PRESTO | GEOSYSTEMS®

STORMWATER & WASTEWATER

GEOWEB®
3D Soil Stabilization

GEOPAVE®
Gravel Pavers

GEOBLOCK®
Grass Pavers

Design + Construction
Resource Package

PRESTO | GEOSYSTEMS®

3D Soil Stabilization & Porous Pavements

Resources

What You Will Find

GEOWEB 3D Soil Stabilization System Key Applications:

- Porous Pavements
- Stormwater Channels
- Basin Containment
- Spillway & Overflow Protection

GEOBLOCK & GEOPAVE Rigid Paver Key Applications:

- GEOBLOCK Grass Pavers
- GEOPAVE Gravel Pavers

GEOWEB System Resources

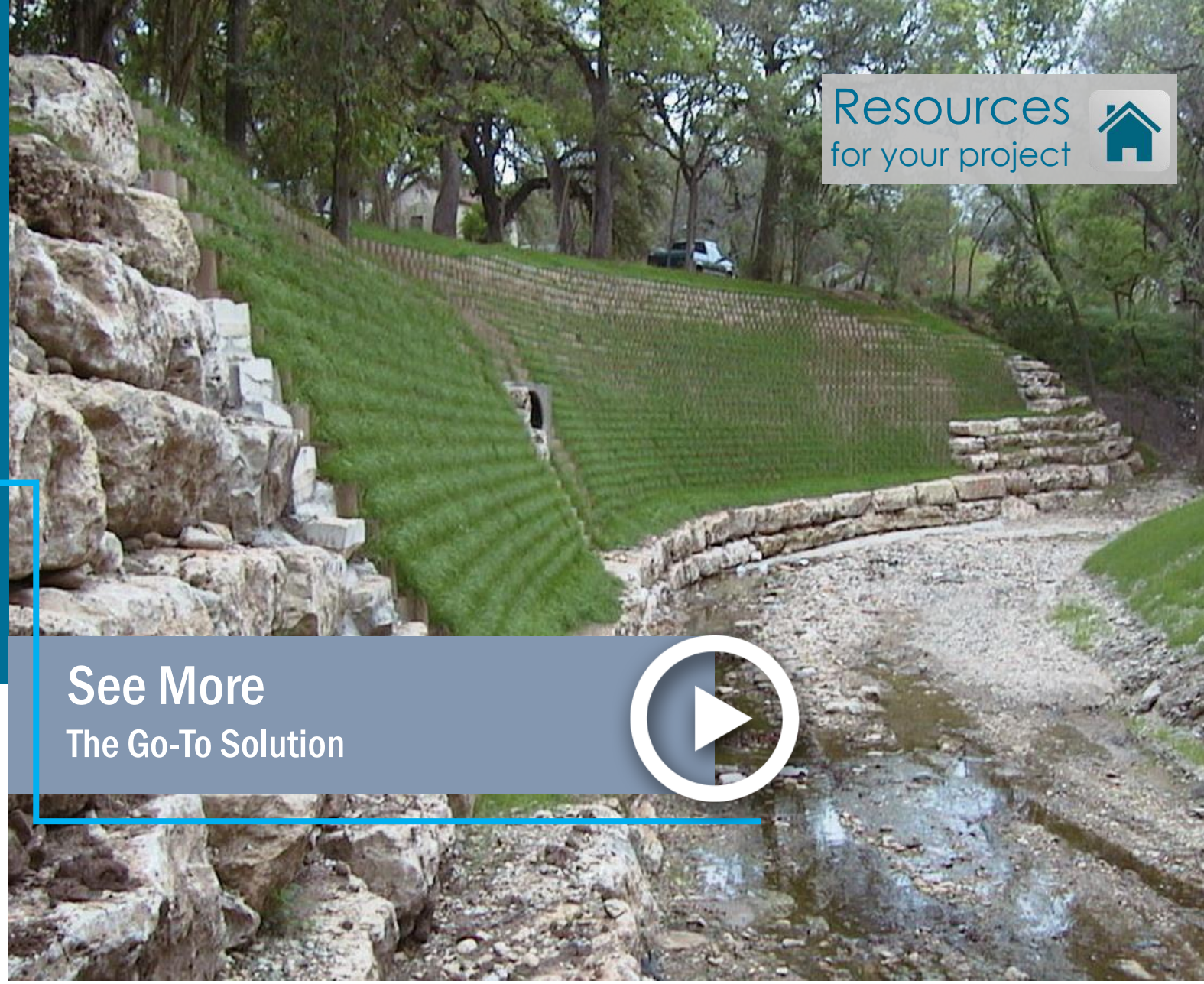
GEOBLOCK & GEOPAVE System Resources

PRESTO | GEOSYSTEMS®

BETTER SOLUTIONS TO MANAGE & CONTROL

Stormwater & Wastewater

This resource package offers tools & resources to design high-performing, long-lasting infrastructure—porous pavements, basin containment, stormwater channels, spillways/overflow protection and liner protection.



PRESTO | GEOSYSTEMS®

GEOWEB®

3D Soil Confinement

Stormwater & Wastewater Key Applications

Take the Tour.

See how 3D soil confinement addresses the most challenging soil stability issues in stormwater and wastewater applications.

Porous Pavements (p. 5-7)

Stormwater Channels (p. 8-18)

Basin Containment (p. 19-20)

Spillway & Overflow Protection (p. 21-22)

PRESTO GEOSYSTEMS®

GEOWEB®

POROUS PAVEMENTS

Resources for your project

Strengthen & Transform Fill

With the 3D GEOWEB® porous pavement system, fill materials are confined and stable—even under the heaviest loading.

Ideal for emergency, utility and site access roads, and permeable parking areas.

- The 3D cellular structure is a low-cost solution for creating permeable aggregate roads and pavements.
- Fire lanes & occasional use traffic areas can be built with topsoil/aggregate ‘engineered infill’ for load-supporting grass pavements.

BENEFITS

Delivered by the 3D GEOWEB® System

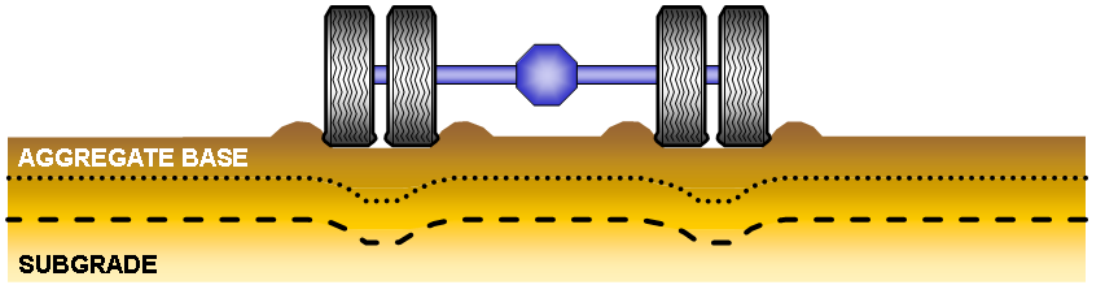
Resources for your project

Porous Pavements

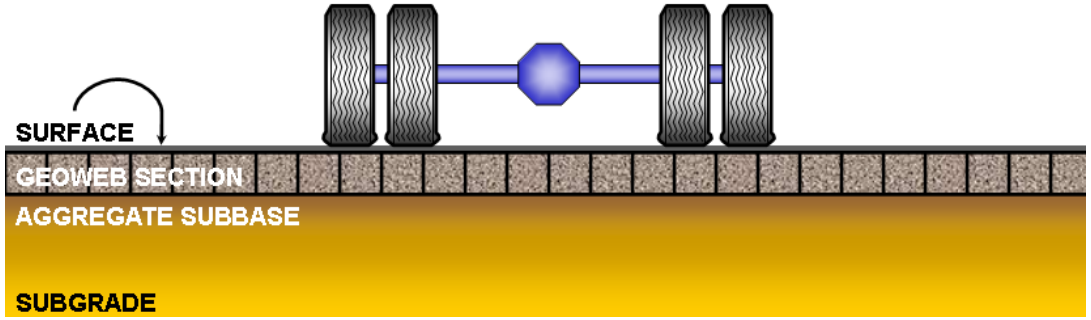
GEOWEB 3D Confinement

- Allows for use of low-quality aggregate [low friction angle (<28°)].
- Reduction of aggregate cross-section (up to 70%).
- Controls lateral and vertical infill movement which prevents shearing.
- Creates a stiff base with high flexural strength.
- Aggregate or vegetation infill options.

Unconfined Infill = aggregate movement, loss of strength



Confined Infill = infill strength, maintenance reduction



[See how GEOWEB Porous Pavements Work >>]

CASE STUDY

Gravel Porous Pavement System

Resources
for your project

Porous Parking Lot

Legion Park, Blair County, PA

The Legion Park parking lot often had problems with water ponding after rain events. The temporary fix was to periodically place stone to fill the low spots, but parking traffic had compacted the underlying soils and stone to the extent that would allow for minimal infiltration.

The Blair County Conservation District recognized this problem and suggested the GEOWEB® 3D Soil Stabilization System be installed to help with stormwater storage and infiltration.

The total improved parking area measured approximately 16,300 sf. A few heavy thunderstorms proved that the stormwater storage capacity was enough to handle significant sized storms. The load support capabilities of the GEOWEB structure supported the weight of vehicles and greatly reduced the compaction of the underlying stone and soils.

See Project Success >>

Parking lot, prior to GEOWEB System install, had developed ponding and runoff issues.

Finished Project: the GEOWEB with aggregate infill promotes runoff infiltration & storage.

PRESTO | GEOSYSTEMS®

Stormwater Channels BENEFITS

Resources for your project

Stormwater Conveyance

GEOWEB System Single-Layer Protection

Designed for intermittent low- or high-flow channels.

Open channel designs with the GEOWEB® 3D system offer a more economical solution compared to rip-rap, gabions or reinforced concrete—systems that are expensive and hard to place and maintain.

Trapezoidal or parabolic channels with wide or deep channel bottoms can be designed for high volumes with the GEOWEB® 3D system.

The system can be used on the channel side slopes or throughout the entire channel cross-section.

More Economical Solution

BENEFITS

Delivered by the 3D GEOWEB® System

Resources for your project

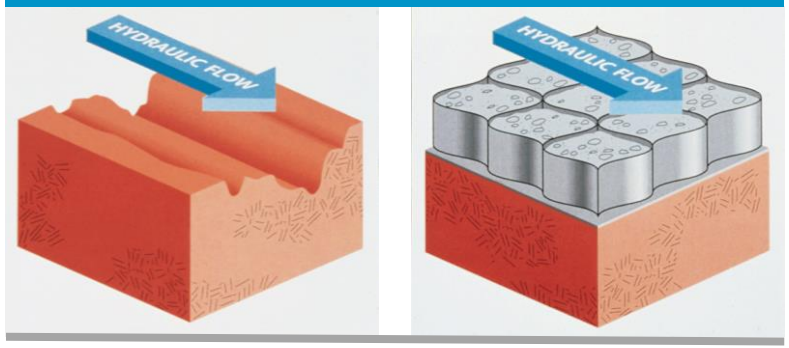
Embankment Stabilization & Stormwater Control

Improves hydraulic performance of conventional protection materials through confinement.

GEOWEB channels can be designed in a multitude of configurations to allow for varying bottom width, side-slope length and angle, bed slope, and expected volume & velocity.

- **VEGETATED INFILL:** Promotes infiltration and reduces stormwater runoff.
- **AGGREGATE INFILL:** Allows use of smaller, less expensive rock.
- **CONCRETE INFILL:** No other formwork or reinforcement is required. Flexes with subgrade deformation, minimizing cracking.
- **MULTILAYER PROTECTION:** Creates a natural living green wall. With concrete or grout infill (outer cells only), provides greater resistance to highest flows and shear stresses.

How 3D GEOWEB Confinement Works



INFILL OPTIONS: Vegetated, Aggregate, Concrete

VEGETATED CHANNELS

Resources
for your project

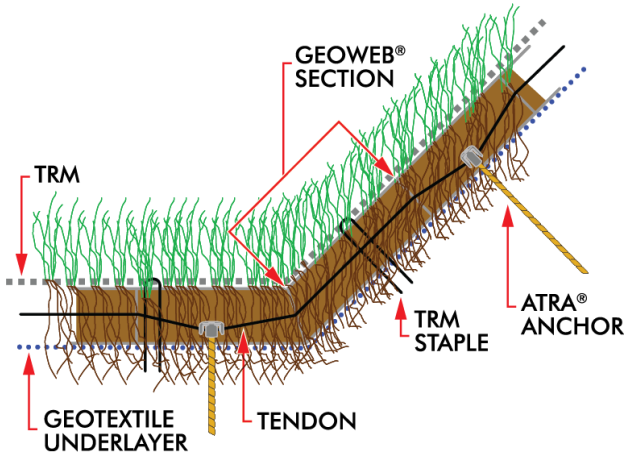
Intermittent Low- or High-Flow Channels

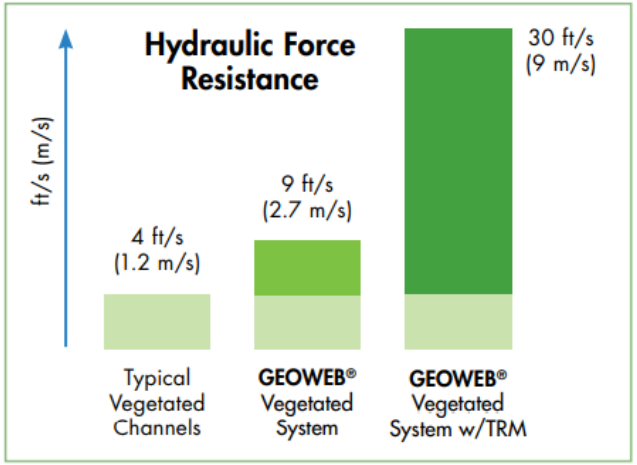
Green-Engineered Channel Lining System

GEOWEB Vegetated Channels offer protection in continuous low-flow channels, as well as high-flow intermittent channels, allowing lower-maintenance, aesthetically pleasing vegetation in place of rip-rap.

The 3D cellular network creates check-dams that protect the upper soil layer from hydrological erosive forces and resulting erosion that impacts unconfined soils.

- Root systems “lock in” to the cell wall perforations to support vegetation in intermittent channels. GEOWEB protection can offer substantially greater resistance to erosion and washouts when compared to unprotected drainage channels.
- When combined with an overlying Turf Reinforcement Mat (TRM) for vegetated channels, the GEOWEB/TRM system can withstand velocities up to 30 ft/sec.
- The GEOWEB channel system doubles performance resistance to shear stress and velocity for TRMs and Erosion Control Blankets (ECBs).





View Colorado State University Test Results >>

CASE STUDY

Shoreline Stabilization System

Stormwater Canal Erosion Prevention & Stormwater Mitigation Plan

City of Opa-locka, FL

The City of Opa-locka had experienced significant flooding throughout much of its 4.2 square miles for many years.

In 2002, a hurricane that struck Florida wiped out most of the Opa-locka canal at the water line, resulting in steep 2-foot drop-offs in places. This presented a serious danger to residents who fish along the canal's banks.

A decision had to be made regarding which of many solutions would be best suited for stabilization of the canal.

The GEOWEB system was chosen based on the velocities of the canal and the overall aesthetic the city wanted to achieve. They wanted to create a park-like setting where area residents could access the water without the fear of hidden alligators.

The GEOWEB system solved that problem.
Approximately 500,000 sf of GEOWEB was installed.

See More
on Case Study >>

AGGREGATE CHANNELS

Resources
for your project

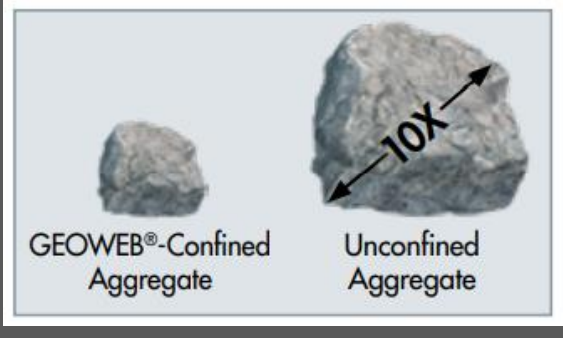
Low to Moderate Flow Channels

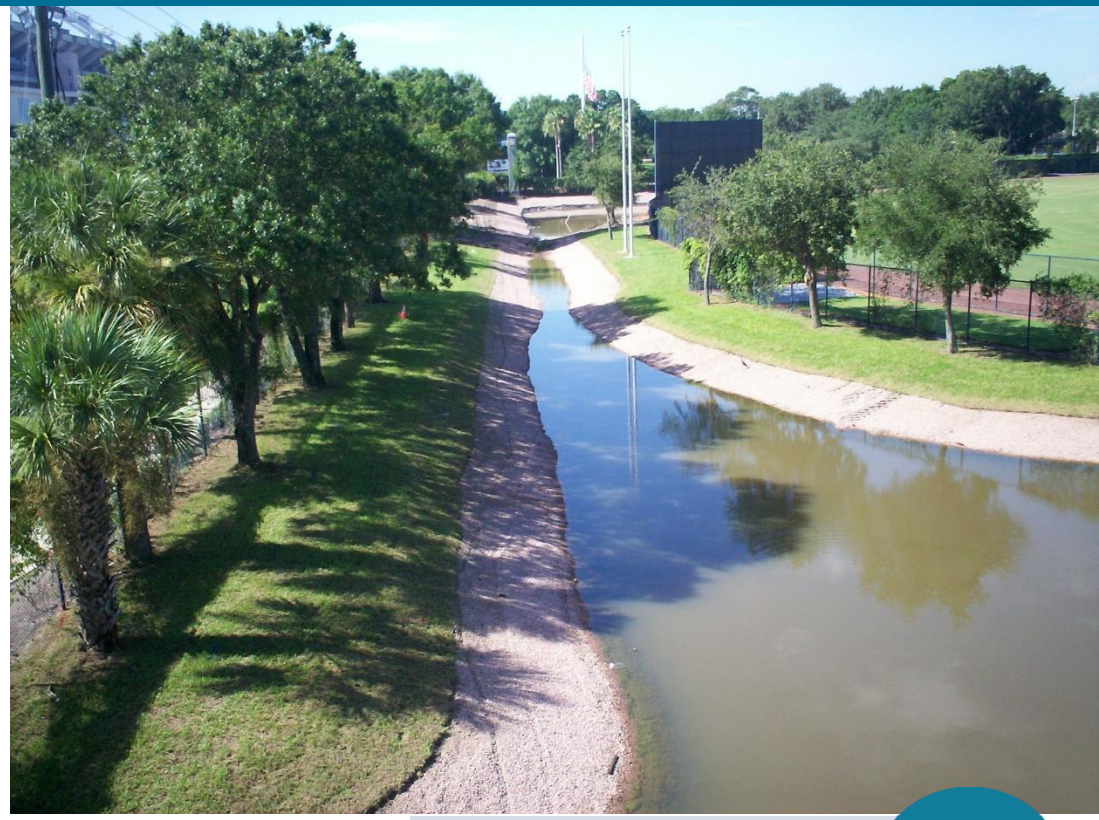
Use Locally-Available Rock & Waste Rock

GEOWEB Aggregate Channels are designed for low-to-moderate flow conditions. Aggregate confined in the GEOWEB 3D structure is far more stable than when unconfined.

As a result, smaller, less expensive aggregate can be used instead of large, difficult-to-place rip-rap. GEOWEB confinement reduces the rock size up to 10 times while still delivering the same protection.

Performance backed by Colorado State University Testing. Presto incorporates research-based thresholds into their design modeling and evaluation tools.





View Colorado State University Test Results >>

CASE STUDY

Shoreline Stabilization System

Resources
for your project

Repair Stormwater Detention Ponds of Severe Erosion

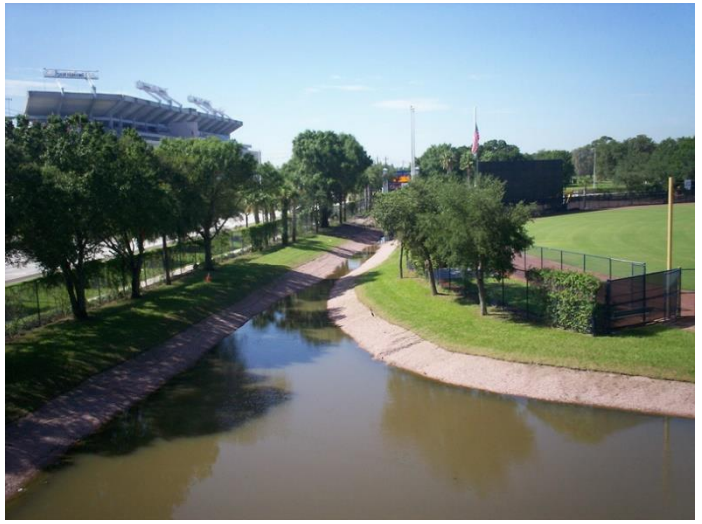
Legends Field Yankee Stadium, Tampa, FL

Tampa's Legends Field was experiencing severe erosion at the stormwater detention ponds throughout the facility. The ponds are not only used for stormwater containment, but are also designed as native wildlife ponds sponsored by Busch Gardens.

The ponds began to experience a type of slope erosion where the constant daily wave chop generated from wind eats away at the sandy soils from which they are constructed. Erosion of these slopes can be accelerated when drought conditions lower water levels below the vegetation that help to stabilize soil.

The four-inch thick perforated GEOWEB Soil Stabilization System was chosen to provide erosion protection for this 50,000 sf project.

Red rock infill was chosen to match warning tracks on field.



See More
on Case Study >>

CONCRETE CHANNELS

Resources
for your project

Hard-Armored Protection for High Flows

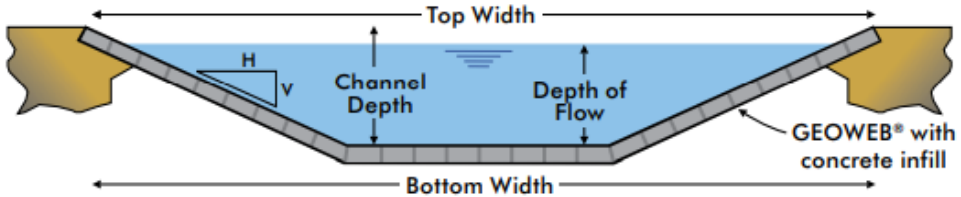
Flexible Solution for High Hydraulic Stresses

When filled with concrete, the system becomes a flexible slab that conforms to minor subgrade movement and is more economical than pre-formed concrete systems or Articulated Concrete Blocks (ACBs). GEOWEB concrete channels are proven to withstand sustained flow velocities in excess of 36 ft/s and shear stresses of 20.9 psf.

The cellular confinement technology creates a flexible mat of concrete reinforced by the GEOWEB interconnected high density polyethylene structure.

Benefits Compared to Rip-Rap or Gabions:

- Flexible Form for Concrete
- Conforms to Site Grades
- Made from Non-Corrosive Materials
- Keeps Strength, Accommodates Settlement
- No Heavy Equipment Required



View Colorado State University Test Results >>

CASE STUDY

Concrete Channel Lining

Stormwater Containment

Ontario, Canada

In 1986, the A.G. Simpson Inc. plant required a concrete-lined channel for stormwater containment and runoff. The original design called for a formed 152.4 mm (6”) deep reinforced concrete liner on the 1,000-foot-long section of channel. As a cost saving measure, concrete filled 4” GEOWEB was used instead. The side slopes were 1:1 to 3:1 and peak flow velocities were projected to be 11-12 feet per second.

The installation began with placement of a nonwoven geotextile down the channel side slopes and across the bottom. The geotextile was then toed in 12” along the top of the channel slope. GEOWEB sections were placed over the geotextile and the top row of cells were staked with 15” long steel pins at approximately 3’ on center to secure each section prior to filling with concrete.

A 4,000 psi concrete was poured into the upper cells and the overfill was raked into the lower cells. Designated cells in the bottom of the channel were filled with clear stone, instead of concrete, to provide drainage for groundwater collected by the underlying geotextile. The concrete liner was finished with a rough raked surface.

The 30,000-square-foot by 4-inch depth concrete pour was completed in two days with a four-man crew. **Total time, from start to completion, was eight days for the 1,000-foot channel liner; half the projected time and cost of a traditional formed and poured concrete channel liner.**

See More
on Case Study >>

Finished in half the time and cost of a traditional formed and poured concrete channel liner.

MULTI-LAYER PROTECTION

Resources
for your project

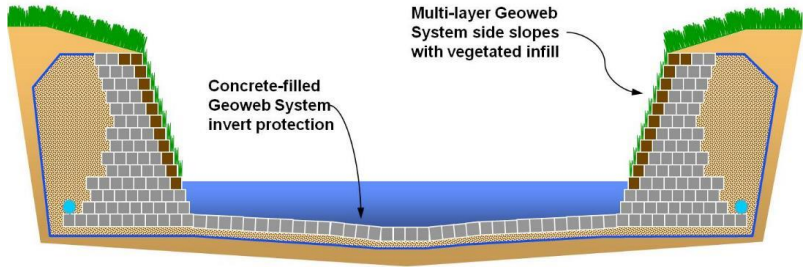
Embankment Stabilization & Stormwater Control

Natural Alternative to Wire-Framed Gabion Baskets

GEOWEB Multi-Layered Channels can withstand high flows for short durations, allowing naturally vegetated channels to be designed in place of hard armoring (gabions or concrete). GEOWEB multilayered channels tolerate reasonable differential settlement without loss of integrity, so they perform well in soft-soil environments.

- Green and tan fascia panel options allow natural blending with the environment.
- Under extreme flows, the system, with wrapped-coir fabric face, offers higher resistance and reduces potential for soil loss.
- With concrete or grout infill (outer cells only), provides greater resistance to highest flows and shear stresses.

Ideal Applications: Drainage ditches, stormwater channels



APPLICATION OVERVIEW

Resources for your project

Multi-Layer Protection

Drainage Ditches & Flood Control Channels

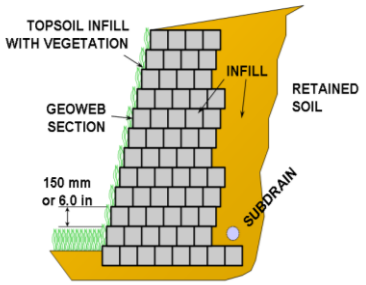
- **Aesthetics:** Creates a natural living green wall. Allows select, local vegetation.
- **Infill Materials:** Backfill and infill materials can be sourced locally. Allows smaller, less expensive rock in back cells and reinforced zone.
- **Design Flexibility:** Highly adaptable to varying infill types, landscape contours, curves and obstructions.
- **Handling/Equipment/Placement:** No heavy equipment required. Lightweight sections easy to transport, deploy and install, even in difficult-to-access locations.

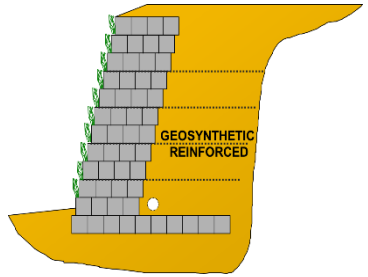
Natural Aesthetics

Hard-Armoring with Natural Aesthetics

Wall Options:

- Gravity
- Reinforced





CASE STUDY

Canal Shoreline Stabilization

Resources
for your project

Erosion Protection for Stormwater Canal Embankments

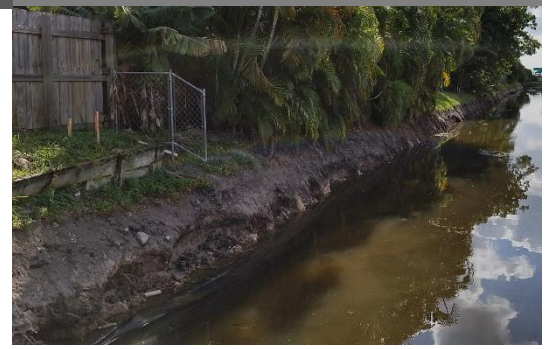
South Florida is notorious for storms and hurricanes that dump large amounts of water on communities over short periods of time. These storm events cause fast rise and fall of water levels in storm water canals causing topsoil loss and severe erosion issues on the canal embankments. Soil had sloughed off along the water's edge, impeding flow and decreasing capacity within the canals. The town of Miami Lakes contacted ADA Engineering Inc. for a solution.

After evaluating flow rates, ADA Engineering designed a solution to protect the embankments from future storm damage with the GEOWEB Channel Protection System. **The versatile GEOWEB geocell confinement system was chosen due to its ease of installation and ability to be filled with different materials in a stacked wall configuration on the embankments.**

The GEOWEB system's flexible nature allowed to conform to the many curves and turns in the channels. The GEOWEB wall sections below the water line were filled with rock. Soil and vegetation were installed above the water line to allow for natural aesthetics. Green wall fascia panels were chosen for aesthetic appeal and blending with the surrounding vegetation.

Over 12,000 face sf of the GEOWEB channel protection system was installed.

Before Repair



Installation

See More
on Case Study >>

BASIN CONTAINMENT

Resources
for your project

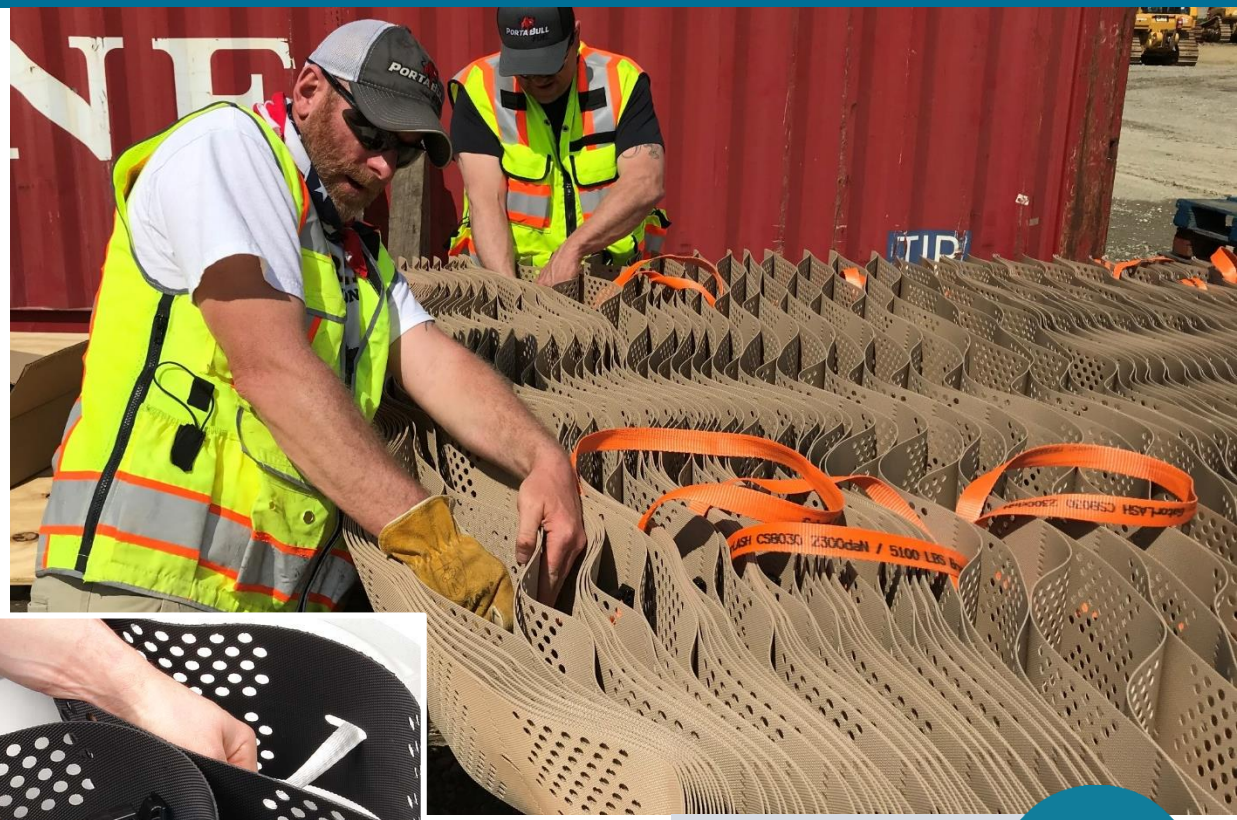
Stormwater Storage & Wastewater Containment

Protection of Geomembranes

Impervious liners that prevent leakage or infiltration of contaminants in stormwater and wastewater ponds, effluent storage ponds, and evaporation ponds are protected from damage for decades with the GEOWEB® system.

Compatible with all geomembrane types, the versatile GEOWEB system accommodates differential settlement and may be designed with several infill options including vegetation, aggregate or concrete for ‘flexible’ hard-armor protection.

The GEOWEB system offers a complete solution for liner protection with high strength tendons and **ATRA® load transfer clips**—creating a suspended protective cover over the geomembrane that prevents accidental puncture and protects against natural degradation.



Visit Website>>

APPLICATION OVERVIEW

Resources
for your project

Stormwater Storage & Wastewater Lagoons

Basin Containment Benefits

- Vegetated, aggregate or concrete pond slope protection alternatives are tailored to meet the specific challenges related to containment.
- Concrete or aggregate infilled systems are suspended over the liner with a complete load transfer solution. High-strength tendons and ATRA tendon load transfer clips protect the liner without compromising its integrity.
- Concrete systems conform well to the subgrade soils, accommodating significant differential settlement. This is accomplished through the system's inherent high FLEXIBILITY.
- The GEOWEB solution reduces the cross-section 50% or more compared to reinforced concrete.
- Accommodates construction equipment traffic during sediment removal operations.
- Quick to deploy, occupies a small footprint in delivery and storage, and conforms to a variety of ground surface conditions.

View Case Studies >>

SPILLWAY & OVERFLOW PROTECTION

Resources
for your project

Reinforcement Solutions

Embankment Stabilization & Stormwater Control

GEOWEB spillways direct water from embankments and dams in controlled areas and can be designed to resist hydraulic conditions with appropriate infill. The system delivers excellent resistance to sheet flow runoff, scour, and erosion with a vegetated or hard-armored surface.

Naturally Vegetated Spillways

Intermittent spillways benefit from GEOWEB 3D confinement. The topsoil layer confined in the 3D structure is highly resistant to washout and rill and gully formation, allowing for vegetation in place of higher cost rip-rap. With an ECB or TRM overlayment, GEOWEB vegetated spillways withstand flows up to 30 ft/sec.

APPLICATION OVERVIEW

Resources
for your project

Efficient & Erosion-Resistant Water Conveyance

Hard-Armored Protection

Higher velocity and shear stress spillways benefit from the GEOWEB system's poured-in-place concrete. Because of the system's inherent flexibility, it conforms well to landscape contours--preventing large cracks from forming that result from soil movement and settlement.

GEOWEB® 3D Benefits with Concrete Infill:

- No additional formwork or reinforcement is required, so installation is fast and efficient, even in areas with difficult site access.
- Assures a consistent-depth and thinner cross-section of concrete.
- Allows for integrated components for controlling water flow, such as energy dissipaters and overflows.

PRESTO | GEOSYSTEMS®

GEOPAVE® & GEOBLOCK®

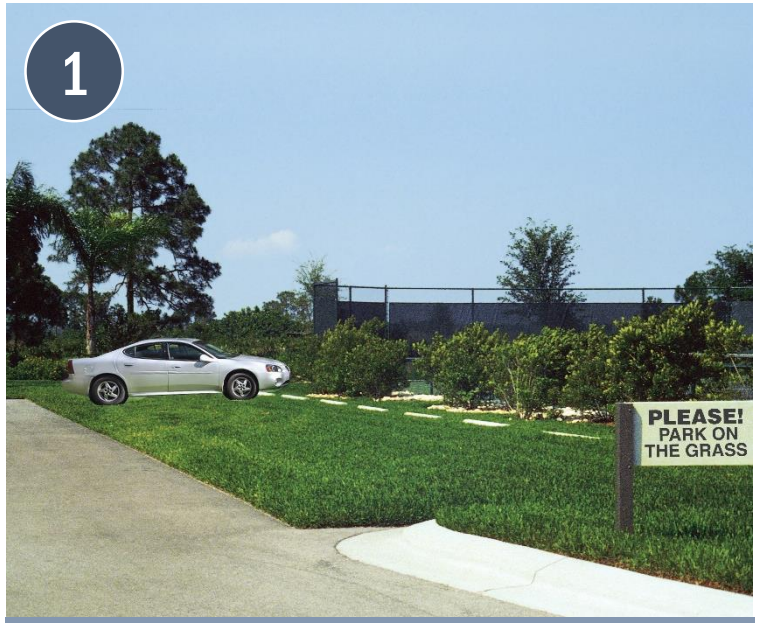
Gravel & Grass Pavers

Stormwater

Key Applications

Take the Tour.

See how these rigid porous paving solutions meet your aesthetic & stormwater needs.



Grass Porous Pavements (p.25-27)

Gravel Porous Pavements (p. 28-30)

Resources
for your project

PRESTO | GEOSYSTEMS®

Surface Infiltration BENEFITS

Rigid Pavers Deliver Performance

GEOBLOCK® Grass & GEOPAVE® Gravel Systems

Environmental regulations that control and limit stormwater runoff, reduce impervious surface, and increase green space have resulted in the growth of permeable pavements for traffic areas. Presto manufactures two high-quality rigid pavers that offer numerous environmental and performance benefits over hard surface pavements.

POROUS PAVEMENT OPTIONS:

The GEOBLOCK® and GEOPAVE® systems are both rigid porous pavements designed to handle the most demanding load support requirements while promoting natural stormwater infiltration, reducing runoff, and reducing the need for detention or retention ponds.

GEOBLOCK® Grass Pavers

Resources
for your project

Natural Aesthetics for Occasional Use Traffic

Grass Paving Provides Drive-On Turf

Create drivable grassed pavements for occasional traffic loading and protect the grass from loading stresses with GEOBLOCK® high-strength turf pavers.

Because of their rigid design and exceptional load-spreading capability, GEOBLOCK® porous pavements support heavy traffic loads (up to H/HS25 loading) with minimal base.

With topsoil infill and an engineered base, the system offers high stormwater infiltration rates and is an excellent growing medium—allowing grass to grow faster and stay healthier than in other systems.

View GEOBLOCK Pavers Website >>

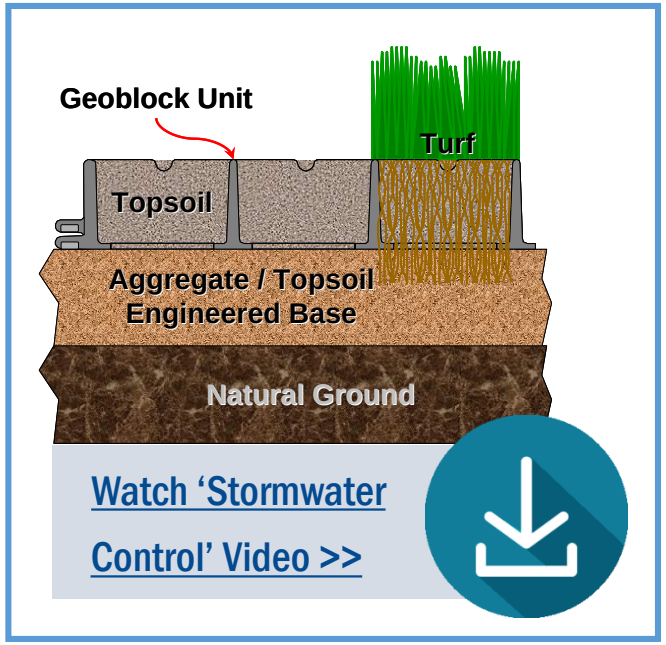
BENEFITS

Resources for your project

Surface Infiltration

Structured Grassed Areas Supporting HS25 Loads

- Protects turf in “occasional” traffic areas up to H/HS25 loading
- Offers aesthetics of green space
- Promotes stormwater infiltration:
  - Reduces runoff, improves stormwater quality
  - Can reduce stormwater management fees and need for stormwater containment facilities (ponds)
  - Contributes to green building credits in several categories
- Recycled HDPE
- Accommodates Curves



APPLICATIONS

GEOBLOCK® System

Resources for your project

For Occasional Traffic & Stormwater Management



Green Parking Areas & Shoulders


Driveways


Emergency/Maintenance Access

[See Project Photos, Videos, Case Studies >>]

GEOPAVE® Gravel Pavers

Resources
for your project

Aggregate Pavers for Everyday Traffic

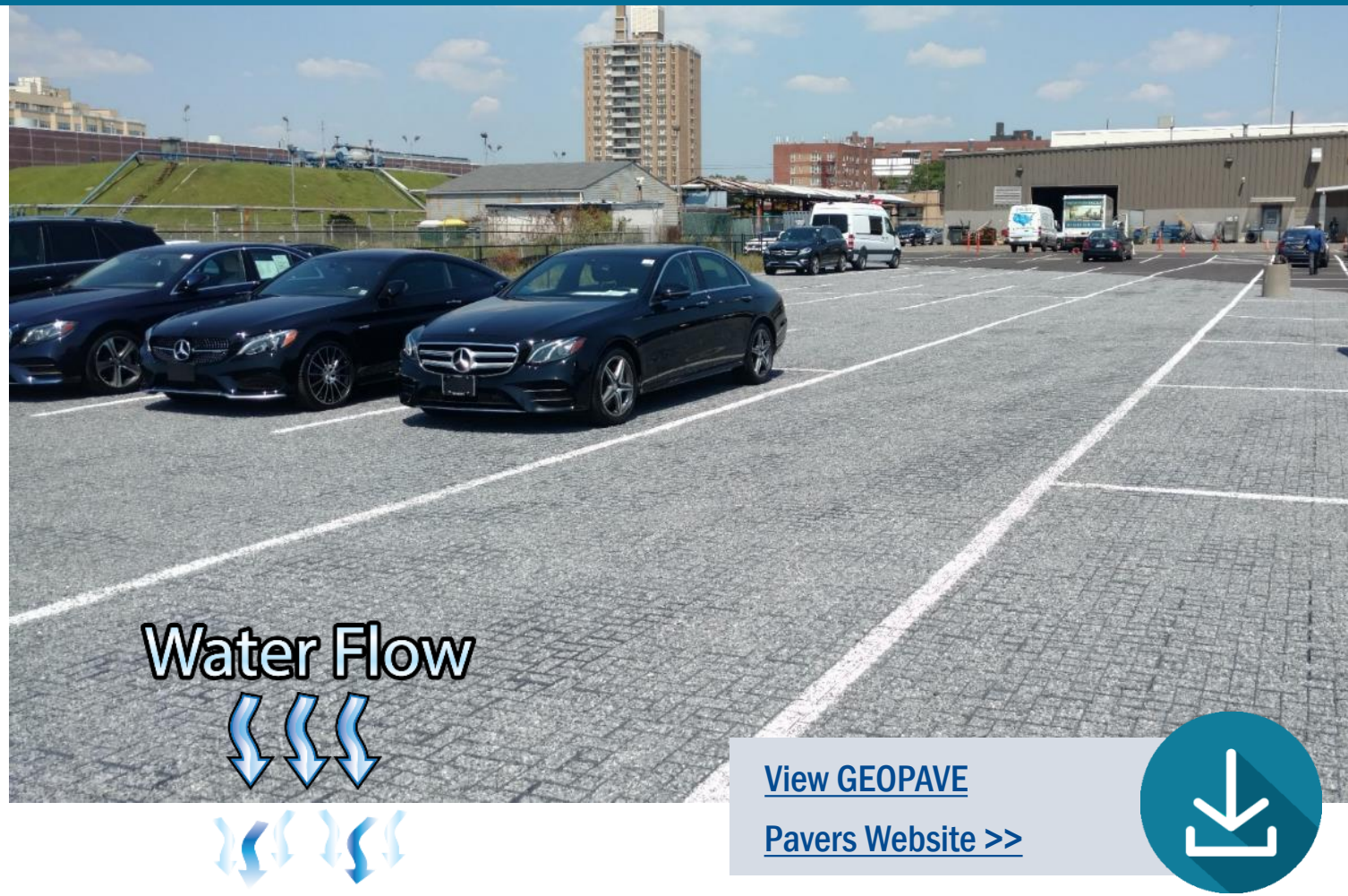
Delivers Infiltration & Storage

Control stormwater infiltration, manage runoff and create storage with porous pavements designed for everyday traffic.

With highly permeable open-graded aggregate infill, GEOPAVE pavers promote a high rate of percolation, limit runoff and perform as a natural on-site retention system.

Herringbone cells and integrated mesh bottom keeps aggregate in place even under heavy traffic use.

Marking parking spaces and other delineation areas is a SNAP with GEOPAVE SNAP delineators.



[View GEOPAVE Pavers Website >>]

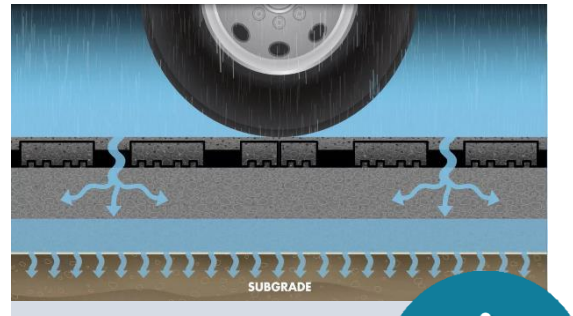
BENEFITS

Resources
for your project

Surface Infiltration

Meet Stormwater Regulations & Green Initiatives

- Economical and highly permeable aggregate pavements with visual appeal
- No traffic frequency restrictions
- Recycled HDPE
- Stormwater infiltration and in-system water storage:
  - Reduces runoff, improves stormwater quality
  - Can reduce stormwater management fees & need for stormwater containment facilities (ponds)
  - Contributes to green building credits in several categories.



Watch 'Stormwater Control' Video >>

APPLICATIONS

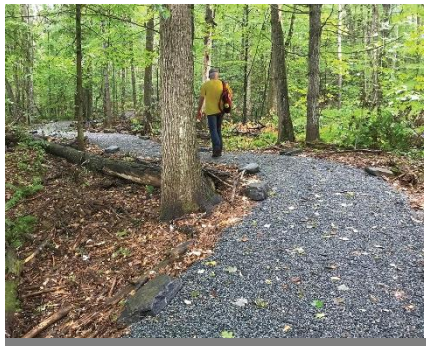
GEOPAVE® System

Resources for your project

For Everyday Traffic & Stormwater Management

Utility/Emergency & Maintenance Access

Road Shoulders



Trails/Pathways

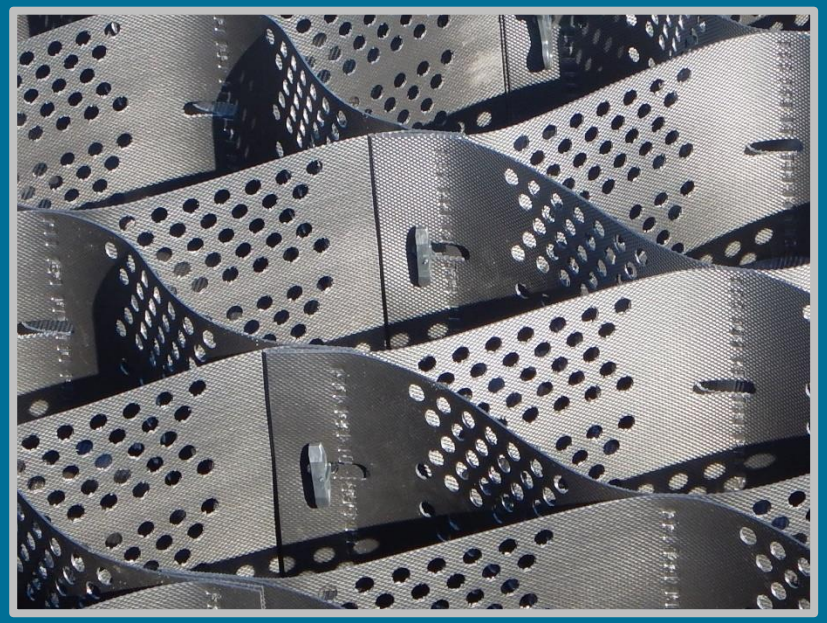
Parking Lots & Driveways

[See Project Photos, Videos, Case Studies >>]

PRESTO | GEOSYSTEMS®

GEOWEB

RESOURCES



PRESTO | GEOSYSTEMS®

Let Our Knowledge Work for You

Resources for your project

40+ Years Experience

Put Our Experience to Work on Your Project

The GEOWEB® system is the original and most advanced geocell on the market.

We continue advancing the technology through research and development to make better solutions that benefit your project.

Let our knowledge and experience help you solve your soil stabilization problems.

LEARN MORE

PRESTO | GEOSYSTEMS®

Industry Leader in Solutions

Resources for your project

Fast & Easy Design & Specification Tools

Our proven solutions are designed to handle unique challenges, lower overall project cost, and reduce construction time with minimal environmental impact. Our products are backed by stringent research and internationally recognized testing, and quality processes, ensuring high-performing and long-lasting solutions.

Request Free Project Evaluation >>

SPECMaker® Tool: Create a Custom CSI Spec in Minutes

GEOWEB® Specification Summary: Download the Specification Summary

Industry Specifications: ARCAT | CADDetails

PRESTO | GEOSYSTEMS®

Your Project is Important. See How We Can Help.

Resources
for your project

THE PRESTO ADVANTAGE

See how our advanced, adaptable geocells, porous pavers and mats put your project on track for success, and keeps your projects on time and on budget.

WATCH THE VIDEO

PRESTO | GEOSYSTEMS®

GEOPAVE & GEOBLOCK

RESOURCES

Resources
for your project

PRESTO | GEOSYSTEMS®

Resources for your project

Create a Specification

Fast & Easy Specification Tools

Create your own custom specification or use industry-standard specifications from ARCAT.com and CADdetails.com

SPECMaker® Tool:

Create a Custom CSI Spec in Minutes

CSI Specifications (Word doc)

GEOPAVE | GEOBLOCK | GEOBLOCK 5150

Specification Summary

GEOPAVE | GEOBLOCK | GEOBLOCK 5150

Industry Specifications

ARCAT | CADDetails

PRESTO | GEOSYSTEMS®

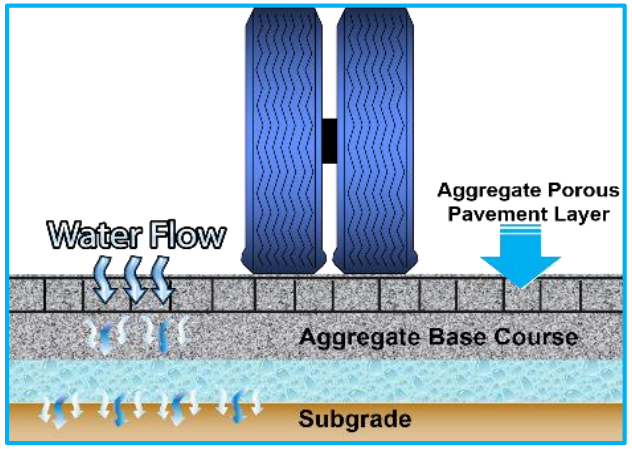
Resources for your project

Evaluate Pavement Scenarios

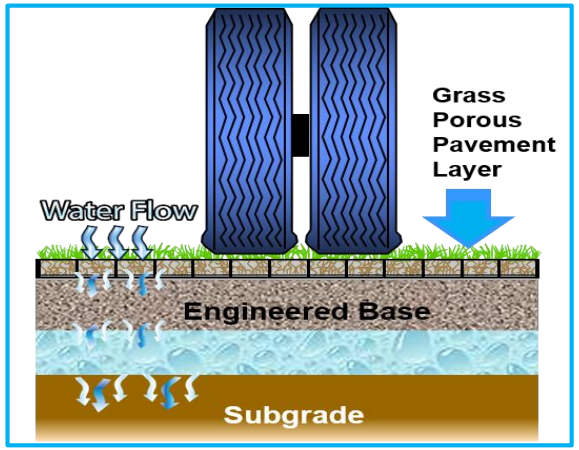
Interactive Porous Pavement Design Assistant

Evaluate best pavement options for site conditions and expected use.

Easy input parameters and quick cross-section details for your project.



Download Interactive GEOPAVE Tool >>



Download Interactive GEOBLOCK Tool >>

PRESTO | GEOSYSTEMS®

See Rigid Paver Products in Action

Resources for your project

[Download GEOBLOCK Design Resources Package]

[Download GEOPAVE Design Resources Package]

[Download GEOBLOCK Construction Package]

[Download GEOPAVE Construction Package]

Watch the WEBCAST Stormwater Infrastructure >>

Local Support
Get an Estimate

Our global network of distributors and representatives will work with you to provide a price estimate.

[Find Local Distributor/Rep >>]

PRESTO | GEOSYSTEMS®

Design with Certainty.

Get answers to your questions and help with your design. Our solution will be tailored for your unique project and site challenges. You can rely on our experience, tools & resources to help you create a quality design package.

Certainty and Peace of Mind—from project start to finish.

Contact Us 1-800-548-3424 | www.prestogeo.com