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:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>566.01 M</td>
<td>Modular Expansion Joint System - One Cell</td>
<td>Meter</td>
</tr>
<tr>
<td>566.02 M</td>
<td>Modular Expansion Joint System - Two Cell</td>
<td>Meter</td>
</tr>
<tr>
<td>566.03 M</td>
<td>Modular Expansion Joint System - Three Cell</td>
<td>Meter</td>
</tr>
<tr>
<td>566.04 M</td>
<td>Modular Expansion Joint System - Four Cell</td>
<td>Meter</td>
</tr>
<tr>
<td>566.05 M</td>
<td>Modular Expansion Joint System - Five Cell</td>
<td>Meter</td>
</tr>
<tr>
<td>566.06 M</td>
<td>Modular Expansion Joint System - Six Cell</td>
<td>Meter</td>
</tr>
</tbody>
</table>

SECTION 567 - ARMOURED BRIDGE JOINT SYSTEMS

567-1 DESCRIPTION. The work shall consist of furnishing and installing armoured 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 armoured 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 armoured 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 armoured joint system will be indicated on the contract plans.

C. Armored Joint System with Preformed Elastic Strip Seal. This system shall consist
of structural steel components, angles, anchor studs, threaded studs, bolts, nuts, washers, lock washers, anchor bolts, preformed elastic strip seal and adhesive, all combined in the manner required by the Contract Documents so that a fully operational, waterproof system will seal the joint over which it is installed. Armored joint systems of this nature are installed by various methods. The required method for a particular installation will be indicated on the Contract Plans.

**Type.** Preformed elastic strip seals are manufactured in various sizes, defined by a type number. The type of strip seal to be installed in any one joint system will be indicated on the Contract Plans.

### 567-1.02 Terminology

The following terminology will be used throughout this section:

**A. Armored Joint System.** This term is used to describe the installation with all of its component parts as installed in the structure slab. Terminology used to differentiate one kind of joint system from another will be found in the title of the various sub-sections (e.g. 567-2.01 Armored Joint System with Elastomeric Sealer, etc.)

**B. Segment.** An armored 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 structure to allow for movement.

### 567-2 MATERIALS

Material and Fabrication requirements shall be as described for the various bridge joint systems.

#### 567-2.01 Armored Joint System with Elastomeric Sealer

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elastomer (Polychloroprene or Natural Rubber)</td>
<td>Table 567-1</td>
</tr>
<tr>
<td>Structural Steel Segment Angles</td>
<td>ASTM A242M and 715-01, or ASTM A36M</td>
</tr>
<tr>
<td>Headed Concrete Anchor Studs and Threaded Studs (Dimensions as shown on the contract plans)</td>
<td>709-05</td>
</tr>
<tr>
<td>Bolts, Nuts and Washers Steel</td>
<td>ASTM F568 Class 4.6 or ASTM A325M</td>
</tr>
<tr>
<td>Expansion Bolt Anchor Steel</td>
<td>U.S. Government GSA FF-S-325</td>
</tr>
<tr>
<td>Bonding Tape (to bond end surfaces of the preformed elastomeric joint sealer to each other)</td>
<td>Group III, Type 1 or Group VIII, Type 1 Fed. Spec MIL C 18969a, Type II, Class B Polyisobutylene-based extrusion, with aggressive tack</td>
</tr>
</tbody>
</table>

**A. Physical Composition.** Armored segments shall be comprised of elastomer or natural rubber, and structural steel components in the manner indicated on the contract plans.

**B. Length.** Armored segments shall be furnished in lengths not less than a single lane width, excluding length of tongues. Shorter lengths may be used at locations requiring special treatment or to provide the closing sections.

**C. Steel Fabrication.** All steel fabrication work shall be done in accordance with the requirements of the SCM. Mill inspection will not be required. Shop inspection will be conducted at the discretion of the Department.

**D. Cleaning.** The surface of the armored joint segment, to which the preformed elastomer is to be heat bonded, shall be thoroughly cleaned of all dirt, oil, grease, scale and oxides by grinding or sandblasting immediately prior to the heat bonding process. The metal surface after cleaning shall be defined by SSPC Vis 1-89 Pictorial Standard, and shall meet the requirements of SSPC-SPC-6, Commercial Blast Cleaning, but shall not be of a quality less than CSP6.
TABLE 567-1 ELASTOMER MATERIAL REQUIREMENTS

<table>
<thead>
<tr>
<th>Property</th>
<th>ASTM Test</th>
<th>Polychloroprene</th>
<th>Natural Rubber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>D412</td>
<td>12.5 MPa</td>
<td>15.5 MPa</td>
</tr>
<tr>
<td>Tensile Elongation at break</td>
<td>D412</td>
<td>400 percent minimum</td>
<td>400 percent minimum</td>
</tr>
<tr>
<td>Hardness, Shore A Durometer</td>
<td>D2240</td>
<td>45 (±5)</td>
<td>50 (±5)</td>
</tr>
<tr>
<td>Compression Set (22 hrs at 70°C)</td>
<td>D395 Method B</td>
<td>20 percent maximum</td>
<td>20 percent maximum</td>
</tr>
<tr>
<td>Low Temperature</td>
<td>D746 Procedure B</td>
<td>Not brittle at -40°C</td>
<td>Not brittle at -54°C</td>
</tr>
<tr>
<td>Oil Deterioration (Volume increase after immersion in ASTM Oil No. 3 for 70 hrs @ 100°C)</td>
<td>D471</td>
<td>120 percent maximum</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

E. Basis of Acceptance. All materials used for this item, regardless of whether they are employed for fabrication or installation, shall be accepted at the work site upon certification, by the proper manufacturer, that all of the requirements of the contract documents have been met.

567-2.02 ARMORED JOINT SYSTEM WITH COMPRESSION SEAL

Compression Seal 705-09
Angles, Plates and Bars (Structural Steel) ASTM A242M, A588M², 715-01 and SCM
Headed Concrete Anchor Studs and Threaded Studs Dimensions as shown on the contract plans 709-05
Bolts, Nuts and Washers ASTM A568 Class 4.6 or ASTM A325M
Support Bar for the compression seal ASTM A242M, AISI 1018 or AISI 1020⁴
Expansion Bolt Anchors U.S. Government GSA FF-S-325
Adhesive (to bond the preformed compression seal to the steel surfaces) Table 567-2, Moisture Curing Urethane with hydrocarbon solvent

NOTES:
1. The sealer shall be applied in one piece for the full length of each joint. Splices will not be permitted if the full length of joint is less than 15 m. If the full length of joint is more than 15 m, but less than 30 m long, one shop splice in the sealer will be permitted. If the full length of joint is greater than 30 m, shop splices in the sealer will be permitted at approximately 15 m intervals.
2. Support angles may be ASTM A36M.
3. If AISI 1018 or AISI 1020 steel is used it shall be painted in accordance with the requirements of the contract documents.

TABLE 567-2 MOISTURE CURING URETHANE ADHESIVE¹

<table>
<thead>
<tr>
<th>Average weight per liter</th>
<th>0.96 kg ± 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solids Content</td>
<td>72% - 74% by Weight</td>
</tr>
<tr>
<td>Adhesive to remain fluid, from</td>
<td>-15°C to 50°C</td>
</tr>
<tr>
<td>Film Strength (ASTM D412)</td>
<td>8.5 MPa</td>
</tr>
<tr>
<td>Elongation</td>
<td>350%</td>
</tr>
</tbody>
</table>

A. Assembly. The joint system shall be shop assembled and delivered to the work site ready for installation.

If the Contractor desires to assemble the joint system at the work site, prior permission to do
so must be obtained from the D.C.E.S.

Joint systems assembled at the work site shall have all materials certified by the respective manufacturers that the respective materials meet the requirements of §567-2.02A. Field methods of fabrication shall be in accordance with the requirements of this subsection.

B. Procedures. Steel fabrication shall be done in conformance with the requirements of the SCM. Mill inspection will not be required. Shop inspection will be conducted at the discretion of the Department.

C. Cleaning. Metal surfaces which are to be coated with adhesive shall be cleaned in accordance with Steel Structures Painting Council, Surface Preparation No. 6, Commercial Blast Cleaning (SSPC SP6) with the following modifications and additions:

1. The cleaned surfaces shall have adhesive applied before detrimental rusting occurs.

2. A commercial blast cleaned surface shall be as defined by SSPC SP6 and SSPC Vis 1-89 pictorial references BSP6 and CSP6 only.

D. Basis of Acceptance. The armored joint system with preformed compression seal will be accepted at the work site upon certification to the Engineer by the Contractor, that the materials used and the fabricating procedures were in accordance with this specification.

The certification shall include the name of the sealer manufacturer, the lot numbers of all sealers used in the fabrication of the armored joint system and the statement that all sealer used in the fabrication of the armored joint system was appropriately identified as accepted materials by the presence of Department security seals when received by the fabricator.

§567-2.03 Armored Joint System with Preformed Elastic Strip Seal. Since there are various methods of installing the joint system, all of the materials listed in this Subsection may not be applicable for a particular installation. It is the Contractor's responsibility to ensure that only those materials necessary are actually installed, where required, or as specified on the Approved Shop Drawings.

<table>
<thead>
<tr>
<th>Material</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angles, Plates, Extrusions and Milled Shapes</td>
<td>ASTM A588M and 715-01</td>
</tr>
<tr>
<td>Headed Concrete Anchor Studs and Threaded Studs (Dimensions indicated on the Contract Plans)</td>
<td>709-05</td>
</tr>
<tr>
<td>Bolts and Nuts</td>
<td>ASTM A307M or A325M.</td>
</tr>
<tr>
<td>Anchor Bolts</td>
<td>ASTM F568 Class 4.6</td>
</tr>
<tr>
<td>Anchor bolt grout</td>
<td>701-07</td>
</tr>
<tr>
<td>Preformed Elastic Strip Seal</td>
<td>ASTM D2628 modified¹</td>
</tr>
<tr>
<td>Adhesive (to bond the strip seal to the steel surfaces)</td>
<td>Table 567-2, Moisture Curing Urethane with Hydrocarbon Solvent</td>
</tr>
<tr>
<td>Concrete²</td>
<td>501, Class E</td>
</tr>
<tr>
<td>Bonding Grout</td>
<td>705-22</td>
</tr>
<tr>
<td>Elastomeric Concrete²</td>
<td>Contract Documents</td>
</tr>
</tbody>
</table>

NOTES:
1. Recovery Test is not required. The sealer shall be supplied in one piece for the full length of each joint.
2. Concrete and Elastomeric Concrete, if used, shall be placed and paid under a separate item.

A. Steel Fabrication. Steel fabrication shall be done in conformance with the requirements of the SCM. Mill inspection will not be required. Shop inspection will be conducted at the discretion of the Department.

B. Cleaning. Metal surfaces which are to be coated with adhesive shall be thoroughly cleaned of all dirt, oil, grease, scale and oxides by grinding or sandblasting. Metal surfaces after cleaning shall exhibit a clean quality of CSa2, or better, as defined by the Steel Structures Painting Council Standard SSPC Vis1.

C. Adhesive Coating. The recess of the steel extrusions shall be thoroughly coated with
§567-2

adhesive. The strip seal shall be installed within the recess in such a manner that it will be completely and firmly bonded to the recess surface over the total length of the joint system.

D. Basis of 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.

567-2.04 Shop Drawings. Shop drawings will be required for any joint system supplied as part of this work. Shop drawings shall meet the various applicable requirements of this subsection. All shop drawings shall note the name and address of the joint system (or segment) fabricator as well as the location where the joint system (or segments) are to be fabricated.

A. General. The applicable provisions of Section 2-Drawings, of the New York State Steel Construction Manual shall apply with the following modifications

1. Shop Drawings. Shop drawings shall be submitted for review, approval and distribution in accordance with the requirements of the SCM, Section 2. The shop drawings shall indicate the type, location and details of the mechanical devices required to compress the joint to its required width based on the ambient temperature at the time of installation. All references, within Section 2 to the DCES, shall be interpreted as the Regional Director, with the following exceptions:
   • 202.7 - Distribution of Approved Shop Drawings.
   • 202.8 - Disposal of Original Reproducibles.

   No shop drawing approval will be issued for shop drawings unaccompanied by current WPS(s). No shop work shall begin prior to the Contractor's receipt of approved shop drawings.

2. Welding Procedure Specifications. The Contractor shall submit with the shop drawings a Welding Procedure Specification (WPS), approved by the DCES for each combination of joint system type and welding process shown on the shop drawings.

   The WPS approval date shall be within 36 months of the joint system fabrication date. A submitted WPS showing an approval date earlier than 36 months prior to joint system fabrication will be rejected and the Contractor shall be required to submit shop drawings accompanied by a currently approved WPS(s). No extension of time, nor additional payment will be forthcoming for delays caused by the Contractor's failure to submit current WPS(s).

567-3 CONSTRUCTION DETAILS. The construction details shall be as required for the various joint systems and the approved shop drawings.

567-3.01 Armored Joint System with Elastomeric Sealer

A. Manufacturer's Representative. The joint system shall be installed in strict accordance with the manufacturer's instructions and this subsection. In the event of a conflict, the terms of this subsection shall rule. A representative of the manufacturer shall be present at the beginning of the installation. The representative shall be fully conversant in all respects with the correct installation methods. The representative shall be responsible to advise both the Engineer and the Contractor, that the proper installation method is being followed.

B. Preparation. The preformed recess which is to receive the joint system shall be air blown or vacuum-cleaned in order that all loose or foreign matter is removed prior to installation of the system.

C. Storage Inspection and Handling. The joint system shall be stored, inspected and handled in accordance with the following:
1. Handling and Storing. All material shall be handled and stored in a manner approved by the Engineer, and consistent with the requirements of the SCM. No material shall be dropped, thrown, or dragged upon the ground. Material shall be kept clean, properly drained and stored on proper supports above the ground. All material shall be adequately shored, braced, or clamped to resist lateral forces which might occur. Permanent distortion will be cause for rejection of material.

If the shop applied protective coating deteriorates to the point that the Engineer considers it unacceptable, the contractor shall restore the shop applied coating to a condition acceptable to the Engineer. This work shall be done before other coatings are applied. The work shall be done in accordance with the requirements of the contract documents.

2. Field Inspection. All installation work shall be subject to the Engineer’s inspection. The Engineer shall be given all facilities required for a thorough inspection. Materials and workmanship subject to shop inspection shall be identified by the acceptance stamp of the Shop Inspector. Materials and workmanship not required to be shop inspected will be inspected by the Engineer. 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.

D. Installation Inspection. Immediately prior to installation, the armored segments shall be inspected by the Engineer for proper alignment and complete bond between the polychloroprene and the steel, and proper stud placement and effectiveness. No bends or kinks in the armor steel shall be allowed, nor shall straightening of such bends or kinks be allowed. Armored segments exhibiting bends or kinks shall be removed from the work site, and replaced with new armored segments at the Contractor’s expense. Armored segments which exhibit any separation of the polychloroprene and the armor steel shall be removed from the work site and replaced with new armored segments at the Contractor's expense. Studs shall be inspected visually and shall be given a light blow with a hammer. Any threaded 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 from the location shown on the shop drawings shall be carefully removed and a new stud placed in the proper location.

E. Mechanical Devices. In order for the armored segments to be installed properly, they must be set at a width which is directly dependent upon the ambient temperature at the start of installation, as shown on the shop drawings. The width setting shall be accomplished through the use of mechanical devices supplied by the armored segment fabricator. After the armored segment has been set to its proper line and grade and securely attached to its supports, the mechanical devices shall be removed and returned to the armored segment manufacturer.

F. Sealing Segment Surfaces. The mating surfaces of the armored segments shall be scrubbed with wire brushes, or other means satisfactory to the Engineer, to remove any rust from the steel and roughen the polychloroprene. This operation shall immediately precede the application of tape to the mating surfaces.

G. Concrete Placement and Finishing. After the joint system has been fully installed, concrete shall be placed in accordance with the contract plans. The concrete shall be finished in accordance with 557-3.09 - Finishing Integral Wearing Surfaces on Superstructure Slabs.

H. Watertight Integrity Test At least five work days after the joint system has been fully installed the Contractor shall test the entire (full length) joint system for watertight integrity employing a method satisfactory to the Engineer. The entire joint system shall be covered with water, either ponded or flowing, for a minimum duration of 15 minutes. The concrete surfaces under the joint shall be inspected, during this 15 minute period and also for a minimum of 45 minutes after the supply of water has stopped, for any evidence of dripping water or moisture. Water tightness
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shall be interpreted to be no free dripping water on any surface on the underside of the joint. Patches of moisture shall not be cause for non-acceptance.

Should the joint system exhibit evidence of water leakage at any place whatsoever, the Contractor shall locate the place(s) of leakage and take all measures necessary to stop the leakage. This work shall be done at the Contractor's expense. A subsequent water integrity test shall be performed subject to the same conditions and consequences as the original test.

567-3.02 Armored Joint System with Compression Seal

A. Delivery. The joint system shall be delivered to the work site ready for installation in accordance with the requirements of 567-2.02B1.

B. Preparation. The requirements of 567-3.01B, shall apply.

C. Storage Inspection and Handling. The requirements of 567-3.01C shall apply.

D. Installation Inspection. The armored joint system with compression seal shall be inspected in the same manner as required for armored segments under 567-3.01D. All of the requirements of 567-3.01D shall apply, except that compression seal not fully bonded to the armoring angles will not mandate replacement of the joint system. However, compression seal not fully bonded, shall be fully bonded to both armoring faces, by the Contractor, at no expense to the State.

E. Mechanical Devices. The requirements of 567-3.01E shall apply.

F. Concrete Placement and Finishing. The requirements of 567-3.01G shall apply.

G. Watertight Integrity Test. Not required.

567-3.03 Armored Joint System with Preformed Elastic Strip Seal

A. Site Delivery. The joint system shall be shop assembled and delivered to the work site ready for installation, unless prior permission to field assemble has been granted by the Engineer.

B. Field Assembly.

1. If the Contractor desires to assemble the joint system at the work site, prior permission to do so shall be obtained from the Engineer, in writing.

2. Joint systems assembled at the work site shall have all materials certified by the respective Manufacturers. The certifications shall state that the Materials requirements of this Specification have been met.

C. Storage Inspection and Handling. The requirements of 567-3.02C shall apply.

D. Installation Inspection. The requirements of 567-3.02D shall apply. The term “compression Seal” shall be interpreted as “preformed elastic strip seal.”

E. Mechanical Devices. The requirements of 567-3.01E shall apply.

F. Recess Finishing. If the joint system is installed within a preformed concrete or asphalt recess, the recess will be filled and finished to grade with either structural concrete or elastomeric concrete. The exact materials will be indicated on the Contract Plans. The respective materials will be installed in the following manner:

1. Concrete. Placement shall be in accordance with 555. Prior to concrete placement, all existing concrete surfaces shall be coated with Portland Cement Bonding Grout. Finishing shall be done in accordance with 557-3.09. Machine finishing will not be required.

2. Elastomeric Concrete. Placement shall be in accordance with the requirements of the elastomeric concrete specification.
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G. Watertight Integrity Test. The requirements of 567-3.01H shall apply.

567-4 METHOD OF MEASUREMENT. Measurement will be made as the number of meters of joint system completely installed, measured horizontally and vertically along the centerline of joint system between the outer limits as 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:

- All sealant in its proper position.
- All nuts tightened or retightened as required.
- Concrete placed and finished.
- Elastomeric concrete placed and finished.
- Water-tight integrity tests.

567-5 BASIS OF PAYMENT. The unit price bid per meter shall include all labor, materials and equipment necessary to complete the work.

567-5.01 Non-Payment. Payment will not be made for the following conditions as described:

A. Armored Joint System with Elastomeric Sealer.

1. Drilling of any expansion bolt holes made necessary by the misalignment of the originally drilled holes and the matching holes in the elastomeric segment.
2. Work by the Contractor to stop water leakage evidenced by any water-tight integrity test.

B. Armored Joint System with Compression Seal

1. The terms of 567-5.01A1 shall rule.
2. Rebonding of the compression seal as required by 567-3.02D.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>567.31 M</td>
<td>Armored Joint System with Compression Seal-Type A1</td>
<td>Meter</td>
</tr>
<tr>
<td>567.32 M</td>
<td>Armored Joint System with Compression Seal-Type A2</td>
<td>Meter</td>
</tr>
<tr>
<td>567.33 M</td>
<td>Armored Joint System with Compression Seal-Type A3</td>
<td>Meter</td>
</tr>
<tr>
<td>567.34 M</td>
<td>Armored Joint System with Compression Seal-Type A4</td>
<td>Meter</td>
</tr>
<tr>
<td>567.35 M</td>
<td>Armored Joint System with Compression Seal-Type A5</td>
<td>Meter</td>
</tr>
<tr>
<td>567.36 M</td>
<td>Armored Joint System with Compression Seal-Type A6</td>
<td>Meter</td>
</tr>
<tr>
<td>567.37 M</td>
<td>Armored Joint System with Compression Seal-Type A7</td>
<td>Meter</td>
</tr>
<tr>
<td>567.50 M</td>
<td>Armored Joint System with Preformed Elastic Strip Seal - Type as Noted</td>
<td>Meter</td>
</tr>
</tbody>
</table>

SECTION 568 - BRIDGE AND CULVERT RAILING

568-1 DESCRIPTION. This work shall consist of furnishing and erecting bridge and culvert railing as shown on the contract plans and in accordance with the specifications.

As soon as the Contract is awarded, the Contractor shall notify the D.C.E.S. of the name and address of the Fabricator of all bridge and culvert railing. This notification shall list the specific shop or shops in which the railing will be fabricated.

568-2 MATERIALS. Materials shall meet the requirements of the following subsections:

Concrete Grouting Material 701-05
Steel Bridge and Culvert Railing 710-23
Stainless Steel Connecting Products 715-16
Rubber Impregnated Random Fiber Pad 728-02

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
STANDARD SPECIFICATIONS of January 2, 2002

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When Steel Bridge Railing - Rustic is specified, the Contractor shall supply all unpainted, weathering steel railing or all galvanized and painted steel railing, unless the Contract Documents require a particular method of obtaining the rustic appearance. A combination of unpainted weathering steel and galvanized, painted steel will not be permitted.

568-3 CONSTRUCTION DETAILS

568-3.01 Erection of Bridge and Culvert Railing

A. Inspection of Railing. Immediately prior to erection, the railing shall be inspected for damage. Significant bends or kinks in the railing not specifically called for in the contract documents shall constitute sufficient cause for rejection. Straightening of such bends or kinks shall not be allowed.

Bending or curving rails in the field in order to fit alignment requirements, shall not be permitted. The Engineer may order some bending or curving to allow for necessary minor adjustments.

B. Inspection of Galvanizing. Damage to galvanizing of steel bridge and culvert railing shall constitute sufficient cause for rejection except for the following conditions:

1. If the damaged area is not required to be repaired under the provisions of 710-23, Steel Bridge and Culvert Railing.

2. If the total damaged area of a single piece (i.e. post or rail) is 4000 mm² or less. Total damaged area is exclusive of the damaged area as described under 568-3.01B1.

C. Field Galvanizing for Repair. Field galvanizing repair shall be allowed to be performed upon damaged areas meeting the requirements of 568-3.01B2.

Field galvanizing repair shall be made by painting zinc repair material onto the damaged area in accordance with the requirements of 719-01, Galvanized Coatings and Repair Methods.

All finished surfaces of welds and adjacent surfaces of rails and posts upon which galvanizing has been removed, due to any field welding operation, shall be field galvanized.

D. Field Welding. Field welding shall not be permitted unless noted in the contract documents or ordered by the Engineer.

E. Erection. All railing shall be erected in accordance with approved shop drawings prepared and submitted as specified in the New York State Steel Construction Manual.

F. Positioning Railing. Railing shall be erected so that the rails are parallel to each other and to the top of parapet, sidewalk or structural slab.

G. Positioning Posts. Posts shall be set vertical.

H. Base Plates. Post base plates shall be perpendicular to the post, unless otherwise noted. When the railing is to be placed on a preformed surface, the base plate may be placed parallel to the grade or may be perpendicular to the post and made level by the use of beveled shims conforming to the applicable requirements of 710-23, Steel Bridge and Culvert Railing.

I. Non-Metallic Pads. Posts which are to be placed on a preformed surface shall be mounted on a non-metallic pad conforming to the requirements of 728-02. Beveled Shims, if required, shall be inserted between the non-metallic pad and the post base plate.

J. Jacking Nuts. For railings set on jacking nuts, the railing posts shall be erected to proper line and grade before concrete under the post and in back of the granite curb is placed or before the mortar pad is placed.
K. Rail Span. The rails of railings shall span the following minimum number of posts:

<table>
<thead>
<tr>
<th>Railing Type</th>
<th>Number of Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-Rail, Steel</td>
<td>3*</td>
</tr>
<tr>
<td>Four-Rail, Steel</td>
<td>3</td>
</tr>
<tr>
<td>Five-Rail Steel</td>
<td>3</td>
</tr>
<tr>
<td>Box Beam Culvert</td>
<td>3*</td>
</tr>
</tbody>
</table>

Note: *If this is not possible, the absolute minimum shall be 2 posts if approved by the D.C.E.S.

L. Anchor Studs. After the anchor stud nuts have been tightened in a manner satisfactory to the Engineer, the studs shall be flame cut 25 mm above the nut. The first thread of the stud above the nut shall be damaged. The cut end of the anchor stud shall be coated in conformance with the requirements of §719-01, Galvanized coating and Repair Methods.

M. Touch-Up Painting. Any damage to the paint on a railing system shall be repaired in accordance with §572-3.06; except that only a finish coat shall be applied.

N. Inspection. All erection shall be subject to the inspection of the Engineer who shall be given all facilities required for a visual inspection of workmanship and materials.

Any single piece of the railing system with a total damaged area in excess of the amount specified in 568-3.01B2 shall be rejected and replaced.

568-3.02 Cement Mortar Pads

A. Proportioning. Cement mortar pads shall consist of a concrete grouting material.

The concrete grouting material shall meet the requirements of §701-05, Concrete Grouting Material. The grouting material shall be mixed with water, in the ratio recommended by the manufacturer, to produce a trowelable mix.

B. Mixing. Mixing shall be carried out in strict accordance with the manufacturers recommendations or the following as determined by the Engineer.

- All necessary mixing equipment shall be present and in good working order prior to the start of mixing.
- Mixing time shall not exceed three minutes unless otherwise permitted. No mixing shall be started until all preparations have been made to place the mortar.
- All mortar in any individual batch shall be used within 25 minutes after the start of mixing.
- Retempering will not be allowed.

C. Surface Preparation. All concrete surfaces to receive the mortar shall be free from laitance, oil, grease, paint, dust, loose particles or other foreign material.

The concrete surface shall be cleaned by sandblasting to the satisfaction of the Engineer, followed by a thorough vacuum cleaning.

The bottom surfaces of the base plates shall be free of oil, dirt and other foreign matter.

The concrete surface shall be lightly moistened with water.

D. Form Preparation. The forms shall be positioned about the base plate as shown in the plans or as directed by the Engineer. If the forms are to be coated with a release agent, it shall not be deleterious to the physical properties of the mortar system being used as determined by the Engineer.

E. Application. After the concrete surfaces and the base plates surfaces have been properly prepared the mortar shall be placed within the limits of the forms and tamped into place to assure that there are no voids in the completed pad. Exposed surfaces of the mortar shall be screeded and troweled to the level of the bottom of the base plate. The mortar pads shall be protected from rain for at least 24 hours.

F. General. In all cases, the installation of the mortar pads shall be made when the concrete and ambient air temperatures are above 10°C.
§568-4

568-4 METHOD OF MEASUREMENT

568-4.01 Bridge and Culvert Railing. The quantity to be paid for bridge and culvert railing shall be the number of meters measured along the centerline of railing anchorage between the extreme outer limits indicated on the contract plans.

568-4.02 Cement and Mortar Pads. The quantity to be paid shall be the number of completed pads placed in a manner satisfactory to the Engineer.

568-5 BASIS OF PAYMENT

568-5.01 Bridge and Culvert Railing. The unit price bid shall include the cost of furnishing all labor, materials and equipment necessary to complete the work. All pads (except Mortar Pads), shims, splices with their hardware, railing anchor studs with nuts, washers and anchor plates, and hand rails when specified shall also be included in the price bid.

No payment shall be made for those railing pieces which are replacements for those railing pieces that have been rejected.

Progress payments will be made when the railing is erected in accordance with approved shop drawings as specified in the New York State Steel Construction Manual exclusive of the cutting, peening and galvanizing of studs. Payment will be made at the unit bid price for 90% of the quantity erected. The balance of the quantity will be paid for upon proper completion of the work.

568-5.02 Cement Mortar Pads. The unit price bid for each pad shall include the cost of furnishing all labor, equipment and materials necessary to complete the work.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>568.15 M</td>
<td>Box Beam Culvert Railing</td>
<td>Meter</td>
</tr>
<tr>
<td>568.32 M</td>
<td>Cement Mortar Pads</td>
<td>Each</td>
</tr>
<tr>
<td>568.44 M</td>
<td>Box Beam Culvert Railing - Rustic</td>
<td>Meter</td>
</tr>
<tr>
<td>568.50 M</td>
<td>Steel Bridge Railing (Two-Rail)</td>
<td>Meter</td>
</tr>
<tr>
<td>568.51 M</td>
<td>Steel Bridge Railing (Four-Rail)</td>
<td>Meter</td>
</tr>
<tr>
<td>568.52 M</td>
<td>Steel Bridge Railing (Five-Rail)</td>
<td>Meter</td>
</tr>
<tr>
<td>568.53 M</td>
<td>Steel Bridge Railing (Two-Rail) with Handrail</td>
<td>Meter</td>
</tr>
<tr>
<td>568.54 M</td>
<td>Steel Bridge Railing (Three-Rail)</td>
<td>Meter</td>
</tr>
<tr>
<td>568.60 M</td>
<td>Steel Bridge Railing - Rustic (Two-Rail)</td>
<td>Meter</td>
</tr>
<tr>
<td>568.61 M</td>
<td>Steel Bridge Railing - Rustic (Four-Rail)</td>
<td>Meter</td>
</tr>
<tr>
<td>568.62 M</td>
<td>Steel Bridge Railing - Rustic (Five-Rail)</td>
<td>Meter</td>
</tr>
<tr>
<td>568.63 M</td>
<td>Steel Bridge Railing-Rustic (Two-Rail) with Handrail</td>
<td>Meter</td>
</tr>
</tbody>
</table>

SECTION 569 - PERMANENT CONCRETE TRAFFIC BARRIER FOR STRUCTURES

569-1 DESCRIPTION

569-1.01 Work. The work shall consist of constructing concrete traffic barrier, of the configuration and at the locations indicated on the Contract Plans.

569-1.02 Methods. Construction of the barrier shall be accomplished by cast-in-place or precast methods. Slip forming will be allowed as an acceptable cast-in-place method, unless the plans show anchor bolts projecting beyond concrete limits; in this instance slipforming procedures will require the approval of the D.C.E.S.
569-1.03 Shape Modification. The barrier shape indicated on the plans shall not be altered. Minor modifications, to allow slip-forming, will be submitted to the Regional Construction Engineer for approval.

569-1.04 Approvals. For approval requirements and procedures refer to the Construction Details.

569-2 MATERIALS

569-2.01 Fabrication. Materials used for traffic barrier fabrication shall meet the following requirements:

- Precast Concrete Barrier: 704-03 and 704-05
- Cast-In-Place Concrete (Constructed Forms): 501, Class A Concrete
- Cast-In-Place Concrete (Slip Formed): 501, Class J
- Epoxy Coated Reinforcing Bars: 709-04
- Portland Cement Bonding Grout: 705-22 (air entrained with an 8.0% ± 2.0% air content)
- Steel Tubes: ASTM A500M, Grade B
- Steel Plates, or Bars: ASTM A36M or A588M (A709M Grade 250 or 345W)
- Anchor Bolts (Fully Threaded): ASTM F568M, Class 8.8
- Nuts: ASTM F563M, Class 10S HH
- Washers: ASTM F436M, Type 1 or 3
- Concrete Grouting Material: 701-05
- Concrete Repair Material: 701-04
- Joint Filler: 705-08 Type I, or Type II
- Curing Compound: 711-05
- Locking and anchoring devices for precast units: 715-01 and 709-04, as applicable
- Galvanizing: 719-01

All steel, except reinforcing steel, shall be galvanized.

569-2.02 Fabrication Tolerances. All cast-in-place concrete barrier, regardless of the method of construction, shall conform to the following finished tolerances:

- Bar Reinforcement Cover: -0, +13 mm
- Width (Top): -0, + 6 mm
- Width (Bottom): -0, +13 mm
- Surface Straightness: 13 mm in 6 meters (Deviation from theoretical centerline)
- Vertical Alignment: 13 mm in 6 meters (Deviation from a line parallel to the theoretical grade line)
- Horizontal and Vertical Misalignment: 4 mm (between adjacent precast units)

All precast concrete barrier shall conform to the tolerances contained in §704-03, §704-05 and to the foregoing misalignment tolerance.

Reinforcement cover shall be verified while the concrete is still plastic, except in the case of cured precast units. In that case, cover will be verified in accordance with established Department procedures. These procedures may include coring.

569-3 CONSTRUCTION DETAILS

569-3.01 Approvals

A. Cast-In-Place Concrete - Modifications to Contract Plans. The D.C.E.S. shall be supplied with three copies of pertinent details and necessary design computations. Every effort will be made to render a decision, in a timely manner, after all pertinent information has been received.
§569-3

However, the time required to render a determination will not be taken into account should the Contractor request an extension of time as provided for under §108-04 Extension of Time.

B. Precast Concrete. Precast barrier systems shall be approved by the DCES prior to the contract award in order to be used in the contract.

569-3.02 General: Cast In Place Concrete

A. Cleaning. Surfaces against which barrier is to be placed shall be thoroughly cleaned and vacuumed to remove any dirt or other foreign substances, laitance or partially loose chips of concrete.

B. Defects. Defects are divided into two categories: minor defects and major defects. Minor defects in the barrier shall be repaired. Major defects shall be cause for rejection of the section. Such rejected sections shall be removed and replaced or, upon approval of the Engineer, the section shall be repaired to the satisfaction of the Engineer.

1. Minor Defects. Minor defects are defined as holes, honeycombing or spalls which are 150 mm or less, in diameter, and which do not expose the outermost surface of the steel reinforcement. Surface voids 15 mm, or less, in diameter, and 6 mm, or less in depth are not considered defects. They do not require repair.

2. Major Defects. Major defects are defined as:
   a. Any defect, except as noted in §569-3.02 B.1. above which does not meet the definition of a minor defect.
   b. Minor defects which, in aggregate, comprise more than five percent (5%) of the surface of the barrier section.

C. Repair. Repair shall be made with a material acceptable under §701-04. Methods of repair shall be acceptable to the Engineer. The color of the repaired portion shall match, as nearly as practicable, the color of the surrounding concrete. Repaired portions shall exactly match shape requirements. The repaired portion shall withstand a moderate blow from a .5 kg hammer. Repair shall be done at no cost to the State.

569-3.03 General: Precast Concrete. The definition of defects and the repair requirements contained in 704-03 shall apply.

569-3.04 Cast-In-Place Concrete - Constructed Forms. The requirements of 555 and 556 shall apply with the following modification:

   If the forms are removed before seven curing days have passed, the concrete shall be cured by means of a clear curing compound. No curing blankets will be required. Curing compound shall be sprayed on the concrete surface immediately following the slipforming and hand finishing operations. The compound shall be applied by means of pressure spraying or distributing equipment at the rate directed by the Engineer, but not less than 1 L per 3.5 square meters of surface. The equipment for applying the compound shall be such that the compound is applied as a fine spray with no surface damage to the concrete. The equipment shall also provide adequate agitation of the compound during application, and shall be approved by the Engineer before work is started. Should the method of applying the compound produce a non-uniform film, or should the spraying equipment fail and duplicate equipment not be immediately available, the application of curing compound shall be discontinued immediately and the curing shall be accomplished by another method acceptable to the Engineer. The Contractor shall stockpile sufficient approved coverings for protection of the concrete in the event of rain, non-uniform film application, or breakdown of spray equipment.
569-3.05 Cast-In-Place Concrete - Slipformed. The requirements of Section 555, Section 556 and the following, shall apply:

A. The forming of the barrier shall be accomplished by self-propelled equipment approved by the Engineer. The requirements of 555-3.03 shall not apply.

B. After all reinforcing bars have been placed, all bridge joints installed, and all other hardware placed in the area of the barrier, the Contractor shall perform a "dry run" over the entire length of the barrier installation location. It is necessary only to "dry run" a single day's placement during any given day; however, the entire barrier length shall be traversed.

The "dry run" may be made with either the actual slip forming equipment, or with an exact "mock-up" of the equipment. The "mock-up"; if utilized, shall be the exact size, shape and dimensions of the slip forming equipment. It shall be a minimum of 1.2 m long. Its movement shall be able to be correlated with a string, or survey, line indicating the correct offset location of the barrier.

C. After the "dry run" portion of the work has been completed and all obstructions have been cleared, the slip-forming equipment shall be demonstrated for capability. The demonstration shall be done in the presence of the Engineer. The Contractor shall make all adjustments, or alterations, to ensure that the equipment has the capability to produce an acceptable product. No work shall be done without the Engineer's approval. The capability demonstration will be required only once for each piece of forming equipment used on the project.

D. The Engineer's approval is for equipment capability only. The Contractor shall be entirely responsible for meeting the tolerances given under MATERIALS, 569-2.03, Fabrication Tolerances. Sections which do not meet tolerance requirements are subject to removal and replacement at no cost to the State, at the discretion of the Engineer.

E. Central and Transit Mixed Concrete. The provisions of 501-3.03 C and D shall apply for Central Mixed and Transit Mixed Concrete respectively, except that water may be added to the mixture one additional time at the point of deposition to maintain the desired slump. The water addition may be made anytime after the beginning of discharge until approximately two-thirds of the load, as determined by the Engineer, has been discharged. After the water addition, the concrete shall be mixed at least 30 revolutions in the mixing range. When the water addition is made after discharge the total number of revolutions shall not be more than 190.

Truck Mixed Concrete. The provisions of 501-3.03 E shall apply except that after initial slump has been achieved, water may be added to the mixture one additional time to maintain the desired slump. The water addition may be made anytime after the beginning of discharge until approximately two-thirds of the load, as determined by the Engineer, has been discharged. After the water addition, the concrete shall be mixed at least 30 revolutions in the mixing range.

F. Concrete supply shall be sufficient to produce a continuous, completely shaped barrier. If concrete placement is interrupted, for any reason, the placement shall be protected from drying by several layers of wet burlap. A construction dam, or bulkhead, shall be installed if the interruption exceeds 30 minutes. If the interruption exceeds 90 minutes, further placement shall be discontinued. Concrete placement at this location may then resume only after 12 hours, measured from the time of delay, has elapsed.

G. Concrete placement may begin at the joint beyond the bulkhead without time constraints. If the length of placement between the bulkhead and the next joint is such that, in the opinion of the Engineer, it may not be slipformed, the Contractor shall form the section by methods other than slipforming.

H. Cold joints in the barrier, that is, joints formed due to the attachment of fresh concrete to set
§569-3
concrete, shall be made in the following manner. The set concrete shall have its surface cut to remove all loose, and otherwise unsatisfactory materials. Tools used for this purpose shall be approved by the Engineer, prior to use. The surface shall be scrubbed with wire brooms and shall be kept wet until new concrete is placed. Immediately prior to placing fresh concrete, the set surface shall be completely coated with portland cement bonding grout, 705-22, thoroughly brushed in.

I. The Contractor shall make provisions to allow hand finishing, should it be necessary, on all surfaces. Hand finishing, if done, shall be done immediately after the passage of the slipforming equipment. Curing compound shall be applied only after hand finishing has been completed at any particular location.

J. Concrete shall be cured by means of a clear curing compound in accordance with the requirements of 569-3.04.

K. Joints and construction grooves shall be introduced at the locations indicated on the Contract Plans. If sawcutting methods are employed the following requirements shall apply:
1. The equipment shall be demonstrated, for capability, to the Engineer.
2. No sawcuts, for any purpose, shall be made in the structural slab.
3. In order to avoid sawcuts in the structural slab, the portion of the joint 75 mm directly above the structural slab shall be hand tooled immediately after finishing.
4. All sawcuts shall be made normal to the structural slab surface. The joints shall be sawcut as soon as no damage to the concrete will result with a maximum time of 8 hours. The clear curing compound shall be reapplied at the sawcut.

569-3.06 Precast Concrete

A. Immediately prior to installation, the barrier units shall be inspected for defects. Defects which conform to the definition of minor defects as given in §704-03 shall be repaired in accordance with the requirements of that subsection.

After the inspection for defects has been completed, the contact surface of all precast barrier shall be sandblast cleaned in accordance with the requirements of §584-3.02A, and §584-3.02C. After sandblasting operations are completed the surfaces shall be thoroughly vacuum cleaned.

B. All precast barrier shall be installed on grout beds conforming to the requirements of §705-22 as modified herein. The exact bedding placement requirements shall be established by the barrier system manufacturer. However, no grout bed shall be greater than 13 mm in thickness after the barrier has been installed in its permanent position. All grout bedding material shall be tooled flush with the barrier edge.

Care shall be taken to prevent grout from setting prior to barrier unit installation. If, in the opinion of the Engineer, the grout has set, or has begun to set, it shall be removed. No retempering will be permitted. The affected installation area shall be thoroughly cleaned of grout, by methods acceptable to the Engineer, and new grout shall be placed, all at no additional cost. All vertical adjustments shall be made by the addition, or removal, of grout. No wedges will be permitted.

Lifting of the barrier which, in the Engineer’s opinion, will result in permanent voids occurring between the barrier unit and the grout bed, will not be permitted.

C. Unless otherwise noted joints between units shall utilize materials required by 705-08 and shall be installed in the manner indicated on the approved precast barrier system drawings.

D. Units which are damaged during installation, due to the Contractor’s operations, shall be repaired, or replaced, as determined by the Engineer. Repair or replacement shall be done at no cost to the State.

E. Precast barrier anchored to the underlying support by means of drilled-in-bolts, may be anchored by one of two methods:
1. **Bolts chemically anchored to the underlying support.** Holes drilled for this method will not go completely through the underlying support. Bolt installations will be subjected to load testing acceptance requirements.

2. **Bolts mechanically anchored to the bottom of the underlying support.** Holes drilled for this method will go completely through the underlying support. Bolt installations will not be load tested.

569-3.07 Requirements for Method permitted under §569-3.06E1

**A.** Drilling shall be done by means of a rotary impact drill. Hole diameter shall be in strict accordance with the grout manufacturer’s instructions. If reinforcing steel is encountered, the reinforcing shall be cut and removed by means of a core drill. If approved by the Engineer, hole locations may be moved to avoid encountering reinforcing steel. The remainder of the drilling shall be done by rotary impact drill. Drilling with a lubricant will not be permitted. Water use is permissible. Concrete spalled, or otherwise damaged by the contractor’s operations shall be repaired, in a manner approved by and, to the satisfaction of the Engineer, at no additional cost.

**B.** Unless otherwise specified in the Contract Documents, the minimum depth of embedment of the anchor bolt shall be in accordance with Table 569-1.

The Contractor may increase the embedment length beyond that shown on the Plans or specified in the above table provided 1) the increase is done at no additional cost to the State and 2) the hole stops at least 50 mm from the bottom of the structural slab.

<table>
<thead>
<tr>
<th>TABLE 569-1 MINIMUM EMBEMENT AND REQUIRED TEST LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Anchor Bolt Diameter (mm)</td>
</tr>
<tr>
<td>Embedment Length (mm)</td>
</tr>
<tr>
<td>Test Load (kN)</td>
</tr>
</tbody>
</table>

**C.** Grouting material shall be a non-metallic, non-shrink grout, or polymer resin. It shall contain no products which promote the corrosion of steel. When cured, the material shall exhibit a maximum loss of four percent (4%) when tested for freeze-thaw resistance. Freeze-thaw testing will be done in accordance with Materials Test Method 502-3P, except that the material will be subjected to 50 cycles of testing. Cured material shall not be reactive with salt water, portland cement, or petroleum products.

The contractor shall supply the Engineer with two copies of the grout manufacturer’s certification that the material meets the foregoing requirements.

**D.** All anchor bolts shall be inserted at least the specified depth into the hole. After insertion of the bolt, all excess grout shall be struck-off flush with the concrete face. Should the grout fail to fill the hole, additional grout shall be added to the hole to allow a flush strike-off.

**E.** A portion of each lot of grouted-in anchor bolts shall be designated by the Engineer for load testing. The first lot shall consist of the first 10 grouted in anchor bolts. The remaining lots shall be defined by the Contractor subject to the following:

- The lot size shall not exceed 600 anchor bolts.
- A lot shall only include anchor bolts installed during a single construction season.
- A lot shall only include anchor bolts grouted with the same grout or resin.

Unless otherwise specified in the Contract Documents, the minimum load applied during the
load testing shall be in accordance with Table 569-1.

Table 569-2 shows the lot size (column L), the initial number of anchor bolts selected for testing (column N1) and the number of anchor bolts selected for additional testing (column N2).

<table>
<thead>
<tr>
<th>Lot Size</th>
<th>Initial Sample Size</th>
<th>Additional Test Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>N1</td>
<td>N2</td>
</tr>
<tr>
<td>1-30</td>
<td>All the bolts in the lot</td>
<td>---</td>
</tr>
<tr>
<td>31-50</td>
<td>30</td>
<td>---</td>
</tr>
<tr>
<td>51-75</td>
<td>38</td>
<td>---</td>
</tr>
<tr>
<td>76-100</td>
<td>44</td>
<td>21</td>
</tr>
<tr>
<td>101-200</td>
<td>49</td>
<td>26</td>
</tr>
<tr>
<td>201-300</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>301-600</td>
<td>55</td>
<td>30</td>
</tr>
</tbody>
</table>

NOTES:
1. If all of the N1 anchor bolts selected for testing pass the load test, then the lot shall be accepted.
2. If the lot size is 75 or less and one or more of the N1 anchor bolts fail the load test, then all the anchor bolts in the lot shall be tested.
3. If the lot size is 76 or greater and only 1 of the N1 anchor bolts fails the load test, the Engineer shall designate an additional N2 anchor bolts for testing. If none of the N2 anchor bolts fail the load test, the lot shall be accepted. If any of the N2 anchor bolts fail the load test all of the anchor bolts in the lot shall be tested.
4. If the lot size is 76 or greater, and more than one of the N1 anchor bolts fail the load testing then all the anchor bolts in the lot shall be tested.

Anchor bolts shall be deemed to pass if the specified test load is attained without permanently displacing the anchor bolts. **THIS LOAD TESTING SHOULD BE NON-DESTRUCTIVE. LOADING SHOULD BE STOPPED AS SOON AS THE MINIMUM ACCEPTABLE PULL-OUT RESISTANCE IS ATTAINED.**

**F.** The testing equipment shall consist of a calibrated jack system, a frame to distribute the jack load, couplers to connect the jack to the anchor bolts, and safety devices. Prior to starting the testing, the Contractor shall supply the Engineer with a certificate of calibration for the jack less than 6 months old.

Supports for the frame used to distribute the jack load shall be located outside a circle centered at the anchor bolt and of a diameter equal to 50 mm plus twice the anchor bolt embedment length but need not exceed 600 mm. The frame and jack shall be positioned so that the load is applied along the centerline of the anchor bolt. Chains or cables shall be used to connect the various pieces of the tensioning system so that free projectiles will not be created by a failure of an anchor bolt anchorage, coupling or other portion of the tensioning system.

**G.** All anchor bolts which fail load testing shall be replaced and load tested in accordance with the foregoing requirements at no additional cost.

### 569-3.08 Requirements for Method permitted under §569-3.06E2

**A.** The requirements of §569-3.07A shall apply.

**B.** Grouting material shall meet the requirements of §701-05. It shall be mixed and placed in strict accordance with the grout manufacturer's instructions unless otherwise modified by the contract documents.

**C.** Both hole and bolt shall be clean and dry at the time of bolt insertion. The bolt shall be held in place such that it will remain vertical during subsequent grout placement. The method of bolt retention shall be such that the grout will be held within the hole until setting is complete.
Barrier units mechanically anchored to the underlying support by means of bolting shall be grouted into place in accordance with the following:

- Grout shall be prepared in accordance with the grout manufacturer’s written instructions. Two copies of the manufacturer’s instructions shall be delivered to the Engineer a minimum of two weeks prior to the beginning of barrier installation work.
- Grout shall be placed only if the ambient air temperature is at least 10°C and is predicted to rise. No grout shall be placed if the ambient air temperature falls below 7°C, unless external heat has been provided in the manner required by §555-3.06A, and §555-3.06B. The underlying support may be used as the floor of the enclosure if the Engineer approves.
- External heat shall be maintained for a minimum of seven curing days. A curing day is defined by §555-3.09. After seven curing days have passed, or the grout has reached a minimum compressive strength of 25 MPa, whichever occurs last, the enclosure may be removed. All work of providing external heat shall be done at no additional cost.

569-4 METHOD OF MEASUREMENT. The work will be measured as the number of meters of concrete traffic barrier installed. Measurement will be taken along the centerline of the top of the barrier. No deduction will be made for joints.

569-5 BASIS OF PAYMENT

A. The unit price bid per meter shall include the cost of all labor, materials and equipment necessary to complete the work. This price shall also include the cost of bar reinforcement, drilling, and testing.

B. In the case of barrier constructed by cast-in-place methods, 40% of the quantity will be paid for after all of the bar reinforcement has been placed and approved by the Engineer. This payment shall include the cost of chairs, supports, fastenings, connections and any splices not specifically indicated on the plans. If the Engineer permits the substitution of larger bars than those specified, or the D.C.E.S. permits splices not indicated on the plans, the payment will not be increased nor will any extra compensation be considered.

*Payment will be made under:*

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>569.01 M</td>
<td>Permanent Concrete Traffic Barrier for Structures (Full Section)</td>
<td>Meter</td>
</tr>
<tr>
<td>569.02 M</td>
<td>Permanent Concrete Traffic Barrier for Structures (Half Section)</td>
<td>Meter</td>
</tr>
<tr>
<td>569.03 M</td>
<td>Vertical Faced Concrete Parapet</td>
<td>Meter</td>
</tr>
<tr>
<td>569.04 M</td>
<td>Single Slope (Half-Section) Concrete Bridge Barrier</td>
<td>Meter</td>
</tr>
<tr>
<td>569.05 M</td>
<td>Single Slope (Full-Section) Concrete Bridge Barrier</td>
<td>Meter</td>
</tr>
<tr>
<td>569.06 M</td>
<td>F-Shaped (Half-Section) Concrete Bridge Barrier</td>
<td>Meter</td>
</tr>
<tr>
<td>569.07 M</td>
<td>F-Shaped (Full-Section) Concrete Bridge Barrier</td>
<td>Meter</td>
</tr>
<tr>
<td>569.08 M</td>
<td>Texas Aesthetic Concrete Bridge Barrier</td>
<td>Meter</td>
</tr>
</tbody>
</table>

**SECTION 570 - ENVIRONMENTAL GROUND AND WATER PROTECTION**

570-1 DESCRIPTION. This work shall consist of providing environmental protection for cleaning operations as specified by the contract documents.

570-1.01 Definition - Environmental Protection. Environmental protection shall be defined as the collection and removal of old paint chips, corrosion residues, spent abrasives and newly applied paint (hereafter referred to as waste materials) that result from cleaning and painting operations performed in the field.