achieve a LEED Gold-certification status.

Once completed, the 400,000-square-foot Coast Guard VRA will not only look great but also retain storm water that would otherwise combine with waste water and bypass the Blue Plains Wastewater plant.

wet pond, which, according to Hartz, was primarily intended to provide long-term water for the grasses and shrubs planted in the deepest soil (12 inches to 18 inches). Hartz added that the overhead sprinkler system, which uses potable water, was only intended to be used during the plants' establishment period. After 12 months, crews will remove it to ensure the project is in compliance with LEED.

Because the Coast Guard building is terraced into a hillside, it provided unique challenges that allowed for appealing solutions. Specifically, HOK designed the landscape to provide all offices that look over the D.C. skyline to enjoy unobstructed views of the vegetative roof, as well as keeping mechanical equipment out of sight. As part of this effort, crews planted hardy sedum mats around the perimeter of most of the roofs. The sedum plants provided a neat and tidy edge to the wilder grasses and shrubs in the mounded middle areas of the roofs.

Experts on the project gave considerable thought to the long-term maintenance of the roofing system's plants, as any installation should. For example, in addition to installing the very sustainable drip-irrigation system using on-site water, HOK worked with Clark to determine which of the roofs would be least accessible and, thus, most difficult to maintain. On those roofs, crews planted pregrown sedum mats from Sempergreen (Stevensburg, Va.).

Achieving multiple positive goals

Once completed, the 400,000-square-foot Coast Guard VRA will not only look great but also retain storm water that would otherwise combine with waste water and bypass the Blue Plains Wastewater plant. Additionally, this advanced roofing system will help the project achieve a LEED Gold-certification status.

Between this project and another—the City Center project, also in D.C.—the author's company has close to 1 million square feet of VRAs under construction in the D.C. market. These systems have become a permanent part of the landscape and are, certainly, a *growth* niche in the industry. (Pun intended.)

About the author

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