

Retaining Wall Systems

**Installation
and Special
Considerations
Manual**

Tensar Earth Technologies, Inc.

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INTRODUCTION

The Mesa® Retaining Wall Systems from Tensar Earth Technologies offer superior and cost-effective solutions for all of your retaining wall needs. Whether creating stairs, 90° corners, or convex and concave curves, the Mesa Systems can easily accommodate a variety of design considerations. This manual provides the information needed to construct Mesa Retaining Walls for a wide array of applications.

It's the Connection™

Unlike other segmental retaining wall (SRW) systems, the Mesa Systems incorporate a positive, mechanical connection between the wall face and the reinforcement providing unsurpassed structural integrity. It is 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 owners expect, and the dependability engineers require — all from a single source.

Endless Design Options

No matter what design consideration is needed, the Mesa Systems have the solution. Curved walls blend with natural contours, inside and outside corners complement the traditionally angular look of existing structures, and steps and stairs provide functionality, allowing for limitless wall designs. From structural walls to tiered gardens, the Mesa Systems blend effortlessly with the natural surroundings of any site.



To meet the aesthetic requirements of any property, Mesa Units are offered in a variety

of colors and textures, including color matched blocks for high-profile installations. The innovative design of a Mesa Connector allows units to be installed with a near vertical face or a 5/8-inch setback — profiles not all SRW systems can provide.*

The Mesa Systems are available throughout the Americas and Canada. For more information, call an authorized Mesa Systems Licensee or contact Tensar Earth Technologies via phone at 800-TENSAR-1 or via e-mail at info@tensarcorp.com. To quickly download specifications, review case histories, or access CAD drawings, visit the Tensar Earth Technologies web site at www.tensarcorp.com.

** See the next page of the manual for a list of available Mesa Units and Connectors.*

Note: the Mesa Systems offer other units and connectors not included in the manual. Contact Tensar Earth Technologies or an authorized Mesa Licensee for a complete list of all available Mesa Units.



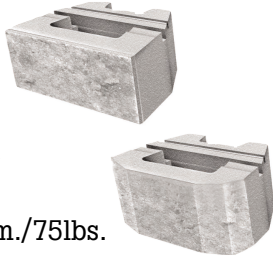
MESA UNITS & CONNECTORS

Mesa Units

Available in either a straight or radius face, Mesa Units can accommodate a variety of applications.

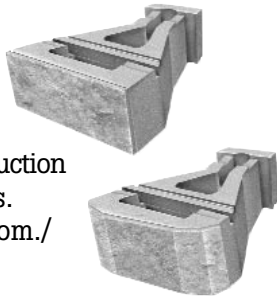
■ STANDARD UNITS

The most popular size in the Mesa Units line. They fulfill virtually every retaining wall need. 8"h x 18"w x 11"d nom./75lbs.



■ XL UNITS

Units have extended "tails" that allow for the design and construction of taller gravity walls. 8"h x 18"w x 22"d nom./110 lbs.



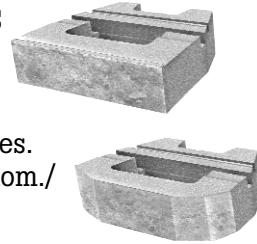
■ STANDARD CONNECTOR

A fiberglass reinforced composite connector that engages the Tensar Geogrid and creates a mechanical connection between the facing and the geogrid reinforcement.



■ LANDSCAPE UNITS

An attractive accent when used on alternating courses. 4"h x 18"w x 11"d nom./40 lbs.



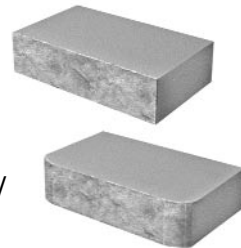
■ CORNER UNITS

Used to create walls with clean and precise 90° corners. 8"h x 18"w x 9"d nom./75 lbs.



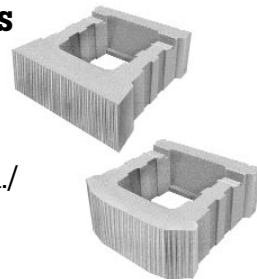
■ CAP UNITS

Used at the top of the wall for a finished look. 4"h x 18"w x 11"d nom./40 lbs.

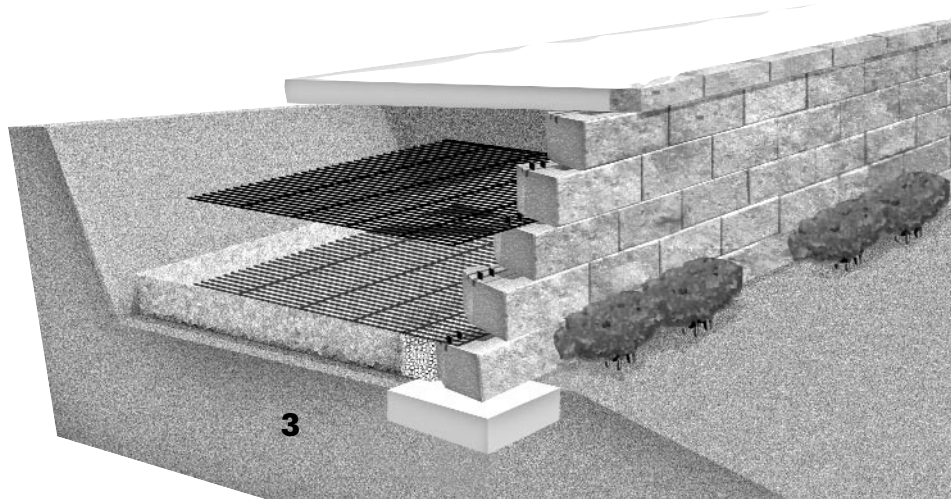


■ SIERRASTONE UNITS

Have the largest plantable area of any SRW unit available. 4"h x 18"w x 11"d nom./40 lbs.



Contact your local licensee or manufacturer for availability. Weight may vary by region.



CONSTRUCTION & QUALITY CONTROL

This "Installation" section of the manual provides guidelines for the construction and the quality control of the installation. This section shall be provided to the owner's Engineer, the Construction Quality Assurance Inspector, and the Contractor.

All installation instructions shall apply to the Mesa Standard Unit, the Mesa XL Unit, and the Mesa Landscape Unit, except where otherwise noted.

1.1 Responsibilities for Construction Compliance

- The Contractor must provide construction 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 Engineer is solely charged with enforcement of the contract plans, documents, and specifications.
- A Mesa Systems technical representative may assist the contractor and the inspection staff with the procedures within this manual and the contract documents, plans, and specifications. The representatives may be on-site at the start of construction and thereafter only as requested and necessary.

1.2 Materials and Handling

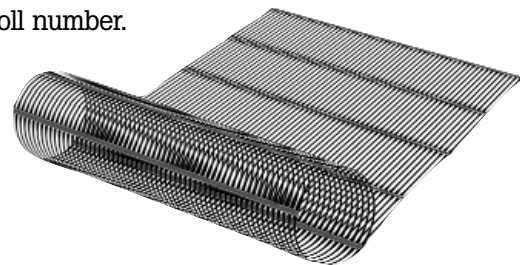
MATERIALS SUPPLIED

- Mesa Segmental Concrete Facing Units and Mesa Connectors
- Mesa Cap Units (where required)
- Tensar® Uniaxial (UX) and Biaxial (BX) Geogrids

- drainage composite and piping (where required)
- Geotextile filter materials (where required)

HANDLING WALL MATERIALS

- The concrete facing units are delivered on pallets and off-loaded by the Contractor. Transporting equipment must have firm ground and a stable, level area to off-load. A forklift is normally used to handle pallets. If pallets are the property of the block manufacturer, they must be stored by the Contractor for pickup. The Contractor must provide protection from staining or discoloration of the units, such as by using wood dunnage and polyethylene sheet film.
- The Mesa Connectors are shipped in cartons and shall be stored in a secure and dry location.
- The Tensar Geogrids are shipped in roll form with the Contractor responsible for off-loading.
- Rolls should be stored in a secure area. Each roll will be labeled as to its type, its lot number, and its roll number.



- Standard roll sizes of Tensar UX Geogrid is 4.36 feet wide by 200 or 250 feet long. Rolls weigh between 87 and 170 pounds depending on type. Before labels have been removed, it is suggested that rolls be color-coded with spray paint to identify geogrid type.

- It is the Contractor's responsibility to verify the quantities shipped and condition of the materials. The Contractor will inventory materials supplied to assure sufficient quantities have been delivered.
- The Contractor will be allowed a limited amount of time to off-load materials.
- If certifications are required, the Contractor must provide a written request prior to shipment of the material. The Contractor will ensure that all information, including product type, roll/lot number, etc., is furnished to the Engineer.

CONTRACTOR SUPPLIED MATERIALS

- Dead blow hammer
- 2-foot or 4-foot levels
- Utility saw and/or grinder
- Masonry string and chalk line
- Pitchfork (optional to remove slack from Tensar Geogrid)
- All cast-in-place concrete and structural components
- Stone filter medium
- Reinforced or select fill
- Stakes and/or rods used to remove the slack from the geogrid unless pitchfork is used
- All labor, equipment, and supervision necessary to perform the total Mesa Wall construction

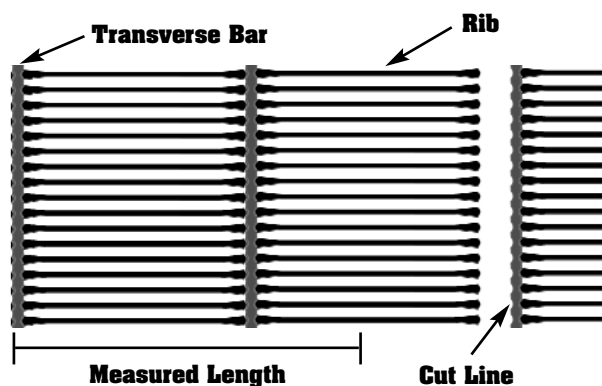
1.3 Preparatory Work for Wall Construction

- Verify approval of Mesa Units, Tensar Geogrid, and reinforced fill
- Review drawings to plan Tensar Geogrid layout

- Prepare subgrade by excavating vertically to plan elevation and horizontally to design geogrid lengths. If a rock face is shown, it is the responsibility of the Engineer to determine the competency of the rock at the limits of excavation shown on those plans.

Any deviation in the location of the rock face with respect to the face of the retaining wall may require an adjustment to the Tensar Geogrid design and the designer of record must be notified by the contractor prior to proceeding with the wall construction.

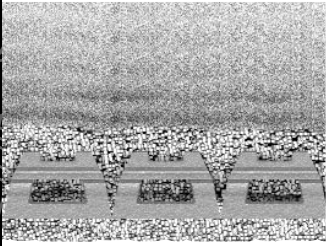
- The subgrade shall be approved before proceeding with wall construction. Any foundation soils found unsuitable by the Engineer shall be treated in a manner approved by the Engineer.
- On larger projects it is suggested that Tensar Geogrid be cut in advance to speed wall construction.
- Cut geogrid flush at the nearest transverse bar beyond measured length as is illustrated below or in front of the transverse bar to provide "finger shims" (as illustrated in Figure 2 on page 8).



LEVELING PAD CONSTRUCTION

- The leveling pad must be flat and level to assure that the first course of Mesa Units will provide uniform support to the courses above it. Non-uniform support will induce tensile stresses and shear stresses in the Mesa Units above the first course that can result in cracking.

- The leveling pad may be constructed with unreinforced concrete or compacted, 3/4-inch minus, well-graded aggregate. It is typically 12 inches wider than the Mesa Units, providing



6 inches in front of and behind the Mesa Unit, allowing for wall curvature and minor alignment adjustments. It is generally 6 inches deep. For unrein-

forced concrete leveling pads, steel or wood forms are required to assure that the top of the leveling pad is flat and level. For aggregate leveling pads, the aggregate is generally overfilled, compacted, and then carefully trimmed down to near plan elevation. The Mesa Units are then seated into the aggregate with a rubber mallet to the plan elevation, and leveled front to back and side to side.

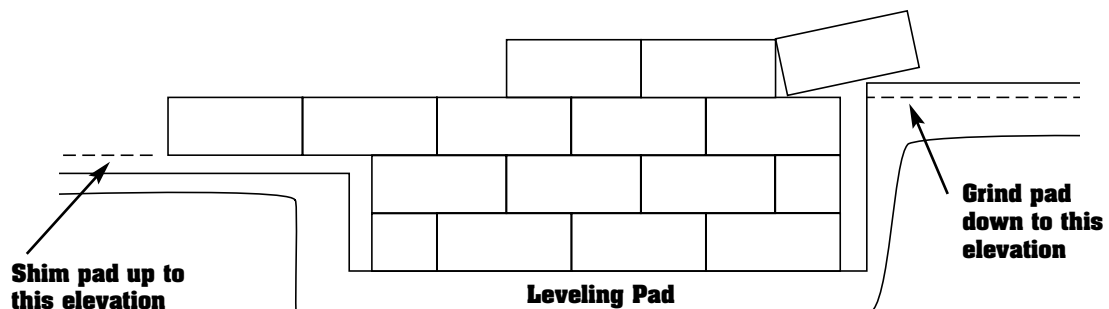
- Steps in the leveling pad are required to change elevation. It is important that the height of the step is equal to the height of the number of Mesa Unit courses. In practice, the steps may be slightly more or less due to the thickness of the Tensar Geogrid reinforcement connected between courses and to the normal dimensional tolerances of the units. Where a concrete step is not at the same elevation of the adjacent courses, shimming or grinding will be required to match the elevation and provide a flat and level bearing surface for the next course of units. As shown in the figure below, such grinding or shimming will be required over some distance (5 feet min.) from the step to

assure that the top surface of the entire course of Mesa Units placed on the stepped section of the leveling pad is flat and level. Ribs or transverse bars of the Tensar Geogrid may be used as shims if their thickness is correct.

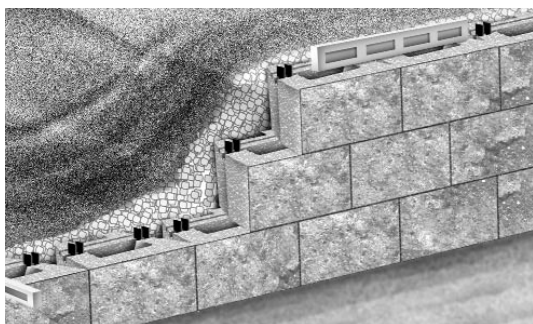
- If contract documents indicate the wall has a battered face, the Contractor shall ensure that the 5/8-inch setback is accounted for at each leveling pad step. It is recommended that the elevation change of the leveling pad does not exceed four courses.
- The top of the Mesa Units should be checked for level and adjusted as required. Shimming and/or grinding may be required (see pages 7 to 8 for shimming instructions).

1.4 Wall Construction

- Wall line shall be established using a chalk or string line. Chalk line should be placed on the concrete pad along the tails of the Mesa Units. A string line can be used in lieu of a chalk line and will be necessary where leveling pad consists of aggregate. (Alignment based on the split faced Mesa Units may render an uneven wall face.)
- Once the leveling pad is complete, the first course can be installed. Place the Mesa Unit with the sides touching and the textured face outward. The first course must be accurately placed, carefully spaced, and leveled to facilitate construction and to enhance the appearance of the wall.



- Prior to the installation of the second course and each successive course, the tops of the Units on which the course is to be placed must be swept clean. Failure to do this will result in problems with seating and leveling the Mesa Units and increase the likelihood of cracks developing in the units due to load concentrations as additional courses are set.
- The Mesa Units are stacked in a running bond fashion, similar to standard masonry wall construction. A limit for the shift from a perfect running bond is needed. On straight wall sections, it should be a 1/2 inch to assure all standard connector teeth are squarely in the slots. The units, once placed, shall be advanced forward toward the face of the wall until they make contact with the Mesa Connector. The connectors do allow for the units to slide from side to side, therefore, the vertical joint alignment should be checked frequently (max. 20 units) to ensure that a running bond pattern is maintained within the limits stated above.
- Drainage fill is placed to the limits shown on the drawings. Drainage and/or core fill may not be required for structural walls (refer to the Definitions section under "Drainage Fill" and "Core Fill"). Proper installation of drainage materials is critical to overall wall performance. Drainage materials must be installed properly and protected during construction.

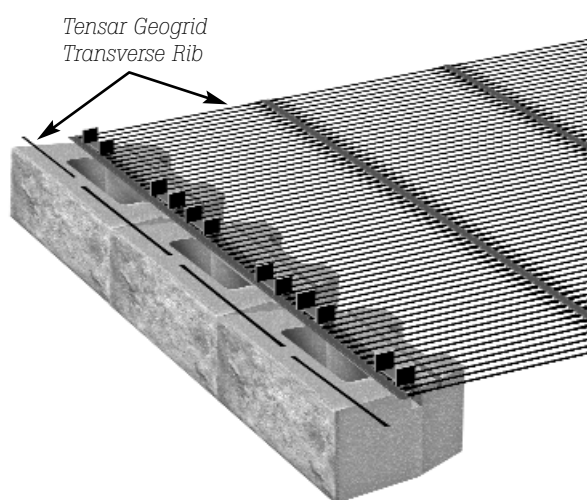


As subsequent courses of Mesa Units are placed, it is important that the units remain level from front to back and side to side. This level should be checked as each course is placed. If the units are more than 1/8-inch out of level from front to back or side to side, or if the units are not level from back to front, they should be brought to level by grinding and/or shimming (see Figure 1 to the right and Figure 2 on page 8).

SHIMMING FOR MESA UNITS

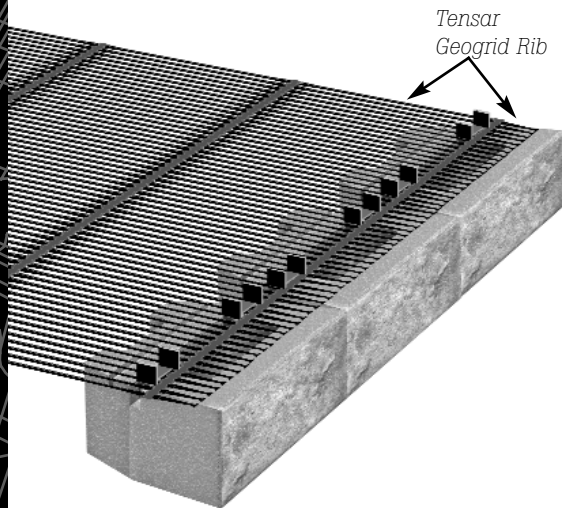
- It is important that the courses of Mesa Units are level front to back and side to side. To achieve this in the front to back plane, it may be necessary to grind the units or use shims between some of the courses to correct for:
 1. the thickness of the Tensar Geogrid reinforcement ribs that cross the tails of the units, or
 2. for slight differences in the height at the front and back of the units.

Figure 1: Geogrid Rib Shim



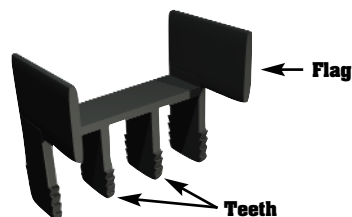
- For courses placed on a geogrid elevation, shims may be required on the front face shell of the Mesa Unit below. The shims should be the same thickness of the geogrid rib. The shim material can be a rib trimmed from the same roll of Tensar Geogrid that is placed on top of the front face shell of the Unit. An alternative is to cut the geogrid so that the ribs extend approximately 1 inch onto the front face shell. These methods are shown in the drawing above and on the drawing on the next page.

Figure 2: Geogrid Finger Shim



- To correct for slight differences in unit heights, a geogrid rib may be cut and placed on successive courses to bring the face and/or tail back to level. As shown in Figure 1 (page 7) and Figure 2 (above), the "Rib Shim" and "Finger Shim" should be positioned on the inside of the front face shell of the unit, generally within a 1/2 inch of the core. This results in less stress on the underlying block than would exist if the shim is placed near the front face of the unit.
- The Tensor Geogrid may be draped over the upper courses of the wall until the reinforced fill reaches the level of the Tensor Geogrid. To ensure the Mesa Wall's geometry is being maintained, a string line should be pulled after each course has been set. The string can be referenced from the connector slot or tail of the Mesa Unit.

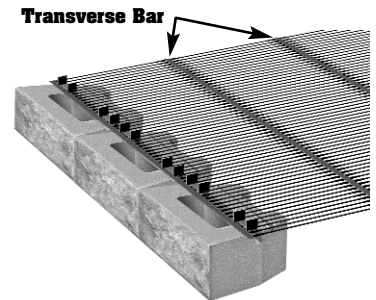
NOTE: To ensure proper installation, the geogrid transverse bar must be pulled to contact with the teeth of the Mesa Connector.



1.5 Geogrid & Connector Placement

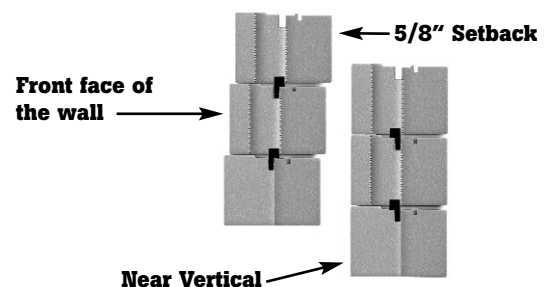
The following section shall reference installation for both the geogrid and connectors based on use of the the Standard, XL, and/or Landscape Units.

- At the location and elevation shown on the plans, install the Tensor Geogrid of the type and length specified, ensuring the transverse bar of the Tensor UX Geogrid is in the location indicated in the illustration.



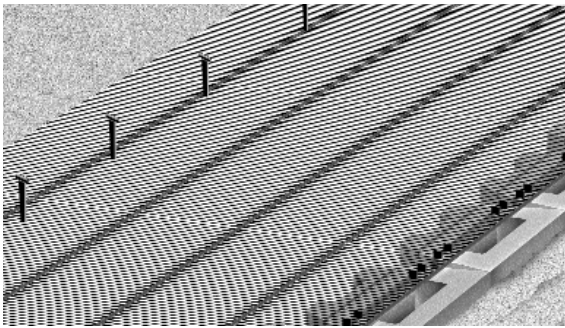
The teeth of the Mesa Standard Connector must penetrate through the Tensor Geogrid apertures into the Connector slot on each side of the top of the Mesa Units. On courses that receive geogrid and on courses that do not receive geogrid, a Mesa Standard Connector shall be placed in each of the connector slots on top of the units. All four teeth of the connectors should be positioned in the slots. Where necessary, to align standard connectors over slots, the transverse bar of the geogrid may be cut midway between the connectors. The transverse bar should be snug against the connector teeth before final seating of the connector.

- Flags on top of the Mesa Connector must be oriented in the proper direction for a "battered" or "near vertical" wall as per the contract documents. Placement of the connector with flags forward toward the face of



the wall will render a near vertical wall. Placing the connectors with the flags pointed away from the wall face will provide a 5/8-inch setback.

- The fill on which the geogrid is placed shall have been compacted to the required density (see compaction requirements on this page) and graded reasonably smooth. On courses that require geogrid, the reinforced fill must be at the same elevation as the top of the course for a distance of three feet before the fill can be gradually sloped. Remove slack from the geogrid by pulling it taut, and then anchor it using stakes and/or rods. The stakes used to position the tail of the geogrid can be withdrawn once the fill has been placed and then reused on subsequent lifts. Optionally, a pitchfork can be inserted at the tail of the geogrid and slack removed by prying until the fill



has been placed on the geogrid. The removal of the slack from the geogrid prior to fill placement will help prevent any movement of the wall face due to translation of the slack toward the wall face.

- Fill placement shall be performed to minimize development of slack in the geogrid. The fill should be spread in a direction away from or parallel to the face of the wall. By doing this, any slack that does develop will tend to be pushed toward the free (unconnected) end of the geogrid. Unless the contract documents are more stringent, the loose lifts of the reinforced fill shall not exceed 6 inches where hand compaction equipment is used, or

10 inches where heavy compaction equipment is used. These thicknesses may vary depending on the project specific soil types used. The fill shall be compacted to 95% of ASTM D-698 or as required by the contract documents, whichever is more stringent. Only hand-operated compaction equipment shall be used within 3 feet of the tail of the unit.

- Heavy equipment shall not be used within 3 feet of the back of the facing units. Tracked construction equipment shall not be operated directly on the geogrid. Rubber tired equipment may be operated on the geogrid providing the subgrade is not pumping or rutting. Turning of tired equipment shall be minimized to prevent dislocation or damage to the geogrid. The equipment must travel slowly and with sufficient care to avoid dislocating the geogrid or the facing units.
- At the end of each day, the Contractor shall ensure 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 site.
- The Cap Units, if required, are installed by attaching them to the units below using an approved exterior concrete adhesive. The Cap Units may be placed such that a nominal 1 inch overhang is achieved or flush with the face of the wall.
- Wall penetrations may be accommodated by cutting the Mesa Units to fit using a utility saw and a mason's hammer. The small voids, less than 1 inch, can then be closed with a cement and sand mix or other methods approved by the Engineer.

MESA CURVES AND CORNERS

2.1 - Concave Curves

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

Refer to the "Construction & Quality Control" section of this manual for proper installation of connectors, units, and geogrids for all courses.

FIRST COURSE

Follow standard installation instructions for preparing the subgrade and leveling pad. When placing the first course, *Diagram A*, it is suggested that a flex pipe be placed on the tail of the unit to ensure a smooth curve. If using the 5/8-inch 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 1/2 inch. If the maximum gap is exceeded, may be removed one flag from each connector to close the gap.

2ND COURSE

Follow standard installation procedures for backfilling and course placement. Refer to *Diagram B* for proper positioning of the second course. Set the first unit on halfbond to the base course in the center of the concave curve where possible. Work in both directions to minimize movement off bond.

3RD COURSE

Follow standard installation procedures for backfilling and course placement. Refer to *Diagram C* for proper positioning of third course. Set the first unit on halfbond to the second course in the center. Work in both directions to minimize movement off bond. Assure that all four teeth of the connector are positioned in the connector slot. At the ends of the curve, the running bond must be re-established to develop full connection capacity. This may require cutting or grinding of the facing units.

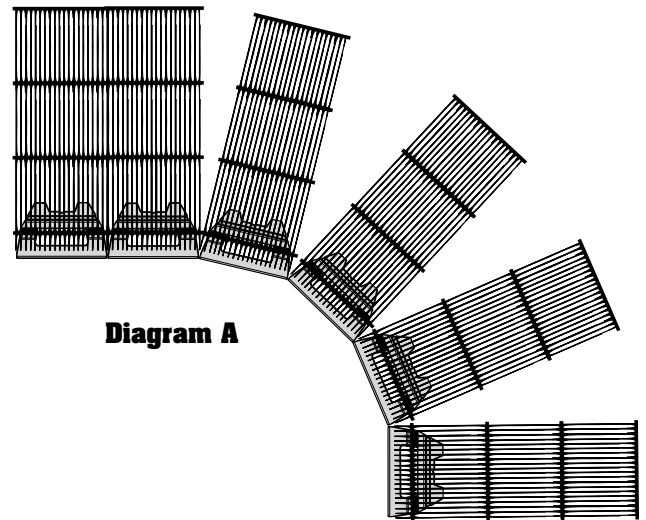


Diagram A

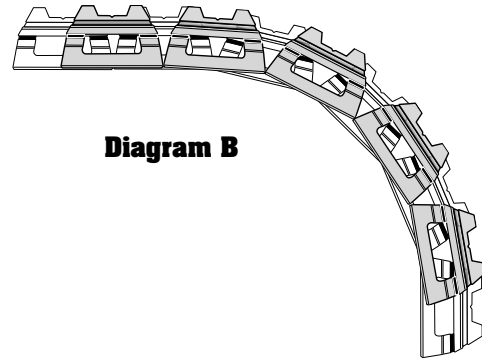


Diagram B

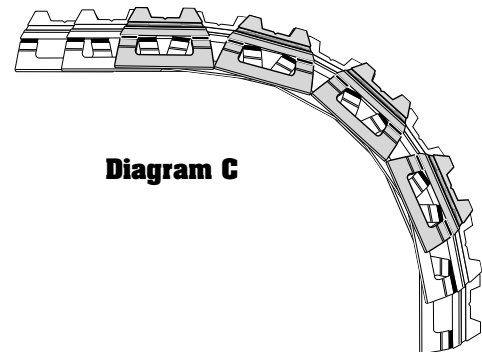


Diagram C

2.2 - Convex Curves

As with Mesa Concave Walls, begin a Mesa Convex Wall from the center of the curve, alternating left and right of the center unit. When building with a 5/8-inch 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.

Refer to the "Construction & Quality Control" section of this manual for proper installation of connectors, units, and geogrids for all courses.

1ST COURSE

Follow standard installation instructions for preparing the subgrade and leveling pad. When placing the first course, *Diagram A*, it is suggested that a flex pipe be placed on the tail of the unit to ensure a smooth curve. If using the 5/8-inch setback, gap the units on the base course by no more than 1/2 inch. the radius becomes smaller as the wall becomes taller, therefore binding will occur.

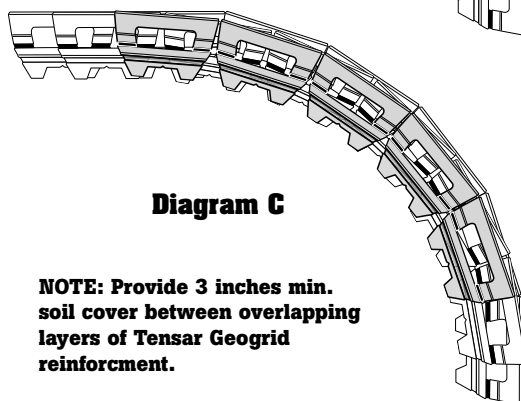
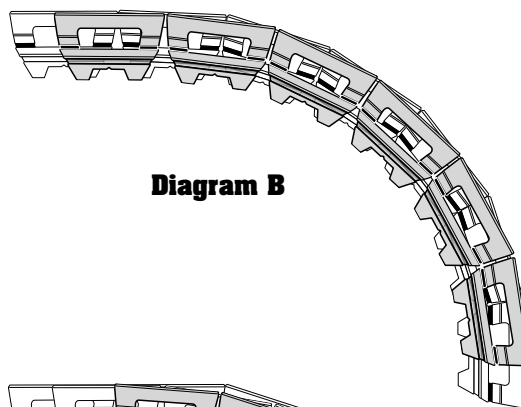
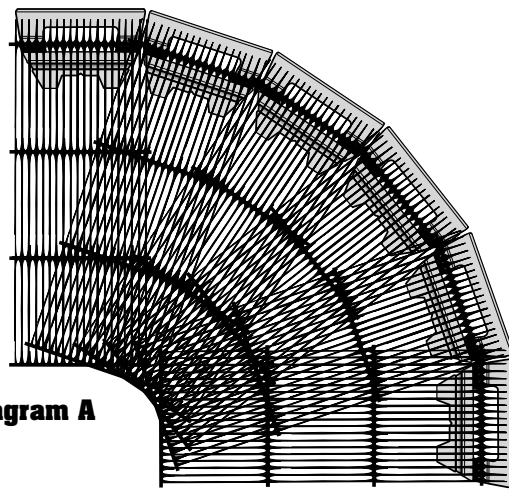
2ND COURSE

Follow standard installation procedures for backfilling and course placement. Refer to *Diagram B* for proper positioning of the second course. Set the first unit on halfbond to the base course in the center of the curve where possible. Work in both directions to minimize movement off bond.

3RD COURSE

Follow standard installation procedures for backfilling and course placement. Refer to *Diagram C* for proper Mesa Unit placement of the third course. Set the first unit on halfbond to the second course in the center of the curve where possible. Work in both directions to minimize movement off bond.

If binding on any course begins to occur, trim the sides of the units with a concrete saw to realign. Assure that all four teeth of the connector are positioned in the connector slot. At the ends of the curve, the running bond must be reestablished to develop full connection capacity. This may require cutting or grinding of the units.



NOTE: Provide 3 inches min. soil cover between overlapping layers of Tensor Geogrid reinforcement.

2.3 – 90° Outside Corners

Corner Units simplify installation, and provide a sharply defined and visually appealing component to any Mesa Wall. Installation is simple, quick, and requires no special equipment or specialized personnel.

Refer to the "Construction & Quality Control" section of this manual for proper installation of connectors, units, and geogrids for all courses.

1ST COURSE

Follow standard installation instructions for preparing the subgrade and leveling pad. Working from the corner unit (see *Diagram A*), place units tightly against each other. Drainage fill shall be placed in the corner unit, and in the units to either side of the corner unit.

2ND COURSE

Follow standard installation procedures for backfilling and course placement. Refer to this *Diagram B* for proper positioning of the second course. When building a Mesa Wall with a 5/8-inch setback, the shorter (9") side of the corner unit should be field cut to account for the setback and to 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 corner unit, and in the units to either side of the corner unit.

3RD COURSE

Follow standard installation procedures for backfilling and course placement. Refer to *Diagram C* for proper positioning on the third course. When building a Mesa Wall with a 5/8-inch setback, the shorter (9") side of the corner unit should be field cut to account for the setback and to maintain a running bond. Alternate the direction of the corner unit and set units on halfbond to the second course. Secure the corner unit to the unit below using an approved exterior concrete adhesive. Drainage fill shall be placed in the corner unit, and in the units to either side of the corner unit.

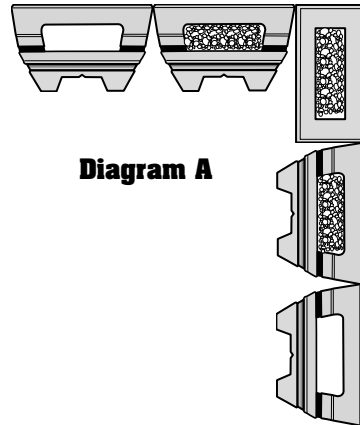


Diagram A

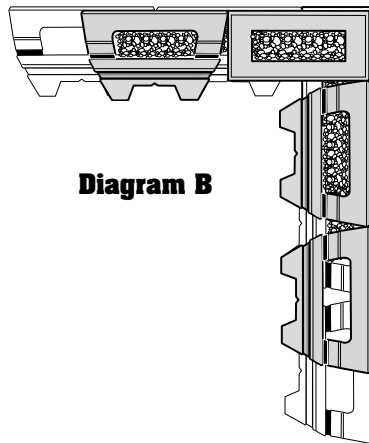


Diagram B

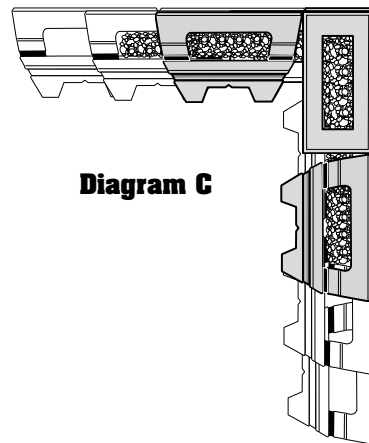


Diagram C

2.4 - 90° Inside Corners

Mesa 90° Inside Corners require some preparation and planning for results that are sharply defined. Once the initial sizing is correctly determined, installation is simple and quick. For the most visually appealing walls, the field cuts discussed below should be applied to the shorter (Wall A) of the two walls.

Refer to the "Construction & Quality Control" section of this manual for proper installation of Mesa Connectors, Mesa Units, and Tensar Geogrids for all courses.

1ST COURSE

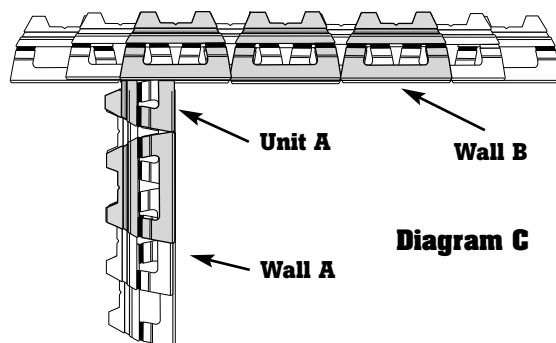
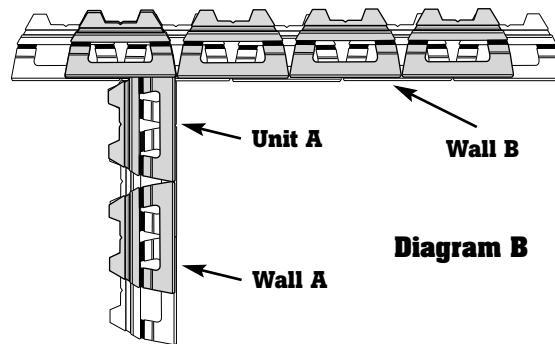
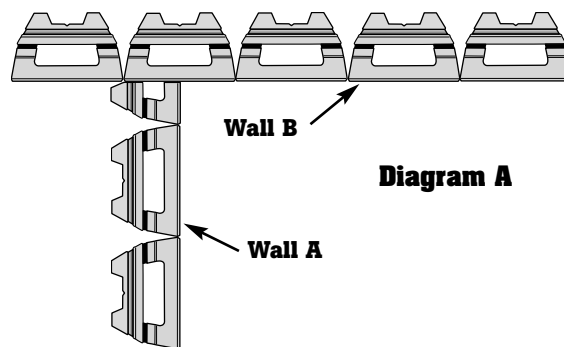
Follow standard installation instructions for preparing the subgrade and leveling pad. First course construction (see *Diagram A*) can begin at the corner or at a point beyond the corner. At the inside corner, begin with a Mesa Unit cut to approximately 1/3 of the original face length. From the corner unit, position the units tightly against each other.

2ND COURSE

Follow standard installation procedures for backfilling and course placement. Refer to *Diagram B* for proper unit placement on the second course. When building this course, begin with Wall B, and construct Wall B past the extent of Wall A. Measure and field cut Unit A to provide a symmetric running bond over the first course.

3RD COURSE

Follow standard installation procedures for backfilling and course placement. Refer to *Diagram C* for proper unit placement on the second course. When building this course, begin with Wall B, and construct Wall B past the extent of Wall A. Measure and field cut Unit A, such that the third course units are centered over the units in the first course.



MESA STEPS & STAIRS

There are a variety of options when it comes to designing and installing steps in conjunction with a Mesa Wall. By combining corner units, standard units, and cap units, virtually any design can be realized.

When building steps, follow the installation techniques previously stated in this manual. A variety of riser heights can be achieved by varying the location of the base Mesa Standard Unit (see detail on next page). Mesa Standard Units used for step construction shall be filled with granular fill or concrete.

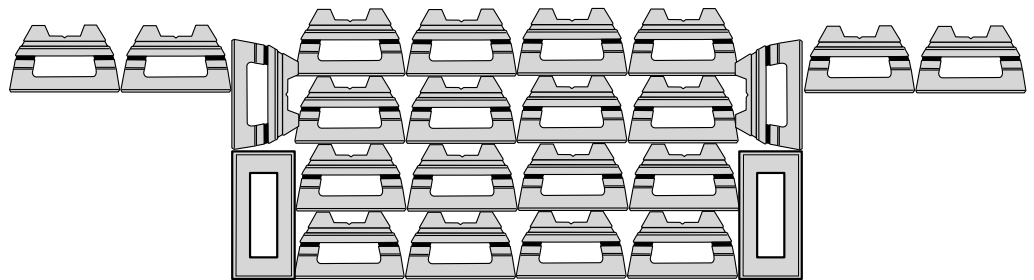


3.1 - Steps in Front of Wall

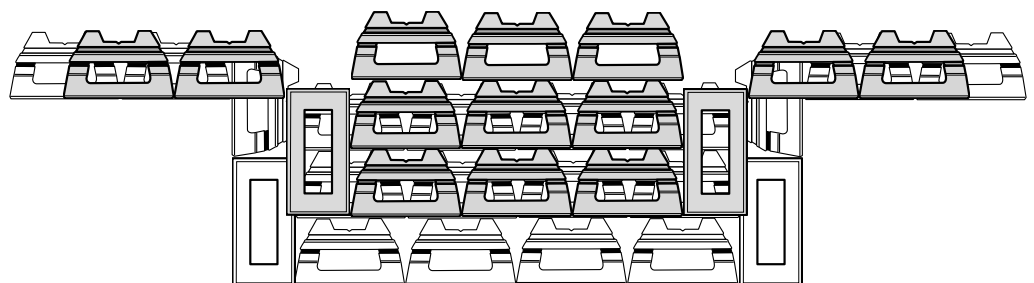
Refer to the "Construction & Quality Control" section of this manual for proper installation of connectors, units, and geogrids for all courses.

Note: Various tread material can be used to cap steps and stairs including but not limited to: Mesa Cap Units, pavers, natural stone, and concrete. When required by the engineer, an approved exterior concrete adhesive should be used.

1ST COURSE

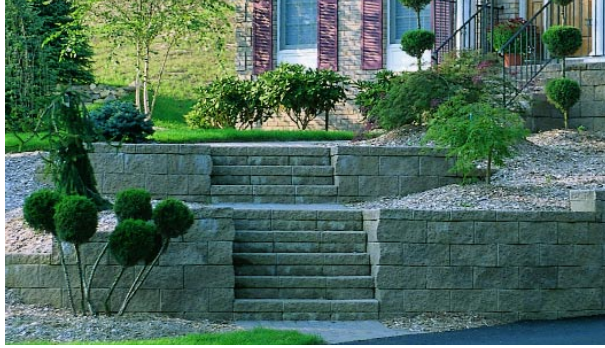


2ND COURSE

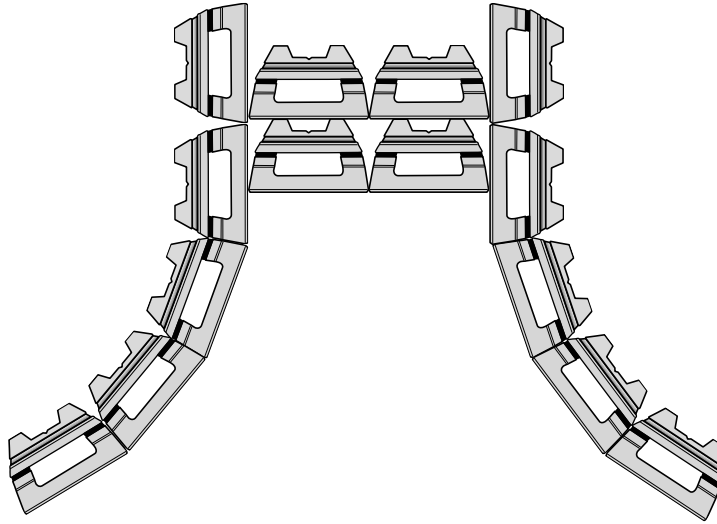


3.2 - Steps in Wall

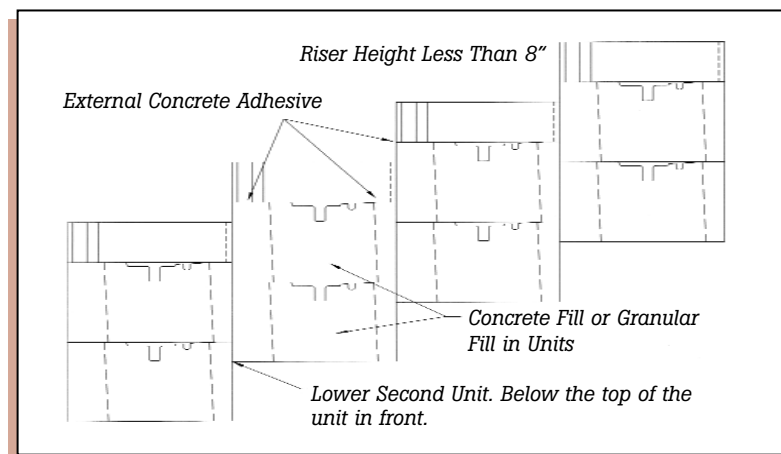
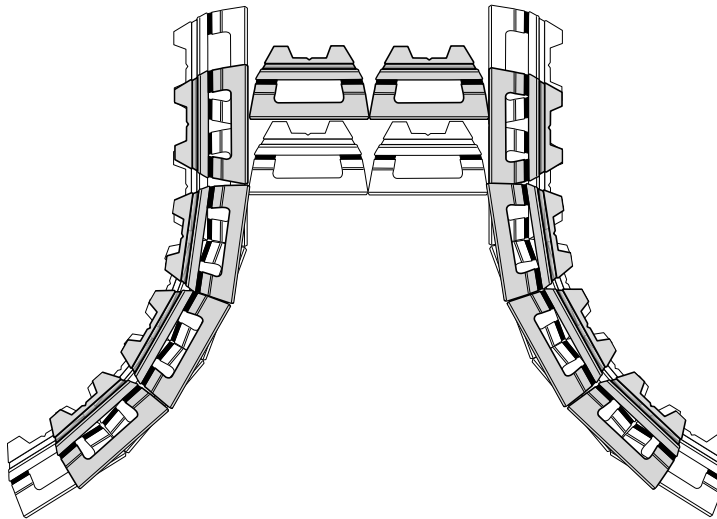
Refer to the "Construction & Quality Control" section of this manual for proper installation of connectors, units, and geogrids for all courses.



1ST COURSE



2ND COURSE



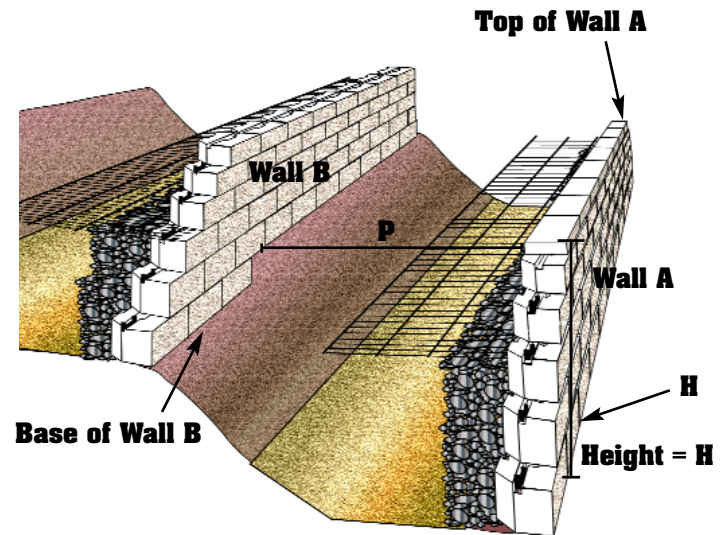
RISER HEIGHT DETAIL

TIERED & TOP OF WALL FINISHES

4.1 Tiered Wall

Tiered Mesa Walls offer a visually pleasing and less obtrusive alternative to conventional wall construction. On sites that provide sufficient land area for this application, these walls are typically designed with greenspace between the tiers. For tiered walls to be designed separately, the distance between the lower Wall A (at its top) and the upper Wall B (at its base) must be at least twice the height of the lower Wall A (see illustration to right). If this condition does not exist, the lower Wall A must be designed to account for the additional loading of the upper Wall B.

See the "Construction & Quality Control" section of this manual for proper installation procedures of the units, connectors, and geogrid.

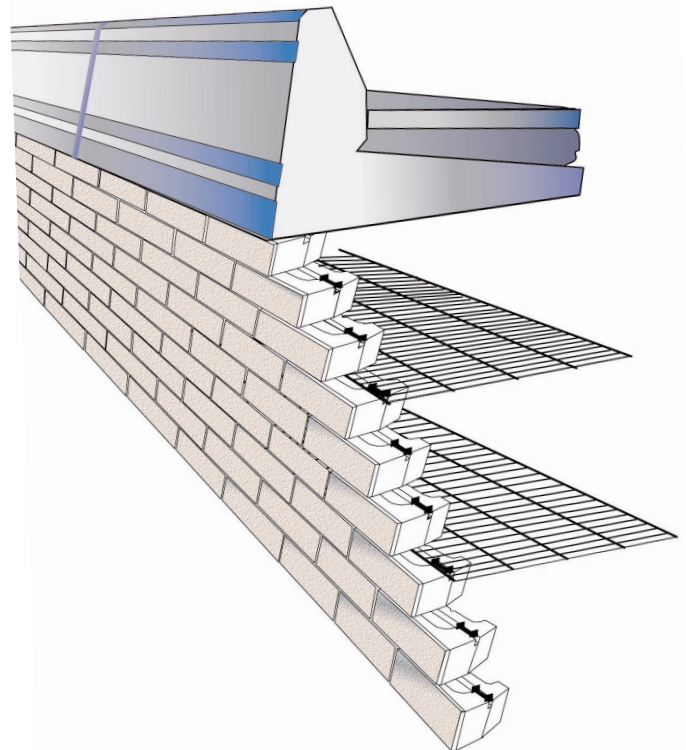


If P is $> 2 \times H$, then design the walls independently of each other.

4.2 Traffic Barriers

Mesa Retaining Walls can be easily capped with reinforced concrete traffic barriers. Following the wall installation, set and secure forming materials along the top course of the Mesa Wall according to standard procedures. When the design calls for an overhanging barrier, form the front edge by attaching an "L" shape forming material to the face of the Mesa Wall. Construct the barrier as designed, including, but not limited to, the use of control joints.

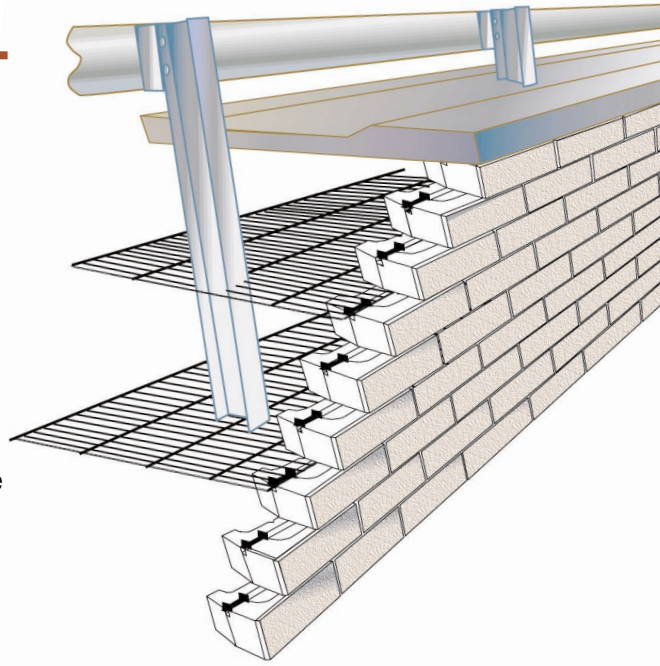
See the "Construction & Quality Control" section of this manual for proper installation procedures of the units, connectors, and geogrid.



4.3 Guide Rails

Guide rails can be easily placed along the top of the Mesa Wall according to standard installation procedures. Guide rail posts may be placed by cutting holes in the geogrid, or the post may be driven through the geogrid. The guide rail post location, design, and impact on the Mesa Retaining Wall shall be taken into account by the Design Engineer. Guide rails can also be placed into sonotubes positioned during wall construction and then filled with concrete. Tensar Geogrid can be cut to accommodate the sonotubes.

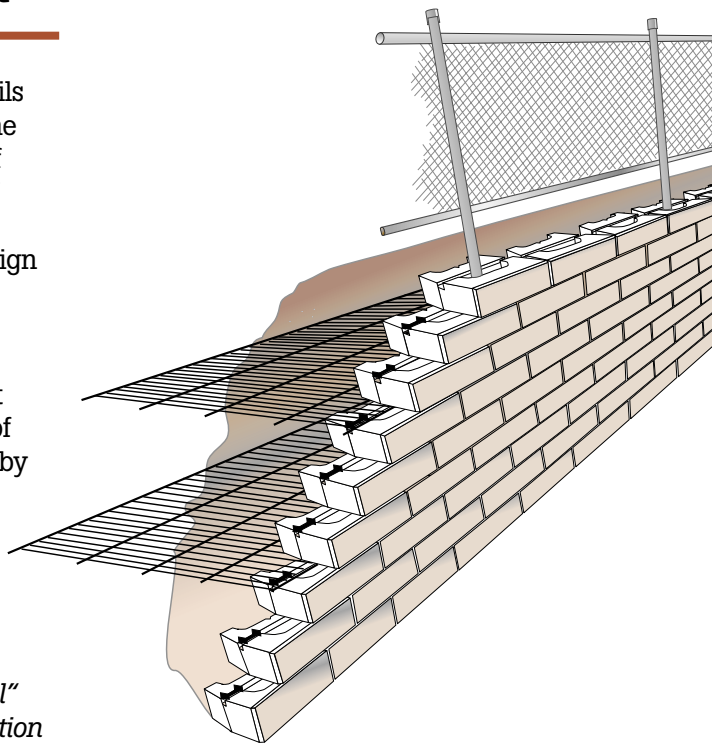
See the "Construction & Quality Control" section of this manual for proper installation procedures of the units, connectors, and geogrid.



4.4 Handrail/Fence Post

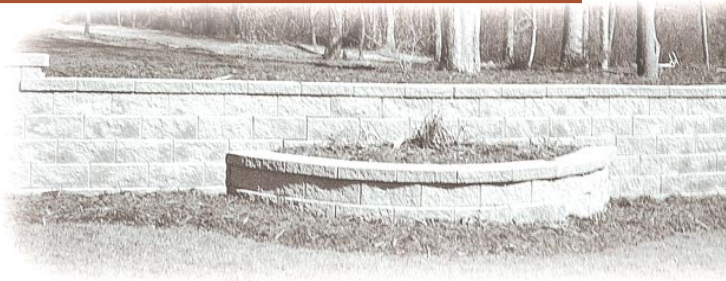
Similar to guide rail installations, handrails and fence posts can be placed behind the Mesa Units as described in section 4.3. If posts are to be placed within the core of the Mesa Unit, they must be placed in increments of 1.5-foot spacings. The Design Engineer shall determine the post depth within the Mesa Unit. At the specified depth, a separation membrane shall be placed under the Mesa Unit so that grout can be placed in the core up to the top of the wall. Posts are placed first, followed by grout installation. The purpose of the separation membrane is to ensure the grout is placed only to the specified depth. Mesa Cap Units shall be field cut to accommodate the posts.

See the "Construction & Quality Control" section of this manual for proper installation procedures of the units, connectors, and geogrid.

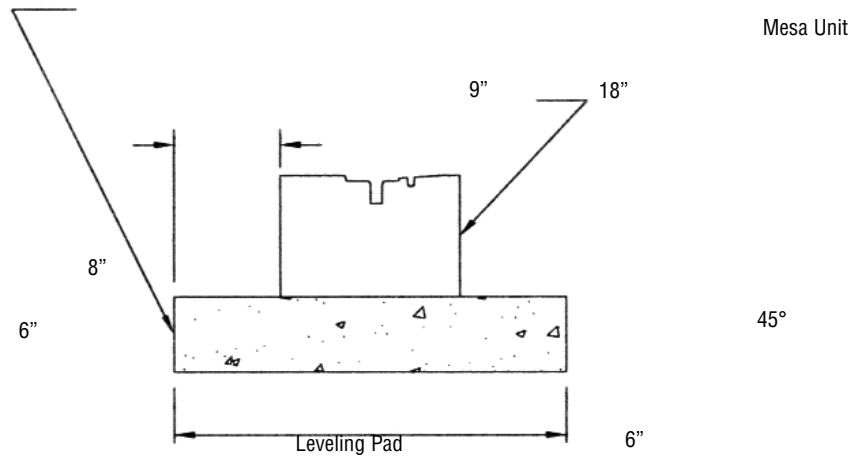


MESA WALL DETAILS

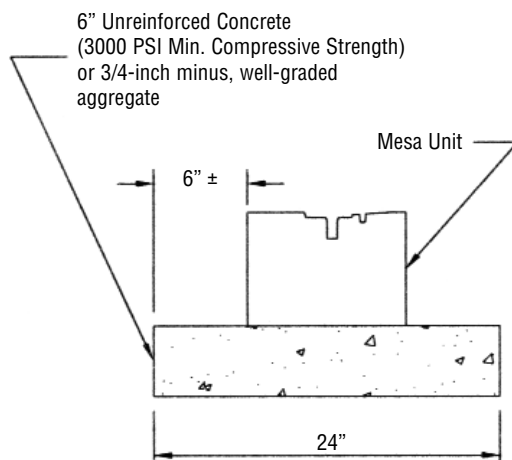
The following section contains the standard details for designing Mesa Walls with special considerations. Please refer to the section 1.0 of this manual for proper installation instructions for units, connectors, and geogrid.



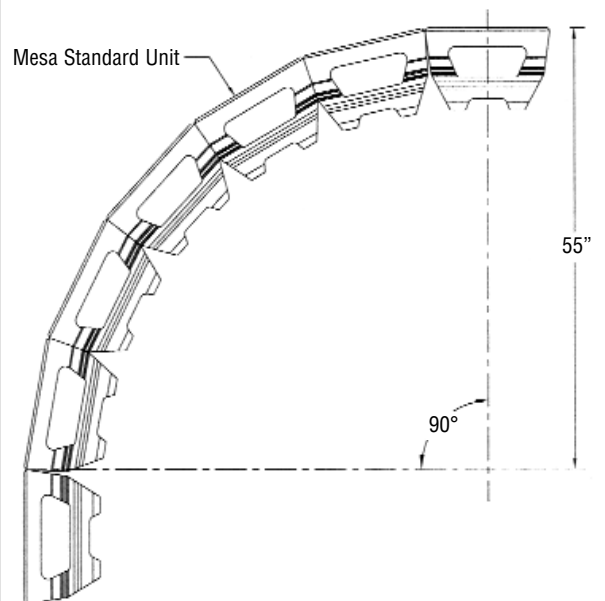
TYPICAL LEVELING PAD STEP DETAIL



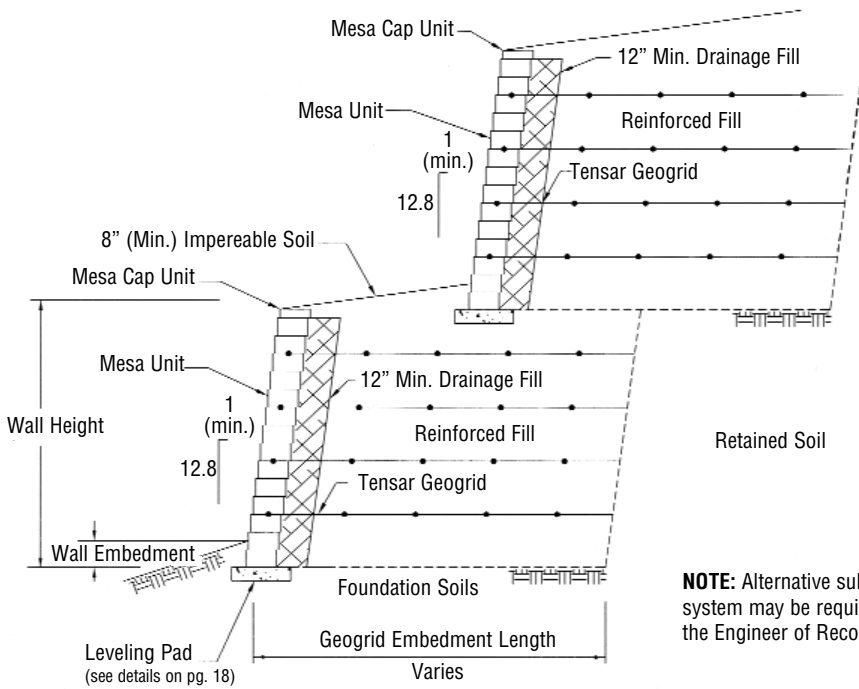
TYPICAL LEVELING PAD DETAIL



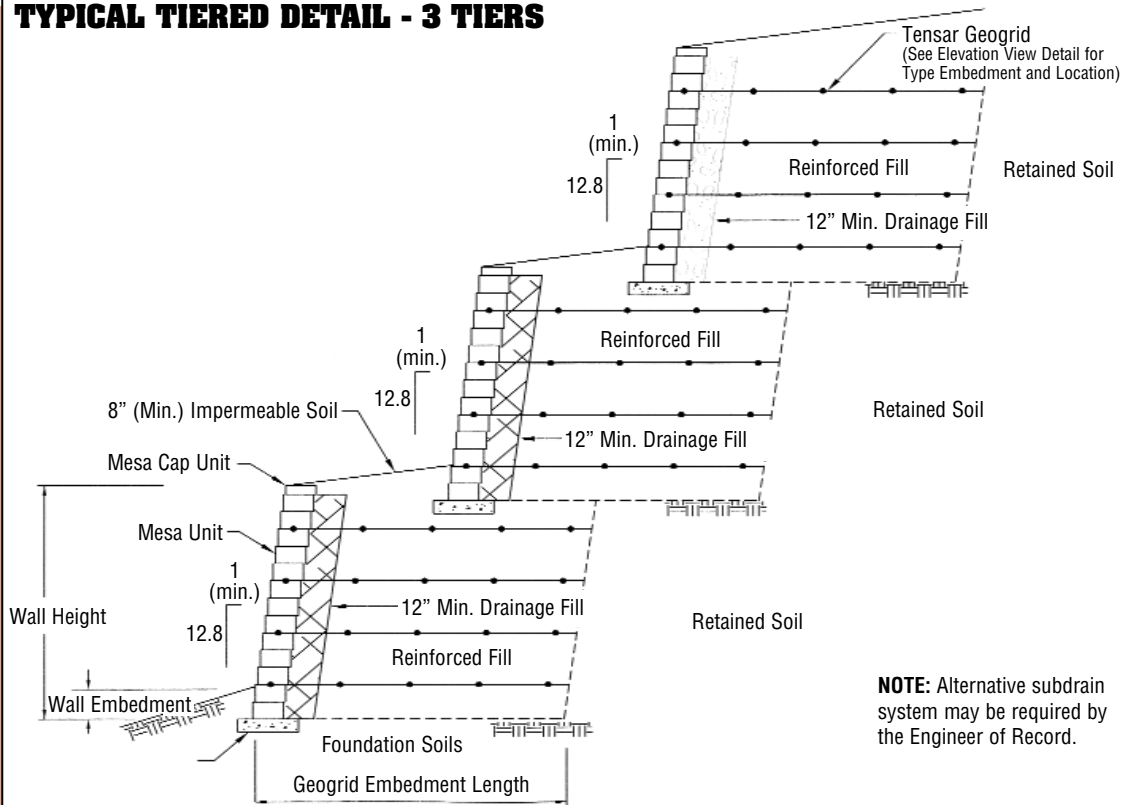
TYPICAL 90 DEGREE CURVE DETAIL



TYPICAL TIERED DETAIL - 2 TIERS

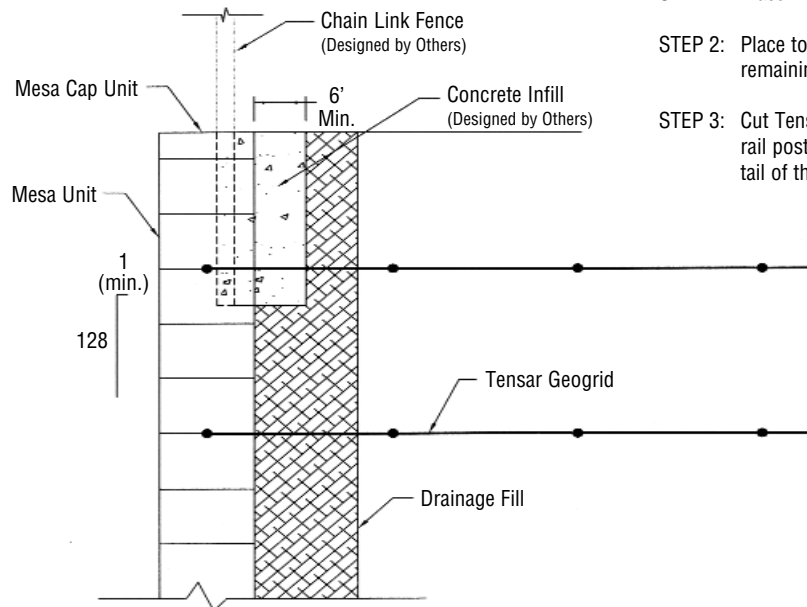


TYPICAL TIERED DETAIL - 3 TIERS





HAND RAIL ON TOP OF WALL DETAIL

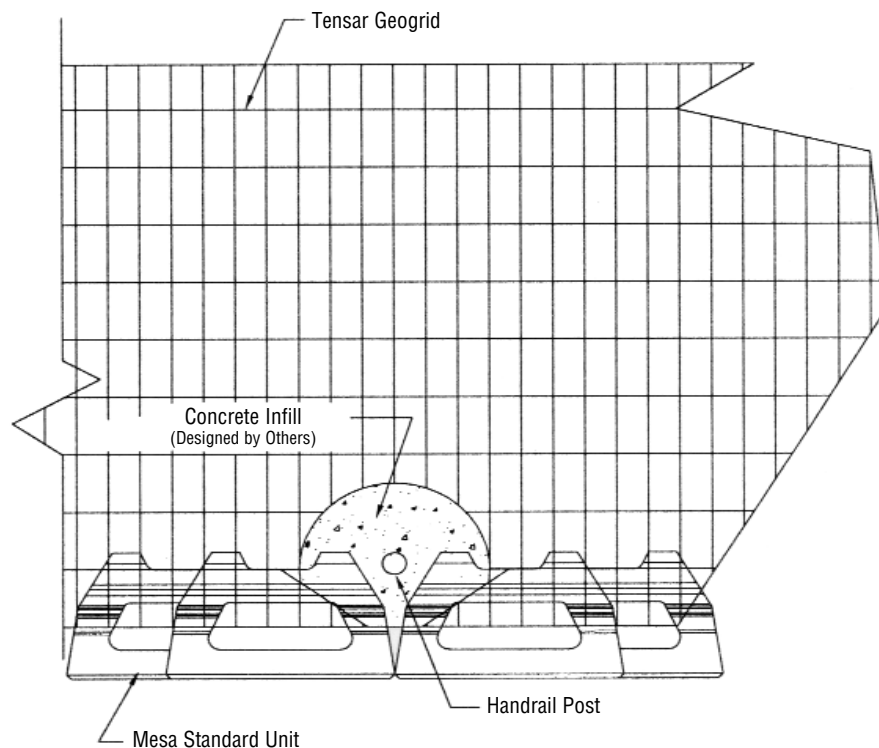


STEP 1: Place Drainage Fill to bottom of fence.

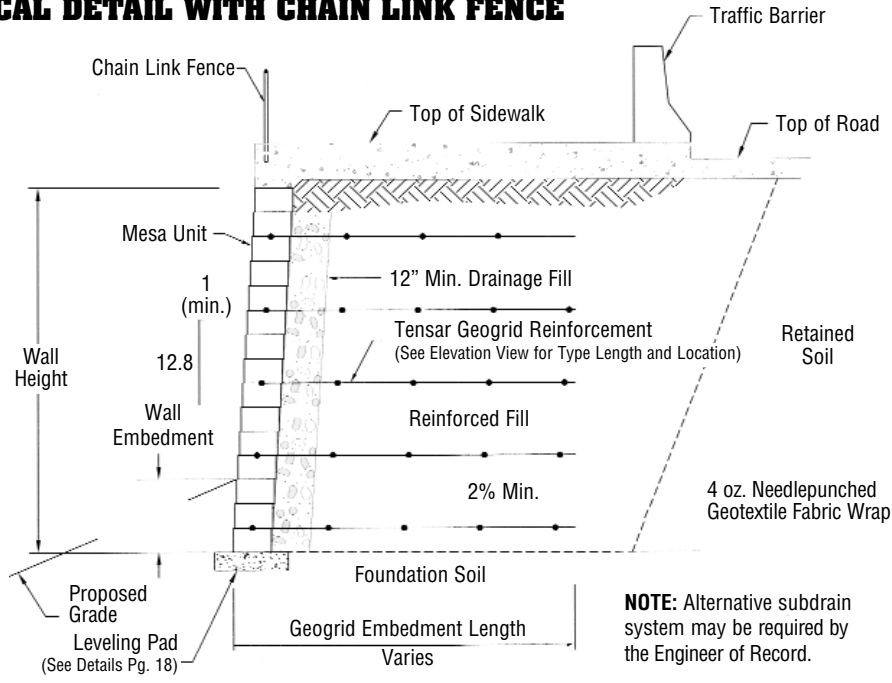
STEP 2: Place top layer of Tensar Geogrid and remaining Mesa Units above it.

STEP 3: Cut Tensar Geogrid and then set fence or rail post. Form and pour concrete infill at tail of the Mesa Units.

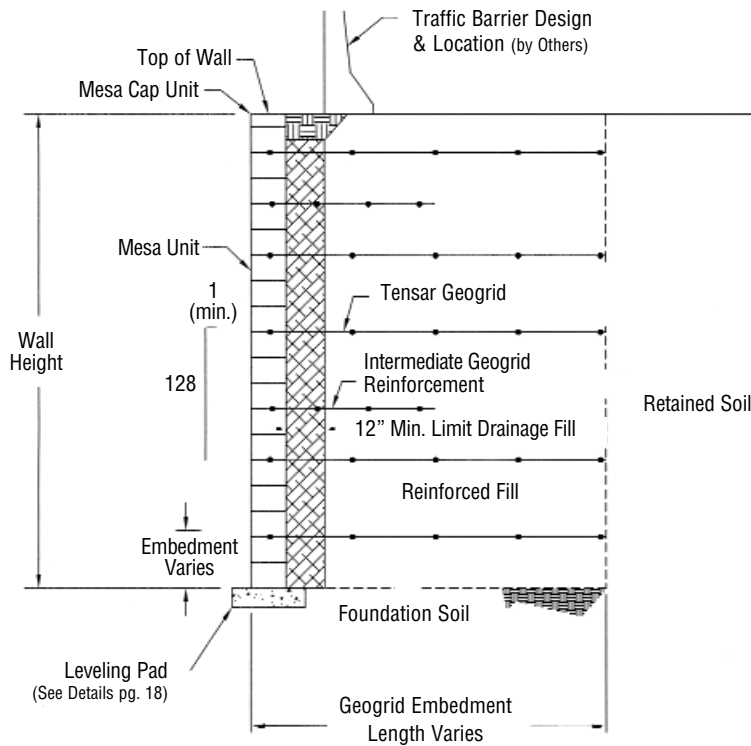
PLAN VIEW - DETAIL OF HANDRAIL ON TOP OF WALL



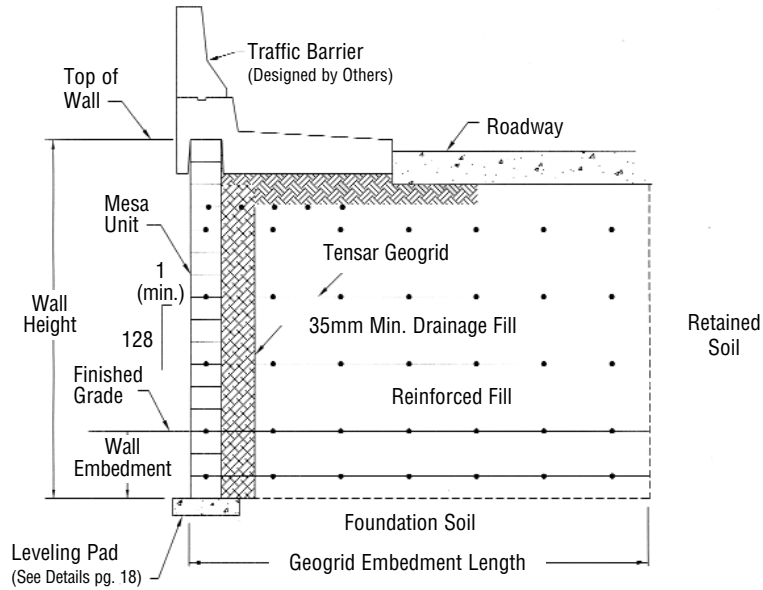
TYPICAL DETAIL WITH CHAIN LINK FENCE



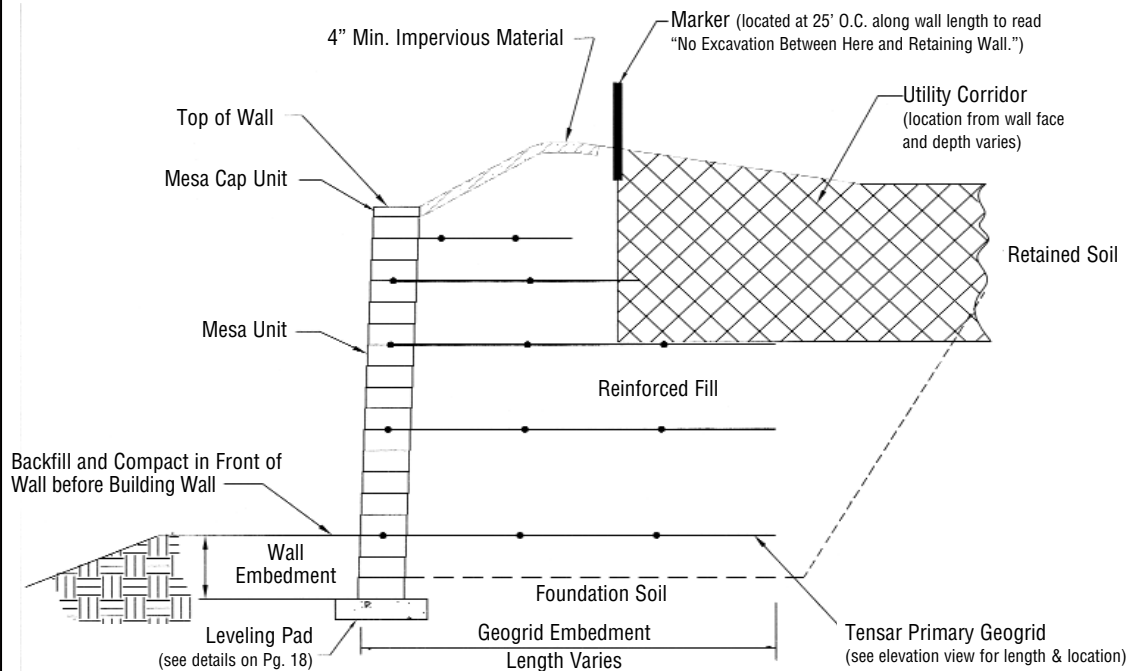
TYPICAL DETAIL OF TRAFFIC BARRIER BEHIND WALL



TYPICAL DETAIL OF TRAFFIC BARRIER ON TOP OF WALL



TYPICAL DETAIL WITH UTILITY CORRIDOR BEHIND WALL



NOTE: Alternative subdrain system may be required by the Engineer of Record.

DEFINITIONS

■ **Contract Documents:**

The Agreement between the Owner and the Contractor including conditions of the contract drawings, specifications, and the provisions of the Agreement between the Contractor and the Supplier of the Mesa Systems. These documents shall also include addenda and other modifications issued prior to the execution of the Contract.

■ **Core Fill:**

Free-draining, coarse-grained soil which is placed within the empty cores of the Segmental Concrete Facing Units. Core Fill may not be required within the Mesa Unit if the Contractor can provide the Engineer and/or Architect with connection testing performed without Core Fill verifying that the connection strength of the System exceeds the requirements set forth in the design data.

■ **Drainage Fill:**

Free-draining, coarse-grained soil which is placed behind the Mesa Segmental Concrete Facing Units and in the openings between the Mesa Units as specified on the Plans. The Engineer and/or Architect may specify a nonwoven geotextile which meets AASHTO M288-96 subsurface drainage requirements in lieu of Drainage Fill.

■ **Inspector:**

The Authorized Representative assigned to see that the workmanship and materials are in accordance with the terms of the Contract.

■ **Mesa Connector:**

A mechanical connection device made of high density polymeric with fiberglass inclusions to positively connect the Tensar Geogrid to the Mesa Units.

■ **Plans:**

The part of the Contract documents consisting of the approved plans, profiles, typical cross sections, working drawings and supplemental drawings, or exact reproduction thereof, which shows the location, character, dimensions, and details of the Work to be performed.

■ **Reinforced Fill:**

The soil material that interacts with the Geogrid reinforcement to create a flexible gravity mass. Its limits extend from the back of the facing element or granular medium to the tails of the soil reinforcement or as indicated on the Plans.

■ **Setback (Batter):**

The rearward offset from the vertical plane between two adjacent block courses created by the orientation of the flags on the Mesa Connectors.

■ **Specifications:**

A description of the quality and quantity of the materials and workmanship that will be required of the Contractor in the execution of the Work under the Contract between the Owner and the Contractor.

■ **Tensar Geogrids:**

A polymeric grid formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth and connection to Mesa facing units that function as tensile reinforcement.





NOTES

Authorized Mesa Retaining Wall Systems Representative

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MESA-SPEC-12.03

