

Space-Saving Drainage

By Philip W. Kresge

Pervious concrete helps a retail outlet design team achieve economic and environmental balance



With growing concern over the depletion of our nation's most precious resource, drinking water, and the ever-increasing regulatory control of storm water management, the challenge for designers is to meet shifting environmental needs while also meeting the needs of the owner and the community at large.

In the Chesapeake Bay area, storm water runoff is the most significant new source of pollution and is often linked to increasing amounts of impervious surfaces such as rooftops and parking lots. It was with this concern in mind that Prime Retail, one of the largest developers of outlet centers in the country, incorporated innovative storm water management systems, including pervious concrete, when designing its 115,000-sq-ft, \$55-million expansion at Prime Outlets in Williamsburg, Va.

At a total gross leasable area of 456,922 sq ft, Prime Outlets is the region's largest outlet shopping destination, offering 120 stores. Construction elements, including the largest pervious concrete paving project in the U.S., eco-conscious storm water management, rainwater recycling irrigation and reduced water consumption, allowed the project to comply with federal requirements for "green" building and facilitated its qualifying for certification in the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

The Material

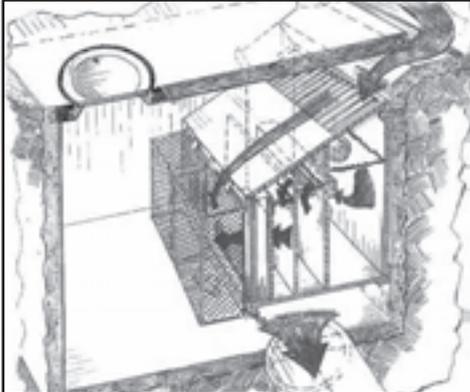
Pervious concrete pavement is a unique cement-based product; its porous structure permits free passage of water through the pavement and into the soil without



The Prime Outlets project resulted in 1 448 new pervious concrete parking spaces and 139 parking spaces converted from asphalt to pervious concrete; 2 248 converted spaces; 3 503 new spaces; 4 156 converted spaces; and 5 16 new spaces and 16 converted spaces.

STORMWATER FILTER

Curb Inlets & Catch Basins



ClearWater BMP

Filters:

- 97% TSS
- Hydrocarbons
- Metals
- Pathogens
- Trash

Benefits:

- Fits Into Existing Drainage Structures
- Stainless Steel
- Non-Scouring
- Affordable

CLEARWATER SOLUTIONS™
STORM DRAIN SPECIALISTS

1-800-758-8817

ClearWaterBMP.com

Write in 8040

AquaShield™
STORMWATER TREATMENT SOLUTIONS

Stormwater Filtration

- Hydrodynamic Separation
- Pre-assembled, modular design
- Verified results targeting TSS, TPH, nutrients and metals
- TSS removals > 80% @ 20µm



• Dependable Support • Reliable Service • Experienced Staff

Call 888-344-9044 for more information
or visit www.aquashieldinc.com/sws

Write in 8044

compromising the pavement's durability or integrity. Pervious concrete is not new. Studies show that pervious concrete was first used in the mid-1800s, and in fact, has been used widely for more than 30 years in many applications in Europe and Japan, including as a roadway surface course to reduce traffic noise and improve skid resistance.

However, pervious concrete is enjoying a new popularity—to the point that it is the hottest topic in today's sustainable development design community. Pervious concrete allows rainwater to pass through to the ground below while providing a flat, stable place on which to park the family car. This type of pavement has a void content of 15 percent to 30 percent, equating to a flow rate of 3 to 5 gal per minute per square foot, or 270 to 450 in./hour.

Pervious concrete has been recognized by the U.S. Environmental Protection Agency as a storm water pollution prevention best management practice device. When used as an infiltration alternative to the more traditional options (i.e., grassy swales and drain invert filtration systems), pervious concrete pavement can also reduce or eliminate the need for expensive sewer tie-ins and provide the inherent durability, safety and low life-cycle cost expected of concrete pavement.

From Pond to Parking

Storm water runoff was a major factor influencing the design of this expansion, and the team at Landmark Design Group, led by Stephen Romeo, recognized early on the potential to not

only address specific hydrologic concerns but also to increase the amount of rentable space for the owners.

A unique storm water management system was devised that combined storm water infiltration with water harvesting. A portion of the filtered rainwater is collected through the use of underground storm water chambers and underdrain, and it is used for irrigation of the trees, shrubs and flowers that dot the parking lot landscape.

Additionally, underground storage was designed to maximize the use of land previously dedicated to an existing detention pond. The pond was fitted with Atlantis D-Raintank modules—a system that resembles hundreds of plastic crates lashed together with plastic zip-ties—that will store and then slowly release excess water over time. This storm management system is paved with pervious concrete and can be used as an auxiliary parking lot with spaces for up to 448 vehicles.

Through this design, the project team found a balance between two forces frequently at odds with one another: economic development and environmental protection. "Finding and investing in such a green compromise," said Virginia Sen. Thomas K. Norment, "is not always a characteristic you see in the development community." Speaking at the first annual Green Pavement Day, which was hosted at the Williamsburg site by the Virginia Ready Mixed Concrete Association (VRMCA), Norment joined other state and local officials in congratulating Prime Retail and Landmark Design Group for their progressive thinking.

Native vegetation is the sustainable solution to stormwater management.

EC09
Booth
#336

Envirolok™

(Patent Pending)

Before

After

Envirolok Systems make it simple to integrate native vegetation into your stormwater engineering plans

Benefits include:

- Ideal for sensitive watersheds
- Native plants improve water quality
- Encapsulated soil prevents the spread of sediment
- Creates habitat; safe for amphibious species

Components include:

- Envirolok bags
- Engineered sand/soil mixes
- Envirolok native seed mixes for hydroseeding
- Spikes
- Bag stabilizer
- Bag filling equipment

Envirolok systems:

- Become stronger over time
- When constructed to manufacturer's specifications, the wall becomes a solid, monolithic structure
- Adaptable solution for establishing local eco-type vegetation
- Envirolok distributors in the Continental United States and Canada (distributorships available)

www.agrecol.com

- Specifications
- Construction diagrams
- Engineered drawings
- Photos and case studies

Agrecol®
Agricultural Ecological Solutions

Agrecol® Corporation
2918 Agriculture Drive
Madison, Wisconsin 53718
Telephone 608.223.3571
Fax 608.223.3575
ecosolutions@agrecol.com
www.agrecol.com

AGRECOL HAS ALWAYS BEEN "Green"

Write in 8033

Project Details

The project included approximately 7.5 acres of pervious concrete pavement. The general contractor was Henderson Inc., Williamsburg, and the pervious concrete was placed by Magruder Construction, Sanford, Fla., a certified pervious concrete contractor of the National Ready Mixed Concrete Association (NRMCA). Concrete was supplied by Titan Virginia Ready Mix.

The design team at Prime Outlets and Landmark Design Group relied heavily on the ready-mixed concrete industry for design support and to present its case to the James City County Planning Commission for approval. NRMCA worked closely with VRMCA's director of industry services, Keith Beazley, to provide support and technical assistance, which aided in the commission's ultimate acceptance of the pervious concrete technology.

Additionally, approximately 3.5 acres of conventional concrete pavement was utilized in the driving lanes. The combination of conventional and pervious concrete pavements allowed for a more uniform subgrade preparation in the main parking areas.

It also allowed all the area beneath the more than 11 acres of pavement to be used for storm water detention, eliminating the need for a dedicated area above ground for a traditional detention pond. This allowed the developer to add more than 40 percent more retail rental space. Furthermore, Prime Retail can expect up to 45 percent savings in total ownership costs

over the 20-year design period by using low-maintenance concrete for the paving elements.

A member of the upper-level management of Prime Retail stated that using pervious concrete was a "no-brainer" choice, referring to the material's economic benefit and environmental friendliness. **[SWS]**

Philip W. Kresge is senior director, national resources, for the National Ready Mixed Concrete Association. Kresge can be reached at 610.966.7220 or by e-mail at pkresge@nrmca.org.

For more information, write in 5005 on this issue's Reader Service Card.

WEBresources >>>

Related search terms from
www.waterinfolink.com:

pervious, porous, concrete, pavement

.....
For more information related to this article; visit
www.estormwater.com/lm.cfm/st010904

When you need to control stormwater...



...it's what's underneath that counts.
CULTEC Stormwater Systems

- Store Large Volumes in a Smaller Area
- Allow for More Controlled Infiltration into the Ground
- Unique In-line Manifold Provides Design Flexibility
- No Separate End Plates
- Quick and Easy, Patented Overlapping Rib-Lock Connection
- Limited 10-Year Warranty
- Largest Variety of Sizes Available (8.5" - 34" high)
- Single or Multi-Level Systems

Ask about our gravel-less septic leachfield capabilities!



1-800-4-CULTEC
www.cultec.com

Write in 8031