SPECIAL SPECIFICATION
4526
Interlocking Articulating Concrete Blocks

1. **Description.** This Item shall govern for dry cast concrete interlocking concrete blocks and geotextile fabric underlayments to provide an erosion control matrix manufactured and installed according to these specifications and to the dimensions on the plans.

2. **Materials.**

   (1) **Interlocking Articulating Concrete Blocks.** The Interlocking Articulating Concrete Blocks shall be multi-directional, positive, and interlocking type. When installed, the interlocked grid matrix shall exhibit the ability to expand and contract.

   The individual grid blocks shall consist of a homogeneous mass of consolidated concrete and shall be machine-made by a vibration and compression process, and composed of approved aggregates with a no-slump concrete mix. The mix water used shall be clean, fresh, free from oil, acids, soluble salts and organic impurities. Cement shall conform to ASTM C150 requirements (Portland Cement). Test procedures shall conform to ASTM C-140. Aggregates shall conform to ASTM C33. When potentially reactive aggregates are used, 25 to 35 percent of the cement shall be replaced with a Class F fly ash meeting the requirements of Departmental Material Specification DMS-8900; or 50 percent of the cement shall be replaced with Grade 100 or Grade 120 GGBF slag meeting the requirements of ASTM C 989. Type II cement shall be used in sulfate and/or salt-water environments as determined by the Engineer.

   The manufacturer of the Interlocking Articulating Concrete Blocks shall furnish the system's Hydraulic Stability Test Report that complies with the test procedures under Federal Highway Guideline Report FHWA-RD-88-181 or FHWA-RD-89-199 to determine the system's critical shear stress value. Anchoring devices such as, Helix Anchors, Duckbill Anchors, Shear Pins, Cables, etc., used in the hydraulic stability test procedure shall be installed in the field in accordance with the manner in which they were used during the hydraulic stability testing.

   The minimum weight of any component within the Interlocking Articulating Concrete Block Revetment System shall not be less than the system's weight per square foot of coverage. Where full units can not be placed, the void areas shall be filled with grout.

   The Interlocking Articulating Concrete Block Revetment System shall exhibit a capacity to withstand the specified hydraulic data and physical application dimensions as shown on the plans, with a factor of safety of not less than 1.5. The Factor of Safety calculations shall be in accordance with Hydraulic Engineering Circular 23, FHWA HI-97-030 HEC 23, Bridge Scour and Stream Instability Countermeasures.
The Interlocking Articulating Concrete Blocks shall meet the following physical characteristics requirements:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Requirement</th>
<th>ASTM Standard</th>
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<tbody>
<tr>
<td>Compressive Strength (min)</td>
<td>4000 lbs/sq. inch 28 days</td>
<td></td>
</tr>
<tr>
<td>Water Absorption (ma)</td>
<td>7%</td>
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<tr>
<td>Specific Weight (min)</td>
<td>130 lbs./cubic ft.</td>
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<tr>
<td>Minimum Critical Shear Stress</td>
<td>12 lbs./sq. ft.</td>
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<tr>
<td>Minimum Unit Coverage per Sq. Ft.</td>
<td>1.0</td>
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<tr>
<td>Percentage Open Area*</td>
<td>as shown on the plans</td>
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*Open area determined at top and bottom of block

(2) **Filter Fabric Underlayment.** The filter fabric shall be of the type and quality recommended by the manufacturer based on particle size and distribution in accordance with ASTM C 422 for the specific site soil conditions as shown on the plans. The filter fabric shall be a continuous sheet of woven or non-woven geotextile fabric and shall consist of long chain polymeric filaments or yarns such as polypropylene, polyethylene, polyester, polyamide, or polyvinylidene-chloride formed into a stable network such that the filaments or yarns retain their relative position to each other.

The Filter Fabric shall be inert to chemicals commonly encountered in natural water and soil conditions. When woven Filter Fabric is used, the side edges of the Filter Fabric panels shall be selvaged or otherwise finished as to prevent filaments from pulling away from the edges.

During all periods of shipment and storage, the Filter Fabric shall be protected from direct sunlight, ultraviolet rays and temperatures greater than 140 F, and kept in its protective covering. If the Filter Fabric protective covering is damaged or removed, the Filter Fabric shall be immediately covered with an opaque tarp or moved to an indoor storage facility.

At the time of installation, Filter Fabric shall be rejected, as determined by the Engineer, if it has been removed from its protective cover for over 72 hours, or has defects, tears, punctures or shows deterioration or damage incurred during manufacture, transportation or storage.

3. **Construction Methods.**

(1) **Earthwork.**

**Construction Methods.** Areas on which Filter Fabric and Interlocking Articulating Concrete Blocks are to be placed shall be constructed to the lines and grades as shown on the plans. Where such areas are below the allowable grade they shall be brought to grade by placing layers not to exceed eight (8) inches of selected material and compacted. The depth of layers and amount of compaction shall be as required to obtain a density equal to the adjoining undisturbed soil, or as specified by the Engineer. All obstructions, such as but not limited to, roots, lumps and projecting stones larger
than one (1) inch, shall be removed; and soft or low-density pockets of material shall be
removed with the resulting void to be filled with select, compacted material.
Compaction shall not be less than 90 percent density as determined by Test Method
Tex-114-E.

The finished sub-grade shall be constructed to exhibit a raked, rolled or otherwise
smooth planar profile within a zero (0) to +1/2 inch tolerance within a ten (10) foot
straightedge from established sub-grade elevation as shown on the plans or as approved
by the Engineer.

Immediately prior to placing the Filter Fabric and Interlocking Articulating Concrete
Blocks, the prepared area shall be inspected by the Engineer and no Filter Fabric or
Grids shall be placed thereon until that area has been approved by the Engineer.

(2) **Placement of Filter Fabric.** Filter Fabric shall be placed directly on the prepared area.
Longitudinal and transverse joints shall be overlapped at least two (2) feet. Securing
staples, as needed, shall be inserted through both strips of overlapped fabric along one
(1) line through the midpoint of the overlap as needed to temporarily hold the Filter
Fabric panels in place until the Interlocking Articulating Concrete Blocks can be placed.
No more than 200 linear feet of Filter Fabric shall be laid before covering with the
Interlocking Articulating Concrete Blocks. Filter Fabric installed more than two (2)
days not covered by blocks shall be lifted and the surface of the slope inspected for
slope defects. The Engineer will require uncovered Filter Fabric to be lifted after heavy
rainfall to inspect for slope damage.

The Filter Fabric panels shall be placed so that the upstream strip of Filter Fabric will
overlap the downstream strip. Each securing staple shall be pushed through the fabric
until it bears against the fabric and secures it firmly to the ground. Job site sewing of
fabric panels shall be allowed in lieu of overlapping methods as approved by the
Engineer.

(3) **Placement of Interlocking Articulating Concrete Blocks.** The Interlocking
Articulating Concrete Blocks shall be placed individually on the Filter Fabric in such a
manner as to produce a continually interlocking surface free from field seams and non-
interlocked connections except as approved by the Engineer, or as shown on the plans.
Interlocking Articulating Concrete Blocks shall be constructed to the specified lines and
grades shown on the plans. Final acceptance and approval of the installation shall be
made by the Engineer.

The voids of the Interlocking Articulating Concrete Blocks shall be filled with topsoil,
seed and fertilizer as shown on the plans. No more than 500 linear feet of Interlocking
Articulating Concrete Blocks shall be exposed unturfed. Prior to topsoil placement,
concrete blocks shall be inspected for damage. Individual concrete blocks which are
cracked and reduced to individual block weight by one-third shall be replaced or
grouted prior to placement to topsoil.

Excavation and preparation for the Interlocking Articulating Concrete Block Anchor
Trenches, Toe Trenches and Aprons, Top Trenches, Upstream Termination Trenches,
and Downstream Termination Trenches shall be as shown on the plans.
4. **Measurement.** This Item will be measured by the square foot as shown on the plans, complete in place.

5. **Payment.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement", will be paid for at the unit price bid for "Interlocking Articulating Concrete Blocks". This price shall be full compensation for furnishing all materials, equipment, labor and incidentals necessary to complete the work.