July 6, 2020

Addendum #2 - Engineers Responses to Questions and Comments
170B & Intersection Improvement Project
IFB-20-03145

This addendum to the Invitation for Bids for the above reference project supersedes all contrary and conflicting information which is hereby supplemented or revised in certain particulars as follows:

Changes:

- Revision of Section 506 (included in this addendum) provides additional information for the Geogrid Reinforcement item.

Questions:

Question: What Mesa County standard specifications should be used? General note 1 refers the contractor to the latest edition of the Mesa County Standard Specifications.

Answer: Bidders should refer to the project Special Provisions and the special conditions included in the IFB.

Please note that all addenda must be acknowledged on page 9 in the bid documents. Bids will be rejected if they do not follow the instructions provided in the IFB.

All remaining requirements of the Invitation for Bids remain unchanged.

Provided By:

Sean Yeates, PE
Senior Engineer
REVISION OF SECTION 506
GEOGRID REINFORCEMENT

Section 506 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

This work consists of furnishing and installing geogrid reinforcement material, in accordance with these specifications and in conformity with the lines and grades shown on the plans or as determined by the Engineer.

MATERIALS

Geogrid shall be a polymer grid structure specifically fabricated for use as soil reinforcement.

Geogrid reinforcement material shall conform to the following:

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>Unit</th>
<th>Characteristic Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roll Length</td>
<td>Feet</td>
<td>164 to 246</td>
</tr>
<tr>
<td>Roll Width</td>
<td>Feet</td>
<td>9.8 to 13.1</td>
</tr>
<tr>
<td>Mass per Unit Area</td>
<td>oz/sq yd</td>
<td>6 to 12</td>
</tr>
<tr>
<td>Resistance to Installation Damage</td>
<td>%</td>
<td>90*</td>
</tr>
</tbody>
</table>

*Resistance to loss of load capacity or structural integrity when subjected to mechanical installation stress in crushed stone classified as poorly graded gravel (GP).

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Units</th>
<th>Geogrid Requirements ¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junction Efficiency ²</td>
<td>ASTM D7737 Method A</td>
<td>%</td>
<td>93</td>
</tr>
<tr>
<td>Aperture Shape</td>
<td>Observed</td>
<td>n/a</td>
<td>Rectangular</td>
</tr>
<tr>
<td>Ribs Per Junction</td>
<td>Calipered</td>
<td>in</td>
<td>4</td>
</tr>
<tr>
<td>Aperture Size (Nominal)</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Radial Stiffness @ 0.5% Strain ³</td>
<td>ASTM D6637</td>
<td>lb/ft</td>
<td>1.0 x 1.3 × 10^³</td>
</tr>
<tr>
<td>Flexural Rigidity</td>
<td>ASTM D7748</td>
<td>mg-cm</td>
<td>16 x 10^5</td>
</tr>
<tr>
<td>Tensile Strength at 2% Strain</td>
<td>ASTM D6637</td>
<td>lb/ft</td>
<td>15,400</td>
</tr>
<tr>
<td>Ultimate Tensile Strength</td>
<td>ASTM D6637</td>
<td>lb/ft</td>
<td>750,000</td>
</tr>
</tbody>
</table>

Notes:
REVISION OF SECTION 506
GEOGRID REINFORCEMENT

1. Minimum Average Roll Values (MARVs) in accordance with ASTM 4759, unless indicated otherwise
2. Load transfer capability expressed as a percentage of ultimate rib tensile strength in the same direction as the junction test (determined in accordance with ASTM D6637)
3. Machine Direction (MD) x Cross Machine Direction (XD)
4. Determined by measuring the spacing between sets of parallel ribs (i.e. the “rib pitch”) in any direction
5. ASTM D6637 Method B with a 2 aperture gage length tested in all "rib" and "mid-rib" directions. Radial stiffness is the minimum measured modulus at 0.5% strain for each of the aforementioned directions.

The geogrid reinforcement shall be composed principally of polypropylene or high density polyethylene, and shall have rigid openings in a triaxial or biaxial pattern.

The geogrid reinforcement shall contain stabilizers or inhibitors to prevent degradation of properties due to ultraviolet light exposure. The geogrid reinforcement shall be inert to all naturally occurring alkaline and acidic soil conditions.

The manufacturer shall furnish certified test reports from an independent laboratory indicating that the material meets the requirements of the specification.

CONSTRUCTION REQUIREMENTS

Geogrid reinforcement shall be installed in accordance with the following:

(a) Delivery, Storage, and Handling. Upon delivery, the Contractor shall check the geogrid to assure the proper material has been received. Special care shall be taken in the handling of geogrids manufactured from polypropylene at temperatures at or below 0 °F.

(b) Subgrade Preparation. All trees and brush shall be cleared from the site where the geogrid is to be placed. The subgrade shall then be excavated to the required elevation. Specialized equipment with low ground pressure may be required to complete the excavation. If there is a remaining vegetative mat and the Engineer determines it is necessary to leave it in place to keep near surface soils stabilized, it may be mowed to a height no greater than 2 inches and remain in place, as approved by the engineer.

The surface of the subgrade shall be relatively smooth and level prior to placement of the geogrid, with depressions or humps greater than 6 inches graded out.

The Engineer may require completion of the excavation from the adjacent existing roadway embankment prior to installation of the geogrid.

(c) Geogrid Installation. Geogrid shall be laid at the proper elevation and alignment as shown on the
REVISION OF SECTION 506
GEOGRID REINFORCEMENT

plans or as directed by the Engineer. Geogrid shall be oriented such that the roll length runs parallel to the roadway alignment. It shall be rolled out flat and tight with no folds.

Parallel rolls shall be overlapped a minimum of 2 feet. When a new roll is started, a 3 foot overlap shall be made over the end of the previous roll. Care shall be taken to ensure that geogrid sections do not separate at overlaps during construction.

Placement of geogrid around corners and curves will require cutting of geogrid product and diagonal overlapping of same to ensure that excessive buckling of grid material does not occur. At these locations, a minimum 2 foot overlap shall be made over the end of the previous roll.

Geogrid material shall be secured to the ground surface by placement of loose fill at the corners and edges or as directed by the Engineer.

(d) Fill Placement Over Geogrid. Tracked construction equipment shall not operate directly upon the geogrid. A minimum fill thickness of 8 inches will be required prior to operation of tracked vehicles over the geogrid.

Rubber-tire equipment may pass over the geogrid at slow speeds, less than 5 mph, if the underlying material is capable of supporting the loads without excessive rutting (more than 4 inches) or causing damage to the mesh. Operators shall avoid sudden braking or sharp turning. If excessive rutting or damage to the geogrid mesh is observed, rubber-tire equipment will no longer be allowed to pass over the geogrid until a minimum fill thickness of 8 inches is in place.

Damaged or displaced geogrid shall be replaced at the Contractor's expense.

Fill material shall be back-dumped from trucks riding on top of the reinforced fill and bladed onto the geogrid in such a manner that the fill rolls onto the grid ahead, e.g., by gradually raising dozer blade while moving forward.

Material placed over the geogrid shall be compacted in accordance with the compaction requirements for embankment for this project or as directed by the Engineer. Care shall be taken to assure the geogrid reinforcement is not damaged.

METHOD OF MEASUREMENT

Geogrid reinforcement will be measured in place by the square yard of surface area in which geogrid has been placed, completed and accepted.
REVISION OF SECTION 506
GEOGRID REINFORCEMENT

BASIS OF PAYMENT

The accepted quantities will be paid for at the contract unit price per square yard.

Payment will be made under:

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geogrid Reinforcement</td>
<td>Square Yard</td>
</tr>
</tbody>
</table>

Payment will be full compensation for all labor, materials, equipment, and other items necessary and incidental to the completion of the work.

Additional geogrid for overlaps will not be measured and paid for separately, but shall be included in the work.