***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

### SECTION 271 – BIAXIAL GEOGRID BASE REINFORCEMENT

**DESCRIPTION**

**271.01.01 GENERAL**

A. This work shall consist of furnishing and placing geogrid reinforcement of base course and/or subgrade reinforcement as shown in the plans.

**MATERIALS**

**271.02.01 GENERAL**

A. Geogrid shall be one of the following structure types:

1. A structure comprised of punched and drawn polypropylene (PP) or high-density polyethylene (HDPE) sheet integrally formed into a grid.

2. A structure comprised of high-density polyethylene (HDPE) or polypropylene (PP) extruded to form a grid.

**271.02.02 PROPERTIES**

A. The geogrid shall be biaxial, having high tensile strength and modulus in both principal directions, perpendicular to each other. The geogrid polymer shall be inert to all naturally occurring alkaline and acidic soil conditions. The geogrid shall also conform to the following requirements:

B. The geogrid shall be an integrally-formed, polypropylene grid structure meeting all of the following characteristics:

|  |  |  |  |
| --- | --- | --- | --- |
| ***Property*** | ***Test Method*** | ***Units*** | ***Type 2 (MARV)*** |
| Junction EfficiencyIDH\_FT19 | GRI-GG2-87 | % | 93 |
| Flexural RigidityIDH\_FT20 | ASTM D1388-96 | mg-cm | 750,000 |
| # of layersIDH\_FT17 | Physical inspection | N/A | Single layer |
| Traffic Benefit Ratio (TBR) | AASHTO PP46-01 | N/A | Ranges btwn. 3-5, depending on R-value. See Design Chart. |

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C. For Geogrid Materials not meeting the material properties shown above, submit the following to the Owner for review per Special Provision 100 at least 10 days prior ordering:

1. Full-scale laboratory and in-ground testing of pavement structures reinforced with the specific alternate geogrid material that quantifies a TBR meeting or exceeding that of the design geogrid.

2. Independent certified test results stating that the specific alternate geogrid exhibits an aperture stability modulus at 20cm-kg, when testing in accordance with the “Grid Aperture Stability In-Plane Rotation” test, of 3.2 cm-kg/deg for Type 1 or 6.5 cm-kg/deg for Type 2 geogrid.

3. A list of 5 comparable projects that are similar in terms of size and application, are located in the United States, and where the results of using the specific alternate geogrid material can be verified after a minimum of 1 year of service life.

4. A sample of the alternate geogrid material and certified specification sheets.

5. Additional information as requested by the Engineer to fully evaluate the product.

6. Geotextile materials will not be considered as an alternate to geogrid materials.

D. Geogrid shall be installed in accordance with the installation guidelines provided by the manufacturer or as directed by the Engineer.

E. Geotextile materials will not be considered as an alternate to geogrid materials for subgrade improvement or base/sub-base reinforcement applications. A geotextile may be used in the cross-section to provide separation, filtration or drainage; however, no structural contribution will be attributed to the geotextile.

**CONSTRUCTION**

**271.03.01 SHOP DRAWINGS**

A. The Contractor shall submit the following for the Engineer’s approval:

1. Geogrid product sample approximately 4 inches by 7 inches or larger.
2. Geogrid product data sheet and certification from the Manufacturer that the geogrid product supplied meets the requirements of Subsection 271.02.02.
3. Manufacturer’s installation instructions and general recommendations.

B. The contractor shall obtain the material approval from the Engineer prior to ordering, delivery to the project site, or placement of the product.

**271.03.02 DELIVERY, STORAGE, AND HANDLING**

A. The Contractor shall follow the following guidelines for storage and protection of the biaxial geogrid material:

1. Prevent excessive mud, wet concrete, epoxy, or other deleterious materials from coming in contact with and affixing to the geogrid materials.

2. Store at temperatures above -20 degrees F (-29 degrees C).

3. Rolled materials may be laid flat or stood on end.

4. Geogrid materials should not be left directly exposed to sunlight for a period longer than recommended by the manufacturer.

**271.03.03 SITE PREPARATION**

A. Grade the area to receive the geogrid to an even, smooth surface that is free of cavities, large stones or other debris capable of puncturing or tearing the geogrid. Remove and dispose of unsuitable materials in accordance with Subsection 107.14. Properly backfill excavated areas formed by removing unsuitable material with an approved material.

**271.03.04 PLACEMENT**

A. Any equipment used for installation shall be capable of laying the geogrid smoothly, without wrinkles or folds. The equipment used shall comply with manufacturer’s recommendations, or as approved.

B. Unroll and place the geogrid parallel to the roadway alignment. Place geogrid in intimate contact with the underlying soil without wrinkles or folds. Join adjacent geogrids sheets and roll ends by overlapping a minimum of 2 feet. Overlap up slope sheets over down slope sheets. Maintain a minimum 5 foot offset between adjacent overlapped geogrid roll ends.

C. Use care to insure that the geogrid is not damaged by installation procedures. Place the geogrid so that backfilling operations do not excessively stretch, deform, or tear the geogrid.

**271.03.05 FILL PLACEMENT OVER GEOGRID**

A. Granular fill material or base material shall be placed, spread, and compacted in such a manner that minimizes the development of wrinkles in the geogrid and/or movement of the geogrid.

B. A minimum loose fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid. Rubber-tired equipment may pass over the geogrid reinforcement at slow speeds (less than 10 mph).

C. Place overlying material by dumping from the edge of the geogrid, or from a previously placed material lift. Do not drop aggregate base from a distance higher than 3 feet above the geogrid during placement. Before covering, inspect the condition of the geogrid to determine that no rips, tears, folds, or wrinkles are present. Repair or replace any defects found. Repair rips or tears by placing a new layer of geogrid extending beyond the defect at least 3 feet in all directions.

**271.03.06 INSPECTION**

A. The Engineer may randomly inspect geogrid before, during and after (using test pits) installation.

B. Any damaged or defective (i.e. damaged coating, separated junctions, separated layers, tears, etc.) geogrid will be repaired/replaced in accordance with section 271.03.07

**271.03.07 REPAIR**

A. Any roll of geogrid damaged before, during and after installation shall be replaced by the Contractor at no additional cost to the Owner.

B. Proper replacement shall consist of replacing the affected area +3ft (1m) of geogrid all around side of the affected area.

**METHOD OF MEASUREMENT**

**271.04.01 MEASUREMENT**

The quantity of BIAXIAL GEOGRID BASE REINFORCEMENT will be measured per square yard of surface covered. No allowance will be made for material overlap.

**BASIS OF PAYMENT**

**271.05.01 PAYMENT**

The accepted quantity of BIAXIAL GEOGRID BASE REINFORCEMENT will be paid for at the contract unit price per square yard and shall include all labor, equipment and materials, including but not limited to delivery; storage; handling; site preparation; fine grading and shaping; placement; material overlap; anchors or pins; removal of unsuitable or rejected material and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 271.0010 | BIAXIAL GEOGRID BASE REINFORCEMENT | SY |

**END OF SECTION 271**