

# Subsurface retention benefits above-ground aesthetics

**Underground pipe and stone bed accommodates runoff from a 25-year storm while maintaining upscale image for a luxury auto dealer.**

By Toni L. Durliat

## Project

Kenny Kent auto dealership  
stormwater management,  
Evansville, Ind.

## Participants

Morley and Associates, Inc. (engineer)  
Peyronnin Construction Co., Inc.  
(contractor)

## Product application

HDPE underground stormwater  
retention system preserves valu-  
able real estate and meets local  
mandate to mitigate flooding.



**C**ommercial property owners today are challenged to find new ways to manage stormwater runoff, due primarily to stringent regulations and skyrocketing land values. Engineering an effective solution can be a high-stakes assignment, particularly when the client is a luxury car dealership located in a floodplain.

Such was the case when the Kenny Kent Toyota Scion Lexus dealership in Evansville, Ind., undertook a major expansion that created a new parking lot and building addition for its sales and service facilities. To be successful, the stormwater management solution had to meet the following four criteria:

- comply with the local stormwater runoff ordinance;
- keep expensive land in use;

- allow for future expansion; and
- maintain aesthetics appropriate for a luxury auto dealership.

Given these requirements, an open stormwater retention system was not an option. "Open retention wastes expensive property and takes regular maintenance to keep it looking good in the spotless dealership environment," explained James Q. Morley, president of Morley and Associates, the civil engineering firm responsible for designing the solution.

With open storage off the table for space and aesthetic reasons, as well as for the safety risks it poses in a public area, the engineering firm considered how best to comply with a local ordinance that requires minimizing the impact of development on the entire

A worker compacts an open-graded stone backfill around the underground pipes to provide stormwater storage capacity as well as structural support for the surface parking lot.

surface water drainage system. Located on the Ohio River, Evansville has an unusually high water table. Flooding has become more common in recent years, so the dealership expansion plans would need to address this concern. "When you have 12 acres that are primarily pavement and roofing, the stormwater runoff would contribute significantly to the flooding problem," said the dealer's director of fixed operations Joe Fredrich.

Fortunately, Morley and Associates previously designed a system to collect stormwater runoff from the parking lot of a big-box retail development in

Evansville. This project had the same strict runoff management requirements the dealership faced, and eight years after installation it was still functioning perfectly. The firm knew it would work for Kenny Kent as well.

### Subsurface retention

The solution was a subsurface retention system using high-density polyethylene (HDPE) perforated pipe laid in a bed of aggregate. With this solution, the water evaporates or percolates slowly into the ground, recharging the groundwater instead of causing flooding downstream. By contrast, containment methods such as underground concrete basins and storage tanks convey runoff quickly into streams, aggravating flooding problems. These methods also increase costs because they require deeper excavation than HDPE pipe.

According to Morley, "The water storage area in the pipes plus all the volume in the void areas of the aggregate provide plenty of storage capacity." Combined, the pipe and aggregate beds hold 30,500 cubic feet of water.

Most of the soils in this area of Evansville are silty clays with very low permeability, so the local ordinance required that the system be designed based on the assumption that the water cannot percolate and that it must drain out of the primary discharge pipe. Of course, some water will naturally soak in, but the amount depends on the time of year and annual precipitation, among other factors.

The Evansville and Vanderburgh County Drainage Ordinance requires that the stormwater system accommodate a 25-year storm event, but engineers must also account for what happens to stormwater during a 100-year event. In such an event, stormwater backs up into the system. If runoff exceeds the volume of the storage facility, the water will back up into the parking lot beginning at the lowest area drain. The

parking lot was designed and graded so that when stormwater gets more than about 6 inches deep at the area drain — not deep enough to get into any of the buildings or flood vehicles sitting on the car lot — it spills over into adjacent streets and then into a receiving ditch. Also taken into consideration was that when stormwater backs up into the parking lot, it creates more head pressure in the retention system, thereby pushing more water out the primary



Nyloplast drain basins connect to perforated pipes in the subsurface stormwater retention system. Two workers can place the lightweight HDPE components, eliminating the need for cranes.

discharge pipe.

Morley and Associates specified Hancor's LandMax retention system, a complete HDPE stormwater pipe system with compatible fittings, joints, coupler, and adapters. "The LandMax components were all inventory items, which made constructing the retention system as simple as it was functional," said Hancor regional sales representative Robert Miller.

"Because it was a flat area located in a floodplain, the new buildings and parking lot had to be elevated above the original ground level, with the floor of the buildings at the minimum flood protection level and the parking lot sloping away from the building," said Morley. In addition to having

the proper grade, the parking lot had to be smooth and flat. Depressions in the pavement would collect rainwater that would attract birds, which was not acceptable at the car dealership.

The retention system was constructed around an existing parking lot and buildings and tied into an existing storm sewer. Land adjacent to the new parking lot was conserved for future dealership expansion by confining the runs of pipe to the smallest area possible without compromising the storage capacity of the system.

A large retention basin was excavated 6 feet deep and lined with nonwoven geotextile to prevent soil particles from infiltrating into the retention area. Six inches of INDOT No.2 aggregate — an open-graded stone with a high void ratio — were placed over the geotextile to form the base for the LandMax retention system. Runs of SureLok HDPE 15-inch perforated pipe were laid 52 feet wide by 183 feet long. Perpendicular to this area, runs of SureLok HDPE 24-inch perforated pipe were laid 26 feet wide by 156 feet long. In total, nearly 4,500 feet of perforated HDPE pipe were used in the L-shaped retention system.

Hancor's Nyloplast engineered inline surface drains and drain basins, also part of the LandMax retention system, were installed in 21 areas around the parking lot to collect stormwater into the retention system below. The lightweight drains were installed by two workers, eliminating the expense and risk of bringing a crane to the dealership — which remained open during construction — to lift and place heavy drains into the excavated area.

According to Morley, the ability to make connections easily with the lightweight HDPE pipe accelerated the installation process. "Saving time was important to the dealership, since they never closed their doors during the construction," Hancor's Miller noted. "Besides helping get cars out on the



Workers carefully level and compact the final asphalt surface for the auto dealer sales lot around one of the 21 surface drains.

new lot sooner, reducing installation time also made HDPE pipe a cost-effective solution.”

James Hall, project manager for contractor Peyronnin Construction Co., Inc., agreed that HDPE pipe was easy to work with. “It was light-

weight and everything went together quickly.” Before construction began, Miller met with the contractor to explain the correct installation procedures, and he was on the job site to answer questions at critical intervals.

After all the pipes were connected, the area was backfilled to the top of the pipes with aggregate and compacted. Besides providing more storage capacity

for the retention system, the rock adds strength and structural support. A final cover of 25 inches was installed over the backfill and the lot was surfaced with asphalt. While SureLok withstands heavy traffic loads with only 12 inches of cover, the extra cover in this

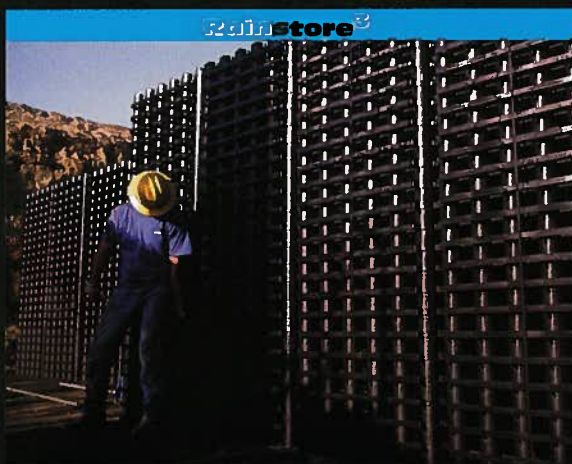
case ensured that the lot would have the required flat surface.

Morley said he’s an advocate of using perforated pipe, water storage in rock, and groundwater recharge. “We should take every opportunity to get rainfall back into the soil and not into the creeks and rivers to prevent flooding downstream. It’s much better to maintain our groundwater table.”

Upon completion, the parking lot was readied quickly for new vehicle inventory. According to the dealership’s Fredrich, “The system is functioning as expected — out of sight, out of mind.” ■

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