**SPECIFICATION**

# BONDED FABRIC/GEOGRID COMPOSITE FOR BASE REINFORCEMENT

1. **Scope:** The Contractor shall furnish all the materials, labor and equipment necessary to construct, install, and maintain the geogrid/geotextile system (henceforth called the Fabric/Geogrid Composite) until the aggregate is placed and accepted according to the Plans and these Specifications.
2. **Materials:** The Fabric/Geogrid Composite shall be an integrally formed grid structure manufactured of a stress resistant polypropylene Geogrid material, bonded on top of a non-woven, Geotextile fabric. The Geogrid and Geotextile shall meet the physical requirements listed in the tables below. The Geogrid shall have molecular weight and molecular characteristics which impart: (a) high resistance to loss of load capacity or structural integrity when subjected to mechanical stress in installation; (b) high resistance to deformation when subjected to applied force in use; and (c) high resistance to loss of load capacity or structural integrity when subjected to long-term environmental stress such as UV exposure or submergence in saltwater. The Geogrid shall be formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, aggregate, and earth, and function primarily as reinforcement. A non-woven Geotextile separator fabric such as specified in the table below or an approved equal shall be used. Proposed equals must be submitted to the Engineer at least 30 days before bid date to be considered for approval. The Fabric/Geogrid Composite shall also possess the following characteristics:
	1. A sufficient cross-sectional profile to present a substantial abutment interface between the existing soil and aggregate to resist movement relative to those materials when subject to the applied force;
	2. A sufficient flexural rigidity to help maintain intimate contact with the existing very soft to soft soils after the aggregate is placed on top;
	3. A sufficient true initial modulus to cause applied force to be transferred to the Geogrid at low strain levels without material deformation of the reinforced section.

# Table 1 – Geogrid Properties

|  |  |  |  |
| --- | --- | --- | --- |
| **Physical Property (Geogrid)1** | **Units** | **MARV MD Values1** | **MARV XMD Values1** |
|  |  |  |  |
| Aperture Dimensions | in (mm) |  |  |
| Minimum Rib Thickness2 | in (mm) |  |  |
| Tensile Strength @ 2% Strain | lb/ft (kN/m) |  |  |
| Tensile Strength @ 5% Strain | lb/ft (kN/m) |  |  |
| Ultimate Tensile Strength | lb/ft (kN/m) |  |  |
| Flexural Stiffness | mg-cm |  |
| Aperture Stability | m-N/deg |  |
| Resistance to Installation Damage | %SC / %SW / %GP |  |
| Resistance to Chemical Degradation4 | % |  |
| Resistance to UV Degradation5 | % |  |

**Notes:**

1. Unless indicated otherwise, values shown are minimum average roll values determined in accordance with ASTM D4759-02. Brief descriptions of test procedures are given in the following notes.
2. Nominal dimensions.
3. Load transfer capability determined according to ASTM D7737-11.
4. Resistance to loss of load capacity or structural integrity when subjected to chemically aggressive

environments according to EPA 9090 immersion testing.

1. Resistance to loss of load capacity or structural integrity when subjected to 500 hours of ultraviolet light and aggressive weathering in according to ASTM D4355-05.

# Table 2 – Geotextile Properties

|  |  |  |
| --- | --- | --- |
| **Physical Property (Test Method)** | **Units** | **Values** |
|  |  |  |
| Grab Tensile Strength (ASTM D-4632) | lb (kN) |  |
| Grab Elongation (ASTM D-4632) | % |  |
| Trapezoidal Tear (ASTM D-4533) | lb (kN) |  |
| CBR Puncture Resistance (ASTM D-6241) | lb (kN) |  |
| Permittivity (ASTM D-4491) | Sec-1 |  |
| Trapezoidal Tear (ASTM D-4533) | lb |  |
| Water Flow Rate (ASTM D-4491) | Gpm/ft2 (l/min/m2) |  |
| Apparent Opening Size\* (AOS) (ASTM D-4751) | US Sieve (mm) |  |
| UV Resistance (at 100 hrs) (ASTM-4355) | % / hrs |  |

1. **Shipment and Storage:** Each Fabric/Geogrid Composite roll shipped shall be individually identified and maintained in a protective cover(s) prior to placement. It shall be rejected during installation if defects, rips, flaws, deterioration or damage occurred during manufacture, transportation, or storage. During shipment and storage, it shall be protected from moisture, dust, debris, ultraviolet light, and other contaminants following the guidelines of ASTM D- 4873. Each roll shall be labeled or tagged with the manufacturer's name, product identification, shipping lot, parent roll number(s), and date of manufacture.
2. **Approved Product:** The Fabric/Geogrid Composite shall be **BaseLok™ FabGrid™** or approved equal. **BaseLok™ FabGrid™** can be obtained from Industrial Fabrics, Inc. by calling 800-848-4500. Proposed equals must be approved by the engineer a minimum of thirty (30) days prior to bid date. The engineer reserves the right to accept or reject any proposed equals.
3. **Submittals:** Manufacturing Certificate: All Fabric/Geogrid Composite and mechanical connections used in construction will be accepted on the following basis. At least thirty (30) days prior to installation, the Contractor shall furnish to the Engineer, in duplicates, a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the materials. The certificate shall contain the signer's title, the name and address of the contractor, the contract number, and the project name and location. The mill certificate or affidavit shall attest that the materials meet the chemical, physical, and manufacturing requirements in this specification. Accompanying the certificate/affidavit, the Contractor shall submit a three (3) foot by three (3) foot sample of the Geogrid composite to the Engineer.
4. **Installation:** The Fabric/Geogrid Composite shall be placed in continuous overlapped rolls below and parallel to the centerline of the lines and grades shown on the Plans. The Contractor shall prepare the surface to receive the Fabric/Geogrid Composite, ensuring the surface is relatively smooth and free of obstructions, depressions, debris, soft or low density pockets of material, and stone, which could damage the Fabric/Geogrid Composite during placement. At the time of installation, the Fabric/Geogrid Composite shall be rejected if defects, rips, holes, flaws, deterioration or damage occurred during manufacture, transportation, or storage. The Fabric/Geogrid Composite shall be protected at all times during construction to ensure the Geogrid Composite's original chemical and physical properties are unchanged.

The Fabric/Geogrid Composite shall extend beyond the toe of the aggregate by approximately one (1)

foot on both sides. Adjacent Rolls of Fabric/Geogrid Composite shall have a minimum one (1) foot overlap, unless specified otherwise by the engineer, to maintain alignment during placement of the aggregate. Care shall be taken to ensure that Fabric/Geogrid Composite rolls do not separate during construction. All wrinkles and sags shall be stretched out immediately before aggregate is placed on the Fabric/Geogrid Composite. To immediately mobilize tensile forces in the Fabric/Geogrid Composite, the edges of the Fabric/Geogrid Composite aggregate footprint shall be "tacked" with a line of aggregate before proceeding with placement of aggregate across the full width of the Fabric/Geogrid Composite footprint. The work shall be scheduled so that it is completely covered with a layer of the aggregate by the end of each workday and failure to do so shall require replacement of Fabric/Geogrid Composite.

The Fabric/Geogrid Composite shall be protected from damage during placement of aggregate. This shall be accomplished by limiting the height of drop to less than one (1) foot for the first lift. Any Fabric/Geogrid Composite rejected or damaged shall be replaced by the Contractor at no additional cost to the Owner.

Tracked construction equipment shall not be operated directly on the Fabric/Geogrid Composite. A minimum aggregate thickness, as recommended by the manufacturer based on the foundation soils, shall be required prior to operation of tracked or rubber-tired vehicles over the Fabric/Geogrid Composite. Turning of tracked vehicles shall be kept to a minimum to prevent tracks from displacing the aggregate and damaging the Fabric/Geogrid Composite.

1. **Damages and Repairs:** The Geogrid Composite shall be protected at all times to ensure the original chemical and physical properties. The Contractor shall check the Fabric/Geogrid Composite upon delivery to verify that the proper materials have been received. Damaged Fabric/Geogrid Composite shall be either removed and replaced or covered with a second layer of Fabric/Geogrid Composite which extends three (3) foot in each direction from the damaged area. Any Fabric/Geogrid Composite that is rejected or damaged due to the fault or negligence of the Contractor shall be repaired or replaced at no additional cost to the Owner.
2. **Measurement and Payment:** Payment for this item will be made at the contract unit price per square yard. The Fabric/Geogrid Composite will be measured in place to the nearest square yard as shown on the Plans. Overlaps will be measured as a single layer and no payment will be made for Fabric/Geogrid Composite placed outside of the minimum specified area. Price and payment shall constitute full compensation for providing all labor, material, and equipment and performing all operations necessary for the complete and satisfactory installation of the Geogrid Composite. No payment shall be made for Fabric/Geogrid Composite that is rejected or damaged due to Contractor fault or negligence.

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