University of Virginia administrators recognized the need for flat, open recreational space for students in the Alderman Road Residence Area, which houses nearly 2,000 first-year students.

CREATING SUSTAINABLE GREEN SPACE AT UVA

NEW STUDENT RECREATION SPACE CONSERVES WATER.

By Devin M. Keeler, P.E., LEED AP, SIT, CST-III

THE HISTORIC GROUNDS of the University of Virginia (UVA), in Charlottesville, are set in the foothills of the Blue Ridge Mountains. As Thomas Jefferson envisioned, the mountains provide a dramatic backdrop along the grounds' western edge, including Mount Jefferson, also known as Observatory Hill. Observatory Hill is the location for the university's McCormick Observatory and a dozen residence halls that rise along the scenic hillside. The residence halls, which make up UVA's Alderman Road Residence Area, house nearly 2,000 first-year students.

While the hilly, wooded setting is among the university's most beautiful areas, administrators have long recognized the need for flat, open recreational space for students. The campus master plan identified a one-acre site at the base of Observatory Hill, fronting the Observatory Hill Dining Hall, as an ideal location for a multi-use green space. The lawn would accommodate student gatherings and activities such as soccer, football, and Frisbee; and with a temporary stage, would host concerts and special events. With Scott Stadium directly across the street, the site could also host tailgate parties during football games; and on move-in day, families could use the space for parking and staging to access the surrounding residence halls.

High use, low impact

Given the multi-purpose nature of the green space, durability and minimal maintenance were key goals. The university also sought to incorporate a number of sustainable strategies, most notably in terms of stormwater management and water reuse.

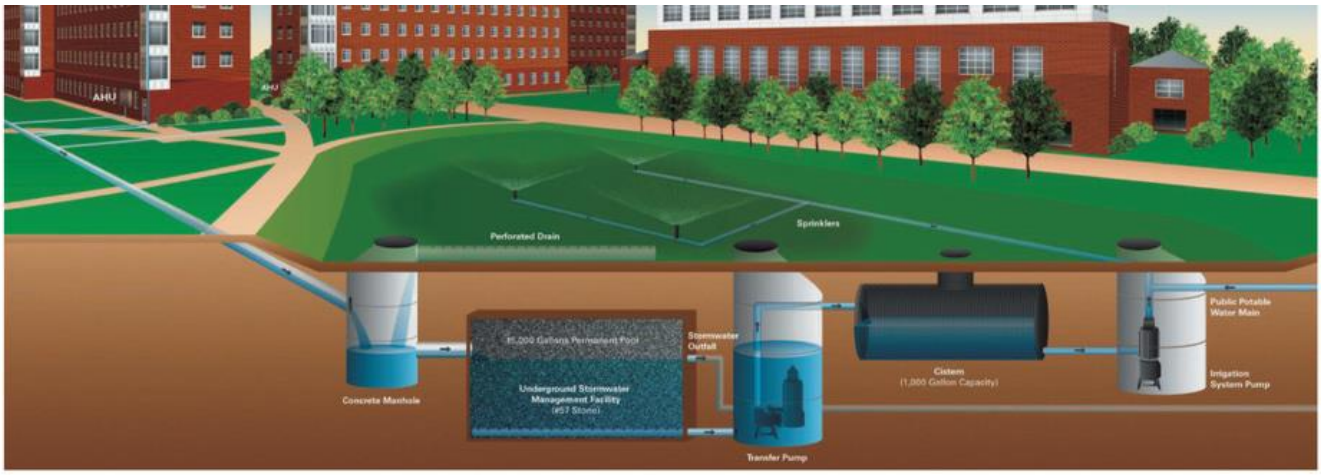
Working with civil engineers from Dewberry, administrators planned a site equipped with irrigation, underdrains, and a new soil media to support a resilient, Bermuda-type turf that would stand up well to heavy foot traffic, occasional vehicular traffic, and hot summer weather.

According to UVA Senior Project Manager Kate Meyer, "Dewberry has helped us with stormwater management best management practices all over the grounds. Their engineers understood that we were looking for something beyond just a flat grassy area — this is a quality project above and below ground."

The university requested an irrigation system that would be fed primarily from stormwater with potable water as a backup. Under a prior contract, Dewberry had designed an underground stormwater management facility (SWMF), which had a permanent pool of water that happened to be available for use for irrigation purposes. The SWMF was nicknamed the "stone burrito" because it was created by burying #57 stone (40 percent void ratio) wrapped in a geotextile fabric to prevent the migration of fine soil particles into the reservoir. The underground SWMF, coupled with a new underground cistern, provides a storage capacity of 35,000 gallons of water — approximately half of the Hill dining lawn area's weekly irrigation requirement during peak hot weather weeks, and more than enough the rest of the year.

Dewberry also designed an underground pump station and underground meter vault to minimize the visual impact to the otherwise open site. The meter vault houses control valves and level sensors to determine if the irrigation systems should be supplied via stormwater or potable water.

As the irrigation water percolates through the ground, any water that is not taken up by the grass is returned to the cistern via the new underdrains. In addition, the HVAC systems in the adjacent residence halls enable condensate from the air handler units to be captured by the storm sewer and directed to the cistern. This set-up



The Dewberry-designed underground stormwater management facility, coupled with a new underground cistern, provides storage capacity of 35,000 gallons of water.

provides a third source of water for irrigation and allows the cistern to be replenished during the peak of summer when water and air conditioning are needed the most.

Innovative materials and equipment

The cistern is composed of steel-reinforced polyethylene (SRPE), which, with steel reinforcing ribs and pressure-rated polyethylene resin, is strong enough to enable the 8-foot-diameter structure to withstand vehicular traffic. The selection of this durable material was also critical to the schedule, as the polyethylene cistern was light enough to be installed without the use of a crane. This streamlined the construction process, which, following a 60-day design phase, was taking place during the summer and needed to be complete in time for student move-in day.

The university also wanted to avoid a filtration system that might be costly or prone to maintenance issues. Because of the long settling times in the "stone burrito," the reclaimed water was expected to be fairly clean and free of large particles. However, Dewberry engineers worked with the irrigation designer to ensure that larger spray nozzles were specified for reclaimed water rather than potable water, to avoid any clogging.

The sustainable, synergistic approach of using reclaimed water from harvested rainwater and condensate from the air handling units in the nearby residence halls, as well as potable water, has proven successful in meeting the university's goals. In 2015, more than 350,000 gallons of reclaimed water were used for irrigation. The durable turf has withstood heavy use, minimizing the need for re-sodding. Most importantly, students use the green space constantly for pick-up sports, recreation, and social gatherings.

"The University of Virginia needed an innovative solution for managing stormwater and creating a new playing field where students can gather, play intramural sports, hold concerts, and even build snow sculptures in the winter," said Cheryl Gomez, director of operations for UVA. "The Dewberry team designed a state-of-the-art stormwater storage and recharge system with a beautiful, highly functional playing field that the students love. The creative and innovative design approach is helping the University of Virginia achieve its sustainability goals."

The site — equipped with irrigation, underdrains, and a new soil media to support a resilient, Bermuda-type turf — has withstood heavy use, minimizing the need for re-sodding.

Lightweight, traffic-rated cistern

Contech Engineered Solutions' UrbanGreen Rainwater Harvesting cistern, used in the University of Virginia installation, is made from DuroMaxx steel reinforced polyethylene (SRPE). According to Contech, the 80-ksi steel reinforcing ribs provide the strength, and pressure-rated polyethylene resin provides the durability. Its SRPE cisterns are available as large as 120 inches in diameter, include prefabricated access points, often can be installed without the use of heavy construction equipment, and feature H-25 traffic-rated design.
— Bob Drake, editor

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