INSTALLATION GUIDE

Tensar INTERNATIONAL

MESA®
RETAINING WALL SYSTEMS

Introduction

The Mesa® Retaining Wall Systems from Tensar International Corporation offer superior and cost-effective solutions for all of your retaining wall needs. This installation guide provides general instructions to assist in the construction of Mesa Retaining Walls in a wide variety of applications.

The Connection You Can Count On™

Unlike other segmental retaining wall (SRW) systems, Mesa Walls incorporate a positive, mechanical connection between the wall face and the Tensar® Geogrid reinforcement providing unsurpassed structural integrity. It's this positive, mechanical connection that greatly reduces the chance of wall failure, even under the most severe conditions. Only Mesa Walls provide the aesthetics architects demand, the efficient installation contractors expect and the dependability engineers require – all from a single source.

Endless Design Options

No matter what design considerations are needed, the Mesa Systems have a solution. From structural walls to tiered gardens and curved walls to stairs, Mesa Walls blend effortlessly with the natural surroundings of any site. For more information, call your authorized Mesa Systems licensee or distributor; contact Tensar International Corporation at 800-TENSAR-1 or www.tensar-international.com. Units are locally available in a wide variety of colors, textures and facing options.

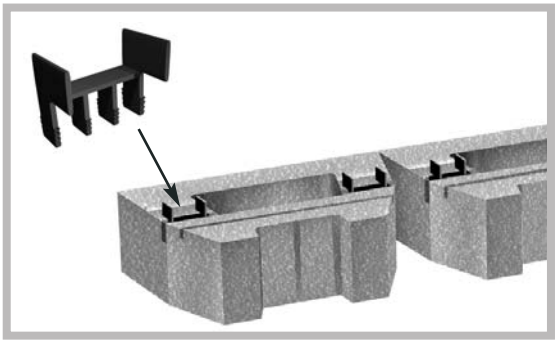
Units & Connectors

Locally available in either a straight or radius face, Mesa Units are designed for a variety of applications.

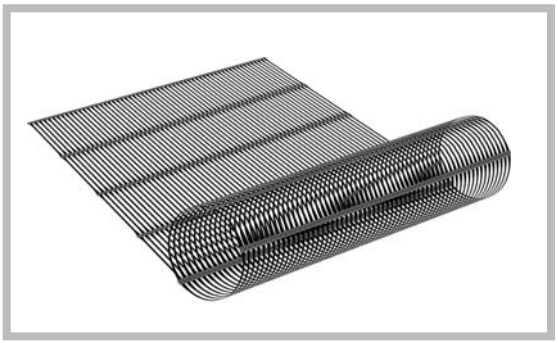
- **Standard Units**
  [8"h x 18"w x 11"d nom./75 lbs.]

- **Cap Units**
  [4"h x 18"w x 11"d nom./40 lbs.]

- **Standard Connector**



- **Tensar® Uniaxial (UX) Geogrids**



Standard Installation Procedures

The following steps provide general guidelines for installing a Mesa Wall. If you require more detailed information, please refer to the *Mesa Systems Installation and Special Considerations Manual* or the project's installation instructions and drawings within the contract bid documents.

Step 1:
Preconstruction Preparation

It's important to make yourself familiar with the components of the Mesa Systems prior to the start of construction. Below is a list of these components as well as the tools you will need to construct a standard Mesa Wall.

Mesa corner units, drainage composite, piping and geotextile materials may also be required.

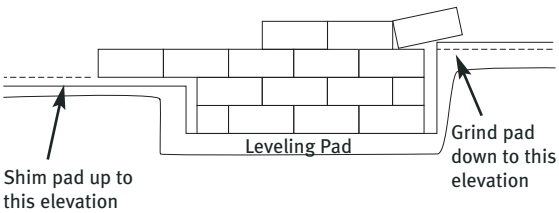
Suggested tools for installation:

- Dead blow hammer
- 2- to 4-ft level
- Utility saw and/or grinder
- Masonry string and chalk line
- Pitchfork (for removing slack from geogrid)
- Shovels
- Compaction equipment
- Rubber mallet

Step 2:
Prepare the Leveling Pad

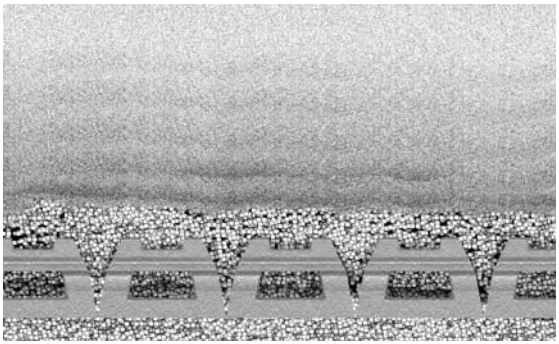
Prepare the subgrade by excavating vertically to plan elevation and horizontally to design geogrid lengths. If stockpiling excavated material for reinforced fill, remove all surface vegetation and debris in the stockpile area. Start the leveling pad at the lowest elevation of the wall. Level the prepared base with 6 in. of unreinforced concrete or well-compacted granular fill (gravel, road base or 3/4 in. minus [13 – 20 mm] crushed stone). The leveling pad is typically 12 in. wider than the Mesa Unit, 6 in. in front and behind the block. The contractor should locate the leveling pad to account for wall curves and wall batter. Compact the well-graded stone in accordance with the project plans and specifications.

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. Aggregate leveling pads are generally overbuilt and should be carefully trimmed down to meet the proper elevation. If a concrete leveling pad is used, it is important to have the step heights match the Mesa Unit's height exactly. If not, grinding and/or shimming may be required. Use a thin set masonry mortar to make up for variations or follow the recommendations for shimming between block courses to account for minor variations.



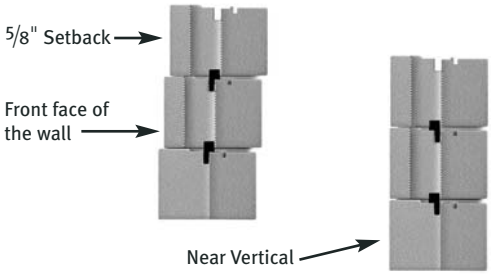
Step 3:
Install the Base Course

Once the pad is in place, begin by making a wall line where the units will rest. Striking a chalk line works well for concrete leveling pads. A string line is recommended for aggregate leveling pads. Place the first course of blocks 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 tails 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, follow the recommended shimming procedures.

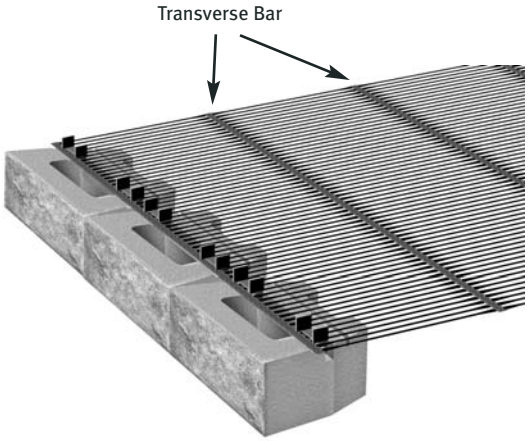


Step 4:
Geogrid and Connector Placement

Prior to placing additional courses, two Mesa Connectors are inserted into each preceding Mesa Unit. The flags or exposed portion of the connector orientation will create the batter of the wall face.

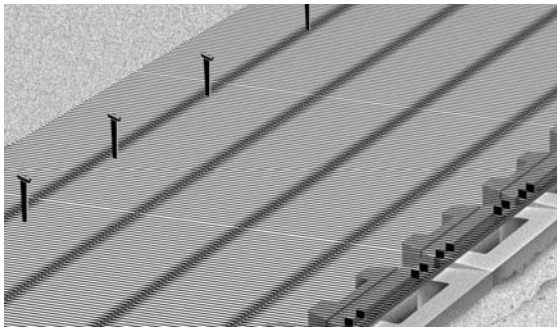


If the design dictates the need for a geogrid at a particular elevation, the Tensar Geogrid will be installed with the teeth of the Mesa Connectors penetrating through the geogrid apertures. The flags should never be utilized to connect the geogrid to the facing units.



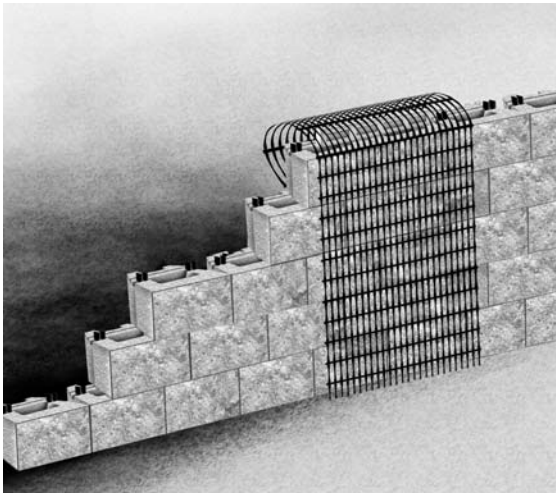
Snug the geogrid against the connector teeth, and then drive the connector the rest of the way using a rubber mallet.

Note: The transverse bar of the geogrid must be pulled taut against the teeth of the connectors prior to final seating of the connector into the block. Any slack in the geogrid may be removed by anchoring it with stakes or rebar.



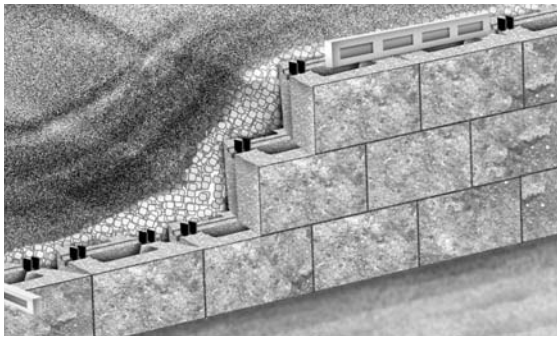
Once the connectors and the geogrid are in place, the Mesa Units must be swept clean prior to placing the next course. Failure to do this can result in problems with seating and leveling of subsequent courses. Stone or "core" fill is not required to be placed inside the Mesa Units for wall segments that are straight, concave or 90° inside corners. Refer to pages 15 and 16 for guidance on core fill for convex curves and 90° outside corners. Core fill is typically required with other segmental block wall types to develop the strength between the geogrid and the block, however with the Mesa System, the Mesa Connectors provide the connection strength necessary. The omission of the core fill also allows for the Mesa Units to be stacked

ahead of the backfill operation. The freestanding units should not be stacked more than four units high and construction equipment should be careful not to move or dislodge the freestanding units. At the next geogrid layer, connect the geogrid and then drape it over the front face of the wall while the backfill is placed up to the geogrid elevation.



Step 5:
Place and Compact Backfill

Install drainage fill, typically 3/4 in. well-graded stone, behind the wall face as directed by the design drawings (12 in. min.). Peagravel should not be used for drainage fill. Behind the drainage fill, use backfill material that meets project specifications. When placing backfill over the geogrid layer, the 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 to the direction of fill placement, a pitchfork can be used to remove slack.



Typically, loose lifts of the reinforced fill shall not exceed 6 in. where hand-operated compaction equipment is used or 10 in. where heavy compaction equipment is used. These thicknesses may vary depending on the approved project-specific soil types used. Compact fill to 95% of the maximum dry density as determined in accordance with ASTM D-698 (Standard Effort Proctor Test).

Note: Only hand-operated compaction equipment shall be used within 3 ft of the tail of the Mesa Units.

Step 6:
Install Additional Courses

Place the next course over the Mesa Connectors on 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 needed, shim when required. Once the current course is level, continue to repeat steps 4 through 6 until final elevation is reached.

Step 7:
Place Cap Units (When Required)

These units may be placed such that a nominal 1 in. overhang is achieved or flush with the face of the wall. A concrete adhesive suitable for bonding concrete to concrete should be used to secure cap 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 local area. Apply the adhesive in accordance with the adhesive manufacturer's recommendations.

Shimming Mesa Units

It is important that the courses of Mesa Blocks are level front-to-back and side-to-side. It may be necessary to grind the blocks or use shims between some of the courses to correct an out of level condition.

Figure 1

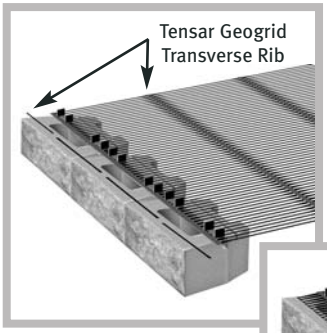


Figure 2

For courses placed on a geogrid elevation, shims may be required on the front face shell of the Mesa Unit (Figure 1 above). The shims should be the same thickness of the geogrid rib. The shim material can be a rib trimmed from the same roll of Tensar Geogrid that is placed on top of the front face shell of the unit. An alternative is to cut the geogrid so that the ribs extend approximately 1 in. onto the front face shell (Figure 2 above).

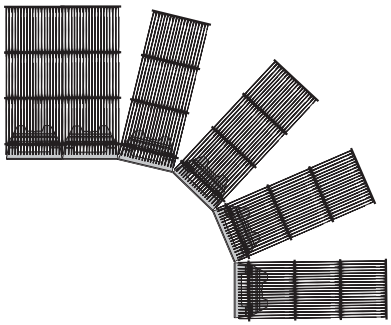
Mesa Curves & Corners

Concave Curves

When possible, begin a concave wall from the center of the curve, alternating left and right of the center unit. When building with a 5/8 in. setback, each Mesa Unit falls behind on a concave curve relative to any units below.

It is suggested that a flex pipe be placed on the tail of the units in the curve to ensure a smooth curve. If using the 5/8 in. setback, overlap corners of the Mesa Units on the base course. The amount of overlap will vary based on the size of the curve. The radius becomes larger as the wall becomes taller, therefore gapping will occur. The maximum acceptable gap is a 1/8 in. If the maximum gap is exceeded, one flag may be removed from each connector to close the gap.

Diagram A



Note: On tight curves, Tensar Geogrid may be cut lengthwise to the width of the Mesa Units to ensure the transverse bar engages both connectors.

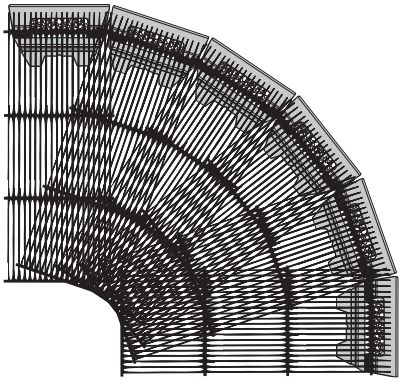
Convex Curves

As with concave walls, begin a convex wall from the center of the curve alternating left and right of the center unit. When building with a 5/8 in. setback, each Mesa Unit gains on a convex curve relative to any units below. Conversely to concave curves, the radius of a convex curve gets smaller with each additional course.

For wall segments that form convex curves with a radius less than 25 ft, use drainage fill to fill the core of all units on all courses located within that segment.

It is suggested that a flex pipe be placed on the tail of the units in the curve to ensure a smooth curve. If using the 5/8 in. setback, gap the units on the base course by no more than 1/8 in. The radius becomes smaller as the wall becomes taller, therefore binding will occur.

Diagram B



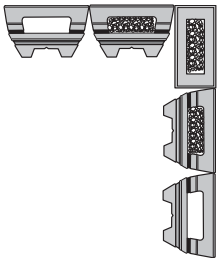
Note: On tight curves, Tensar Geogrid may be cut lengthwise to the width of the Mesa Units to ensure the transverse bar engages both connectors. The wall designer should consider eliminating the requirement for fill between overlapping layers in areas with a tight radius and/or staggering the layout of adjacent sections of geogrid.

90˚ Outside Corners

First Course

Drainage fill shall be placed in the core of the corner unit and in the core of the units to either side of the corner unit.

Diagram C



Second Course

When building a Mesa Wall with a 5/8 in. setback, the shorter (9 in.) side of the corner unit should be field cut to account for the setback and maintain a running bond. Alternate the direction of the corner unit and set units on halfbond to the base units. Secure the corner unit to the unit below using an approved exterior concrete adhesive. Drainage fill shall be placed in the core of the corner unit and in the cores of the units to either side of the corner unit.

Diagram D

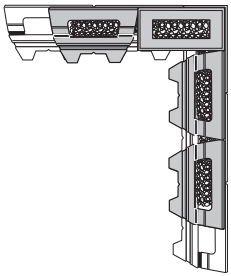
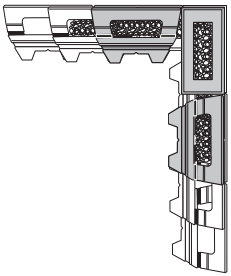


Diagram E



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