GEOMEMBRANE **DEFENSE**

Lined storm water management system earns stadium extra LEED points

By Chuck Pappas

Located on the east bank of the University of Minnesota (UM) campus, TCF Stadium is the new home of the Golden Gophers football team. According to the university, it is more than a sporting venue: It is a contribution to the university's heritage, and an icon for the community at large.

Opened in 2009, the 50,000-seat facility, constructed by M.A. Mortenson Co., became the first collegiate or professional football stadium to earn Leadership in Energy and Environmental Design–New Construction Silver certification from the U.S. Green Building Council.

The ambitious project included several "green" building design and construction features:

- Ninety-seven percent of the nearly 9,000 tons of steel used in the structure came from recycled steel fabricated primarily in Minneapolis.
- Paint, carpet, sealants and adhesives were low in volatile organic compounds.
- A reflective roof helps reduce the urban heat-island effect.
- Ninety-eight percent of the construction waste from the site was recycled.
- The amount of potable water used for landscape irrigation was cut in half.
- A 30% reduction in indoor potable water use was achieved.

At the heart of the stadium's sustainability initiative is an eco-friendly, space-saving storm water management system. It captures rainwater in a comprehensive underground filtering system outside the stadium, where it is harvested, filtered and drained into the Mississippi River. A geomembrane liner helps control soil erosion.

Playbook

Because the stadium was being constructed on a highly developed campus, the primary challenge was creating a sustainable storm water management solution within the confines of limited usable green space.

To create an economic and environmentally viable solution, Minneapolis-based Rehbein Environmental Solutions Inc. (RESI) installed its Environmental Passive Integrated Chamber (EPIC) storm water management system on a half-acre site adjacent to the stadium. This nonpressurized gravity-flow irrigation and drainage system relies on capillary water movement and evapotranspiration from a subsurface water supply. The site stores and treats water from a 3.75-acre watershed and features a below-ground capacity in excess of 60,000 gal.

"From a sustainability standpoint, we're able to reduce our need—and related costs—for irrigation because the roots from the turf pull water up through the sand profile," said Doug Lauer, landcare supervisor for UM. "We also save money by eliminating the disposal of water down the storm sewer."

Above ground, RESI created a landscaped plaza comprised of a ReFlex polypropylene mesh (Netlon advanced turf system) blended with the top layer of soil. When used in conjunction with the EPIC system, the turf mesh stabilizes soil, improves load bearing capacity, reduces compaction and decreases the potential for rutting and deformation from vehicle parking.

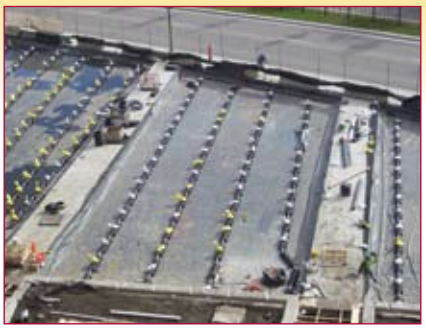
"With limited space available at the stadium, this multifunctional system eliminates the need for a traditional storm water holding pond, while improving water quality," said Dave Muellner, senior project manager for RESI. "It also provides the university with an open green space that is strong enough to support heavy vehicles used by media, emergency personnel, maintenance staff and others during football games."

The system will manage all runoff from a 3.5-in. rain event and filter and hold more than 140,000 gal of water in its above- and below-ground capacities.

Kickoff

To construct the multilevel storm water management system, RESI first

The stadium's storm water system includes a geomembrane liner for erosion control.



Four workers installed the liner in about five days.

excavated and prepared the watershed's subsurface, creating a laser-level flat basin with 3:1 and 4:1 rising slopes. Next, workers installed approximately 100,000 sq ft of 45-mil Firestone EPDM geomembrane liner to provide an impervious barrier over the existing soil. Crews used 20-ft-wide by 100-ft-long geomembrane panels to reduce the amount of field seaming needed. Panels were overlapped 6 in., primed and secured in place with QuickSeam tape.

"Our crews find the seaming method easier than most other geomembranes because there is no need for utilities or mechanical seaming devices, and the panels conform to contours better than other lining products while seaming," Muellner said. "The liner and the Netlon advanced turf system were used in combination to minimize soil erosion and to help stabilize the slopes."

A four-person crew completed the liner installation in about five days, creating a foundation to control the quality of water exiting the multifunctional green space. RESI crew members then began installing the EPIC system, including nearly 600 chambers. The system is based on a combination of sand filtration technology and controlled subsurface water flow. It consists of storm water chambers and piping, fine aggregate and the turf system with sand profile. The entire system was covered with a layer of sod.

Post-Project Recap

The completed storm water system, according to Muellner, has the capability to remove more than 85% of phosphorous pollutants, 90% of total suspended solids and 60% of nitrates.

"[The system] withstood the summer rains well, and there were no problems with any of the pipes throughout the winter," Lauer said. "The turf is healthy, green and growing well, even though it gets a lot of student traffic." SWS

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