PONY Baseball volunteer wins FOY

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Two systems control drainage at new DC pitch

Two underground systems add to the high quality of the new Audi Field here at Buzzard Point, the new home for DC United of Major League Soccer. Opened in July 2018, the stadium, which cost approximately $500 million, will also host other sporting and cultural events, community activities, and concerts. The state-of-the-art urban facility has a capacity of 20,000 with 31 luxury suites, a bike valet, and 500,000 total square feet of mixed-use retail and residential space on the 110-acre site. This includes the storm water drainage storage system and an underground system to help dry and cool the natural grass. Project leaders are striving to reach a Leadership in Energy and Environmental Design (LEED) Gold certification.

Under the pitch is a network of perforated high-density polyethylene (HDPE) pipe that provides additional drainage into the underground storm water detention system and can be used to air-dry and even cool the natural Northbridge grass. The storm water storage system used these chambers from ADS to handle the capacity spec of 50,000 gallons.

EDITOR’S NOTE: Advanced Drainage Systems (ADS), founded in 1966, manufactures thermoplastic corrugated pipe and other water management and drainage products. They sent this article on their work at the new Audi Field in Washington, DC.
bermudagrass. Precision Turf, Sugar Hill, GA, handled the installation.

“This is very similar to a lot of the drainage systems we put in on high profile fields,” said Kyle Simonian, general superintendent of Precision Turf. “The only thing different is the oversight nature of both the lateral lines and the trunk lines that are under the field. We ran two, 24-inch HDPE trunk lines, and coming off of each are 6-inch perforated HDPE pipelines. That perforated pipe does two things. First, it can do just simple gravity drainage and in the future it can be hooked up to a blower/vacuum unit at the downstream side of the pipe and actually either blow warm or cool air depending on the season, or put the whole system under negative pressure and actually increase the drainage flow rate of the system. A lot of times what stadiums do is use these systems for the negative pressure to increase drainage flow. But sometimes they will use the cool blowing to cool down the profile during the summer heat. This increases the oxygen content of the soil and helps the plant.”

The Precision Turf crew of six installed more than 1,000 feet of the 24-inch diameter and 8,860 feet of the 6-inch diameter perforated corrugated HDPE pipe in about 15 working days.

“This is probably double what we would usually use for a field this size,” he said. “The drainage lines on this are 10 foot on center; normally on a high profile field you might see 15’s but more likely you’ll see 20 on center on the laterals. To get the proper airflow through the field system when you have these systems, you need the spacing between each lateral tighter otherwise the air movement would get completely through the pitch. If you were to put 20 foot centers there would probably be areas in between those drain lines that would not be getting the proper heat or the cool from the blower unit.

“The design depends on how they want to run the collector, the big pipe like the 24 inch we used. Sometimes it’s one short run down the middle or at the end of field. There is also another type of design that makes a two-pronged fork so you have one pipe running down the field and two spurs that split the field into thirds,” Simonian said.

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The laterals are buried between 24 to 30 inches below the engineered soil and gravel surface. The subgrade is flat rather than pitched with a crown down the middle. The crew used an excavator with a rotating laser to get the ditches pitched for the gravity flow.

“The water flows into a chamber that is a basically a settling tank and when the outflow is above the bottom of the box that water goes underneath the field below into the StormTech system to capture the water and allow it to slowly infiltrate into the ground,” Simonian said.

The DC Department of Energy and Environment (DOEE), which overseas storm water management, restricts the amount and rate of storm water runoff that it allows to enter into the public storm network. This led to investigating the various types of ways to detain the storm water, and 242 StormTech MC-3500 chambers from ADS were used to construct eight systems at the site to provide a total installed volume of 51,142 gallons. The chambers are made from an engineered grade of impact-modified polypropylene copolymer.

“The preliminary design to control storm water runoff called for four large ‘box of rocks’ infiltration areas under the field,” said Branch Echols, project manager for Joseph J. Magnolia Construction, Inc., Washington, DC. “They were 9 feet deep to the bottom and each one would have required quite a bit of layback excavation to meet OSHA requirements, not to mention quite a bit of stone backfill. So, underground storm water retention was necessary because space was not available for construction of typical BMP retention ponds.”

The goal was to detain and store storm water runoff in order to control flows at the same level before the new construction. But due to the tight area of the site, there were restrictions on the amount and size of materials that could be used, and the schedule was tight as well. Calculations showed that a system capable of handling more than 50,000 gallons of water would be required. As this was a design/build project, Magnolia was able to propose an alternative that greatly reduced the amount of excavation required as well as the amount of stone backfill.

Additional access restrictions access were created due to the aggressive schedule and specific construction milestones along with facilitating deliveries and staging of the stadium’s structural steel. In order to work around these obstacles and comply with the required storage capacity requirements, Magnolia proposed to use StormTech chambers instead of large, stone-filled infiltration areas.

Each chamber, without end caps, measures 90 inches long x 77 inches wide x 45 inches high and has an installed volume of 178.7 cubic feet of
There are five chamber units under the field and three others under bio-retention fields outside of the stadium, which are dedicated to store runoff from the roof, sidewalks and parking lots.

“There was no place for a laydown area to construct storage units or stockpile stone,” Echols said. “Every square foot of the site was being occupied by either men, equipment, or both. With the product we could meet DOEE’s storm water retention requirements as well as reduce the required laydown area to only a couple of pallets. Work inside the stadium had to be coordinated around the structural steel subcontractor due to their mobile cranes and large staging areas needed for the structural beams. Because of this, we were restricted to windows of time to complete the installation, so it was imperative to have all of our material on-site and ready.

“Due to the staging of large steel beams adjacent to the excavation, we only had access from three of four sides,” Echols said. “To overcome this when placing stone between and around the chambers, our general superintendent, Scott Windon, came up with the idea to use a crane and large concrete bucket/hopper. We staged a mini-excavator next to our stone stockpile and alternated filling two concrete hoppers, enabling the crane to keep moving with no downtime for loading. Normally, we would have used a large excavator to place the #57 stone, which also would have taken longer. The crane cost a little more, but we were able to save time and beat our estimate, which ultimately resulted in a cost savings.”

Along the sides and on top of the chambers, ADS 0601TG non-woven geotextile was used as a soil separation layer. Underneath the chambers, ADS 315WTM woven geotextile was used to add scour protection.