SECTION 563 - PRESTRESSED CONCRETE UNITS (STRUCTURAL)

563-1 DESCRIPTION. This work shall consist of furnishing and placing prestressed concrete units for structures, as specified in the contract documents.

563-2 MATERIALS

563-2.01 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 the P.C.C.M.

563-2.02 Transverse Tie Rods or Strands. Refer to P.C.C.M., Section 4.

563-2.03 Shear Key Material. Refer to P.C.C.M., Section 4.

563-2.04 Anchorage Block-Out Grout. Refer to P.C.C.M., Section 4.

563-3 CONSTRUCTION DETAILS. The requirements of the P.C.C.M. shall apply.

563-4 METHOD OF MEASUREMENT

563-4.01 Prestressed Concrete I-Beam Units. The quantity to be paid for under this work shall be the number of meters (horizontal length center-to-center of bearings or anchor dowels, as shown on the plans) of each unit furnished and placed in accordance with the plans and specifications.

563-4.02 Prestressed Concrete Box-Beam Units and Hollow and Solid Slab Units. The quantity to be paid for under this work shall be the number of square meters of plan area of each prestressed unit installed. Plan area is defined as the area bounded by the centerline of bearings and the outer edges of each prestressed unit. No deductions will be made for chamfers, shear keys, or notch cuts. Space between the units shall not be included in any measurement.

563-5 BASIS OF PAYMENT. The unit price bid for these units 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 exclusive of preparing and filling joints. Payment will be made at the unit price bid for 90% of the quantity properly placed. The balance of the quantity will be paid for upon completion of the work. The completion of work will include the correct preparation and filling of the joints as well as the tightening of transverse ties.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>563.010X M</td>
<td>Prestressed Concrete I-Beam Units (Types 1-6)</td>
<td>Meter</td>
</tr>
<tr>
<td>563.02 M</td>
<td>Prestressed Concrete Box Beam Units</td>
<td>Square Meter</td>
</tr>
<tr>
<td>563.03 M</td>
<td>Prestressed Concrete Hollow Slab Units</td>
<td>Square Meter</td>
</tr>
<tr>
<td>563.04 M</td>
<td>Prestressed Concrete Solid Slab Units</td>
<td>Square Meter</td>
</tr>
</tbody>
</table>

X = Type Designation (1 through 6)
SECTION 564 - STRUCTURAL STEEL

564-1 DESCRIPTION. Under this work, the Contractor shall fabricate, furnish and erect structural steel and other metal parts as shown on the plans and in accordance with the provisions of the contract documents. The Contractor's attention is directed to §106-01, Source of Supply and Quality Requirements, with regard to advising Departmental Representatives of the sources of proposed materials.

564-2 MATERIALS. Materials for this work shall meet the requirements of the New York State Steel Construction Manual and the following subsections of §700 - Materials:

<table>
<thead>
<tr>
<th>Material</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint as Specified</td>
<td>708</td>
</tr>
<tr>
<td>Structural Steel</td>
<td>715-01</td>
</tr>
<tr>
<td>High Strength Bolts, Nuts and Washers</td>
<td>715-14</td>
</tr>
<tr>
<td>Pins and Rollers</td>
<td>715-15</td>
</tr>
<tr>
<td>Vertical Load Transmitting Devices</td>
<td>728</td>
</tr>
<tr>
<td>Painting Procedures</td>
<td>740</td>
</tr>
</tbody>
</table>

Certified copies of the results of tests conducted by the manufacturer shall be furnished to the Engineer in accordance with the requirements of §715-01, Structural Steel.

564-2.01 Structural Steel Replacement - Stock Steel Option. Stock steel may be furnished for this work. If furnished, the stock steel shall comply with the provisions of §715-01, Structural Steel. Positive heat identification will be required for all stock steel. Certified copies of the results of chemical analysis and physical tests shall be furnished to the Department. Shop inspection will be provided unless otherwise noted on the contract plans, or waived by the D.C.E.S. The provisions of this subsection shall apply only to pay items entitled “Structural Steel Replacement (kg.)” or “Structural Steel Replacement (Each).”

564-3 CONSTRUCTION DETAILS. All structural steel work, including, but not limited to fabrication inspection, transportation, and erection shall be done in accordance with the provisions of the SCM.

Shop drawings prepared for pay items titled Structural Steel Replacement (Kg.) and Structural Steel Replacement (Each) shall be prepared, approved and distributed in accordance with the provisions of the SCM, except that the term “D.C.E.S.” shall be interpreted as “the Engineer.”

564-4 METHOD OF MEASUREMENT. Measurement will be made by one, or combinations of the following methods as indicated in the contract documents.

- Kilogram
- Each
- Lump Sum

564-4.01 Kilogram. Measurement will be made on a kilogram basis. The mass of each shipping unit shall be clearly shown on the approved shop drawings. For the purpose of measurement, such items as castings, anchor bolts, forgings, fasteners, cable and other metal parts used in the construction shall, unless otherwise provided, be considered to be structural steel even if made of other materials.

A. Payment Mass. Payment will be based on the computed mass of metal as shown on the approved shop drawings, and shall include permanent bolts and welds in the structure as erected. The mass of all erection materials including but not limited to bolts, pilot and driving nuts, temporary protective coatings, and all boxes, crates or other containers used for packing, together with sills, struts, and rods used for supporting members during transportation, shall be excluded.

The mass of all required bolt heads, nuts and washers will be estimated, making no allowance for waste, and included in the mass for which payment will be made.
The mass of all required welds will be estimated and included in the mass for which payment will be made.

**B. Computed Mass.** The mass of steel shall be assumed as 7850 kg/m³. The mass of cast iron shall be assumed as 7210 kg/m³.

The masses of rolled shapes and of plates of all dimensions shall be computed on the basis of their nominal masses as required by the dimensions shown on the approved shop drawings. If the Contractor, however, elects to use for his convenience, steel members with masses that are greater than the nominal masses specified on the approved drawings, the computations shall be based on the nominal mass values on the drawings. Deductions shall be made for copes, cuts and all holes except those holes required for high-strength bolts.

The mass of fillet welds shall be computed from the following:

<table>
<thead>
<tr>
<th>TABLE 564-1 MASS OF DEPOSITED METAL PER METER OF FILLET WELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Fillet (mm)</td>
</tr>
<tr>
<td>Deposited Metal (kg/m)</td>
</tr>
</tbody>
</table>

The masses of castings shall be computed from the dimensions shown on the approved shop drawings, with an addition of 10% for fillets and overrun.

The mass of high-strength bolts, nuts and washers, exclusive of grip, shall be computed from the following:

<table>
<thead>
<tr>
<th>TABLE 564-2 MASSES OF HIGH-STRENGTH BOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolt Diameter (mm)</td>
</tr>
<tr>
<td>Mass of 100 Bolts with Nut and 2 Washers (kg)</td>
</tr>
</tbody>
</table>

**NOTE** 1. Measured mass will be exclusive of grips.

**564-4.02 Each Unit.** Measurement will be made for each unit of structural steel as indicated on the contract plans. The provisions of §564-4.01, concerning castings, anchor bolts, forgings, fasteners, cable, and other metal parts, shall apply.

**564-4.03 Lump Sum.** No measurement will be taken. The provisions of §564-4.01 concerning castings, anchor bolts, forgings, fasteners, cable and other metal parts, shall apply.

**564-5 BASIS OF PAYMENT**

**564-5.01 General.** The price bid shall include the cost of furnishing all labor, materials and equipment necessary to complete the work. For the purpose of payment, castings, forgings, fasteners, anchor bolts for other than bridge bearing installation, cables and other metal parts used in the construction, will be considered to be structural steel, even if made of other materials.

Partial payment will be made for structural steel in accordance with §109-04 PARTIAL PAYMENTS.

**564-5.02 Additional Work.** Items that are included in the price bid and are the Contractor's responsibility are as follows:

**A. Shop Drawings, including Paper Prints and Reproducible Prints.** The cost of all
§564-5

shop drawings, prints and reproducible prints required by the specifications shall be included in the unit price bid for the payment item requiring the drawings.

Any prints and reproducible prints required beyond the number specified shall be furnished by the Contractor at cost.

**B. Laminar Defects at the Boundary of Tension Groove Welds.** The cost of all work and materials required for the correction or elimination of laminar defects at the boundary of tension groove welds shall be included in the price bid for structural steel.

The cost of all ultrasonic testing and repairs and the cost of replacement of defective portions of plates where partial replacement is approved shall be borne by the Contractor and included in the price bid for structural steel.

**C. Inspection of Bolted Connections.** All labor and equipment necessary for the performance of inspection of bolt tightness during structural steel fabrication and erection shall be provided by the Contractor and included in the price bid for structural steel. The State shall witness the bolt testing, but will not provide equipment or labor.

**D. Qualification Test for Welders, Welding Procedures and Electrode and Flux Combinations.** The cost of tests required to qualify welders, welding procedures and electrode and flux combinations shall be included in the unit price bid for the steel with the exception that the State will witness tests and perform Charpy V-Notch Impact Tests without cost to the Contractor.

**E. Radiographic Inspection.** The cost of radiographic inspection and of preparation for radiography, together with the cost of providing access and of furnishing adequate facilities for the review of radiographs in the shop or field, shall be included in the price bid for structural steel.

**F. Ultrasonic Inspection.** Ultrasonic inspection, when required, will be performed by the State or its representatives unless otherwise provided for in the contract documents. The cost of any required preparation and of furnishing access to the joints shall be included in the price bid for structural steel.

**G. Magnetic Particle Inspection.** The cost of magnetic particle inspection when specified or required by the inspector to verify limits of defects discovered during visual inspection shall be included in the unit price bid for structural steel.

**H. Repair of Defects in Welds and Base Metal.** The cost of repairing defects found by visual inspection or nondestructive tests shall be included in the unit price bid for structural steel.

**I. Field Inspection of Rejected Material or Material Not Offered for Shop Inspection even though Required to be Shop Inspected by the Contract Documents.** When the Department, at its discretion, permits inspection of the subject materials to be performed at the project site, all costs of this inspection shall be borne by the Contractor as a condition of the Department's approval of inspection of this material. All costs associated with the inspection of rejected material, which has been shipped to the field without approval, shall be borne by the Contractor.

**J. Straightening Bent Material and Correcting Camber Deficiencies.** All corrective work required to straighten bent material and correct camber deficiencies, when permitted, shall be performed at no additional cost to the State.

**K. Field Repair, Reaming and Drifting of Holes.** All work permitted for the correction of unacceptable holes shall be provided at the Contractor's expense.

**L. Metal Scuppers.** Metal scuppers shall be paid for as structural steel unless otherwise noted on the plans.
M. Adjustment and Alignment of Bearings. All labor, materials and equipment required for adjustment and alignment of bearings shall be included in the unit price bid for structural steel.

N. Field Splices. When the specific location for a bolted or welded field splice in stringers and girders is not shown on the plans, the Contractor will be permitted to introduce splices at locations of his choice. The splices shall be made in accordance with the provisions of the SCM. No payment will be made for labor, material, and equipment required to make a splice if the splice is not shown on the contract plans. Also, payment will not be made for increases in the thickness of webs or flanges made necessary by the requested splice.

O. Photographs. Photographs requested by the D.C.E.S. in accordance with the provisions of the SCM, shall be furnished at no additional cost.

P. Testing of Stock Steel. All labor, materials and equipment necessary to perform chemical and physical tests on stock steel when such tests are required shall be furnished by the Contractor and included in the price bid for structural steel.

Q. Heat-Curving and Cambering. All costs of nondestructive testing, repairs or replacement of material damaged due to over stressing or destructive heating during heat-curving or cambering shall be borne by the Contractor.

564-5.03 Progress Payments - Lump Sum. These shall be calculated by multiplying the lump sum price bid by the ratio which represents the structural steel members erected during the payment period in question. (Refer to §109-03). The ratio will be computed by dividing the shipping mass of the erected steel (obtained from the Report of Shipment of Structural Material, Form B & GC-4b) by the Total Mass for Progress Payments for the appropriate item. “The Total Mass for Progress Payments” will be indicated on the plans for use in determining Partial Payments and Progress Payments. Under no circumstances will the “Total Mass for Progress Payments” be used for final payment purposes. The Contractor is advised not to use the “Total Mass for Progress Payments” as a bidding tool. Discrepancies which may occur between the total mass shipped and the “Total Mass for Progress Payments”, as indicated on the plans, will not be a basis for additional compensation.

564-5.04 Other Work. Work not included in the unit price bid for the structural steel item is as follows:

A. Setting Anchor Bolts for Bridge Bearings. The pipe sleeves, anchor bolts and work required to furnish, set and grout the anchor bolts, shall be included in the price bid for the respective bearing item.

B. Vertical Load Transmitting Devices. The furnishing and installing of vertical load transmitting devices, such as; rubber impregnated random fiber pad, and plain rubber pad, shall be included in the price bid for the respective item.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>564.05XX M</td>
<td>Structural Steel (Type 1-16)</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>564.10nn M</td>
<td>Structural Steel Replacement</td>
<td>Kilogram</td>
</tr>
<tr>
<td>564.51nn M</td>
<td>Structural Steel</td>
<td>Kilogram</td>
</tr>
<tr>
<td>564.70nn M</td>
<td>Structural Steel Replacement</td>
<td>Each</td>
</tr>
</tbody>
</table>

NOTE: nn denotes serialized pay item, see §101-02 Definitions of Terms under "Specifications".
SECTION 565 - BRIDGE BEARINGS

565-1 DESCRIPTION. The work shall consist of furnishing, placing and setting bridge bearings at the locations indicated on the plans.

565-1.01 Bearing Types. There are various types of bearings. The specific type required will be indicated on the plans. Bearing types are:

A. Type S.R. - Steel Rocker Bearings. These accommodate rotation by pivoting around a pinned joint. They are fabricated in fixed and expansion versions. The expansion version accommodates longitudinal movement by means of a curved rocker rotating on the bearing surface. Steel rocker bearings do not allow for transverse movement. This type of bearing shall only be used in rehabilitation situations where only one or two bearings are to be replaced on a bridge.

B. Type S.S. - Steel Sliding Bearings. These accommodate rotation by means of a rocker. They are fabricated in fixed and expansion versions. The expansion version accommodates movement with a sliding element. Steel sliding bearings do not allow for transverse movement. This type of bearing shall only be used in rehabilitation situations where only one or two bearings are to be replaced on a bridge.

C. Type M.R. - Multi-Rotational Bearings. These accommodate rotation by the deformation of a confined elastomeric element, or an unconfined urethane disc. Multi-rotational bearings are fabricated in fixed and expansion versions. The expansion version accommodates movement by means of sliding elements. Expansion versions may be guided, allowing movement in only one direction, or non-guided, allowing multi-directional movement.

D. Type E.P. - Plain Elastomeric Bearings. These accommodate rotation by the deformation of a plain elastomeric pad. They may be used for both fixed and expansion applications without changes in details. The bearings will accommodate longitudinal, transverse, and rotational movements.

E. Type E.L. - Steel Laminated Elastomeric Bearings. These accommodate rotation by the deformation of a laminated elastomeric and steel pad. They may be used for both fixed and expansion applications without changes in details. The bearings will accommodate longitudinal, transverse, and rotational movements.

F. Type E.B. - Elastomeric Bearings with External Load Plates. These accommodate rotation by the deformation of a plain or steel laminated elastomeric pad. Elastomeric bearings with external load plates are fabricated in fixed and expansion versions. The fixed version will accommodate rotational movements. The expansion bearings will accommodate longitudinal, transverse, and rotational movements.

565-2 MATERIALS

565-2.01 General. Materials shall meet the following requirements:

Concrete Grouting Material 701-05
Plain Elastomeric Bridge Bearings 716-10
Steel Laminated Elastomeric Bridge Bearings 716-11
Cap Screws ASTM F835M or A574M
Elastomeric Bridge Bearings with External Load Plates 716-12
Disc Design Structural Bridge Bearings 716-06.01
Pot Design Structural Bridge Bearings 716-07.01
Anchor Bolts 723-60
Rubber Impregnated Woven Cotton Fabric 728-01
Rubber Impregnated Random Fiber Pad 728-02
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Plain Rubber Pad 728-03
Steel Anchor Dowel 709-01
Paint Department Approval List - Paints for Structural Steel

Note a. Steel anchor dowels shall meet the requirements of §709-01 - Bar Reinforcement.

565-2.02 Fabrication. Steel components of bridge bearings shall be fabricated in accordance with the applicable requirements of the NYS Steel Construction Manual (SCM). In addition, component parts of individual bearings shall meet fabrication details as shown in the contract documents.

A. Type S.R. Bearings. These shall conform to the plans and other contract documents.

B. Type S.S. Bearings. These shall conform to the plans and other contract documents.

C. Type M.R. Bearings. These shall conform to the requirements of either §716-06.01 or §716-07.01 as applicable, and other contract documents. When type M.R. bearings are specified, the Contractor may supply either disc design or pot design bearings. Only one bearing design, disc or pot, shall be supplied for any one bridge.

D. Type E.P. Bearings. These shall conform to the requirements of §716-10 and other contract documents.

E. Type E.L. Bearings. These shall conform to the requirements of §716-11 and other contract documents.

F. Type E.B. Bearings. These shall conform to the requirements of §716-12 and other contract documents.

565-2.03 Drawings. Shop drawings shall meet the requirements specified in the following:

- Type S.R. and S.S. Bearings SCM, Section 2
- Type M.R. Bearings 716-06.01 or 717-07.01
- Type E.L. Bearings 716-11
- Type E.B. Bearings 716-12

565-2.04 Protective Coatings

A. Machine finished surfaces in contact, including pins, pin holes, surfaces in sockets at the top of rocker bearings, and bronze or copper plates in sliding contact shall receive one coat of automotive grease as soon as machining is complete. None of these surfaces shall be painted.

B. Stainless steel and polytetrafluoroethylene surfaces shall not be painted or otherwise coated.

C. Metal to metal surfaces to be field welded shall be given a coat of clear lacquer or other protective coating approved by the Engineer, or Inspector, if exposure is to exceed three months prior to welding. The coating shall be removed at the time of welding. Painting, if required, will be done only after the completion of welding. Surfaces to be painted shall be primed and painted in accordance with §565-2.04D.

D. All other metal surfaces shall be cleaned to meet SSPC-SP6, Surface Preparation Specification No. 6 Commercial Blast Cleaning, and painted with three coats of paint. The paint (primer, intermediate and finish coat) shall be selected from the Department's Approved List, Paints for Structural Steel. All coats of paint used shall be produced by the same manufacturer and be applied at a rate sufficient to produce a minimum dry film thickness of 75 μm per coat. Each single paint coat shall be a color different from others. For bearings used in conjunction with painted steel the color of the finish coat shall be the same color as the finish coat of the structural steel. For bearings used in conjunction with unpainted steel, the color of the finish coat shall be a rusty brown color which is a reasonable visual match to Federal Color Standard No. 595, Color 20059.
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565-2.05 Shipping. Each bearing shall be shipped as an assembled unit, except for elastomeric bearings. Elastomeric bearings may be shipped in packages containing more than one bearing, provided the package can be handled with normal construction equipment. Bearings shall be packaged in such a manner to protect all rotating and sliding surfaces from the intrusion of outside material. Type M.R. Bearings shall be shipped precompressed to 3.45 MPa.

565-3 CONSTRUCTION DETAILS

565-3.01 Concrete Bearing Surface Elevations

A. General. The elevation of the concrete bearing surface for all types of bearings, except Type M.R. bearings, shall be as given on the plans.

B. Type M.R. Bearings. The elevation of the concrete bearing surface may vary from that given on the plans depending on the vertical dimension of the actual bearing supplied. The Contractor shall notify the Engineer of all required elevation changes. Changes to the roadway profile will not be allowed. All elevation adjustments necessary to maintain the profile shall be made to the concrete bearing surfaces. Any adjustments, including changes to the reinforcement, will be made at no additional cost to the State.

565-3.02 Concrete Bearing Surface Preparation. No bearing shall be placed upon a concrete bearing surface which is deformed, irregular, or poorly finished. The entire bearing surface area shall be floated and troweled.

565-3.03 Setting Anchor Bolts. Anchor bolts shall be set as shown on the plans unless changes are permitted by the D.C.E.S. If anchor bolts are cast in substructure concrete, templates, or other suitable means, shall be used to keep the bolts vertical at the required embedment and in the correct horizontal position during concrete placement. If the Contractor elects to drill the finished, cured concrete in order to set the anchor bolts, the reinforcing steel shall be positioned prior to casting the concrete so that it will not be damaged during drilling. If anchor bolts are drilled and grouted, material and construction details shall be in conformance with §586-2 and §586-3.

565-3.04 Bearing Pad Installation. Bearing pads placed between concrete, or other masonry, and steel masonry plates shall be located to correct alignment and elevation, and placed at the time of masonry plate installation. Bearing pads shall conform to §728-01, §728-02, or §728-03 at the Contractor's option. Each bearing pad shall be the same size in plan as the masonry plate it supports. Holes to accommodate anchor bolts shall be cleanly and accurately cut prior to bearing pad placement.

565-3.05 Bearing Installation and Alignment

A. Type S.R. and Type S.S. Bearings

1. General
   a. The centerline of sole plates or fixed portions of bearing assemblies attached to the structural steel shall not be offset from the centerline of bearing stiffeners or diaphragm connection plates by more than one-half the thickness of the flange at that location, or the thickness of the bearing stiffener or connection plate, whichever is the lesser distance.
   b. The bearing shall be cleaned and regreased with automotive grease at the time of installation.

2. Fixed. No additional requirements apply.

3. Expansion. These may vary from perfect alignment. Therefore, expansion bearings shall be set in accordance with the following.
   a. Type S. R. Bearings

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(1) The bearing shall be set vertical under full dead load at an ambient temperature of 20°C.

(2) The maximum variation from perfect alignment is a function of the bearing height. The bearing height is the distance between the upper and lower contact surfaces of the movable portion of the bearing. For bearings with a height of 510 mm or less, the maximum variation from perfect alignment, taking into account the effect of temperature and load at the time of measurement, shall be calculated by the following formula:

\[ M = \pm (13 \text{ mm} + (L/356,000)) \]

where "M" = maximum variation from perfect alignment measured as the horizontal distance between the centerline of the cap plate and the centerline of the masonry plate in millimeters and "L" = total expansion length in millimeters between the centerline of the movable bearing being considered and the centerline of the fixed bearing, from which motion must progress. Such variations shall not exceed 25 mm offset, or a five degree rotation of the movable portion of the bearings from the required alignment, whichever is less.

The maximum variation of all bearings having a height exceeding 510 mm shall be approved on an individual basis by the D.C.E.S.

(3) No bearing adjustments shall be made until the completed structural slab has been in place for at least seven curing days. Any adjustments needed to meet the above requirements may require jacking the superstructure. All adjustments shall be accomplished according to a written procedure submitted by the Contractor for D.C.E.S. approval. All adjustments shall be made at no additional cost to the State.

b. Type S.S. Bearings

(1) The sliding plate shall be centered on the masonry plate under full dead load at an ambient temperature of 20°C.

(2) The maximum variation from perfect alignment between the centerlines of the fixed and movable portions of the bearing device, taking into account the effect of temperature and load at the time of measurement, shall not exceed plus or minus 13 mm longitudinally. This variation shall be measured as the horizontal distance between the centerline of the sliding plate and the centerline of the masonry plate. The movable portion of the bearing device shall be fully supported by the fixed portion under all temperature and loading conditions.

(3) No bearing adjustments shall be made until the completed structural slab has been in place for at least seven curing days. Any adjustments needed to meet the above requirements may require jacking the superstructure. All adjustments shall be accomplished according to a written procedure submitted by the Contractor for D.C.E.S. approval. All adjustments shall be made at no additional cost to the State.

B. Type M.R. Bearings

1. General. The centerline of sole plates or other fixed portions of bearing assemblies attached to the structural steel shall not be offset from the centerline of bearing stiffeners or diaphragm connection plates by more than one-half the thickness of the flange at that location, or the thickness of the bearing stiffener or connection plate, whichever is the lesser distance.

2. Fixed. No additional requirements apply.

3. Expansion. These may vary from perfect alignment. Therefore expansion bearings shall be set in accordance with the following:

a. The sliding plate shall be centered on the masonry plate under full dead load at an ambient temperature of 20°C.
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b. The maximum variation from perfect alignment between the centerline of the fixed and movable portions of the bearing device, taking into account the effects of temperature and load at the time of measurement, shall not exceed plus or minus 25 mm longitudinally unless otherwise indicated on the plans. This variation shall be measured as the horizontal distance between the centerline of the sliding plate and the centerline of the masonry plate.

c. No bearing adjustments shall be made until the completed structural slab has been in place for at least seven curing days. Any adjustments needed to meet the above requirements may require jacking the superstructure. All adjustments shall be accomplished according to a written procedure submitted by the Contractor for D.C.E.S. approval. All adjustments shall be made at no additional cost to the State.

C. Type E.P. and Type E.L. Bearings

1. General

a. These bearings are designed to function properly provided that minimum distortion occurs along the beam axis under full dead load at an ambient temperature of 20°C. Elastomeric bearings shall be installed when the ambient temperature is between 5° and 26°C inclusive. The Contractor may elect to install the bearings when the ambient temperature is outside of the allowable range, provided the Contractor submits, and receives D.C.E.S. approval, of an installation procedure that either resets the bearings when the temperature is in the allowable range or deforms the bearings so that they perform as if they were installed at 20°C.

b. For prestressed concrete superstructures, the bearing shall be anchored to establish the fixed end of the bridge as soon as possible after stringer erection. For adjacent prestressed box beams, or prestressed slab superstructures, the anchorage shall be completed prior to filling the shear keys. The method of anchorage shall be in accordance with the details shown on the plans. Anchor dowel holes shall be core drilled to the nominal size and depth and at the locations required by the plans. In lieu of core drilling, the Contractor may submit an installation procedure that incorporates the use of either preset anchor bolts or pipe sleeves to the D.C.E.S. for approval. Prior to placing the anchor dowel, the hole shall be inspected and approved for filling by the Engineer. Fill material shall be in accordance with the details on the plans.

2. Fixed. No additional requirements apply.

3. Expansion

a. These may vary from perfect alignment. The maximum variation from perfect alignment under full dead load shall not exceed the value shown on the plans. This variation shall be measured as the horizontal distance between the centerline of the highest elastomer surface and the centerline of the lowest elastomer surface.

b. No bearing adjustments shall be made until the completed structural slab has been in place for at least seven curing days. Any adjustments needed to meet the above requirements may require jacking the superstructure. All adjustments shall be accomplished according to a written procedure submitted by the Contractor for D.C.E.S. approval. All adjustments shall be made at no additional cost to the State.

D. Type E.B. Bearings

1. General

a. The centerline of sole plate or other fixed portions of bearing assemblies, attached to steel stringers, shall not be offset from the centerline of bearing stiffeners of diaphragm connection plates by more than one-half the thickness of the flange at that location, or the
thickness of the bearing stiffener or connection plate, whichever is the lesser distance.  

b. These bearings are designed to function properly provided that minimal distortion occurs along the beam axis under full dead load at an ambient temperature of 20°C. Elastomeric bearings shall be installed when the ambient temperature is between 5°C and 26°C inclusive. The Contractor may elect to install the bearings when the ambient temperature is outside of the allowable range, provided the Contractor submits, and receives D.C.E.S. approval, of an installation procedure that either resets the bearings when the temperature is in the allowable range or deforms the bearings so that they perform as if they were installed at 20°C.

2. **Fixed.** No additional requirements shall apply.

3. **Expansion**

   a. These may vary from perfect alignment. The maximum variation from perfect alignment under full dead load shall not exceed the value shown on the plans. This variation shall be measured as the horizontal distance between the centerline of the highest elastomer surface and the centerline of the lowest elastomer surface.

   b. No bearing adjustments shall be made until the completed structural slab has been in place for at least seven curing days. Any adjustments needed to meet the above requirements may require jacking the superstructure. All adjustments shall be accomplished according to a written procedure submitted by the Contractor for D.C.E.S. approval. All adjustments shall be made at no additional cost to the State.

565-3.06 **WELDING**

**A. Type S.R. Bearings.** Bearings shall be welded permanently to the structural steel only after all necessary adjustments have been made. All welding shall be done in accordance with the requirements of the SCM. The Contractor shall submit a Welding Procedure Specification to the D.C.E.S. No welding shall be performed until the manufacturer receives an approved Welding Procedure Specification.

**B. Type S.S. Bearings.** The requirements of §565-3.06A shall apply.

**C. Type M.R. Bearings.** The requirements of §565-3.06A shall apply except that during field welding operations the temperature of the steel adjacent to the rotational element shall not exceed 90°C. Temperature shall be controlled by welding procedures and monitored using temperature indicating crayons, or other devices. Procedures, crayons, and other devices shall be acceptable to the Engineer. If the temperature limit is exceeded, the D.C.E.S. and the Director, Materials Bureau shall be immediately notified. The D.C.E.S. will provide the proper repair procedure, which may include complete replacement of the bearing. All repair work shall be done at no additional cost to the State.

**D. Type E.B. Bearings.** The requirements of §565-3.06A and §565-3.06C shall apply.

565-3.07 **Grouting Anchor Bolt Holes.** All slotted anchor bolt holes in masonry plates shall be filled with concrete grouting material to the top edge of the hole. All excess grout material shall be cleaned from the bearing surfaces in a manner satisfactory to the Engineer. Slotted anchor bolt holes in fixed bearings may be filled any time subsequent to stringer placement. Slotted holes in expansion bearings shall be filled only after all necessary bearing adjustments have been made.

565-3.08 **Final Verification.** Prior to final acceptance of the bridge, the Engineer will verify that all necessary adjustments have been made; that all steel bearings, or external load plates, are permanently welded or attached with cap screws to the superstructure steel as shown on the contract plans; that all
§565-3

slotted holes are completely filled with grout; that all anchor bolts are firmly tightened; and that all other work required to make the bearings completely functional has been completed.

565-4 METHOD OF MEASUREMENT. Measurement will be taken as the number of bearings installed in accordance with the Contract Documents.

565-5 BASIS OF PAYMENT. The unit price bid for each bearing shall include the cost of all labor, materials, equipment and adjustment necessary to complete the work. All material between the bottom of the superstructure, and the top of the substructure, including anchor bolts and sole plates, shall be included in the price bid for this item.

565-5.01 Progress Payments

A. Type S.R. Bearings

1. Eighty percent of the quantity will be paid for after the bearing is installed.
2. The remainder of the quantity will be paid for after the bearing is aligned as required.

B. Type S.S. Bearings. The requirements of §565-5.01A shall apply.

C. Type M.R. Bearings. The requirements of §565-5.01A shall apply.

Payment will be made under:

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SECTION 566 - MODULAR EXPANSION JOINT SYSTEMS

566-1 DESCRIPTION. The work shall consist of fabricating, furnishing, and installing a modular expansion joint system at the locations indicated on the Contract Plans.

566-1.01 Modular Joint Systems. Modular expansion joint systems are manufactured in various sizes, defined by their total movement capability. The correct movement capability required at any one location is indicated on the Contract Plans.

566-1.02 Sealing Elements. On each individual structure, all the box seals used in the modular joints shall be of the same configuration and shall be from the same manufacturer.

566-1.03 Modular Joint System Suppliers

A. Multi-cell Modular Joint Systems. Only firms which appear on the Department’s Approved List will be acceptable suppliers. No supplier other than those listed will be considered.

B. One Cell Modular Joint Systems. Firms that do not appear on the Department’s Approved List may supply one cell Modular Joint Systems. Firms which appear on the Department’s Approved List will also be acceptable suppliers.

566-1.04 Terminology. The following terminology will be used throughout this section:

A. Joint System. This term is used to describe the installation with all of its component parts as installed in the structure slab, and if applicable in sidewalks, barriers and other bridge components.

B. Segment. A modular joint system manufactured at less than full roadway width. No segment shall be less than a single lane width long.

C. Joint. The separation between two elements of a bridge to allow for movement.

566-2 MATERIALS. Materials shall conform to the following requirements.

566-2.01 Modular Joint System. The modular joint system and all its component parts, including stiffening plates and anchorages, shall be supplied by the Manufacturer. The Manufacturer shall certify that the following components meet the listed requirements:

- Hollow Beams, Steel Extrusions and Milled Steel Shapes: ASTM A588M
- Box Seals: 705-09a
- Strip Seal: ASTM D2628b
- Adhesive: 567-2.02A6
- Stud Shear Connectors and Threaded Studs: 709-05
- Connecting and Sliding Plates - 10 mm Thickness: ASTM A588M
- Parapet Cover Plates - 13 mm Thickness: ASTM A36Mc

Notes:

a. Shape approval by the Director of Materials is not required. Hardness, Type A Durometer shall be 60 + 5; ASTM Method D2240. A 1 meter sample of the seal shall be submitted for testing to the Materials Bureau. No splices shall be permitted in permanent seals for any reason whatsoever.

b. Recovery test not required.

c. Parapet Cover Plates shall be Galvanized in accordance with §719-01, Type I.

566-2.02 Shop Drawings

A. Shop Drawings shall be required for any joint system supplied as part of this work. Shop Drawings shall be prepared and reviewed in accordance with the applicable provisions of the SCM and this Specification and submitted to the D.C.E.S. for approval. All Shop Drawings shall note the name and address of the Joint System Fabricator, including the actual location (address) where the
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fabrication will take place.

B. The Modular Joint System Manufacturer's instructions for the proper installation of the joint system shall be entered on the Shop Drawings. Manufacturer's instructions shall include the proper width settings for various ambient temperatures. Shop Drawings which lack Manufacturer's installation instructions shall be returned without examination.

C. Filler metal shall be qualified in accordance with Section 7 of the SCM. Welding Procedure Specifications (WPS) shall be submitted for approval to the DCES with the Shop Drawings for each combination of joint type and welding process shown on the Shop Drawings. Shop Drawing Approval shall be withheld until this requirement has been met.

566-2.03 Fabrication

A. All steel fabrication (shop and field) shall be done in accordance with the requirements of the SCM. Mill inspection of the steel will not be required.

B. All metal surfaces to come in contact with the neoprene sealer shall be blast cleaned in accordance with the requirements of Steel Structures Painting Council Surface Preparation No. 6 (SSPC-SP6) - Commercial Blast Cleaning. After cleaning, all cleaned surfaces shall exhibit a clean quality of CSP6, or better, as defined by Steel Structures Painting Council Standard SSPC Vis 1.

C. The cleaned metal surfaces shall be protected from rusting until such a time as the sealer, and lubricant adhesive are placed against the metal surface. Any cleaned metal surface upon which rusting appears shall be recleaned in accordance with the foregoing, at no additional expense to the State.

D. The curb and parapet sliding plates, if required, shall be shop assembled to fit the modular joint system. The plates may be disassembled from the joint system for shipment to the project site.

E. Unless otherwise noted, each modular expansion joint system shall be fabricated as a single entity. It shall fit the full width of the structure as indicated on the Contract Plans. The system shall be preset by the Manufacturer prior to shipment. Presetting shall be done in accordance with the joint opening at 20°C. The joint opening will be indicated on the Contract Plans. Should the plans indicate that segmental fabrication is permissible, or required, each segment shall be fabricated to exactly fit that portion of the superstructure under construction, including sidewalks. Segments shall be fitted with temporary seals. Temporary seals will not require lubricant adhesive.

F. Shop inspection shall be conducted at the discretion of the Department.

566-2.04 Acceptance. The fabricated joint system will be accepted at the work site by the Engineer after a visual inspection and upon receipt of the Manufacturer's Certification Report (MCR) that the materials and the fabricating procedures were in accordance with the Approved Shop Drawings and this Specification. The Manufacturer shall submit, with the MCR, a Certified Copy of the Mill Test Report (MTR) for all steel used to fabricate the joint system.

566-3 CONSTRUCTION DETAILS

566-3.01 Manufacturer's Representative. During the initial stages of the joint system installation the Contractor shall have present at the installation site a Representative of the Joint System Manufacturer. This person shall be competent in all respects regarding the proper installation procedures to be used. The Representative shall advise the Contractor of, and certify to the Engineer that, the proper procedures are being followed. All certifications to the Engineer shall be in writing. A Manufacturer's Representative is not required for One Cell Modular joint Systems.
§566-3

566-3.02 Field Inspection. Immediately prior to installation, the joint system shall be inspected by the Engineer, for proper alignment, and complete bond between the neoprene sealer and the steel, and proper stud placement and effectiveness. No bends or kinks in the joint system steel shall be allowed (except as necessary to follow the roadway grades). Nor shall the straightening of such bend or kinks be allowed. Any joint system exhibiting bends or kinks shall be removed from the work site, and replaced by a new joint system, at no additional cost. Neoprene sealer not fully bonded to the steel shall be fully bonded at the expense of the Contractor. Studs shall be inspected visually, and shall be forgiven a light blow with a hammer. Any stud which does not have a complete end weld, or does not emit a ringing sound when struck a light blow with a hammer, shall be replaced. Studs located more than 25 mm, in any direction, from the location shown on the Shop Drawings, shall be carefully removed and a new stud placed in the proper location. All stud replacements shall be at no additional cost.

566-3.03 Installation

A. Manufacturer's Instructions. The modular expansion joint system shall be installed in strict accordance with the Manufacturer's instructions, and the advice of their Official Representative. Two weeks prior to the intended installation, the Engineer shall be supplied with two copies of the written instructions. The permanently installed joint system shall match exactly the finished roadway profile and grades. The words “permanently installed”, shall be interpreted to mean that any work necessary to be done to any other part of the structure, in order to achieve a truly complete permanent installation, has been done. This will apply even if the other work is to be paid for under other items of the Contract.

B. Joint System Width, Splices, and Installation Equipment. The modular expansion joint system shall be set to the proper width for the ambient temperature at the time of setting, as indicated on the Shop Drawings. If the joint system has been fabricated in segments, they shall be field spliced to create a single unbroken system.

All mechanical devices, supplied by the Joint System manufacturer, used to set the joint system to the proper width, will remain the property of the Manufacturer. When no longer required, the devices shall be returned to the Manufacturer.

C. Sliding Plate. In order to perform the work of installing the joint systems in a proper manner, some portions of the curb and parapet cannot be constructed until after the sliding plates of the joint system are installed. At such times that the necessary concrete is placed (after joint system plate installation), existing surfaces shall receive a coating of Portland Cement Bonding Grout (705-22) immediately prior to concrete placement. The cost of the grout shall be included in the unit price bid for the concrete.

D. Permanent Seals. After the joint system has been completely installed over the full width of the structure, including sidewalks, the temporary seals shall be removed and replaced with permanent seals. After the temporary seals are removed, all metal surfaces which will be in contact with the permanent seals shall be commercially blast cleaned (SSPC-SP6) to visual standard CSP6 as defined by SSPC Vis 1-89.

E. Final Placement. After the modular joint system has been set to its final line and grade, the recess opening shall be filled with Class E Concrete. Prior to concrete placement, all existing concrete surfaces shall be coated with Portland Cement Bonding Grout (705-22). The uppermost surface of the concrete placement shall be finished in accordance with the requirements of Section 557 except that machine finishing will not be required. The cost of this work, including grout placement, shall be included in the unit price bid for the slab item(s).

F. Watertight Integrity Test. After the joint system is permanently installed, including plates and all concrete placements, a watertight integrity test shall be performed. The test shall be done in accordance with the requirements of §567-3.01H.
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566-4 METHOD OF MEASUREMENT. The work will be measured as the number of meters of joint system completely installed. Measurement will be taken horizontally and vertically along the centerline of the joint system between the outer limits indicated on the Contract Plans. The words “completely installed” shall be interpreted to mean the joint system in-place with the following operations completed, where applicable:

- Nuts tightened, or retightened, as required.
- Concrete placed and finished.
- Watertight integrity tests performed.

566-5 BASIS OF PAYMENT

566-5.01. The unit price bid per meter shall include the cost of all labor, materials and equipment necessary to complete the work.

566-5.02. No payment will be made for any work noted to be done at the expense of the Contractor, or any work noted to be paid for under other items of the Contract.

Payment will be made under:

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SECTION 567 - ARMORED BRIDGE JOINT SYSTEMS

567-1 DESCRIPTION. The work shall consist of furnishing and installing armored bridge joint systems. The particular bridge joint system required will be indicated on the contract plans.

567-1.01 Bridge Joint Systems. There are various kinds of armored bridge joint systems. Those included as part of the work required by this section are:

A. Armored Joint System with Elastomeric Sealer. The system shall consist of armored joint segments, angles, anchor studs, threaded studs, bolts, nuts, lock washers, expansion bolt anchors, and sealant, all combined as noted in the contract documents so that a fully operational and waterproof system shall seal the joint in which it is installed.

B. Armored Joint System with Compression Seal. This system shall consist of angles, preformed compression seal, anchor studs, threaded studs, bolts, nuts, lock washers all combined as noted in the contract documents so that a fully operational and waterproof system shall seal the joint in which it is installed. The system shall provide for the full expansion and contraction movements of the joint.

This system is fabricated as a single entity designed to be installed across the full width of the bridge as measured along the centerline of joint. If the bridge in question has a raised median, one field splice of the joint system will be allowed at the raised median.

Type. Preformed compression seals are manufactured in various type sizes, defined by a literal-numerical type designation (e.g. Type A1, etc.). The type of seal to be installed in any one armored joint system will be indicated on the contract plans.

C. Armored Joint System with Preformed Elastic Strip Seal. This system shall consist