

## **ITEM 07563.95 M - FURNISH AND INSTALL PRECAST CONCRETE TOWERS**

### **DESCRIPTION**

This work shall consist of furnishing and installing precast concrete units in accordance with the plans and specifications.

Installation of the units shall include positioning and anchoring the units together within the tolerances specified herein. Also the joints between the units shall be constructed under this item as shown on the plans.

Furthermore, this work shall include the preparation and submission of working drawings for each type of precast unit. Preparation of working drawings shall be performed by a Professional Engineer currently licensed to practice in New York State. The submittal shall include all necessary plans, calculations and material and testing certifications. Working drawings shall be submitted in accordance with the requirements of Section 718-01 of the Standard Specifications.

Working drawings shall include a table listing the quantity in cubic yards of concrete for each precast concrete unit.

### **MATERIALS**

Materials shall meet the requirements of Section 718-01 Prestressed Concrete Units (Structural), except as otherwise noted below.

1. Concrete:
  - a. Concrete for panels shall have a minimum compressive strength of 40 MPa at 28 days after casting, and shall have an air content of  $6\% \pm 1\%$ .
  - b. The vertical tendons shall be 13 mm diameter strand with a guaranteed ultimate strength of 1860 MPa. The vertical tendons shall be polystrand, galvanized strand or equal and shall be tensioned to a force of 135 kN.
  - c. Maximum aggregate size shall be 13 mm.
  - d. The Contractor shall submit his proposed mix design to the Engineer for approval prior to start of fabrication.
2. Reinforcing steel shall conform to Section 709-01 or 709-03 of the Standard Specification for epoxy coated bar reinforcement, Grade 400.
3. Steel shims placed between joints in units for erection shall be stainless steel ASTM A167 Type 304.

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4. Plates, angles, anchors, and embedment shall be ASTM A36 M and hot-dip galvanized in accordance with Section 719-01, Type I.
5. Cement grout used to fill joints between precast units as well as void space between the strands and the concrete units shall be in accordance with Section 701-06 Concrete Grouting Material.
6. Joint sealants shall conform to Federal Spec. TT-S-227, Type II for vertical joints and Type I, Class A for horizontal joints.
7. Joint backer rod material shall be closed cell polyethylene.

### **FABRICATION**

Fabrication shall meet the requirements of Section 718-01, except units shall not be prestressed and as otherwise noted below. Contractor shall notify the DCES of the source of the precast concrete units for approval within 7 days after the award of the contract.

1. General: Precast concrete units shall be fabricated by an experienced and acceptable precast concrete manufacturer. The manufacturer shall have been regularly and continuously engaged in the manufacture of precast concrete work similar to that indicated on the drawings for at least three years.

The manufacturer shall produce units that are uniform in appearance.

One test panel with minimum of 915 mm x 915 mm x design wall unit thickness shall be cast and approved by the Engineer prior to casting of full size units. Test shall include edge chamfer and panel anchor to simulate actual unit.

2. Reinforcement, Anchors and Inserts: Precast concrete units shall have minimum reinforcing as shown on the plans. The contractor shall design the precast concrete for all loads including handling and erection loads. Reinforcement, in addition to the minimum requirements shown on the drawings, shall be provided as required.

The Contractor shall locate, design, furnish and install all anchors, inserts and ties required to secure the units. Location and type of anchors and support points shall be shown on the working drawings.

3. Dimensions and Tolerances: The dimensions of the concrete units shall be as shown on the plans with the following permissible tolerances.
  - a. Length of Member: The length of the unit shall not deviate from the length shown on the contract drawings by more than +/- 13.00 mm or +/- 3 mm per 3 m of length, whichever is greater.

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- b. Width of Members: The width of a unit, shall not vary by more than +/- 6 mm.
  - c. Horizontal Alignment (Sweep): The horizontal alignment of the units shall not deviate from a straight line parallel to the theoretical centerline by more than 13.0 mm or 4.00 mm per 3 m of length, whichever is greater.
  - d. Handling Devices: The Contractor will be responsible for the design and positioning of all handling devices. The actual position of handling devices shall not deviate from the designed position by more than +/- 150.0 mm.
  - e. Anchors and Inserts: The actual position of anchors and inserts shall not vary by more than +/- 6 mm from positions shown on the contract drawings.
  - f. Slab or Wall Thickness: The thickness of a slab or wall shall no vary from the dimensions on the drawings by more than +/- 6 mm.
  - g. Planeness: The planeness as measured with respect to a straight line drawn between any two opposite edges shall be +/- 6 mm for the outside surface and +/- 13 mm for the inside surface.
  - h. Squareness of Ends: The ends of units shall not deviate from being square by more than +/- 4 mm. Squareness shall be checked in both the vertical and horizontal planes.
4. Defects
- a. Minor Defects: Minor defects are those which involve less than 230 cm<sup>2</sup> of concrete and do not expose reinforcing steel. These defects will be repaired by the Contractor at his own expense and using methods acceptable to the Engineer. Cracks which are visible but are 0.4mm wide or less will be accepted.
  - b. Major Defects: Major defects are those which involve more than 230 cm<sup>2</sup> of concrete or reinforcing steel. If one or more major defect appears in a member, it shall be rejected. Rejected units shall not be patched, but shall be replaced with approved units. Cracks of a width of more than 0.4 mm shall be repaired by the Contractor at his own expense and using methods acceptable to the Engineer.
5. Handling and Erections: The units shall not be lifted from the forms until the concrete strength has reached 0.7 fc. The location of pickup points for handling of the members and details of the pickup devices shall be shown on the shop drawings.

### **CONSTRUCTION DETAILS**

- 1. All units shall be inspected upon arrival at the construction site to determine any damage during shipment. The same description and requirements for repair of defects shall be as stated above.
- 2. The precast concrete members shall be set into place and post tensioned together as shown on the drawings. The contractor shall be responsible for design and placement of the anchorage system

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used as well as detailing of bleed holes for grouting. If the positioning called for on the drawings is not obtained then the units shall be removed and the situation corrected. Location tolerances for precast unit installation shall be as follows:

|  |           |
|--|-----------|
| Plumbness or vertical alignment:         | +/- 13 mm |
| Variation in horizontal alignment:       | +/- 13 mm |
| Precast element joint to joint alignment |           |
| Horizontal joints:                       | + 3 mm    |
| Vertical joints:                         | + 3 mm    |

3. The Contractor shall submit a detailed installation plan to the Engineer at least 60 days prior to the date that installation of units is to begin. This plan shall indicate Contractor's proposed methods for handling, installation, alignment and securing of the units. Receipt of the Contractor's installation plan shall not relieve the Contractor of his responsibility for erecting precast units into position as required by the plans.

### **METHOD OF MEASUREMENT**

The work shall be measured as the number of towers satisfactorily installed.

### **BASIS OF PAYMENT**

The unit price bid per tower shall include the cost of furnishing all labor, material and equipment necessary to complete the work. Material to be included in the unit price bid shall include, but not be limited to, precast tower segments, reinforcing steel, anchors, inserts, ties, grout, joint sealant and backer rod material and anchor dowels installed in existing concrete.

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