DEMONSTRATION ROOF
The American Society of Landscape Architects decided its own roof would make an excellent demonstration model

ASLA Brings Nature to its Roof

CHALLENGE: The American Society of Landscape Architects (ASLA) wanted a high profile location to demonstrate how landscape architects can play a central role in green roof design and construction. The organization decided to look no further than atop its own Washington, D.C., headquarters building—a black tar surfaced roof on the 11-year-old brick building.

CRITERIA: ASLA felt strongly that landscape architects have quite a lot to contribute to the green roof industry and wanted to use this project to serve as a showcase for those talents and contributions. The group also wanted to create an education tool for both landscape architects and the community in general. "There's a potential to do a lot with a green roof project in Washington, D.C., in terms of educating and informing key decision makers as to the larger vision of green roofs, and demonstrating the major contributions green roofs can make to the environment." says Project Manager Chris Counts, ASLA, of Michael Van Valkenburgh Assocs., Boston.

INFLUENCES: ASLA's 3,300 sq.-ft. roof covered a relatively narrow building envelope and also had had a number of large preexisting mechanicals, including two imposing air return units and an elevator shaft, which had to remain in place.

SOLUTION: Counts devised a "matrix" scheme containing distinct areas representing extensive, semi-intensive, and intensive green roof systems ranging in growing media depths from 3- in. to 24-in. For example, there's a south-facing area with 6- in. planting media depth, a north-facing area planted 4 in. deep, there are slopes with a 2:1 pitch and areas planted underneath metal grating that remain partially shaded. Plus, there is an area that is a standard extensive green roof system that receives lots of light—and some areas that actually reflect light.

The dominant features of the design are two highly sloped areas, or "waves," covered with extensive and semi-intensive plantings. "The concept was actually more about being in-between those slopes, and how it adjusts one's relationship with the horizon," Counts says. "It creates this green horizon in relationship with the city. To my knowledge, this may be one of the first projects that uses green roof materials to make a held physical space, like you're in a small green valley."

Another intent the design team had from the beginning was in determining a way in which a portion of the roof could be seen from street level. "Unless one is in a high-rise

CONTINUED ON PAGE 106

CONTINUED FROM PAGE 104

building next to a green roof, you don't typically get the benefit of seeing it. In our design process, the waves were calibrated through computer modeling so that a portion can be seen from street level."

Surrounding the two highly sloped areas at deck level is a third green roof system covered by metal grating that allows visitors to walk only a few inches above the extensively (3-in. deep) planted material. The roof also features a small observation deck as well as an open pavilion (that houses a stairwell for access) covered with various types of intensive green roof material.

Waterproofing and Assembly

Components of the ASLA green roof included a waterproofing membrane, insulation, and drainage/moisture retention elements and lightweight engineered soil, which are all part of a total Garden Roof Assembly supplied by **American Hydrotech, Inc.**, Chicago. The standard Garden Roof Assembly consists of up to eight layers; starting with the roofing membrane—applied directly to the roof deck—a protection course/root barrier, insulation, water retention/drainage elements, filter fabric, growing media and vegetation.

The roof membrane, according to Steve Skinner, Garden Roof product manager for American Hydrotech, is a hot, fluid applied, rubberized asphalt produced with a minimum of 25% recycled content. This layer is applied in two coats, with a sheet of fabric between each coat for a final thickness of 215 mils to form a long-lasting, tenacious bond to the substrate that can withstand and perform in submersed water conditions. A high density polyethylene sheet was then rolled out over the membrane as a root barrier, and a heavier sheet was applied to protect those areas that were to be subjected to high amounts of construction traffic, or where plants with deeper and more aggressive root structures were to be planted.

Over the root barrier, an insulation layer was installed using Dow Styrofoam, a CFC-free, closed cell polystyrene that is strong, moisture resistant and maintains long-term insulation value. "For the two wave sections, a lightweight aggregate was placed over the rigid insulation," Skinner says. "In the extensive system areas, a moisture retention mat was rolled over the insulation. Composed of recycled, non-rotting polypropylene fibers stitched through a polyethylene sheet, the mat retains moisture and nutrients, as well as provides physical protection to the root battier and waterproofing membrane."

Atop the moisture retention mat, a drainage/water storage/aeration layer was installed. This layer was installed in two distinct profiles for use in the ASLA green roof's extensive and intensive assemblies (excluding the two waves). "They consist of lightweight panels made of 100% recycled polyethylene, molded into retention areas and drainage channels," Skinner explains. "The layer is designed to allow for the free drainage of excess water, while at the same time promoting irrigation through capillary action and evaporation into the soil/vegetation level. In the intensive areas, the panels were filled with lightweight aggregate to enhance load capacity."

Next, a filter fabric was installed over the drainage/water storage/aeration layer. The filter fabric, made of non-rotting, non-woven polypropylene fibers, is resistant to natural acids and alkalis, and is chemical neutral. The filter sheet helps prevent the loss of soil, mulch and plant debris while allowing for the flow of moisture.

High Sloped Areas

Constructing the roof's two wave sections required the use of innovative techniques and new assembly materials to meet the design requirements of the two highly sloped areas. The waves were shaped with rigid insulation then covered by lightweight aggregate. The aggregate was first covered with a filter fabric and then GardNet, a new soil stabilization system for green roofs developed by American Hydrotech. The waves are each framed by a steel structure and anchored by a system of steel cables. "A 2:1 slope (10°) is very steep for general outside landscape purposes," Counts says. "But because of this new soil stabilization system, we could have actually made the waves even steeper. It's really interesting and a bit counter-intuitive, because green roof planting medium looks basically like small-sized gravel—something that would easily slide."

GardNet is a soil confinement component within the Garden Roof Assembly that can be used for steep and high slope applications in extensive and limited intensive applications.

The system, according to Counts, opened up a third dimension for green roof design professionals. Highly sloped roofs provide visual interest, both on the roof and often from vantage points below. GardNet's ability to conform to roofs with irregular slope made it ideal for undulating surfaces. "Working with green roof planting medium on the high slopes without this system would have been very challenging," Counts says. "Without it, I don't think the roof design would have been possible."

Soils and Plantings

Following the installation of all components of the soil support assemblies, the planting media was put down. A critical part of all green roof systems is the soil. The planting media must provide a stable structure for the anchorage of the plants' root system, while remaining as lightweight as possible to prevent excess loading of the roof structures.

For the ASLA project, the planting media was specifically engineered American Hydrotech LiteTop soils, tailored to the specific application to provide for optimum infiltration, moisture retention, temperature and insulation, and chemistry. "In addition, the engineered planting media was also specified to provide good drainage properties to allow excess precipitation to flow to the drains," Skinner says. "The planting media was specially engineered for the specific individual areas of the site."

Goals Met

ASLA is monitoring the performance of the roof over time for storm-water retention, water quality, temperature and plant growth. The green roof retained 77.7% of the rain that fell during the first three months following its completion. Water quality data is being collected on the roof and runoff collected from roof drains. Temperatures on the roof are being tracked against temperatures on the conventional roof of a neighboring building. Light meters have been placed in different areas of the roof and a number of plants have been tagged so that data on plant growth and growing conditions can be collected. Visit hydrotechusa.com or **Circle 328**.