704-B-325 LIGHTWEIGHT CONCRETE FOR FLOOR SLABS

(Adopted 11-17-23)

The Standard Specifications are revised as follows:

SECTION 505, BEGIN LINE 24, INSERT AS FOLLOWS:

** If slag *or lightweight* aggregate is used, the method and procedure for the test shall be in accordance with ASTM C173.

SECTION 702, BEGIN LINE 92, INSERT AS FOLLOWS:

The relative yield of the concrete shall be determined in accordance with 505. The concrete when produced shall provide a relative yield of 1.00 ±0.02. When the relative yield is outside the tolerances, adjustments to the batch weights shall be made. *When lightweight concrete is used, the plastic unit weight shall not exceed the CMD target unit weight by more than 2.5 lb/cu ft. Otherwise, the lightweight concrete will be deemed a failed material and an investigation will be conducted by the Department's Division of Materials and Tests to determine if the final in-place unit weight is less than 120 lb/cu ft at a minimum of 28 days of age.* The minimum amount of cement shall be used for the desired class of concrete. The cement content shall not be increased more than 60 lb/cu yd. The relative yield of the concrete shall be maintained as stated above. If Type IP or Type IP-A cements are to be used in the structural concrete, the cement content shall be increased by a multiplier of 1.06 times the minimum amount of cement required or the desired increased cement content for the specified class of concrete.

SECTION 704, BEGIN LINE 9, INSERT AS FOLLOWS:

704.02 Materials

Materials shall be in accordance with the following:

Castings.....910.05
Concrete, Class C.....702
Joint Materials.....906
Profile Wall PVC Pipe.....907.22
Reinforcing Bars.....910.01
Smooth Wall PVC Pipe.....907.23

(a) Lightweight Concrete

Lightweight concrete shall be achieved by replacing a portion or all of the concrete coarse aggregate with lightweight aggregate in accordance with AASHTO M 195. The lightweight coarse aggregate shall be either expanded clay, expanded shale, or expanded slate and the gradation shall be in accordance with 904.03(e) size No. 91.

1. Concrete Mix Properties

The CMD shall be in accordance with 702.05 with the following exceptions:

Maximum unit weight (equilibrium).....120 lb/cu ft
Maximum unit weight (wet).....124 lb/cu ft
Minimum cement content.....564 lb/cu yd
Maximum cement content.....700 lb/cu yd
Minimum compressive strength.....4,000 psi

The coarse aggregate stockpile shall be soaked continuously for a minimum of 72 h immediately prior to placement of the concrete or the trial batch demonstration.

(b) Trial Batch

A trial batch shall be produced to verify that the lightweight CMD complies with the physical properties specified. Wet unit weight, equilibrium unit weight in accordance with ASTM C567, air content in accordance with ASTM C173, slump, yield, and both 7-day and 28-day compressive strengths shall all be performed by the Contractor's ACI-Certified Concrete Field Testing Technician, Grade I. The equilibrium unit weight shall be determined when the lightweight concrete is a minimum of 90 days old. The Engineer will perform all tests done by the Contractor, except equilibrium unit weight, and share the results with the Contractor. All cylinders shall be 6 in. by 12 in. and cured in accordance with 505.01(a) and Section 10.1 of AASHTO R 100. Compressive strength will be based on the average of two cylinders. A minimum of six cylinders, which includes two spare cylinders, shall be made for determining compressive strength at 7 and 28 days of age. A minimum of three cylinders shall be made for determining the equilibrium unit weight. The equilibrium unit weight shall be based on the average of a minimum of two cylinders.

SECTION 704, BEGIN LINE 140, DELETE AND INSERT AS FOLLOWS:

Just before the concrete has taken the initial set, the ends of slabs, exposed edges, and transverse construction joints shall be rounded to a 1/4 in. radius. Longitudinal construction joints shall not be edged unless otherwise directed. *The surface shall be tined in the transverse direction in accordance with the following. Tining shall consist of transverse grooves that are between 3/32 and 1/8 in. in width, between 1/8 and 3/16 in. in depth, and be spaced as follows: 5/8 in., 1 in., 7/8 in., 5/8 in., 1 1/4 in., 3/4 in., 1 in., 1 in., 1 in., 1 in., 3/4 in., 7/8 in., 1 3/4 in., 7/8 in., 3/8 in., 1 in., 1 in., 1 1/4 in., 1 1/2 in., 7/8 in., 3/4 in., 7/8 in., 1 in., 7/8 in., 1 in. The grooving pattern shall be repeated across the bridge floor. The grooves shall be formed in the plastic concrete without tearing the surface and without bringing pieces of the coarse aggregate to the top of the surface. Machine grooving or grinding shall not be performed on the bridge floor.*

Smoothness shall be in accordance with 502.20. If, after the above requirements have been met, portions of the floor are not entirely satisfactory, the removal and replacement of such portions may be ordered to secure a satisfactory floor. Such removal and replacement shall be done with no additional payment.

~~After final smoothness checking, the surface shall be longitudinally grooved in accordance with 722.11.~~

SECTION 704, BEGIN LINE 161, DELETE AND INSERT AS FOLLOWS:

Opening to traffic *and acceptance* shall be ~~in accordance with the applicable provisions of 702.24~~*based on the average of two 6 in. by 12 in. cylinders tested for compressive strength in accordance with 704.02(b)*.

704.07 Method of Measurement

Concrete floor slab will be measured by the cubic yard in accordance with 702.27. However, no allowance will be made for variations in beam fillet depths, coping depths, or diaphragm depths, which are deemed necessary due to the beam camber, as constructed,

which varies from that shown on the plans. Reinforcing bars will be measured in accordance with 703.07. Castings will be measured in accordance with 702.27.

~~Longitudinal grooving will be measured in accordance with 722.15~~*Transverse tining will not be measured.*

704.08 Basis of Payment

The accepted quantities of concrete floor slab will be paid for at the contract unit price per cubic yard for concrete, C, superstructure*, lightweight*. Reinforcing bars will be paid for in accordance with 703.08. Castings will be paid for in accordance with 702.28.

~~Longitudinal grooving will be paid for in accordance with 722.16.~~

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Concrete, C, Superstructure	CYS
Concrete, C, Superstructure, Lightweight	*CYS*

The cost of forms, curing, finishing, *including transverse tining*, preformed expansion joints within structure limits, slab bridge floor drains, and necessary incidentals shall be included in the cost of the pay items. *The cost of manufacturing, testing, transportation, handling, and all other costs associated with furnishing lightweight concrete in accordance with this specification shall be included in the cost of the pay items.*