

## 707-B-180 PRECAST AND PRECAST PRESTRESSED CONCRETE STRUCTURAL MEMBERS

(Adopted 11-20-08)

The Standard Specifications are revised as follows:

SECTION 707, BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

**SECTION 707 – PRECAST AND PRECAST PRESTRESSED CONCRETE  
STRUCTURAL MEMBERS**

**707.01 Description**

This work shall consist of the ~~construction and~~ *fabrication, furnishing, and installation* of reinforced *precast* or *precast prestressed* concrete structural members or, if specified, concrete deck panels cast outside the structure, transported to, and incorporated into the structure, *all* in accordance with 105.03.

**707.02 Materials**

Materials shall be in accordance with the following:

<i>Admixture for Concrete</i> .....	912.03
Coarse Aggregates, Class A or Higher, Size No. 91.....	904
Concrete Curing Materials <del>and Admixtures</del> .....	912
Concrete Sealers.....	909.09, 909.10
Elastomeric Bearings .....	915.04
Fine Aggregates, Size No. 23.....	904
Fly Ash.....	901.02
Portland Cement.....	901.01(b)
Prestressing <del>Steel Strand</del> .....	910.01(b)7
Reinforcing <del>Steel Bars</del> .....	910.01

Structural steel for steel intermediate diaphragms shall be in accordance with 910.02(a) and shall be galvanized in accordance with ASTM A 123 after cutting, bending, and welding. Bolts for steel intermediate diaphragms shall be 7/8 in. (22 mm) and in accordance with ~~910.02(e)~~ 910.02(f), except they shall be type 1. All bolts, nuts, washers, and similar threaded fasteners shall be galvanized in accordance with ASTM A 123 or may be mechanically zinc coated in accordance with ASTM B 695, class 50.

**707.03 General Requirements**

Structural members including, *but not limited to* ~~bridge slabs, concrete deck panels, box-beams, and I-beams, U-beams, and bulb-T beams~~ shall be manufactured in an *Department* approved plant ~~where strict control over manufacturing and curing procedure is maintained at all times in accordance with ITM 814.~~ Dimensions and design requirements for structural members shall be as shown on the plans. Lengths and dimension tolerances shall be as shown on the plans or as otherwise specified.

*A beam whose dimensions exceed the tolerances shown on the plans will be rejected. A beam which is to include a field attached curb shall have curb reinforcement located longitudinally within 3/4 in. (20 mm) of the locations shown on the plans.*

Structural steel diaphragms shall be fabricated and erected in accordance with 711. Steel diaphragms shall include all connection angles, plates, and associated hardware required for a complete installation. The Contractor shall replace, re-galvanize, or repair all damaged galvanized material at the discretion of the Engineer.

If detailed ~~design~~ drawings are not included in the plans, ~~one set of design computations and four sets of detailed~~ shop drawings shall be submitted for approval *in accordance with 105.02*. ~~The submitted drawings shall be 22 in. by 34 in. (560 mm by 860 mm) in overall size. These shop drawings will be reviewed for design features only. The Contractor shall be responsible for dimensions, accuracy, and fit of work.~~ Certified mill test reports shall be furnished for all high tensile steel *strands*. Fabrication shall not begin until the shop drawings are approved.

*Prior to the beginning of fabrication, a prefabrication meeting shall be held at the fabrication facility or another agreed upon location. The meeting shall be conducted by the fabricator and attended by the fabricator's production supervisor and quality control inspector, and the Engineer. The fabricator shall take notes of the meeting and distribute copies to all attending parties within five days of the date of the meeting. Items to be discussed at the meeting shall include a minimum of: fabrication and shipping schedule including hours of operation; line of communication between fabricator and Engineer; material test reports; shop drawings; special fabrication methods; fabrication hold points for inspection; final inspection and acceptance of materials; method of shipment. The requirement to hold prefabrication meetings may be waived by the Department, if the Department so chooses.*

*Where temperature requirements are specified herein, the fabricator shall provide the Department with written verification that the temperature requirements have been met.*

## CONSTRUCTION REQUIREMENTS

### 707.04 Steel and Concrete Requirements

#### (a) Reinforcing Steel Bars

A tight coat of concrete grout *extending 1/2 in. maximum from the top of precast and precast prestressed concrete members* will be permitted to remain on ~~stirrups~~ reinforcing bars extending from precast and precast prestressed members. All loose and flaky material on these reinforcing bars shall be removed. *Lap splices shall be in accordance with 703.06. In lieu of tying, reinforcing bars may be welded in accordance with 703.06.*

#### ~~(b) Welding Reinforcing Steel~~

~~In lieu of tying, reinforcing steel bars except prestressing steel strands may be welded in accordance with the following: 703.06.~~

- ~~1. Welding will be permitted only at intersections of bars. Splicing of the reinforcing steel by welding will not be permitted. Welds shall have a satisfactory appearance. There are no numerical strength~~

~~requirements for the completed welds. However, they shall be of such strength as to adequately hold the crossing bars in their true position during the placement of concrete. As low a current as possible shall be used so as to preclude notching and undercutting and still provide a weld of the intended strength. Notching or undercutting of the bars will be cause for rejection of the bars so damaged and the bars shall be replaced as directed.~~

- ~~2. Welding shall be by the shielded metal arc process using only electrodes with low hydrogen classifications E7015, E7016, E7018, or E7028 in accordance with AWS A5.1. No minimum preheat or interpass temperature is required, except that welding shall be done only when the base metal temperature is above 35°F (2°C). The low hydrogen electrodes shall be dried for at least 2 h at a temperature between 450°F (232°C) and 500°F (260°C) before they are used. Electrodes shall be stored immediately after drying in a storage oven held at a temperature of at least 250°F (121°C). Electrodes that are not used within 4 h after removal from a drying or storage oven shall be re-dried before use. Electrodes which have been wet shall not be used.~~
- ~~3. All welding procedures and welders to be employed shall be qualified by tests as prescribed below. Evidence may be accepted of previous qualification of the welding procedures and welders to be employed. The same bar stock and type of welding equipment that is required for fabrication of the steel shall be used in qualifying welding procedures and welders. Welding procedures shall be qualified by preparing and testing two sample welds of each combination of bar size and steel type to be welded at intersections in the construction work. Each sample shall be subjected to a tensile test across the point of the weld. The specimens shall develop the minimum requirements for tensile strength and yield strength of the bar stock. However, failure to be in accordance with the percentage of elongation specified for the steel bars used will not be cause for disqualifying the welding procedure or the welder.~~
- ~~4. Welders shall be qualified by preparing and testing samples in the same manner as specified above for qualification of welding procedures. Preparation of welds for qualifying procedures and welders shall be done in the presence of the Engineer. Such inspection shall be requested at least five days in advance. All necessary equipment, personnel, and materials shall be assembled and any experimental work performed so that qualification of welders and welding procedures can be concentrated on a reasonably short and continuous period of time. The cost of qualifying the welders and welding procedures shall be at the expense of the Contractor and will be considered incidental to and included in the pay item for structural~~

~~members, except that testing of the specimens will be performed by the Department at no expense to the Contractor.~~

**(b) Prestressing Strands**

*The splicing of straight prestressing strands is acceptable provided that the location of the splice does not occur within a concrete member. Splicing of draped strands is not allowed. Spliced prestressing strands shall have the same twist or lap. For single strand tensioning, slippage of the splices should be considered in computing the elongation. For multiple strand tensioning, either all of the strands shall be spliced or not more than 10% of the strands. If all of the strands are spliced the average splice slippage shall be considered in computing the elongation. If 10% or less of the strands are spliced, no slippage allowance shall be required.*

*Wire breaks will be permitted to remain on the prestressed concrete casting bed as follows:*

<i>Number of Strands in Bed</i>	<i>Wire Breaks</i>
<i>19 or Fewer</i>	<i>0</i>
<i>20 through 39</i>	<i>1</i>
<i>40 through 59</i>	<i>2</i>
<i>60 or More</i>	<i>3</i>

*The ends of each permitted wire break shall be tied to the strand. If more than the permissible number of wire breaks appears in a particular strand pattern, or if more than one broken wire appears in an individual strand, such strands shall be removed and replaced.*

*The tolerance for the center of gravity for a prestressing strand group shall be  $\pm 1/4$  in. ( $\pm 6$  mm). The tolerance for the longitudinal position of handling devices shall be  $\pm 6$  in. ( $\pm 150$  mm).*

**(c) Concrete**

Concrete shall be air entrained and in accordance with the applicable requirements of 702.05. *The concrete shall have a minimum temperature of 50°F (10°C) and a maximum temperature of 90°F (32°C) at the time of placement.* Chemical admixture types A, D, F, or G shall be used in combination with an air entraining admixture. A High range water reducing, HRWR, ~~and~~ or high range water reducing retarding, HRWRR, admixture systems ~~may~~ shall be used. Chemical admixture types B, C, and E will be permitted only with written permission. Admixtures, other than air-entraining admixtures, shall not be used with air-entrained cement. The cement content of the mixed concrete shall be sufficient to obtain the specified minimum 28 day compressive strength. The total of portland cement and other cementitious materials shall not exceed 800 lb/cyd (475 kg/m<sup>3</sup>). Slump shall be no less than 2 in. (50 mm) nor more than 5 in. (125 mm) for concrete without chemical admixtures or concrete containing chemical admixture types A and D.

Concrete containing admixture type F, G, or admixture systems shall have a slump no less than 3 in. (75 mm) nor more than 7 in. (175 mm). The amount of time from

mixing to placement and consolidation shall be a maximum of 30 min. The concrete shall not be retempered with additional amounts of chemical admixture types F or G after the initial mixing has been completed.

### **1. Cold Weather Concrete**

*Cold weather concrete shall be in accordance with 702.11 except that two minimum-maximum recording-type thermometers shall be provided in the enclosure.*

### **2. Hot Weather Concrete**

*When it is necessary to fabricate concrete structural members during times of hot weather the mix water may be chilled or an appropriate amount of ice may be added to the concrete mix in order to produce concrete of the temperature specified herein.*

### **3. Acceptance Testing**

*Acceptance of precast and precast prestressed members will be based on tests for slump, air content, and compressive strength. The 28 day compressive strength shall be equal to or greater than the specified concrete compressive strength. Test cylinders for acceptance shall be molded and field cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The fabricator shall make a minimum of two 6 in. dia. x 12 in. test cylinders per member cast. The fabricator may elect to make additional cylinders for acceptance testing prior to 28 days. The 28 day compressive strength of the concrete for each structural member will be determined by the average strength of two cylinders representing that member. The strength of any individual cylinder for a member shall not be lower than 95% of the specified concrete compressive strength. The fabricator may elect to make and test additional cylinders for acceptance at an earlier age in lieu of the 28 day requirement.*

*All molds, facilities, labor, and materials necessary to prepare and cure the test specimens shall be furnished.*

#### **(d) Other Requirements**

*The fabricator shall control prestressing operations and shipment of structural members through the use of compressive strength test cylinders that are molded and field cured in accordance with ASTM C 31.*

Precast concrete members which are not prestressed shall have a minimum compressive strength of 4500 psi (31 MPa) in 28 days. *Precast prestressed members shall be in accordance with the following unless otherwise shown on the plans:*

1. Maximum water/cementitious ratio in pounds (kilograms) of water per pound (kilogram) of cementitious material shall be ~~0.400~~ 0.420.
2. Minimum 28 day compressive strength of concrete shall be 5000 psi (34.5 MPa).
3. Minimum compressive strength of concrete at time of prestressing shall be 4000 psi (27.6 MPa).

4. Initial tension of prestressing ~~steel~~ *strands* shall be as shown on the plans.

Inspection of the precast *prestressed* member during manufacture and checking and testing aggregates, cement, concrete, and steel specimens will be performed. All specimens shall be furnished without cost to the Department. ~~Notification shall be made as soon as reinforcing steel is available for sampling and testing, and also at least five days in advance of the beginning of the manufacture of the precast member. This~~ Inspection, checking, and testing performed by the Department will not relieve the Contractor or ~~his manufacturers~~ *the fabricator* from performing their own *quality control* inspection, testing, and checking as necessary to maintain ~~strict~~ *quality control* over the manufacturing, handling, and curing procedure. ~~By means of a mechanical recording device, a~~ A permanent record of the *force applied to and measured elongation obtained* ~~to~~ for each *prestressing* strand of ~~prestressing steel~~ and the identification of the strand and unit to which the record applies shall be provided. *This record shall be certified that it accurately represents the force applied and measured elongation by the fabricator's production supervisor and provided to the Engineer prior to shipment.*

#### **707.05 Forms**

Structural members shall be manufactured in steel forms which are unyielding, *smooth*, mortar-tight, and of sufficient rigidity to prevent distortion due to pressure of the concrete. They shall be so designed that the finished concrete is in accordance with the required dimensions and contours. The design of the forms shall take into account the effect of vibration of the concrete as it is placed. Forms shall be filleted at all sharp corners and shall be given a bevel or draft at all projections to ensure easy removal. Exposed edges of curbs shall be beveled or edged. Forms shall be set and maintained true to the lines designated until the concrete is sufficiently hardened or for periods hereinafter specified. Interiors of forms shall be treated with an approved formulated form coating which allows them to be released without adhering, discoloring, or otherwise damaging the concrete. Form coating materials shall not come in contact with reinforcing *bars* or prestressing ~~steel~~ *strands*.

#### **707.06 Placing and Finishing Cement Concrete**

*The temperature of the prestressing strands and forms shall be monitored between the time of the application of prestressing force and the placement of the concrete. During hot weather, approved means shall be undertaken to cool the prestressing strands and forms immediately prior to placement of the concrete.*

Concrete, during and immediately after depositing, shall be consolidated with vibrators and suitable spading tools. Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. The vibrators used may be internal, external, or a combination of both. Internal vibration shall be of sufficient duration and intensity to consolidate thoroughly, but shall not be continued so as to cause segregation. Vibration shall not be continued at any one point so that localized areas of grout are formed.

The entire operation of depositing and consolidating the concrete shall be conducted so that the concrete will be smooth, dense, and free from any honeycomb or pockets of segregated aggregates. The concrete in each member shall be placed in one

continuous operation. The outside vertical faces of fascia girders and the exposed face and top of the curb section shall be finished in accordance with 702.21.

*Voids in prestressed concrete box beams shall be vented during beam production until after the initial concrete set, then sealed before the beams are shipped.*

The tops of all beams and the outside faces *and bottom flanges* of the fascia beams shall be sealed ~~with an approved concrete sealer~~ in accordance with 709.

#### **707.07 Removal of Forms and Curing**

Side forms may be removed when no distortion, slump, or misalignment of the concrete will result. Precast members which are not prestressed shall remain on the bottom supporting forms for the span until the concrete has reached a strength of at least 2,000 psi (13.8 MPa) as evidenced by test cylinders made and cured in the same manner as the slab.

Curing may be done by wet curing or by accelerated curing.

When wet curing is used, the exposed surfaces of the members shall be covered by two layers of wet burlap and the burlap shall be kept wet. Additional curing of precast or *precast* prestressed units will not be required provided the minimum specified ultimate strength can be obtained.

When accelerated curing of the concrete is used, it shall be done by low pressure steam or radiant heat curing. Insulated blankets may be used to reduce heat and moisture loss subject to maintaining a 50°F (10°C) minimum temperature. The heat shall always be applied at a controlled rate following the initial set of the concrete, and an effective method of retaining the heat and moisture in the concrete shall be used during the curing cycle.

Curing shall be in a suitable enclosure to minimize heat and moisture loss. Except to maintain a minimum temperature of 50°F (10°C), heat shall not be applied until the concrete has attained its initial set. The time of initial set may be determined by ASTM C 403. When the initial set is not determined by ASTM C 403, the initial application of heat shall be from 2 to 4 h after final placement. If retarders are used, this time shall be increased to 4 to 6 h.

During the initial application of radiant heat or live steam, the ambient temperature within the curing enclosure shall increase at an average rate not exceeding 40°F/h (5°C/h) until the curing temperature is reached. Neither the maximum temperature within the enclosure nor the maximum temperature on the surface of the concrete shall exceed 160°F (71°C). The maximum curing temperature shall be held until the concrete has reached the minimum required strength for moving precast *and precast prestressed* units. *In discontinuing the steam application, the air temperature inside the enclosure shall decrease at a rate not to exceed 70°F/h (20°C/h) until the temperature has reached 20°F (7°C) above the temperature of the air to which the member will be exposed. Time and temperature recording thermometers shall be provided and used to verify compliance with the stated heating and cooling rates.* Detensioning should be

accomplished immediately after accelerated curing has been discontinued, *provided the member has met or exceeded the specified release strength. When multiple members are cast in the same bed, all members shall meet or exceed the specified release strength prior to detensioning.* Additional curing of precast or *precast* prestressed units will not be required provided the minimum specified ultimate strength can be obtained.

Radiant heat may be applied by means of pipes circulating steam, hot oil or hot water, or by electric heating elements. When steam is used, the jets shall be positioned so that they do not discharge directly on the concrete, forms, or test cylinders. ~~the~~ *The* steam shall be at 100% relative humidity to prevent loss of moisture and to provide moisture for proper hydration of the cement.

During the period of initial set of the member and during the accelerated curing by radiant heat, the concrete shall be kept wet by the method outlined above for wet curing.

~~A recording thermometer shall be provided and used to verify compliance with the temperature requirements.~~

Approval shall be obtained before curing is done by any means other than those outlined above.

#### **707.08 Handling and Shipping**

~~The precast~~ *Precast and precast prestressed* members shall not be subjected to excessive abuse which produces crushing or undue marring of the concrete. All members damaged during handling, storing, transporting, or erecting shall be replaced. Unless ~~some other method is~~ *otherwise* approved, *precast and precast prestressed* members shall be handled with a suitable hoisting device provided with a spreader sling. The spreader shall be of sufficient length to prevent horizontal forces being produced in the member due to lifting and shall be equipped with leads and hooks at each end. The girders shall be lifted by the devices shown on the plans. *Proposed* ~~A~~ *alternate* lifting devices and procedures shall be *approved prior to use and shown on the shop drawings at the owner's or supplier's option, and must be approved prior to use. If any other method of handling is used, it shall be shown on the shop drawings and approved prior to use.* If the method produces horizontal forces in the *precast or precast prestressed* member, sufficient ~~steel~~ reinforcement shall be added to compensate for them.

The members shall remain in an upright position at all times and shall be supported as indicated herein when in storage and during transportation to the construction site.

In storage, ~~I-beams, box beams, and slabs~~ *all members* shall be fully supported across their width on battens not less than 4 in. (100 mm) wide with one being placed at each end at the centerline of the bearing. The supports of the members while in storage shall be maintained in a level position so no twisting occurs.

~~The precast~~ *Precast* members shall not be shipped nor used until the concrete *compressive strength* reaches a ~~strength~~ *minimum* of 4,500 psi (31 MPa) for members

which are not prestressed and 5,000 psi (34.5 MPa) for members which are prestressed as evidenced by test cylinders made at the time of casting and cured in the same manner as the precast members which they represent. ~~If they are shipped prior to 28 days, additional test cylinders shall be made to ensure adequate 28 day results in case of earlier failure.~~

During transportation, the members shall be supported with truck bolsters or battens no less than 4 in. (100 mm) wide which are padded with no less than 1/2 in. (13 mm) of rubber. The ends of I-beams shall extend no more than the depth of the beam and not more than 3.5 ft (1 m) beyond the supports. The ends of box-beams shall extend no more than 1 1/2 times their depth and not more than 3 ft (0.9 m) beyond the supports. The ends of slabs shall extend no more than the depth of the beam beyond the supports. Supports of cantilever beams shall be as shown on the plans. Trucks with double bolsters will be permitted, provided the beams are fully seated on the outer bolsters and the inner bolsters are no more than 8 ft (2.4 m) from the ends of the beams. Wood blocks or other suitable material shall be placed under the tie chains to prevent chipping the concrete.

### **707.09 Placing Structural Members**

Erection of ~~the~~ precast *prestressed structural members* ~~deck~~ shall commence at the centerline and proceed out to the curb, one member at a time. As each member is placed, the transverse tie bars, if shown on the plans, shall be inserted and secured. Any shifting of the members shall be done while they are held free of the supports by the hoisting device. The use of a steel pinch bar will not be permitted. Members shall be set to proper line and grade with uniform bearing on bridge seats, mortar joints, or bearing pads as required on the plans. When required, members shall be secured to the pier or bent with dowel rods. Holes for dowels shall be filled with mortar at fixed ends and with crack or joint filler at expansion ends. Longitudinal keyway joints shall be cleaned. A coat of cement mortar shall be scrubbed on the surface. The joint shall be filled with a non-shrinking grout composed of one part portland cement, two parts No. 23 fine aggregate, and an approved non-shrinking additive or a non-shrink, non-metallic cementation grout in accordance with ASTM C 1107. All bolts or drains shown on the plans as necessary or desirable to be placed in the concrete shall be placed by the methods and at the locations shown on the plans. Necessary tie rods, tie bolts, and hardware for tying members together shall be furnished.

Dowel holes shall not be grouted nor concrete or the forming ~~therefore~~ *thereof*, be placed in floor slabs, diaphragms, or shear keys prior to receipt of complete documentation of the acceptability of the members and bearing pads, including the satisfactory laboratory reports and certifications in accordance with 915.04(e). Neither the members, nor the bearings will be considered incorporated into the work, and neither will be paid for until this documentation is accomplished satisfactorily.

Railing, when required, shall be of the type shown on the plans. The component parts shall be in accordance with 706, unless otherwise indicated on the plans. Other precast or *precast* prestressed structural members shall be placed in the structure in accordance with the plans and the specifications or special provisions indicated for the type of structure being built.

Cranes or other heavy erection equipment may be operated on the precast or *precast* prestressed members only if approved in writing and if a proposed operating procedure is submitted showing loading, distribution of loads, resulting stresses, and that the design of the members is satisfactory to permit. However, such approval shall not relieve the Contractor of any damage from this operation.

#### **707.10 Precast Prestressed Concrete Deck Panels**

Precast prestressed concrete deck panels shall be designed as a non-composite section to support the dead load of the panel, reinforcement, plastic concrete, and a construction load of 50 lb/ft<sup>2</sup> (2.4 kPa).

When the Contractor elects to use precast prestressed deck panels, ~~the~~ the panel shall be designed as a composite section with ~~the~~ class C concrete to support the live load. The Contractor shall revise the area of top longitudinal reinforcing ~~steel bars in the deck~~ over interior supports for negative moment to be equal to the total area of top and bottom longitudinal reinforcing ~~steel bars~~.

Shop drawings ~~and design computations~~ shall be submitted in accordance with ~~707.03~~ 105.02. Design computations ~~for deck panels~~ shall be submitted ~~for approval only~~ for total slab thicknesses greater than 8 in. (200 mm) or clear spans in excess of 7.5 ft (2.3 m). Design shall be in accordance with *either the AASHTO Standard Specifications for Highway Bridges or the AASHTO Standard Load Resistance Factor Design Bridge Design Specifications for Highway Bridges as shown on the plans*. Details such as type, size, and location of the reinforcing ~~steel bars~~, the prestressing strands, welded wire ~~fabric reinforcement~~, and concrete shall be as shown on the plans.

The concrete for deck panels shall be placed in accordance with 702.20. The concrete shall be vibrated to prevent honeycombs and voids, especially at the corners and edges of the panels. The tops of the deck panels shall be broom or wire brush finished in the direction of the prestressing strands. The corrugations formed shall be uniform in appearance and shall not be more than 1/4 in. (6 mm) in depth. The coarse aggregate shall not be displaced when preparing the roughened surface.

#### **707.11 Method of Measurement**

Precast or *precast* prestressed concrete structural members will be measured by the linear foot (meter) ~~along the top of each member or by the square foot (square meter) of top surface of each member~~. Railing will be measured in accordance with 706.05 if specified as a pay item. Structural steel for intermediate diaphragms will not be measured.

*When the Contractor elects to use precast prestressed concrete deck panels, the panels will not be measured for payment.*

#### **707.12 Basis of Payment**

The accepted quantities of precast or *precast* prestressed concrete structural members will be paid for at the contract unit price per linear foot (meter) ~~or per square foot (square meter)~~ for structural member, concrete, of the type and size specified. Precast or *precast* prestressed concrete structural members for which the type and size is

not shown in the Schedule of Pay Items will be paid for at the contract lump sum price for structural members, concrete.

Railing will be paid for in accordance with 706.06 when specified as a pay item.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit Symbol</b>
Structural Member, Concrete, _____, _____.....	LFT (m)
type size	SFT (m <sup>2</sup> )

Reinforcing ~~steel~~ bars, elastomeric bearing pads, *modifications to bearing pads*, bearing beams required for box beams, bearing assemblies required for I-beams, bulb-T beams, *U-beams*, and box beams, bearing plates, expanded polystyrene, threaded reinforcing bars, threaded inserts in ~~facia~~ beams, hex bolts, sealer on the outside face *and bottom flange* of ~~facia~~ beams and on the tops of all beams, and necessary incidentals shall be included in the cost of ~~this work~~ *the pay items of this section. The cost for providing all molds, facilities, labor, and materials necessary to prepare and cure the test specimens required for work in this section shall be included in the cost of the pay items in this section.*

No payment will be made for *removing and replacing prestressing strands due to excessive wire breakage, or replacing precast or precast prestressed members damaged during handling, storing, transporting or erecting.*

*When the Contractor elects to use precast prestressed concrete deck panels, the cost of the panels shall be included in the cost of class C concrete in superstructure.*

The cost of railing shall be included in the cost of ~~this work~~ *the pay items of this section* if such railing is not specified as a pay item.

The cost of all materials, including galvanizing, labor, and equipment for furnishing and installing steel intermediate diaphragms shall be included in the cost of structural member, concrete of the type and size specified.