SECTION 035216 - LIGHTWEIGHT INSULATING CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes cast-in-place perlite aggregate, vermiculite aggregate, cellular-type lightweight insulating concrete for roof decks and roof slopes to roof drains.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include mixing and application instructions for each type of lightweight insulating concrete.

B. Shop Drawings: Include plans, sections, and details showing roof slopes, lightweight insulating concrete thicknesses, embedded insulation board, roof penetrations, roof perimeter terminations and curbs, control and expansion joints, and roof drains.

C. Design mixtures.

D. Qualification data.

E. Material Test Reports: For lightweight aggregates.

F. Research/evaluation reports.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A firm that is approved by lightweight insulating concrete manufacturer.

B. Fire-Test-Response Characteristics: Where lightweight insulating concrete is part of a fire-resistance-rated roof-deck assembly, provide lightweight insulating concrete identical to that used in assemblies tested for fire resistance per ASTM E 119 by a testing agency acceptable to authorities having jurisdiction.


1.4 PROJECT CONDITIONS

A. Do not place lightweight insulating concrete unless ambient temperature is 40 deg F (4.4 deg C) [32 deg F (0 deg C) and rising.]
B. Do not place lightweight insulating concrete during rain or on surfaces covered with standing water, debris or any other unrelated material.

PART 2 - PRODUCTS

2.1 MATERIALS


C. Foaming Agent: ASTM C 869.

D. Water: Clean, potable.


F. Joint Filler: ASTM C 612, Class 2, glass-fiber type; compressing to one-half thickness under a load of 25 psi (172 kPa).

G. Steel Wire Mesh: Cold-drawn steel wire, galvanized, 0.041-inch (1.04-mm) diameter, woven into 2-inch (50-mm) hexagonal mesh, and reinforced with a longitudinal 0.062-inch (1.57-mm) diameter wire spaced 3 inches (75 mm) apart.

H. Galvanized Plain-Steel Welded Wire Reinforcement: ASTM A 185, 2 by 2 inches (50 by 50 mm), W0.5 by W0.5, fabricated from galvanized steel wire into flat sheets.

I. Molded-Polystyrene Insulation Board: ASTM C 578, Type I, 0.90-lb/cu. ft. (14.4-kg/cu. m) minimum density.

   1. Provide units with keying slots of approximately 3 percent of board's gross surface area.

2.2 AGGREGATE LIGHTWEIGHT INSULATING CONCRETE

A. Produce lightweight insulating concrete using the minimum amount of water necessary to produce a workable mix.

   1. Do not exceed maximum air content recommended by aggregate manufacturer.

B. Perlite Aggregate Mix: Lightweight insulating concrete produced from cementitious materials, water, air-entraining admixture, and perlite mineral aggregates with the following physical properties:

   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      a. Airlite Processing Corporation of Florida.
b. Danosa
   c. Puerto Rico Wire Products
   d. Quikrete

2. As-Cast Unit Weight: 38 to 44 lb/cu. ft. (610 to 705 kg/cu. m) at point of placement, when tested according to ASTM C 138/C 138M.

3. Oven-Dry Unit Weight: 24 to 30 lb/cu. ft. (385 to 480 kg/cu. m), when tested according to ASTM C 495.

4. Compressive Strength: Minimum 125 psi (860 kPa), when tested according to ASTM C 495.

5. Cement-to-Aggregate Ratio, by Volume: as per Manufacturer’s recommendations.

C. Vermiculite Aggregate Mix: Lightweight insulating concrete produced from cementitious materials, water, air-entraining admixture, and vermiculite mineral aggregates with the following physical properties:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Mandoval Vermiculite Products Inc.
   b. Palmetto Vermiculite Company.
   c. Siplast.

2. As-Cast Unit Weight: 45 to 49 lb/cu. ft. (720 to 785 kg/cu. m) at point of placement, when tested according to ASTM C 138/C 138M.

3. Oven-Dry Unit Weight: 23 to 26 lb/cu. ft. (370 to 416 kg/cu. m), when tested according to ASTM C 495.

4. Compressive Strength: Minimum 140 psi (965 kPa), when tested according to ASTM C 495.

5. Cement-to-Aggregate Ratio, by Volume: as per manufacturer’s recommendations.

2.3 CELLULAR LIGHTWEIGHT INSULATING CONCRETE

A. Produce cellular lightweight insulating concrete with the following minimum physical properties using cementitious materials, air-producing liquid-foaming agents, and the minimum amount of water necessary to produce a workable mix.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Siplast.

2. As-Cast Unit Weight: 34 to 42 lb/cu. ft. (545 to 673 kg/cu. m) at point of placement, when tested according to ASTM C 138/C 138M.

3. Oven-Dry Unit Weight: 26 to 32 lb/cu. ft. (416 to 513 kg/cu. m), when tested according to ASTM C 495.

4. Compressive Strength: Minimum 190 psi (1310 kPa), when tested according to ASTM C 495.
PART 3 - EXECUTION

3.1 PREPARATION

A. Control Joints: Install control joints at perimeter of roof deck and at junctures with vertical surfaces, including curbs, walls, and vents, for full depth of lightweight insulating concrete. Fill control joints with joint filler.

   1. Provide 1-inch- (25-mm-) wide control joints for roof dimensions up to 100 feet (30 m) in length; 1-1/2-inch- (38-mm-) wide control joints for roof dimensions exceeding 100 feet (30 m).

B. Wire Mesh: Place steel wire mesh with longest dimension perpendicular to steel deck ribs. Cut mesh to fit around roof openings and projections. Terminate mesh at control joints. Lap sides and ends of mesh at least 6 inches (150 mm).

C. Welded Wire Reinforcement: Place steel welded wire reinforcement with longest dimension perpendicular to steel deck ribs. Cut reinforcement to fit around roof openings and projections. Terminate reinforcement at control joints. Lap sides and ends of reinforcement at least 6 inches (150 mm).

3.2 MIXING AND PLACING

A. Mix and place lightweight insulating concrete according to manufacturer's written instructions, using equipment and procedures to avoid segregation of mixture and loss of air content.

B. Install insulation board according to lightweight insulating concrete manufacturer's written instructions. Place insulation board in wet, lightweight insulating concrete slurry poured a minimum of 1/8 inch (3 mm) over the structural substrate. Ensure full contact of insulation board with slurry. Stagger joints and tightly butt insulation boards. Install insulation board in a stair-step configuration with a maximum step-down of 1 inch (25 mm).

C. Deposit and screed lightweight insulating concrete in a continuous operation until an entire panel or section of roof area is completed. Do not vibrate or work mix except for screeding or floating. Place to depths and slopes indicated.

D. Finish top surface smooth, free of ridges and depressions, and maintain surface in condition to receive subsequent roofing system.

E. Begin curing operations immediately after placement, and air cure for not less than three days according to manufacturer's written instructions.

F. If ambient temperature falls below 32 deg F (0 deg C), protect lightweight insulating concrete from freezing and maintain temperature recommended by manufacturer for 72 hours after placement.

END OF SECTION 035216