



# TENSAR® GRADE SEPARATION SOLUTIONS SYSTEMS OVERVIEW



► We provide innovative engineered, economical solutions for grade change requirements in the residential, commercial and transportation markets.



### TENSAR® GEOGRIDS

Tensar's Grade Separation Solutions owe their long-term performance and durability to high strength Tensar® Uniaxial (UX) Geogrids. Due to their stiff interlocking capabilities, these geogrids stand the test of time, performing better than other commercially available geosynthetics. For more information on our patented soil reinforcement systems, please visit [www.tensarcorp.com](http://www.tensarcorp.com).

## Proven Solutions and Technologies

Tensar International Corporation (Tensar) is the leading developer and manufacturer of high-performance products and engineered solutions. Our manufacturing facilities enable us to satisfy and exceed customer needs by providing a wide range of geosynthetic solutions for your common earthwork problems.

By providing innovative application technologies and specialized technical services, we supplement our products with value-enhancing alternatives to traditional materials and practices used in earthwork construction. Together, these products, technologies and services constitute engineered systems that serve a variety of commercial and industrial markets.

Simply put, we are a full service provider of specialty products and engineering services and offer economical solutions to common infrastructure and site development needs.

Our expertise focuses primarily on the following fields of grade separation systems:

- ▶ ARES® Modular® Panel Walls
- ▶ ARES Full-Height Panel Walls
- ▶ Mesa® Segmental Retaining Walls
- ▶ SierraScape® Stone Face Wire Formed Walls
- ▶ SierraScape Vegetated Face Wire Formed Walls
- ▶ Sierra® Steepened Slopes
- ▶ Tensar® Temporary Walls

For over 25 years, Tensar has been providing economical solutions for the most challenging grade change requirements. We are committed to serving our client's global interests by providing innovative engineered systems using sophisticated earth reinforcement techniques.



**Eastgate Road - Henderson, Nevada**

*With geogrid reinforcement inert to chemical and electrical exposure, ARES panel walls are well suited for fills that do not meet electrochemical backfill criteria.*



**Inverness Heights - Hoover, Alabama**

*The random placement of four different colors for the Mesa walls provided an attractive and unique aesthetic complement to the store's facade.*



## Experience You Can Rely On

Tensar delivers engineered systems that combine technology, engineering, design and products. Unique in their quality, consistency and durability, Tensar® Geogrids are composed of materials resistant to physical deterioration and loss of strength caused by aggressive chemical environments.

### TENSAR® UNIAXIAL GEOGRIDS

Tensar UX Geogrids are manufactured using select grades of high-density polyethylene (HDPE) resins that are highly oriented and resist elongation when subjected to high tensile loads for long periods of time. These geogrids carry large tensile loads applied in one direction, and their open aperture structure interlocks with natural fill materials, making them ideal for mechanically stabilized earth (MSE) and reinforced soil slope (RSS) applications.

### THE ENGINEERED ADVANTAGE™

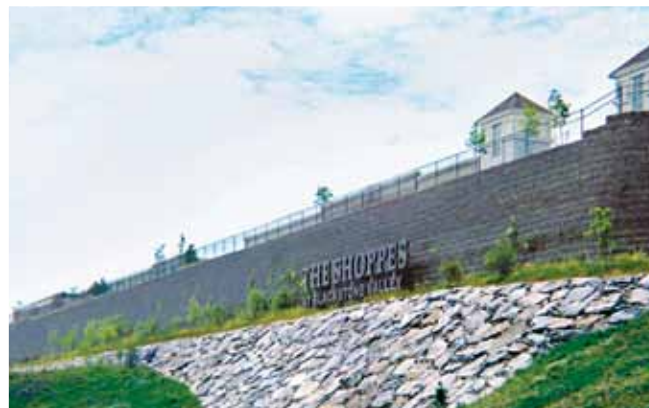
Tensar is the industry leader in internal soil reinforcement. We have developed products and technologies that have been at the forefront of the geotechnical industry for more than two decades. As a result, you can rely on our systems and design expertise. Our products are backed by the most thorough quality assurance practices in the industry. And, we can provide full engineering and construction services, including detailing, design, site assistance and final stamped drawings for each of our grade separation solutions.

For more information on all of our Grade Separation Systems, call **800-TENSAR-1**, visit [www.tensarcorp.com](http://www.tensarcorp.com) or send an e-mail to [info@tensarcorp.com](mailto:info@tensarcorp.com). We are happy to supply you with additional information, system specifications, design details, conceptual designs, preliminary cost estimates and much more.



**Interstate H-3 – Oahu, Hawaii**

ASCE recognized this Sierra® Slope project with the 1998 Outstanding Civil Engineering Achievement Award.



**Blackstone Valley – Millbury, Massachusetts**

The SierraScope® System was chosen because it met the aesthetic demands of the town and the Engineer's space requirements, all while saving time and money by using on-site soils.

» When long-term performance and speed of construction are important, ARES® Retaining Wall Systems offer unmatched advantages.



DOTs, contractors and engineers have long appreciated the many advantages of MSE panel walls. Their wide range of appearances and finishes, combined with the simplicity and speed of construction, make them attractive when compared to other types of wall systems. Unfortunately, limitations imposed by the behavior of steel reinforcing materials and a very narrow and expensive range of acceptable backfill properties have restricted their use until the introduction of the ARES® Systems featuring Tensar® Geogrids. By mechanically connecting Tensar Geogrids to the panel facing, the fully integrated ARES Retaining Wall Systems now offer a long lasting, cost-effective and aesthetic solution.

ARES Systems are proven MSE retaining wall solutions. They have been evaluated by the Highway Innovative Technology Evaluation Center (HITEC) and millions of square feet have been installed on a variety of transportation and site development projects.

### NO METAL - NO CORROSION

With soil reinforcement that is 100% polymeric, ARES Retaining Wall Systems are proven concrete panel wall solutions that eliminate corrosion concerns. ARES Systems offer the cost advantages of an MSE retaining wall without the long-term consequences of exposure to chlorides, sulfates, low-resistivity soils or stray electric current potential. This makes ARES Systems the logical choice for “hot” backfill soils, transformer platform areas and electrified rail systems.

### THE ARES SYSTEMS ADVANTAGE

The ability to utilize non-metallic earth reinforcement makes the ARES Systems inert to chemical and electrical corrosion. The inert properties of Tensar Geogrids permit the use of a wide range of backfills, including recycled materials, translating into greater economy and the potential for a sustainable design.

ARES® Systems' Components	
Component	Function
<b>Tensar Geogrids</b>	High-density polyethylene (HDPE) structural geogrids internally reinforce the fill materials. Inert to chemical degradation, they can be used with different backfill materials, even recycled concrete.
<b>Precast Panel Facing</b>	Available in standard 5 ft x 5 ft (1.5 m x 1.5 m), 5 ft x 9 ft (1.5 m x 2.75 m), or can be customized for full height construction.
<b>Bodkin Connector</b>	HDPE Connector for high connection efficiency without the concern for corrosion.
<b>Full Engineering and Construction Services</b>	Detailing, design, site assistance and stamped drawings for each ARES project upon request.



**Tanque Verde Interchange – Tucson, Arizona**

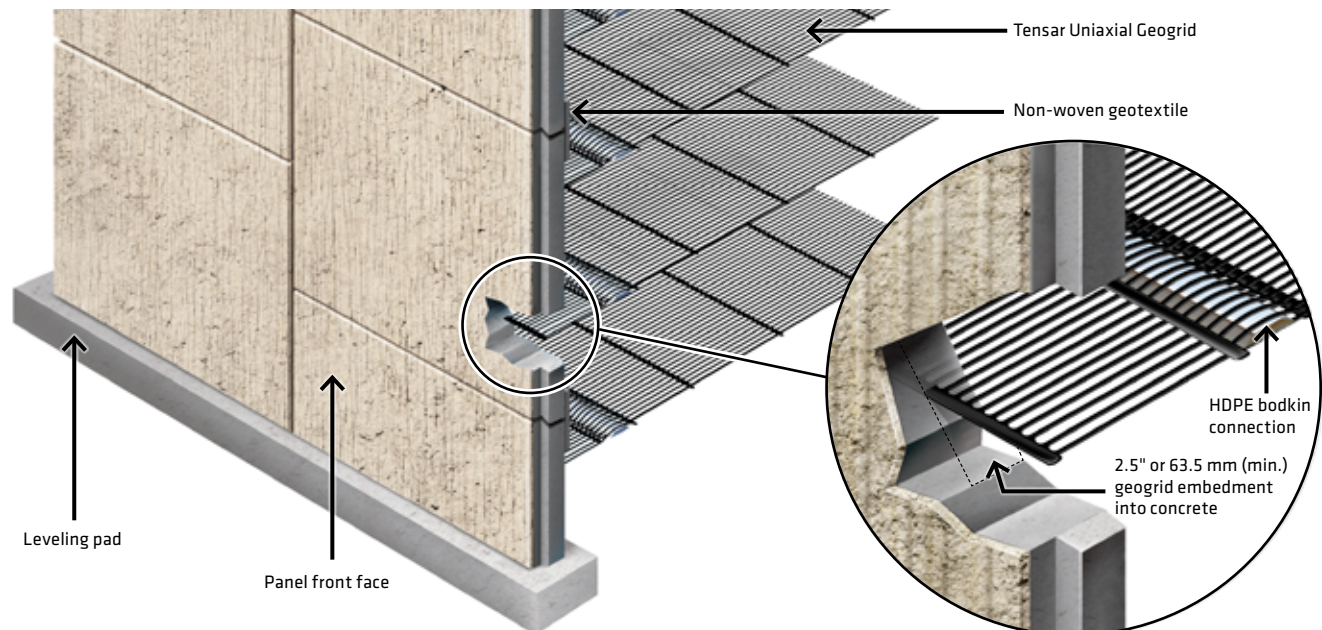
Constructed in 1984-85, this was one of the first Tensar Walls ever built. This demonstrates the long-term performance of the Tensar® ARES® Full-Height Panels System.

## Proven in the Field

As testimony to the durability of the ARES® Systems, one of the first Tensar® Geogrid-reinforced panel walls was built as a seawall on the Gaspé Peninsula in Canada. After 20 years of North Atlantic storms and constant exposure to salt water, there are no signs of corrosion or deterioration of the soil reinforcement. In fact, some of the first ARES installations were instrumented and carefully observed to verify the

effectiveness and long-term performance of the systems. As part of an FHWA study at the Tanque Verde project in Arizona, the Tensar Geogrid behind sections of one such ARES wall was excavated to validate its durability. Twenty-five years after the original installation, the walls continue to perform as designed with no maintenance issues.

## ARES Retaining Wall Systems – Modular Panel Walls



➤ All in all, ARES® Systems provide a structurally dependable solution for a variety of grade change requirements, while saving time and money during installation.

## Structural Stability Combined with Aesthetic Appeal

### AN ECONOMICAL ADVANTAGE

ARES® modular and full-height panels offer designers a choice of textures and patterns to fit the architectural, structural and budgetary needs of your next retaining wall project. The panels are cast with polymer tabs embedded in the rear face of each panel and then connected to the Tensor® reinforcing geogrid. The 100% polymer connection assures load transfer to the reinforcement with no loss in design strength for the project's life.

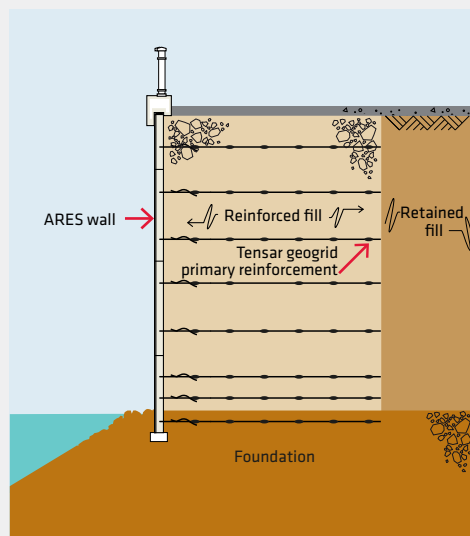
In addition to the various aesthetic options available, contractors will also benefit by saving time and labor costs when installing ARES Systems. The ARES panels contain significant face area while the reinforcement is lightweight and easy to connect - no nuts or bolts to tighten.

All in all, ARES Systems provide a structurally dependable solution for a variety of grade change requirements, while saving time and money during installation.



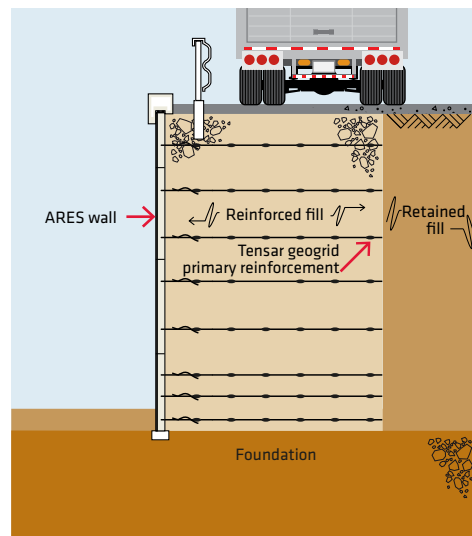
#### Memorial Causeway - Clearwater, Florida

*The non-corrosive properties associated with Tensor Geogrids allowed the ARES System to be used in this salt water application.*



#### King Kamehameha - Oahu, Hawaii

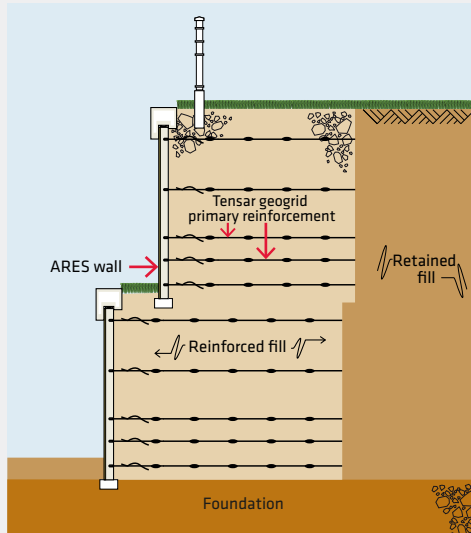
*ARES Full-Height Panels permit the use of a wide range of architectural finishes.*





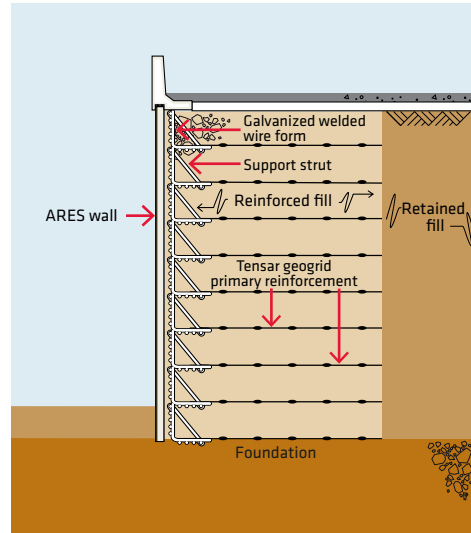
**West Reynolds Road - Lexington, Kentucky**

By using the ARES® Full-Height Panels, the contractor and government saved a significant amount of time and expense on installation.



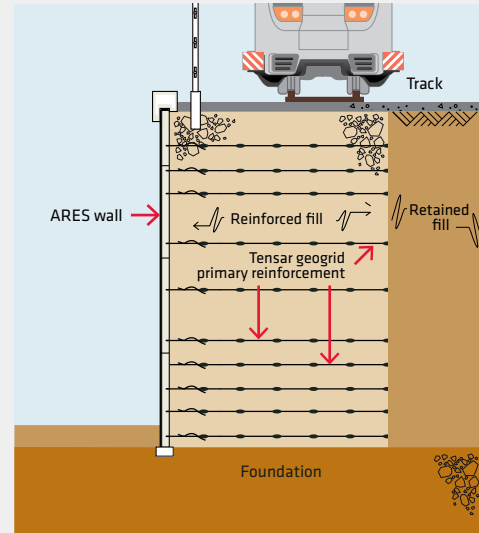
**Third Street - Auburn, Washington**

Faced with constructing an embankment of very soft soils, the ARES 2-stage wall system was utilized to allow for anticipated post-construction settlement.



**San Diego Light Rail - San Diego, California**

Project specifications required that metal not be in contact with the earth backfill. The Tensar® Geogrid reinforcement used with the ARES System provided the ideal solution.





➤ Mesa® Walls provide the dependability engineers require, the efficient installation contractors have come to expect, and the aesthetics owners and architects demand in the industry today.



### A SINGLE-SOURCE SOLUTION

For over a decade, the Mesa® Retaining Wall Systems have been the retaining wall solution of choice for many architects and engineers. One of the only concrete segmental retaining wall (SRW) systems with a proven, positive, mechanical connection, the Mesa Systems offer superior and cost-effective solutions for your structural and landscaped retaining wall needs in the commercial, industrial, residential and transportation markets.

With a network of licensed independent block manufacturers throughout the United States, Canada and Latin America, the Mesa Systems have become a new standard in SRW technology. Designed as a truly integrated solution, they are the only SRW system where the block, geogrid and connector have been developed by one company. Unlike other SRWs, the components of a Mesa Wall have been specifically designed

to work together for optimum efficiency and performance. High-strength, low-absorption concrete units, high-shear strength connectors and Tensar® Geogrids all work together to form a mechanically stabilized earth (MSE) system that can meet or exceed the industry standard. In fact, as a result of the high connection strength and reliability of the system,\* core fill is rarely needed. Using less core fill results in greater project savings through less imported stone and less labor.

If you're looking for long-term durability, increased structural integrity and simplified construction, all at lower costs than most conventional alternatives, specify the Mesa Retaining Wall Systems on your next project.

*\*Core fill is defined as the aggregate fill within the open void space of an SRW Block. Core fill is suggested for wall segments that form convex curves with a radius less than 25 ft (7.6 m) and 90° outside corner units.*

Mesa® Systems' Components	
Component	Function
<b>Tensar Geogrids</b>	High-density polyethylene (HDPE) structural geogrids internally reinforce the fill materials. Inert to chemical degradation, they can be used with non-select fill or even recycled concrete.
<b>Mesa Segmental Units</b>	High-strength concrete block with a compressive strength that exceeds the National Concrete Masonry Association (NCMA) standards (>4,000 psi) (27.6 MPa).
<b>Mesa Connectors</b>	Unique locking connectors are designed to mechanically connect the Tensar Geogrids to the Mesa Units. Provide a low-strain, end-bearing connection that is not dependent on friction for structural integrity and allow walls to be built near vertical or with a 5/8" (1.6 cm) setback.
<b>Full Engineering and Construction Services</b>	Detailing, design, site assistance and stamped drawings for each Mesa project upon request.





## The Connection You Can Count On

### TESTED TRANSPORTATION SOLUTIONS

The long-term performance of any retaining wall system is tested most rigorously in the public transportation market. Differential settlement, traffic barriers and seismic loads can test the strength of any retaining wall, so connection strength must be reliable. The Mesa® Connectors were specifically designed to meet these long-term performance demands, providing a mechanical connection where it's needed most – at the face. The system and connection components are largely unaffected by abrasion, tearing or hydrolysis – factors that can undermine the performance of frictional systems using a woven polyester reinforcement. When specifying a Mesa Wall, you are assured that the system's structural components are reliable and designed for long-term performance.

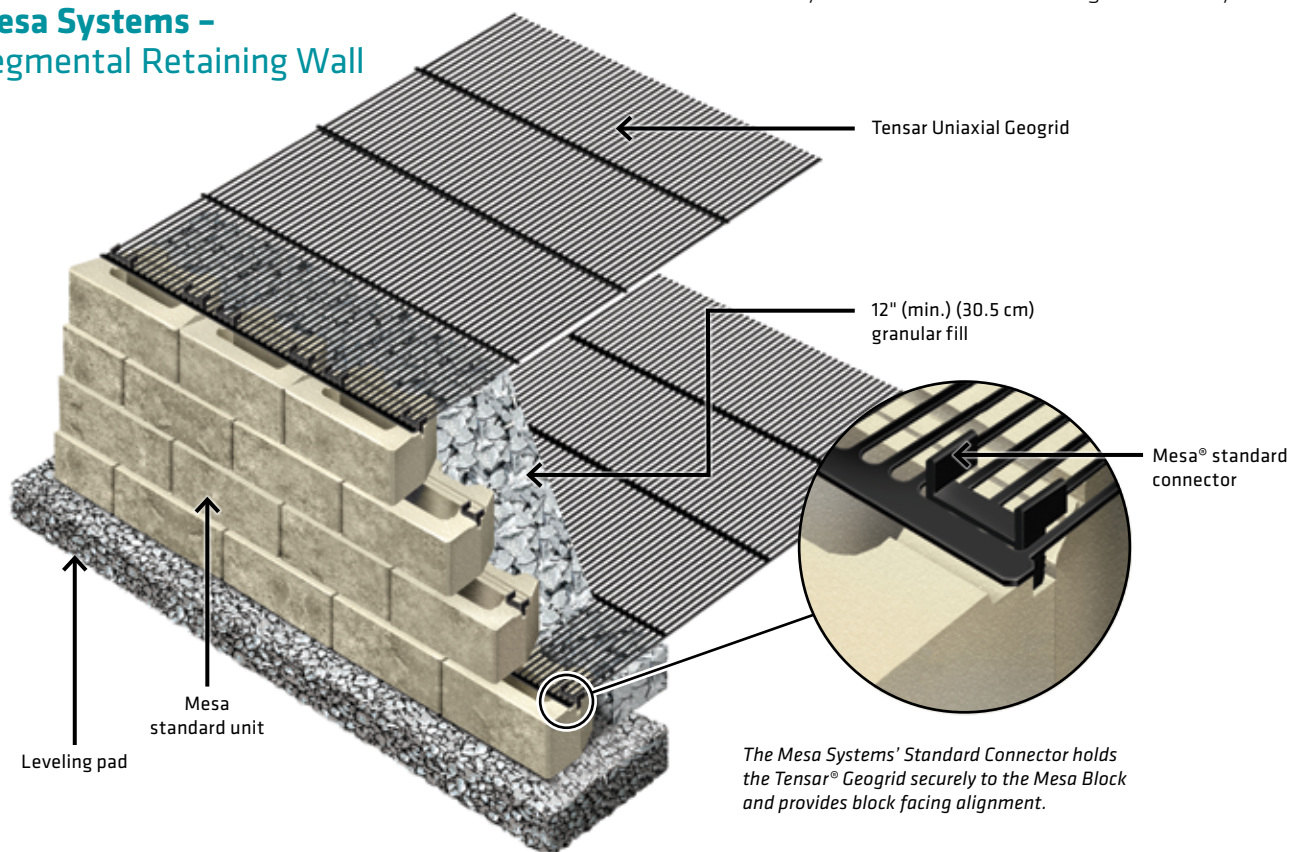
### CREATIVE COMMERCIAL APPLICATIONS

When designing for commercial applications, the need to combine creative looks with practical installations becomes a necessity, while at the same time maintaining the bottom line. That's where the Mesa Systems can help. By coexisting with both nature and industry, a Mesa Wall combines creativity with structural stability, providing the ideal solution for almost any commercial application.

### RELIABLE RESIDENTIAL PROJECTS

Whether you're increasing useable land or improving property value, the Mesa Systems can solve your most challenging grade change requirements with a full line of segmental retaining wall products. From building large structural walls for multi-family homes to tiered garden walls in your own backyard, Mesa Units blend effortlessly with the natural surroundings of most any site.

## Mesa Systems – Segmental Retaining Wall





## Exceptional Performance and Integrity

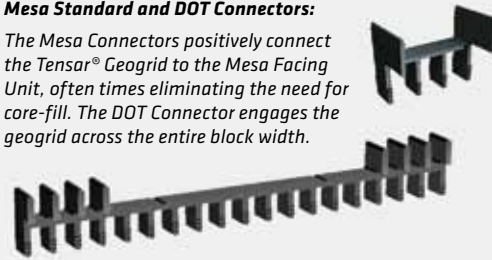
### ENDLESS DESIGN AND AESTHETIC OPTIONS

Beyond design, if your site needs a retaining wall, why not make it as attractive and useful as possible. In today's competitive and ever-changing wall market, architects and owners are continually looking for new ways to build walls that look as good as they perform.

Mesa® Systems are at the forefront of the industry with a wide array of design options. From blending and variegating colors and textures, to planting greenery on tiered walls and top slopes, segmental retaining walls become more than a site solution – they become an appealing aesthetic feature on your site.

#### Mesa Standard and DOT Connectors:

The Mesa Connectors positively connect the Tensor® Geogrid to the Mesa Facing Unit, often times eliminating the need for core-fill. The DOT Connector engages the geogrid across the entire block width.



#### Standard Units

The most popular Mesa Unit in our full line of products. The Standard Unit can be used for almost any SRW need.

8" h x 18" w x 11" d nom./75 lbs  
(20 cm x 46 cm x 28 cm/34 kg)



#### Ashford™ Units

Create randomly patterned walls using the Mesa® Ashford™ System. Units are available in three different sizes for a wide variety of facing options (only available with a straight split).

Standard Unit: 8" h x 18" w x 11" d nom./75 lbs  
(20 cm x 46 cm x 28 cm/34 kg)

Medium Unit: 8" h x 12" w x 11" d nom./60 lbs  
(20 cm x 30 cm x 28 cm/27 kg)

Tall Unit: 16" h x 6" w x 11" d nom./60 lbs  
(40 cm x 15 cm x 28 cm/27 kg)



#### Corner Units

Units are used to create walls with clean and precise 90-degree corners.

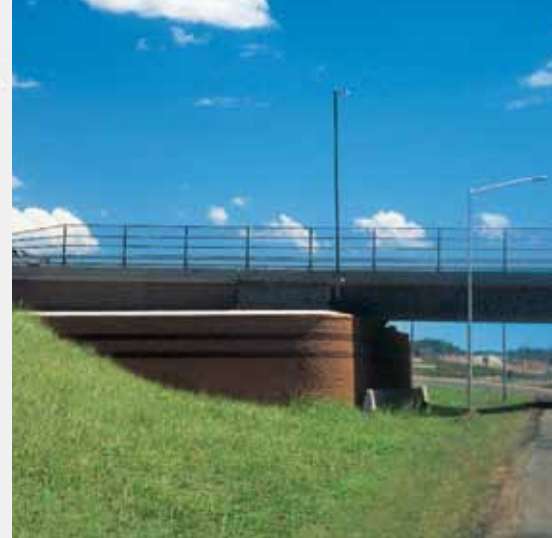
8" h x 18" w x 9" d nom./60 lbs  
(20 cm x 46 cm x 23 cm/27 kg)



#### Cap Units

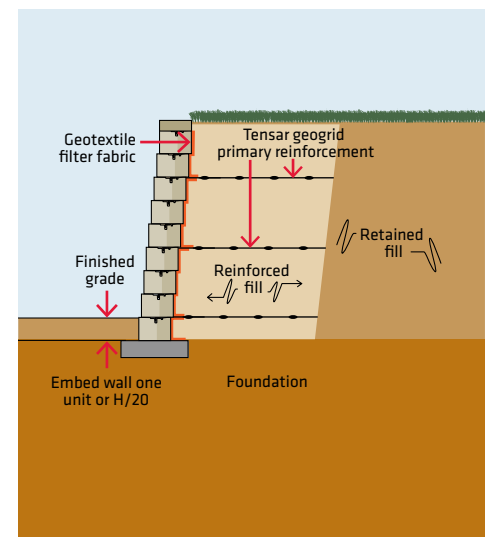
Units are used at the top of the wall for a finished look.

4" h x 18" w x 11" d nom./40 lbs  
(10 cm x 46 cm x 28 cm/18 kg)



#### I-25 Founders Meadow – Castle Rock, Colorado

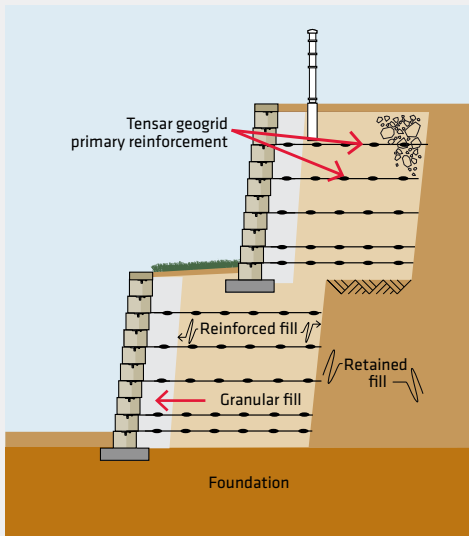
CDOT I-25 was the first major bridge in the United States to be built on footings supported by geogrid-reinforced abutments.





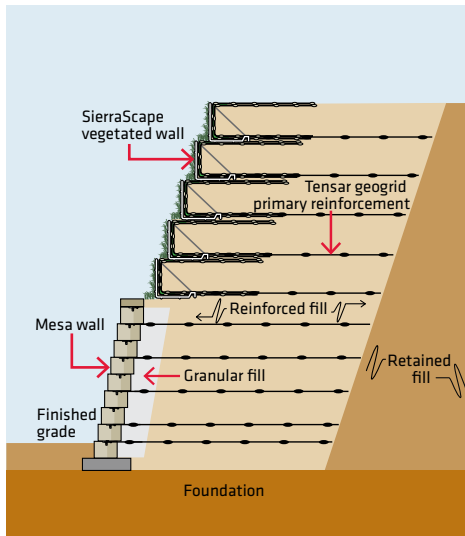
**Avalon Bay Communities – Fort Lee, New Jersey**

Varying elevations and tight property constraints posed a challenge for the residential site. A design-build solution provided over 48,000 sq ft (4,459 m<sup>2</sup>) of Mesa® Walls, with heights exceeding 30 ft (9 m).



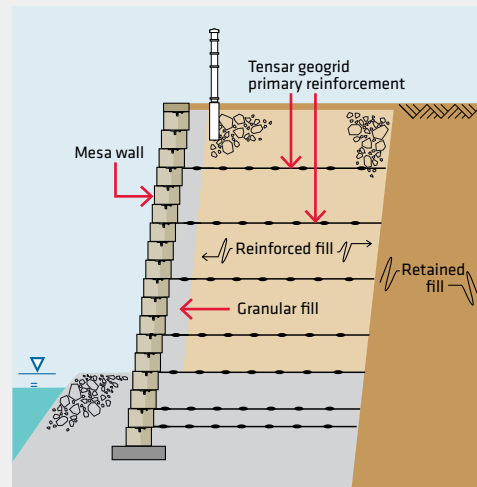
**Brookworth Plaza – West Chester, Pennsylvania**

A multi-system installation of both Mesa and SierraScape® Systems provided a solution to the owner's request for green sightlines to the detention pond.



**Westgate Villas – Orlando, Florida**

Originally proposed 4:1 grass slopes would have resulted in an inefficient use of the property. Instead, Mesa Walls were used to maximize land use, contain the water runoff and provide a structural connection.



▶ The SierraScape® Retaining Wall System offers a more affordable alternative to concrete for various grade change requirements.



Engineers and architects are constantly under pressure to find cost-effective alternatives to traditional wall systems. In a range of applications, they are finding that the best solution – in terms of appearance, performance and overall value – is the SierraScape® Wire-Formed Retaining Wall System. Backed by over two decades of engineering experience and over 10 million square feet of installations worldwide, the SierraScape System is a complete retaining wall solution which includes materials, design, specifications and technical assistance when needed.

### THE POSITIVE CONNECTION™

The SierraScape System combines Tensar® Geogrids with a positive mechanical connection, providing a dependable and cost-effective solution for the most challenging grade change projects. This connection better withstands differential settlement, offers exceptional performance in areas where seismic activity or heavy external loads are a concern and

virtually eliminates surficial stability problems often associated with other alternatives. The SierraScape Connection also provides a visual construction quality control check during installation.

### INSIDE AND OUT – NO OTHER WALL SYSTEM COMPARES

When it comes to structural stability, no other wire-formed retaining wall compares. The SierraScape System adapts to a variety of project conditions, design requirements and aesthetic options. When compared to concrete, the system can be a more cost-effective solution. Its unique wire forms ease installation and help speed up construction time. Better yet, the SierraScape System’s resistance to environmental degradation, low maintenance and design versatility help make it the right choice for almost any retaining wall application.

#### SIERRASCAPE® Systems’ Components

Component	Function
<b>Tensar Geogrids</b>	High-density polyethylene (HDPE) structural geogrids internally reinforce the fill materials. Inert to chemical degradation, they can be used with non-select fill or even recycled concrete.
<b>SierraScape Facing Elements</b>	Galvanized wire-form baskets that provide permanent facial stability during placement and compaction of fill material, and simplify facing alignment.
<b>Locking Tail Strut</b>	Locking struts secure the geogrid to the SierraScape basket tail, and help stiffen the facing element to maintain alignment.
<b>Geotextiles</b>	Separation filter fabric provides a barrier between the backfill material and the stone fill at the face.
<b>Turf Reinforcement Mats</b>	Permanent, erosion-control products that aid in vegetation establishment and provide long-term turf reinforcement. Only used in vegetated face applications.
<b>Full Engineering and Construction Services</b>	Detailing, design, site assistance and stamped drawings for each SierraScape project upon request.



## A Complete Retaining Wall Solution

Unlike the stark appearance of most concrete wall systems, the SierraScape® System offers many different facing options to meet your design needs.

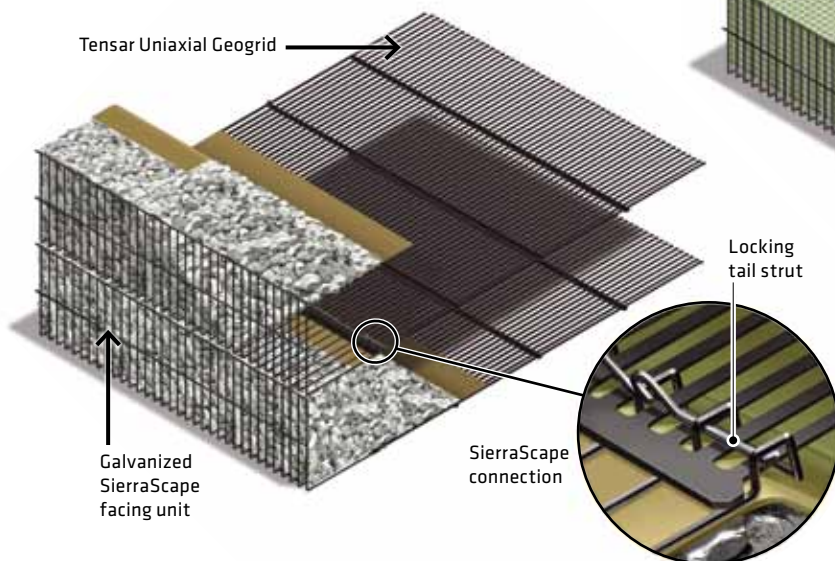
SierraScape facing options include:

- ▶ Stone – facing filled with native or imported stone that can be color and size specified for a desired look and feel
- ▶ Vegetated – designed with a vegetated face for a natural appearance and usually incorporates local plant species to blend the wall into the existing environment
- ▶ Architectural – veneer treated with stacked stone or a shotcrete sculpted face providing a unique, traditional finish

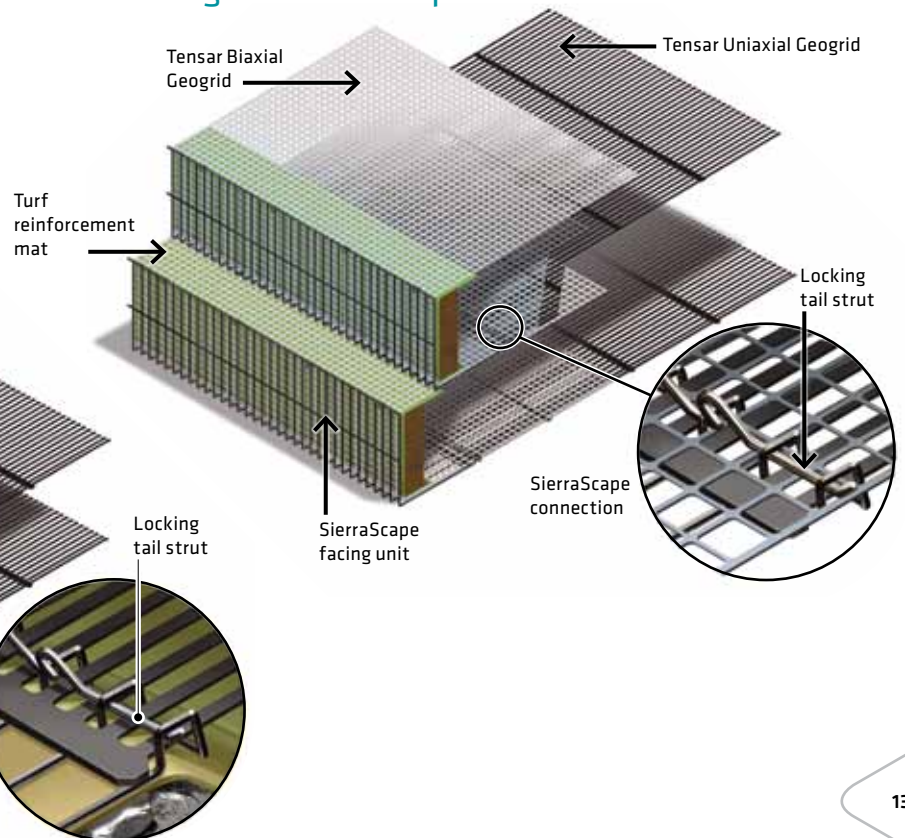
### EASE OF INSTALLATION KEEPS COSTS DOWN

Integrating SierraScape components create durable, yet simple-to-build structures. With a small number of components, project assembly moves quickly and without specialized equipment or labor. Welded-wire forms stack easily to create a uniform wall face, and unlike geotextile wrap walls, stiff Tensor® Geogrids and the unique SierraScape Locking Tail Strut help maintain facing alignment. And, because the system can be backfilled with general embankment fills or on-site soils, cost savings for fill materials and disposal costs can also be realized.

### SierraScape System – Stone Face Option



### SierraScape System – Vegetated Face Option





## A Positive Connection with an Economical Advantage

### THE SOLUTION OF CHOICE

The SierraScape® System has increasingly become the system of choice for residential, commercial and transportation applications. By combining beauty and elegance with efficiency and performance, SierraScape Walls are built to stand the test of time.

#### ► Stone:

Components stack quickly and evenly to create a more uniform wall face. Their flexibility and connection capabilities help resist differential settlement.

#### ► Vegetated:

SierraScape Vegetated Walls provide a versatile soil retaining wall structure where different native vegetated covers blend naturally with the surrounding green space.

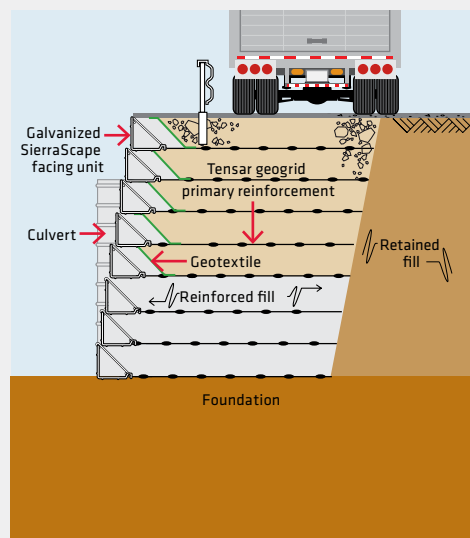
#### ► Pressure Relief:

Structurally equivalent to traditional approaches, SierraScape Pressure Relief walls effectively reinforce surrounding fill so lateral soil loads against the below grade structure are eliminated.



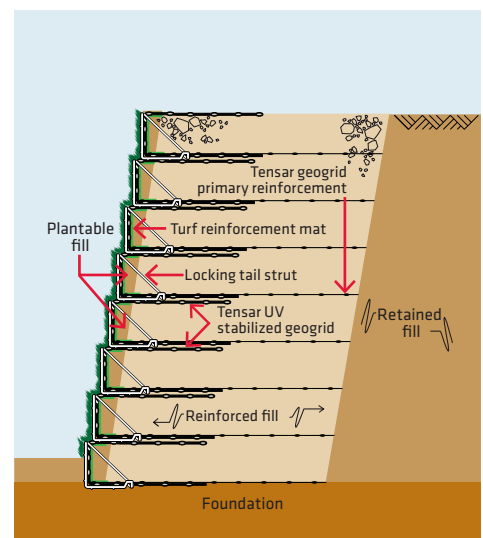
### Vulcan Materials Plant – Columbia, South Carolina

*The stone-filled SierraScape wall and superspan structure allow heavy trucks easy and stable passage to and from the quarry.*



### Post River Apartments – Atlanta, Georgia

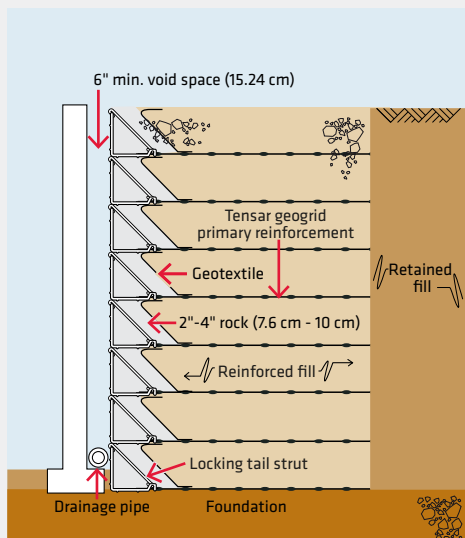
*Environmental impact, budget and aesthetics were concerns when selecting a retaining wall for this apartment complex, the natural choice was the SierraScape System with a vegetated face.*





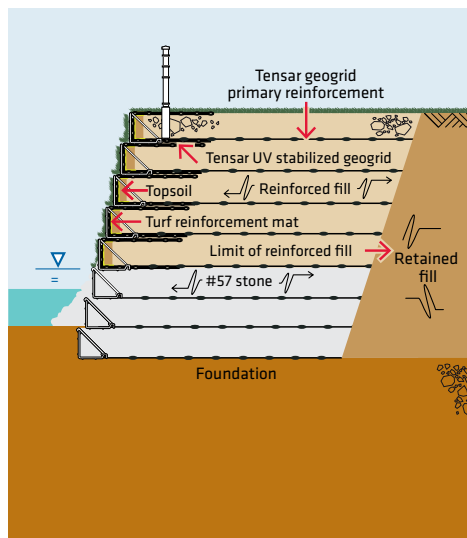
**Brentwood Towne Square - Pittsburgh, Pennsylvania**

To eliminate lateral soil loads, a SierraScape® Pressure Relief Wall was selected as a cost-effective alternative to traditional below-grade construction.



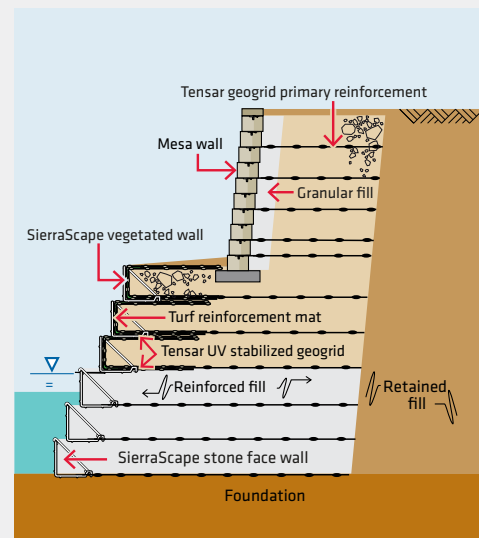
**Quail Ridge - Kelowna, British Columbia**

The combination of stone face walls for drainage and vegetated walls for a "green" natural face provided the ideal configuration at this upscale golf course community.



**Webb Gin - Gwinnett County, Georgia**

A multi-system design combined a Mesa Wall with both vegetated and stone face SierraScape Walls, providing a unique and aesthetic solution.



› The Sierra® Slope Retention System provides an economical and aesthetic alternative to conventional retaining walls.



The Sierra® Slope Retention System, a premier reinforced soil slope (RSS) retention system, was introduced by Tensar in 1982.

The Sierra Slope Retention System is a complete and fully integrated mechanically stabilized earth (MSE) system. Each mechanical component has been designed to work together for optimum efficiency in a variety of challenging site and loading conditions.

The cost effectiveness of the Sierra System, coupled with a natural aesthetic appeal, provides an RSS retention system that is routinely specified by government agencies, developers, engineers and architects for a variety of applications:

- ▶ Commercial, industrial and retail
- ▶ Single- and multi-family residential housing
- ▶ Transportation infrastructure
- ▶ Recreation facilities
- ▶ Municipal water and storm water management

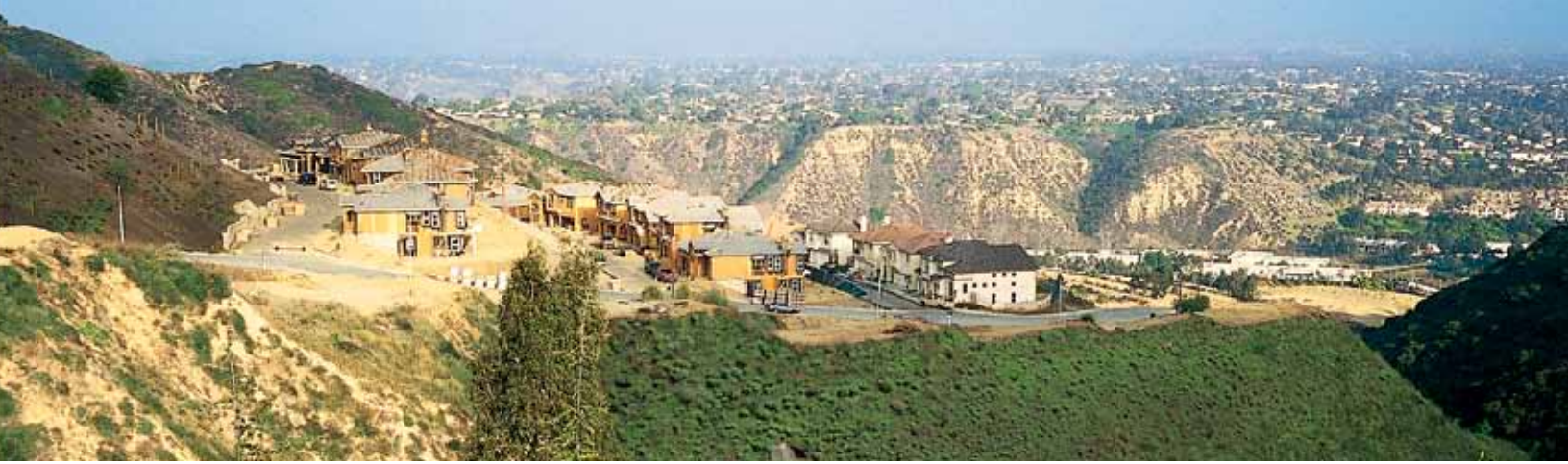
The Sierra System significantly reduces material and installation costs by virtually eliminating limitations imposed by soil conditions, minimizing fill requirements and allowing the use of on-site fills. The economic benefits of Sierra Slopes have led cost-conscious transportation agencies around the world to select them for landslide repairs, overpasses and roadway widenings.

These same cost advantages have led to the use of the Sierra System by site developers concerned with enhancing property values and preserving the natural beauty of their sites. Sierra Slopes can be graded so that the appearance of these reinforced earth retention structures is almost indistinguishable from the native terrain.

### Sierra® Systems' Components

Component	Function
<b>Tensar Uniaxial (UX) Geogrids</b>	Primary reinforcement that internally reinforces the soil structure and fill materials.
<b>Tensar Biaxial (BX) Geogrids</b>	Secondary reinforcement that provides surficial stability of the slope structure.
<b>Site-Specific Facing System</b>	Provides aesthetic value by offering multiple facing options, including bioengineering.
<b>Full Engineering and Construction Services</b>	Detailing, design, site assistance and stamped drawings for each Sierra project upon request.





## A Complete and Proven System

### ECONOMICAL

- ▶ Create usable land in previously undeveloped areas
- ▶ Save up to 60% versus conventional concrete retaining walls
- ▶ May allow for lower quality fills so on-site soils are usually acceptable
- ▶ Installs quickly and without specialized equipment

### FLEXIBLE

- ▶ Create slopes from 26° to 70° to fit site development conditions
- ▶ Use a smaller footprint while maximizing land for development
- ▶ Create curved slopes and varying face angles for a more natural look
- ▶ Specify a variety of facing options from erosion blanket to professionally landscaped vegetation

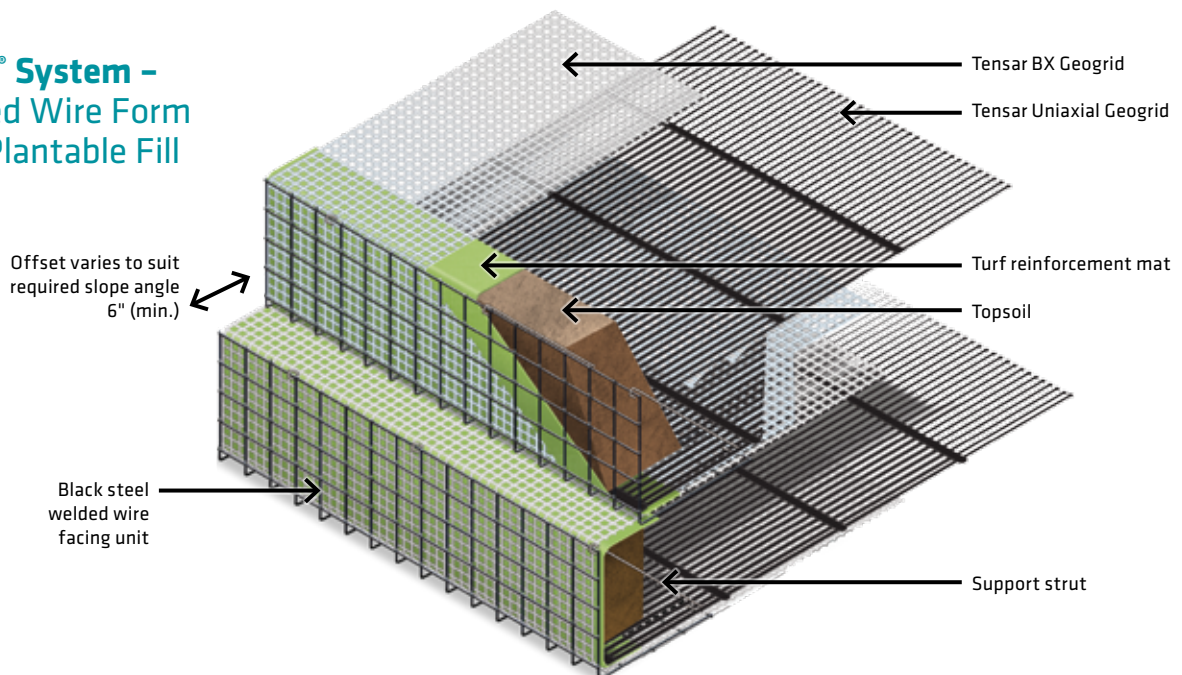
### ATTRACTIVE

- ▶ Blends naturally with the surrounding environment
- ▶ Not subject to facial distortions and cracking like concrete walls
- ▶ Resists the effects of differential settlement and seismic activity

### PROVEN

- ▶ Over 40 million square feet of Sierra® Slopes have been installed
- ▶ Stands up to the most critical loading situations: railways, bridge abutments and building foundations
- ▶ Sierra Slopes have adapted to extreme conditions and withstood multiple seismic events exceeding 0.4 g
- ▶ Constructed with high performance Tensar® Geogrids

### Sierra® System – Welded Wire Form with Plantable Fill





## Optimal Designs Based on Site Constraints

### SITE SPECIFIC SOLUTIONS

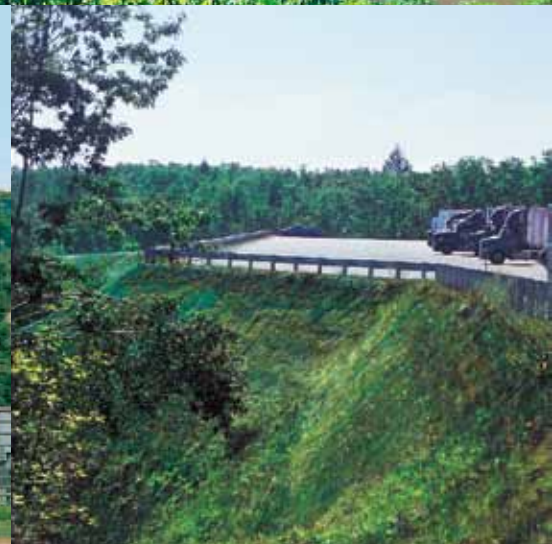
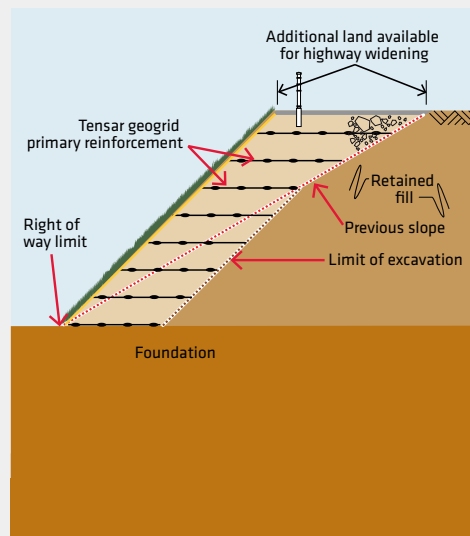
The Tensar® Sierra® Slope System was developed to provide designers and specifiers countless layout and slope angle options. The flexibility of the Sierra Slope System makes it an ideal choice when solving grade separation challenges.

Designers and owners are continually faced with different property and site constraints that require innovative solutions. Some projects may require a very steep grade change in which a green, vegetative face is the right solution. Other projects may utilize complementary grade separation systems, such as the Mesa® Retaining Wall System, to create an aesthetic and cost-effective alternative.



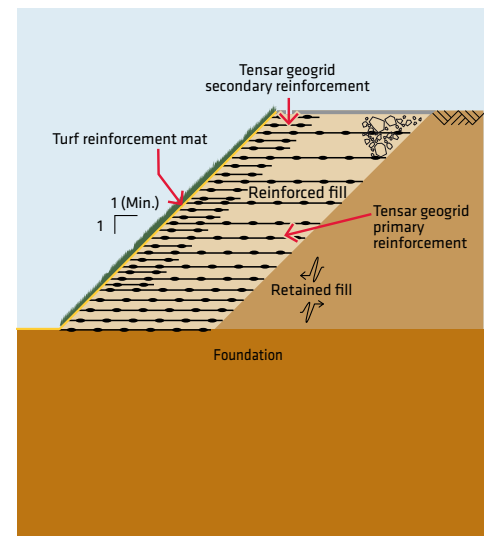
#### Bridge Street – Irwin, Pennsylvania

Departments of Transportation use the Sierra System to stay within the restricted rights-of-way while maximizing land use.



#### Poland Spring Plant Expansion – Poland Spring, Maine

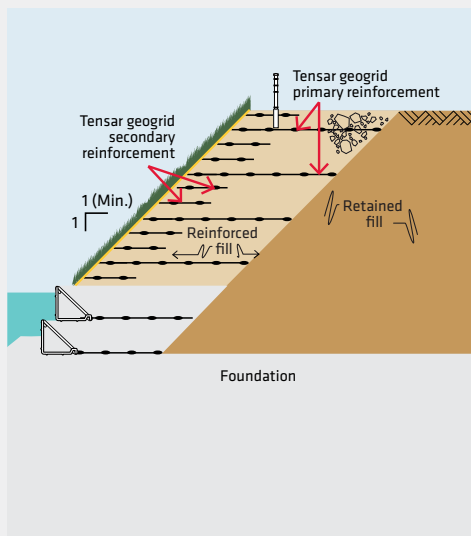
Flower or grass seed installs quickly and is a low-cost alternative for many projects, including overpasses and roadways.





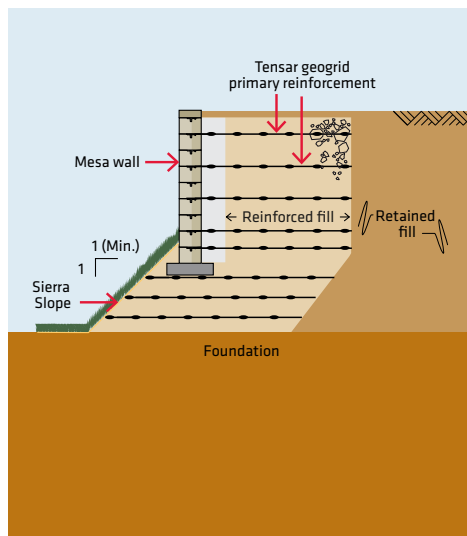
**Marriott Riverchase - Hoover, Alabama**

The Sierra® System easily adapts to a wide range of slope and slope/wall combinations, but the 1H:1V remains the most commonly specified Sierra Slope solution.



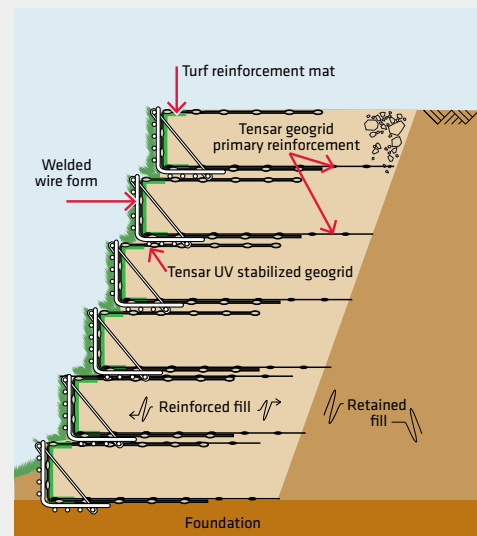
**Pearl Street - Braintree, Massachusetts**

Combine Sierra Slopes and Mesa® Retaining Walls on projects where vertical retention along with reduced material and labor costs are essential.



**Banks County Landfill - Banks County, Georgia**

The Sierra System was used to create 1H:1V inboard slopes and 1H:6V outboard slopes to increase disposal capacity at this landfill without expanding the footprint.



➤ By utilizing less expensive materials, unskilled labor and lightweight equipment, the Tensar® System provides a low-cost alternative for temporary wall applications.



## TENSAR® TEMPORARY WALL

Temporary walls are a necessity for many types of staged construction, but conventional means of constructing them are expensive and require heavy lifting and pile driving equipment. Fortunately, there is a proven technology that allows you to build temporary walls without the difficulties and expense of conventional techniques – the Tensar Temporary Retaining Wall System.

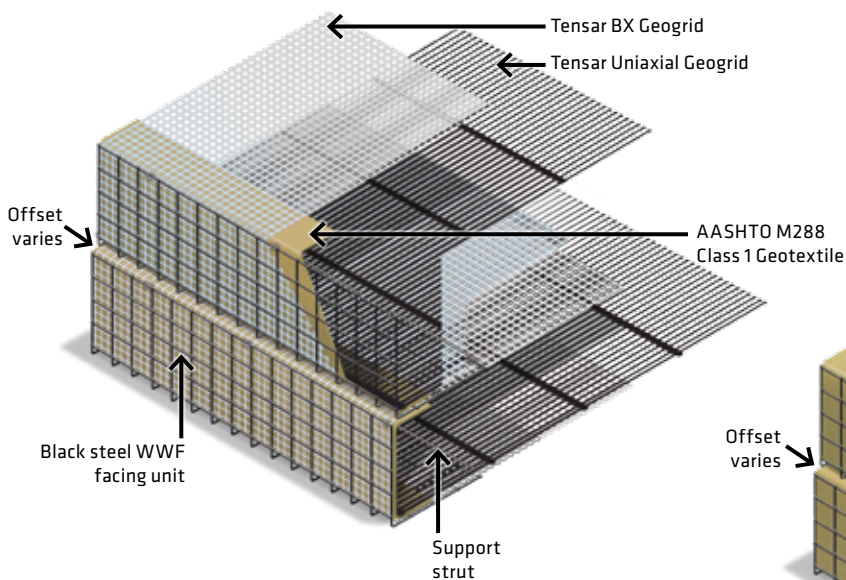
A Tensar® Temporary Retaining Wall can change the construction parameters for applications, such as bridge improvements, road widening projects, phased or staged construction or the construction of surcharge load cells. Tensar Geogrids internally reinforce the fill within the wall and utilize an inexpensive wire-form facing system. Construction of

temporary walls is no longer restricted to sheet pile or soldier pile and lagging walls. Both of these typically require toe penetration equal to or greater than the wall height and/or the use of secondary bracing or deadmen to safely retain the fill.

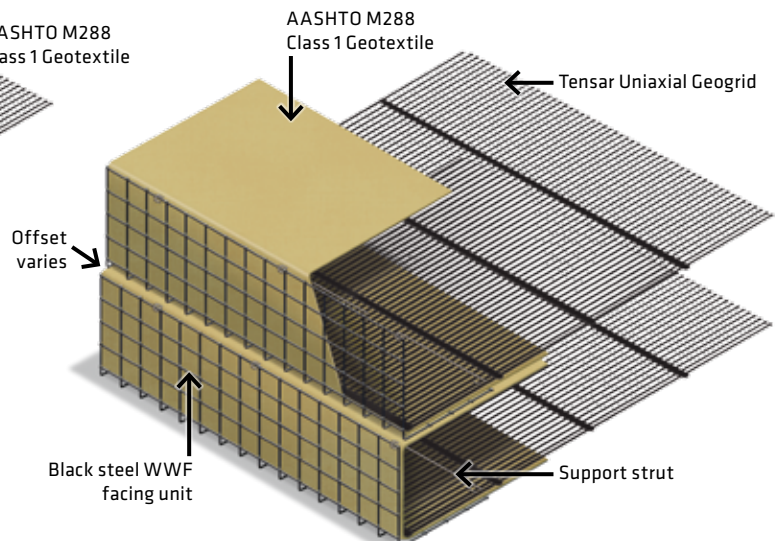
Pile systems have been the temporary wall of choice for many years. These walls require the use of expensive equipment and labor, resulting in significant project costs.

By utilizing less expensive materials, unskilled labor and lightweight equipment, the Tensar Temporary Wall System provides a low-cost alternative for temporary wall applications. Additionally, the materials may be left in place or easily removed as required.

### Temporary Welded Wire Form – with BX and Fabric



### Temporary Welded Wire Form – with Fabric





*The John Paul Jones Arena at the University of Virginia combined the Geopier System in lieu of drilled shaft foundations, with a SierraScape® Pressure Relief Wall to eliminate costly concrete foundation walls.*

## Tensar® Corporation Provides Complete Site Solutions

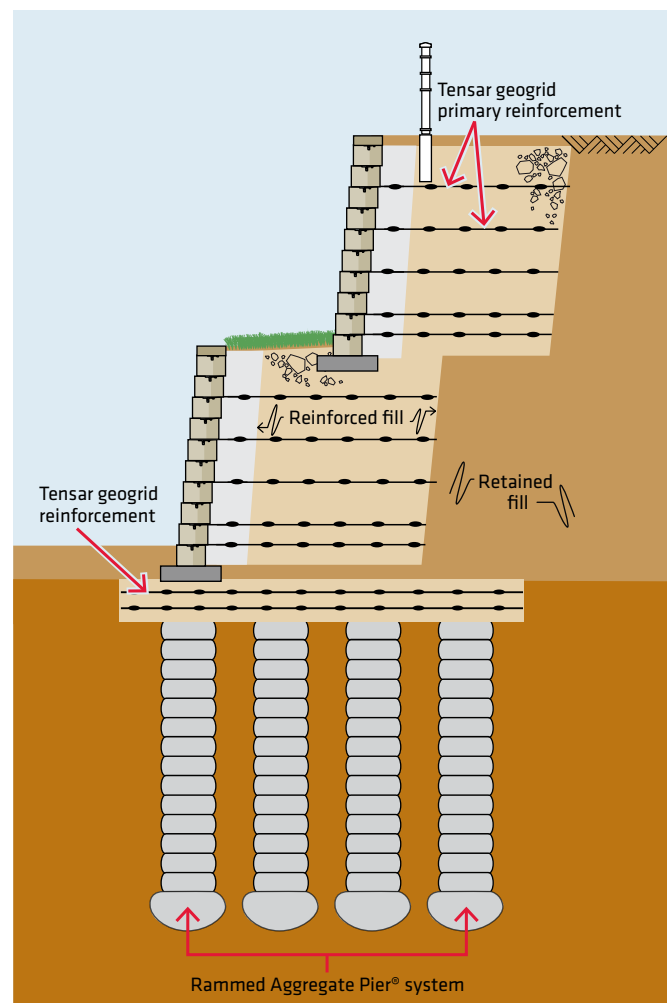
Tensar® Corporation is a premier provider of technology-driven site solutions. We believe that the synergies inherent in combining two or more of our Company's products, services, applications and systems will create faster, stronger, and more economical solutions that save time and money when compared to conventional alternatives. Through Tensar Corporation's Subsidiary units – Tensar International, Geopier Foundation Company and North American Green, we are able to offer high-performance solutions for a wide range of construction site challenges.

An example of these synergies is found in the Southlands of Orchard project in Denver, Colorado. Existing conditions required the use of a Rammed Aggregate Pier® design to reinforce soft soils found on the site. The Geopier® System provided total and differential settlement control and increased bearing support for the proposed Mesa Retaining Wall System. By bringing together two systems from within the same company, Tensar is able to provide a complete site solution package, all from a single source.



*Southlands Orchard Road – Denver, Colorado. This Mesa® Wall used with Geopier System Foundation provided a complete site solution.*

Our systems are based on advanced soil reinforcement technologies that incorporate high-performance patented products. It is the synergies within our company that allow us to be well positioned to provide customized, engineering-based solutions for common site development applications.



## ► Evaluate Every Tensar® Grade Separation System with a Proven Design Application



Tensar is a global site development solutions provider. And the more we grow, the more we're able to offer unique tools that make the design of grade separation systems simpler, faster and more cost-efficient.

That is why we now offer TensarSoil™ Software to engineers and designers of retaining walls and reinforced soil slopes here in North America. Successfully used in Europe, Asia and other regions for more than a decade, the latest version of TensarSoil Software has been expanded to evaluate the feasibility, potential performance and cost benefits of each of our geogrid-reinforced systems, including:

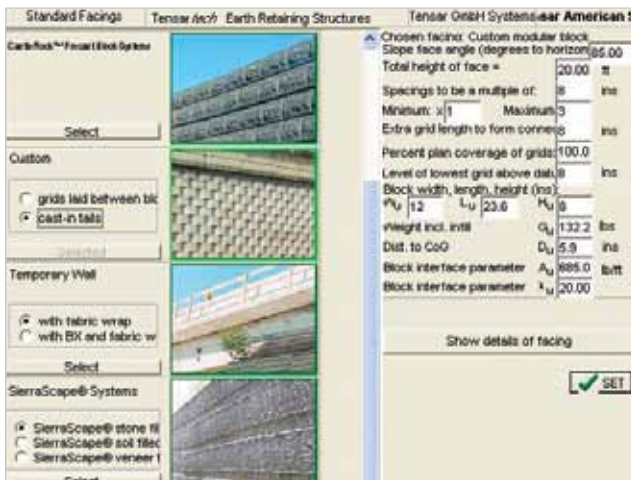
- ARES® Retaining Wall Systems
- Mesa® Retaining Wall Systems
- SierraScape® Retaining Wall Systems
- Sierra® Slope Retention System
- Tensar® Temporary Retaining Walls

In addition, TensarSoil Software may be used with large precast block systems that incorporate Tensar® Uniaxial Geogrid into their design.

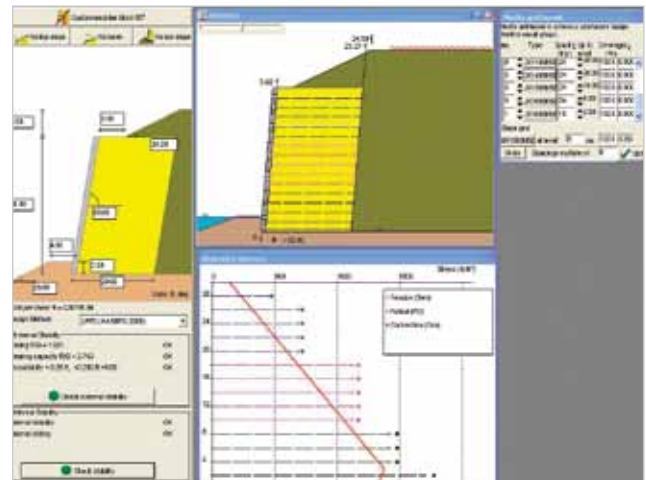
### TENSARSOIL SOFTWARE IS COMPATIBLE WITH ALL MAJOR DESIGN METHODOLOGIES

TensarSoil Software offers a versatile technology that enables you to design Tensar Systems in accordance with all major industry-standard protocols including:

- National Concrete Masonry Association – (NCMA) 1997
- Federal Highway Administration – Demonstration Project 82 (1997)
- Federal Highway Administration – National Highway Institute (FHWA NHI 043) 2001 (AASHTO ASD) 2002
- American Association of State Highway and Transportation Officials – Load and Resistance Factor Design (AASHTO LRFD) 2007



TensarSoil Software allows you to design and compare costs for different Tensar Systems.



Several windows can be simultaneously displayed on a full screen. Windows can be re-dimensioned or repositioned for graphic emphasis, presentation purposes, etc.



*TensorSoil™ Software has been used to design thousands of critical structures across the globe, like the Al Mawaleh Bridge in Muscat, Oman.*

TensorSoil™ Software is programmed with data on all Tensar® wall and slope systems. Fully interactive, it allows you to input and easily alter wall/slope geometry, geogrid grade or layout, surcharge load and/or soil characteristics – *all on a single screen image* – to determine stability data and material costs instantaneously. With each change, results are updated in real time. For Tensar walls, that means that any underdesigned area is immediately revealed, with no need to back-trace through previous screens and then recalculate. Once internal and external stability parameters have been determined, wall or slope design results can be exported to TensarSlope™ Software, our slope stability application, for a comprehensive, compound and global stability analysis.

### EXPERIENCE YOU CAN RELY ON

Tensor, the leader in geosynthetic soil reinforcement, offers a variety of solutions for retaining wall and steepened slope projects. Our products and technologies, backed by the most thorough quality assurance practices, are at the forefront of the industry. Our support services include site evaluation, design consulting and site construction assistance. For innovative solutions to your engineering challenges, rely on the experience, resources and expertise that have set the industry standard for more than two decades.

No other program offers the capabilities you'll find with TensorSoil Software. To sign-up for a training workshop near you, call us at **800-TENSAR-1**. For more information on our Grade Separation Solutions, visit [www.tensarcorp.com](http://www.tensarcorp.com), or call the number above to speak with a Tensar representative.



# Tensar®

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