

**ITEM 599.1501 10 M**    **TRUNNION ASSEMBLY – SB BRIDGE**  
**ITEM 599.1502 10 M**    **TRUNNION ASSEMBLY – NB BRIDGE**

**DESCRIPTION**

This work shall consist of furnishing and installing all components required, reconditioning and painting the Trunnion Assemblies of the Southbound and Northbound bridges as shown in the Plans or as directed by the Engineer. This work shall also include the removal and disposal of all components replaced.

**MATERIALS**

**A. General.** The materials for fabrication and installation of the Trunnion Assembly components shall be as shown on the Plans and in accordance with the requirements specified herein.

**B. Material Certifications.** The Contractor shall submit material certifications for all materials specified to require material testing within the Plans and Specifications or within a referenced material Specification (e.g. ASTM, ANSI, or others).

**C. Material Compatibility.** The Contractor shall provide products which are compatible with other products of the mechanical work and with other work requiring interface with the mechanical work, including mechanical/electrical connections, control devices, and supporting structure.

**D. Fasteners.** Fasteners for attaching new equipment and as replacement fasteners shall be provided as required in the Plans. Unless otherwise specified, fasteners used for connecting machinery parts to each other or to supporting steelwork shall be turned bolts that conform to the minimum specified physical requirements of high strength, ASTM A325 or ASTM A449 cut thread, washer faced, hexagonal head bolts. Provide threads for turned bolts that conform to the requirements of ASTM A325. Do not use ASTM A490 bolts. Use nuts that conform to ASTM A563 or A194, Grade DH or 2H, heavy hex series.

Replacement high-strength, non-fitted bolts in existing holes in structural steel or machinery components shall be replaced with ASTM A325 hexagonal head bolts. Use nuts that conform to ASTM A563 Grade DH or 2H.

Bolt heads, nuts and hexagonal cap screws shall be dimensioned in accordance with ANSI B18.2. Such fasteners are to be of the heavy series.

Socket head cap screws, socket flat head cap screws and socket set screws shall conform to ANSI B18.3. Such screws shall be heat treated alloy steel. Unless otherwise specified, set screws shall be of the headless, safety type and be of the coarse thread series and have cup points. Set screws shall not be used to transmit torque nor as a stop for equipment that provides stability or contributes to operation of the bridge. Class 2 coarse thread tolerances shall be required for all bolts, nuts and cap screws.

Provide approved type positive locks for cap screws and nuts on turned bolts unless noted otherwise in the Plans. Use standard thickness nuts where double nuts are required in locations where occasional opening or adjustment is necessary. Use flat jam nuts only where space prohibits use of standard nuts. Lock washers shall be made of tempered steel and conform to regular SAE dimensions and Specifications. The Contractor shall properly tension high strength bolts and nuts, which will create a self-locking effect. If wire is used for locking, it shall be stainless steel.

Hardened steel, plain washers conforming to ASTM F436 shall be used at the rotated end of high strength ASTM A325 or A449 bolts and always under the nut.

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Unless otherwise specified or shown in the Plans, provide miscellaneous fasteners and hardware, including cotter pins and lock wire of corrosion resistant stainless steel, with material composition of type 304 or 316.

**E.     *Wedges***    Where replacement is required in the Plans, provide wedges of the configuration and materials required in the Plans. If this information is not provided, wedges shall be fabricated from ASTM A709 Grade 50 plate and shall match the original shape of the existing wedges.

**F.     *Shims.***    Provide shims required for leveling and alignment that are stainless steel, full depth shims, drilled for all bolts that pass through, and trimmed to the dimensions of the assembled unit. The nominal shim pack thickness shall be 13mm (½ inch) unless otherwise specified. Shim material shall be ASTM A666, type 304 or 316 stainless steel. Thin brass precision thickness shims may be used for final adjustment. Sufficient thicknesses shall be provided to permit 0.1mm (0.004 inch) variations of the shim allowance plus one full allowance shim. All shims shall be corrosion-resistant. Provide the State with one full set of additional shims for each type of component.

**G.     *Lubrication of Machinery.***    Giant button head fittings shall be used on all bearings and other machinery (not including gear teeth) requiring grease lubrication. Tubing shall be seamless brass pipe meeting the requirements of ASTM B43 and bronze fittings ASTM B62 or ASTM A269 Type 304 stainless steel tube with Type 304 or 316 stainless steel fittings. Stainless steel or corrosion resistant hardware shall be used to secure lubrication tubing and fittings. Provide two grease guns for each type fitting.

All lubricants shall be formulated for extreme temperature service and shall have operating extremes of –34 to +100 C (30 to 210 degrees F) or better. Lubricants shall be chemically inert, anti-wear type with extreme pressure rating.

Sleeve Bearings: The lubricant chosen shall be approved for use in sleeve bearings by the lubricant Manufacturer. Recommended Lubricant: NLGI No. 2 grease with rust and oxidation inhibiting additives, 280 Worked Penetration at 25° C (77° F), 170°C (340° F) or higher ASTM Drop Point, SUS 900 @ 38°C (100° F), water resistant, anti-wear/extreme pressure.

**CONSTRUCTION DETAILS**

**A.     *General.***    The Contractor shall be responsible for the complete construction and satisfactory operation of the movable spans. This responsibility shall include material workmanship, erection, and the designation of parts and details, which are not covered by the Plans. Unless otherwise specified or shown in the Plans provide fits and finishes for machinery and machined structural parts in accordance with the AASHTO requirements, ANSI B 46.1 and ANSI B 4.1. All work shall comply with the provisions of the New York State Steel Construction Manual (SCM).

**B.     *Basis of Acceptance.***    All fabrication of Structural Steel shall follow all of the requirements of the SCM. In addition, all shop drawings submitted shall follow all guidelines given in the SCM. No installation or rehabilitation work may take place until the shop drawings and procedures are approved by the Engineer.

**C. Wedge installation.** If wedges are replaced, inboard Trunnion alignment shall be accomplished through the installation and adjustment of the wedge assemblies. Adjust wedge assemblies such that the center of the inboard end of each trunnion shaft falls within 0.64 mm (0.025”) of a laser point or alignment wire (with adjustment made for wire sag). The laser shall be secured to the pier in such a way that it will not move after alignment of the laser is established. Laser alignment at the outboard ends shall be set to be within 0.25 mm (0.010”) of the centers of each outboard end of the trunnion bore. All offsets shall be recorded and adjustments made to inboard readings accordingly. Alignment relative to the outboard ends of the trunnions shall be checked before and immediately after each inboard reading is recorded. Wedges shall not be secured with final fasteners until alignment is witnessed and accepted by the Engineer.

**D. Bolting.** Perform all bolting of machinery components to new and existing materials in accordance with the following:

1. Unless otherwise specified or shown in the Plans, drill new holes in machinery parts for connection to supporting steelwork in the shop a minimum 1.6 mm (1/16”) diameter smaller than the finished bolt diameter or drill from solid at assembly. Ream machinery and existing bolt holes for turned bolts to a size a minimum of 1.6 mm (1/16”) larger rill and ream at final assembly.
2. Unless otherwise specified or shown in the Plans, drill new bolt holes in steelwork for turned bolts from solid at assembly or erection after proper alignment. Do not pre-drill holes full size prior to final assembly.
3. Except as noted herein or in the Plans, tension ASTM A325M and ASTM A449 bolts, used for connecting steel machinery parts together or to structural steel and whose nominal threaded diameter is less than or equal to 38 mm (1 ½”), in accordance with the Bolted Connection requirements of the AASHTO structural steel Specifications..
4. Tension turned bolts larger than 38mm (1 ½”) (nominal thread diameter) by turning the nut 1/4 turn past snug tight and adding a backing nut (double nuts) turned snug tight, unless otherwise noted in the Plans. If the Plans require a turned bolt larger than 38 mm (1 ½”) to be tensioned, hydraulically tension the bolt as detailed below. If the Plans require a turned bolt larger than 38 mm (1 ½”) to be tensioned but do not specify a preload value, tension the bolt to 70 percent of the minimum tensile strength of the bolt, using the nominal area of the threaded section.
5. Replacement high-strength, non-fitted bolts in existing holes in structural steel or machinery components shall be replaced and tensioned in accordance with the AASHTO Construction Specifications and the Standard Specifications.

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**E.    *Lubrication of Machinery.*** The Trunnion Bearings shall be cleaned of old lubrication as noted in the Plans. Old grease shall be solvent cleaned through hand application, pressure application or a combination. All surfaces shall be wiped clean after use of solvents and all foreign material shall be removed prior to application of new lubricants.

Connect grease fittings with tubing or fittings so that grease is introduced directly into the grease grooves for distribution. Tubing is to be extended from the bearings to convenient lubrication stations. Install vibration absorbent braided stainless steel hose, eight inch minimum length, between the pipe and the component lubricated. Provide tubing supports at increments not to exceed three feet between supports.

Immediately after cleaning and flushing and before any operation, lubricate all rotating and sliding parts and fill all gear housings with the approved lubricants specified on lubrication charts.

**F.    *Painting.*** Painting of the Trunnion Assemblies shall be incidental to this payment item. Cleaning and painting of all unfinished surfaces of machinery shall comply with requirements of the NYSDOT Standard Specifications, “Structural Steel Painting: Field Applied - Full Removal.”

All areas of the Trunnion within 50 mm (2”) of the trunnion bearing shall be masked prior to blasting to prevent intrusion of blast media into the bearing. These areas shall be hand tool cleaned in accordance with SSPC-SP11 prior to painting.

**G.    *Demolition.*** Where removal or replacement is called for in the Plans or the Specifications, these components shall be removed in their entirety. Removal and disposal of such equipment shall include all shims, fasteners or other miscellaneous items that are also replaced through the work of this Contract. All removed components shall be disposed of properly, by the Contractor, in accordance with all local, State and Federal regulations. All associated fees shall be borne by the Contractor and shall be incidental to this payment item.

**METHOD OF MEASUREMENT**

This work will be measured for payment on a lump sum basis for each bridge.

**BASIS OF PAYMENT**

The lump sum price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work. A progress payment of 25% of the quantity will be paid based upon all non-painting work being acceptably completed on this item.