Racetrack upgrade

Vertical drainage system plays a vital role in horse track renovation and safety.

By Tori L. Durliat

Project
Keeneland Racetrack, Lexington, Ky.

Civil engineer
GRW, Inc., Lexington, Ky.

Product application
Installation of a synthetic racing surface and vertical drainage system improves horse track conditions and safety.

Keeneland Racetrack replaced deteriorating reinforced concrete pipe with high-density polyethylene pipe when it installed a synthetic track surface in 2006.

In horse racing, horse and jockey safety is top priority. Consequently, racetracks across the world are continually looking for ways to make their racing surfaces safer and more consistent. With conventional dirt tracks, water drains horizontally, which can compromise the track's condition by allowing it to freeze in cold temperatures or become muddy after hard rains. These types of conditions could lead to a decrease in the number of starters and an increase in the number of injuries and cancelled racing days — all of which can contribute to unappealing wagering and reduced track attendance.

Some racetracks are turning to improved drainage and synthetic racing surfaces, like Polytrack, to help solve the problem. This particular surface is made up of a blend of fibers, recycled rubber, and silica sand covered with a wax coating that allows water to flow vertically through the top surface to the layers below and helps avoid a freezing or inconsistent racetrack. The sub layers include porous macadam and dense aggregate rock that provide a solid foundation, while the vertical drainage system carries water away from the track. Together, they work to provide a safer, more consistent racing surface compared with conventional dirt tracks.

In the heart of Kentucky's Bluegrass Region, storied Keeneland Racetrack was originally built in the 1930s and has since played host to some of the greatest races in the history of the sport. A lot had changed throughout the years. Keeneland's grandstand, concessions, and wagering technology had all been modernized, but surprisingly, the main racetrack's design and layout had stayed the same.

In 2006, Keeneland Association Officials decided to replace the old dirt track with the vertical drainage system and Polytrack combination. "Our track has not changed much since it was laid out and constructed using mules prior to our first race meeting in 1936," said Keeneland President and CEO Nick Nicholson. "The time had come for us to take advantage of the latest, cutting-edge advancements to create the safest racing environment possible, furthering the mission outlined by our founders to build a model racetrack."

Keeneland's existing dirt track was not having drainage problems. The new vertical drainage system was installed because it's a prerequisite for Polytrack. One needs the other to function properly and the success of the final product is totally dependent on the two working in unison.

Operation and maintenance

Wastewater from the restaurants' kitchens is routed by a 4-inch, schedule 40 PVC pipe sewer line to the 5,000-gallon grease interceptor tank, where it then flows to the 6,100-gallon septic tank. All other wastewater from the facility, including three public restrooms, travels directly through a 6-inch, schedule 40 PVC pipe to the 6,100-gallon septic tank.

From the septic tank, effluent flows through a 4-inch line to a 7,700-gallon, duplex timed-dosing tank, which delivers measured flows of 400 gallons per cycle to the High-Strength FAST 9.0 ATU in the 9,100-gallon pre-treatment tank through two, 2-inch pipes. An ATU system was selected for pre-treatment because fats, oils, and grease were a potential problem, in addition to high biochemical oxygen demand.

Pre-treated effluent from the ATU flows via gravity through a 4-inch pipe to a 2,000-gallon triplex demand-dosing tank. Installing three pumps instead of two allowed use of smaller, more economical pumps, as well as more management options. Each pump in the tank is connected by a 2-inch line to one of three drainfield zones, allowing redundancy and the ability to control use of specific areas of the drainfield. Each trench has a shut-off valve at the manifold and flush valves at each end to control resting cycles and the potential for winter freezing.

The ATU system is designed to prevent biomat development and the drainfield's three zones provide the ability for rest and recovery. The combination of the ATU and the Infiltrator chamber system enabled design of an effective system on a site with extremely limited space.

The system is up and running with an operation plan that includes monitoring flows and adjusting zones and timer settings accordingly. Initially, drainfield zones will be switched on a quarterly basis. Once the center has been in operation long enough to establish usage patterns, the schedule for drainfield recovery may be adjusted. Wastewater will also be tested on a periodic basis to ensure that adequate treatment is being achieved. ■

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Left: The new drainage system incorporates almost 9,000 feet of ADS drainage pipe and 62 Nyloplast structures and basins.

Right: The completed synthetic surface helped Keeneland Racetrack achieve increases in wagering, attendance, and the number of starters.

The installation process began in May and needed to be complete by the end of August in time for Keeneland's fall race meeting. Engineers and contractors were all under pressure and knew that versatile drainage products would have to be used to complete this project on time. The drainage system was constructed using Advanced Drainage Systems (ADS) pipes and Nyloplast structures and basins. Engineers and contractors who worked on the project all stressed the fact that the success of this synthetic racing surface is dependent on the quality of the drainage system installed beneath it.

GRW, Inc., Engineer Harvey Helm recommended ADS pipe and Nyloplast structures, and Keeneland, which had used ADS products in the past, agreed. "We chose ADS because of the quality of their products, their lower installation costs, lightweight design, and practicality when working under tight deadlines and restrictions," said Helm.

Three parallel runs of perforated pipe are installed around the track, spaced about 20 feet apart. Then, every 300 feet around the track, the three perforated pipes connect to a cross drain perforated pipe that runs to the inside of the track. These cross drains connect to the Nyloplast manholes, which are spaced 300 feet apart.

Under the inner part of the track, just inside the rail, a system of pipe gathers the water coming from the track to the Nyloplast manholes. This system drains in multiple directions around the entire inner portion of the track. The pipe diameter ranges from 8 inches at the high point and increases in diameter to 30 inches at the low point. At the low point of the manhole, a 42-inch-diameter pipe runs across the track and over the back slope to an existing manhole.

Pipes and basins were also used around the clubhouse lawn areas to drain newly established grades. Elevation of the grandstand apron changed as well. This required an end-to-end drainage structure to empty the runoff of the trench and roof drains.

In total, the track and drainage installation incorporates almost 9,000 feet of ADS drainage pipe, 62 Nyloplast structures and basins, 16,000 tons of specialized Polytrack material, 90,000 tons of limestone, and 4,500 tons of porous asphalt.

"The ease of adjustment on the Nyloplast really played a key role, especially in the grandstand area because of the number of existing roof drains. We used ADS pipe to tie the new system into the existing one," said Tommy Cramer, project manager, Central Rock Mineral Company.

The new track was quickly put to the test when, shortly after installation, the area received a record-setting rainfall. The new drainage system passed with flying colors.

The track's inaugural fall race meeting, held Oct. 6-28, 2006, was a huge success. Results included an increase in total wagering, record attendance, and average field size. The new design also attracted a high number of starters, as well as a large contingent of Breeders' Cup-bound horses.

"This meet has been extraordinary for us in so many ways," said Nicholson. "While we are proud of the many records that were set, we are even more proud of how well the Polytrack surface and ADS drainage system performed. It remained very safe throughout the meet, despite getting more than twice the usual amount of rainfall during the month."

In early 2006, The California Horse Racing Board declared that all major tracks in the state would have to install a synthetic surface by Dec. 31, 2007, or have their racing licenses annulled. Consequently, racetracks, engineers, and contractors should all take note of drainage system capabilities and performance. ■

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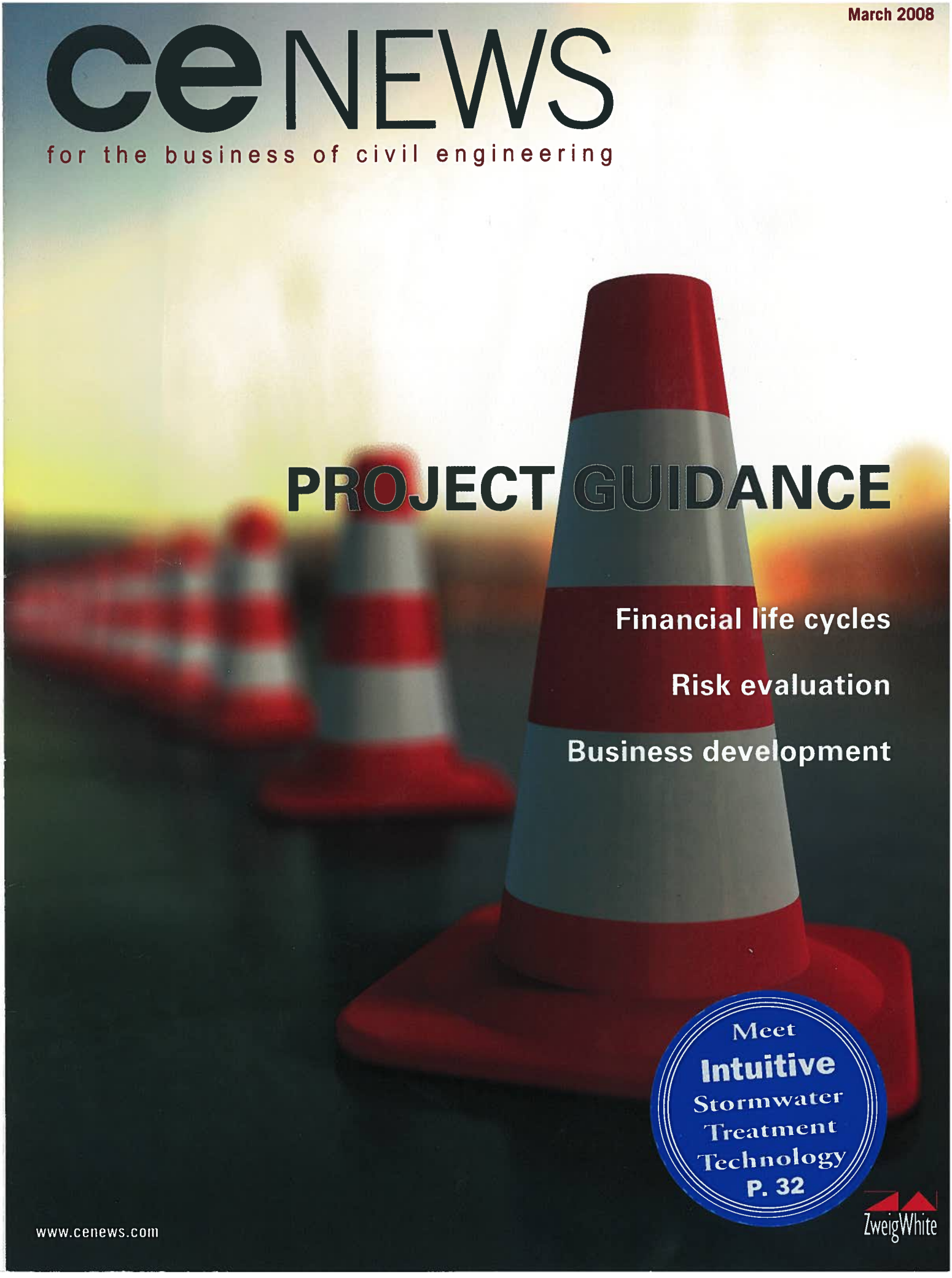

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