

- ITEM 557.0102 18M - LIGHTWEIGHT, HIGH-PERFORMANCE SUPERSTRUCTURE SLAB WITH INTEGRAL WEARING SURFACE - BOTTOM FORMWORK REQUIRED**
- ITEM 557.0502 18M - LIGHTWEIGHT, HIGH-PERFORMANCE SUPERSTRUCTURE SLAB WITH INTEGRAL WEARING SURFACE - BOTTOM FORMWORK NOT REQUIRED**
- ITEM 557.0702 18M - LIGHTWEIGHT, HIGH-PERFORMANCE SUPERSTRUCTURE SLAB WITH SEPARATE WEARING SURFACE - BOTTOM FORMWORK REQUIRED**
- ITEM 557.0902 18M - LIGHTWEIGHT, HIGH-PERFORMANCE SUPERSTRUCTURE SLAB WITH SEPARATE WEARING SURFACE - BOTTOM FORMWORK NOT REQUIRED**

DESCRIPTION.

Furnish and place reinforcing steel and lightweight, high-performance concrete to construct superstructure slabs as shown in the contract plans.

MATERIALS.

Use materials meeting §557-2 A & B. Perform additional work as follows:

Manufacture lightweight, high-performance concrete according to §501, and the following modifications:

1. Design a lightweight, high-performance concrete mixture, proportioned according to the American Concrete Institute Manual of Concrete Practice, ACI 211.2, Standard Practice for Selecting Proportions for Structural Lightweight Concrete. Produce a homogeneous mixture of cement, pozzolan (fly ash or GGBFS), microsilica, fine aggregate, lightweight coarse aggregate, air entraining agent, normal range set-retarding, water-reducing admixture, and water as designed.
2. Use Type 1, I/II, 2 or Type SF cement. Use a minimum cementitious content of 400 kg/m³. Use 15-20% pozzolan (fly ash or GGBFS) and 6-10% microsilica.
3. Use lightweight coarse aggregate conforming to §703-10, with a gradation in the 25mm to 4.75 mm size designation in Table 1, ASTM C330.
4. Construct lightweight coarse aggregate stockpile(s) at the production facility so as to maintain uniform moisture throughout the pile. Continuously and uniformly sprinkle the stockpile(s) with water for a minimum of 24 hours using a sprinkler system approved by the Materials Engineer. If a steady rain of comparable intensity occurs, turn off the sprinkler system at the direction of the Materials Engineer, until the rain ceases. At the end of the wetting period, or after the rain ceases, allow stockpiles to drain for 12 to 15 hours immediately prior to use, unless otherwise directed by the Materials Engineer.

The Materials Engineer, or his representative, will take a ½ - 1 liter microsilica sample in accordance with Materials Method 9.1 for each days placement, for testing by the Department.

If densified powder is used and added independently - weigh cumulatively in the following order: cement, fly ash, and microsilica. Base the batching tolerance of ± 0.5 % on the total mass of cementitious material, for each material draw mass.

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If densified powder is used as part of a blended cement - weigh cumulatively in the following order: blended cement and fly ash. Base the batching tolerance of $\pm 1\%$ on the total mass of cementitious material, for each material draw mass.

5. After the materials have been accepted for this work, determine the proportions for concrete and equivalent batch masses based on trials made with materials to be used in the work.
 - a. Determine the cement content for each trial batch by means of a yield test according to ASTM C138.
 - b. At least 1 week prior to concrete placement, provide the Materials Engineer with a copy of the trial mix design with the following data:
 - i. Fine and coarse aggregate (saturated, surface - dry condition) content in kg/m^3 .
 - ii. Cementitious content in kg/m^3 .
 - iii. Water content in kg/m^3 .
 - iv. Dry unit mass in accordance with ASTM C567.
 - v. 28-day compressive strengths.
 - vi. Batch masses.

The Materials Engineer, or his representative, will approve the batch weights prior to use. Use these values to manufacture all lightweight concrete for this project, and periodically correct the batch masses to account for changes in the fine aggregate fineness modulus and aggregate moisture contents.

6. Achieve an average 28-day compression strength of 25 MPa, or greater, with no individual cylinder compressive strength less than 21 MPa.
7. Produce concrete with an average dry unit mass ranging from 1750 to 1850 kg/m^3 when tested in accordance with ASTM C567.

CONSTRUCTION DETAILS.

Apply the provisions of §557-3 and the following modifications:

1. Add the following to §557-3.01, Concrete Manufacturing and Transporting:
 - a. Use slump and air tests as a control measure to maintain a suitable consistency. Perform slump and air tests according to NYSDOT Materials Method 9.2. Determine air content by the volumetric method described in ASTM C173. Air content and slump placement

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limits are:

	<u>Minimum</u>	<u>Desired</u>	<u>Maximum</u>
Air Content (Volumetric Method)	5.0%	6.5%	8.0%
Slump (mm)	----	75-125	125

- b. If the lightweight coarse aggregate moisture content at the time of batching is less than saturated surface dry (SSD), introduce lightweight coarse aggregate, along with approximately 2/3 of the total mixing water, into the mixer and mix for a minimum of 10 minutes. Otherwise, batch the coarse aggregate routinely with the fine aggregate, admixtures, cement, fly ash, microsilica, and remaining mixing water and mix completely.
 - c. Have the lightweight aggregate manufacturer supply a service representative at the site for the first two days of lightweight concrete placement operations to assist in the control of lightweight concrete mixing and placement operations.
2. Handle and place concrete according to §557-3.06, Handling and Placing, except that pumping is not permitted. No waivers will be granted.

Test the concrete according to NYSDOT Materials Method 9.2 procedures with the following modifications:
The Engineer will cast cylinders, in sets of 2 individual cylinders, at a frequency of 1 set for each 50 m³, or fraction thereof actually placed. A minimum of 1 set will represent each day's concrete placement.
 3. Cure concrete according to §557-3.12, Curing, except that only continuous wetting is allowed.
 4. Make any repairs as per the provisions of §557-3.13, Damaged or Defective Concrete. The Engineer will reject any concrete represented by a 28-day cylinder set with an average compressive strength less than 25 MPa, or an individual cylinder with a compressive strength less than 21 MPa. Proposed repairs require Deputy Chief Engineer, Structures approval.
 5. The loading limitations of §557-3.14 apply, except that concrete cylinder sets designated for early loading must attain an average compression strength of 25 MPa, or greater, with no individual cylinder less than 21 MPa.
 6. Lightweight aggregate concrete requires a minimum 14-day "drying" period, after curing, during which the ambient air temperature must remain above 0° C. Remove all of the wet curing (burlap, soaker hoses, etc.) during the 14-day drying period. Polyethylene can remain in place, but provision must be made for air flow under the polyethylene. The specified curing temperatures,

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meeting the requirements of §555-3.09C, must be maintained during the drying period.

METHOD OF MEASUREMENT.

Apply all the provisions of §557-4.

BASIS OF PAYMENT.

Apply all the provisions of §557-5.

DISAPPROVED BY
EI 08-018