



**SPECIAL PROVISIONS
FOR
GRID TIED CONCRETE BLOCK MAT**

**Des Moines County
NHSX-061-2(69)--3H-29**

**Effective Date
December 15, 2020**

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

150711.01 DESCRIPTION.

This work shall consist of furnishing and placing the grid tied concrete block mat in accordance with this specification and conforming with the lines, grades, design, and dimensions shown on the plans.

150711.02 MATERIALS.

A. Grid Tied Concrete Block Mat.

1. Grid tied concrete block mat is manufactured from individual concrete blocks tied together with high strength polypropylene bi-axial geogrid. Each block is tapered, beveled and interlocked and includes connections that prevent lateral displacement of the blocks within the mats when they are lifted for placement.
2. **Manufacturers.**
 - Flexamat, manufactured by Motz Enterprises, Inc.
 - Shoreflex, manufactured by Shoretec, LLC.
 - Armadune, manufactured by Submar, Inc.
 - Or approved equal (See Article SP-150711.02, D).
3. **Blocks.**

Furnish blocks manufactured with concrete conforming to the cement requirements of ASTM C150 and to the aggregate requirements of ASTM C33. Meet a minimum compressive strength of 5000 psi at 28 days. Furnish blocks that have a minimum weight of 3 pounds per block. Blocks shall be placed no further than 2 inches apart.
4. **Polypropylene Bi-Axial Geogrid.**

Provide revetment mat that is constructed of a high tenacity, low elongating, and continuous filament polypropylene fibers that is securely cast into and embedded within the base of the concrete blocks and obtains connection strength greater than that of the geogrid. Ensure the geogrid meets the requirements of Table 1:

Property	Value
UV Stabilization	2% Carbon Black
Ultimate Tensile Strength (MD and CMD)	2055 lb./lf

5. Splicing, U-Anchors, Ties.

- a. Splicing of mats shall be performed by mat overlap or joining of abutting mats with zip ties per Article SP-150711.03.
- b. For mat overlap locations an overlap tail without concrete blocks may be provided for the adjacent downstream mat in lieu of overlapping full mat sections. This tail will be included in the measured width of mat for payment. The overlap tail shall be placed below the adjacent upstream mat.
- c. Stainless steel zip ties shall be 20 inch stainless steel ties, width 0.31 inch, 304 Stainless Steel, Minimum tensile strength 250 pounds.
- d. U-Anchors shall be galvanized No. 3 deformed bars shaped in a “U” with 18 inch legs. Location and spacing shall be per the plans.

6. Delivery and Handling.

- a. Cover the mat or otherwise protect it during long periods of storage to protect against degradation of the backing material as recommended by the manufacturer.
- b. Mats will be rolled for shipment and are packaged with handling straps. Upon delivery, rolls may be left exposed for up to 30 days. If exposure will exceed 30 days, cover or tarp the rolls to minimize UV exposure.
- c. All mats to be inspected upon delivery. Assure that all units are sound and free of defects that would interfere with the proper placing of the unit or impair the strength or permanence of the construction.
- d. Chipping or missing concrete resulting in a weight loss exceeding 15% of the average weight of a concrete unit is grounds for rejection by the engineer. Replace, repair or patch the damaged areas per the manufacturer’s recommendations.

B. Underlayment Material.

The underlayment material shall be TRM (Type 2) as shown in the plans. The underlayment shall be installed as noted in the plans and in accordance with Section 2601 of the Standard Specifications.

C. Grid Tied Mat Ground Anchors.

- 1. Intended for use in anchoring mat on slope. Percussion type anchor with 1,000 lb. working capacity in normal soil. Acceptable products Gripple TLA3 with 1/8 In. galvanized wire rope, Duckbill Model 68 with 1/8 inch galvanized wire rope, American Earth Anchor 3AL-60 with 1/8 inch galvanized wire rope or approved equal.
- 2. Mat shall be fastened to anchor with a steel top bearing ‘X’ plate, 12 inches cross, 0.11 inch thick steel. Plate shall be Zinc Plastisol coated or approved equal. Acceptable products are Gripple TL-3CRS plate or approved equal. Acceptable top termination to secure cable to plate are Gripple TL-300, American Earth Anchor Quickwise, or approved equal.
- 3. Normal soil referenced above defined as Medium-Firm Clay, Loose Standard Gravel, Compact Fine Sand. Anchor spacing shall be as shown on the plans.

D. Alternative Products.

Alternative products may be considered if composition matches the materials detailed. Such products must be approved in writing by the Engineer. Submittal packages for alternate products must include, as a minimum, the composition of materials, stating product is comprised of the following components:

- Concrete Blocks.
- Polypropylene Bi-Axial Geogrid.

150711.03 CONSTRUCTION.

- A. Prior to installing grid tied concrete block mat, prepare the subgrade as detailed in the plans. All subgrade surfaces to be smooth and free of all rocks, stones, sticks, roots, and other protrusions or debris of any kind that would result in an individual block being raised more than 3/4 inch above the adjoining blocks.
- B. Install mats to the line and grade shown on the plans and per the manufacturer's guidelines. The manufacturer or authorized representative will provide technical assistance during the slope preparation and installation of the concrete block mats as needed. Provide the proper equipment to place the mat that will not damage the mat material or disturb the top soil subgrade and seed bed.
- C. Provide fastening or anchoring as per the plans, specifications or as recommended by the manufacturer in the absence of specific contract details.
- D. For mat seams parallel to the flow direction show in the plans (longitudinal seams) abutting sections of mat shall be joined using stainless steel zip ties spaced at 12 inch centers.
- E. For mat seams perpendicular to the flow direction (transverse seams) shingle seams with the downstream mat recessed under the upstream mat and anchored along the seam per the contract documents. In the absence of specific contract requirements, a 2 feet minimum overlap is required with a row of ground anchors spaced at 3 feet along a line upstream of the last upstream mat blocks.
- F. Underlayment seams shall be overlapped 2 feet minimum. Underlayment shall be continuous across mat seams, with edge of overlap extending 2 feet minimum from edge of mat seam, otherwise a 4 feet wide section of underlayment shall be placed centered on the seam.
- G. Provide edge (longitudinal) and terminal (transverse) trenches at exposed edges of the mat as required by the contract. In the absence of specific contract details provide a minimum 18 inch deep terminal trench at transverse mat edges.

150711.04 METHOD OF MEASUREMENT.

Grid Tied Concrete Block Mat, of the width specified, will be measured by the square feet as shown on the plans, complete in place.

150711.05 BASIS OF PAYMENT.

The Contractor will be paid the contract unit price for Grid Tied Concrete Block Mat, per square foot, including mat placed in edge or terminal trenches. Overlapped mats required per the contract shall be measured separately. This payment shall be full compensation for all work including transporting and placing concrete block mats, complete with specified underlayment. In addition, this payment shall be full compensation for all work to furnish and place the ground anchors, steel cable, cable clamps and anchor plate as required to secure the mat in accordance with the plans and manufacturer requirements. The work includes but is not limited to furnish and placement of cable ties at seams, underlayment material for seam bridging and cut-off trenches, and aggregate backfill for cut-off trenches.