

**ITEM 16563.63 M - SPLICED PRESTRESSED CONCRETE BEAMS  
USING HIGH  
PERFORMANCE CONCRETE FOR BEAMS**

**DESCRIPTION.** This work shall consist of furnishing and placing prestressed concrete units for structures, as specified in the contract documents. Closure placements and field cast diaphragms are part of the work.

**MATERIALS**

**A. Prestressed Units.** The Contractor shall notify the D.C.E.S. of the source of prestressed units, for approval within (7) days after the award of the contract. Prestressed concrete units shall meet the requirements of §718 - 47 High Performance Concrete for Precast and Prestressed Bridge Elements.

**B. Post-tensioning System.** The requirements of the P.C.C.M. shall apply.

**C. Transverse Tie Rods or Strands.** Refer to P.C.C.M., Section 400.

**D. Anchorage Block-Out Grout.** Refer to P.C.C.M., Section 400.

**E. Concrete for Closure Placements and Diaphragms.** Materials shall meet §501 except that classes of concrete shall not apply.

All the material requirements of §555-2 shall apply. The corrosion inhibitor shall consist of a calcium nitrite solution as approved by the Director, Materials Bureau, containing 30±1% calcium nitrate solids by weight and weighing 1.27 ±0.01kg per liter. A representative one liter sample, from each delivery of corrosion inhibitor intended for Department use, shall be taken for acceptance testing. Samples shall be taken by the Department's representatives as directed by the Materials Bureau. The Materials Bureau shall be permitted 14 days to complete the evaluation of each sample.

This concrete shall consist of a homogeneous mixture of cement, fly ash, microsilica admixture, fine aggregate, coarse aggregate, air entraining agent, corrosion inhibitor, high range water reducing admixture, set retarding water reducing admixture and water which meets the requirements of the following mix criteria table.

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***Mix Criteria***

Cement content (kg/m <sup>3</sup> )	398
Fly ash content (kg/m <sup>3</sup> )	38
Microsilica content (kg/m <sup>3</sup> )	38
Corrosion Inhibitor (l/m <sup>3</sup> )	24.7
High Range Water Reducer	As Required
Set Retarding Water Reducer	As Required (At least manufacturer's min.)
Air Entraining Agent	As Required
Sand percent total aggregate (solid volume)	40
Designed water/total cementitious content of 474 kg	0.33*
Desired air content (%)	6.5
Allowable air content (%)	5.0 - 8.0
Desired slump (mm)	150
Allowable slump (mm)	75 - 200
Type of coarse aggregate gradation	CA 2

**NOTE:** The criteria are given for design information and the data is based on a fine aggregate fineness modulus of 2.80. The mixture proportions shall be determined using actual conditions for fineness modulus and bulk specific gravities (saturated surface dry for aggregate). The proportions shall be computed according to Department written instructions. The use of a set retarding water reducing admixture AND a high range water reducing admixture is required.

\*The water/total cementitious ratio shall remain fixed and no additional water is allowed. Reduce the design water by the amount contained in the corrosion inhibitor. Adjust slump with the addition of a high range water reducer.

**CONSTRUCTION DETAILS**

**A. General.** The requirements of the P.C.C.M. shall apply for installation of the beams and post-tensioning work.

The diaphragms shall not be placed until the post-tensioning work on the connected beams has been completed. Exceptions to this requirement may be granted if the post-tensioning is done in stages that minimizes the differential length between adjacent beams.

**B. Field Placed Concrete for Closure Placements and Diaphragms.** The requirements of §555 and the following shall apply:

Concrete cylinders shall be cast by the Contractor from each truck load of concrete used in the work. The contractor shall provide a system, subject to the Engineer's approval, for identifying the cylinders and the concrete they represent. Cylinders shall be cured with the concrete they represent. Cylinders shall be cast for testing at 1,3,7, 14, and 28 days. The contractor may cast additional cylinders for testing at other time intervals.

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***1. Curing***

- a.** Concrete in the closure placements shall be cured for 28 days or until the concrete reaches a strength of 50 MPa
- b.** Curing of closure placement concrete shall be by curing covers and forms. The Contractor must accelerate the strength gain of the concrete by insulating to retain heat or by adding external heat using saturated steam or heat blankets. Salamanders and other direct combustion heating systems shall not be allowed. If the temperature during the curing period is forecast or likely to go below 15°C the Contractor shall enclose the splice area and provide external heat using the above allowed systems.

When external heat is added, the temperature of the forms shall not be heated at a rate exceeding 10°C per hour and the temperature of the forms shall not exceed 70°C. After the curing is completed the forms shall be allowed to gradually cool, at a rate not to exceed 10°C per hour, until the forms are within 10°C of the ambient temperature.

- c.** Forms for closure placements shall not be removed until the end of the curing period.
- d.** Diaphragm concrete shall be cured for 7 days according to §555, except that curing compounds are not allowed.

**2. Concrete Sealer.** The concrete surfaces in the closure placements and diaphragms shall be cleaned and coated in accordance with Section 6 of the PCCM.

**3. Post-tensioning.** Post-tensioning work shall not commence until the concrete in the closure placements has reached a compressive strength of 50 MPa or an age of 28 days, whichever ever occurs first.

Post-tensioning, grouting of ducts, and protection of the prestress anchorages shall be in accordance with Section 8 of the PCCM and the approved Installation Drawings.

**METHOD OF MEASUREMENT.** The quantity to be paid for under this work shall be the number of meters (horizontal length center-to-center of end bearings or anchor dowels, as shown on the plans) of each beam furnished and placed in accordance with the plans and specifications. No separate measurement shall be made of the diaphragms between beams or for the closure placements.

**BASIS OF PAYMENT.** The unit price bid shall include all labor, materials and equipment necessary to complete the work except that bearings shall be paid for under their respective items.

Damaged units which cannot be satisfactorily repaired or which do not meet dimensional and camber tolerances shall be replaced by the Contractor at no cost to the State.

Progress payments will be made when each unit is furnished and placed in accordance with the plans and specifications. Payment will be made at the unit price bid for 80% of the quantity properly

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placed when the post-tensioning has been completed. The balance of the quantity will be paid upon completion of the work.

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