ITEM 17207.07 M - COMPOSITE GEOMEMBRANE

DESCRIPTION

This work shall consist of furnishing and installing an approved Composite Geomembrane at the locations shown on the plans or as directed by the Engineer, in writing, prior to performing the work.

MATERIALS

General

The Composite Geomembrane shall be a geomembrane with a non-woven, needle-punched geotextile permanently bonded to one face. The Composite Geomembrane shall meet or exceed the following criteria:

<table>
<thead>
<tr>
<th>Property</th>
<th>ASTM Standard</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geotextile Weight</td>
<td>D5261</td>
<td>135g/m²</td>
</tr>
<tr>
<td>Geomembrane Thickness</td>
<td>D5199</td>
<td>0.5 mm</td>
</tr>
<tr>
<td>Grab Tensile Strength</td>
<td>D4632</td>
<td>800 N</td>
</tr>
<tr>
<td>at Ultimate</td>
<td></td>
<td>65%</td>
</tr>
<tr>
<td>Elongation at Ultimate</td>
<td>D4632</td>
<td>265 N</td>
</tr>
<tr>
<td>Trapezoidal Tear Resistance</td>
<td>D4535</td>
<td>400 N</td>
</tr>
<tr>
<td>Puncture</td>
<td>D4833</td>
<td>0</td>
</tr>
<tr>
<td>Permeability</td>
<td>D4491</td>
<td>80% of the grab tensile strength at ultimate</td>
</tr>
<tr>
<td>Factory Seam Strength</td>
<td>D4545</td>
<td>80% of the grab tensile strength at ultimate</td>
</tr>
<tr>
<td>Field Seam Strength</td>
<td>D4437</td>
<td>80% of the grab tensile strength at ultimate</td>
</tr>
</tbody>
</table>

The Composite Geomembrane shall meet the basis of acceptance requirements of either Method A or Method B.

Basis of Acceptance (Method A)

Composite Geomembranes will be accepted on the basis of brand name and certification from the manufacturer that they meet the criteria noted above, provided that both constitute materials, geomembrane and geotextile (slope protection), are on the Approved List issued by the Department's Materials Bureau.

Basis of Acceptance (Method B)

At least four (4) months prior to installation, the contractor shall submit a twenty square meter sample of the Composite Geomembrane to the Director, Geotechnical Engineering Bureau, for testing, evaluation, and approval. Acceptance of the Composite Geomembrane will be based on the criteria noted above.

CONSTRUCTION DETAILS

Where the area to be covered exceeds 20 m in width, the Composite Geomembrane shall be shop fabricated into panels not less than 10 m in width and not less than 30 m in length, except that where multiple panels are used, one (1) panel may be less than 10 m in width. Where the area to be covered is less than 20 m but greater than 10 m in width, the Composite Geomembrane shall be installed with a maximum of one (1) field seam parallel to the length, in minimum lengths of 30 m. Where the area to be
covered is 10 m or less in width, the Composite Geomembrane shall be installed with no field seams parallel to the length, in minimum lengths of 30 m.

At least two months prior to furnishing and installing the Composite Geomembrane, the Contractor shall submit to the Director, Geotechnical Engineering Bureau, for approval, the following:

1. Shop drawings showing the proposed system layout, location of all proposed field seams, and orientation of all factory fabricated seams.

2. Details of proposed factory and field seaming methods, and two (2) three-meter-long seamed samples for inspection and testing, one prepared using each of the two methods. All field seams shall be sealed geomembrane to geomembrane only.

3. Details of non-destructive field testing methods for verifying field seam continuity.

The Composite Geomembrane manufacturer shall certify that the material provided is capable of maintaining a slope of 1 (Vertical) on 3 (Horizontal) with a cover layer of Item 623.12 M, Crushed Stone (Size Designation 1).

The Composite Geomembrane shall be protected from exposure to sunlight during transport and storage. After placement, the Composite Geomembrane shall not be left uncovered for more than two (2) weeks. The surface upon which the Composite Geomembrane is to be placed shall be within reasonable conformity to the proposed grade. The Composite Geomembrane shall be placed with the membrane side down. Material placed on top of the Composite Geomembrane shall not be dropped from a height exceeding 0.6 m. The Composite Geomembrane shall be placed in direct contact with the ground without causing folds in the membrane. The edges of the Composite Geomembrane shall be secured in the manner shown on the contract plans or as ordered by the Engineer.

Traffic or construction equipment will not be permitted directly on the Composite Geomembrane. A working pad a minimum of 150 mm thick shall be maintained between any equipment and the surface of the Composite Geomembrane.

All field seams shall be sealed in accordance with manufacturer's recommendations as accepted by the Department. Any deviation from the approved shop drawings shall require prior approval, in writing, by the Deputy Chief Engineer, Technical Services.

Field seams shall be non-destructively tested at a minimum one (1) test per every 150 m of seam length using a method recommended by the Contractor and approved by the Department. All test locations will be determined during or after seaming at the Engineer's discretion. Any seam failing a non-destructive test shall be reconstructed and retested at the Contractor's expense. Composite geomembrane which becomes torn or damaged shall be patched with the same Composite Geomembrane and the seams shall be tested for continuity, all at the Contractor's expense. The patch shall extend a minimum of 150 mm beyond the perimeter of the tear or damage.

During installation, a representative of the Composite Geomembrane manufacturer shall be present to provide technical assistance to the Contractor.

METHOD OF MEASUREMENT
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The quantity of Composite Geomembrane will be the number of square meters computed from the payment lines shown on the plans or from payment lines established in writing by the Engineer. Measurement will not be made of Composite Geomembrane used for repairs, seams, or overlaps.

**BASIS OF PAYMENT**

The unit price bid per square meter for this item shall include the cost of furnishing all labor, equipment and materials necessary to satisfactorily complete the work, including the cost of placing the material, all required seaming, non-destructive testing and anchoring the edges.