Geomembrane liner and subsurface stormwater system installed at new Minnesota football stadium

By Ron Bygness and Mark Apfelbacher

Photos courtesy of Rehbein Environmental Solutions Inc.

| With the geomembrane in place, the stormwater chambers and connecting pipes are installed on top of the liner.

Developers of large urban projects — such as the new TCF Bank Stadium at the University of Minnesota — are challenged to find sustainable ways to manage stormwater without wasting precious space.

"At the stadium, space is at a premium," said Mark Apfelbacher, a sustainability consultant with RESI. To maximize useable space, the company constructed a multifunctional system that eliminates the need for a traditional stormwater holding pond. An innovative environment-friendly, space-saving, sub-

Project Highlights
TCF Bank Stadium
University of Minnesota, Minneapolis
RESI: Rehbein Environmental Solutions Inc., Minneapolis
EPIC: Environmental Passive Integrated Chamber
Geomembrane: EPDM-R, 45-mil, Firestone Specialty Products
Design engineering: Rehbein Environmental Solutions Inc.
Installer: R&R Horn and Associates

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surface stormwater management system, accompanied by a reflex/mesh-and-turf cover, is part of the state-of-the-art infrastructure installed at the new open-air University of Minnesota football stadium that opens in fall 2009.

"Once the sod is down [spring 2009], our system will create a lush, green, park-like space strong enough to support heavy maintenance vehicles," Apfelbacher said. The EPIC system actually resides below the green space, quietly doing its work beneath the surface while supporting the multipurpose area that can double as parking for broadcast trucks and as a staging area for other event, safety, and emergency vehicles.

Geosynthetics

After preparation of the subgrade, the layers for the system include the 45-mil geomembrane liner, the stormwater chambers and piping, fine aggregate, then the reflex mesh and sand, with a fresh layer of sod on top. More than 100,000ft² of reinforced EPDM geomembrane liner were required for this job.

"The EPDM liner provides an excellent impervious barrier," Apfelbacher said. "This allows our systems to have complete control of the quality of all water exiting the multi-functional green space."

Apfelbacher said it took a crew of 4 about 5 days to install the liner at the stadium's watershed site.

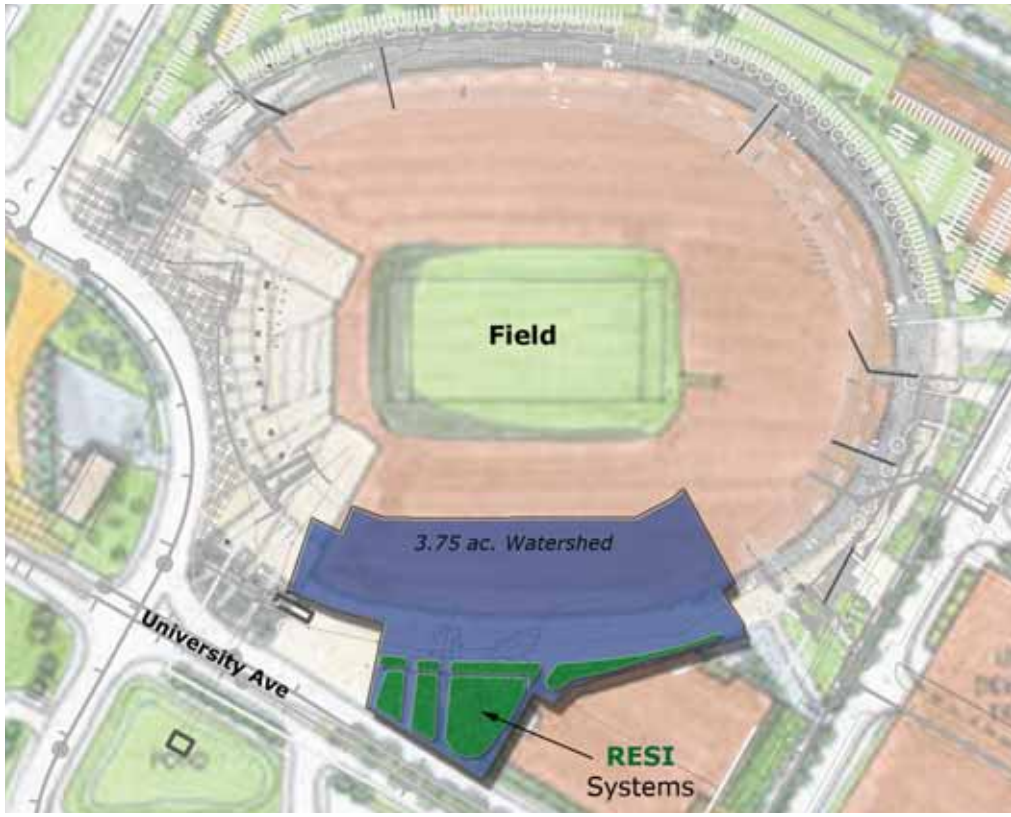
For some projects, another geosynthetic component that can be used to undergird and buffer is specified — typically a 4-oz. nonwoven geotextile under the liner.

Stormwater system

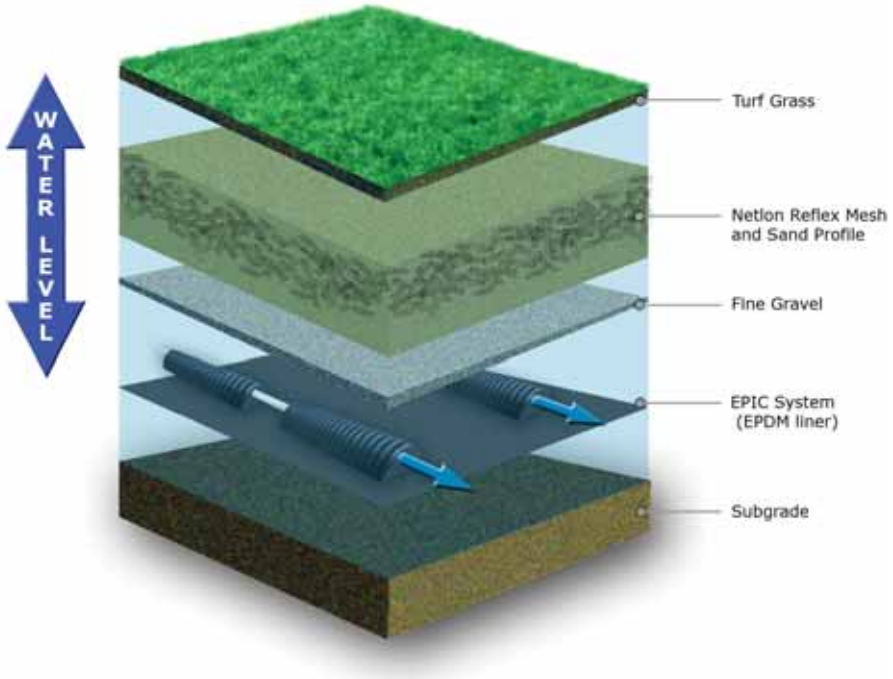
The stadium plans called for a multi-million-dollar stormwater management system that also serves a larger area of campus.

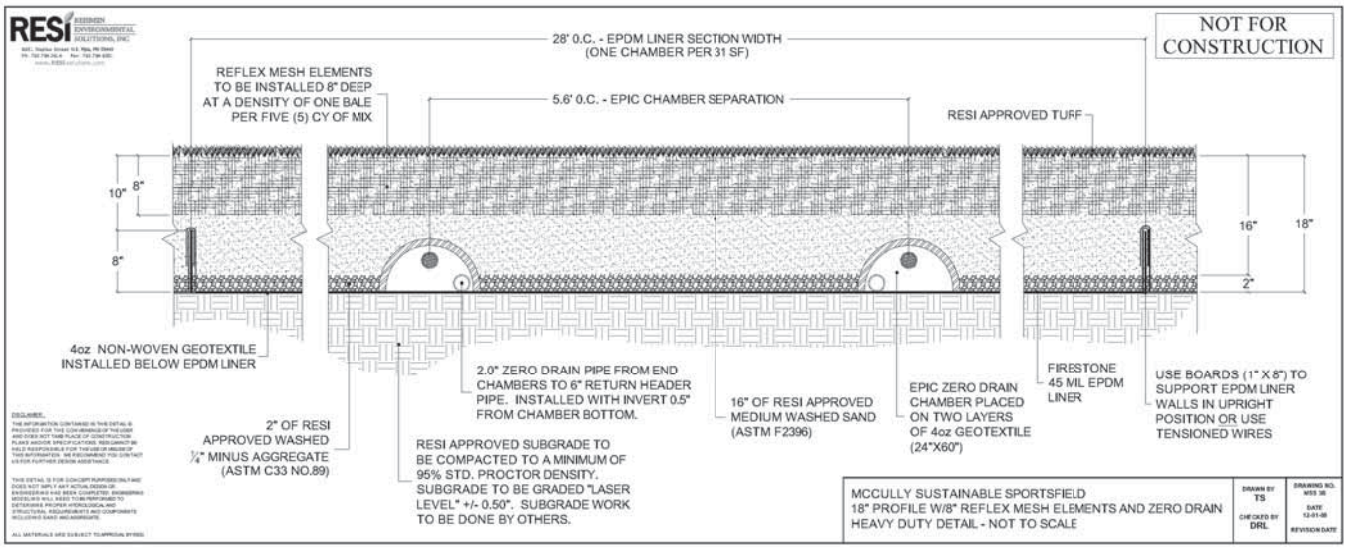
The system captures rainwater, filters out sediment, and slows the rate of water — allowing it to further filter through the soil — as it flows into the Mississippi River. A prior component to the stormwater management system was the installation of a major league sand filter that will help cleanse this stormwater before it is discharged into the Mississippi.

Aerial view of the stormwater system installation



University of Minnesota football stadium watershed area





With 1 chamber per 40ft² (589 chambers total), the new stadium's stormwater system is designed to multitask — storing, filtering, and discharging stormwater runoff.

The drainage area served by the system at the stadium site (3.75 acres) is 7 times the footprint (0.54 acres) of the underground stormwater system itself (see stadium watershed diagram, above). And it features a below-ground capacity of more than 60,000 gallons, enough capacity to hold stormwater produced by a 0.50-in. rainfall event. If needed, the above-ground capacity is more than 72,000 gallons.

The water-treatment capability of the system is similar to, but more effective than, sand-filter technology, which removes pollutants from stormwater by filtering runoff through a sand bed. At the stadium site, this system can remove up to 70-85% of total suspended solids and up to 35% of pathogens including coliform, streptococci, and E. coli.

Meanwhile, the reflex mesh soil reinforcement (polypropylene netting segments), which is used underneath the grass planted above the stormwater system, stabilizes the soil, improves load-bearing capacity, reduces compaction, and decreases the potential for rutting and deformation.

"The system provides a sustainable surface that improves turfgrass rooting and health while providing a surface strong enough to support U of M fans and the media and emergency vehicles that will be on hand during game days," Apfelbacher said. "[It] provides an environmentally conscious and cost-efficient way to manage stormwater runoff within the confines of a newly constructed urban stadium." G

| Clean aggregate backfill is applied.

| Top grading is completed and prepared for laying sod.

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