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DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**EXPANDED POLYSTYRENE BLOCK LIGHTWEIGHT FILL SYSTEM**

DES:MY 1 of 3 APPR:DMG:RWS:06-06-22

**a. Description.** This work consists of furnishing and installing expanded polystyrene (EPS) geofoam blocks, PVC liner, and wire fabric reinforced concrete base course in accordance with the plans, the standard specifications, and this special provision. The wire fabric reinforced concrete base course has a minimum thickness of 6 inches and a nominal maximum thickness of 18 inches.

**b. Materials.**

1. EPS. Furnish EPS geofoam blocks in accordance with *ASTM D6817/D6817M, Type EPS29*, rigid cellular polystyrene geofoam. Ensure the density of EPS blocks is a minimum of 1.80 pcf (*ASTM D1622*) and have a compressive resistance of 10.9 psi for 1 percent deformation (*ASTM D1621*). The EPS geofoam must contain no chloro-fluorocarbon, hydro-chloro-fluorocarbon, or hydro-fluorocarbon compounds, and be resistant to biological degradation.

Furnish the EPS blocks of standard nominal dimensions of 2 feet by 4 feet by 8 feet, or to dimensions of similar magnitude specific to project geometry and plan dimensions as approved by the Engineer.

2. Fine Aggregate. Provide 2NS fine aggregate in accordance with section 902 of the Standard Specifications for Construction.

3. PVC Liner. Use resins to manufacture the PVC liner that are 100 percent first quality virgin PVC. Ensure the PVC liner is resistant to UV degradation, construction damage, and to all forms of biological and chemical degradation normally encountered in highway construction applications. Furnish PVC liner with a thickness of 30 mils. Certify the following physical properties as minimum values:

**Table 1: Physical Properties for PVC Liner**

|  |  |  |
| --- | --- | --- |
| Property | Test Method | Requirement |
| Thickness Tolerance, % | *ASTM D1593* | ±5 |
| 100 % Modulus, psi | *ASTM D882* | 1000 |
| Elongation @ Break, % | *ASTM D882* | 300 |
| Dimensional Stability, % change (maximum) | *ASTM D1204* (212 ºF, 15 minutes) | 5 |

4. Reinforced Concrete Base Course. Furnish materials in accordance with subsection 602.02 of the Standard Specifications for Construction. Furnish steel welded wire fabric in accordance with subsection 905.06 of the Standard Specifications for Construction and Standard Plan R-37 Series.

**c. Acceptance.** With each EPS block shipment, provide a Test Data Certification showing that the lot of material shipped meets the unit weight and compressive resistance required in subsection b.1 of this special provision. Ensure each block is stamped to provide identification sufficient for field identification and correlation to test results.

Acceptance of the EPS blocks will be by test for density and compressive resistance. Samples will be obtained by the Department from on-site material intended for use on the project. Sampling frequency for certification verification testing will be based upon project quantities as follows: Three samples for the first 5000 cubic yards, with two additional samples for each 5000 cubic yards thereafter. Ensure sample size is at least 4 feet by 4 feet by 2 feet.

Provide a manufacturer’s Test Data Certification with each PVC liner material shipment and include a certified report of quality control test results obtained from the lot(s) of material in the shipment intended for use on the project. Label each unit of material to provide product identification sufficient for field identification and correlation to certified test results. Certify the specified physical properties as Minimum Average Roll Values (MARV). Acceptance will be based on the Test Data Certification meeting the properties in Table 1 in subsection b.3 of this special provision.

**d. Construction.** Prepare working drawings of the EPS block layout. The working drawings must include plan and profile views with stationing and elevations, all changes in site geometry, construction methods and material specifications. Submit the working drawings to the Engineer for review and approval at least 14 days prior to fabrication.

Prepare grades beneath EPS blocks in accordance with the plans and level to a tolerance of +0.4 percent. Place EPS blocks tightly, both vertically and horizontally, in accordance with plan details. Place blocks in successive courses at 90 degrees to the previous course and offset such that block joints between layers are not continuous. Use double-faced spiked timber connectors spaced a maximum of 5 feet in each direction to secure each horizontal joint between courses of block. Ensure the surface of each block course is within the +0.4 percent level tolerance.

Minimize voids between blocks. Fill all voids between EPS blocks with 2NS fine aggregate. Testing for compaction of the fine aggregate will not be required.

Shop fabricate or field-cut block to meet specific project geometry. Coordinate geometry with the construction of the concrete base course load distribution slab.

Take the following precautions to eliminate potential damage to the EPS blocks:

1. Do not operate equipment directly on the EPS blocks. Place protective sheathing or planks on the EPS blocks to allow use of light rubber-tired equipment.

2. Ballast or otherwise secure the EPS blocks during storage and placement. Cover the blocks with a light-colored opaque tarp if stored outdoors longer than 14 calendar days.

3. Do not expose EPS to hydrocarbons or petroleum-based solvents such as gasoline, diesel fuel, concrete curing compound, coal tar pitch and asphalt/mastic compounds. Do not expose EPS, which is combustible, to flame or other ignition sources.

4. Determine when high water events or rainfall events will occur. Protect EPS block from buoyant forces. Reinstall dislodged blocks at no additional cost to the contract. No additional costs or extensions of time will be allowed for removal, replacement or resetting of EPS blocks, PVC liner and concrete base course load distribution slab due to blocks becoming buoyant.

5. Replace damaged blocks at no additional cost to the contract. The Engineer will determine what constitutes damage.

Cover the EPS blocks with PVC liner. To minimize UV degradation, ensure the direct exposure to sunlight to the PVC liner is a maximum of 14 calendar days. Ensure the PVC liner is continuous over the entire EPS top and vertical side surface areas with shingle-lapped seams having a minimum 2 foot overlap between rolls or custom cut liner pieces. Ensure all shingled overlaps are placed with the liner pieces on the high side of the overlap on top and oriented down-slope to promote fluid flow over the overlap. As an alternative to shingle-lapping seams, continuous wedge welding of seams may be performed.

Construct the reinforced concrete base course in accordance with subsection 602.03 of the Standard Specifications for Construction, the details shown on the plans and this special provision. Conduct work without causing damage to the underlying PVC liner and EPS block. Ensure damage to the PVC liner and/or EPS block caused by the Contractor’s operation is repaired or replaced at no additional cost to the contract, as directed by the Engineer.

Place the steel reinforcement at the 3-inch depth below the top of the surface of the concrete base course. Ensure the minimum lap in steel reinforcement is 6 inches. The steel reinforcement must extend throughout the limits of the concrete base course.

**e. Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract unit price using the following pay items:

**Pay Item Pay Unit**

Fill, Lightweight, Expanded Polystyrene Block Cubic Yard

PVC Liner for Expanded Polystyrene Block Square Yard

Conc Base Cse, Reinf, Spec Cubic Yard

1. **Fill, Lightweight, Expanded Polystyrene Block** will not include credit for wasted material.

2. **PVC Liner for Expanded Polystyrene Block** includes furnishing and placing the liner in accordance with the plans and this special provision. No credit will be made for wasted material, overlapped areas, or required replacement or repair areas due to excessive exposure or damage.

3. **Conc Base Cse, Reinf, Spec** will be paid for based on plan quantities in accordance with subsection 109.01 of the Standard Specifications for Construction. Payment for furnishing and placing steel reinforcement will be included in the pay item for **Conc Base Cse, Reinf, Spec**.