

MESA® RETAINING WALL SYSTEMS

SYSTEM OVERVIEW



➤ Mesa® Retaining Wall Systems provide the dependability engineers require, the efficient installation contractors expect, and the aesthetics owners and architects demand.



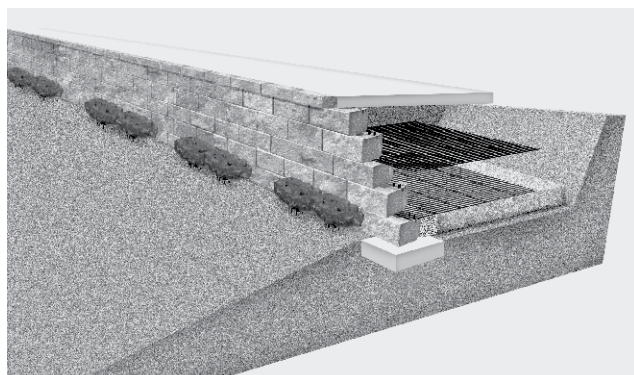
Tensar® Geogrids

Tensar International Corporation's Grade Separation Solutions owe their long-term performance and durability to high-strength Tensar® Uniaxial (UX) Geogrids. With their stiff interlocking capabilities, these geogrids stand the test of time, performing better than other commercially available geosynthetics.

The Solution You Can Count On™

A SINGLE-SOURCE SOLUTION

Since 1999, Mesa® Retaining Wall Systems have been the retaining wall solution of choice for many architects, engineers and DOTs. The first segmental retaining wall (SRW) system with a positive mechanical connection between the geogrid and the wall face, Mesa Systems offer superior and cost-effective solutions for both structural and landscape retaining wall needs in the transportation, industrial, commercial and residential markets.



With a network of licensed independent block manufacturers throughout the United States, Canada and Latin America, Mesa Systems have become the standard in SRW technology. A truly integrated solution, they are the only SRW system where block, geogrid and connector have been developed by one company; unlike other SRWs, the components of the Mesa Systems 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 work together to form a Mechanically Stabilized Earth (MSE) system that meets or exceeds the industry standard. With the Mesa Systems' high connection strength and reliability, core fill* is rarely needed. Using less core fill reduces imported stone and labor requirements, resulting in greater project savings.

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

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

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



Full Line of Products

STRUCTURAL AND LANDSCAPE SOLUTIONS

Whether you're increasing usable land or improving property value, the Mesa® Systems can solve your most challenging grade change requirements with a full line of products. From building large structural walls to small, tiered garden installations, Mesa Units blend effortlessly with the natural surroundings of any site.

AESTHETICALLY VERSATILE

Whether you're creating stairs, 90° corners, or convex or concave curves, Mesa Walls can easily accommodate a variety of design considerations. Based on your aesthetic requirements, Mesa Units can be varied by color and texture, and walls can even be built mixing different facing options. Designs are nearly limitless – architects and designers are bound only by their imaginations.

In addition to the units shown here, we offer Landscape and XL Units as well as products for the do-it-yourself market. Consult your local licensed block manufacturer for the availability of each type of Mesa Unit.

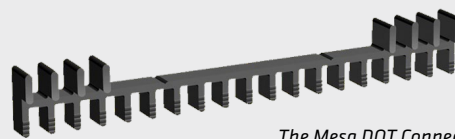


Mesa Components

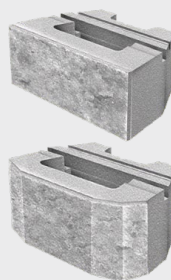
Mesa Standard and DOT Connectors



The Mesa Standard Connectors positively connect Tensor® Geogrid to the Mesa Facing Unit, often eliminating the need for core fill.



The Mesa 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 most retaining wall needs.

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

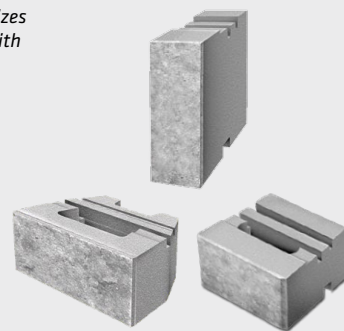
Ashford™ Units

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

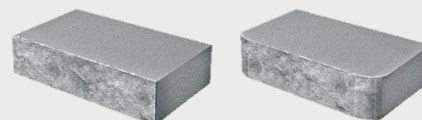
Tall Unit: 16" h x 6" w x 11" d nom./60 lbs
(40 cm x 15 cm x 28 cm/27 kg)



Corner Units

Used to create walls with clean and precise 90° corners.

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



Cap Units

Used at the top of the wall for a finished look.

4" h x 18" w x 12" d nom./40 lbs
(10 cm x 46 cm x 28 cm/18 kg)

NOTE: Actual dimensions may vary depending on location.

► With the Mesa® Systems' structural mechanical connection, you're assured of connection integrity where it's needed most – at the wall face.



Tried and True Transportation Solutions

The long-term performance of any retaining wall system is challenged most rigorously in the public transportation market. Differential settlement, traffic barriers and seismic loads can test the capabilities of any retaining wall, so connection strength must be especially reliable. To ensure that Mesa® Systems meet and exceed the stringent standards of the transportation market, Tensar developed the Department of Transportation (DOT) Connector. With the Mesa Systems' DOT Connector, you're assured of a mechanical connection where it's needed most – at the wall face.

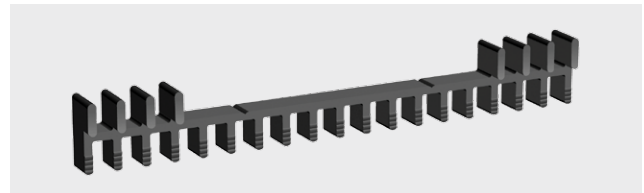
EXCEPTIONAL PERFORMANCE AND INTEGRITY

The Mesa Systems' DOT Connector was designed to meet the long-term performance requirements under current American Association of State Highway and Transportation Officials (AASHTO), Load and Resistance Factor Design (LRFD) and Allowable Stress Design (ASD) criteria. This connector structurally attaches geogrid to the Mesa Systems' concrete facing unit. The system and connection components are largely unaffected by abrasion, tearing or hydrolysis – factors that can undermine the performance of a frictional system using a woven polyester reinforcement. When specifying a Mesa System, you can be assured that its structural components are both reliable and designed for the long term.

RECOGNIZED FOR ITS HIGH STANDARDS

In 2000, the Highway Innovative Technology Evaluation Center (HITEC) completed its assessment of various Mesa Retaining Wall Systems' configurations. (Unbiased performance reviews conducted by HITEC provide information that helps Departments of Transportation make informed purchasing decisions.) The evaluation of the Mesa Systems as a geosynthetic-reinforced retaining wall solution is often a determining factor for their inclusion in transportation project specifications. Since the 2000 evaluation, Mesa Systems have undergone additional installation and design improvements. Many of the improvements made have been accepted and are being utilized by leading DOTs.

To obtain a copy of the Mesa Systems' HITEC evaluation, please call **800-TENSAR-1**.



The Mesa Systems' DOT Connector engages the geogrid across the entire block width.





► Adaptable to a variety of environments and industry demands, a Mesa® Wall combines knowledge with creativity and functionality, providing the ideal solution for any setting.



Creative Commercial Projects

When designing for commercial applications, the need to combine design performance, practicality and cost efficiency becomes a necessity. That's where the Mesa® Systems can help. After all, a Mesa Wall offers both aesthetic appeal and structural stability, providing the ideal solution for almost any commercial project.

ENDLESS APPLICATIONS, COMMERCIAL AND MORE

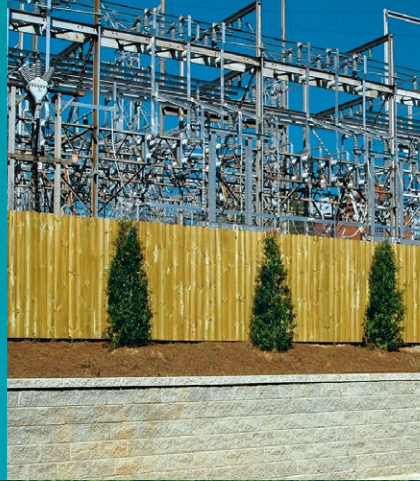
- **Commercial Developments:** Retail malls, big box stores and office complexes
- **Municipal Projects** – Schools, hospitals, government buildings, public parks and libraries
- **Stormwater Management** – Detention ponds, dry ponds and extended storage ponds, including brackish and salt water environments
- **Recreational Jobs** – Golf courses, amusement parks, amphitheaters and sports facilities

BUILDING ON CODE

Local building codes are applicable to almost all retaining walls in the commercial, industrial and even residential markets. Most municipalities in the U.S. regulate, enforce and inspect the design standards for SRWs that exceed four feet in height. Conforming to these codes is imperative. If codes are not met, the chance of wall failure and/or fines is increased. We're proud that various configurations of the Mesa Systems have been rigorously evaluated by local and state governments across North America.

NOTE: Please consult with a local geotechnical engineer to determine the suitability of a Mesa Systems' installation for your particular needs.





- ▶ Durable Tensar HDPE Geogrids are unaffected by aggressive soil conditions and resist chemical, biological and environmental degradation.



Up to the Task at Industrial Sites

Retaining walls are vital to the operational efficiency of industrial sites worldwide. They must be designed to be durable, with the ability to carry heavy loads and repeated traffic for many years. Mesa® Retaining Wall Systems featuring Tensar® UX Geogrid address grade separation and earth retention needs on and adjacent to a variety of industrial sites to keep operations running safely and smoothly.

When specifying a Mesa Wall, you can be assured that its structural components are reliable and designed for the long term. And with soil reinforcement that is 100% polymeric, Mesa Walls also allow structures to be built using a wide range of backfills, including recycled materials, for greater economy.

Tensar UX Geogrids are manufactured using select grades of HDPE resins that can be highly oriented to resist elongation when subjected to heavy loads for long periods of time. These geogrids carry large tensile loads applied in one direction, while their open aperture structure interlocks with natural fill materials, making them ideal for MSE walls required at industrial sites.

BENEFITS OF MESA® RETAINING WALL SYSTEMS

- ▶ Durable geogrids that are unaffected by aggressive soil conditions and resist chemical, biological and environmental degradation
- ▶ The ability to use a variety of backfill soils, including those with chlorides, sulfates, and high and low pH levels
- ▶ Rapid and economical construction, without the need for specialized equipment or labor
- ▶ Reliable structures that require little or no maintenance
- ▶ Resistance to impact loading and seismic activity
- ▶ Reduced need for expensive foundation treatments due to low bearing pressure

In addition, Tensar's team of professionals can provide a full range of services including initial planning, engineered drawings and on-site assistance. We offer solutions that combine technology, engineering, design and materials to meet the unique requirements of industrial operations and applications.





Reliable Residential Applications

Mesa® Walls provide a variety of solutions for single-family and multi-family home developments. Whether you need a structural or landscape wall, Mesa Units blend with the natural surroundings to combine creativity with functionality and provide a solution for almost any residential application. By building a Mesa Wall, you're adding property value to your land – it's that simple.

POWER OF THE POSITIVE

There's a lot to be said for beauty and versatility in the residential market. But you want to be sure that your wall withstands the test of time.

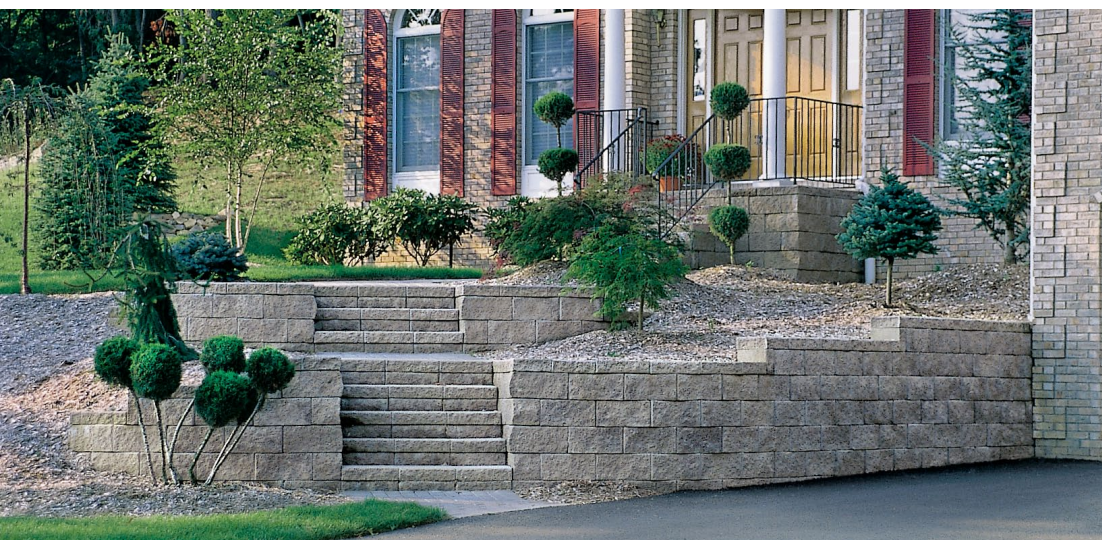
With structural walls, it can all come down to connection. If you compromise connection strength, you risk wall failure. Most other segmental retaining wall systems rely on aggregate interlock or friction between the components to hold the geogrid in place, calling it a "connection." By contrast, the patented, mechanical Mesa Connector provides a block-to-geogrid connection that does not rely on friction or the weight of the Mesa Unit to achieve connection strength.

MORE THAN JUST LANDSCAPE WALLS

Beyond structural walls, your property can be enhanced using simple landscape wall designs. Mesa Systems offer aesthetic options that complement any architectural style and are easier to maintain than conventional wall alternatives. Unlike treated lumber and railroad ties, Mesa Units will not rot or warp. Their high-compression strength concrete resists insect infestation, assuring a virtually maintenance-free and environmentally friendly structure that is sure to please any property owner.



The Mesa Systems' Standard Connector holds Tensar® Geogrid securely to the Mesa Block.



➤ TensarSoil-PRO™ Software helps you make sound technical decisions based on specific site requirements while continuing to optimize the overall design of Mesa® Retaining Wall Systems.



Designing with TensarSoil-PRO™ Software

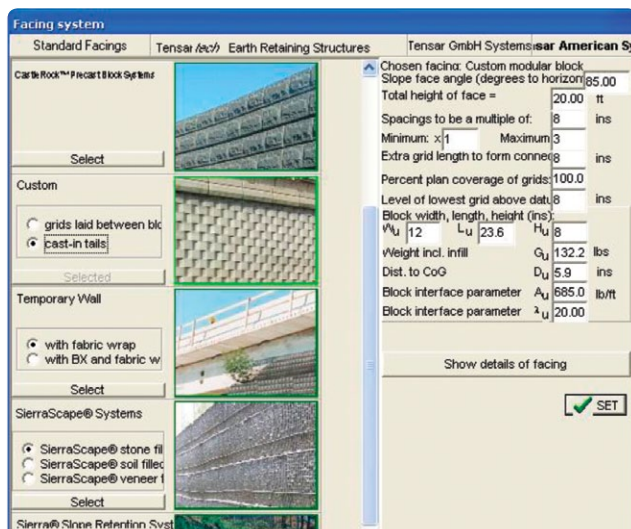
We're proud to offer TensarSoil-PRO™ Software to engineers and architects interested in state-of-the-art technology for designing Mesa® Retaining Wall Systems. This unique application has the flexibility to adjust design input variables to meet project specifications while helping you make sound technical decisions based on your specific site requirements.

TensarSoil-PRO Software offers versatile technology that enables you to design Mesa Walls in accordance with all major industry-standard protocols including:

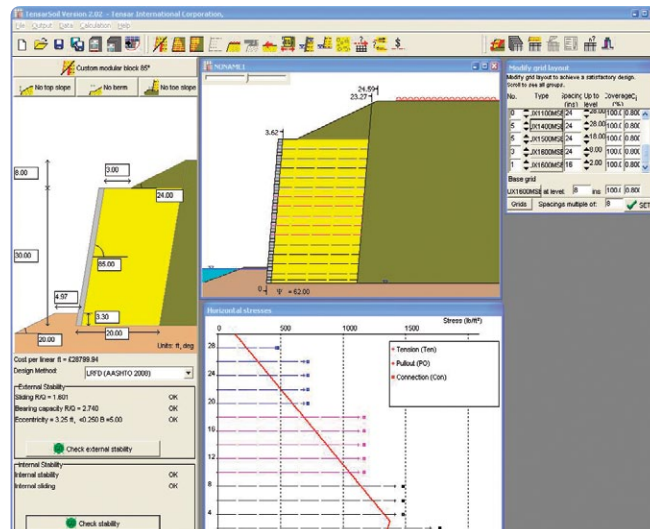
- ▶ National Concrete Masonry Association – (NCMA) 1997
- ▶ Federal Highway Administration – Demonstration Project 82 (1997)
- ▶ Federal Highway Administration – National Highway Institute (FHWA NHI 043) 2001 (AASHTO ASD) 2002
- ▶ American Association of State Highway and Transportation Officials – Load and Resistance Factor Design (AASHTO LRFD) 2010

This innovative software includes data on all of our retaining wall systems. Fully interactive, it allows you to input and easily alter wall 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 Mesa Walls, that means that any under-designed area is immediately indicated, with no need to back-trace through previous screens for recalculation. Once internal and external stability parameters have been determined, design data can be exported to TensarSlope™ Software, our slope stability application, for comprehensive, compound and global stability analyses.

No other application offers the capabilities you'll find with TensarSoil-PRO Software. Training workshops are available through your local sales representative. In addition, a hands-on demonstration is available for TensarSoil® Software, which features two design methodologies for the analysis of Mesa Retaining Wall Systems, the SierraScape® Retaining Wall System and the Tensar® Temporary Retaining Wall System.



TensarSoil-PRO™ Software allows you to design prototypes and compare costs of different retaining wall solutions.



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

Standard Mesa® Systems Design

PLEASE NOTE: The following information is provided for general illustration purposes only and does not constitute engineering advice. Final designs should be executed only by a qualified professional engineer providing sealed drawings, calculations and detailed installation requirements.

USING THE CHARTS

The generalized design charts on pages 12-13 address six different design scenarios with wall elevations ranging from 4 ft (1.2 m) to 14 ft (4.2 m) and increasing in height incrementally by 2 ft (600 mm). The design scenarios alter the wall batter, backfill soil type and loading conditions. Understanding these different scenarios is important for selecting the most appropriate solution for your specific design.

- ▶ **Wall Batter** – Mesa® Walls can be constructed at either near-vertical or 4.5° batter
- ▶ **Soil Types** – The two backfill soil types are a sand material (32°) and a silty sand or clayey sand (28°) that meet a minimum gradation and plasticity recommendation provided by NCMA

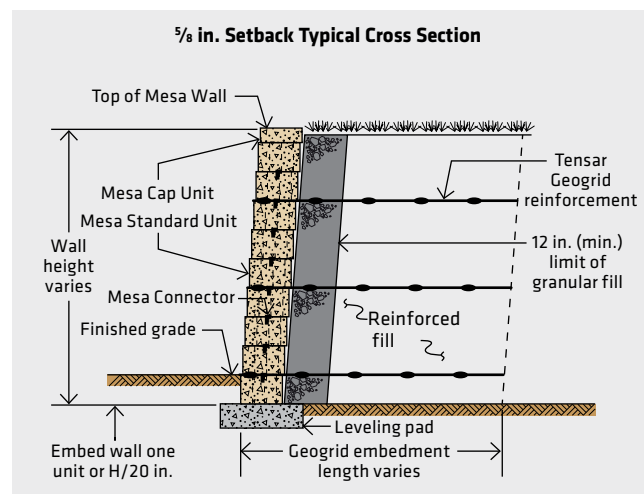
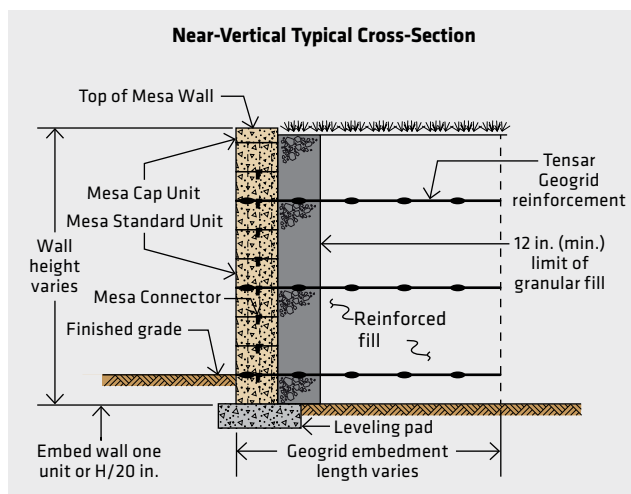
▶ **Loading Conditions** – The three loading conditions are:

1. A horizontal surface at the top of the wall with no surcharge load
2. A horizontal surface at the top of the wall with a uniform surcharge of 180 psf
3. A 3H:1V slope on top of the wall

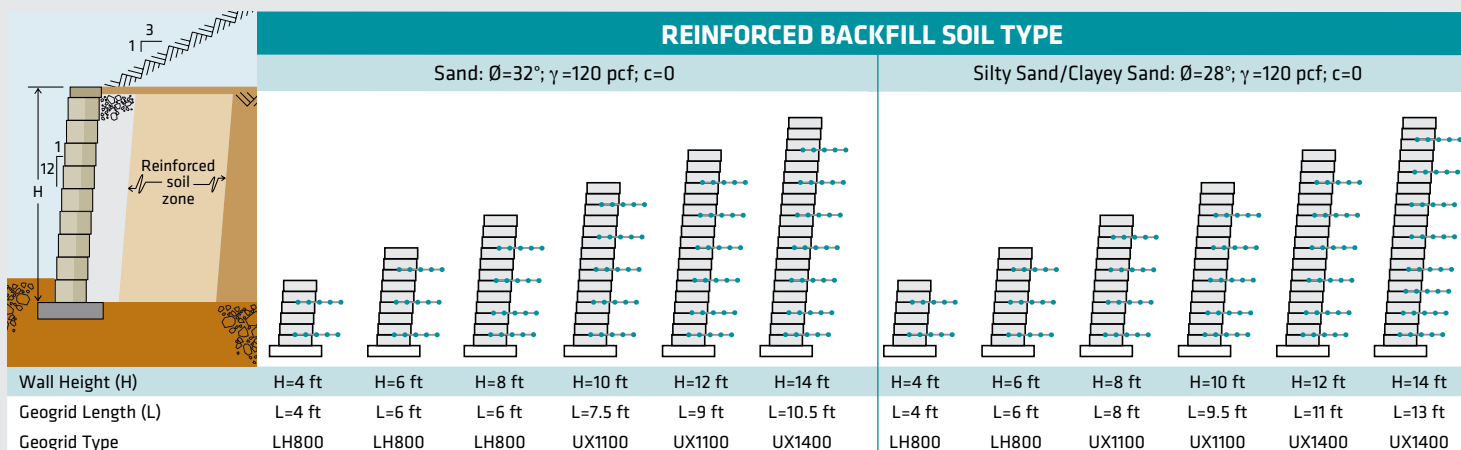
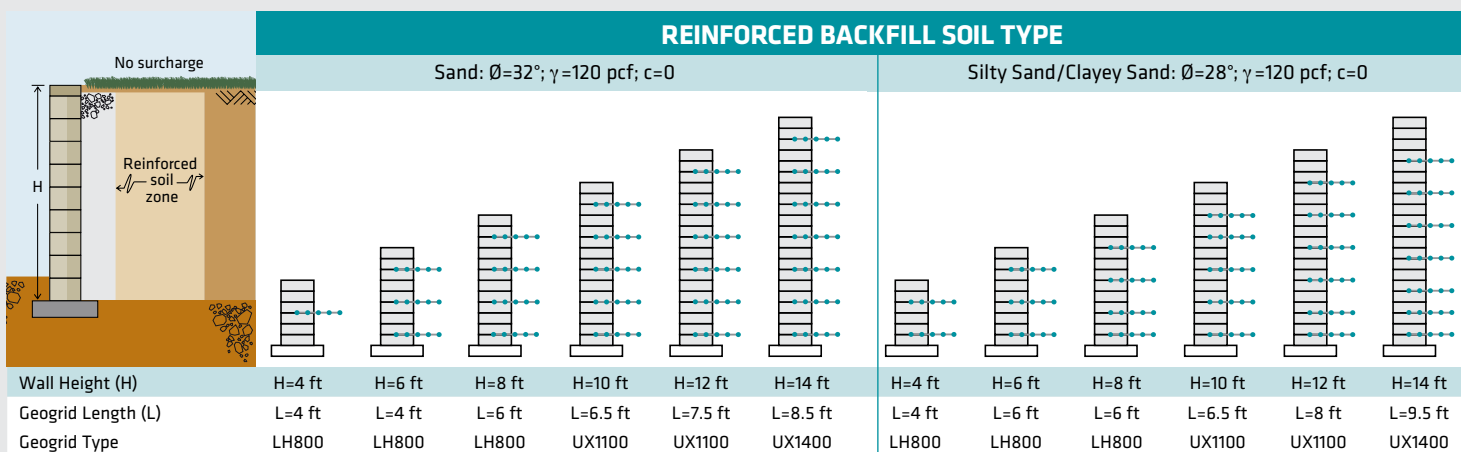
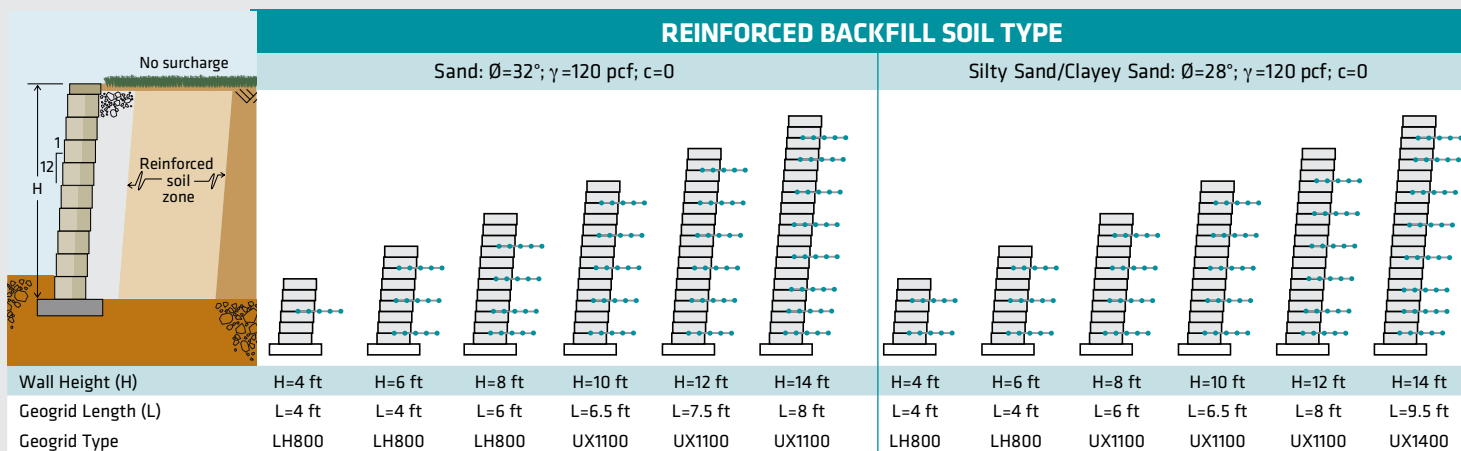
Once the most appropriate design has been selected, the charts will provide the suggested geogrid type, embedment length and geogrid spacing. All lengths listed are measured from the wall face to the last transverse bar* on the Tensar® Geogrid and are uniform throughout the given elevation of the wall.

The design charts assume that the walls are constructed in accordance with the Mesa® Systems' standard specification and installation guidelines. Other requirements and limitations based on actual site conditions may also apply.

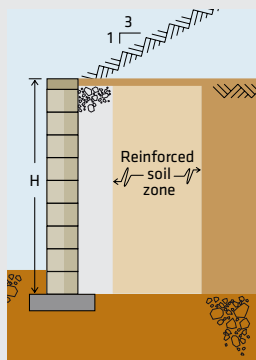
**The transverse bar is the solid section of the Tensar® UX Geogrid, approximately 3/4 in. wide, located parallel to the face of the retaining wall and in a repeat pattern at a 6 in. to 20 in. spacing (depending upon the type of UX Geogrid being evaluated).*



Mesa® Design Charts



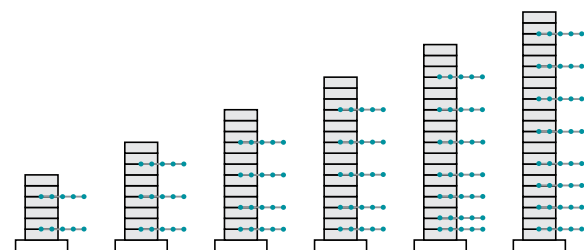
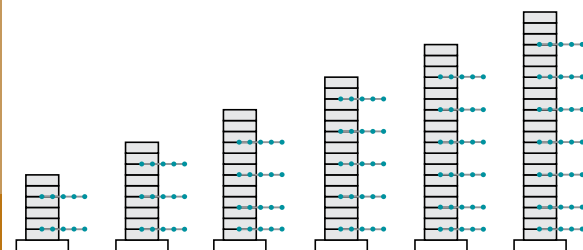
NOTE: All Tensor Uniaxial Geogrids shown are UXMSE Geogrids.



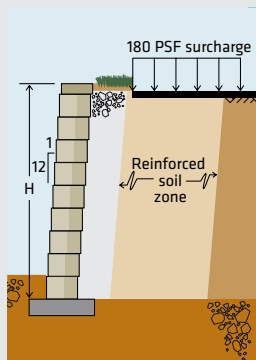
REINFORCED BACKFILL SOIL TYPE

Sand: $\phi=32^\circ$; $\gamma=120$ pcf; $c=0$

Silty Sand/Clayey Sand: $\phi=28^\circ$; $\gamma=120$ pcf; $c=0$



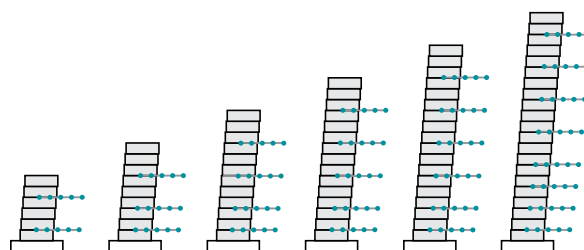
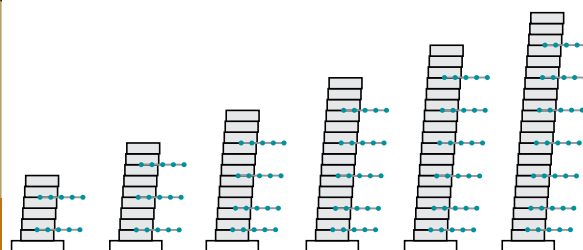
Wall Height (H)	H=4 ft	H=6 ft	H=8 ft	H=10 ft	H=12 ft	H=14 ft	H=4 ft	H=6 ft	H=8 ft	H=10 ft	H=12 ft	H=14 ft
Geogrid Length (L)	L=4 ft	L=6 ft	L=6 ft	L=7 ft	L=8.5 ft	L=10 ft	L=4 ft	L=6 ft	L=7.5 ft	L=9 ft	L=11 ft	L=12.5 ft
Geogrid Type	LH800	LH800	LH800	UX1100	UX1100	UX1100	LH800	LH800	UX1100	UX1100	UX1100	UX1400



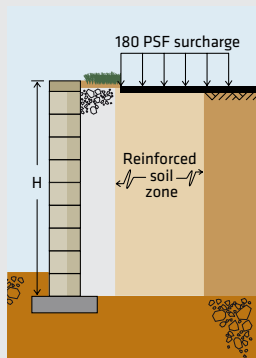
REINFORCED BACKFILL SOIL TYPE

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Silty Sand/Clayey Sand: $\phi=28^\circ$; $\gamma=120$ pcf; $c=0$



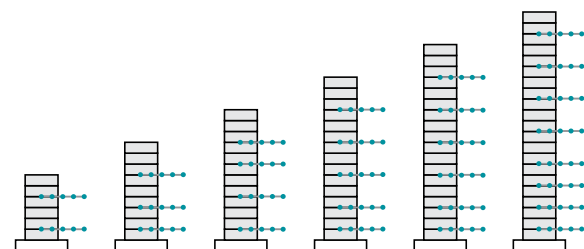
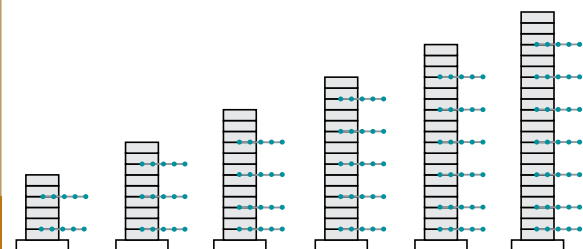
Wall Height (H)	H=4 ft	H=6 ft	H=8 ft	H=10 ft	H=12 ft	H=14 ft	H=4 ft	H=6 ft	H=8 ft	H=10 ft	H=12 ft	H=14 ft
Geogrid Length (L)	L=4 ft	L=5 ft	L=6 ft	L=7.5 ft	L=8.5 ft	L=10 ft	L=6 ft	L=6 ft	L=8 ft	L=9.5 ft	L=11 ft	L=12 ft
Geogrid Type	LH800	LH800	LH800	UX1100	UX1100	UX1400	LH800	LH800	UX1100	UX1100	UX1400	UX1400



REINFORCED BACKFILL SOIL TYPE

Sand: $\phi=32^\circ$; $\gamma=120$ pcf; $c=0$

Silty Sand/Clayey Sand: $\phi=28^\circ$; $\gamma=120$ pcf; $c=0$



Wall Height (H)	H=4 ft	H=6 ft	H=8 ft	H=10 ft	H=12 ft	H=14 ft	H=4 ft	H=6 ft	H=8 ft	H=10 ft	H=12 ft	H=14 ft
Geogrid Length (L)	L=4 ft	L=6 ft	L=6 ft	L=7.5 ft	L=8.5 ft	L=10 ft	L=6 ft	L=6 ft	L=8 ft	L=9.5 ft	L=11 ft	L=12 ft
Geogrid Type	LH800	LH800	LH800	UX1100	UX1100	UX1400	LH800	LH800	UX1100	UX1100	UX1400	UX1400

For further information, please refer to the TensarSoil-PRO™ Software.

► Mesa® Walls are more than a site solution; they create a visually appealing landscape feature on your site.



The Many Faces of Mesa® Retaining Wall Systems

UNLIMITED DESIGN AND AESTHETIC OPTIONS

If your site requires 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 structural element – they become an appealing aesthetic feature of your site.

MESA® ASHFORD™ SYSTEM

Recent design and architectural trends are calling for solutions with a more natural and aesthetic appeal. Segmental retaining walls are no exception.

The Mesa® Ashford™ System is meeting the demand with an ashlar-inspired, mosaic-like pattern facing. Available in the same colors, blends and textures as other Mesa Units, Ashford Units can be configured in a number of ways. Walls can be built to a near-vertical facing angle equivalent to a 4.5° batter. They can also be installed to create 90° corners, stairs and dramatic serpentine curves.

The Mesa Ashford System's unique top and bottom connector slots allow the flexibility to design almost any look while maintaining the Mesa Systems' unique positive mechanical connection, which assures a stronger facing connection to the geogrid reinforcement.

For additional information on suggested Mesa Ashford wall patterns and how to calculate estimated block quantities, please contact your local sales representative.





DESIGNING FOR SPECIAL CONSIDERATIONS

Serpentine walls blend with naturally curving contours, while inside and outside corners complement the traditional angular look of existing structures. With the Mesa® Systems, your design options have no bounds.

- **Curves and Corners** – Designing for inside, outside and serpentine curves as well as 90° inside and outside corners is easy since the unique locking connector makes alignment and installation quick and simple.
- **Steps** – Whether you require steps inside or in front of your wall, the Mesa Systems are up to the challenge. By offering different size and style units to aid in your project requirements, virtually any design can be achieved.
- **Tiered and Terraced Walls** – A less obtrusive alternative than conventional wall solutions, tiered and terraced walls can be built in areas with sufficient land space. For each wall to be considered an independent structure, typical design guidelines require enough “green space” between the walls equal to or greater than two times the height of the lower wall.

- **Facing Combinations** – The blend of hardscape and softscape (vegetated face) is often preferred on projects that require an aesthetically green look.

For more information on design and construction of these or other special considerations, please refer to the *Mesa Systems Installation and Special Considerations Manual*. Other requirements and limitations based on actual site conditions may also apply.



Standard Installation Procedures

The following steps provide a generalized guideline for installing a Mesa® Retaining Wall System with the Mesa Standard Unit. These steps will take you through a typical installation from start to finish.

Additional information is contained within the *Mesa Systems Installation and Special Considerations Manual* available at www.tensarcorp.com.

NOTE: Specific requirements and installation steps for your project are governed by the final drawings sealed by a registered professional engineer and the project specifications. Another useful document which should be consulted prior to final design and construction is the NCMA Segmental Retaining Wall Drainage Manual (2002).



Step 1: PRECONSTRUCTION PREPARATION

It's important to be familiar with the components of the Mesa® Systems prior to the start of construction. Below is a list of these components and the tools needed to aid you in the construction of a standard Mesa Wall. Mesa Corner Units, drainage composite, piping and geotextile materials may also be required.

MESA COMPONENTS:

- ▶ Mesa Block
- ▶ Mesa Connector
- ▶ Tensar® Geogrid
- ▶ Mesa Cap Unit (if applicable)
- ▶ Concrete adhesive (if applicable)

SUGGESTED TOOLS FOR INSTALLATION:

- ▶ Dead blow hammer
- ▶ 2- to 4-ft level
- ▶ Utility saw and/or grinder
- ▶ Masonry string and chalk line
- ▶ Pitchfork (used to help remove slack from geogrid)
- ▶ Shovels
- ▶ Compaction equipment

Step 2: PREPARE THE LEVELING PAD

Prepare the subgrade by excavating or filling vertically to plan elevation and horizontally to design geogrid lengths. If the excavated material can meet the reinforced fill requirement, then it can be stockpiled with surface vegetation and debris removed prior to backfill. Start the leveling pad at the lowest elevation of the wall. Level the prepared base with 6 in. of unreinforced concrete or well-compacted granular fill (gravel, road base or ¾ in. minus crushed stone). The leveling pad is typically 12 in. wider than the Mesa Unit, extending 6 in. in front of and 6 in. behind the unit. Compact the well-graded stone in accordance with project plans and specifications. Aggregate leveling pads are generally overbuilt and should be carefully trimmed down to meet the proper elevation.

Steps in the leveling pad are required to change elevation. It is important that the height of the step is equal to the height of the number of unit courses. If a concrete leveling pad is used, it is important to have the step-up heights match the Mesa Unit's height exactly. If not, grinding and/or shimming may be required.

NOTE: The leveling pad requirements and the suitability of the foundation soil for your project should be determined by a qualified professional engineer engaged by the installer on the project.

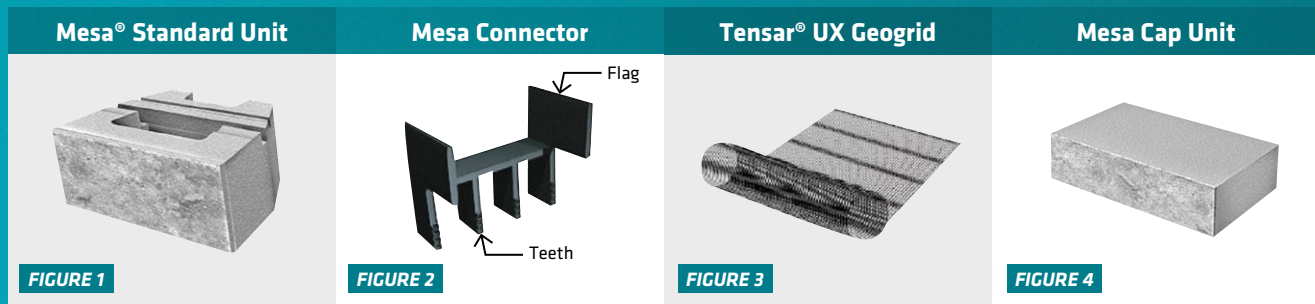
Step 3: INSTALL THE BASE COURSE

Once the pad is in place, begin by making a wall line where the units will be positioned. Chalk works well for concrete, while string works well for aggregate. Place the first course of Mesa Units tightly together, with the sides touching and the textured face outward. The first course must be accurately placed to align with the string line, carefully spaced and leveled to facilitate construction and enhance the appearance of the wall. The tail of the unit should always be used to align the wall face. Occasionally, a unit will have a slight difference in height. If this occurs, the rib or fingers of the geogrid may be used to shim the face or tail back to level.

NOTE: Surface or subsurface water should never be allowed to saturate the backfilled reinforcement zone. Adequate drainage measures, the testing of site soils and backfill compaction, and overall construction quality control are responsibilities of the owner or owner representatives (not Tensar).

NOTE: A qualified professional geotechnical engineer should evaluate the site, surface and subsurface conditions, other environmental factors and the intended use and location of the wall in advance of final wall design and installation.

Mesa® Systems' Standard Components:



Step 4: PLACE GEOGRID AND CONNECTORS

Prior to the placement of additional courses, and depending on the block being used, insert two Mesa® Connectors (Figure 2) into each preceding Mesa Unit (Figure 1). The orientation of the exposed portion of the connector, or flag, will create the batter of the wall face. If the design dictates the need for geogrid at a particular elevation, install Tensar® UX Geogrid (Figure 3) with the Mesa Connectors penetrating through the geogrid apertures. Snug the geogrid against the connector teeth, then drive the connector the rest of the way with a rubber mallet.

NOTE: The geogrid's transverse bar must be pulled taut against the connectors prior to final seating of the connector into the block. The geogrid may be held in place by anchoring it with stakes or rebar at the tail end.

Once the connectors and geogrid (as required) are in place, the Mesa Units must be swept clean prior to placing the next course. Failure to do so can result in problems with seating and leveling of subsequent courses. Stone or core fill is not required to be placed inside the Mesa Units for wall segments that are straight, concave or have 90° inside corners.



Step 5: PLACE AND COMPACT BACKFILL

Install granular fill, typically $\frac{3}{4}$ in. well-drained stone, behind the wall face as specified in the design drawings (12 in. min.). Pea gravel should not be used for granular fill. Behind the granular fill, use backfill material that meets project specifications. When placing backfill over the geogrid layer, fill should be placed to minimize any slack in the geogrid; placing the fill in a direction away from or parallel to the face of the wall will minimize this slack. In addition, a pitchfork or rake can be used to help remove slack during fill placement.

Loose lifts of the reinforced fill shall not exceed 6 in. where hand compaction equipment is used or 10 in. where heavier compaction equipment is used. These thicknesses may vary depending on the approved project-specific soil types specified. Compact fill to 95% Standard Proctor per ASTM D-698 or as required by the design and contract documents.

NOTE: Only hand-operated compaction equipment shall be used within 3 ft of the tail of the Mesa Units; heavy equipment in this area can dislocate the geogrids and face units.



Step 6: INSTALL ADDITIONAL COURSES

Place the next block course over the Mesa Connectors onto the previous course, fitting the flags inside the open cavity of the block. Push the unit forward so that it makes contact with the connectors. The vertical joint alignment should be checked frequently as the connectors allow the units to slide from side-to-side. As you build up, maintain level on each course by continually checking for level front-to-back and side-to-side. If necessary, shim back to level with a rib or fingers of the geogrid. Once the course is level, continue to repeat steps 4 through 6 until final elevation is reached.

Step 7: PLACE CAP UNITS (WHEN REQUIRED)

Mesa® Cap Units (Figure 4) may be placed flush with the face of the wall or with a nominal 1 in. overhang. A concrete adhesive suitable for bonding concrete-to-concrete should be used to secure the units to the course below. The adhesive should be suitable for use in an outdoor environment and stable under the temperature extremes expected for the area. Apply the adhesive in accordance with the manufacturer's instructions.

► By combining beauty and elegance with efficiency and performance, Mesa® Walls are built to stand the test of time.

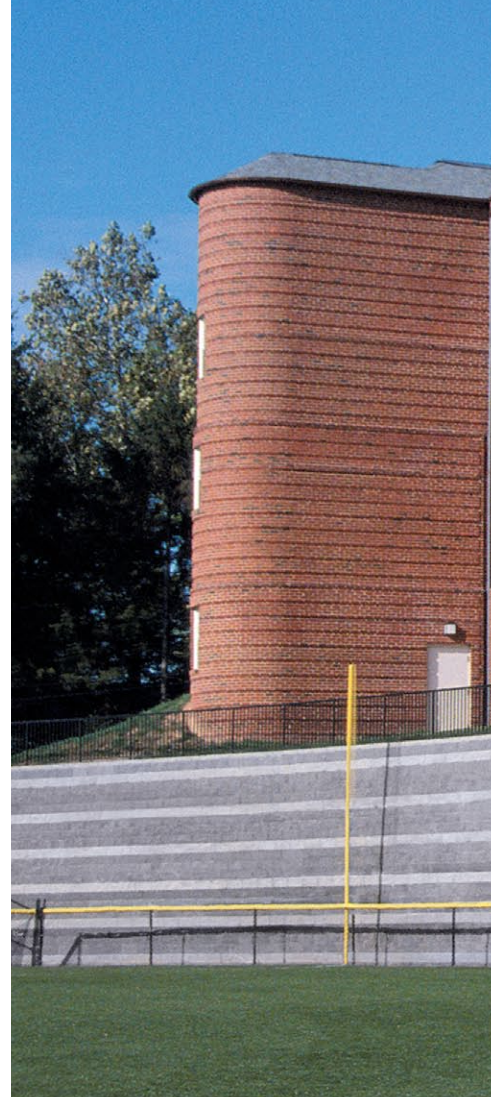


The Solution of Choice

The Mesa® Systems have increasingly become the solution of choice for transportation, industrial, commercial and residential applications. By combining beauty and elegance with efficiency and performance, Mesa Walls are built to stand the test of time.

Our distribution team, located throughout the United States, Canada and Latin America, is dedicated to providing you with the highest quality products, service and support. With a technically trained field sales staff and an in-house engineering department, Tensar succeeds in keeping its systems at the forefront of today's design technology and market trends.

For more information on our Mesa Systems, please call **800-TENSAR-1**, visit **www.tensarcorp.com** or e-mail **info@tensarcorp.com**. We can provide you with additional information including specifications, preliminary cost estimates, summaries of completed projects, software and much more. Engineering and design services are also available upon request and contract.





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