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Architectural Pavers Bring Rooftop Terraces to Life in Seattle, Washington

by Charles Cronenweth, western regional manager, American Hydrotech, Inc.

Architects often represent the high caliber of creativity in their work by reserving a space in their plans for art. In two recently completed Seattle projects, that space has been reserved on their roofs. Rather, the actual roofs have become works of art. Both projects incorporate a variety of colored, 12-inch-square pavers that, while both attractive and functional on the roof level, form intricate mosaics when viewed from higher elevations.

From atop the nearby Seattle Space Needle, the recently completed Fisher Pavilion roof artfully mimics raindrops hitting a pond and radiating outward. Paver mosaics atop the Seattle Waterfront Marriott mimic the view of Puget Sound, which is directly in front of the hotel, as well as incorporate the illusion of courtyard gardens on its lower-level roofs. These new views have been designed to integrate with the countless other beautiful man-made and natural views in and around Seattle to provide and further sustain the city's cultural identity and orientation.

Opening a Vista

The Fisher Pavilion, completed in November 2002, replaced Seattle's Flag Pavilion, originally constructed for the 1962 Seattle World's Fair. Nestled into the heart of the 74-acre Seattle Center Campus, the new pavilion is a multi-purpose exhibition hall featuring an expansive open rooftop plaza that serves as a versatile gathering space and home to many outdoor events.

"Seattle Center administrators had programmatic requirements for the old Flag Pavilion site because for decades it had been a venue for conferences, festivals and other gatherings," says Ron Rochon, project architect with The Miller/Hull Partnership, Seattle. "But they also wanted to open up a vista between another building on the campus, The Seattle Children's Theater, and the International Fountain Plaza." The Flag Pavilion, originally intended for only six months' use, was sitting between these two structures.

"We looked at the grade change from one end of the site to the other and determined we could bury the new pavilion, essentially build it into the site's natural hillside," says Rochon. "We found that by doing this we could almost double the building's programmatic square footage, by utilizing the roof of the plaza coming off grade onto the upper street. This would also open up the vista between the Children's Theater and the fountain."

Building the Roof to Last

The Fisher Pavilion's 19,000-square-foot landscaped rooftop plaza combines aesthetics with the high functionality of a protected membrane roof (PMR). Designed and built as a long-term structure, and with a high-mass (10" total concrete) roof, the building is ideally served by a PMR system, creating

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a roof that is both watertight and protected from UV degradation, thermal shock and the physical abuse of pedestrian and light vehicle traffic. In addition, the intended use of the rooftop plaza demanded a useful, aesthetic surface, and a PMR system offers this in the form of concrete architectural pavers.

The roof consists of a waterproofing membrane, insulation, drainage, and pavers, all part of a total assembly supplied by American Hydrotech, Inc., Chicago. Snyder Roofing, Seattle, served as roofing contractor.

The watertight integrity of the waterproofing membrane is essential to the long life of the roof. Fabric-reinforced Monolithic Membrane 6125® (MM6125-EV) was used, a hot fluid-applied rubberized asphalt forming a long-lasting, tenacious bond to the substrate. While still hot, a fiberglass-reinforced, rubberized asphalt protection sheet was embedded into the membrane to complete the waterproofing assembly. Styrofoam®, 6" closed cell, extruded polystyrene was then applied to provide the required thermal value.

Art Meets Functionality

"Center management wanted the roof to be completely wide open so they would not be limited in how they programmed it - how they rented it to festivals," says Rochon. "This directive presented quite a challenge because this huge open area would be unused a good portion of time. We decided that, if we couldn't include modulation of the surface, we at least could create an interesting paving pattern. We then hit on the idea of using small architectural pavers, with each paver serving as a single pixel in an overall image."

Rochon says the image needed to be classic looking; essentially creating a view that would not become dated. "The result is an orthogonal building with a circular, organic raindrop pattern on top. This keeps with Seattle Center's overall design concept because, although the old campus is based on the city grid, within this grid are many large circular elements including several plazas and the South Fountain Lawn. The Fisher Pavilion roof sustains and builds upon this theme."

After creating the raindrop image it was brought into Photoshop® and digitized. Realizing they had to work with a finite number of colors, the image's color pallet was narrowed to four shades of blue and four shades of green. A custom grid laid over the digitized image assigned a color to each pixel making up the image, and the grid was then separated into eight layers, each layer depicting the pixels of one color. By using AutoCAD to assign numbers to the separate layers, the precise quantity of pavers required for each of the eight colors could be determined, thereby making ordering easy for the general contractor, Howard S. Wright Construction, Seattle, Wash.

FACING THE WATER, THE SEATTLE WATERFRONT MARRIOTT.

Pavers from American Hydrotech were selected as the roof's finished surface. The hydraulically pressed architectural pavers were chosen for their high compressive strength and low moisture absorption. Appian Construction, Seattle, installed the pavers, first putting down a drainage medium over the thermal-protection layer to maximize the roof's water migration. The roof's drainage composite system, Hydrodrain 700®, is comprised of a three-dimensional, crush-proof drainage core and a woven filter fabric, providing a flow rate of 110 gallons per minute, per square foot.

Paint-by-Numbers, One Paver at a Time

The 19,000 individual pavers making up the roof plaza's finished surface were installed one-by-one in an open joint assembly. Open joint allows for very quick drainage, so pavers are dry after rains sooner than sand- or mortar-set pavers. For the roof's primary areas, the pavers were placed directly on top of the drainage layer to hold a surface tilt to¼" per foot. Small rubber shims were installed under individual pavers requiring minor height adjustments, and weighted, cross-shaped spacers were installed between each paver for alignment. For a recessed portion of the roof along the front of the building, the pavers were set on special adjusted pedestals to allow this area to remain level.

The project architect laid out the roof design in four quadrants, and a straightforward, "paint-by-numbers" approach was developed to facilitate paver installation. "We made enlarged hard copies of our image composite and individual grid layers, showing the installers where to place every square of each color," says Rochon. "We also provided them with origin points - directing them where to start at a specific point in the grid of each quadrant and then progress in a certain direction."

"We had someone on site with a printout of the grid whose sole responsibility was to oversee and direct the laying of pavers every step of the way," says Nigel Jones, project manager for Appian. "The installa-

tion was carried out strictly by the numbers and proceeded without a hitch."

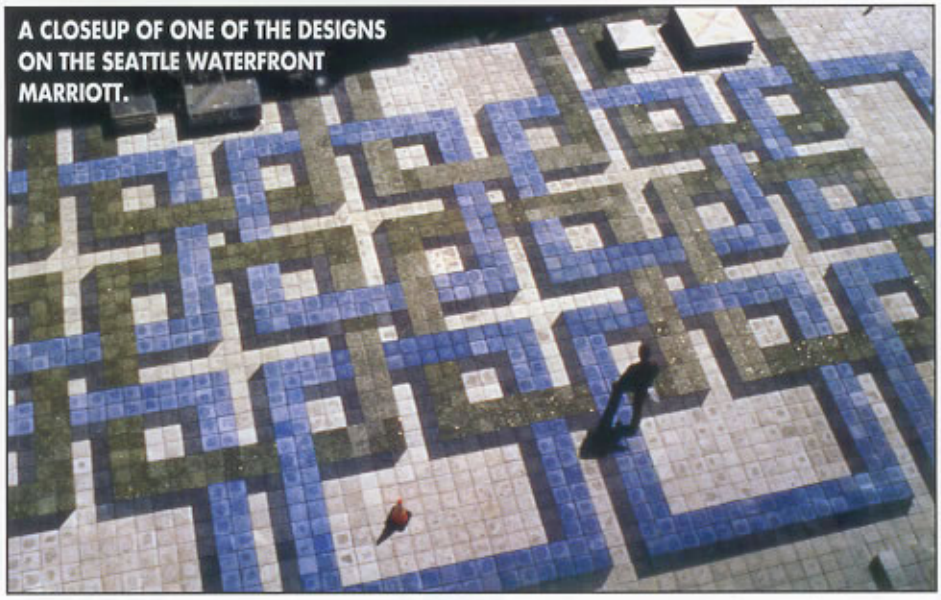
The entire paver installation took approximately six weeks. Following installation, the surface was sandblasted to address potential glare and slipperiness issues and to produce a subtle, earth-toned rooftop image. Fisher Pavilion is one of the first buildings in Seattle to be designed and constructed under the city policy requiring all public facilities over 5,000 square feet to achieve a LEED™ Silver rating. Helping to achieve this was the roof's waterproof membrane (MM6125®-EV), which contains a minimum 20% post-consumer recycled content, as well as the roof's drainage mat, which is made with 100% recycled polyethylene.

Rooftop as Canvas

The Waterfront Marriott is only the second hotel to locate on Seattle's famous waterfront, and represents a key component in the revitalization of the central waterfront district. Turner Construction, Seattle, Wash., served as the project's general contractor.

The hotel's unique contemporary design includes exterior finishes of polished precast concrete and natural stone. Crowning the new eight-story structure is an original seascape rooftop design that employs more than 45,000 12-inch-square colored concrete pavers with embedded recycled glass that serve as ballast and, from an elevated position, create mosaics that mimic a water view and the look of courtyard gardens.

As with the nearby Fisher Pavilion project, Snyder Roofing served as the roofing contractor, installing the waterproofing for the Waterfront Marriott roof project. Appian Construction installed the pavers. The project originally specified custom-made pavers from an independent supplier but, after a series of delays following partial delivery, the contractor switched to pavers from American Hydrotech. The original pavers were used on the building's lower two roofs while the Hydrotech were used on the upper roof to make up a portion of the water view design.



A CLOSEUP OF ONE OF THE DESIGNS ON THE SEATTLE WATERFRONT MARRIOTT.

"The artist oversaw the paver installation with regular site visits and also furnished us with a drawing that provided a paint-by-numbers-type guide," says Stacey Bevan, project manager for Appian Construction. "This was a ballast-style paver installation; the pavers were laid down directly on filter fabric covering insulation board."

Haddad-Drugan, Seattle, Wash., a team of artists, designers and landscape architects, was commissioned to design the rooftop mosaics. "The client, Marriott, originally limited our palette to blues, greens and white, but we ultimately added black to create a shadow effect on the two lower roofs," says Laura Haddad, of Haddad-Drugan. The mosaics atop the new Seattle Waterfront Marriott bring artful beauty to what is very often a neglected area. The project demonstrates that the only limit to rooftop design is one's imagination.