Compact subsurface system manages stormwater quality and site discharge for a new commercial development.

By Tori Durliat

Project
Park Place Tower stormwater detention, Jeffersonville, Ind.

Civil engineer
Heritage Engineering, Jeffersonville, Ind.

Product application
Commercial development uses a Hancor LandMax subsurface detention system and stormwater quality unit to meet local requirements and maximize land use.

The LandMax system for the Park Place Tower project required about 740 feet of 30-inch-diameter pipe. The entire system is contained beneath just 13 parking spaces.

Stormwater regulations established in most communities limit the runoff volume or rate and pollutant loads from a developed site. Owners are required to manage runoff actively to minimize the effect it may have on the environment and existing sewers. Rarely is a commercial or industrial site exempted from these regulations.

There are a variety of new products — and new applications of existing products — that have been introduced to help engineers meet stormwater regulations. Surface storage systems (ponds or basins) are commonly used to hold runoff; an overflow pipe is used to control the runoff discharged to a sewer or other outlet. While ponds can be made relatively attractive, they sometimes pose safety concerns and consume expensive real estate that could be used for building or other applications. Subsurface storage systems, typically comprised of an underground pipe network, eliminate many of the negatives associated with surface systems.

Storage systems, whether a surface or subsurface design, are generally not depended on to remove pollutants. That is accomplished by other products, including stormwater quality units (SWQUs), which have been introduced during the last several years as regulations have become more restrictive. SWQUs operate by capturing a portion of the initial runoff which generally contains the most concentrated pollutants. Pollutants are settled or floated out of the runoff, while the relatively clean portion flows to a storage system or another discharge point.

Park Place Towers, a Sprigler Development project, included a two-story office building and a few retail stores on a parcel that had previously been an open farm field. It is located in Jeffersonville, Ind., across the Ohio River from Louisville, Ky.

The city of Jeffersonville limits runoff from new development to that which existed prior to development for 2-, 10-, and 100-year storm events. In addition, the city requires the use of an SWQU to improve the quality of the runoff. The Park Place Towers development was only about an acre; a parking lot covers about half the area and the building encompasses about a quarter of the site. The remaining area is open space. The addition of the impervious surfaces to what was originally an open area meant that stormwater runoff would definitely increase. The engineer on the project, Heritage Engineering, also of Jeffersonville, determined that 0.08 acre-feet would need to be stored

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Program schedule*

March 25, 2008

8:30 a.m. - 12:30 p.m. — Conference sessions

12:30 p.m. - 1:30 p.m. — Networking lunch

1:30 p.m. - 5:00 p.m. — Conference sessions

5:30 p.m. - 7:00 p.m. — Networking cocktail reception

March 26, 2008

8:30 a.m. – 12:30 p.m. — Conference sessions

12:30 p.m. — Conference concludes

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Amy Walsh is conference producer for ZweigWhite. She can be contacted at awalsh@zweigwhite.com.

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The engineer wanted to make the most of the small site ... by placing a subsurface stormwater storage system beneath the parking area.

to meet the stormwater regulations for post-development runoff.

The engineer wanted to make the most of the small site and one of the best ways of doing that was by placing a subsurface stormwater storage system beneath the parking area. A LandMax detention system using Hancor, Inc., Sure-Lok ST HDPE pipe was designed for the site. The LandMax system for the Park Place Tower project required about 740 feet of 30-inch-diameter pipe. The entire system is contained beneath just 13 parking spaces. A Hancor SWQU was installed to capture pollutants prior to the runoff entering the LandMax system and to meet the city's requirements. Additional Hancor HDPE pipe in 12-, 15-, and 18-inch diameters was used elsewhere on the site for storm sewers.

Design and layout of a Hancor LandMax and similar systems require input from both the design engineer and the manufacturer. Manufacturers have a standard product offering for subsurface storage systems and can provide custom-fabricated components if required. Special fabrications may include headers, tees, wyes, or elbows with certain dimensions, or pipe of a certain length.

Once delivered to the site, the components can be assembled easily and accurately using the plan drawings.

The LandMax system at the Park Place Tower site was installed in December 2005. The system went together quickly and easily, even though it was the first subsurface pipe system the project manager, Leo Messmer of Dan Cristiani Excavating, Clarksville, Ind., had installed. An excavator was used to remove the native soil and position the LandMax system. LandMax components are lightweight and can easily be handled by a few laborers and ordinary construction equipment.

Specifications required a #57 stone for the backfill. The contractor used the excavator bucket to pour the backfill on

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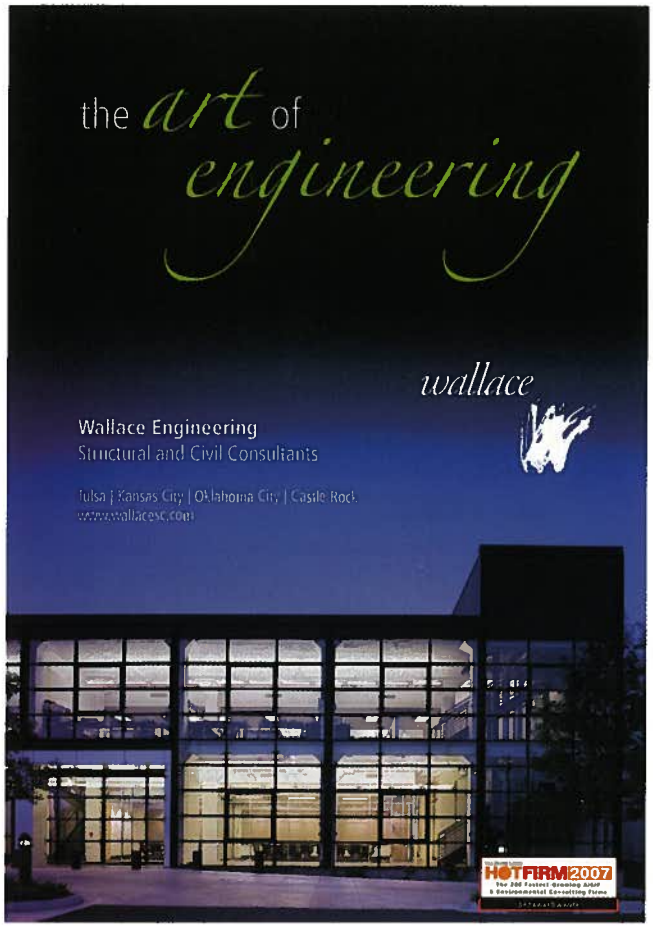
The total cover over the system varied from 2 to 3 feet. The #57 stone backfill extended 12 inches to 24 inches over the pipe crown. The asphalt base, binder, and surface layers added nearly 12 inches more.

the pipe crown so that it flowed uniformly on either side of the HDPE pipe laterals. A laborer shoveled the backfill into the pipe haunch area to minimize any voids that might have been created. One pass was made with a plate compactor when the backfill was about at the springline. The pipe did not misalign during backfilling or compaction. Backfilling continued until there was approximately 12 inches of gravel over the pipe crown; the contractor then used a dozer to level the backfill.

The total cover over the system varied from 2 to 3 feet. The #57 stone backfill extended 12 inches to 24 inches over the pipe crown. The asphalt base, binder, and surface layers added nearly 12 inches more.

The Hancor SWQU was installed near the LandMax system. The SWQU was 42 inches in diameter and 20 feet



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filled similar to pipe on the project. The units themselves are sized to capture the "first flush" from a storm event so that most of the pollutants can be captured. Flow in excess of the first flush is less contaminated and flows through a bypass pipe to the subsurface system.

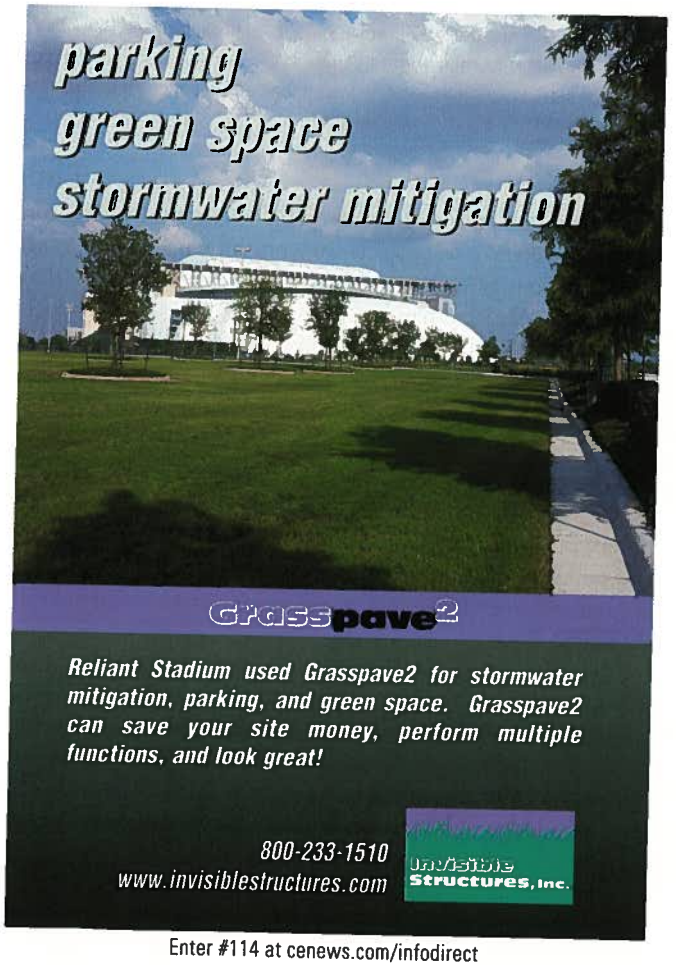
LandMax subsurface systems are designed to withstand standard AASHTO HS-25 highway loads with 1 to 2 feet of compacted cover. Some vehicles, including some construction equipment, are heavier than highway loads and should not be allowed to travel over the system without some additional cover.

Subsurface systems, regardless of pipe material, may require a geotextile (filter fabric) to separate the backfill from the native soil to prevent soil migration. Conditions at the Park Place Tower site did not require use of a geotextile since the native soils and stone backfill were unlikely to create migration concerns.

The subsurface system in this project used non-perforated pipe and functioned as detention. The system holds the runoff temporarily and then discharges it at a controlled rate. Perforated or non-perforated pipe can function as a detention system; however, a detention system will always have a controlled discharge. Pipe is used in detention applications with either soil-tight or watertight joints, depending on the project specifications. Like detention systems, retention systems temporarily store runoff; however, retention systems allow the stored stormwater to recharge to the surrounding soil. Perforated pipe with soil-tight joints are used in retention applications. Whether a system should be a detention system or a retention system is often determined by local regulations.

The LandMax detention system at the Park Place Tower project has been performing well for more than 18 months. The contractor was pleased with how easy it was to install the system and looked forward to installing more of them. As real estate costs continue to rise, demand for subsurface systems will be increased. These systems allow efficient management of stormwater without creating an eyesore or a safety issue. ■

Tori Durliat is corporate manager of marketing and communications for Hancor, Inc. She can be contacted at tdurliat@hancor.com.



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Technology approach

Airport planning firm offers best practices for upgrading civil engineering technology.

By Bob Endres

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Objective
Increase efficiency and capabilities for airport planning and airspace analysis

Product application
Upgrade from 2-D applications to dynamic 3-D modeling using Autodesk Civil 3D

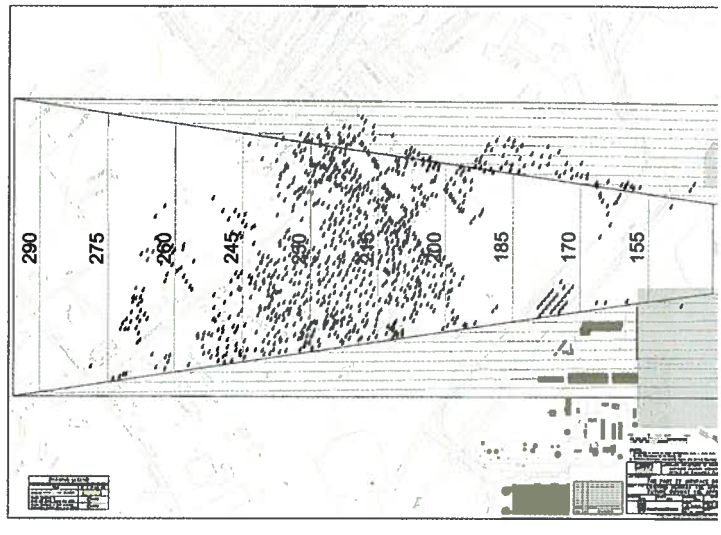

Figure 1: An overhead view of the Northwest approach to the Baltimore/Washington International Airport. The "dots" are all violations to the approach surface, such as trees and telephone poles, which must be carefully measured and input into the design.

Conventional wisdom tells us: "If it ain't broke, don't fix it," and "just leave well enough alone." At Landrum & Brown, the oldest privately owned consultancy dedicated solely to aviation and airport planning, we have always taken a more proactive approach to our civil engineering processes than what conventional wisdom recommends. We are committed to, and actively pursue, the development of sophisticated, state-of-the-art analytical technology necessary to serve the aviation industry.

This philosophy is what led our company to upgrade from 2-D civil engineering software applications to dynamic 3-D modeling. Our successful experience adopting this new technology has provided us with the following series of best practices that should be universally applicable to all firms, regardless of size:

- assess the strengths and limitations of current systems;
- obtain buy-in at all levels of the organization for the new system;
- invest in sufficient training;
- reengineer processes to take full advantage of the new technology; and
- whenever possible, reuse the same data sets for multiple purposes.

Review current systems

To understand our experience upgrading to Autodesk Civil 3D, it's helpful to understand the type of work we do as a firm and what role technology plays. Landrum & Brown provides environmental and airport planning solutions for aviation decision makers. The projects we work on range in size from very small to very large, as we have a wide range of clients that we service. We have handled projects for large airports such as Los Angeles LAX and Chicago O'Hare, as well as smaller — though not necessarily less challenging — municipal airports in Ohio and Rhode Island.

Some of the most interesting work we do is airspace analysis. We analyze the airspace surrounding airports to ensure that multiple air approaches are free from all potential obstructions, such as trees, communication towers, buildings, and freeway overpasses (see Figure 1). Even approaches over water must account for the possibility of tall ships (see Figure 2).

On the ground, we must grapple with rigorous environmental and community review processes. Everyone from the Federal Aviation Administration (FAA) to the National Oceanic & Atmospheric Administration can play a role in the development of an airspace project.

Although many of the surfaces we model are in the air, the design principles are the same as they are for creating land-based assets. A surface is a surface whether it's below-grade, above-grade, or at-grade.