SECTION 03520 - LIGHTWEIGHT INSULATING CONCRETE DECK

City of San Diego, CWP Guidelines

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing all lightweight insulating concrete over the [structural flooring] and [roof decking] and all appurtenant work, complete.

1.2 RELATED SECTIONS

A. The WORK of the following Section applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 05300 Metal Decking

1.3 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1.	ASTM A 185	Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement
2.	ASTM C 31	Practices for Making and Curing Concrete Test Specimens in the Field
3.	ASTM C 42	Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
4.	ASTM C 78	Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
5.	ASTM C 138	Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
6.	ASTM C 143	Test Method for Slump of Portland Cement Concrete
7.	ASTM C 150	Specification for Portland Cement
8.	ASTM C 172	Method of Sampling Freshly-Mixed Concrete
9.	ASTM C 192	Method of Making and Curing Concrete Test Specimens in the Laboratory
10.	ANSI/ASTM C 332	Specification for Lightweight Aggregates for Insulating Concrete
11.	ANSI/ASTM C 495	Test For Compressive Strength of Lightweight Insulating Concrete
12.	ASTM C 617	Method of Capping Cylindrical Concrete Specimens

13. ASTM D 2626 — Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing

1.4 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Manufacturer's Data: The CONTRACTOR shall submit complete manufacturer's data to show conformance with the Contract Documents on all materials proposed for use in the WORK.

2. Mix Design: The CONTRACTOR shall submit the concrete mix design showing the proportions of all materials proposed for the lightweight insulating concrete. The mix design shall be designed by an independent testing laboratory approved by the CONSTRUCTION MANAGER. No material shall be used in the work without written approval of the mix design by the CONSTRUCTION MANAGER. All costs related to such mix design shall be borne by the CONTRACTOR.

1.5 OWNER'S MANUAL

A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:

1. Certification: Prior to installation, the CONTRACTOR shall submit the product manufacturer's certificate of qualification and approval of the applicator to the CONSTRUCTION MANAGER.

2. Prior to application of lightweight insulating concrete, CONTRACTOR shall have the manufacturer furnish to the CONSTRUCTION MANAGER a signed certificate stating that the surface to receive insulation is acceptable.

3. The CONTRACTOR shall require the manufacturer of the lightweight insulating concrete deck product to submit a letter certifying to the CONTRACTOR and the OWNER, in writing, after the roof deck has been inspected, that the insulation meets the indicated requirements [and the Specifications of the Vermiculite Institute,] [, and is ready to receive roofing] [and] [decking].

1.6 TESTING OF CONCRETE

A. Lightweight concrete will be tested as follows:

1. Tests for slump conforming to the requirements of ASTM C 143.
2. Tests for compressive strength conforming to ASTM C 495.
3. Tests for oven dry density conforming to ASTM C 138.
4. Wet density shall be determined in accordance with the requirements of [ ].

B. At least 4 test specimens of the lightweight insulating concrete will be taken for each day's pour, or each 80 cubic yards of material placed. Specimens shall be 3-in by 6-in cylinders. Each cylinder will be dated, numbered, marked with precise location where sample was taken, and slump of sample noted.

C. All testing will be performed by an independent testing laboratory.

D. The cost of all laboratory tests on cement, aggregates, and concrete will be borne by the OWNER. However, the CONTRACTOR shall be charged for the cost of any additional tests and investigation on WORK performed which does not meet the Specifications.

E. Concrete for testing shall be supplied at no additional cost to the OWNER, and the CONTRACTOR shall provide assistance to the CONSTRUCTION MANAGER in obtaining samples. The CONTRACTOR shall also provide adequate facilities for storing and curing test cylinders at the site and protecting them from damage and temperature extremes.

1.7 SERVICES OF MANUFACTURER

A. The CONTRACTOR shall provide the services of a representative of the insulation manufacturer to inspect the insulating roof deck system. After approval by the insulation applicator, the CONTRACTOR shall have the manufacturer submit a letter stating that the insulating concrete is ready to receive roofing system or decking system.

PART 2 - PRODUCTS

2.1 GENERAL

A. The minimum "R" value of the lightweight insulating concrete roof insulation shall be 1.4 per inch of thickness.

B. Water used for lightweight concrete shall be clean and potable.

2.2 SYSTEM "A" -- ROOF INSULATION (LIGHTWEIGHT INSULATING CONCRETE)

A. Insulating concrete shall be vermiculite or perlite insulating concrete.

B. The mix shall consist of portland cement and concrete aggregate, with air-entraining admixture as specified by manufacturer, to obtain a minimum compressive strength of [125] [ ] psi. The oven dry density shall be [22 to 28] [ ] lb/cu ft. Calcium chloride, pregenerated foam, or any admixture containing chloride salts shall not be used.

2.3 SYSTEM "A" PRODUCTS

A. Aggregate shall be vermiculite or perlite conforming to ASTM C 332, Group I.

B. Portland cement shall conform to ASTM C 150, Type II or III; or Type IIA or IIIA for air-entrained portland cement.

C. Welded wire fabric shall be 4x8-12/14 galvanized fabric conforming to ASTM A 185.

D. Control joint filler shall be fiberglass which will compress to one-half the original thickness under load of 25 psi.

E. Hardening curing compound shall be per written recommendations of the insulation manufacturer and as approved by the CONSTRUCTION MANAGER.

F. [Vent board shall be 1-1/2-inch thick venting board with minimum "R" value of 6.25, and shall be of a type approved by the insulating concrete manufacturer.] [1-inch (min)-thick vent board shall be installed at parapet perimeter and curbs to assure a continuous ventilation path.]

2.4 SYSTEM "B" -- ROOF AND FLOOR INSULATION (LIGHTWEIGHT INSULATING CONCRETE)

A. Roof and floor insulating concrete may be a vermiculite, perlite, or cellular insulating concrete.

B. The mix shall consist of portland cement and concrete aggregate, with air-entraining admixture as specified by manufacturer. Roof insulating concrete shall have a minimum compressive strength of [125] [ ] psi and an oven dry density of be [22 to 30] [ ] lb/cu ft. Floor or deck insulation shall have a minimum compressive strength of [1500] [ ] psi and a density of [95 to 110] [ ] lb/cu ft. Calcium chloride or any admixture containing chloride salts shall not be used.

C. Cellular concrete for insulated floor and roof decks shall conform to Cellular Concrete Insulation Association, Inc. requirements.

2.5 SYSTEM "B" PRODUCTS

A. Aggregate shall be vermiculite or perlite, both conforming to ASTM C 332, Group I.

B. Portland cement shall conform to ASTM C 150, Type II or III; or for Type IIA or IIIA for air-entrained portland cement.

C. Underlayment shall be 15-lb organic asphalt-saturated felt or inorganic asphalt-saturated fiberglass fabric conforming to ASTM D 2626 or ASTM D 2178.

D. Welded wire fabric reinforcing shall be:

1. For vermiculite: 4-inch by 8-inch, 12/14-gauge galvanized welded wire fabric.

2. For cellular concrete: Galvanized reinforcing fabric of a type recommended by Cellular Concrete Insulation Association, Inc.

[E. Bonding agent shall be a non-oxidizing, non-crystallizing, liquid resinous water emulsion which will provide a permanent bond for gypsum, lime putty, portland cement or acoustical plaster finishes to gypsum, portland cement plaster, concrete, masonry, wood, steel, painted or unpainted, old or new, damp or dry surfaces. It shall be free from any tendency to harden or craze crack. It shall be non-toxic, vermin proof, and incapable of supporting flame. Bonding agent shall be certified to be non-deteriorating as shown by minimum 2-year controlled laboratory test.]

F. Hardening curing compound shall be per written recommendations of the insulation manufacturer and approved by the CONSTRUCTION MANAGER.

2.6 SYSTEM "C" -- SLOTTED INSULATION ROOF DECK SYSTEM (LIGHTWEIGHT INSULATING CONCRETE AND POLYSTYRENE)

A. The slotted roof-deck insulation system shall be a vermiculite aggregate concrete and slotted styrene insulation board system. The vermiculite aggregate and the slotted styrene insulation board shall be of the same manufacturer.

B. The complete roof deck assembly shall meet Factory Mutual Class I requirements for wind uplift resistance.

C. The minimum "R" value of the insulating roof deck system shall be [16.4] [ ]. "R" value is based on an average [2] [ ] inches of lightweight insulating concrete and [3] [ ] inches of polystyrene. Calculations of "R" shall include the vermiculite concrete and slotted styrene insulation board only.

2.7 SYSTEM "C" PRODUCTS

A. Aggregate shall be vermiculite and conform to ANSI/ASTM C 332, Group I. The aggregate shall be neutral (pH 7) non-reactive, not requiring expansion joints.

B. The insulating board shall be an expanded polystyrene board. The board shall measure 4 ft by 2 ft, containing bond holes and vent slots in the field area of the board.

C. Cement shall conform to ASTM C 150, Type I, II, or III.

D. Chlorides, preformed foams, or other admixtures shall not be used.

E. Concrete shall have the physical properties of:

1. Oven dry density: [24 - 30] [ ] lb/cu ft
2. Minimum compressive strength: [125] [ ] psi at 28 days

2.8 MANUFACTURERS

A. Products shall be of the following manufacture and type (or equal):

1. Bonding agent:

Larson Products Corporation, "Weld-crete"
Enco Products, "Enco Weld"
Rohm and Haas, "Roll-plex E-300"

PART 3 - EXECUTION

3.1 GENERAL

A. The lightweight insulating concrete deck system[s] shall be installed by an applicator approved by the insulation manufacturer.

B. No area of the roof shall receive less than [ ] inches of insulation material.

C. Relief vents required for lightweight insulating concrete shall be coordinated with roofing system.

3.2. ROOF INSULATION (LIGHTWEIGHT INSULATING CONCRETE) (SYSTEM "A")

A. Vent board shall be installed in accordance with manufacturer's printed instructions. Minimum perimeter clearance shall be provided to assure a continuous ventilation path.

B. Insulating concrete shall be pumped into place and screeded to a true and even smooth surface, sloping to drains and ready to receive roofing or decking system. The total overall thickness shall be not less than [2] [ ] inches and not more than the maximum thickness as indicated.

C. Control joints of 1/2-inch width shall be provided at roof penetrations and parapets where perlite aggregate lightweight insulating concrete is used.

D. Welded wire fabric shall be provided in perlite aggregate lightweight insulating concrete.

E. When air temperatures of 40 degrees F or above are predicted for the first 24 hours after pour, normal pouring procedures may be used. When air temperatures of 32 degrees F to 40 degrees F are predicted for the first 24 to 72 hours after pouring, special procedures should be followed as recommended by the manufacturer. Insulating concrete shall not be placed when the air temperature is consistently below 40 degrees F, and/or the deck is covered with standing water.

F. Curing shall be accomplished in accordance with the published recommendations of the manufacturer.

3.3 ROOF AND FLOOR INSULATION (LIGHTWEIGHT INSULATING CONCRETE) (SYSTEM "B")

A. Insulating concrete shall be pumped into place and screeded to a true and even smooth surface, sloping to drains and ready to receive roofing or hardener [and decking]. The total overall thickness shall be 2-inch (min), unless indicated otherwise. On flat roofs, insulation shall slope up at not less than 1/4-inch to 12-inch from roof drains unless indicated otherwise. Floors shall be finished smooth, flat (unless sloping to floor drains) and ready for finish treatment or material.

B. When air temperatures of 40 degrees F or above are predicted for the first 24 hours after pour, normal pouring procedures may be used. When air temperatures of 32 degrees F to 40 degrees F are predicted for the first 24 to 72 hours after pouring, special procedures should be followed as recommended by the manufacturer. Insulating concrete should not be placed when the air temperature is consistently below 40 degrees F, and/or the deck is covered with standing water.

C. Curing shall be accomplished as recommended by the manufacturer.

D. Floor insulating concrete shall be installed over a membrane, provided with curbs where indicated, and finished with a hardening curing compound. Concrete installed over existing concrete surface shall be provided with membrane only where indicated.

[E. Existing concrete sub-layer shall be sandblasted and provided with coating of bonding agent. The insulating concrete shall be poured while the bonding agent is still wet as instructed in the manufacturer's printed installation instructions.]

3.4 SLOTTED INSULATED ROOF DECK SYSTEM (LIGHTWEIGHT INSULATING CONCRETE AND POLYSTYRENE) (SYSTEM "C")

A. Concrete substrate shall be clean and free of debris.

B. A 1:6 mix of vermiculite concrete slurry shall be placed over the structural concrete substrate to a minimum thickness of 1/8-inch in all areas to receive the slotted styrene insulation board.

C. The slotted styrene insulation board shall be placed firmly into the fresh vermiculite slurry coat.

D. Insulation boards shall be layered, cut and fitted around roof penetrations, electrical conduits, etc.

E. A minimum thickness of [ ]-inch of 1:6 mix of vermiculite concrete shall be pumped into place over the slotted styrene insulation board and screeded to the levels indicated, with slopes to the drain.

F. Finish shall be smooth, ready to receive roofing or hardener.

G. Curing shall be accomplished by applying hardening curing compound immediately upon final screeding.

H. Traffic shall not be permitted on the roof deck until the lightweight insulating concrete system has developed sufficient strength to withstand light foot traffic associated with roofing operations and manufacturer's recommendations.

** END OF SECTION **