SierraScape®

RETAINING WALL SYSTEM

INSTALLATION GUIDE

Tensar®
INTERNATIONAL

The SierraScape® System is a cost-effective and easy-to-install alternative 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 stiff interlocking capabilities, Tensar Geogrids stand the test of time, performing better than other commercially available geosynthetics. The SierraScape System featuring Tensar Geogrids is one of the many patented soil reinforcement systems available for a variety of grade change applications. For more information, visit www.tensar-international.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 they often find these can be expensive to install and time consuming to construct. In a range of applications, they are finding a better solution is the SierraScape® Wire-Formed Retaining Wall System from Tensar International (TI).

The SierraScape System provides a dependable and cost-effective structural solution for the most challenging grade separation applications. It is a wire-formed, geogrid-reinforced retaining wall system featuring a positive mechanical connection for long-term structural stability. Beyond the performance capabilities, SierraScape walls are easy to install and can be built to adapt to a wide variety of project conditions, design requirements and aesthetic options.

SierraScape Wall Facing Options

- **Stone** – facing filled with native or imported stone that can be color, size and shape specified for a desired look and feel
- **Vegetated** – facing with a natural appearance that can be designed by local landscape architects to blend with the natural surroundings
- **Architectural finishes** – facing is veneer treated with a stacked stone or shotcrete sculpted finish providing a unique and traditional look

This manual provides a guideline for construction and quality control of the installation for both stone- and vegetated-faced walls. It should be provided to the Engineer, the construction quality assurance inspector and the Contractor. For more specific instructions on installing special architectural finishes, please contact your local Tensar Representative.

SierraScape System's Components

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

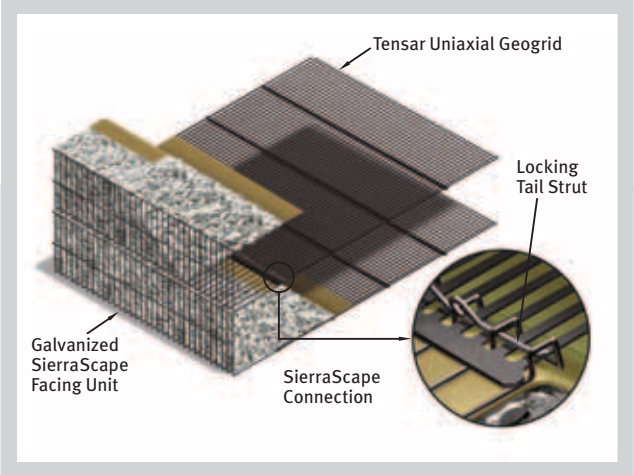
1. Responsibilities for Construction Compliance

- 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.
- The Tensar technical advisor may assist the Contractor and the inspection staff with the procedures within this manual and the contract plans, documents and specifications. The advisor may be onsite at the start of construction and thereafter only as requested or necessary.
- The Tensar technical advisor is not authorized to countermand any details or instructions in these guidelines, or on the approved construction drawings, without the express written agreement of the Engineer.

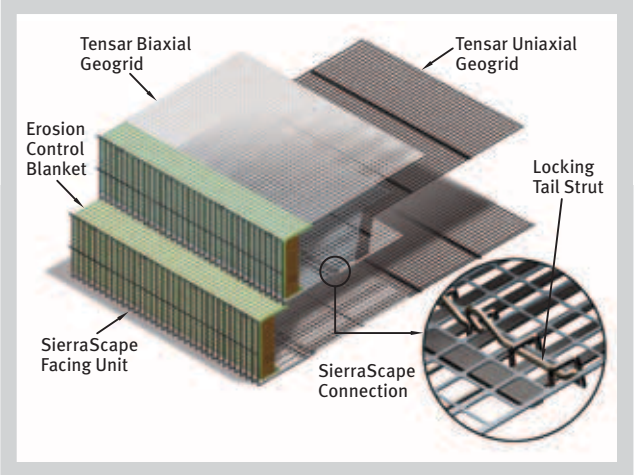
2. Materials & Handling

MATERIALS SUPPLIED

- Tensar® Uniaxial (UX) and Biaxial (BX) Geogrids
- SierraScape® Facing Units
- Locking Tail Struts
- Non-woven needle punched geotextile, Erosion Control Blanket (ECB), or Turf Reinforcement Mat (TRM) from North American Green® (depending on facing option)



Stone-faced option



Vegetated-faced option

HANDLING WALL MATERIALS

- Tensar Geogrids are shipped in roll form. The Contractor is responsible for off-loading the rolls. Prior to the removal of the 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 wall materials, see chart below.
- SierraScape® Facing Units are delivered in bundles while the Locking Tail Struts come in clear bags. Geotextile, ECB and TRM products are shipped in roll form. All materials are to be off-loaded by the Contractor.
- It is the Contractor's responsibility to verify the quantities shipped and the condition of the materials.
- If certifications are required by the contract documents, and if requested by the Contractor, they will be supplied along with the material that is shipped. It is the Contractor's responsibility to ensure that the Engineer is provided this information.

CONTRACTOR SUPPLIED MATERIALS

- Select or plantable fill
- Cable ties or tie wire
- Utility saw for field cutting of geogrid
- Alignment system materials (laser, stringline, etc.)
- Side cut shears for field cutting of Facing Units
- 4 ft level
- All labor, equipment and supervision necessary to perform the total wall construction

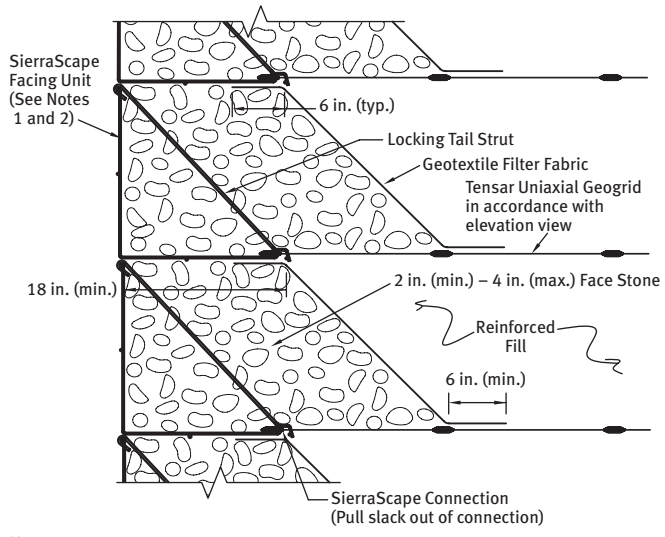
Geosynthetic Wall Materials

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

Prepare for wall construction by clearing the site and cutting and color-coding the Tensar® Geogrid.

3. Wall Preparation

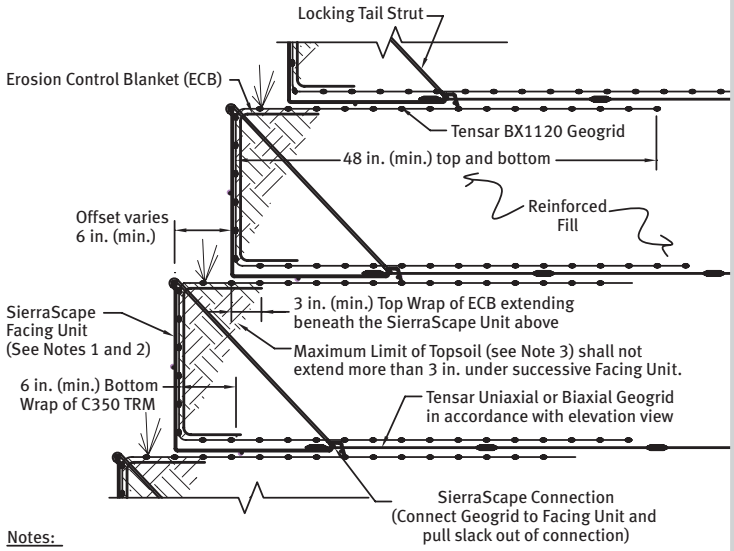
- Verify the condition, approval and receipt of the SierraScape® System's Facing Units, Locking Tail Struts, Tensar Geogrid and fill materials. Materials should arrive in good condition. Tensar will not replace materials that have been accepted by the Contractor.
- The subgrade should be approved by 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.
- Grade and proof roll subgrade.
- Install offset stringline, story pole or other control to check and maintain wall alignment and grade.
- Color-code and pre-cut the geogrids and geotextiles to the lengths stated on the plans. An easy way to cut the geogrids is using a circular saw. Make the cut 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, and then stockpile them for later use.



Notes:

1. See SierraScape Facing Unit detail for facing material and dimensions.
2. All Facing Units shall be galvanized per ASTM A123 after fabrication.
3. Optional – A thin layer (2 in. min.) of finer stone (1/4 in.–1 in.) may be placed at the top of each unit to provide a level surface for the unit above.

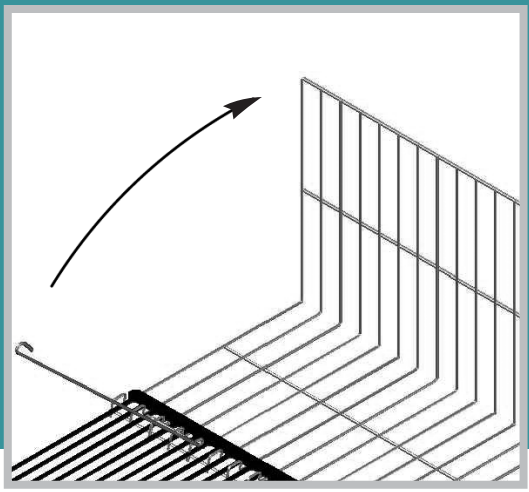
Typical stone-faced wall detail

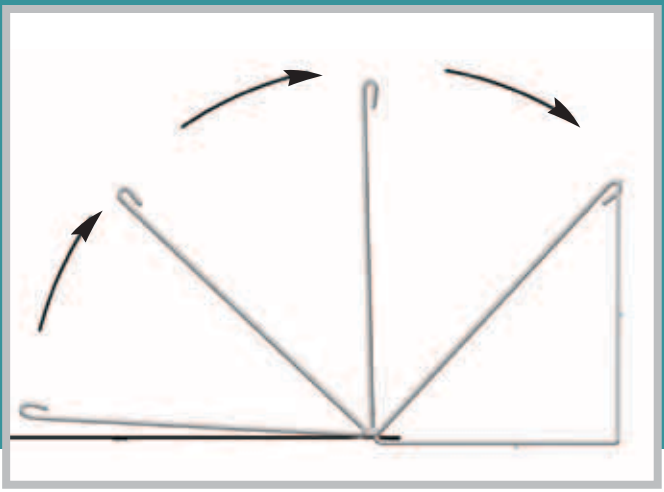


Notes:

1. See SierraScape Facing Unit detail for facing material and dimensions.
2. Facing Units shall be constructed from black steel.
3. Topsoil shall be loamy sand or finer gradation with 10% – 15% organic content or material approved by a qualified landscape architect. Vegetation type shall be specified by a qualified landscape architect.

Typical vegetated-faced wall detail





Insert the tail of the strut through the connection loops from the back and rotate upward to fasten to top of basket.

4. Wall Construction

- Install the Facing Units on level grade. Butt the units end-to-end with the extended horizontal wires on one unit overlapping the adjacent unit.

  Note: The Facing Units may move forward during placement of the backfill and compaction. Set the first few courses 1 to 2 in. behind the face control line. Adjust 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 wires to aid in maintaining alignment.

- Two full widths of UX Geogrids should be attached to each Facing Unit. The geogrid should not overlap adjacent units. The two outer ribs of the left geogrid should be placed between the outer two wires on the left side of the Facing Unit. The outer ribs of the other geogrid should be positioned between the outer wires on the right side of the Facing Unit. 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. Cuts should be made only at apertures between wire pairs.

  Note: The transverse bar may need to be cut in a few more places to allow contact between the geogrid and the connection loops. A maximum of five cuts is allowed per geogrid roll width.

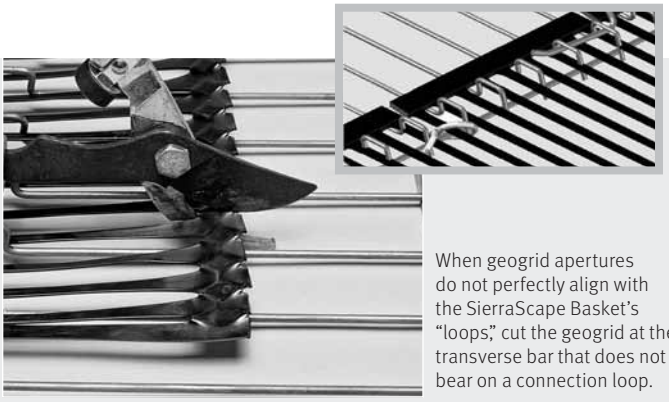
- Fasten geogrid to bottom wire with hog ring in areas where the geogrid is cut.

- Place face-backing as specified where face fill is finer than 2 in. Where 1 to 2 in. stone-face fill is specified, use BX1120 Geogrids to retain the stone. If a vegetated face is desired, use a permanent erosion control blanket from 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. In instances where an erosion blanket is specified, the blanket should also extend 6 in. under the next installed Facing Unit.

- Insert the tail of the strut through the connection loops from the back and rotate upward to fasten to top of basket.

- Adjacent struts to be placed approximately 16 in. apart.

- One strut should be positioned between the two end wires to support the joint between Facing Units.



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

Install Locking Tail Struts at both ends of the SierraScape Facing Unit.

- In preparation for fill placement, pull the UX Geogrid toward the reinforced backfill zone so that it's tight against the connection. Maintain facing alignment. Place the first 9 in. backfill lift on top of the geogrid, while maintaining an open zone at the Facing Unit for the stone fill. The backfill should be placed near the wall face first and then proceed toward the geogrid tails. This will promote further geogrid tensioning.
- 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. loose lifts unless the plans require otherwise. To provide a level surface for the next Facing Unit, it is optional to use a thin layer of well-graded aggregate at the top of the basket.
- Compact facing and reinforced fill materials within 3 ft of the wall face or as the plans require. A vibratory plate tamper is recommended for compaction in this area.

Note: Proper compaction at the wall face will minimize "pillowing" of the lower facing units as wall construction proceeds. Conventional wheeled 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. The 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 Facing Unit.

Note: Facing Units 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 every course is placed.

- At the end of each day, the Contractor must ensure that the reinforced backfill is graded to drain away from the face of the wall. Berms and/or ditches must also be in place and functioning to prevent the entrance of runoff into the wall construction area.

Install backfill over the geotextile separator fabric.

Place stone fill within the Facing Units.

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