SECTION 585 - STRUCTURAL LIFTING OPERATIONS

585-1 DESCRIPTION. The work shall consist of raising, supporting and lowering each bearing point designated on the plans in order to perform the work to be done under other items.

585-1.01 Bearing Point. For purposes of this specification the term bearing point is defined as a point on the structure, designated on the plans, to be raised in order to perform other work.

585-1.02 Lift Point. For purposes of this specification, the term lift point is defined as a point on the structure where the lifting force is applied.

585-1.03 Type. Some bearing point locations may require different methods of accomplishing the work. Such situations will be noted on the contract plans. They will be defined by a type designation. The type designation will be reflected in the pay item title (e.g., 585.01 Structural Lifting Operations - Type A, etc.).

585-2 MATERIALS

585-2.01 Used Materials. Used materials will be allowed, except that materials that are permanently attached to the structure shall be in conformance with the current New York State Department of Transportation Standard Specifications.

585-2.02 Lifting Equipment. Unless otherwise specified on the plans, the choice of lifting equipment shall be at the Contractor's option, subject to the following provisions:

If jacks are used for the lifting operations, each jack shall have the rated capacity clearly shown on the manufacturer's name plate attached to each jack. Jacks or other lifting equipment shall have a rated capacity of at least one and a half times the calculated lifting force. The Engineer may require that any lifting equipment deemed to be inadequate or faulty be removed from the project site.

Jacks or other lifting equipment shall be equipped with pressure gages or other load measuring devices that will enable the applied lifting force to be monitored at all times.

585-3.01 General. The plans designate, by type, the bearing points that must be raised in order to perform the work. The loads at each bearing point are shown on the plans.

The Contractor shall select the location of the lift points, subject to the approval of the Deputy Chief Engineer (Structures), and calculate the required lifting force.

Unless a specific distance is shown on the plans, each designated bearing point shall be raised the minimum distance that will allow the work to be completed.

The Contractor shall engage the services of a New York State Licensed Professional Engineer (PE) to design and detail the structural lifting system. The PE shall be available for consultation in interpreting his plans and in the resolution of problems which may arise during the performance of the work.

All design and details shall be in conformance with the current New York State Department of Transportation Standard Specifications for Highway Bridge and the current New York State Steel Construction Manual.

585-3.02 Working Drawings. The Contractor shall furnish working drawings, prepared, stamped and signed by a New York State Licensed Professional Engineer, for the system proposed to raise, support and lower each designated bearing point. The working drawings shall not alter the number or location of designated bearing points.

The drawings shall include, but need not be limited to the following:

- Lift point locations.
- Calculated lifting forces.
- Details for all lifting equipment and support systems.
- Type and grade of all materials.
§585-3

- Distance that each bearing point is to be raised.
- Schematic hydraulic layout.
- All disconnections, reconnections or adjustments that are necessary to properly complete the lifting operations. This includes but is not limited to railings, joints, power lines, gas lines, water lines, etc.

Three legible, standard sized (560 mm x 910 mm nominal, 530 mm x 850 mm working area) prints of each drawing, together with three copies of all design computations shall be submitted to the Deputy Chief Engineer (Structures) for approval. Failure to submit drawings of the required size will cause for their return without examination.

The Deputy Chief Engineer (Structures) shall be allowed the longest of the following time durations to examine design computations and working drawings:
- Fifteen working days.
- Two working days for each drawing of a set of working drawings.
- One working day for every four (4) design computation sheets. Any design computation sheet written on both sides will be considered as two design computation sheets.

All time for examination shall begin upon receipt of all pertinent information by the Deputy Chief Engineer (Structures).

The Deputy Chief Engineer (Structures) comments shall be indicated on the returned copies. Should the proposed system not be approved, the reasons shall be indicated with the return of the material. The Contractor shall then submit revised drawings for approval, subject to the same terms as the first submission. Resubmission shall not be considered legitimate reason to request an extension of time under §108-04, Extension of Time.

All work shall be done in accordance with the approved working drawings. The Contractor must have approved working drawings prior to the start of any structural lifting operations.

The Contractor shall bear all costs and/or damages which may result from the ordering of any materials, or equipment; or the use of any preparatory labor prior to the approval of the working drawings.

585-3.03 Lifting Operations. The Contractor shall raise each designated bearing point by applying the necessary lifting force at each lift point. At no time will the Contractor be allowed to apply a lifting force in excess of one and a half times the calculated lifting force.

During all phases of the operation, the differential lift between any two adjacent bearings on a common centerline of bearing shall not exceed 15 mm unless otherwise noted on the Plans.

The Contractor shall, at the earliest possible moment during or after each lift, safely secure the structure with shims, cribbings, bolsters or other suitable supports. Details to be used shall be shown on the working drawings.

Unless otherwise indicated on the plans, vehicular traffic or construction equipment shall not be permitted on the lifted span until shims, cribbing, bolsters or other suitable supports are in their required position.

The lifting operation shall be conducted such that the distance between the structure and the shims, cribbing, bolsters or other suitable supports do not exceed 10 mm at any time.

Any replacement, repair, or adjustments to the superstructure steel shall be performed in conformance with the current New York State Steel Construction Manual.

All welding shall comply with the requirements specified in the current New York State Steel Construction Manual.

All materials required for temporary support of the structure shall remain the property of the Contractor and shall be removed from the site after the work is completed, unless otherwise agreed to.

585-4 METHOD OF MEASUREMENT. The quantity to be paid for under this item shall be the number of bearing points designated on the plans, actually raised, supported and lowered. Payment will
be made only once at each bearing point regardless of the number of times the bearing point is raised, supported and lowered during the course of the planned work.

585-5 BASIS OF PAYMENT. Payment will be made at the unit price bid for each bearing point actually raised, supported and lowered. The unit price bid per bearing point shall include the cost of all labor, materials and equipment necessary to complete this work.

For payment purposes each bearing point will be considered a separate unit. After all lifting has been performed and all temporary supports have been installed for any one bearing point, payment will be made for seventy percent of that particular unit. The remainder of the unit will be paid for after the bearing point has been lowered to its final permanent position and the lifting equipment and temporary supports have been removed.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>585.XX M</td>
<td>Structural Lifting Operations - (Types A - K)</td>
<td>Each</td>
</tr>
<tr>
<td>XX (01 through 11) = Type Designation (A through K)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION 586 - MISCELLANEOUS STRUCTURAL RECONSTRUCTION

586-1 DESCRIPTION. The work of this section shall consist of the following:

- Drilling and Grouting Bolts, or Reinforcing Bars.
- Removal of Rivets-Replacement with High Strength Bolts.
- Field Drill Holes in Existing Structural Steel.

586-1.01 Drilling and Grouting Bolts, or Reinforcing Bars. For the purposes of this section the terms bolts and reinforcing bars are identical.

586-1.02 Field Drill Holes in Existing Structural Steel. Existing structural steel is that structural steel in service prior to the beginning of construction.

586-2 MATERIALS

586-2.01 Drilling and Grouting Bolts. Grout material shall conform to §701-07; Anchoring Materials - Chemically Curing.

586-2.02 Removal of Rivets - Replacement with High Strength Bolts. High strength bolts, nuts and washers shall meet the requirements of §715-14.

If paint color is not specified, the paint shall match the existing paint to the degree practicable. The Engineer shall be the sole judge of the acceptability of the paint match. Department approved paint for metal structures shall be used.

586-3 CONSTRUCTION DETAILS

586-3.01 Equipment - General. All equipment proposed for use shall be approved by the Engineer prior to actually performing the work.

586-3.02 Drilling and Grouting Bolts

A. All holes shall be drilled by means of a rotary impact drill. If reinforcing steel is encountered, the reinforcing steel shall be cut and removed by means of a core drill. The remainder of the drilling shall be done with the rotary impact drill.

B. Drilling with a lubricant will not be permitted. Water is not considered a lubricant. Drilling methods shall not cause spalling, or other damage to concrete. Concrete spalled, or otherwise
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damaged by the Contractor's operations shall be repaired in a manner satisfactory to the Engineer. Such repair shall be done at the expense of the Contractor.

C. Holes shall be surface dry and shall have had all foreign and loose material removed immediately prior to grout placement.

D. Grout shall be mixed and placed in strict accordance with the manufacturer's instructions, unless modified here, or elsewhere, in the contract documents. No grout shall be placed at a temperature below that recommended by the grout manufacturer.

E. Prior to bolt placement in the grouted hole, all material which might interfere with bond between the bolt and the grout shall have been removed. This includes, but is not limited to: moisture, grease, dirt, mill scale and rust. Rust which cannot be removed even by vigorous scrubbing with a wire brush is considered firmly bonded and may remain. The hole diameter shall be in accordance with the grout manufacturer's recommendation. The bolts shall be inserted full depth into the hole and shall be manipulated to ensure complete coverage by the grout. 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 after bolt insertion, additional grout shall be added to the hole to allow a flush strike-off.

F. If the bolt is inserted in a hole with an axis predominantly horizontal to the ground surface, care shall be taken to prevent grout from running down the face of the concrete. These precautions shall be done in a manner satisfactory to the Engineer.

586-3.03 Removal of Rivets-Replacement with High Strength Bolts

A. Paint Removal. If the steel is painted, then prior to the beginning of any other work operations, the paint shall be removed for a minimum distance of 100 mm on each side of the centerline of work location. The paint removal work shall be done in accordance with the requirements of Section 741. In cases where the contractor can clearly demonstrate through exposure monitoring that other work practices and engineering controls, under the oversight of a certified industrial hygienist, can effectively maintain actual worker exposure below the permissible exposure level, exceptions to this requirement may be granted by the Engineer.

B. Unless otherwise noted in the contract documents, all bolts shall be the same diameter as the rivets they replace.

C. Rivets shall be removed by one of the following methods:

1. Shear rivet head using a pneumatic rivet breaker (helldog), and drive out rivet shank with a pneumatic punch.

2. Flame cut rivet head 2 mm above the base metal using a rivet scarfing tip, and drive out shank using a pneumatic punch.

If, in the Engineer's opinion, punching will damage the base metal, the shank shall be removed by drilling.

D. High strength bolts shall be installed after the nicks, burrs and foreign substances that might interfere with seating of the bolt head and nut washers are removed. Light grinding may be ordered by the Engineer.

E. Installation and inspection of high strength bolts shall be done in accordance with the New York State Steel Construction Manual requirements.

F. If it becomes necessary to disconnect, or adjust, steel remaining as part of the structure to complete the work the Contractor shall obtain the Engineer's approval prior to performing disconnections or adjustments.
G. If the bolt will not fit the rivet hole, the hole may be reamed sufficiently to accommodate the bolt.

H. If the contract does not include an item(s) for cleaning, priming and painting of structural steel, cleaning and painting of the bolt and immediate surrounding area shall be done as part of this work. Cleaning and painting shall be done in accordance with the requirements of section 572. All steel exposed by the cleaning operations shall be painted. However, at least 50 mm in every direction, measured from the washer’s edge, shall be painted.

586-3.04 Field Drill Holes in Existing Structural Steel

A. The requirements of §586-3.03A shall apply.

B. The required hole diameter will be indicated on the plans.

C. No flame cutting, or flame drilling will be permitted.

D. All damage to existing steel, as determined by the Engineer, shall be repaired by the Contractor, at no cost to the State. All repair shall be done in a manner satisfactory to the Engineer.

586-4 METHOD OF MEASUREMENT

586-4.01 Drilling and Grouting Bolts. Measurement will be taken as the number of millimeters of holes into which grout and bolts have been inserted. Measurement will be taken to the nearest one-hundredth of a meter.

586-4.02 Removal of Rivets - Replacement with High Strength Bolts. Measurement will be taken as the number of high strength bolts installed.

586-4.03 Field Drill Holes in Existing Structural Steel. Measurement will be taken as each hole drilled. No allowances will be made for holes drilled through different thicknesses of steel, or different numbers of plates.

586-5 BASIS OF PAYMENT

586-5.01 Drilling and Grouting Bolts

A. The unit price bid per millimeter shall include the cost of all labor, materials, and equipment necessary to complete the work.

B. Payment will not be made for holes which do not contain both grout and bolts.

C. The cost of the bolts will be paid for under a separate, appropriate item.

586-5.02 Removal of Rivets - Replacement with High Strength Bolts

A. The unit price bid for each installed bolt shall include the cost of all labor, material and equipment necessary to complete the work including paint removal and when appropriate painting.

B. Payment will be made for each installed bolt regardless of whether or not, a rivet had been removed from the location in question.

586-5.03 Field Drill Holes in Existing Steel

A. The unit price bid for each hole drilled shall include the cost of all labor, equipment and materials necessary to complete the work, including paint removal when required.

B. No extra compensation will be paid for holes drilled through different thicknesses, or through different numbers of plates.
§586-5

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>586.01 M</td>
<td>Drilling and Grouting Bolts, or Reinforcing Bars</td>
<td>Millimeter</td>
</tr>
<tr>
<td>586.05 M</td>
<td>Removal of Rivets-Replacement with High Strength Bolts</td>
<td>Each</td>
</tr>
<tr>
<td>586.10 M</td>
<td>Field Drill Holes in Existing Structural Steel</td>
<td>Each 5</td>
</tr>
</tbody>
</table>

SECTION 587 - BRIDGE RAILING RECONSTRUCTION

587-1 DESCRIPTION. The work shall consist of the following:

- The removal and disposal of bridge railing.
- The Removal and storage of bridge railing.
- The installation of stored bridge railing.
- The furnishing and installing of box beam bridge railing.
- The furnishing and installing of thrie beam bridge railing.

587-1.01 Bridge Railing Removed and Disposed; and Stored Bridge Railing Installed.
Material removed for disposal and material not used for installation shall become the property of the Contractor and shall be removed from the work site.

587-1.02 Bridge Railing Removed and Stored. All bridge railing removed shall remain the property of the State and shall be transported to a location within the project site designated by the Engineer.

587-2 MATERIALS

587-2.01 New Material. Materials shall meet the requirements of §710-23, Steel Bridge and Culvert Railing and the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>ASTM Designation or Standard Specification</th>
</tr>
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<tbody>
<tr>
<td>S75 x 8.5 Post</td>
<td>A36M</td>
</tr>
<tr>
<td>Post Plate</td>
<td>A36M</td>
</tr>
<tr>
<td>Spacer Brackets</td>
<td>A36M</td>
</tr>
<tr>
<td>Rail Connection Angles</td>
<td>A36M</td>
</tr>
<tr>
<td>Rail Plates</td>
<td>A36M</td>
</tr>
<tr>
<td>“U” Bolts, Nuts and Washers</td>
<td>F568 Class 4.6 or A307</td>
</tr>
<tr>
<td>Anchor Bolts, Nuts and Washers</td>
<td>A325M</td>
</tr>
<tr>
<td>Thrie Beam</td>
<td>710-201</td>
</tr>
<tr>
<td>W150 x 37.1 Post</td>
<td>A36M</td>
</tr>
<tr>
<td>Anchor Bolts (Thrie Beam)</td>
<td>A449</td>
</tr>
<tr>
<td>Carriage Bolts (Thrie Beam)</td>
<td>F568 Class 4.6 or A307</td>
</tr>
<tr>
<td>Nuts and Washers for Carriage Bolts</td>
<td>A563 and F436</td>
</tr>
<tr>
<td>Attachment Plate</td>
<td>A36M</td>
</tr>
<tr>
<td>Concrete Grouting Material</td>
<td>701-05</td>
</tr>
</tbody>
</table>

Note 1. Thrie Beam Bridge Railing shall be fabricated from 10 gage material.

587-2.02 Stored Material. The Contractor shall choose the best available material for installation, subject to the approval of the Engineer.

587-3 CONSTRUCTION DETAILS

587-3.01 Bridge Railing Removal. If so indicated on the plans, the existing anchorages shall be reused for anchoring new or stored railing. Should this be the case, the Contractor shall exercise care removing the railing so as not to damage the existing anchorages. The provisions of §589-3.01 shall apply for the removal of any painted bridge railing.
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587-3.02 Bridge Railing Storage. The Contractor shall remove, transport, unload and store bridge railing. Care shall be taken not to damage the railing during the various operations. In the event railing is damaged it shall be repaired or replaced in kind as directed by the Engineer. Such repair or replacement shall be done at no expense to the State.

587-3.03 Stored Bridge Railing Installation. Installation of the railing shall be done in accordance with the following subsections of section 568, Bridge and Culvert Railing:

| Inspection of Railing | 568-3.01A | Non-Metallic Pads | 568-3.01I |
| Field Welding | 568-3.01D |
| Positioning Railing | 568-3.01F | Anchor Studs | 568-3.01L |
| Positioning Posts | 568-3.01G | Inspection | 568-3.01N |
| Base Plates | 568-3.01H |

NOTE: 1. Bends or kinks in the railing which were present at the place of storage will not be cause for rejection.

587-3.04 Box Beam Bridge Railing Installation. Erection shall be in accordance with requirements of 568-3.01, Erection of Bridge and Culvert Railing.

The installation procedure shall be coordinated to provide the least disturbance of pedestrian and vehicular traffic, if such traffic is maintained during the course of the work.

587-3.05 Thrie Beam Installation

A. Direct Attachment to Existing Railing. The railing shall be installed in accordance with the following:

| Inspection of Railing | 568-3.01A |
| Field Galvanizing for Repair | 568-3.01C |
| Inspection of Galvanizing | 568-3.01B |
| Inspection | 568-3.01N |

The railing shall be installed such that the bottom edge is parallel to the roadway profile.

B. Separate Post Installation - Concrete Support Surface. The posts and railing shall be installed in accordance with the following:

| Inspection of Railing | 568.3.01A |
| Positioning Posts | 568-3.01G |
| Inspection of Galvanizing | 568-3.01B |
| Base Plates | 568-3.01H |
| Field Galvanizing for Repair | 568-3.01C |
| Anchor Studs | 568-3.01L |
| Field Welding | 568-3.01D |
| Inspection | 568-3.01N |
| Erection | 568-3.01E |

Mortar leveling courses shall be made from Concrete Grouting Material (§701-05). Manufacturer's instruction shall be strictly followed.

Railing shall be installed such that the bottom edge is parallel to the roadway profile.

C. Separate Post Installation - Steel Support Surface. The posts and railing shall be installed in accordance with the following:

| Inspection of Railing | 568-3.01A |
| Positioning Posts | 568-3.01G |
| Inspection of Galvanizing | 568-3.01B |
| Base Plates | 568-3.01H |
| Field Galvanizing for Repair | 568-3.01C |
| Anchor Studs | 568-3.01L |
| Field Welding | 568-3.01D |
| Inspection | 568-3.01N |
| Erection | 568-3.01E |

Railing shall be installed such that the bottom edge is parallel to the roadway profile.
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METHOD OF MEASUREMENT

A. All Railing Removal and Installation Except Thrie Beam Railing Installation. Measurement will be taken as the number of meters of railing removed, or installed. Measurement will be taken along the centerline of the top rail, end-to-end of railing between the limits indicated on the contract plans. No deduction will be made for open joints. If there is only one rail it will be considered the top rail.

B. Thrie Beam Railing Installation. Measurement will be taken as the number of meters of railing installed. Measurement will be taken along the top of the thrie beam, end-to-end of railing between the limits indicated on the contract plans. No additional measurement will be taken for overlapping sections of railing. If transition sections are installed, measurement will be taken to the end of the transition section indicated on the contract plans.

587-5 BASIS OF PAYMENT. The unit price bid shall include the cost of all labor, materials and equipment necessary to complete the work. When required, mortar leveling courses, anchor bolts, nuts and washers shall be included in the unit price bid. The drilling and grouting of anchor bolts, when required will be paid for under a separate item.

Painting of the railing, if required, shall be paid under a separate 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>587.01 M</td>
<td>Bridge Railing Removal and Disposal</td>
<td>Meter</td>
</tr>
<tr>
<td>587.02 M</td>
<td>Bridge Railing Removal and Storage</td>
<td>Meter</td>
</tr>
<tr>
<td>587.03 M</td>
<td>Installation of Stored Bridge Railing</td>
<td>Meter</td>
</tr>
<tr>
<td>587.1001 M</td>
<td>Box Beam Bridge Rail, One Rail</td>
<td>Meter</td>
</tr>
<tr>
<td>587.1002 M</td>
<td>Box Beam Bridge Rail, Two Rail</td>
<td>Meter</td>
</tr>
<tr>
<td>587.20 M</td>
<td>Thrie Beam Bridge Rail - Attachment to Existing Bridge Rail</td>
<td>Meter</td>
</tr>
<tr>
<td>587.21 M</td>
<td>Thrie Beam Bridge Rail - New Post Installation Mounted on Concrete Surfaces</td>
<td>Meter</td>
</tr>
<tr>
<td>587.22 M</td>
<td>Thrie Beam Bridge Rail - New Post Installation Mounted on Steel Surfaces</td>
<td>Meter</td>
</tr>
</tbody>
</table>

SECTION 589 - REMOVAL OF EXISTING STEEL

589-1 DESCRIPTION. The work shall consist of removal and disposal of existing steel where indicated on the contract plans, or where ordered by the Engineer. Unless otherwise noted, all materials removed as part of this work shall become the property of the Contractor, and shall be removed from the work site.

589-2 MATERIALS. Not applicable.

589-3 CONSTRUCTION DETAILS. The removal of existing steel requires the submittal of a written work plan. This plan shall meet the requirements of §202-3.01; General and Safety Requirements. The work plan shall set forth all expected supports, disconnections and adjustments to steel which is to remain. If, during the course of the work it becomes necessary to support, disconnect, or adjust steel, not previously noted in the work plan, the contractor shall submit a revised work plan to the Engineer for approval. All such proposals shall be approved prior to implementation.

In addition, the requirements of §202-3.05; Demolition of Structures shall also apply.

All work performed on steel which is to remain as part of the structure shall be in accordance with the applicable requirements of the SCM.

Actual removal procedures shall conform to the following requirements:
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589-3.01 Paint. If the steel is painted, then prior to the beginning of any steel removal operations, the paint shall be removed for a minimum distance of 100 mm on each side of the centerline of cut, bolt row, rivet row, or weld as applicable. The paint removal work shall be done in accordance with the requirements of Section 741. In cases where the contractor can clearly demonstrate through exposure monitoring that other work practices and engineering controls, under the oversight of a certified industrial hygienist, can effectively maintain actual worker exposure below the permissible exposure level, exceptions to this requirement may be granted by the Engineer.

589-3.02 Cutting. All cutting work shall be done in accordance with the requirements of the SCM, part 601, and when applicable, part 602.

589-3.03 Fastener Removals

A. Bolts. Nuts shall be removed with wrenches, wherever possible, and the bolts driven out with a hand held punch. Alternate removal procedures shall be set forth in the work plan.

B. Rivets. Rivets shall be removed by either of the following methods:
   - Shear rivet head, using a pneumatic rivet breaker (helldog), and drive out rivet shank with a pneumatic punch, OR
   - Flame-cut rivet head 2 mm above the base metal, using a rivet scarfing tip, and drive out shank using a pneumatic punch.

   If, in the opinion of the Engineer, rivet shanks, or bolts, cannot be removed by punching, without damaging the base metal, the rivet shank, or bolt, shall be removed by drilling.

589-3.04 Welded Connections. Welded connections shall be disassembled in accordance with the following:

A. The affected weld shall be removed by means of air carbon arc gouging equipment. To ensure that base metal remaining in place is not damaged, at least 3 mm of weld material shall be left in place. If it is necessary to gouge into base metal to remove the weld fusion, the least critical member, as determined by the Engineer, shall be damaged. If the damaged member is permitted to remain, it shall be repaired by procedures approved by the D.C.E.S.

B. The weld material left in place shall be ground flush with the base metal surface. No base metal shall be removed by grinding.

C. The Engineer shall perform a careful visual inspection of all weld removal locations. If damage is suspected the Engineer will direct the Contractor to perform a dye penetrant inspection in accordance with the requirements of the SCM.

   If the Contractor's operations damage existing steel which is to remain in place, the damaged steel shall be repaired, or replaced, as determined by the D.C.E.S. The Contractor shall be required to repair damage, or replace damaged material, caused by the Contractor's operations, at no additional expense to the State.

589-4 METHOD OF MEASUREMENT

589-4.01 Removal of Existing Steel (kg.) Measurement will be taken as the number of kilograms of existing steel removed and disposed of.

The mass of existing steel removed shall be computed from the nominal sizes indicated on the contract plans. If the nominal size is not indicated on the contract plans, field measurements shall be used to determine the mass, using 7850 kg per cubic meter as the mass of steel. The weight of bolts, rivets and welds shall be neglected, and no deductions in mass shall be made for any rivet, or bolt holes, in the existing steel, or for any loss of steel section due to corrosion.
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589-4.02 Removal of Existing Steel (Each). Measurement will be taken as each unit of existing steel removed, and disposed of.

589-5 BASIS OF PAYMENT. The unit price bid per kilogram, or per each unit, shall include the cost of all labor, materials and equipment necessary to complete the work, including the removal of fasteners, and disconnecting, supporting, or adjusting steel as necessary.

No payment will be made for repair of, or replacement of, damaged material, which was made necessary due to the Contractor's operations.

No separate payment will be made for the removal of paint.

The treatment, handling and disposal of the paint removal waste will be paid under a separate item.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
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</thead>
<tbody>
<tr>
<td>589.01nnn M</td>
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<td>Kilogram</td>
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<tr>
<td>589.52nnn M</td>
<td>Removal of Existing Steel</td>
<td>Each</td>
</tr>
</tbody>
</table>

NOTE: nnnn denotes a serialized pay item. See §101-02 Definitions of Terms under "Specifications".

SECTION 590 - ADJUSTMENT OF BRIDGE APPURTENANCES

590-1 DESCRIPTION. This work shall consist of adjusting the elevation of bridge joints and drainage devices to meet the proposed finished elevations in the manner indicated on the Contract Plans.

In order to perform the work, it may be necessary to remove structural concrete. Structural concrete removal, if performed, shall be done under its respective item.

590-2 MATERIALS. Materials shall meet the following requirements:

<table>
<thead>
<tr>
<th>Structural Steel</th>
<th>ASTM A36M, A242M or A588M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuts, Bolts, and Washers</td>
<td>ASTM F568 Class 4.6</td>
</tr>
<tr>
<td>Galvanized Coatings and Repair Methods</td>
<td>719-01</td>
</tr>
<tr>
<td>Preformed Elastic Joint Sealer</td>
<td>705-09</td>
</tr>
</tbody>
</table>

590-3 CONSTRUCTION DETAILS. All steel materials, including nuts, bolts, and washers, used as a part of this work, shall be galvanized in accordance with §719-01. Any galvanized surface, either existing or installed as a part of this work, which is damaged by welding or abrasion, shall be repaired in accordance with §719-01.

All welding shall be done in accordance with the applicable requirements of the New York State Steel Construction Manual.

The Contractor shall take suitable precautions to prevent damage to materials designated to remain in-place. Damage to such material, due to the Contractor's operations, shall be repaired or the damaged material replaced, as determined by the Engineer.

Dimensions shown on the plans shall be verified by the Contractor and any necessary changes approved by the Engineer prior to construction of any needed fabrications.

Preformed elastic joint sealer, where required, shall be installed in accordance with the Contract Plans.

590-4 METHOD OF MEASUREMENT

590-4.01 Bridge Drainage Devices. The work will be measured as each bridge drainage device as defined by the Contract Plans which has had its elevation adjusted in accordance with the Contract Plans.

590-4.02 Bridge Joints. The work will be measured as the number of meters of joint system which has had its elevations adjusted in the manner indicated on the Contract Plans.
Measurement will be taken only between curb lines. No measurements will be taken across sidewalks, or raised medians. In the event that curbs are not present, measurement will be taken only to those points where the elevations have actually been adjusted.

590-5 BASIS OF PAYMENT

590-5.01 Bridge Drainage Devices. The unit price bid for each bridge drainage device adjusted shall include the cost of all labor, materials, and equipment necessary to complete the work.

No payment will be made for work done to repair damage due to the Contractor’s operations, nor for any material supplied as replaced material made necessary due to damage attributable to the Contractor’s operations.

590-5.02 Bridge Joints. The unit price bid per meter shall include the cost of all labor, materials and equipment necessary to complete the work.

No payment will be made for work done to repair damage due to the Contractor’s operations, nor for any material supplied as replacement material made necessary due to damage attributable to the Contractor’s operations.

Any concrete removal or replacement will be paid for under the appropriate items.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>590.01   M</td>
<td>Vertical Adjustment of Bridge Drainage Devices - 1</td>
<td>Each</td>
</tr>
<tr>
<td>590.02   M</td>
<td>Vertical Adjustment of Bridge Drainage Devices - 2</td>
<td>Each</td>
</tr>
<tr>
<td>590.03   M</td>
<td>Vertical Adjustment of Bridge Drainage Devices - 3</td>
<td>Each</td>
</tr>
<tr>
<td>590.04   M</td>
<td>Vertical Adjustment of Bridge Drainage Devices - 4</td>
<td>Each</td>
</tr>
<tr>
<td>590.05   M</td>
<td>Vertical Adjustment of Bridge Drainage Devices - 5</td>
<td>Each</td>
</tr>
<tr>
<td>590.21   M</td>
<td>Vertical Adjustment of Joint System - 1</td>
<td>Meter</td>
</tr>
<tr>
<td>590.22   M</td>
<td>Vertical Adjustment of Joint System - 2</td>
<td>Meter</td>
</tr>
<tr>
<td>590.23   M</td>
<td>Vertical Adjustment of Joint System - 3</td>
<td>Meter</td>
</tr>
<tr>
<td>590.24   M</td>
<td>Vertical Adjustment of Joint System - 4</td>
<td>Meter</td>
</tr>
<tr>
<td>590.25   M</td>
<td>Vertical Adjustment of Joint System - 5</td>
<td>Meter</td>
</tr>
</tbody>
</table>

SECTİON 594 - TIMBER AND LUMBER

594-1 DESCRIPTION. Under this work the Contractor shall furnish and place timber and lumber of various sizes and types as may be specified for sills or platforms beneath the road, for culverts, bridges reinforcing existing structures, and for other similar purposes as shown on the plans or specified by the Engineer.

594-2 MATERIALS. Materials shall meet the following requirements:

- Wood Preservative - Creosote Oil, Type I 708-30
- Wood Preservative - Water Borne 708-31
- Wood Preservative - Oil Borne 708-32
- Timber and Lumber 712-13
- Stress Graded Timber and Lumber 712-14
- Steel Plates as Specified 715-01

594-2.01 Fasteners. Fasteners such as: spikes, nails, screws, timber connectors, bolts, nuts and washers shall meet the standard industrial fastener specifications for the intended application.

594-2.02 Approval of Order. Prior to ordering timber and lumber, the Contractor shall submit to the Engineer for approval, a detailed statement of his proposed order. No material shall be ordered until the statement is approved.
§594-2

594-2.03 Preservative Treatment. The preservative treatment shall be applied to stress graded lumber and timber and shall conform to the requirements of the AWPA C2, C3, and C18.

594-2.04 Sampling and Inspection. Sampling and inspection will be done by an accredited representative of the Department. The Inspector shall have the power to take samples of the material for analysis and to reject those materials which do not fulfill the requirements of these specifications as to either quality or workmanship. The acceptance of any materials by the Inspector shall not be a bar to their subsequent rejection if found defective. The Contractor shall furnish all facilities and equipment for the inspection and testing of materials and workmanship and the Inspector shall be allowed free access to all premises where inspections can be made.

The Contractor shall give the Department and Department's Inspection Agents ample notice relative to the location of, and time when, treating operations will take place. Inspection of all timber and lumber will be made by the Department's Inspection Agents before, during, and after pressure treatment at the treating plant. No treated timber and lumber shall be shipped which does not bear, in legible form, the Inspector's stamp of approval.

594-3 CONSTRUCTION DETAILS

594-3.01 General. Timber and lumber shall be placed or erected as shown on the plans or specified by the Engineer.

Any surface breaks resulting from storage and handling which do not warrant rejection shall be treated in accordance with AWPA M4 with the addition that at least three coats of preservative shall be applied.

Paint, where specified, shall be applied as required by the Contract Documents.

594-3.02 Treatment after Fabrication. All cutting, framing and boring of timber and lumber shall be done before treatment whenever practicable. Cutting and boring below high water shall be particularly avoided in material which is to be used in waters infested with marine borers.

All cut surfaces and all bolt holes bored subsequent to treatment shall be treated in accordance with AWPA M4 with the addition that at least three coats of preservative shall be applied. Any unfilled holes, after being treated with preservative shall be plugged with preservative treated plugs.

All cut surfaces and bolt holes below the high water line shall, in addition to the AWPA M4 preservative treatment, be coated with a thick application of a mixture of 30% creosote and 70% pitch.

The Contractor shall obtain all necessary permits pertaining to the purchase and field application of wood preservatives from the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation.

594-4 METHOD OF MEASUREMENT. The quantity to be paid for timber and lumber will be the number of cubic meters placed in the completed work. In measuring dressed timber and lumber, the cross-section of any piece will be taken as the minimum nominal commercial size of undressed material from which the piece could have been cut. When round timber is used, it shall be estimated as square timber of the smallest undressed commercial size from which the timber can be manufactured. The length of any piece will be taken as the actual length in the finished work, making no deductions for bevels, notches or splices. If the measured quantity is first computed in board feet, the conversion factor shall be 0.00235974 cubic meters per board feet.

594-5 BASIS OF PAYMENT. The unit price bid per cubic meter shall include the cost of furnishing all spikes, nails, screws, timber connectors, bolts, nuts, washers, hardware, preservative treatment and other required materials together with labor and equipment necessary to complete the work.
§597-1

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>594.01 M</td>
<td>Timber and Lumber</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>594.02 M</td>
<td>Stress Graded Timber and Lumber</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>594.03 M</td>
<td>Treated Timber and Lumber</td>
<td>Cubic Meter</td>
</tr>
</tbody>
</table>

SECTION 595 - VACANT

SECTION 596 - OPEN STEEL FLOOR

596-1 DESCRIPTION. The work shall consist of furnishing and placing open steel floor in structural slabs, at the locations indicated on the contract plans.

596-2 MATERIALS

596-2.01 Steel. All steel for the component parts shall conform to the requirements of ASTM A36M or A588M. If steel conforming to ASTM A36M is used, it shall be furnished with a minimum copper content of 0.20 percent.

The Contractor shall furnish the Department with two certified copies of the record of physical tests and chemical analysis of the steel used.

596-2.02 Fabrication. All the requirements and provisions of the SCM shall apply.

596-2.03 Shop Painting. The open steel floor shall be painted in accordance with the contract documents. Surfaces which are to be welded shall not be painted until all welding is completed.

596-3 CONSTRUCTION DETAILS

596-3.01 Placement. Open steel floor shall be placed true to line and grade and shall make full and even bearing on the underlying surface.

596-3.02 Field Welding. All the requirements and provisions of the SCM shall apply.

596-3.03 Field Painting. The requirements of §596-2.03 shop painting, shall apply.

596-4 METHOD OF MEASUREMENT. The quantity to be measured will be the actual area, in square meters, of open steel floor furnished and installed, including any portions that are filled with concrete.

596-5 BASIS OF PAYMENT. The unit price bid per square meter shall include the costs of all labor, material (including fabrication) and equipment 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>596.01 M</td>
<td>Open Steel Floor</td>
<td>Square Meter</td>
</tr>
</tbody>
</table>

SECTION 597 - TIMBER BRIDGE RAILING AND TRANSITIONS

597-1 DESCRIPTION. The work shall consist of furnishing and erecting timber bridge railing and transitions 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 timber bridge railing. This notification shall list the specific shop or shops in which the railing will be fabricated.
§597-2

597-2 MATERIALS. Materials for this work shall meet the following requirements:

<table>
<thead>
<tr>
<th>Component</th>
<th>ASTM or SAE Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Steel Plates</td>
<td>A36M (A709, Grade 250)</td>
</tr>
<tr>
<td>Rail Splice Plate</td>
<td>A36M (A709, Grade 250)</td>
</tr>
<tr>
<td>Tension Rods and Connection Bolts</td>
<td>F568, Class 8.8</td>
</tr>
<tr>
<td>Round Head Square Neck Threaded Bolt Nuts</td>
<td>F568, Class 4.6</td>
</tr>
<tr>
<td>Washers</td>
<td>A563M Class 10S, Type HH</td>
</tr>
<tr>
<td>Thrie Beam</td>
<td>F436M, Type 1</td>
</tr>
<tr>
<td>Thrie Beam to W-Beam Transition Piece</td>
<td>A588M or A572M (A709, Grade 345 or 345W)</td>
</tr>
<tr>
<td>Dome Head Drive Spike</td>
<td>Industry Standard</td>
</tr>
<tr>
<td>Split Rings</td>
<td>SAE 1010 Hot Rolled Carbon Steel</td>
</tr>
<tr>
<td>Shear Plates</td>
<td>ASTM A47/A47M, Grade 32510</td>
</tr>
</tbody>
</table>


Glued laminated timber shall comply with the requirements of the American Institute of Timber Construction (AITC). All wood products shall be pressure treated with wood preservative in accordance with §708-31 or §708-32 except that laminations for glue laminated timbers shall be treated prior to gluing with wood preservative designated as light pentain oil as in AWPA C28 and glued with wet-use adhesives conforming to Sections 4.5.1.2 of ANSI/AITC A190.1-1983.

The bridge rail shall be horizontally laminated glued laminated timber, visually graded Western species combination No. 2 or visually graded Southern Pine Combination No. 48. Other species and grades of glued laminated timber may be substituted provided that the minimum values tabulated in the latest edition of the National Design Specification for Wood Construction (ANSI/NFPA NDS) are not less than the following:

\[ F_{by} = 12.4 \text{ MPa} \]
\[ E = 12,410 \text{ MPa} \]

Posts, curbs, scuppers, and spacing blocks may be sawn lumber or glued laminated timber. When sawn lumber is used, material shall be visually graded No. 1 Southern Pine or visually graded No. 1 Douglas Fir-Larch. Other species and grades of lumber may be substituted provided that the minimum values tabulated in the latest edition of the National Design Specification for Wood Construction (ANSI/NFPA NDS) or obtained through a Machine Stress Rated (MSR) procedure approved by the American Lumber Service (ALS) are not less than the following:

\[ F_{b} = 9.30 \text{ MPa} \]
\[ E = 10,342 \text{ MPa} \]

597-3 CONSTRUCTION DETAILS

597-3.01 Fabrication. Timber bridge railing shall be fabricated to the dimensions shown on the Contract plans and in compliance with the specifications.

**A. Shop Drawings.** Shop drawings shall be provided in accordance with the Steel Construction Manual (S.C.M.) except as follows:

- The drawings shall be submitted to the Engineer for review and approval; and
- The computed weights need not be shown.

**B. Galvanizing.** Galvanizing shall conform to the requirements of §719-01, Galvanized Coatings and Repair Methods, Type I. All steel components of the railing, including the round head square necked threaded bolts, shall be galvanized. Galvanizing of high-strength steel tension rods shall follow the recommendations of the tension rod manufacturer so as not to adversely affect the mechanical properties of the steel. All steel components shall be galvanized after welding and other fabrication.
§597-3

Shop galvanizing repair of uncoated areas will be permitted on localized areas. Repair of localized areas is limited to a total of 1,300 mm² on any one component. Any component requiring more than 1,300 mm² of galvanizing repair shall be stripped and regalvanized. Shop repair shall be in accordance with the methods given in §719-01. The following areas shall not require galvanizing repair: One 3 mm maximum dimension spot of tight flux remaining in the fusion line of any 180 mm length of weld after blast cleaning, pickling and galvanizing.

C. Shop Wood Repair. All cutting, framing and boring of timber shall be done before treatment whenever practicable.

All cut surfaces shall be treated in accordance with AWPA M4 with the addition that at least three coats of preservative shall be applied.

All bolt holes bored subsequent to treatment shall be treated with preservative by means of an approved pressure bolt hole treater. Any unfilled holes, after being treated with preservative shall be plugged with preservative treated plugs.

597-3.02 Erection of Timber Bridge Railing and Transitions

A. Inspection of Railing. Prior to installation, all timber and lumber shall be examined for shakes, holes, knots, checks, splits, and decay. The Materials Requirements under "Defects" of §712-17 shall apply. Any piece of timber or lumber exhibiting any one of the aforementioned defects shall be subject to rejection as determined by the Engineer.

B. Inspection of Galvanizing. Immediately prior to erection, the railing shall be inspected for damage. Damage to the galvanizing of steel railing components shall constitute sufficient cause for rejection except for the following conditions:

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

2. If the total damaged area of a single piece is 4000 mm² or less. Total damaged area is exclusive of the damaged area described under §597-3.02B1.

C. Field Wood Repair. All cut surfaces shall be treated in accordance with AWPA M4 with the addition that at least three coats of preservative shall be applied.

All bolt holes bored subsequent to treatment shall be treated with preservative by means of an approved pressure bolt hole treater. Any unfilled holes, after being treated with preservative shall be plugged with preservative treated plugs.

The Contractor shall obtain all necessary permits pertaining to the purchase and field application of wood preservatives from the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation.

D. Field Galvanizing Repair. Field galvanizing repair shall be allowed to be performed upon damaged areas meeting the requirements of §597-3.02B2.

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 where galvanizing has been removed, due to any field welding operation, shall be field galvanized.

E. Holes in Metal Plates. Prior to galvanizing, any necessary holes in the metal plates shall be made in the shop in accordance with the requirements of the S.C.M.

F. Installation. The installation work shall be done by bolting methods alone. The requirements of the S.C.M. shall apply.
§597-3

G. Posts. Bridge railing posts shall be installed as truly vertical as possible within the following tolerance limit: 8 mm in any direction as measured from the top of the deck to the top of the post.

Bridge railing transition posts shall be installed at the location and in the manner indicated on the Contract plans. The Contractor shall carefully excavate for all post holes. Post holes and post foundation structures shall be backfilled and compacted in accordance with §203-3.15, "Fill and Backfill at Structures, Culverts, Pipes, Conduits and Direct Burial Cables". Prior to acceptance, all posts shall be plumb to a tolerance of +/- 8 mm.

Posts, in their final position, shall satisfy the Material Requirements for "Defects" of §712-17.

The tops of all posts and the top of the rail splice plate kerf shall be sealed with roofing cement or otherwise protected from direct exposure to weather.

H. Rails. The rails of timber railings shall span a minimum of four (4) posts. Bolts on traffic face of rail shall be round head square neck threaded bolt. Railing splices shall be installed in the manner indicated on the Contract plans.

I. Washers. Unless otherwise noted, malleable iron washers shall be provided under bolt heads and under nuts that are in contact with wood. Washers may be omitted under heads of dome-head timber bolts when the size and strength of the head is sufficient to develop connection strength without wood crushing.

J. Erection 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.

597-4 METHOD OF MEASUREMENT

597-4.01 Timber Bridge Railing. The quantity to be paid for timber bridge railing shall be the number of meters measured along the centerline of railing between the extreme outer limits indicated on the Contract plans.

597-4.02 Timber Bridge Railing Transition. The quantity to be paid for timber bridge railing transition shall be the number of transitions required.

597-5 BASIS OF PAYMENT. The unit price bid per linear meter of the timber railing shall include the cost of all labor, material and equipment necessary to do the work.

The price bid per timber bridge railing transition shall include the cost of all labor, material and equipment necessary to do the work.

All drilling and grouting work, if permitted, will be done at the contractor’s expense.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>597.10 M</td>
<td>Timber Railing</td>
<td>Meter</td>
</tr>
<tr>
<td>597.20 M</td>
<td>Timber Railing Transition</td>
<td>Each</td>
</tr>
</tbody>
</table>

SECTIONS 598 AND 599 VACANT