SP-155107
(New)

SPECIAL PROVISIONS
FOR
GRID TIED CONCRETE BLOCK MAT

Warren County
STBG-SWAP-3680(621)--SG-91

Effective Date
March 21, 2023

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.

155107.01 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.

155107.02 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.
- Or approved equal (See Article 150566.02, E).

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:

Table 1: Geogrid Properties

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

5. Ties and U-Anchors.

a. Ties shall be:

- 20 inch long zip ties,
- Width 0.31 inches,
- 304 Stainless Steel, and
- Minimum tensile strength 250 pounds.

b. 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 orpatch the damaged areas per the manufacturer's recommendations.

B. Underlayment Material.

1. The underlayment material shall be 10 ounce non-woven filter fabric packaged in roll of grid tied concrete block mat and shall meet the following characteristics:

Property	Value	Test Method
Weight – Typical	10 oz/sy	ASTM D 5261
Tensile Strength	250 lbs	ASTM D 4632
Elongation @ Break	50%	ASTM D 4632
Mullen Burst	500 psi	ASTM D 3786
Puncture Strength	155 lbs	ASTM D 4833
CBR Puncture	700 lbs	ASTM D 6241
Trapezoidal Tear	100 lbs	ASTM D 4533
Apparent Opening Size	100 US Sieve	ASTM D 4751
Permittivity	1.20 Sec-1	ASTM D 4491
Water Flow Rate	80 g/min/sf	ASTM D 4491
UV Resistance @ 500 Hours	70%	ASTM D 4355

2. The underlayment material may be delivered with the mat roll or placed prior to installation of the mat. If delivered with the mat, underlayment shall be securely attached to geogrid along the outside of the mat to ensure proper function of the underlayment.

C. Grid Tied Mat Ground Anchors.

Grid Tied Mat Ground Anchors shall be as follows:

1. Type 1 Ground Anchor.

a. Intended for use in anchoring mat on slope. Percussion type anchor with 1000 pound working capacity in normal soil. Acceptable products Gripple TLA3 with 1/8 inch 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.

b. Mat shall be fastened to Type 1 anchor with a steel top bearing 'X' plate, 12 inch 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 Quickvise, or approved equal.

2. Type 2 Ground Anchor.
Intended for use with Anchor Block. Percussion type anchor with 3000 pound working capacity in normal soil. Acceptable products Duckbill Model 88 with 5/16 inch galvanized wire rope, American Earth Anchor 8AL-60 with 5/16 inch galvanized wire rope, 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. Grid Tied Mat Anchor Block.
Concrete and reinforcing steel for the anchor block shall be in conformance with Section 2301 of the Standard Specifications. HMA pavement wedge shall be in conformance with Section 2303 of the Standard Specifications. Filter fabric shall be in conformance with Article 155107.02, B. Steel cable used to tie mat to anchor block reinforcement shall be 1/8 inch galvanized.

E. Alternative Products.

1. Alternative products may be considered if composition matches the materials detailed. Such products must be approved in writing by the Engineer.

2. Submittal packages for alternate products must include, as a minimum, composition of materials, stating product is comprised of the following components:
a. Concrete Blocks.
b. Polypropylene Bi-Axial Geogrid.

155107.03 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 foot minimum overlap is required with a row of Type 1 ground anchors spaced at 3 feet along a line upstream of the last upstream mat blocks. 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.

F. Underlayment seams shall be overlapped 2 foot minimum. Underlayment shall be continuous across mat seams, with edge of overlap extending 2 feet minimum from edge of mat seam, otherwise a 4 foot 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 inches deep terminal trench at transverse mat edges.

155107.04 METHOD OF MEASUREMENT.

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

B. Grid Tied Mat Anchor Block
Anchor block will be measured by the linear foot as shown on the plans, complete and in place.

C. Grid Tied Mat Ground Anchor
Ground Anchors, Type 1 and Type 2, will be measured per each, complete and in place.

155107.05 BASIS OF PAYMENT.

A. Grid Tied Concrete Block Mat, Riverine.
The Contractor will be paid the contract unit price for Grid Tied Concrete Block Mat, per square yard, 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. 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.

B. Grid Tied Mat Anchor Block.
The Contractor will be paid the contract unit price for Grid Tied Mat Anchor Block per linear foot. This payment shall be full compensation for all work to complete the anchor block including furnish and placement of reinforcing steel, concrete, joint underlayment fabric, plastic bond break, steel cable to tie mat to the block reinforcing steel, and HMA Pavement wedge with underlying aggregate layer.

C. Grid Tied Mat Ground Anchor.
The Contractor will be paid the contract unit price for Grid Tied Mat Ground Anchor, Type 1 and Grid Tied Mat Anchor, Type 2, per each. This payment shall be full compensation for all work to complete the ground anchor including furnish and placement of the ground anchor, steel cable, cable clamps and anchor plate as required to secure the mat or anchor block to the anchor.