

ITEM 16562.95XXYY M -PRECAST REINFORCED PORTLAND CEMENT
ITEM 16562.96XX M -
CONCRETE BRIDGE STRUCTURE
ITEM 16562.97YY M -

DESCRIPTION. The work shall consist of designing, fabricating, and installing a precast reinforced p.c.c. bridge structure(s) at the location(s) indicated on the plans.

A precast reinforced p.c.c. bridge structure is composed of the following discrete elements:

1. SPAN UNITS
2. SPAN FOOTING W/INVERT UNITS
3. WALL UNITS W/FOOTINGS

All of the foregoing are precast, reinforced p.c. concrete structure units. For bidding, measurement, and payment purposes, each discrete element will be treated as a separate entity in relationship to the completed, installed structure. A list of pay items will be found at the end of the Basis of Payment subsection.

The following required parameters are shown on the plans. They shall not be altered without the express written permission of the D.C.E.S., or the Regional Director.

- Highway Section and Pavement Structure as defined by the Standard Specifications (Fig. 100-1)
- Span and Rise of Structure
- Length of Structure
- Length of Walls
- Hydraulic Area Below Design High Water Elevation. The controlling Design High Water Elevation is given at the upstream fascia.

The contractor shall be responsible to develop an appropriate design together with the necessary details for the structure in question. All design work and detail development shall be done by a Professional engineer licensed and registered to practice in New York State.

Within 45 days after award, the contractor shall submit all details and design computations to the D.C.E.S. for approval. The D.C.E.S. shall be permitted the longest of the following time limits to render approval of the contractor's submission.

1. Ten working days.
2. Two working days for each drawing of a set of drawings.
3. One working day for every four computation sheets. Any sheet written on both sides will be considered two computation sheets.

All time limits will be measured upon receipt of all pertinent information by the D.C.E.S.

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MATERIALS. Precast, reinforced p.c. concrete units shall be fabricated in accordance with the requirements of subsection 718-96 appended to this item. All materials used for fabrication of the units shall be as required by subsection 718-96. The contractor shall provide the Engineer with certification that all materials used for fabrication are in conformance with the requirements of 718-96.

Within seven days after the award of contract, the contractor shall notify the D.C.E.S. of the source of the units. All units, regardless of function, shall be produced by a single fabricator. Notification is hereby given that some structure elements may be proprietary and the possibility of royalty payments exists.

Other Materials

Grout. Grout shall consist of:

- Portland Cement Type 2 (701-01) 1 part
- Concrete Sand (703-07) 3 parts
- Grout shall be proportioned by weight.

Joint Seals. These shall be impervious membrane joints, or an equivalent, specified by the unit's fabricator. The size and type of joints shall also be as specified by the unit's fabricator.

CONSTRUCTION DETAILS

1. Site Preparation - All stream protection, excavation, and drainage work required prior to the installation of the precast units, as indicated on the contract plans, will be done in accordance with the appropriate sections of the Standard Specifications.
2. Inspection, Storage and Handling - All precast units and installation materials shall be inspected both upon arrival at the construction site and prior to installation to determine any damage during shipment and storage and for conformance to dimensional tolerances.

The contractor shall handle the units with extreme care to prevent damage. Damaged units shall be repaired in a manner approved by the Engineer.

Units, which as determined by the Engineer, cannot be repaired or which do not meet dimensional tolerances, shall be rejected and replaced with acceptable units furnished by the Contractor at no additional cost to the State. Rejection of a unit shall be done only with the concurrence of D.C.E.S.

3. Installation of the Structure - The Contractor shall require the precast units Manufacturer to provide technical assistance and an on site representative during installation. The Contractor shall provide the Engineer with all facilities necessary to conduct a thorough inspection of all the installation work. Prior to installation, the Contractor shall supply the Engineer with detailed information concerning the proposed method of installation and the construction equipment he

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intends to use. No work shall be performed without the Engineer's approval.

4. Joints - All dowels, joint filler material, tie rods, connectors, waterproofing strips or other sealing materials supplied by the Manufacturer, shall be furnished and installed by the Contractor in accordance with the Manufacturer's directions and as approved by the Engineer. All welding required shall be performed in accordance with the provisions of the New York State Steel Construction Manual.
5. Grouting - Grouting shall be done in the manner indicated on the contract plans.
6. Backfilling - Backfilling operations shall not begin until the following checks have been made:
 - A. Span unit to span footing unit key joints are grouted as shown on contract plans.
 - B. Transverse connectors between unit segments are placed and secured.
 - C. Headwall tie-rods are placed properly grouted (if required).
 - D. Proper connection and bearing between span units and wall units achieved.
 - E. Joint seals are properly placed.

Backfilling will be paid for under a separate item. Payment limits to be used for backfilling shall be as indicated on the plans or as established in writing by the Engineer. Backfilling procedures shall be in accordance with Section 203 - Excavating and Embankment, with the following modifications:

- a. Fill shall be placed and compacted in layers not exceeding 300 mm in depth.
- b. Dumping for filling operations shall not be allowed any nearer than 900 mm to a plane passing vertically through the back face of any footing.
- c. Backfill shall be placed as symmetrically as possible around the structure with differential depths of backfill on each side of the structure span units not exceeding 450 mm with respect to each other.
- d. Compacting with hand compaction equipment shall be done for all fill within 300 mm of the structure.
- e. The bare structure may not be crossed over by any construction equipment heavier than that specified by the Structure span unit Manufacturer. All damage resulting from equipment passage shall be rectified in a manner satisfactory to the Engineer and at no cost to the State.
- f. Construction equipment will not be permitted atop an uncompleted structure.

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- g. Construction equipment which exceeds the design loading shall not be permitted atop a completed structure regardless of the circumstances.
- h. Construction equipment which does not exceed the design loading shall be permitted atop the completed structure at any time provided the structure has been designed to carry overburden not exceeding 600 mm in depth.
- i. If the structure has been designed to carry overburden of 600 mm in depth, or greater, allowable construction equipment will be permitted atop the structure only after at least 600 mm of overburden has been placed as required.
- j. The use of vibratory rollers for compaction purposes will not be permitted.

METHOD OF MEASUREMENT. Measurement for the discrete units will be taken as follows:

- 1. Precast Reinforced P.C.C. Spans Units. Measurement will be taken as the number of meters of structure installed as measured along the centerline of structure. The estimated length given in the Estimate of Quantities will be used. No field measurements will be taken.
- 2. Precast Reinforced P.C.C. Footing w/Invert Units. Measurement will be taken identically with that for span units.
- 3. Wall Units w/footings. Measurement will be taken as the number of meters of wall installed.

BASIS OF PAYMENT. The unit prices bid shall include the cost of all labor, materials and equipment necessary to complete the work.

The following shall apply:

- 1. Precast Reinforced P.C.C. Span Units and Footing w/Invert Units. The unit price bid per meter shall include the cost of all precast material cast as an integral part of, or attached to, the units.

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2. Wall Units w/Footings. The unit price per meter shall include the cost of the footings.

Payment will be made under:

<u>Item No.</u>	<u>Item</u>	<u>Pay Item</u>
16562.95XXYY M	Precast Reinforced P.C.C. Span Units	M

(XX = Approximate perpendicular span in meters; YY = Approximate rise in meters)

16562.96XX M	Precast Reinforced P.C.C. Span Footing w/Invert Units	M
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XX = Approximate perpendicular span of the PCC span unit in meters)

16562.97YY M	Precast Reinforced P.C.C. Wall Units w/Footings	M
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(YY = Average height of wall in meters)

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Scope:This specification covers the material and fabrication requirements for precast reinforced portland cement concrete structure units.

MATERIAL REQUIREMENTS. Materials shall meet the requirements of the following sections:

Portland Cement	701-01
Fine Aggregates	703-01
Coarse Aggregates	703-02
Bar Reinforcement, Grade 400	709-01
Wire Fabric for Concrete Reinforcement	709-02
Quilted Covers (for curing)	711-02
Polyethylene Curing Cover (White Opaque)	711-04
Admixtures	711-08
Water	712-01
Bearing Plates (if required)	715-01

The concrete shall meet the requirements of Section 501, Portland Cement Concrete, General, with the following modifications:

1. Cement shall be either Type 1, Type 2 or Type 3. Only one type of cement will be used to fabricate the units for any one structure.
2. Coarse aggregate gradation shall be No. 1 size or ASTM D448, No. 67.
3. Concrete requirements for Classes A through H shall not apply.
4. Air content shall be 7 percent \pm 2 percent.
5. The use of calcium chloride, or an admixture containing calcium chloride will not be permitted.

DRAWINGS.

1. Contract Drawings: Drawings which accompany the contract proposal are designated as contract drawings. Contract drawings are not intended to be working drawings.
2. Working Drawings: Complete and accurate drawings shall be made by the Contractor, indicating how each precast concrete unit is to be fabricated. The Contractor shall be responsible for modifying the dimensions of units to compensate for elastic shortening, shrinkage, grade correction and other phenomena that make in-process fabricating dimensions different from those shown on the contract drawings.

The Contractor shall submit to the D.C.E.S. for approval, detailed Working Drawings in the size, format and manner described under this section. These drawings shall be made as soon as possible after the

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aware of contract and they shall be designated as working drawings.

Approval of the working drawings by the D.C.E.S. shall not relieve the contractor from the responsibility for correctness of all dimensions shown.

- A. Size and Type: Working drawings shall be neatly drawn and clearly legible to produce microfilm negatives. The drawings shall be made in ink, or reproduced from pencil drawings by a process subject to the approval of the D.C.E.S. on tracing cloth or mylar of acceptable quality. Working drawings shall be cut to a standard size of 560 mm x 860 mm (nominal) and arranged to conform to the contract drawings.

Failure to submit working drawings of the required size will be cause for their return without examination. The margin line shall be drawn 13 mm from the top, bottom and right hand edges and 50 mm from the left hand edge to permit binding. A space 75 mm x 280 mm and parallel to the length of the sheet shall be reserved in the lower right hand corner for title and approval signature. Each working drawing shall have an identical (top right) corner box to the one shown on the contract drawings. The sheets shall be arranged so that, as far as possible, the notes will appear above each other near the right edge of the sheet.

- B. Information Required on Working Drawings: The working drawings shall include the following information:

1. Plan layout of the structure indicating the piece mark assigned to each precast unit.
2. Fabricating plant production schedule.
3. Description of the fabricating plant, including any backup concrete mixing facilities, original design mix and proposed method of placement. Modifications or deviations from the original mix at any time after the working drawings have been approved, shall be submitted, in writing, to the D.C.E.S.
4. Proposed admixtures to be added to the concrete mix, including brand and dosage rate.
5. Quality control tests and procedures.
6. Outline of the curing procedure proposed for the precast units and test cylinders.
7. The name of the manufacturer of the reinforcing steel, including any alternate source.
8. Complete details of the precast elements including all dimensions and tolerances, location and type of reinforcement, finishing treatments, weights and concrete strength (lifting and 28 day).

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9. Joint dimension and details including type and brand of joint sealing material.
 10. Location and method of forming lifting holes, type and location of lifting devices and proposed method of handling and transporting all precast concrete units to the project site.
 11. Provisions for minor nonstructural repairs to the precast elements, in accordance with the requirements of Section 718-01.
 12. Working drawings shall clearly indicate any proposed deviations from any precast concrete unit details shown on the contract drawings.
 13. Winter concreting procedures, if need is anticipated.
- C. Submission of Working Drawings: When the working drawings, prepared by the Contractor, as specified, are completed, check prints shall be submitted to the D.C.E.S. who will indicate thereon such corrections as may be necessary to secure the completion of the contract in accordance with the requirements of the contract documents. The Contractor shall submit three sets of check prints for the D.C.E.S. and two additional sets of check prints for each agency involved with the contract. All sets of check prints shall be submitted to the D.C.E.S., who will make the distribution to the other agencies involved. One set of check prints or sepias with desired corrections indicated thereon in colored crayon or pencil, will be returned to the contractor. When the revisions have been completed to the satisfaction of the D.C.E.S., the original drawings shall be forwarded to him for his written approval, after which a set of approved drawings will be returned. The original drawings shall remain the property of the State.
- The D.C.E.S. shall be allowed two work days for the examination of each drawing in a set of working drawings, or ten work days minimum per set. A set of working drawings shall be considered to be all drawings received by the D.C.E.S. from any given contractor for a particular contract on any calendar day. If the working drawings are detained for examination for a period longer than that previously stated, such detention will be taken into account when considering application by the contractor for an extension of time for the completion of the contract. All working drawings are time and date stamped as they are received and recorded in a log at the office of the D.C.E.S. This log shall be the basis for determining when drawings must be returned without consideration for an adjustment of the completion date as described herein.
- Approval of working drawings shall not constitute approval for the following information required on the working drawings: 2B(3) and 2B(7). This data is required for information only.
- D. Approval of Working Drawings: No fabrication shall be started until after the Working Drawings have been approved and the Inspector/Engineer has received prints made from the original drawing.

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FABRICATION. The requirements of subsections inspection through Nonstructural repair of Section 718-01 PRESTRESSED CONCRETE UNITS (STRUCTURAL) shall apply with the following modifications:

1. All references to prestressing ,prestressing steel, or requirements for prestressing steel shall not apply.
2. The word “Inspector” shall be read as “Inspector/Engineer” wherever it appears throughout the text.
3. Under Concrete Mix Design and Proportioning, delete the sentence beginning with “If no strength is indicated...” and insert “The required minimum concrete strength shall be 35 MPa at 28 days or at the time of shipment (whichever date comes first).”
4. Under Placing Concrete delete the second sentence. Replace with the following: “Compliance with the following precasting tolerances is a pre-requisite for casting approval by the Inspector/Engineer:”

Minimum reinforcement cover:

- a) Walls and roof
 1. Backfilled surface - 50 mm ± 3 mm
 2. Other surfaces - 38 mm ± 3 mm
- b) Footings
 1. Earth covered surfaces - 75 mm ± 6 mm
 2. Other surfaces - 50 mm ± 3 mm
5. Under Curing, after “1.B1 Saturated Cover” add “2. Water Spray Curing.” Also, under 2.B.2, delete the paragraph “2. Final Curing Phase” and insert the following:

“2. Final Curing Phase.

Water Spray Curing. Under this system, the unit shall be placed in a curing chamber, free from outside drafts. The unit shall be cured by subjecting it to a continuous, fine spray of water, at an ambient temperature or not less than 20 °C. Curing shall be maintained until 72 hours have passed after completion of the initial curing phase or until minimum lifting strength has been reached.

Saturated Cover Curing. Under this system, the unit shall be covered with heavy burlap, saturated with water before the burlap is applied. Other material, suitable to the

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Inspector/Engineer also saturated before application, may be used. The unit shall be kept saturated in this manner at an ambient temperature of not less than 20 °C. Curing shall be maintained until 72 hours have passed after completion of the initial curing phase or until minimum lifting strength has been reached.”

6. Under Rejection of Units, delete paragraph “2. Exposed Prestressing Steel” and insert the following:

“2. Exposed Reinforcing Steel. Any unit that has one (1) reinforcing bar surface exposed in excess of 24 diameters in length, or any portion of a reinforcing bar exposed such that less than one-half of the circumference is surrounded by, and bonded to, the concrete.”

Also, delete paragraph “4. Stress Cracks” and insert the following:

“4. Cracks. Any cracks over 0.25 mm in width or a crack of any width which penetrates to the outermost surface of a reinforcing bar.”

“5. Spalls. Any spall greater than 150 mm in diameter.”

Change “5. Injurious Materials.” to “6. Injurious Materials.”

SAMPLING AND TESTING: Precast concrete units manufactured under the requirements of this specification shall be separated into specific and identifiable stock lots. The maximum number of sections in a lot shall be one section per lot. The properties of the concrete will be determined on a stock lot basis, by the Department in accordance with either of the following methods at the option of the Department:

1. Production Testing. Testing will be performed by the Manufacturer, subject to the approval and inspection of an inspector designated by the State. It will consist of testing the plastic concrete for compliance to the air content required by this specification and the casting and testing of concrete cylinders for compressive strength determination. Test cylinders used to determine the required compressive strength shall be cured with units they represent. The Department reserves the right to test the hardened concrete at any time, in which case the manufacturer will drill cores under the supervision of a Department representative.
2. End Product Testing. The testing of hardened concrete for both air content and compressive strength will be performed by the Materials Bureau on cores drilled by the manufacturer under the supervision of a Department representative.

TOLERANCES: All units shall be checked for compliance with the tolerances listed below, after the units have completed the Final Curing Phase and within three days of actual shipment. The Inspector/Engineer shall document to the D.C.E.S. any unit with dimensions out of tolerance. Any unit

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which fails to meet these tolerances shall be rejected with the concurrence of the D.C.E.S.

INTERNAL DIMENSIONS: Shall not vary more than 1% from the design dimensions, nor 25 mm whichever is less. The haunch dimensions shall not vary more than 6 mm from design dimensions.

SLAB & WALL THICKNESS: Shall not be less than that shown in the design by more than 5% or 5 mm, whichever is less. A thickness greater than that required in the design shall not be cause for rejection.

Laying length of two adjacent units shall not vary by more than 15 mm maximum in any section, except where beveled ends for laying of curves are specified by the Department.

LENGTH OF SECTION: Underrun in any section shall not be more than 12 mm maximum.

SHIPPING: Precast units that meet all requirements of the specifications may be shipped when the 28 day compressive strength is achieved.

BASIS OF ACCEPTANCE: Precast reinforced units will be considered for acceptance at the manufacturing location in accordance to the Section 718-01 procedure for "Basis of Acceptance."