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# ENERGY INFRASTRUCTURE

**GEOWEB®**

3D Soil Stabilization

**Application  
Resource Package**





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**GEOSYSTEMS®**

# GEOWEB® 3D Soil Stabilization

## Energy Resources

### What You Will Find

#### Key Energy Applications

##### Transmission Line

##### Access Roads

- [System Benefits](#)
- [Duke Energy Case Study](#)

##### Substations

- [System Benefits](#)
- [Application Overview](#)

##### Pipeline Support

- [Devil's Canyon Case Study](#)

##### Renewable Energy

- [System Benefits](#)
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##### Slope Protection

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- [LNG Storage Tanks Case Study](#)

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[Free Project Evaluation](#)

[Environmental Benefits](#)

[Installation Support](#)

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## Better Built Energy Infrastructure

# GEOWEB®

### 3D Soil Confinement

This resource package outlines attributes and applications of the GEOWEB® 3D system in energy infrastructure design—for transmission line access roads, substations, pipeline support and renewable energy.



Resources  
for your project



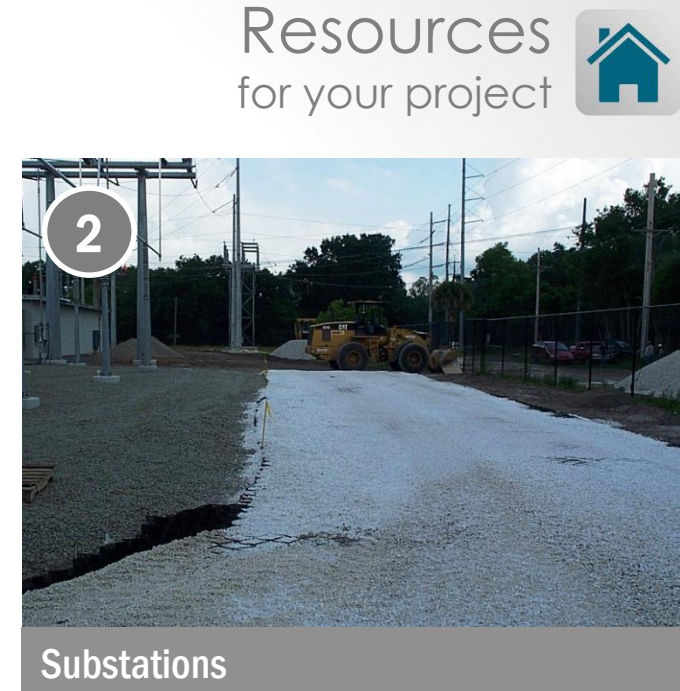


## Key Applications

# GEOWEB® 3D Soil Confinement

### Take the Tour.

See how 3D soil confinement benefits the most challenging site issues in energy applications at a lower cost and with higher performance than alternative solutions.



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# Transmission Line Access Roads

A key component of energy resilience, transmission line access roads provide vitally-important access to conduct emergency repairs following natural disasters or major power outages. Access is often required across challenging terrain, weak soil or soft ground, and environmentally-sensitive areas such as marshes and streams. With the GEOWEB® system, **roads are built with 50% less aggregate**, often allowing use of locally-available fill, to support heavy vehicles with minimal environmental impact.

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GEOWEB®

Dependable Equipment Access.



# BENEFITS

Delivered by the 3D GEOWEB® System

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## Transmission Line Access Roads

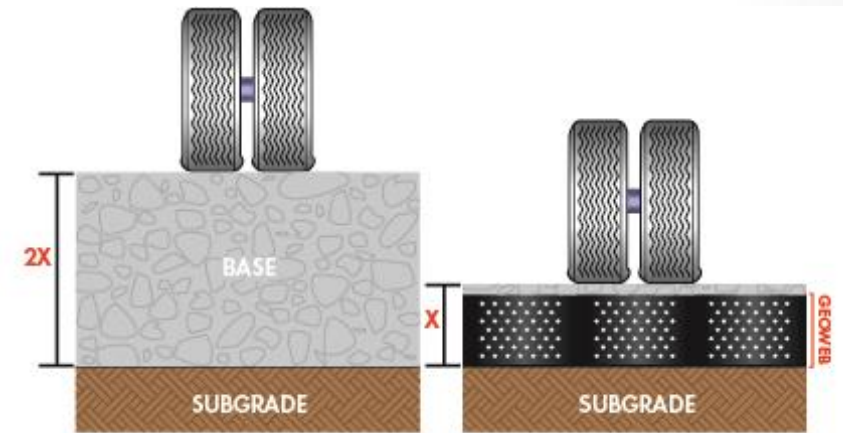
### Extends Access Road Life

Transmission line access roads designed to support heavy vehicle loads require a stable structure to maintain performance. **This can be challenging**—especially in areas with soft soils and soils prone to settlement.

### The GEOWEB® 3D confinement system:

- Stabilizes the roadway structure while **reducing the cross section by 50% or more.**
- Thinner cross section reduces impacts to environmentally-sensitive areas and in turn reduces costs associated with mitigation.
- Confines unpaved roadway aggregate reducing or even eliminating rutting - **thereby reducing annual maintenance costs.**

50%  
Less Cross  
Section



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# CASE STUDY

## Transmission Line Access Road

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### Road Through Wetlands

#### Restored Critical Power Lost From Hurricane Michael

- 34-mile right-of-way from Port St. Joe to Callaway crosses swampy, remote area preventing repair vehicles from accessing repair areas.
- GEOWEB system used to stabilize roadways to support heavy vehicles in the wettest areas.
- The GEOWEB 3D stabilization system kept aggregate fill contained for a stable driving surface.
- The fast-to-deploy and easy-to-install system helped Duke Energy rebuild the grid in three weeks, restoring over 75,000 outages.

Wet, muddy ground through  
swamps and farmland.



Infilled with  
on-site sand.



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[See More  
on Case Study >>](#)

# Substations

Power companies seek cost-effective ways to stabilize the aggregate surface of walkways and roadways at their substations to better resist vehicle stresses, prevent rutting problems, reduce maintenance, and most importantly, reduce step and touch potential for worker safety.

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# BENEFITS

Delivered by the 3D GEOWEB® System

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## Substation Pavements

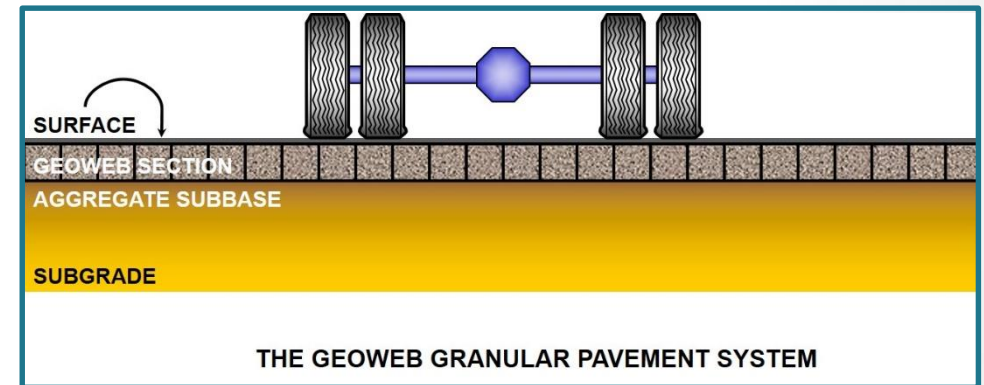
### Reduce Step and Touch Potential

Clean aggregate commonly used for surface layer protection is a safe, non-conducting material—but it alone doesn't offer the surface stability that is provided when the aggregate is confined in the GEOWEB cellular network.

GEOWEB-confined aggregate is extremely stable under loading and has a high resistance to rutting. The system also allows use of highly-permeable open graded base course (OGBC) that provides maximum infiltration to keep water off of the pavement surface.

### The GEOWEB-Confined Aggregate:

- Creates a stiff load distribution system that prevents infill movement, reducing deep rutting caused by vehicle and equipment access stresses.
- Structural support systems may be reduced by 50% or more.
- With highly-permeable OGBC infill, offers a high rate of percolation that prevents dangerous water ponding on the pavement surface.
- OGBC is stable when confined, therefore virtually no surface maintenance will be required.
- Safe & easy to install with field crews, no heavy equipment needed.



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# SAFE & STABLE

Transmission Facilities

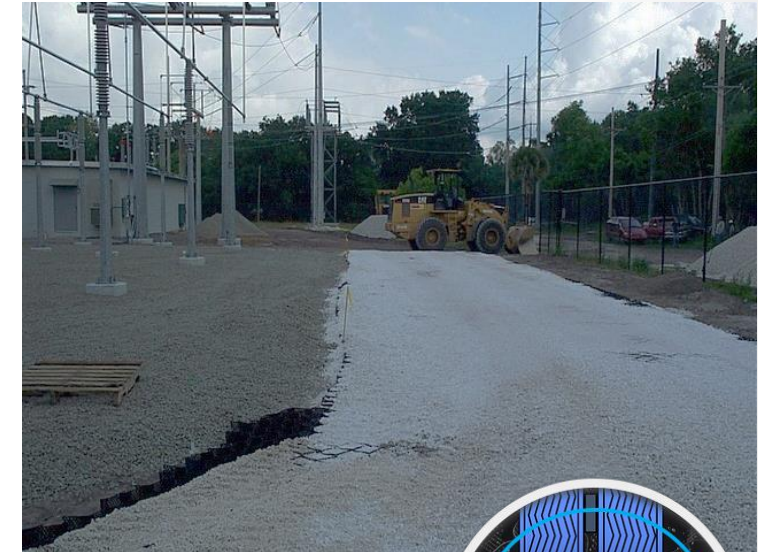
Resources  
for your project



## Pavement Solutions for Substation Access

Over 70,000 substations serve 350+ million customers in the USA.

GEOWEB Geocells offer a safe and low-maintenance solution for stabilizing aggregate surfaces in those substations.



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# Pipeline Support

Protect underlying soils that support pipelines from differential settlement, surface erosion, undermining, and scour with the GEOWEB system. Using infill confinement technology, the 3D GEOWEB structure assures a stable upper soil layer that is highly resistant to erosive forces—supporting sustainable vegetation, aggregate or hard-armor concrete. Protect diversion channels and pipe outfall areas with this effective erosion control measure for a site's Erosion & Sediment Control (E&SC)

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**GEOWEB®.**

**Base Support & Maintenance Access.**



# CASE STUDY

## Devil's Canyon Power Plant

### Flexible Hard-Armor Pipeline Erosion Protection

#### Protects a Pipeline's Support Structures

##### Project Scope:

Devil's Canyon Power Plant was built in the 1970's to aid in supporting the rapidly growing demand for both water and electricity in Southern California.

After years of weathering, the pipelines were at risk from heavy erosion caused by decades of water runoff.

**Engineers needed a solution that could solve their erosion concerns and be installed quickly before the wet winter months.**

Their greatest challenge was access in and around the pipeline. As the pipeline travels down the mountain, it covers some very steep sections. The grade goes from flat to nearly 45%. Several sections are easily accessible with vehicles, while others on the steepest portions are only reachable on foot.



##### Project Results:

Several solutions were suggested, but once all options were weighed, the State of California selected the GEOWEB Soil Stabilization System—infilled with concrete.

The GEOWEB System is a proven solution for both erosion control and slope stabilization. When filled with concrete, it creates a flexible hard-armor mat that provides erosion protection to combat the negative effects of runoff.

Key benefits for the State of California, included:

- Cellular structure eliminated need to build forms—flexible nature of the system conformed to grade contours.
- Compact sections were easily transported & quickly installed.
- No training or special tools were needed for installation.

[See Devils Canyon  
Case Study >>](#)



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## Renewable Energy

Build Sustainable  
Roads & Pads

### Economical & Low Maintenance Options

GEOWEB-confined gravel roads and pads are stronger and more stable while using **50% less gravel or sand**, and **allow access across soft ground and low-lying areas**. The thinner cross section also **reduces impacts to wetlands, floodplains, and environmentally-sensitive areas**, often times reducing mitigation costs.



# BENEFITS

Delivered by the 3D GEOWEB® System

Resources   
for your project

## Stable Roads Allow Access Over Soft Ground

### GEOWEB® LOW MAINTENANCE ACCESS ROADS.

The GEOWEB system—a cost-effective, versatile way to construct your access roads ONE TIME for foundation construction, wind turbine component delivery, and maintenance access. Its inherent strength through confinement of infill virtually eliminates the need to maintain and reconstruct these roads subjected to heavy construction traffic.

**GEOWEB roadways are beneficial for crossing low-lying wet areas with soft subgrade soils.**

- Fast to Deploy
- Uses On-site Fill—Even Sand
- Stable Surface
- Virtually No Maintenance
- No Heavy Equipment Needed
- Bridges Soft Soils
- Low Environmental Impact



# Application Overview

## Wind Roads & Staging Areas Bridging Over Soft Soils

GEOWEB Geocells deliver economical construction and substantial reduction of maintenance for solar and wind access roads & staging areas. Unstable soil conditions, typical of access roads built in undeveloped areas, can be substantially improved by confining poor quality fill—even sand—in the GEOWEB system.

Roads built with the GEOWEB system effectively support heavy cranes and component delivery—even in problematic soft soil areas—with less fill (up to 50%), less maintenance, and with a more stable surface than unconfined aggregate or geogrids.

Resources   
for your project



# CASE STUDY

Enercon, North Germany

Resources  
for your project 

## Electric & Wind Farm

### Access Road & Pads

- 500,000 sf GEOWEB 12"
- 20 New Wind Turbines
- GEOWEB cells were filled with a sand and aggregate mix



# Slope Protection

The GEOWEB® Slope Protection System can be used to meet a wide range of performance and aesthetic requirements. The three-dimensional system confines the determined infill material to resist anticipated hydraulic flows, inhibit erosion and prevent the downward migration of embankment materials. Single or multi-layered protection systems provide sustainable solutions for a wide range of structural and run-off problems.

**GEOWEB®.**

**Steeper, Stabilized Slopes.**

**1H:1V or Greater.**

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GLOBAL LEADER • GLOBAL PARTNER

# BENEFITS

Delivered by the 3D GEOWEB® System

Resources  
for your project 

## GEOWEB Slope Protection

### Structural Benefits:

- Encapsulates infill and protects against runoff and sloughing of saturated soil.
- Protects far beyond the effective limits of 2D systems.
- Limits undermining by confining upper layer.

### Environmental Benefits:

- Environment for sustainable vegetation.
- Permeable infill promotes stormwater infiltration, reduces runoff.
- Offers “green” alternative to traditional hard surface methods.



### Key Applications

- Closure/Capping of Ash Disposal Facilities
- Access Road Embankment Stabilization
- Slope Protection for Stormwater Systems
- Slope Protection Around Substations
- Stabilization of Primary and Secondary Containment Berms
- Protect Ash Ponds and Surface Impoundments



# Application Overview

## Creating Sustainable Slopes

### Solving Most Complex Soil Stabilization Problems

The GEOWEB system has a long, proven history of stabilizing steep slopes prone to erosion problems where material strength and performance are critical. By confinement of infill, the GEOWEB system's cellular structure stabilizes the upper soil layer on embankments to resist sliding, prevent severe erosion caused by surface runoff, and allow steeper slopes to be built, minimizing a site's horizontal footprint.

The system may be designed with:

- Topsoil
- Aggregate
- Sand
- Concrete
- Engineered Fill (Topsoil/Aggregate Mix)



# CASE STUDY

## LNG Facility Slope Protection

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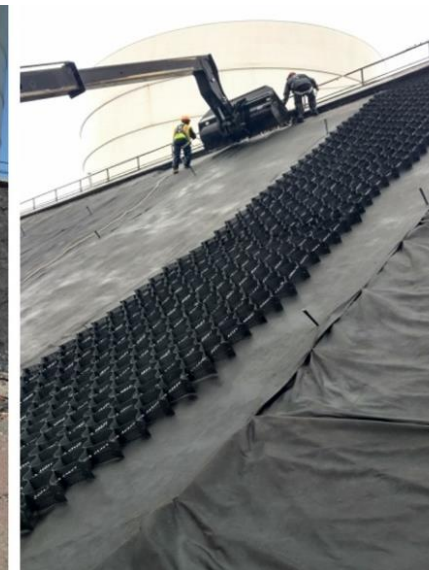
### Repairs Eroded Slopes

#### Protecting LNG Storage Tanks

- Repair 100,000 sf of eroding primary and secondary dikes around a Liquid Natural Gas (LNG) storage tank.
- Steep embankments on the primary dike consisted of 1.2H:1V slopes 26 ft high and 2H:1V slopes 5 ft high on the secondary embankments.
- Primary containment: GEOWEB 6" depth with tendon anchorage.
- Secondary containment: GEOWEB 4" depth with 20" ATRA® Speed Stakes.

#### Rehabilitation Results:

- Completed in Spring of 2017, both the primary and secondary dikes are performing extremely well.





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# Customized Design Support

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## Let Us Evaluate Your Project

### Your site has problems. We can help.

We work closely with energy consultants to evaluate the feasibility of our solutions to economically and technically meet each site's unique challenges.

Our **free project evaluation** considers specific site conditions, loading stresses, and requirements to contain and control water and contaminants.

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

[Request Free Project  
Evaluation >>](#)



## Installation Training

Our experienced technical staff supports energy contractors and owners with pre-construction training and construction oversight.

### Waste no time on site.

Let our experienced staff train your crews—keeping your operations moving efficiently 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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for your project 

Energy projects using the GEOWEB® System offer a low environmental impact solution for reducing energy and land use, preserving resources and water quality, and infiltrating water.



# Environmental Benefits

## Green Sheets



**Energy Use**



**Resource Savings**



**Land Use**



**Water Benefit**

### Download Green Sheets

[Load Support for Maintenance Roads,  
Substations, Wind Pads, Pipeline Support >>](#)

[Slope Protection >>](#)



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**GEOSYSTEMS®**

# Let Our Knowledge Work for You

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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 advance the technology through research and development to provide better solutions that benefit projects in all aspects of energy production.

Let our knowledge & experience help you solve your energy site challenges.

Higher Performance and Lower Maintenance.  
**A better built infrastructure.**

LEARN MORE



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**GEOWEB®**

3D Soil Stabilization

**Build with  
Certainty.**

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

Rely on our experience, tools & resources to help you get in and out of sites faster—and to build safely!



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

**Contact Us: 1-920-738-1328 | [www.prestogeo.com](http://www.prestogeo.com)**