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DESCRIPTION OF WORK:

This work shall consist of installing new span lock machinery components as detailed on the Plans. This work shall include all incidental construction as shown on the plans for a completed installation.

It is the intent and purpose of this Section of the Special Provisions to cover and include all apparatus, tools, devices, material, equipment, and labor necessary to properly detail, manufacture, shop assemble and test, ship, install, erect, align, adjust, lubricate, field test, paint, and put in approved working order the work as specified herein. Any apparatus, tool, device, material, and labor not specified herein shall be furnished by the Contractor and without additional cost to the Department.

All work included under this Section shall be coordinated with the "Maintaining Traffic" item.

The Contractor shall verify existing component details and dimensions as required to detail, fabricate and install new components. Verification of existing components shall be done prior to preparation of shop drawings. Details and dimensions of existing components shown on shop drawings or affecting new components shall be identified on the shop drawings.

Basis of Design:

The design of the machinery conforms to the 1988 American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Movable Highway Bridges, 1992 and 1993 Interim Specifications, except as otherwise provided herein or shown on the Drawings.

Quality Control:

Approvals, except those required for field installation and field tests, shall be obtained before installation is started.

Applicable Publications:

The publications listed hereinafter are of the issue current as of 1995 form a part of this Specification to the extent indicated by the references thereto.

A. American Society for Testing and Materials (ASTM):

A27M	Specification for Steel Castings, Carbon, for General Application
A36M	Structural Steel
A53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
A307	Carbon Steel Externally Threaded Standard Fasteners
A325M	High-Strength Bolts for Structural Steel Joints, Including Suitable Nuts and Plain Hardened Washers
A366M	Steel, Carbon, Cold-Rolled Sheet, Commercial Quality
A449	Quenched and Tempered Steel Bolts and Studs
A501	Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
A519	Seamless Carbon and Alloy Steel Mechanical Tubing
A563M	Carbon and Alloy Steel Nuts
A563	Carbon and Alloy Steel Nuts
A569M	Steel, Carbon (0.15 Maximum, Percent) Hot-Rolled Sheet and Strip,

	Commercial Quality
A576	Steel Bars, Carbon, Hot-Wrought, Special Quality
A668M	Steel Forgings, carbon and Alloy, for General Industrial Use
A668	Steel Forgings, carbon and Alloy, for General Industrial Use
B22	Bronze Castings for Bridges and Turntables
F436M	Hardened Steel Washers
F436	Hardened Steel Washers
F468M	Nonferrous Bolts, Hexcap Screws, and Studs for General Use

B. American National Standards Institute (ANSI):

A13.1	Scheme for the Identification of Piping Systems
B1.1	Unified Inch Screw Threads
B1.13M	Metric Screw Threads
B2.1	Pipe Threads (Except Dryseal)
B4.1	Preferred Limits and Fits for Cylindrical Parts
B16.11	Forged Steel Fittings, Socket Welding and Threaded
B17.1	Keys and Keyseats
B18.2.1	Square and Hex Bolts and Screws
B18.2.2	Square and Hex Nuts
B18.2.3.7M	Metric Heavy Hex Structural Bolts
B18.2.4.6M	Metric Heavy Hex Nuts
B18.3	Socket Cap, Shoulder, and Set Screws
B18.8.1	Clevis Pins and Cotter Pins
B18.21.1	Lock Washers
B18.22.1	Plain Washers
B46.1	Surface Texture

C. Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS).

Submissions:

Manufacturer's data and shop drawings shall be submitted for all manufactured and purchased items of machinery.

Submittals for each manufactured items shall be manufacturer's descriptive literature, drawings, diagrams, performance and characteristic curves, and catalog cuts, and shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, certified layout dimensions, capacity, specification reference, including ASTM, ANSI, Federal, Military Specification and any other applicable referenced, and all other information necessary to establish Contract compliance.

Shop drawings shall conform to the provisions of the Standard Specifications as supplemented and amended herein and to the special requirements specified hereinafter.

Shop drawings shall show all parts completely detailed and dimensioned. The grade and amount of finish machining, with all tolerances and allowances, shall be stated for each part for which a specific fit is required. Finished surfaces shall be as defined by ANSI Standard B46.1, Surface Texture; and fits shall be as defined by ANSI Standard B4.1, Preferred Limits and Fits for Cylindrical Parts, unless otherwise stated herein or on the drawings. ANSI B4.1 shall also apply to fits for noncylindrical parts.

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All proprietary items shall be shown in outline on shop drawings, which shall also indicate the method and sequence to be employed in assembly of bridge machinery and installation of necessary utilities support and service facilities. Shop drawings shall show all external dimensions and clearances necessary for installation and operation of span lock machinery on the bridge. For all span lock machinery shown on the Contract Drawings or listed herein, the Contractor shall furnish complete assembly diagrams showing each part contained within the item and the manufacturer's part number assigned to each part. The diagram shall be sufficient to enable complete disassembly and reassembly of the item covered. In the event that any part is modified in any manner from the way it is described or delivered by its original manufacturer, the Contractor shall deliver a drawing that details each modification; and the part shall be assigned a unique part number to preclude the supply of replacement parts not modified in similar fashion. The assembly drawings of each item shall, in addition to identifying and describing each internal part, contain dimensions of all principal elements within the item; certified external dimensions affecting interfaces or installations; gross weight capacity and normal operating ratings; method and recommended type of lubrication, including location and type of fittings and provisions for adding, draining, and checking the level of each lubricant employed; inspection openings, seals, and vents; and details of all fasteners used to mount the equipment to its foundation.

Complete shop bills of materials shall be made for all machinery parts. If the bills are not shown on the shop drawings, prints of the bills shall be furnished for Engineer approval in the same manner as specified for the drawings.

The material and material specifications shall be stated for each part. Where ASTM Specifications or any of the Standard Specifications are used, the designating numbers of such specifications shall be given. The following abbreviations will be used herein and on the drawings to designate Standard Specifications for materials and workmanship:

American Society for Testing and Materials	ASTM
American National Standards Institute	ANSI
American Railway Engineering Association	AREA
American Iron and Steel Institute	AISI
American Gear Manufacturers Association	AGMA
Society of Automotive Engineers	SAE
National Electrical Manufacturers Association	NEMA
American Association of State Highways and Transportation Officials.	AASHTO
National Lubricating Grease Institute	NLGI
Anti-Friction Bearing Manufacturers Association.	AFBMA

Complete assembly and erection drawings shall be furnished. These drawings shall give identifying marks, matchmarks and essential dimensions for locating each part or assembled unit. Marks or indentations of any type shall be clearly shown and detailed on the drawings. In general diestamping or scoring shall be avoided unless otherwise called for on the Drawings. All components and assemblies shall be detailed separately to assure correct fabrication, assembly, and erection. Use of mirror image or opposite hand drawings will not be allowed.

Each shop drawing shall be given a suitable title to describe the parts detailed thereon and shall state by whom shop inspection will be made.

Where equipment or materials are specified to conform to requirements of the standards of an organization, such as American Society for Mechanical Engineers (ASME), Underwriters Laboratories (UL), American Gas Association (AGA), and American Refrigeration Institute (ARI),

that use a label or listing as method of indicating compliance, proof of such conformance shall be submitted and engineer approved. The label or listing of the specified organization will be acceptable evidence. In lieu of the label or listing, the Contractor shall submit a certificate from an independent testing organization adequately equipped and competent to perform such services and approved by the Contracting Officer, stating that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's standard or code.

As used herein, certified test reports refer to reports of tests conducted on previously manufactured materials or equipment identical to that proposed for use.

As used herein, factory tests refer to tests required to be performed on the actual materials or equipment proposed for use. Results of the tests shall be submitted in accordance with the provisions of this Contract for laboratory test results.

The Contractor shall prepare a list of all machinery items that require lubrication and their recommended cycle for lubrication. The list shall contain the types of lubricant used and the date it was lubricated by the Contractor and shall be given to the Engineer prior to start up and testing of the machinery.

Quality Assurance:

A. Qualifications, Personnel and Facilities:

Products used shall be produced by manufacturers regularly engaged in the manufacture of the specified products.

For the fabrication, installation, and testing the Contractor shall use adequate numbers of skilled, trained, and experienced mechanics and millwrights who are thoroughly familiar with the requirements and methods specified for the proper execution of the specified work. The Contractor shall provide personnel and supervisory personnel with a minimum of two movable bridge jobs as previous experience in the installation of bridge machinery. The installation of the machinery shall be directly supervised by a representative of the machinery manufacturer and supplier having at least ten years of prior similar experience.

The Contractor shall provide adequate plant and all necessary tools and instruments required for the proper performance of the personnel engaged in the execution of the specified work.

B. Codes and Standards:

Work shall comply with, but not be limited to, all applicable requirements of the following codes and standards and their abbreviations used in this Specification shall be as shown:

1. American Association of State Highway and Transportation Officials . . . . . AASHTO
2. American Gear Manufacturers Association . . . . . AGMA
3. American Iron and Steel Institute . . . . . AISI
4. American National Standards Institute . . . . . ANSI
5. American Society for Testing and Materials . . . . . ASTM
6. American Welding Society . . . . . AWS
7. Anti-Friction Bearing Manufacturers Association . . . . . AFBMA

8. National Lubricating Grease Institute . . . . . NLGI
9. Society of Automotive Engineers . . . . . SAE
10. Steel Structures Painting Council . . . . . SSPC
11. Steel Construction Manual . . . . . SCM
12. Standard Specifications

The work shall meet the requirements of all other codes and standards as specified elsewhere in these Specifications. Where codes and standards are mentioned for any pay item, it is intended to call particular attention to them; it is not intended that any other codes and standards shall be assumed to be omitted if not mentioned.

C. Rules, Regulations and Ordinances:

Work shall comply with all applicable Federal, State and local rules, regulations, and ordinances.

In the event of a conflict between these Specifications and the above mentioned codes, standards, rules, regulations, and ordinances, the most stringent requirement shall apply.

D. Measurements and Verification:

Dimensions indicated on the Contract Drawings are nominal and are intended for guidance only. All variations from the nominal dimensions on the Contract Drawings shall be noted on the shop drawings.

E. Substitutions:

The terms "approved equal", "of equal quality" and "or equal" which appear on the Contract Drawings and in these Specifications are intended to allow the Contractor to substitute other manufacturers and model numbers of products of equal quality and rating for those specified.

Prior to the Contractor's ordering of any substitute product, the Engineer's approval of the equivalence of the substitute product shall be obtained in writing. The acceptance of the substitute products is at the sole discretion of the Engineer who will establish the basis for equivalence and will review the quality of the materials and products described in detail on the submitted shop drawings and product data.

The Engineer will "Approved", "Approved as Noted", or "Reject" substitute material. Upon return of a shop drawings showing rejection, the Contractor shall resubmit the shop drawing showing the specified product. Rejection shall not in any way result in any extra cost.

Approval by the Engineer of any substitute products submitted by the Contractor shall not relieve the Contractor of responsibility for the proper operation, performance, or functioning of that product.

Where a particular product is specified by a manufacturer's name and catalog or part number in this Specification or on the Contract Drawings, it is so specified to establish quality, configuration, and arrangement of parts. An equivalent product made by another manufacturer may be substituted for the specified product subject to the approval of the Engineer; however, all necessary changes required by the substitution in related machinery, structural, architectural and electrical parts, shall be made by the Contractor at

no additional cost.

If any departures from the Contract Drawings or these Specifications are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted as soon as practicable for approval. No such departures shall be made without approval by the Engineer.

F. Specialized Machinery Components Field Installation and Inspection:

For the installation, adjustment, and alignment of all specialized machinery components, the Contractor shall provide for the presence at the job site of manufacturers service personnel skilled in these specialties. Such service personnel shall be properly equipped with all necessary instruments to assure that related components have been provided within acceptable tolerances and to make all necessary adjustments for attaining the specified ratings.

G. Inspection and Testing:

The Contractor shall give no less than ten (10) working days notice to the Engineer of the beginning of work at foundries, forge, and machine shops so that inspection may be provided. No materials shall be cast, forged, or machined before the Engineer has been notified where the orders have been placed.

The Contractor will furnish all facilities for the inspection of material and workmanship in the foundries, forge, and machine shops and the Inspector designated by the Engineer shall be allowed free access to necessary parts of the premises. Work done while the Inspector has been refused access or presented in a manner that prevents adequate inspection will automatically be rejected.

The Inspector will have the authority to reject materials or workmanship which do not fulfill the requirements of these Specifications.

Inspection at the foundries, forge, and machine shops is intended as a means of facilitating the work and avoiding errors. It is expressly understood that inspection will not relieve the Contractor from any responsibility in regard to imperfect material or workmanship and the necessity for replacing defective materials or workmanship which are delivered to the job site.

The Contractor shall furnish the Engineer with a copy of all orders covering work performed by subcontractors or suppliers.

Unless otherwise provided, the Contractor shall furnish without additional charge test specimens as required, and all labor, testing machines, tools, and equipment necessary to prepare the specimens and to make the physical tests and chemical analyses required by material specifications. A copy of all test reports and chemical analyses shall be furnished to the Engineer.

The acceptance of any material or finished parts by the Engineer shall not be a bar to their subsequent rejection if found defective. Rejected material and workmanship shall be replaced or made acceptable by the Contractor at no additional cost.

H. Defective Materials and Workmanship:

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All machinery rejected during inspection and testing shall be removed from the work site and replaced without additional cost.

Delays resulting from the rejection of material, equipment or work shall not be the basis of any claim.

All defects found during the guarantee period resulting from faulty material, components, workmanship, or installation shall be corrected by the Contractor without cost. The State reserves the right to make necessary correction with its own forces and charge the resulting costs to the Contractor.

MATERIALS:

Standard Products:

Materials and equipment shall be essentially the standard catalogued products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest standard design that complies with the specification requirements. Materials and equipment shall essentially duplicate items that have been in satisfactory commercial or industrial use at least 2 years prior to bid opening. Where two units of the same class of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the products of the same manufacturer. Each major component of equipment shall have the manufacturer's name and address and the model and serial number on a nameplate, securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable.

Manufacturer's Recommendations:

Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

Castings and Forgings:

All castings shall be free of cracks, cold shuts, shrink holes, blow holes, and porosity.

All castings shall be cleaned free of loose scale and sand, fins, seams, gates, risers, and other irregularities. All unfinished edges of castings shall be neatly cast with rounded corners, and all inside angles shall have ample fillets.

All castings that have solid sections four (4) inches thick or greater shall be ultrasonically tested in accordance with ASTM A609, Method A, Quality Level 3. Castings that do not pass this test may be rejected. Test results, whether positive or negative, shall be submitted to the Engineer.

Carbon Steel and Alloy Steel Forgings shall meet the requirements of AASHTO Specification M102 (ASTM A668) unless as otherwise approved by the Department. Supplementary requirements as outlined in the ASTM specifications may be required upon the request of the State.

No repairs will be permitted on any casting or forging unless approved by the Engineer regardless of the ASTM Specification. The repair procedure shall be described fully and inspection requirements established prior to repair.

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Fasteners:

All bolts for connecting machinery parts to each other or to supporting members shall be as shown on the plans or specified otherwise and conform to one of the following types:

1. Finish body, high-strength bolts, studs and cap screws.

Finished body high-strength bolts shall meet the requirements of ASTM A449. High-strength bolts shall have finished bodies and regular hexagonal heads. Holes for high-strength bolts shall be not more than 0.25 mm (0.01 inch) larger than the actual diameter of the bolt. This will require measuring of the diameter of individual bolts and drilling holes to match the tolerances for each. The clearance shall be checked with 0.3 mm (0.011-inch) wire. The hole shall be considered too large if the wire can be inserted in the hole together with the fastener.

2. Turned bolts, turned cap screws, and turned studs.

Turned bolts, turned cap screws, and turned studs shall have turned shanks and cut threads. Turned bolts shall have semi-finished, washer-faced, hexagonal heads and nuts. Turned cap screws shall have finished, washer-faced, hexagonal heads. All finished shanks of turned fasteners shall be 1.6 mm (1/16-inch) larger than the diameter of the thread, which shall determine the head and nut dimensions. The shanks of all turned fasteners shall have Class LT1 fit in the finished holes in accordance with ANSI Standards B4.1. The material for the turned shank fasteners shall meet the requirements of ASTM A307, Grade A.

High-strength turned bolts, turned cap screws and turned stud details shall be as specified in the previous section, except that the material shall meet the requirements of ASTM A449.

All elements connected by bolts shall be drilled or reamed assembled to assure accurate alignment of the hole and accurate clearance over the entire length of the bolt within the specified limit. Hand held reamers are not considered accurate enough and the Contractor shall assume that a reaming jig shall be used to keep the bolt hole cylindrical. This jig shall be of structural steel, fixed to the drill and secured to the work preventing the reamer shaft from deviating. Holes shall be checked with a bolt hole micrometer to assure uniform diameter.

The dimensions of all bolt heads, nuts, castle nuts, and hexagonal head cap screws shall be in accordance with ANSI Standard B18.2, Square and Hexagon Bolts and Nuts.

Heads and nuts for turned bolts, screws and studs shall be heavy series.

The dimensions of socket-head cap screws, socket flathead cap screws, and socket-set screws shall conform to ANSI Standard B18.3. The screws shall be made of heat-treated alloy steel, cadmium-plated, and furnished with a self-locking nylon pellet embedded in the threaded section. Unless otherwise called for on the Drawings or specified herein, set screws shall be of the headless safety type, shall have threads of coarse thread series, and shall have cup points. Set screws shall neither be used to transmit torsion nor as the fastening or stop for any equipment that contributes to the stability or operation of the bridge.

New fasteners mating with existing threads shall be cut so as to match existing coarse thread series. New fasteners mating with new threads shall be Metric Coarse Thread Series as specified in ANSI B1.13M, and shall have grade 6g tolerances.

Bolt holes through unfinished surfaces shall be spot-faced for the head and nut, perpendicular with

the axis of the hole.

Unless otherwise called for, all bolt holes in machinery parts or connecting these parts to the supporting steel work shall be subdrilled at least 0.8 mm ($^{1}/_{32}$ “) smaller in diameter than the bolt diameter and shall be reamed assembled for the proper fit at assembly or at erection with the steel work after the parts are correctly assembled and aligned.

Holes in shims and fills for machinery parts shall be reamed or drilled to the same tolerances as the connected parts at final assembly.

Positive locks for an equipment manufacturers approved type shall be furnished for all nuts, except those on ASTM A449 bolts. If double nuts are used, they shall be used for all connections requiring occasional opening or adjustment. If lock washers are used for securing, they shall be made of tempered steel and shall conform to the SAE regular dimensions. The material shall meet the SAE tests for temper and toughness.

High-strength bolts shall meet the requirements of ASTM A325M, A325.

High-strength bolts shall be installed with a hardened plain washer meeting ASTM F436M, F436 at each end. Nuts for high-strength bolts shall meet ASTM A563M, A563.

Wherever possible, high strength bolts connecting machinery parts to structural parts or other machinery parts shall be inserted through the thinner element into the thicker element.

All cotters shall conform to the SAE standard dimensions and shall be made of half-round stainless steel wire, ASTM A276, Type 316.

All fasteners shall be of U.S. manufacture and shall be clearly marked with the manufacturer's designation.

Shims:

Where shown on the drawings, all machinery shims required for leveling and alignment of equipment shall be stainless steel, neatly trimmed to the dimensions of the assembled parts and drilled for all bolts that pass through the shims. In general, sufficient thicknesses shall be furnished to secure a minimum of 0.4 mm ($^{1}/_{64}$") variations of the shim allowance plus one shim equal to the full allowance. Shims shall be ASTM A276 Type 316 material. Shims shall be provided without bolt holes and shall be reamed in the field to same fit of the other connected components. Shim packs greater than 12 mm (½") shall include one solid plate of thickness equal to 12mm (½").

Laminated liners shall be surface bonded, laminated brass or bronze shim stock. The laminations shall be peelable by knife for reductions of .075mm thickness of the laminated stock.

Laminated shims shall be as manufactured by on of the following companies, or approved equal:

1. Ohio Gasket and Shim Company, Akron, OH
2. Metallo Gasket Co., New Brunswick, NJ
3. Allinabal, Millford, CT
4. Spirol International Corp., Danielson, CT
5. Laminated Shim Company, Orange, CA

CONSTRUCTION DETAILS:

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General:

All dimensions of existing parts which affect new work shall be field measured. Plan dimensions based on existing contract drawings shall be revised as necessary to suit actual conditions.

English units are provided in this specification to ensure proper fit and operation of new lock bar and bushings with existing span lock machinery components.

Shop Assembly and Operation - Machinery components shall be shop assembled to verify their correct fit prior to shipment. Any components requiring selective assembly shall be match marked for future assembly.

A. Replacement of Existing Materials and Equipment:

Prior to the refurbishing of the span lock machinery, all surfaces that will be distrubed during the refurbishing and removal of the span lock shall be cleaned of lead based paint in accordance to the requirements of Subsection 741-01. The cost of this lead based paint removal and disposal shall be included as part of this item.

Where replacement of materials and equipment is called for on the Plans or in this Specification, such materials and equipment shall become the property of the Contractor and shall be legally disposed of away from state property. Under no circumstances shall material be dropped in the waterway. The Contractor shall take care, during removal operations, to prevent damage to adjoining parts and components that are to be reused. All components damaged by the Contractor, unless scheduled to be discarded, shall be repaired or replaced in kind if practicable as directed by the Engineer at no additional cost to the State.

B. Protection for Shipment:

Machinery parts shall be cleaned of dirt, chips, grit, and all other injurious materials prior to shipping and shall be given a coat of corrosion-inhibiting preservative.

Finished metal surfaces and unpainted metal surfaces that would be damaged by corrosion shall be coated as soon as practicable after finishing with a rust-inhibiting preservative. Excepting unfinished metal surfaces inside of gear reducers, this coating shall be removed from operation and from all surfaces prior to painting after erection.

Machinery parts shall be completely protected from weather, dirt, and all other injurious conditions during manufacture, shipment, and while awaiting erection.

Lock bars shall be protected during shipment and before erection by a packing of oil-soaked rags secured in place by burlap and covered with heavy metal thimbles or heavy timber lagging securely attached. Every precaution shall be taken to ensure that the bearing surfaces are not damaged.

Assembled units shall be mounted on skids or otherwise crated for protection during handling and shipment. Every precaution shall be taken to ensure that the bearing surfaces are not damaged and that all parts arrive at their designation in satisfactory condition.

All machinery components, including bolts, shall be match marked with their mating components to ensure exact proper reassembly.

C. Erection:

All lead based paint shall be removed from faying surfaces in accordance to the requirements of Subsection 741-01. The cost of removal and disposal of the lead based paint from the faying surfaces shall be included for under this item.

Construction and installation shall be done in a coordinated manner to ensure that the machinery components fit the adjacent material furnished under other items.

The Contractor shall submit calculations and plans detailing his intended scheme for installing the machinery. All parts of the machinery shall be match marked for proper assembly and correct orientation. Before final drilling or reaming, all parts shall be adjusted to exact alignment by means of shims.

The use of clamps or under sized bolts shall be used for temporary alignment. When the machinery is aligned in its final position, one by one, the temporary bolts shall be removed, next nominal size holes for the remaining bolts shall be subdrilled and reamed, and the next nominal size bolts installed.

ASTM A449 bolts shall be torqued to the same tension required for ASTM A325 bolts specified in the Standard Specifications.

Torques for other grades or bolts shall be proportioned to their strength and shall be indicated on the erection drawings.

The machinery shall be erected and adjusted by millwrights competent in the type of work involved. They shall be provided with all necessary measuring and leveling instruments as may be required.

D. Contractor’s Inspection:

After erection is completed, the Contractor shall make a thorough inspection to insure that all gears are clean and free of obstruction, that all parts are properly aligned and adjusted as closely as practicable without actual operation, and that all bolts are properly tightened.

Inspection of tightened fasteners shall be in accordance with tension requirements of the specifications for Structural Joints Using ASTM A325 or A490 Bolts found in Part 5, Specifications and Codes, of the AISC manual of Steel Construction.

The Contractor's inspection shall also verify that all exposed surfaces of existing lock bar housings, sockets, covers, and new bolts are cleaned and painted the same color as the structural steel in accordance with the same specifications that were used for the repainting of the bridge superstructure. Touch-up painting shall be performed to correct all paint defects found during this inspection.

The Contractor's inspection shall also verify that all span lock machinery components have been lubricated with lubricant products currently in use.

The Contractors shall be accompanied by the Engineer, during his final inspection before machinery testing. On the basis of the results of this inspection, the Engineer shall determine whether the bridge is ready for testing.

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Refurbish Span Lock Machinery:

Prior to shipment, shop assemble new bushings with new lock bar to ensure proper fit.

Replacement of lock bar and bushings shall be performed within a 48 hour maximum bridge closure to marine traffic. Closure shall be coordinated with the U.S. Coast Guard and Nassau County Bridge Authority.

Disassembly of the drive components, i.e. reducer, screw thrustor, couplings, etc. as well as limit switches and other electrical items will be necessary for removal and replacement of the lock bar. Drive components shall be realigned, mounting holes reamed to next nominal size and remounted using high strength bolts.

Coupler shims shall be supplied by Contractor available in various thicknesses for field installation during 48 hour maximum closure. Final position of coupler shall be as shown on plans, shim thickness shall be so that coupler is snug.

Field Alignment - The lock bar final alignment can not be commenced until the completion of span alignment work described under other sections. During alignment of the new span lock bar and bushings, the span must be fully seated so that rear anchorages are in full contact, with no extraneous loads upon the bascule spans. Receiving socket shoes are provided with shims for field adjustment to achieve proper final clearance between the shoes and lock bar as indicated on plans.

Final Testing - After installation and final adjustments, the span lock bar machinery shall be cycled a minimum of ten (10) operations for inspection clearance requirements specified on the drawings, which shall be verified by the Contractor in the presence of the Engineer.

METHOD OF MEASUREMENT:

Payment for refurbishment of span lock bar machinery shall be on a lump sum basis for this work.

BASIS OF PAYMENT:

The Lump Sump price bid for the Span Lock Machinery shall include the cost of furnishing all equipment, material, labor, and tools required to satisfactorily complete the work as specified herein.

Ten percent of the lump sum price will be paid after the complete set of shop drawings has been marked approved.

Thirty percent of the lump sum price will be paid after the completion and acceptance of the fabricated materials.

Twenty-five percent of the lump sum price will be paid after the completed installation of the refurbished span lock machinery at the west side of the bridge.

Twenty-five percent of the lump sum price will be paid after the completed installation of the refurbished span lock machinery at the east side of the bridge.

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Ten percent of the lump sum price will be paid after final acceptance of refurbished span lock machinery.