

SIERRASCAPE® RETAINING WALL SYSTEM

INSTALLATION GUIDE





The SierraScape[®] System is a cost-effective and easy-to-install solution for projects with grade changes.



Tensar[®] Geogrids

The SierraScape® System owes its long-term performance and durability to high strength Tensar® Uniaxial (UX) Geogrids. Due to their unique durability characteristics, stiffness and interlocking capabilities, Tensar Geogrids perform better than other commercially available reinforcing geosynthetics. The SierraScape System, featuring Tensar Geogrids, is one of the many Tensar soil reinforcement systems available for a variety of grade separation applications. For more information, visit www.tensarcorp.com.

Introduction

Architects, Engineers, Contractors and Owner/Developers are under constant pressure to find economical alternatives for their grade separation projects. Typical solutions call for traditional wall systems but those can be expensive to install and time consuming to construct. In a range of applications, a better solution is the SierraScape® Retaining Wall System from Tensar International Corporation (Tensar).

The SierraScape System provides a dependable and costeffective structural solution for the most challenging grade separation applications. The SierraScape System is a wireformed, geogrid-reinforced retaining wall system featuring a positive mechanical connection between the wire-form and the Tensar Geogrid reinforcement providing long-term structural stability. Beyond the performance capabilities, SierraScape Walls are easier to install and can be built to adapt to a wide variety of project conditions, design requirements and aesthetic options. This manual provides guidance for installation and quality control for both stone and vegetated-faced walls. It should be used by the Engineer, the Project Quality Assurance Inspector and the Contractor. For more specific instructions on installing special architectural finishes, please contact your local Tensar Representative.

SIERRASCAPE WALL FACING OPTIONS

- Stone wire-form is filled with native or imported stone. The color, size and shape can be specified for a desired aesthetic look and feel.
- Vegetated provides a versatile reinforced soil structure where different native vegetative covers can blend naturally with the surrounding environment.
- Architectural Finishes veneer treated with stacked stone or a shotcrete-sculpted face to provide a unique but traditional finish.

Component	Function	
Tensar UX Geogrids	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.	
Tensar UV-Stabilized BX Geogrids	UV-stabilized polypropylene geogrids used at the face of vegetated applications to provide surficial stability to the structure.	
SierraScape Facing Elements	Hot-dip galvanized wire-form baskets that provide facial stability and alignment during placement and compaction of fill material.	
Locking Tail Strut	Pre-galvanized wire struts that mechanically connect the geogrid to the SierraScape basket tail, and help stiffen the wire-form basket to maintain alignment.	
Geotextiles	Typically polypropylene fabric that provides a separation barrier between the backfill material and the stone fill at the face.	
Turf Reinforcement Mats (TRMs)	Permanent, erosion control mats that aid in vegetation establishment and provide long-term turf reinforcement. Only used in vegetated face applications.	
Full Engineering Services	Full design support, conceptual to final stamped design and construction drawings and on-site assistance for each SierraScape project upon request.	

SierraScape[®] Systems' Component



The geogrid should be color-coded by type prior to removing the labels.



1. Materials & Handling

MATERIALS SUPPLIED BY TENSAR

- Tensar[®] Uniaxial (UX) and UV-Stabilized Biaxial (BX) Geogrids
- SierraScape® Wire-Forms
- Locking Tail Struts
- Non-woven needle punched geotextile, or Turf Reinforcement Mat (TRM) from Tensar[®] North American Green[®] (depending on facing option)

SierraScape System – Stone Face Option

HANDLING WALL MATERIALS

- Tensar[®] Geogrids are shipped in rolls. The Contractor is responsible for unloading the rolls. Prior to the removal of the roll labels, the Contractor should color-code each of the geogrid types using spray paint on the edges and ends of the rolls. For physical dimensions of SierraScape geosynthetic materials, see chart on page 4.
- SierraScape[®] Wire-Forms are delivered in bundles while the Locking Tail Struts come in clear bags. Geotextile and TRM products are shipped in rolls. All materials are to be unloaded by the Contractor.
- It is the Contractor's responsibility to verify the quantities shipped and the condition of the materials when delivered.
- If certifications are required by the contract documents, and requested by the Contractor, they will be supplied. It is the Contractor's responsibility to ensure that the Engineer receives this information.





A) The Contractor is responsible for supplying alignment tools such as a stringline.

B) Adequate labor, equipment and supervision is necessary to complete the wall installation.

CONTRACTOR SUPPLIED MATERIALS

- Select or plantable fill for the face of the SierraScape structure and all other fill to be placed in the reinforced zone
- Cable ties, tie wire or hog rings
- Utility saw for field cutting of geogrid and wire-forms
- Alignment system tools (laser, stringline, 4 ft level, etc.)
- Side cut shears to cut the geogrid at the facing of the wire-forms
- All labor, equipment and supervision necessary to perform the total wall construction (installation crew)

2. Responsibilities for Construction Compliance

- The Contractor must construct the wall in accordance with the contract documents, plans and specifications. The Contractor is also responsible for the verification of line, grade and other physical features of the SierraScape structure.
- The Contractor may request the assistance of the Tensar Project Manager to assist with the procedures within this guide and the contract plans, documents and specifications. The Tensar Project Manager may be onsite at the start of construction and thereafter only as requested or necessary.
- The Contractor understands that Tensar Project Manager is not authorized to revise any details or instructions in these guidelines, or on the approved contract documents, plans or specifications, without the express written agreement of the Engineer.

Geosynthetic Materials Schedule			
ТҮРЕ	SIZE	WEIGHT	
UX-MSE Geogrid	4.36 ft wide x 200 or 250 ft long	70 – 150 lbs	
UV-Stabilized BX Geogrid	9.8 or 13 ft wide x 164 or 246 ft long	67 – 140 lbs	
Geotextile (stone face only)	3.75 ft wide x 360 ft long	37 lbs	
TRM (vegetated face only)	6.5 ft x 55.5 ft/6.7 ft x 108 ft	37 – 45 lbs	



3. Site Preparation

- Verify the condition, approval and receipt of the SierraScape® System's Wire-Forms, Locking Tail Struts, Tensar® Geogrid, geotextile, TRM (if required) and fill materials. Materials should arrive in good condition. Tensar will replace materials that have not been accepted by the Contractor. Please call Tensar immediately upon receipt of any damaged SierraScape components.
- Grade and proof roll subgrade as outlined in contract documents, plans and specifications.
- The subgrade should be approved by the owner's Engineer before proceeding with the wall construction. Any soils found unsuitable by the Engineer should be treated in a manner approved by the Engineer.

- Install offset stringline, story pole or other control to check and maintain wall alignment and grade.
- Color-code and pre-cut the geogrids, geotextiles and TRMs (if applicable) to the lengths outlined on the plans. A utility saw can be used to cut the geogrid. Make the geogrid cuts next to the heavy transverse bars that span the width of the rolls. As geogrids are cut, mark and tag them according to the length and type. All geosynthetics can then be stockpiled for use as needed.



Typical stone-face SierraScape detail



Insert the tail of the strut through the connection loops (1) from the back and rotate upward (2) to fasten to horizontal wire at the corrugation.

4. Installation

Install the wire-forms on level grade. Butt vertical members of adjacent forms end-to-end with the extended horizontal wires on one unit overlapping the adjacent unit by 2 in.

NOTE: The wire-forms may move forward during placement and compaction of the backfill. Set the first few courses of the wire-forms 1 to 2 in. behind the wall face control line. Adjust the setback of upper courses based on observed movements.

- Attach the end of the vertical wires of the adjacent units with cable ties, hog rings or tie wires to aid in maintaining alignment.
- Two full width panels of UX Geogrid should be attached to each wire-form. The UX geogrid panels should not overlap adjacent forms, or one another. The outer two ribs of each geogrid panel should be placed between the outer two wires of the wire-forms. Two geogrid ribs should be positioned between each pair of wires. The transverse bar of the UX Geogrid will have to be cut in places to position pairs of ribs between pairs of wires as seen in the photo below. Cuts should be made only at apertures between wire pairs.

NOTE: The transverse bar may need to be cut at additional locations to allow contact between the geogrid and the connection loops. A maximum of five cuts is allowed per geogrid roll width.

- Fasten geogrid to bottom wire with hog rings, cable ties or tie wire in areas where the geogrid is cut.
- Place the TRM and/or UV-Stabilized BX Geogrid as specified where face fill is finer than 2 in. Where 1 to 2 in. stone-face fill is specified, use UV-Stabilized Biaxial Geogrids to retain the stone. If a vegetated face is specified, use a permanent Turf Reinforcement Mat (TRM) from Tensar North American Green, such as C350 or SC150. The face backing should be wide enough to cover the face and extend 6 in. under the fill. (See typical vegetated face SierraScape detail on pg 5.)
- Adjacent rolls of UV-Stabilized BX and/or TRM shall be overlapped 6 in.
- Insert the tail of the strut through the connection loops from the back on top of the geogrid and rotate upward to fasten to the corrugation towards the top of the basket.
- Struts should be placed approximately 16 in. apart.
- One strut should be positioned between the two end wires to support the joint between adjacent wire-forms.



When geogrid apertures do not perfectly align with the SierraScape Wire-Form's "loops," cut the geogrid at the transverse bar that does not bear on a connection loop.



Install Locking Tail Struts across the butted ends of the SierraScape Wire-Form.



A) Install backfill over the geogrid panels.

- In preparation for fill placement, pull the UX Geogrid toward the reinforced backfill zone (away from the facing unit) so that it's tight against the connection. Maintain facing alignment during this process. Place the first 9 in. backfill lift on top of the geogrid (maintain an open zone at the wire-form for the stone fill). The backfill should be placed and advanced from front to rear of the reinforced fill zone, so that any loops or wrinkles in the geogrid are worked out towards the free end of the geogrid. (See left-hand photo above.)
- After the backfill is placed, position the pre-cut geotextile roll along the backfill's front edge (if required). A tab of at least 6 in. of geotextile is required to extend beyond the stone facing.
- Install facing fill materials in 9 in. lifts unless the plans require otherwise.
- Compact facing and reinforced fill materials within 3 ft of the wall face or as required in the plans. A vibratory plate tamper is recommended for compaction in this area (3 ft away from wall face).

NOTE: Proper compaction at the wire-form will minimize "pillowing" of the lower wire-forms as wall construction proceeds. Conventional compaction equipment may be used to compact reinforced fill beyond the 3 ft face zone to 95% of AASHTO-T99 maximum dry density or as otherwise specified. Each compacted lift should be no more than 9 in. thick.

Alignment adjustments will be required as the type of fill, moisture content, equipment and wall height will affect the amount of movement of an individual wire-form.

NOTE: Wire-forms may not move uniformly. Subsequent rows of units can be set with a relative setback based upon observed movements. The Contractor should check facing alignment as each course is placed.

*The process shall be repeated for each subsequent lift of baskets and soil.

The following tolerances will need to be checked as the SierraScape System is being constructed:

- Vertical and horizontal alignment of the wall face shall not vary by more than 2 in. per 10 ft, or as shown in the plans and specifications.
- The overall vertical tolerance (plumbness) of the SierraScape structure shall not exceed 1 in. per 10 ft of wall height. Negative (outward leaning) batter is not acceptable.
- The offset limit between consecutive courses of wireforms shall not exceed 1 in. from the planned offset.
- At the end of each day, the Contractor must ensure that the reinforced backfill is graded to drain water away from the face of the wall. Berms and/or ditches must also be in place and functioning to prevent the intrusion of runoff water into the wall construction area.

The SierraScape® System Advantage

For more than 30 years industry professionals have been using Tensar[®] Geogrids to build economical, long-lasting structures. With clear advantages in performance, design and installation, the SierraScape System offers a proven technology for addressing the most challenging site conditions.

For more information on our full line of Grade Separation Solutions, call **800-TENSAR-1**, visit **www.tensarcorp.com** or send an e-mail to **info@tensarcorp.com**. We are happy to supply you with additional information, system specifications, design details, conceptual designs, preliminary cost estimates, and much more.

B) Place stone fill within the wire-forms.



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