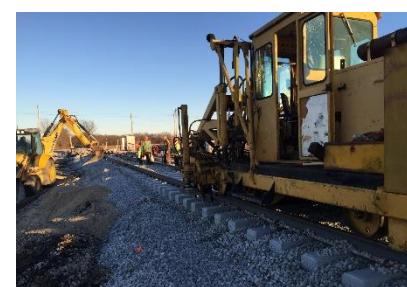
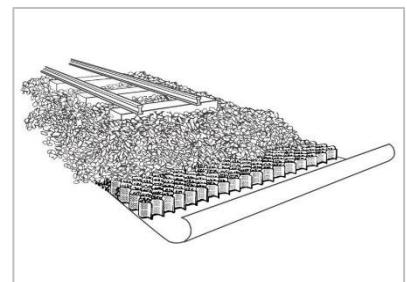


**PRESTO** | **GEOSYSTEMS®**

# **GEOWEB.®**

3D Soil Stabilization

# Design + Construction Resource Package



# RAIL INDUSTRY





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# GEOWEB® 3D Soil Stabilization

## Rail Resources

### What You Will Find

[Key Rail Applications](#)

[How the GEOWEB 3D System Works](#)

[Ballast Reinforcement](#)

[Soft Soil Applications](#)

[High Stress Applications](#)

[Compare 3D GEOWEB System to 2D Geogrids](#)

[Research Results](#)

[See Product in Action](#)

[Embankment Stabilization](#)

[Yard Stabilization](#)

[Pavement Base](#)

[Stabilization](#)

[Channel Stabilization](#)

[Free Project Evaluation](#)

[GEOWEB Complete](#)

[Solution Accessories](#)

[Get an Estimate](#)



Support resources for  
a successful project.

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## Better Built Rail Infrastructure

# GEOWEB® 3D Soil Confinement

This resource package offers tools & resources to design high-performing, long-lasting rail infrastructure—track, yards, embankments and channels.

See why the GEOWEB® 3D System is the Rail Industry's Go-To Solution



Resources  
for your project



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## Key Rail Applications

# GEOWEB® 3D Soil Confinement

**Take the Tour.**

See how 3D soil confinement  
benefits the most challenging  
soil and ballast stability issues in  
rail applications.



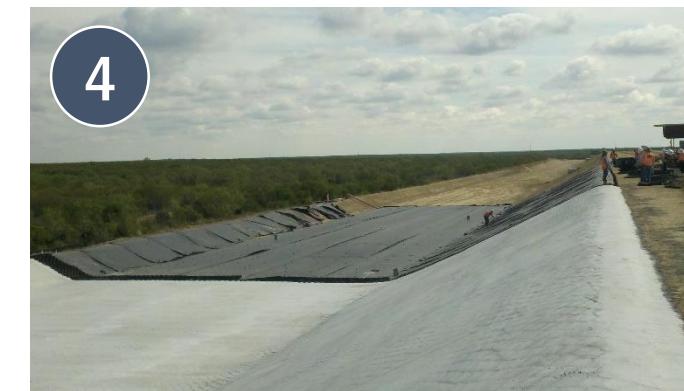
**Ballast Reinforcement**



**Embankment Stabilization**



**Yard Stabilization**



**Stormwater Channels**

Resources  
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# How 3D Soil Confinement Benefits Rail

## Strengthens & Transforms Fill

With the 3D GEOWEB® system, fill materials are confined and stabilized—even under the heaviest loading or steepest grades.

The benefits? **Higher performance** and **lower maintenance**—of track, pavements, embankments & channels.

- [View the Overview Brochure](#)
- [Visit our Photo Gallery](#)
- [See Project Case Studies](#)

Resources  
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# Ballast Reinforcement Typical Track Problems

Solved by the 3D GEOWEB® System

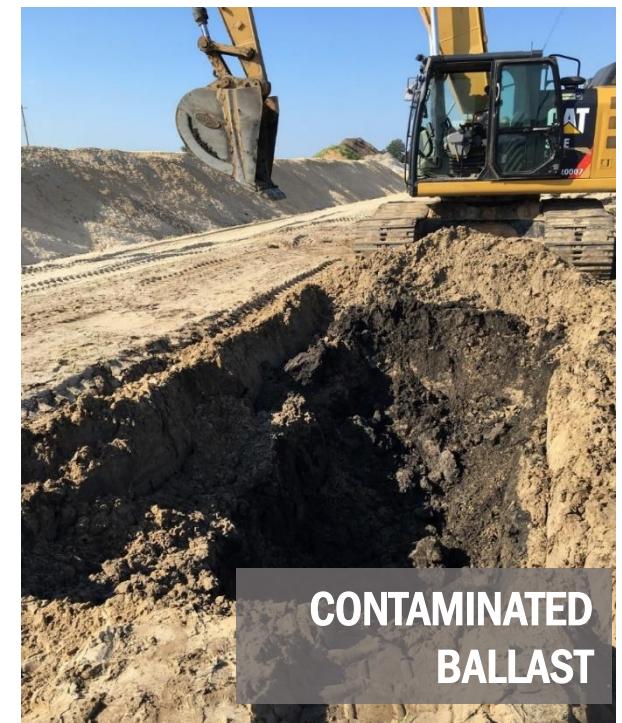
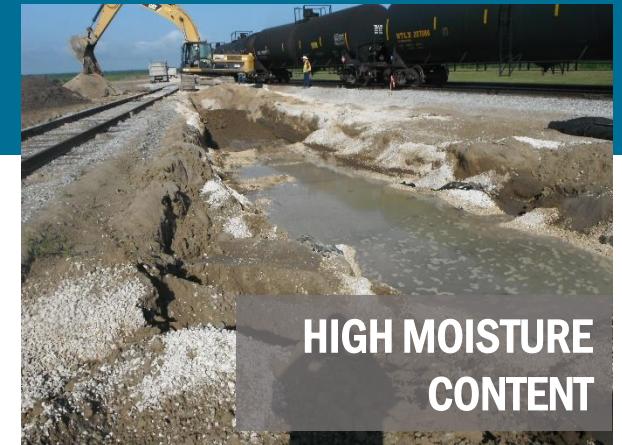


## Common Soft Subgrade Issues

- Differential Settlement
- Pumping & Heaving
- Ballast Contamination
- Poor Drainage

## Leads to:

- Ballast Attrition
- Maintenance/Shutdown
- Speed Reduction
- Worst Case - Derailment



# Ballast Reinforcement **BENEFITS**

Delivered by the 3D GEOWEB® System

Resources  
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## Track

- Reduce ballast attrition
- Bridge poor sub grade soils
- Reduce tamping and maintenance cycles

## Special Track Work

- High G force wheel impacts
- Extend life and reduce repair cycles

## Bridge Approaches

- Provide high G force transition area
- Reduce settlement

## Grade Crossings

- 90 degree loading
- Rigid transition



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# Ballast Reinforcement BENEFITS

## Use of Lower Quality Fill

Save on Hauling and Material Costs.

When fill is confined in the GEOWEB® 3D system—**on-site low quality infill may be used**—even coarse sand or salvaged ballast. Use of lower quality fill is a significant savings on hauling and material costs versus imported ballast.



# Ballast Reinforcement BENEFITS

## Facilitates Better Drainage

### No-Fines Infill Improves Drainage

For poor drainage areas, fill with limited fines can be used as the GEOWEB cells provide the confinement and aid compaction of cohesionless soils.

- drainage is significantly improved
- water flows freely through the system preventing pore pressure build up and potential for global failure of the ballast section.



**Supports  
Open-Graded  
Aggregate**

# Ballast Reinforcement BENEFITS

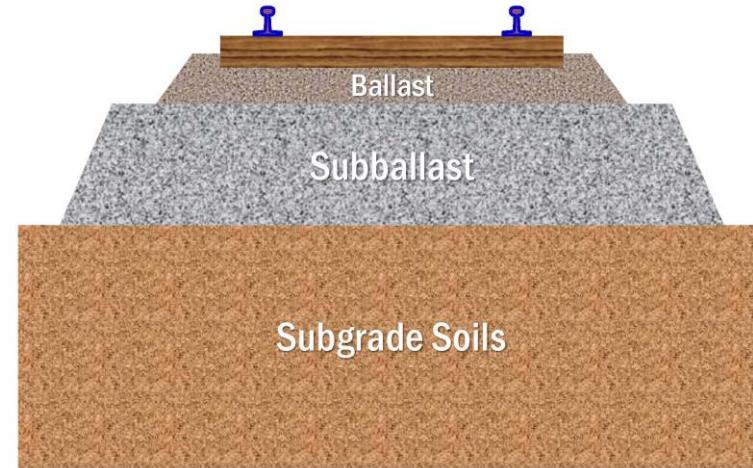
## Reduces Cross Section Thickness

GEOWEB®-confined sub ballast delivers structural benefits that reduce cross section thickness by up to 60%.

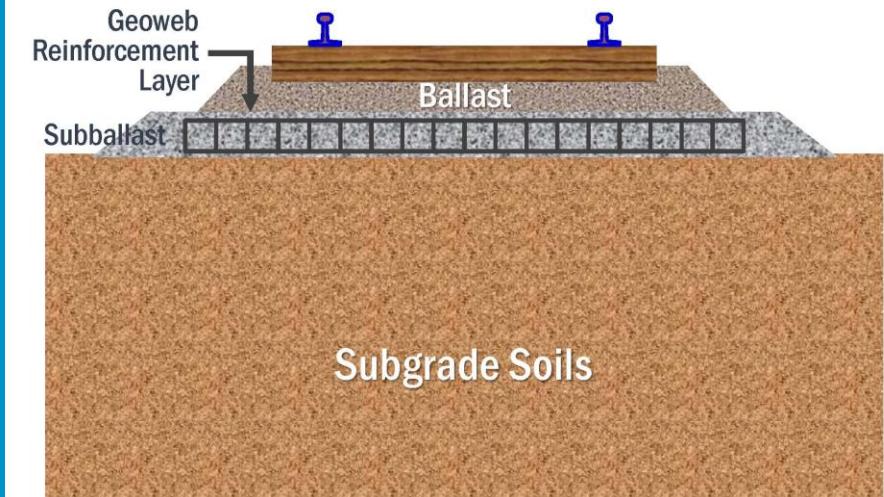
The improvement results in **significantly less installation and rehabilitation costs**.

Up to  
**60% LESS**  
Cross-  
Section

Typical Track Cross-Section



Track Cross-Section with 3D GEOWEB®



# SOFT SOIL

## Applications



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### Ballast Reinforcement

Many main line tracks cross subgrades with low CBR strength and high groundwater.

Build a strong, stiffened base over soft, wet subgrades with the GEOWEB® 3D system and enhanced woven geotextile.

**Free project evaluations** are available to help design a solution customized for your site conditions.



# SOFT SOIL

## Project Case Study



### Ballast Reinforcement

A combination of geosynthetics were used on an extremely wet peat area for a Border's Railway project to create a stabilized ballast layer. Enhanced woven geotextile and GEOWEB® layers worked together to solve exceptionally soft ground conditions at this site.

See how it worked on the  
Borders Railway Project>>



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# HIGH STRESS

## Applications

### At Grade Intersections

Grade crossings are highly prone to stresses from aggressive rail loads and high-volume traffic. Avoid settlement and maintenance issues in these areas and prevent slow-downs.

GEOWEB® 3D confined ballast is a robust solution built to handle these stresses. The system maintains a stable track ballast and **resists the powerful forces in high-stress, concentrated areas.**



# HIGH STRESS

## Applications

### Bridge Abutments

Bridge abutments are also notoriously high maintenance areas due to high impact loadings and settlement. Chronic maintenance in these **problematic areas can be overcome with a GEOWEB-reinforced ballast layer**.

On a Florida East Coast project, the GEOWEB® 3D system was applied at a bridge abutment and through the grade crossing—both high maintenance areas due to soft soils and frequent, heavy truck loadings.

Learn more about  
the project>>



### What FEC Said About the Project

“The area with the GEOWEB stabilization was subjected to over 25 MGT in first year with no deflection. The other end of the bridge without GEOWEB settled over 2 inches and had to be resurfaced twice!”

Chief Engineer Design & Construction, FEC

Minimizes  
settlement  
& pumping



# HIGH STRESS

## Applications

### Grade Crossings

#### Replace Asphalt Pavements and Crossings

Traditional asphalt pavements and crossings are vulnerable to failure caused by excessive braking and acceleration forces transferred through the crossing to the subgrade.

**Reinforce crossings with the GEOWEB® 3D system to dissipate forces from traffic and rail while delivering a floating platform that absorbs the braking and acceleration forces.**



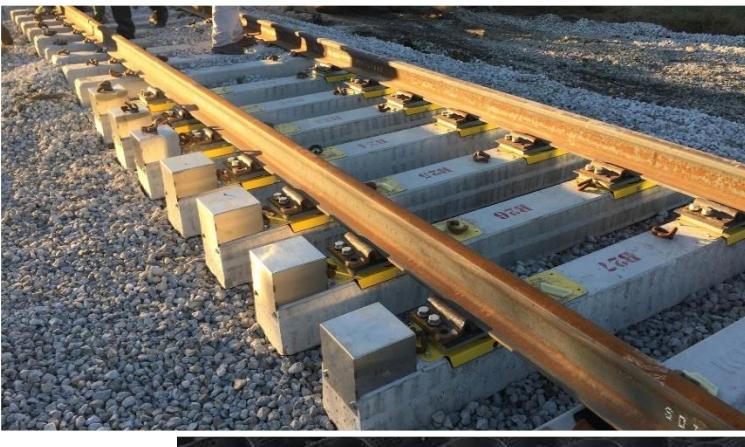
# HIGH STRESS

## Applications

### Special Track Work Scales

Scales require a very stable subgrade for accurate measurement. **Strengthen scale areas with the GEOWEB® 3D system for extra stability and accuracy**—especially over soft subgrades.

Presto's engineers work closely with scale manufacturers to develop **project-specific cross sections for each installation**.



Open graded backfill material allows water flow; prevents pore pressure build up



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## Ballast Reinforcement

See why the 3D GEOWEB system outperforms 2D geogrids

# COMPARE

GEOWEB 3D Stabilization to 2D Geogrids>>



Accredited. Verifiable.  
**RESEARCH  
RESULTS**



## TTCI Test Findings

### of GEOWEB® Confined Ballast

- Performed at FAST High Tonnage Loop (HTL)
- 2.5 Year test compared to a control section.
- Used imported Mississippi mud with high plasticity clay + CBR of <3% + 30% moisture content.
- GEOWEB system significantly reduced pressure and dissipated load over subgrade with no issues.
- Acceptable track geometry maintained over 2.5 year test and over 185 million gross ton (MGT) loadings applied with less than 0.5 inches of settlement.

**Withstands  
Worst-Case  
Conditions**

Even with 100,000 gallons of water dumped over the area to induce failure, no appreciable effect was measured.



See the TTCI Test Results>>

Accredited. Verifiable.  
**RESEARCH  
RESULTS**

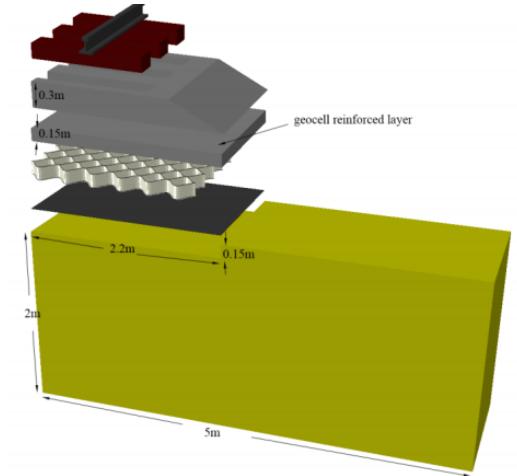
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# Research Findings

## of GEOWEB® Confined Ballast

- Significant decrease in settlement < 50%
- Reduces ballast pressure & movement, abrasion and ballast attrition.
- Decrease sub grade pressure < 50%
- Confirmed stress is concentrated at bottom 1/3 of cell – importance of SEAM STRENGTH!
- Confinement allowed track to return to original position after each load cycle



Exploded view of half of GEOWEB-reinforced cross-section.

**OSU**  
Oregon State  
UNIVERSITY



Reinforced Rail Ballast Finite  
Element Analysis (download)

**KU**  
THE UNIVERSITY OF  
**KANSAS**



Reinforced Rail Ballast +  
Smart Rock Testing (download)

Accredited. Verifiable.  
**RESEARCH  
RESULTS**



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# Research Findings of SMARTROCK Testing

**SMARTROCKs in the ballast layer to measure effectiveness of GEOWEB® 3D confinement to control ballast movement:**

- SmartRocks added below the tie and inside GEOWEB® cells to measure particle translation acceleration and velocity in the x, y, and z directions.

## Impressive Results:

- Reduces ballast pressure & movement - laterally & vertically
- Significantly decreases abrasion and ballast attrition
- Less ballast attrition < tamping
- Reduced Maintenance - Saves \$!



**Reinforced Rail Ballast +  
Smart Rock Testing (download)**



## See GEOWEB® 3D Product in Action

[Visit our Video Gallery](#)

[See Ballast Reinforcement Case Studies](#)

[See Project Photos](#)

Watch the Ballast  
WEBCAST >>



Resources  
for your project





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# Embankment Stabilization BENEFITS

## Slope Protection

### Erosion Control + Slide Repair

Embankments adjacent to track are vulnerable to erosion, slides and washouts under these conditions:

- Steep vertical slope angles
- Unsupported surface layer soils
- Heavily saturated soils
- Drainage & Runoff issues

Protect your rail slopes with the GEOWEB 3D system to **eliminate potential for slides, costly maintenance and downtime.**

[LEARN MORE >>](#)



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## Embankment Stabilization **BENEFITS**

### **Slope Protection**

#### **Vegetated or Hard-Armored Protection**

Build or repair your embankment slopes with 3D protection not offered by 2D planar 'cover only' systems with the GEOWEB® slope system. Designed for vegetation—or hard-armored protection with aggregate or concrete fill.

[See how the System Works  
for Emergency Repair>>](#)



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## Embankment Stabilization BENEFITS

### Retaining Walls

#### Flexible MSE Structures

Instability of fill embankments with steep slopes and wet weather exposure can cause saturation, settlement and loss of strength at the base of the fill. The result is a high-maintenance slope requiring frequent repair.

GEOWEB® retaining walls keep fill materials stable and **resistant to the negative impacts caused by saturated soils**. Vegetated or hard-armored fascia.



See how it Worked  
on a CSX Project>>



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# Yard Stabilization BENEFITS

## Intermodal / Ports Solve Surface Stability Issues

Build GEOWEB® permeable pavements for unpaved intermodal, port and bulk transfer yards with low quality aggregate, recycled materials or coarse sand to **resist ruts, potholes and degradation from heavy vehicle loads**—degradation that can cause pavement failure and high maintenance costs.

See Easy Infilling the  
GEOWEB System>>



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## Subgrade Stabilization BENEFITS

### Pavement Base Reinforcement

#### Solve Base Stability Issues

Support asphalt & concrete pavements with a GEOWEB® reinforced base to resist differential settlement that degrades hard pavements.

Reduce base depth up to 60% with GEOWEB supported base.

See More on GEOWEB  
Pavements>>



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# Channel Stabilization BENEFITS

## Channel Protection

### Stormwater Drainage

GEOWEB® channels significantly reduce costs of materials and installation. The flexible 3D structure acts as the formwork for concrete fill so no additional forms or reinforcement are required. Each cell acts as an expansion joint which controls cracking.

Fast, efficient installation.

See More on  
GEOWEB Channels>>



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# FAST Emergency Response

Resources  
for your project



## Emergency Flood Repair

Heavy rain and flooding costs millions each year in maintenance, repair and downtime

Deploy and install GEOWEB® sections for fast action, **emergency repair in hours** compared to days required with traditional solutions.

Make this Your Emergency  
Repair Plan>>



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# How is it Designed?

## Let Us Evaluate Your Project

### Your site has problems.

Soft ground. Poor subgrade. Poor drainage.  
Heavy loading. Limited road building resources.

### Will our solution work?

Arrange a meeting with our engineers to evaluate the feasibility of our solutions to meet your site's unique challenges.

Email [info@prestogeo.com](mailto:info@prestogeo.com) to request a project evaluation.

Request Free Project  
Evaluation>>



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# How is it Installed?

## Installation Training

Our experienced technical staff supports rail owners with pre-construction training and construction oversite.

### Waste no time on site.

Let our experienced staff train your crews—keeping your operations moving and your costs down.

Email [info@prestogeo.com](mailto:info@prestogeo.com) to request construction training & site support.

Request Technical  
Meeting & Presentation>>



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# Is Installation Weather Dependent?

## All Weather Material

GEOWEB® projects are installed in extreme temperatures and weather--from the coldest to the hottest regions of the world.

**Rain or snow—keep your crews working through any weather condition.**



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What can the GEOWEB® 3D System  
do for your Next Rail Project?

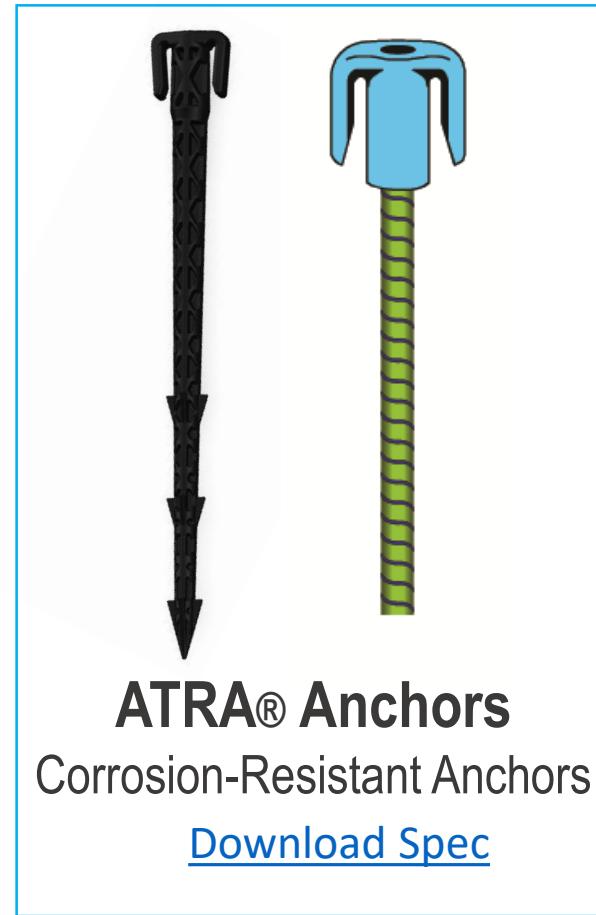


# Difference Makers. Fast Install Accessories & Tools.

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for your project



**ATRA® Keys**  
Fast Section Connection  
[Download Spec](#)



**ATRA® Anchors**  
Corrosion-Resistant Anchors  
[Download Spec](#)



**ATRA® Drivers**  
Fast Anchor Driving Tool  
[Download Spec](#)



## Fastest Way to Connect GEOWEB® Sections



**ATRA® Keys**  
Fast & Efficient Connection

Faster than Stapling & Non-Corrosive  
Side to side and end to end  
connections

LEARN MORE A blue rectangular button with the text "LEARN MORE" in white, followed by a blue right-pointing arrow.

## ATRA® Keys



**3X Faster**  
than Stapling  
Operations



Resources  
for your project





## ATRA® Anchors & Drivers

Corrosion-Resistant Anchors

Speed Stakes & Glass-Fiber Reinforced

Strongest hold-down; most secure  
cell wall connection.

LEARN MORE

# ATRA® Anchors & Drivers

**10X  
Faster  
Driving  
Tool  
than sledge  
hammering**



# Let Our Knowledge Work for You

**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 developed and continue advancing the technology through research and product development.

Let our knowledge & experience help you solve your rail site problems.

[LEARN MORE](#) >>

Resources  
for your project





# 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](#)



# What is the Price? Get an Estimate

Contact our rail engineers  
who will work with you to  
provide a price estimate.

Complete our Online Form  
[Get a Quote](#)

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Get answers to your questions and help before, during and after construction.

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