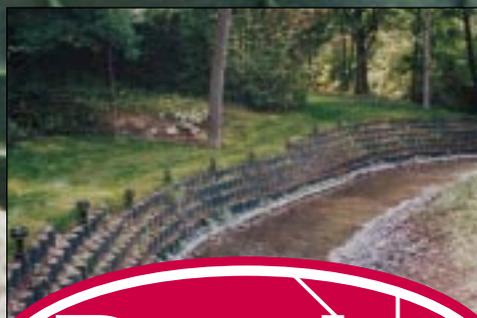


Solving Channel Protection Problems

Geoweb® Cellular Confinement System



Leaders In Advanced Geotechnology™

Channel Protection



An Engineered Framework for Channel Protection

The Presto Geoweb® Cellular Confinement System

Product innovation has always been the key to success for Presto since the company's first involvement in developing cellular confinement technology back in the late '70s. Working in cooperation with the U.S. Army Corps of Engineers, Presto developed the Geoweb® cellular confinement system.

The Geoweb system is an engineered, expandable, polyethylene, honeycomb-like cellular structure that dramatically improves the performance of infill materials. The system is utilized in the areas of slope protection, channel protection, load support and earth retention.

Today, the Presto Geoweb system is the only fully-engineered cellular confinement system available, and Presto Geosystems® materials lead the way in advanced research, testing, field evaluation and geocell product innovations. Successful installations of the Geoweb system can be found worldwide, and the network of Presto Geosystems distributors spans the globe.

ISO-Certified Quality



Extensive research and testing by academic and independent laboratories, ISO 9002 certification, and over fifteen years of in-ground performance tell the story: The Geoweb system provides proven quality and reliability.

Presto's commitment to quality begins with manufacturing and continues through final installation. Our quality management system is certified to ISO 9002 and materials are specifically engineered in accordance with established geosynthetic industry guidelines. All phases of manufacturing are monitored through Statistical Process Control which documents each step in the production process. Geoweb sections are warranted by Presto against manufacturing defects. Copies of Presto's warranty are available from Presto or an authorized Presto Geosystems distributor.

Advanced Product Development

Engineering advancements are on-going at Presto Geosystems and lead to improved cellular confinement systems. Geoweb system advancements include the introduction of both perforated and non-perforated textured Geoweb cells, the use of integral, high-strength tendons and the ATRA™ Anchoring System. The Geoweb system is also available in a variety of colors for better blending with the surrounding project site environment.

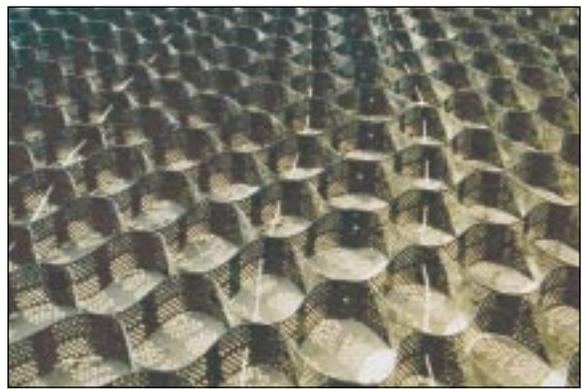
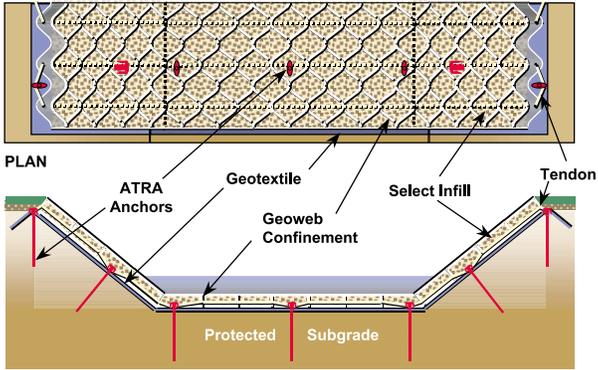
The Geoweb system's unique seam weld pattern is designed to provide maximum strength. The Geoweb system meets and exceeds the rigorous seam strength tests established by the U.S. Army Corps of Engineers. The Geoweb system's long-term seam strength is designed for project longevity.



Geoweb® Channel Protection Systems- The Key Components

The complete Geoweb® cellular confinement system application will include some or all of the following:

- Geoweb sections
- Cell infill materials
- Integral high-strength polymeric tendons
- ATRA™ Anchors
- ATRA® Clips
- Turf Reinforcement Mats
- Geotextiles
- Geocomposite drainage materials
- Geogrids and geotextile reinforcement
- Geomembrane
- Fasteners



Integral Polymeric Tendons

Polymeric tendons can be used to anchor Geoweb sections. Nominal surface anchorage for aggregate-filled Geoweb sections includes continuous tendons running across the channel at 800 mm (32 in) centers with 500 mm (18 in) long ATRA™ Anchors spaced at 1000 mm (38 in) intervals along each tendon. If ATRA™ Anchors cannot be used, tendon spacing should be reduced to 400 mm (16 in) to increase the superimposed weight of aggregate infill bearing directly on the tendon system.

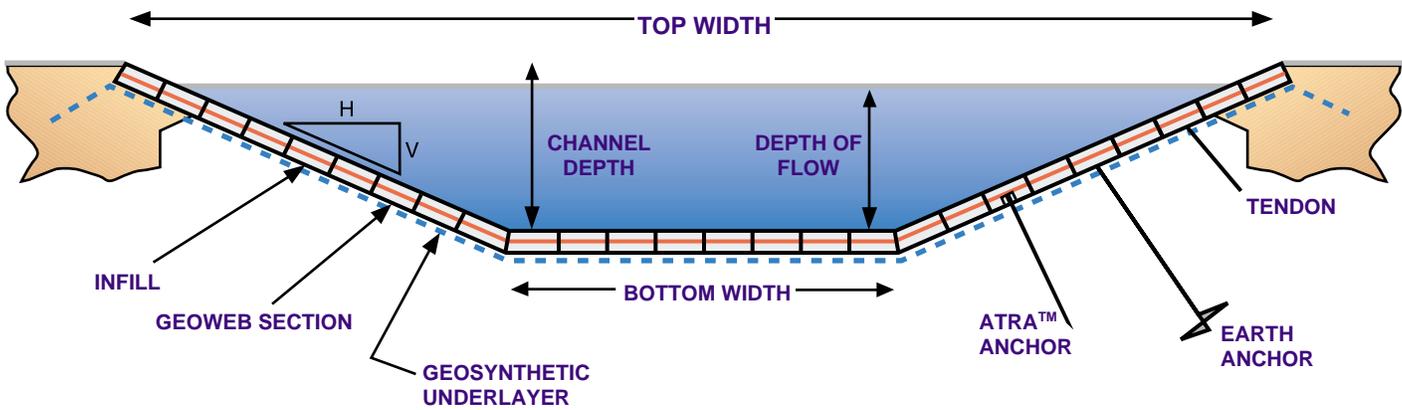
Standard tendons are high-strength polyester and polypropylene, available in various ultimate tensile strengths to meet specific requirements. Polyethylene-coated polyester tendons are available to enhance overall durability. Spacing and quantity of individual tendons within each Geoweb section are determined through engineering analysis methods available through Presto.



The ATRA™ Anchoring System

Presto's high-strength polyethylene ATRA® Clip provides time and material cost savings during Geoweb system installation. The ATRA® Clip inserted on the end of a rebar stake forms the ATRA™ Anchor, providing an in-line, easier to drive anchoring system. Tendons and an ATRA™ Anchor array provide anchoring for channel protection systems that resist excessive sliding and/or uplift forces. The ATRA® Clip used as a restraint pin connects to tendons at specific load-transfer points replacing the need for dowels or other less-secure load-transfer mechanisms.

The Geoweb channel protection system can also be secured with an engineered array of surface anchors designed to meet soil conditions. Anchor details are determined through analysis methods available from Presto or its authorized distributors.



Color Options

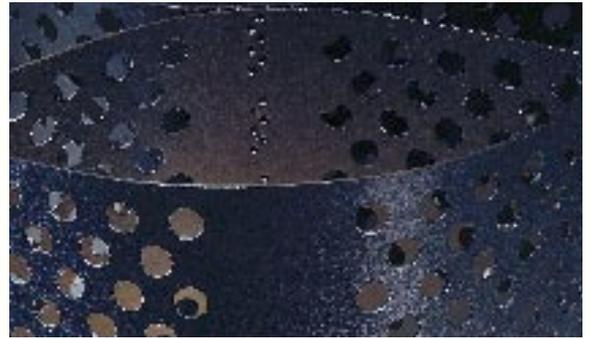
The Geoweb® system can be provided in a variety of colors to meet desired aesthetic requirements. The system is available in natural colors of black, green or tan. Coloring pigments contain no heavy metals and the polyethylene is ultraviolet light stabilized with carbon black or Hindered-Amine Light Stabilizer (HALS) to increase system durability.



Versatile Cell Wall Options

The Presto Geoweb Cellular Confinement System is available in two distinct cell wall types: perforated and non-perforated. Both have an engineered textured pattern of indentations that increase friction between the cell wall and infill material.

The perforated Geoweb cell wall provides increased frictional interlock with aggregates and concrete, and better root lock-up with vegetated systems. The perforations allow lateral drainage through the system, thereby enhancing performance of the Geoweb system in saturated conditions. The textured surface works particularly well with finer grain infill.

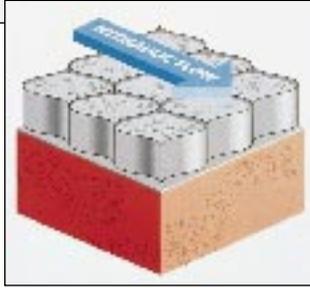
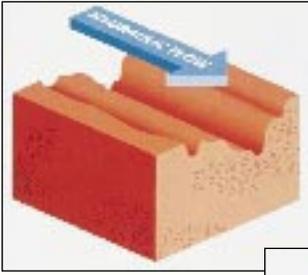


Size Options

Geoweb® cellular confinement sections are available in various lengths, cell depths and cell sizes addressing the specific needs of the design. Channel geometry and flow characteristics influence the choice of infill materials. The characteristics of the required infill material directly influence the choice of the cell size and depth.

Contact Presto or it's authorized distributors for recommendations on product application and details.





Channel Protection Solutions

The Geoweb® cellular confinement system provides a wide variety of flexible protection treatments for open channels and hydraulic structures. The system is ideal for protection of channels exposed to severe erosive conditions, as well as channels with continuous flows. It greatly improves the hydraulic performance of conventional protection materials such as concrete, aggregate, rip-rap and vegetation by confining them within the cellular structure.

A Geoweb system can be designed for a particular site based upon compatibility with local environmental, ecological and aesthetic requirements, maximum anticipated flow conditions, and associated hydraulic stresses. Surface roughness and hydraulic efficiency of the lining system are accounted for. Subgrade drainage requirements and the deformation potential within the structure can also be addressed. A non-woven geotextile underlayer, combined with custom ground water outlet ports, assures effective subgrade drainage and subsoil protection. Future maintenance and sediment cleaning operations can also be considered in the design.

A variety of infill materials can be used with the Geoweb system for channel protection. The choice of infill materials is based upon the needs of the specific project.

Infill materials include:

- Topsoil with various selected vegetation
- Aggregate of varying size and gradation
- Concrete of various strengths and surface finishes
- Combinations of the above to meet special conditions



Vegetative Protection

Vegetated soil with the Geoweb system is ideal for areas where low to moderate, intermittent flows occur, such as in swales, ditches and on upper slopes of large channels. Vegetation is a logical choice when project aesthetics are an important consideration.

The Geoweb cell walls which contain the topsoil infill form a series of check-dams extending throughout the channel protection system. Rill and gully development, produced when concentrated flows cut into the soil, is prevented since the flow is continuously redirected to the surface.

A predetermined depth of topsoil and the vegetative root mass is confined and protected within the individual Geoweb cells. Roots interlock with the perforated cell wall and readily penetrate through the non-woven geotextile underlayer into the subsoil, reinforcing and anchoring the entire protection system. Confinement and anchorage of the root structure increases the limiting shear resistance of the protection and the permissible flow duration.

Normal cell depth for vegetated Geoweb channel protection systems will vary as a function of side slope angle, subsoil type and climatic conditions.



Aggregate Protection

Aggregate is ideal in low to moderate flow channels. This system fills the “gap” between vegetated and concrete channel lining applications. Contact Presto for specific recommendations regarding size of aggregate versus flow conditions.

Armoring: Concrete Protection

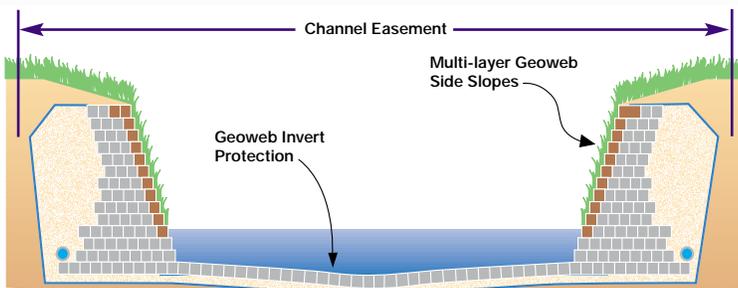
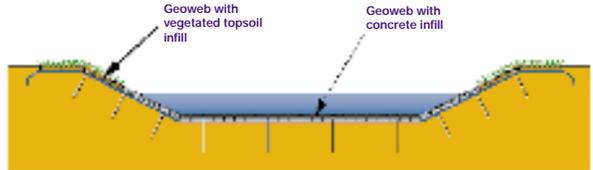
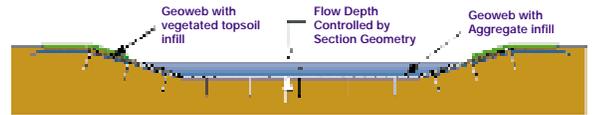
Poured concrete provides hard, durable protection for channels that are exposed to severe hydraulic or mechanical stresses. The Geoweb® cellular confinement system can eliminate the need for complicated structural elements and expensive, time-consuming construction techniques. Concrete quantities and costs can be controlled with the Geoweb system because there is a defined, uniform thickness to the sections. The quality, surface finish and thickness of the concrete can be selected to meet specific design needs. The lining retains flexibility and is able to conform to minor subgrade movement. Special compacted granular bedding layers, necessary with conventional poured concrete slabs, can be omitted. The Geoweb system prevents uncontrolled cracking of the concrete and reduces the chances of piping or undermining. Hydrostatic pressures below the Geoweb layer are relieved by incorporating underlying geotextiles and/or ground water outlet ports where needed.

Critical velocities, Manning's “n” and other hydraulic design parameters have been established for the Geoweb cellular confinement system. Presto can provide further information.

Concrete infill with the perforated Geoweb system offers greater rigidity than the non-perforated system.

Stacked Geoweb sections along channel side slopes provide the structural integrity to withstand high flows depending on the choice of infill material in the outer cells. The use of vegetation along the facia offers a natural appearance and the ability to withstand higher flows for short durations. In the stacked configuration, colored face panels may be utilized allowing the system to blend naturally with the environment. This configuration can tolerate differential settlement without loss of system integrity.

In channel protection applications, the perforated Geoweb system is generally recommended over the non-perforated system with most infill materials.





Easy Installation

The Geoweb® system is designed with ease of installation in mind. Geoweb sections collapse into lightweight, compact bundles for easy shipment. During installation, sections remain flexible and easy to handle. Various methods are used for expanding the Geoweb sections. Stretcher frames are typically used for installations where dimensional tolerances are critical.

Tools & Services

- General Overview - Product data, basic engineering concepts and theory for general application of the Geoweb system.
 - Application Overview - Illustrative project examples using the Geoweb system.
 - Case Histories - Project specific design, construction and performance information for the Geoweb system in all application areas.
 - Design Package:
 - SPECMaker™ Software - A CD tool used to develop complete material and construction specifications.
 - System Components Guideline - A set of tables relating to application-specific system components.
 - Presto & CSI - format Material Specifications - Comprehensive guide specification and product description of the Geoweb system.
 - Design Input Checklist - A product checklist to insure all relevant data is collected for detailed engineering design of the Geoweb system.
 - Technical Overview - An in-depth discourse centered around the theory and application of theory for solving problems with the Geoweb system.
 - AutoCAD® Drawings - Drawings in DWG format and paper copy providing all the engineering details needed for plans with the Geoweb system.
 - Construction Package:
 - SPECMaker™ Software - A CD tool used to develop complete material and construction specifications.
 - Installation Guidelines - An illustrated set of installation guidelines for each application.
 - Practical Tips & Suggestions - Construction tips and suggestions for each application.
 - Videos - Product application and construction techniques videos available in multiple languages.
 - Solutions for an Unstable World CD-ROM - All application documents, AutoCAD® drawings, SPECMaker™ software, clip art library, Power Point presentations, video clips and more.
 - Project Evaluation Service - Available through authorized distributors for all applications.
- For more information, call the Presto Technical Assistance Line at (800) 548-3424 or (920) 738-1118.



Leaders in Advanced Geotechnology™

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