# Rigid Geogrid to Enhance Aggregate Base or to Enhance Rock Base NJSP-18-11B

**1.0 Description.** This work shall consist of furnishing and installing rigid geogrid base reinforcement, over a separation geotextile, on a prepared subgrade prior to the placement of the aggregate base or rock base as shown in the plans or as directed by the engineer.

**2.0 Materials.** The rigid geogrid shall be manufactured from a punched and drawn polypropylene sheet integrally formed into a biaxial or triaxial grid structure designed to provide significant mechanical interlock with the aggregate material being reinforced. The rigid geogrid structure shall be dimensionally stable to retain its reinforcement and interlock capabilities under repeated dynamic loads while in service and shall have high resistance to damage during construction, ultraviolet degradation, and all naturally encountered forms of chemicals, alkalis, acids, and biological degradation encountered in the materials being reinforced. Woven or flexible geogrids will not be allowed. A separation geotextile meeting the requirements of Sec 1011.3.4 shall be used in conjunction with the rigid geogrid. All aggregate base shall comply with Sec 304 and all rock base shall comply with Sec 303.

**2.1 Physical Properties.** The rigid geogrid shall meet the following properties:

| **Property** | **Test Method** | **Units** | **Geogrid Requirements1** |
| --- | --- | --- | --- |
| **MD** | **XMD** |
| Rigid Geogrid Type | Observed | Punched & Drawn Polypropylene |
| Aperture Shape | Observed | Equilateral Triangular, Rectangle, or Square |
| Minimum Roll Width | Observed | feet | 9 |
| **Minimum Index Proerties (Unless indicated otherwise)** |
| Rib Thickness | Observed | inch | 0.05 | 0.05 |
| Maximum Aperture Dimensions6,7 | Calipered | inch | 1.3 | 1.3 |
| Tensile Strength @ 2 % Strain | ASTM D6637 | lbs/ft | 410 | 620 |
| Tensile Streingth @ 5 % Strain | ASTM D6637 | lbs/ft | 810 | 1340 |
| Ultimate Tensile Strength  | ASTM D6637 | lbs/ft | 1310 | 1970 |
| **Structural Integrity** |
| Junction Efficiency2 | ASTM D7737 Method A | Percent | 93 |
| Flexural Stiffness3 | ASTM D7748 | mg-cm | 750,000 |
| Aperture Stability4 | GRI GG9 | m-N/deg | 0.65 |
| **Durability** |
| Resistance to Installation Damage5 | ASTM D 6637 | %SC / %SW / %GP | 95 / 93 / 90 |
| UV Resistance @ 500 hours | ASTM D 4355 | Percent | 100 |
| Resistance to Chemical Degradation | EPA 9090 Emersion Testing | Percent | 100 |

Notes:

1. Minimum Average Roll Values (MARVs) determined in accordance with ASTM 4759, unless indicated otherwise. MD = Machine Direction; XMD = Cross-Machine Direction

2. Load transfer capability expressed as a percentage of ultimate tensile strength.

3. Resistance to bending force determined in accordance with ASTM D7748, using specimens of width two ribs wide, with transverse ribs cut flush with exterior edges of longitudinal ribs (as a “ladder”), and of length sufficiantly long to enable measurement of the overhang dimension.

4. Resistance to in-plane rotational movement measured by applying a 20 kg-cm (2 m-N) moment to the central junction of a 9 inch x 9 inch specimen restrained at its perimeter in accordance with GRI GG9.

5. Resistance to loss of load capacity or structural integrity when subjected to mechanical installation stress in clayey sand (SC), well-graded sand (SW), and crushed stone classified as poorly graded gravel (GP). The rigid geogrid shall be sampled shall be in accordance with ASTM D5818 and load capacity shall be determined in accordance with ASTM D6637.

6. Nominal dimensions rounded to the nearest one tenth of an inch.

7. Maximum MD or XMD shall be no greater than or equal to 2\*D85 of the aggregate base. Minimum MD or XD shall be no less than 1.0 inches.

**2.2 Acceptance.** The contractor shall furnish a manufacturer’s certification to the engineer for each lot of material furnished stating the name of the manufacturer, the chemical composition and certifying that the material supplied is in accordance with this specification. The certification shall include or have attached typical results of tests from specific lots for all specified requirements. A rigid geogrid will be rejected at installation if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transport, handling or storage.

**2.3 Handling.** Each roll shall be clearly marked with manufacturer’s name, brand name, lot number. During all periods of shipping and storage, the separation geotextile and rigid geogrid shall be protected from temperatures greater than 140 deg. F and all deleterious materials that might otherwise become affixed to the rigid geogrid and affect its performance. The manufacturer’s recommendations shall be followed regarding protection from direct sunlight. The separation geotextile and rigid geogrid shall be stored off the ground in a clean, dry environment.

**3.0 Construction.** The separation geotextile and rigid geogrid shall be installed in accordance with the manufacturer’s recommendations and with this job special provision.

**3.1 Site Preparation.** The surface shall be smooth and free of stumps, large stones, sharp objects, and debris that may puncture the separation geotextile or damage the rigid geogrid.

**3.2 Separation Geotextile.**

**3.2.1** The separation geotextile fabric shall be used on all subgrades that require the rigid geogrid to prevent the infiltration of fines.

* + 1. **Separation Geotextile Installation.** The separation geotextile shall be laid out smooth and applied with tension to minimize wrinkles or folds on the prepared subgrade. The separation geotextile shall be oriented such that the roll length runs parallel to the construction centerline.

**3.2.3 Exposure.** The separation geotextile shall be covered with rigid geogrid material the same day of placement to protect against unnecessary exposure.

**3.2.4 Overlaps.** The end of separation geotextile rolls and adjacent separation geotextile rolls shall be overlapped a minimum of 3 feet. The overlap shall be in the direction of anticipated aggregate placement and shall be held in place by U-staples, washer pins or aggregate piles.

**3.3 Rigid Geogrid Installation.** The ridid geogrid shall be laid out smooth and applied with tension to minimize wrinkles or folds on the separation geotextile. The rigid geogrid shall be oriented such that the roll length runs parallel to the construction centerline.

**3.3.1 Exposure.** The rigid geogrid shall be covered with aggregate base material the same day of placement to protect against unnecessary exposure.

**3.3.2 Overlaps.** The end of rigid geogrid rolls and adjacent rigid geogrid rolls shall be overlapped a minimum of 3 feet. The overlap shall be in the direction of anticipated aggregate placement and shall be held in place by U-staples, washer pins or aggregate piles.

**3.3.3** **Intermediate Splicing**.  The rigid geogrid may require intermediate splices to provide for a smooth layout minimizing wrinkles or folds around curves.  Each splice shall be overlapped a minimum of 3 feet and kept taut with fasteners.

**3.4 Aggregate Placement.** Materials shall be placed onto the rigid geogrid from the edge or over previously placed aggregate. A minimum of 6 inches of crushed aggregate shall be placed over the rigid geogrid before construction equipment is allowed on the material. Construction equipment will not be allowed directly on the rigid geogrid. Rollers shall not use vibratory compaction. Avoid sudden stops or sharp turns when operation construction equipment over the rigid geogrid.

**3.5 Damaged Areas.** If any separation geotextile or rigid geogrid is damaged during installation, the contractor shall repair or replace the separation geotextile and rigid geogrid in accordance with manufacturer’s recommendations. The contractor shall replace any separation geotextile and rigid geogrid damaged prior to or during installation at no expense to the commission.

**4.0 Method of Measurement.** Measurement of the separation geotextile and rigid geogrid will be made to the nearest square yard. Incidental overlaps for connections and splices are not included in the pay item.

**5.0 Basis of Payment.** Payment for the rigid geogrid will be paid for at the contract unit price for 304-99.05, Rigid Geogrid to Enhance Aggregate or Rock Base, per square yard. Payment for the separation geotextile will be paid for at the contract unit price for 624-01.04A, Separation Geotextile, per square yard.