HAVING A FIELD DAY

GEOTHERMAL SYSTEM COOLS AND WARMS ATLANTA BRAVES SUNTRUST PARK TURF, ADDITIONAL PIPE SYSTEMS DRAIN AND RECYCLE STORMWATER.

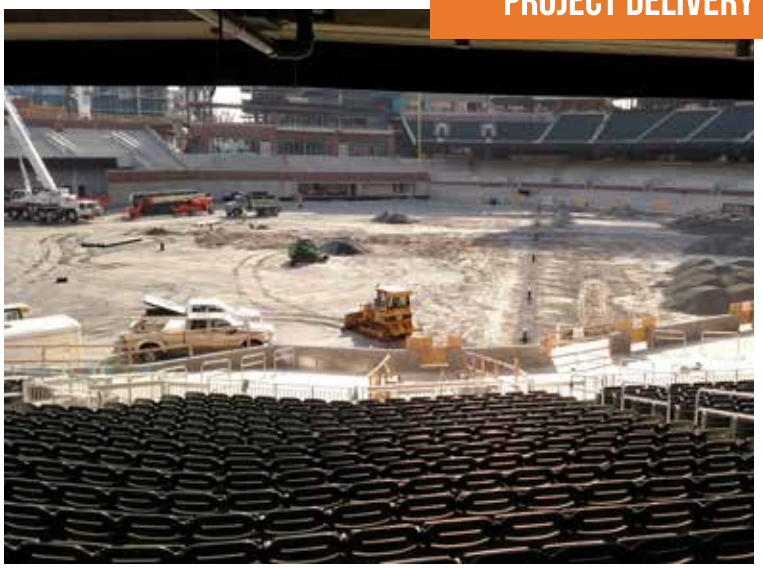
By Steve Cooper

DESIGNING A NATURAL TURF FIELD for major league stadiums has been done since the game began. But figuring out a way to naturally heat and cool the grass while providing optimum drainage is new. And for the just-built Atlanta Braves stadium, failure of the turf management system would have meant the loss of games plus $400,000 to replace the sod.

The $672 million Atlanta Braves SunTrust Park features an innovative design for the drainage, aeration, and geothermal-fed temperature moderation of the root zone for the nearly 130,000 square feet of sod. The design objectives were to remove rainfall at a high rate, reuse stormwater and uniformly distribute air to provide moderate cooling or warming of the root zone. To meet those goals, some 20,600 linear feet of drainage pipe and 4,100 linear feet of irrigation pipe were installed along with more than a thousand feet of pipe for the geothermal system.

In November 2013, the Atlanta Braves announced the move from Turner Field in downtown Atlanta to a site in nearby Cobb County, Georgia. The new stadium would seat 42,000 and would be available to host other events. It had to be ready for the start of the 2017 major league baseball season.
Just about 20 years before, the Braves converted the Olympic Stadium into the Turner Field baseball stadium. The Motz Group, LLC (Cincinnati) constructed the field drainage system and the Braves asked Motz to do the same for the new stadium, SunTrust Park, but with some added features.

According to Mark Heinlein, senior vice president of Motz, "We installed our PAT system at Turner Field in 1996. When we learned that the Braves would be building a new stadium, I talked with Ed Mangan, who is the Head Groundskeeper, about whether there would be an opportunity for Motz to build that field for them. He said 'Well, I really like the PAT system, I've had it for 20 years. What I really need to do is to be able to move air not only down through the field with vacuums, but back up through the bottom of the field with forced air'. We had thought about doing that for some time and said if you're willing to give us some time we'll do the research to prove that we can move air from the bottom of the field in a more efficient and more sustainable manner than other systems currently out in the market. So we built a 'to scale' section with our standard PAT system out in our research area and I hired Jim Goddard, and also Dr. Issam Khoury from Ohio University to help us figure this thing out. Our team did a lot of testing of things like pipe spacing, perforation patterns in the pipe, percentage of openings in the pipe, looked at moving hot and cool air through the system, and did a lot of data collection and analysis. This became our AirPAT root zone management system."



The SunTrust Park playing field under construction. *Photo: The Motz Group*

AirPAT captures the water with either gravity or a vacuum chamber to accelerate drainage and will also move air into the turf's root zone. The SunTrust system goes a step further by tapping the earth to provide the correct air temperature.

The mandate to Motz was to maintain turf temperatures above 39°F in order to avoid freezing of the grass root zone. The key component would be networks of thermoplastic pipes. Rain water would trickle down into one that would also provide a pathway for the temperature controlled air to heat or cool the root zone, another would use the collected rainwater for field irrigation, and another would be buried deeper to gather air for the geothermal system.

"Then, we got the idea of incorporating geothermal principles to provide the warm or cool air to the root zone in an underground loop of pipe." Heinlein said. "This had never been done before. Other systems had basically used giant furnaces to heat the air before blowing it into the system. Our test site confirmed that we could get warmer air in the winter and cooler air in the summer with the geothermal pipe system. We then went back to the drawing board and looked very closely at what kind of temperature differentials can we get from the ground 10 feet below, how much air do we have to move, how long does the air have to be 10 feet below the ground before we get that energy transfer of the warm winter air or cool summer air. And at that point we could effectively moderate the temperature of the root zone."

At SunTrust Park the Motz AirPAT system will keep a constant level of moisture available to the Seashore Paspalum Platinum TE grass in the playing area. AirPAT has a series of sensors that enable the grounds crew to monitor and control the oxygen and moisture levels along with the temperature under the field to keep the sod healthy even in winter and during extremely warm summer months.

The geothermal system is made up of 1,100 feet of 10-inch diameter, single wall, corrugated high-density polyethylene (HDPE) pipe with airtight joints from Advanced Drainage Systems, Inc. (ADS) (NYSE: WMS). "This pipe came in continuous coils of 300 feet," explained

Goddard, who retired as ADS' Chief Engineer and is now a well-known industry expert and consultant. "We wanted to have as few joints as possible for the runs to right and left fields, which is the longest at more than 450 feet to behind home plate. Air that is either cool or warm due to the temperature of the surrounding soil and depending on the time of the year, is fed through these pipes that are buried from nine to ten feet deep on a slope so that any condensation will drain. That depth was chosen because the ground temperature in the Atlanta area at that depth is historically between 64- and 67-degrees F.

"The air is then blown through AdvanEDGE® flat, perforated pipes, and moves into the gravel then the sand level and into the root zone of the turf. The system is designed to replace all the air moving into the field every 10 minutes."

The gravel layer is the equivalent of American Association of State Highway and Transportation Officials (AASHTO) #89 crushed gravel with limited fines. The sand layer meets United States Golf Association (USGA) standards. There were 14,300 cubic yards of stone backfill and 4,500 cubic yards of root zone sand.

The AdvanEDGE pipe being used for both gathering rain water and heating or cooling the root zone is 12 inches wide and meets ASTM D700. It is also a product of ADS and was developed primarily for highway storm water drainage. The perforated pipe was designed to be installed on its edge to provide the largest possible drainage profile while reducing the width of the trench. At SunTrust Park AdvanEDGE is laid flat. This permits the pipe to be installed to drain water near the roots than would be possible with round pipe. Special fittings designed by ADS and Motz connect the flat AdvanEDGE pipe to the round ADS, N-12®, six-inch check pipe.

"We used the AdvanEDGE pipe because it is so very efficient," Heinlein stated. "What we determined in our research plot is that the standard ADS product wouldn't work for us, only because the standard perforations in a 12-inch AdvanEDGE pipe were not optimal for what we wanted to do. This was the first step in the research project. We took pipe that had no perforations, and manually drilled holes of various sizes and in different patterns. Those test pipes were put out in the research trial and we monitored what happens to the air as it moves through these different size holes and perforation patterns. We were able to determine the exact perforation pattern that we wanted for this system. It's now a custom perforation that ADS does exclusively for the AirPAT system."

Field Drainage

The rate of storm water drainage under gravity flow is 2.7 to 3.5 inches per hour. The rain water percolates through the ground and into the AdvanEDGE pipe, and conveyed into a 30,000-gallon underground detention unit for reuse

"The system is built like a giant bathtub," Heinlein explained, "with the field wrapped in an impervious liner so every drop of water that falls on that field can be managed. No water goes into the ground – no water gets lost – every bit of it is captured. One of the benefits of doing that is to be able to take that water and do whatever you want with it.

Screenshots of the OasisPlus dashboard. *Photo: Kinemetrics*

When there is need for that water stored in the underground cistern system, it's brought through a series of particulate filters and UV filters that sanitize it and is ready to be reused. Ed uses that water for things like landscape irrigating, or for a quick wetdown of the infield before a game, watering down the warning track, washing down all of his equipment. It's all recycled water. Plus, the other benefit of the system is that the Braves can really conserve the water that gets put on that field because it can also be sub-irrigated using the captured storm water. As a water management system, it is extremely sustainable and very efficient, especially with Atlanta's history of severe drought conditions."

Additional information can be found at the ADS website: www.ads-pipe.com.

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June 2019 Vol. 5 Issue 15

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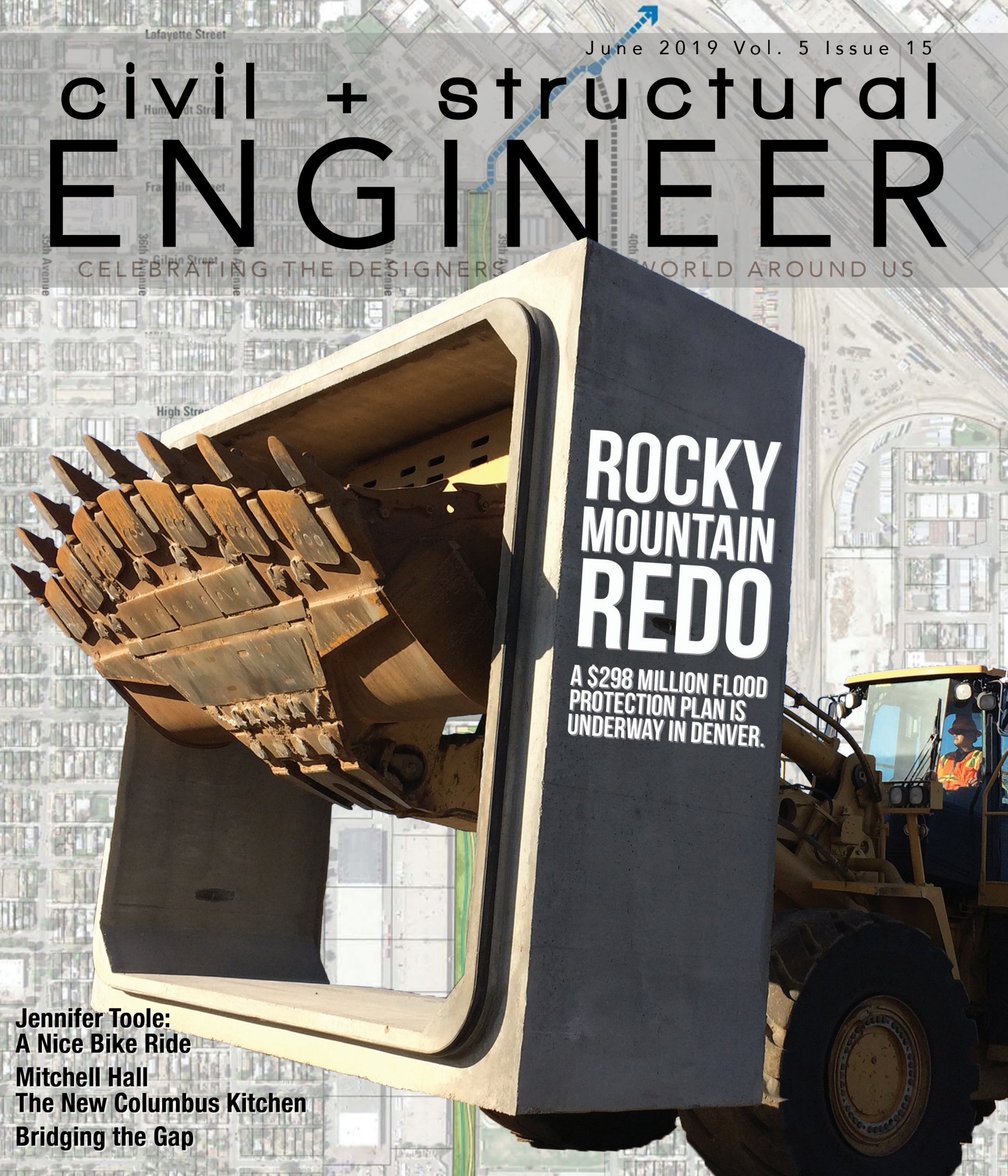

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