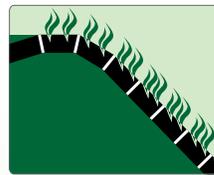


**PRESTO**



# **GEOWEB<sup>®</sup>** slope & shoreline protection

OVERVIEW

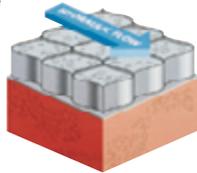


# THE GEOWEB® SYSTEM

The Presto GEOWEB® slope and shoreline protection system is an effective and economical solution to challenging slope-surface stability problems. GEOWEB® slope protection systems meet a wide range of performance and aesthetic requirements with select infill.

## GEOWEB® System Benefits

- The 3D cellular confinement structure confines selected infill material, minimizing the movement and migration of embankment materials by functioning as anchored containers in the upper soil layer.
- The system delivers excellent resistance to sheet flow—preventing severe erosion and controlling rill and gully formation, especially in areas of concentrated flow and over erosive soils.
- Stabilization of the slope surface materials allows embankments to be constructed steeper, with less horizontal footprint and use of land space.



### Typical Applications

- Cut or fill embankment slopes
- Containment dikes and levees
- Shoreline revetments
- Geomembrane protection
- Landfill linings & covers
- Stormwater basins
- Wastewater lagoons
- Dam faces and spillways
- Abutment protection



DESIGN OPTIONS

## GEOWEB® Infill/Application Options

GEOWEB® slope protection systems may be designed with a variety of infill materials to meet project requirements for aesthetics, stability, environmental impact, material availability, and erosion-control. The system also provides protection to impervious liners.

### 1 VEGETATED SLOPES



### 2 PERMEABLE AGGREGATE SLOPES



### 3 HARD-ARMOR CONCRETE SLOPES



### 4 GEOMEMBRANE PROTECTION





# DESIGN OPTION

## 1 Vegetated Slopes

SUSTAINABLE VEGETATION



The GEOWEB® system's 3D cellular network stabilizes topsoil for sustainable vegetation on slopes up to 45° and higher. The system prevents severe erosion caused by surface

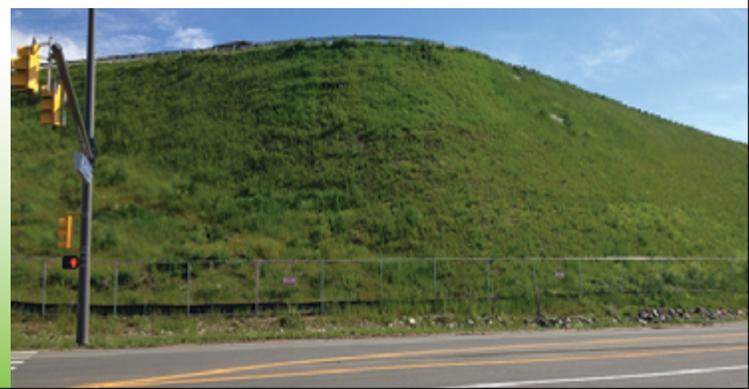
runoff and sheet flow, and offers slope-surface stability not possible with 2D planar systems.

Infill confined in the GEOWEB® 3D system creates a structural surface layer that resists sliding, where each isolated cell creates an eco-zone protected from erosive forces.

GEOWEB® vegetated slopes are a green solution ideal for **Low Impact Development (LID)** and **Green Infrastructure (GI)** designs. The system reduces environmental impacts by infiltrating stormwater, and limiting runoff and soil loss into downstream waterways.

### BENEFITS OF GEOWEB® 3D CONFINEMENT:

- Stabilizes and protects the topsoil layer from movement.
- Reinforces vegetation and increases its resistance to erosive forces. Cell wall perforations increase vegetation stability by stimulating root zone interlock and cross-root growth.
- Allows construction of steeper slopes, minimizing horizontal footprint.
- Allows use of select vegetation and native plantings to meet local climates.





# DESIGN OPTION

2

## Aggregate Slopes

PERMEABLE, HARD-ARMORED SLOPE COVER

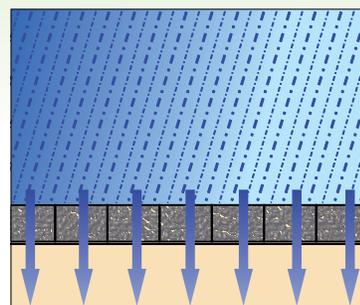


The GEOWEB® system's 3D cellular structure significantly improves the stability and erosion-resistance of granular materials, making them far more stable than

when unconfined. Confinement of aggregate also allows a significant reduction in size and less expensive materials to be used for a low-maintenance slope cover.

Aggregate infill reduces environmental impacts by allowing water infiltration on the slope face, reducing sheet flow runoff.

A wide range of slope angles can be accommodated by selecting the appropriate cell size and cell depth for the considered aggregate.



### BENEFITS OF GEOWEB® 3D CONFINEMENT:

- Confinement and interlocking between cells minimizes down-slope migration of granular materials caused by gravitational and hydraulic forces.
- Allows use of smaller, less expensive rock—even waste rock.
- Creates a permeable, weatherproofing cover when drainage is desired but vegetation is not.
- Provides a controlled mechanism to effectively handle seepage.





# DESIGN OPTION

3

## Concrete Slopes

FLEXIBLE, HARD-ARMORED PROTECTION



GEOWEB® slopes with concrete infill provide economical, hard-armored protection of slopes exposed to severe hydraulic or mechanical stresses. The quality,

surface finish and thickness of the concrete can be selected to meet specific design needs.

Concrete-filled GEOWEB® sections are flexible, poured-in-place articulating mats that are more economical than articulated concrete block systems (ACBs) without requiring specialized equipment to install.

### BENEFITS OF GEOWEB® 3D CONFINEMENT:

- Formless system reduces construction costs by eliminating conventional forms and reinforcement. Installation is fast, efficient and flexible.
- The selected cell depth ensures uniform concrete depth, controls concrete quantities and costs, and allows use of an easier to install, higher slump concrete.
- Becomes a flexible concrete slab with 'control joints' that conforms to minor subgrade movement, prevents uncontrolled cracking and reduces the potential of piping or undermining.



# DESIGN OPTION



4

## Geomembrane Protection

FULLY-INTEGRATED SUSPENDED SLOPE COVER SYSTEM



The GEOWEB® system may be designed as a protective cover over impervious geomembranes to prevent damage and degradation. GEOWEB® liner protection is a 'complete solution' including integral tendons and ATRA® tendon load transfer clips to create a suspended support system with selected infill. By confining infill in the GEOWEB® system, slopes can be designed steeper while still maintaining strength and integrity of the liner.

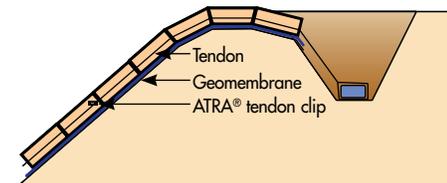
The GEOWEB® system may be designed as a protective cover over impervious geomembranes to prevent damage and degradation. GEOWEB® liner protection is a 'complete solution' including integral tendons and ATRA® tendon load transfer clips to create a suspended support system with selected infill. By confining infill in the GEOWEB® system, slopes can be designed steeper while still maintaining strength and integrity of the liner.

**Ideal Applications:** Stormwater detention and retention ponds, wastewater containment, channel linings, landfill/tailing linings and closure caps, dams, dikes and spillways.

### BENEFITS OF GEOWEB® 3D CONFINEMENT:

The integration of a tendoned-anchoring system creates a suspended, structural support system over the liner that:

- protects the integrity of the geomembrane liner or cover.
- directly protects the geomembrane from wildlife damage, accidental puncturing, and natural degradation.
- indirectly prevents soil contamination and erosion.



# DESIGN CRITERIA

Slope protection details are influenced by the embankment angle (H:V), length, and infill. Presto's free project evaluation service can help determine the suitable cell size, cell depth and structural components for your project.



# KEY COMPONENTS

The complete GEOWEB® slope protection system may include some or all of the following:

## TYPICAL COMPONENTS

- GEOWEB® sections
- ATRA® Key connection device
- Cell infill materials
- ATRA® Anchors & Speed Stakes

## OPTIONAL COMPONENTS

- Polymeric tendons
- ATRA® Tendon Clips
- Geotextile separation layer
- Geomembrane



# INTEGRAL SYSTEM ACCESSORIES

The following accessories may be integrated to meet design requirements and to facilitate and expedite construction.

## 1 ATRA® KEY GEOWEB® CONNECTION DEVICE



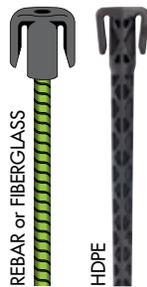
For quick and easy connection of GEOWEB® sections, exclusive ATRA keys significantly reduce contractor installation time and provide a 3X stronger connection of GEOWEB® sections than any other method. Made from corrosion-resistant polymer.



## 2 ATRA® ANCHORS & DRIVERS

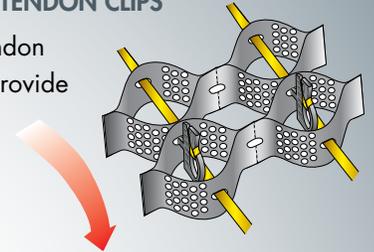
ATRA® Anchors may be part of the GEOWEB® slope design solution for internal and crest anchoring.

- Easier, faster to drive than J-hook stakes.
- With tendons, provide additional resistance to sliding and/or uplift forces.
- Corrosion-resistant HDPE ATRA® Speed Stakes.



## 3 TENDONS & ATRA® TENDON CLIPS

Tendons and ATRA® Tendon Clips work together to provide a load transfer and suspension system over the GEOWEB® system.



### TENDONS

Tendons in various tensile strengths are available to meet design requirements:

- Suspend GEOWEB® material over geomembranes, hard surfaces, or steep slopes without anchors.
- Provide additional stability against gravitational, hydraulic, and buoyancy forces.
- Type and density are critical to the design strength.

### ATRA® TENDON CLIPS

ATRA® Tendon Clips transfer the load from the GEOWEB® cell wall to tendons.

- 2X stronger than other load transfer devices.
- 'Turn-and-lock' design engages ATRA® Tendon Clips securely with the GEOWEB® cell wall.
- Allows easier off-slope preassembly.



## COMPREHENSIVE SERVICES AND RESOURCES

Presto GEOSYSTEMS® and its distributors/representatives offer the most-complete services in the industry to support project design and installation requirements.

### Free Project Evaluation Service:

We analyze specific project needs and provide recommended preliminary designs for each project.

### Construction Services:

Qualified on-site field support specialists can be available for construction training, and start-up installation supervision.

### RESOURCES:

- Engineering analysis/technical overviews
- SPECMaker® specification development tool
- Technical resources binder/case studies
- Detailed construction guides and videos

### PRESTO GEOSYSTEMS® COMMITMENT — *To provide the highest quality products and solutions.*

Presto GEOSYSTEMS® is committed to helping you apply the best solutions to your soil stabilization problems. Contact Presto GEOSYSTEMS® or our worldwide network of knowledgeable distributors/representatives for assistance.

### LEADING-EDGE INNOVATION

Presto is the original developer of the geocell technology and leads the industry in research and development resulting in meaningful product improvements, innovative features and accessories, advanced engineering methodologies, proven field results and ultimately long-term solutions to challenging problems.

### UNSURPASSED QUALITY

Presto's commitment to quality begins with manufacturing and continues through final installation.

- Quality management system certified to ISO 9001:2015 and CE Certification.
- Sections manufactured from high-quality polyethylene provide consistent and maximum seam weld strength.
- Materials engineered to established geosynthetic industry guidelines.
- Sections backed by a 10-year limited warranty.

## Design and Construction Resources

**PRESTO**



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