

# **GORBEL® PRODUCT SPECIFICATIONS**

Gorbel, Inc., P.O. Box 593, Fishers, New York 14453-0593

PHONE: 800-821-0086, FAX: 585-924-6273; WEBSITE: [www.gorbel.com](http://www.gorbel.com)

## **SECTION 14636**

### **CEILING MOUNTED WORK STATION STEEL BRIDGE CRANE**

**\*\*\*\*\* Gorbel, Inc. manufactures a broad range of material handling cranes including monorail, bridge, gantry, and jib cranes. Numerous work station and industrial models are provided.**

**This guide can be used to prepare a specification for incorporating ceiling mounted work station steel bridge cranes into a competitively bid construction project.**

**The specification section is organized by placing information in three standard parts:**

<b><u>PART 1 - GENERAL</u></b>	<b>Describes administrative and procedural requirements.</b>
<b><u>PART 2 - PRODUCTS</u></b>	<b>Describes materials, products, and accessories to be incorporated into the construction project.</b>
<b><u>PART 3 - EXECUTION</u></b>	<b>Describes how the products will be installed at the construction site.</b>

**Throughout this product guide specification, references are made to other specification sections that might be contained in the project manual. These references are presented as examples and coordination reminders. For each project, these references will need to be revised to reflect actual sections being used.**

**The specifier will need to edit this product specification for a specific project to reflect the options and applications being used. The guide section has been written so that most editing can be accomplished by deleting unnecessary requirements and options. Options are indicated by [ ]. Notes to assist the specifier in selecting options and editing the specification guide are printed in bold and indicated with \*\*\*\*\*. For final editing, all brackets and notes will need to be deleted from the guide.**

\*\*\*\*\*

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes: Ceiling mounted, work station, steel bridge crane including hanger assemblies, runways, movable bridge, hoist trolley, [tractor drive], festooning system, and other accessories.

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B. Related sections:

**\*\*\*\*\* List other specification sections related to work of this section such as the following. \*\*\*\*\***

**\*\*\*\*\* Ceiling mounted work station bridge cranes require a structurally adequate overhead structure for support. \*\*\*\*\***

1. Section [\_\_\_\_\_] - [\_\_\_\_\_] : Structural [beam] [roof slab] [auxiliary framing] [\_\_\_\_\_] designed to support crane and live loads.

**\*\*\*\*\* Hoist trolley to move lifting device along bridge is provided as part of work station bridge crane. Lifting devices are typically provided separately from cranes and specified in another section. As an option, Gorbel, Inc. can provide lifting device as a crane component. Contact Gorbel, Inc. for assistance in specifying lifting devices. \*\*\*\*\***

2. Section 14620 - Hoists: [Electric] [Air-powered] [Vacuum] [Manual] lifting device attached to hoist trolley.

**\*\*\*\*\* Hoist trolley and can be equipped with an optional electric tractor drive. Tractor drives can also be installed on end trucks to move bridge. \*\*\*\*\***

3. Section 16100 - Wiring Methods: Electrical supply, conduit, wiring, and other electrical components for powering [lifting device] [hoist trolley tractor drive] [end truck tractor drive].

## **1.2 REFERENCES**

**\*\*\*\* List by number and full title reference standards referred to in remainder of the specification section. Delete non-applicable references. \*\*\*\***

- A. American Institute of Steel Construction (AISC): Manual of Steel Construction, Part 5, Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.
- B. American National Standards Institute (ANSI):
  1. ANSI B30.11 - Monorails and Underhung Cranes.
- C. American Society for Testing and Materials (ASTM) Publications:
  1. ASTM A36 - Carbon Structural Steel.
  2. ASTM A325 - Structural Bolts, Steel, Heat Treated, 120/150 ksi Minimum Tensile Strength.
  3. ASTM A490 - Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

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- D. American Welding Society (AWS):
  - 1. AWS D1.1 - Structural Welding Code.
- E. Occupational Safety and Health Administration (OSHA): OSHA Specification 1910.179 - Overhead and Gantry Cranes.

### **1.3 PERFORMANCE REQUIREMENTS**

- A. Crane shall provide coverage of rectangular area of size indicated on Drawings and consist of:
  - 1. Overhead hanger assemblies leaving crane operating area free of support structures.
  - 2. Two rigid, parallel runways. Cranes with more than two runways or with articulating runways are not acceptable.
  - 3. Rigid, single girder bridge moving perpendicular to runways. Double girder bridges and ones with articulating or threaded connections are not acceptable.
- B. Modular, pre-engineered design: Crane system shall be capable of expansion, disassembly and relocation, and accepting additional or multiple mixed capacity bridges.
- C. Productivity ratio: Crane shall be designed to manually move load with maximum force of 1/100 load weight.
- D. Runway and bridge track: Enclosed type limiting dust and dirt collection on rolling surfaces with maximum deflection of 1/450 span based on capacity plus 15 percent for lifting device weight.
- E. Crane operating temperature: 5 to 200 degrees F.

**\*\*\*\*\* Edit the following to reflect project structural design requirements. \*\*\*\*\***

- F. Crane shall be designed to withstand:
  - 1. Crane and hoist dead load.
  - 2. Live load capacity equal to net rated hook load: [250] [500] [1000] [2000] [4000] pounds.
  - 3. Inertia forces from crane and load movement.

**\*\*\*\*\* Typically, cranes are designed for normal interior operation. Contact Gorbel, Inc.**

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**for assistance in specifying cranes requiring seismic and other additional loads or cranes operating in high humidity or corrosive environments. \*\*\*\***

### **1.4 SUBMITTALS**

A. Provide in accordance with Section 01330 - Submittal Procedures:

1. Product data for crane and accessories. Describe capacities, performance, operation, and applied forces to foundation.
2. Shop drawings showing crane configuration, dimensions, [wiring diagrams,] and construction and installation details.
3. Copy of warranty required by Paragraph 1.6 for review by Architect.
4. Manufacturer's installation instructions.
5. Manufacturer's operation and maintenance manual.

### **1.5 QUALITY ASSURANCE**

- A. Manufacturer: Company specializing in designing and manufacturing cranes with 25 years successful experience.
- B. Installer: Company experienced in assembly and installation of cranes with 5 years successful experience and acceptable to crane manufacturer.
- C. Crane shall be designed, fabricated, and installed in accordance with ANSI B30.11, and OSHA 1910.179.

**\*\*\*\*\* Standard impact factor for crane design is 25 percent. Contact Gorbel, Inc. if increased factor is required for high impact applications. \*\*\*\*\***

- D. Base crane structural design includes full rated load capacity plus 15 percent for hoist and trolley weight and 25 percent impact factor for speed of lifting device and weight of tooling.
- E. Perform welding by certified operators in accordance with AWS D14.1.
- F. Bolted connections shall be in accordance with torque tightening procedures specified in AISC Manual, Part 5.
- G. Clearly label crane with rated load capacity. Place label at height and location easily read from floor level and loading position.

### **1.6 WARRANTY**

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A. Provide under provisions of Section 01780 - Closeout Submittals:

1. 5 years warranty for crane to cover defects in materials and workmanship.

**\*\*\*\*\* Include the following paragraph if tractor drive for end truck or hoist trolley is being specified. \*\*\*\*\***

2. 2 years warranty for motorized tractor drive.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Gorbel, Inc., P.O. Box 593, Fishers, New York 14453-0593; 800-828-0086; [www.gorbel.com](http://www.gorbel.com).
- B. Requests to use equivalent products of other manufacturers shall be submitted in accordance with Section 01630 - Product Substitution Procedures.

### **2.2 CEILING MOUNTED WORK STATION STEEL BRIDGE CRANE**

**\*\*\*\*\* Refer to Gorbel® pre-engineered crane tables in product literature for complete model number based on capacity, bridge length, and runway length. Cranes with other capacities and lengths are available using programs at [www.gorbel.com](http://www.gorbel.com) or contacting Gorbel, Inc. Depending on crane capacity and support system, runways can be either plain enclosed steel track section or Vierendeel truss. The following are ceiling mounted work station steel bridge cranes manufactured by Gorbel, Inc.:**

**GLC: Cranes with plain enclosed steel track runways.**

**GLCS: Cranes with trussed steel runways supported at 20 feet maximum.**

**GLCSL: Cranes with trussed steel runways supported at 20 to 25 feet maximum.**

**GLCSLX: Cranes with trussed steel runways supported at 25 to 30 feet maximum.**

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**Edit the following and complete model number to indicate specific crane and accessories to be specified. \*\*\*\*\***

- A. Type: Ceiling mounted, work station, all-steel construction, bridge crane with overhead hanger assemblies, two runways, bridge moving perpendicular to runways, and equipped with enclosed track, end trucks, hoist trolley, [tractor drive,] festooning system, bumpers, and other accessories; Model No. [GLC] [GLCS] [GLCSL] [GLCSLX]-[\_\_capacity in pounds\_\_]-[\_\_bridge length\_\_]S-[\_\_runway length\_\_] as manufactured by Gorbel, Inc.

**\*\*\*\*\* Refer Gorbel® product literature for standard runway lengths which vary depending on model from 11.5 to 124 feet. Longer lengths can be provided to accommodate project conditions by contacting Gorbel, Inc. \*\*\*\*\***

- B. Runway length: [\_\_\_\_\_] feet.

**\*\*\*\*\* Standard bridge lengths range from 8 to 34 feet as indicated below. Contact Gorbel, Inc. if other bridge lengths are required. \*\*\*\*\***

- C. Bridge length: [8] [10] [15] [20] [23] [28] [34] feet.

- D. Construction: Fabricate from ASTM A36 steel sections with finished ends and surfaces.

**\*\*\*\*\* Ceiling mounted bridge cranes are typically attached to overhead structural steel framing with hanger assemblies designed to clamp onto wide flange steel beams. Contact Gorbel, Inc. if concrete or other type of support structure is used. \*\*\*\*\***

1. Hanger assemblies: Provide number and type of hanger assemblies required for suspending runways from overhead steel beam support structure.
  - a. Equip assemblies with upper hanger bracket adjustable for mounting to 1 to 10 inch flanges and two beam clips.

**\*\*\*\*\* Include the following paragraph if either plain track or trussed runways are suspended by threaded rods below steel support beams. \*\*\*\*\***

- b. Two-piece hangers suspending runways below support beams shall consist of upper hanger bracket with beam clips and lower runway bracket connected with threaded B7 alloy steel rod. Provide rods in 20 and 72 inches lengths for field cutting. Assemblies shall be designed for supporting either plain enclosed steel track runways or trussed steel runways.

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**\*\*\*\*\* Include the following paragraph if plain or trussed track runways are flush mounted to steel support beams. \*\*\*\*\***

- c. Hangers for flush mounting plain or trussed enclosed steel track shall be one-piece assembly designed for runways either parallel or perpendicular to support beams.

**\*\*\*\*\* Sway bracing is required if runways are suspended by B7 alloy threaded rods below steel support beams. Bracing needs to be designed by architect/engineer, detailed on drawings, and specified in other sections. Gorbel can provide optional sway brace fittings used to connect 1 inch diameter diagonal pipe bracing to top chord of trussed runway. Edit and include the following paragraph if sway bracing is required. \*\*\*\*\***

- 2. Sway bracing: Brace runways as detailed on Drawings and specified in Section 05120 - Structural Steel. [Provide runways with sway brace fittings for attachment of 1 inch diameter diagonal pipe bracing to top chord of trussed runway.]

**\*\*\*\*\* Include the following paragraph to specify trussed runway, Models GLCS (20' maximum support centers), GLCSL (25' maximum support centers), and GLCSLX (30' maximum support centers). \*\*\*\*\***

- 3. Runways: Vierendeel truss fabricated from square steel tubes and enclosed steel track.
  - a. Track: Enclosed, cold formed, steel box track which serves as bottom cord of runway and permits end trucks and festoon carriers to ride on lower inside flanges. Fabricate lower running flanges with 2 degrees taper to center trolley within track. Flat, non-centering tracks are not acceptable.
  - b. Splice joint: Provide truss splice plates, channel-shaped track splice joint, bolts, lockwashers, and nuts for joining runway sections.

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**\*\*\*\*\* Include the following paragraph to specify plain enclosed steel track runway, Model GLC (6' maximum support centers). \*\*\*\*\***

- 4. Runways: Enclosed, cold formed, steel box track which permits end trucks and festoon carriers to ride along runway.
  - a. Fabricate lower running flanges with 2 degrees taper to center truck within track. Flat, non-centering track runways are not acceptable.
  - b. Splice joint: Provide channel-shaped track splice joint with bolts, lockwashers, and nuts for joining runway sections.

**\*\*\*\*\* A short section of enclosed track can be added to runway track for stacking festoon**

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**carriers so that bridge can cover full runway length. Include the following paragraph for this option. \*\*\*\*\***

- 5. Festoon stack section: Provide enclosed track extension to provide for stacking festoon carriers at end of runway.

**\*\*\*\*\* Depending on crane capacity and bridge length, bridge for ceiling mounted work station bridge crane can be either plain enclosed steel track section of Vierendeel truss. Refer to Gorbel® product literature for appropriate type of bridge. \*\*\*\*\***

**\*\*\*\*\* Include the following paragraph to specify trussed bridge. \*\*\*\*\***

- 6. Bridge: Single girder, Vierendeel truss fabricated from rectangular steel tubes and enclosed steel box track.
  - a. Track serves as bottom cord of bridge and permits hoist trolley and festoon carriers to ride on lower inside flanges.
  - b. Fabricate track lower running flanges with 2 degrees taper to center trolley within track. Flat, non-centering tracks are not acceptable.

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**\*\*\*\*\* Include the following paragraph to specify plain enclosed steel track bridge. \*\*\*\*\***

- 7. Bridge: Enclosed, cold formed, steel box track which permits hoist trolley and festoon carriers to ride along lower inside flanges. Fabricate lower running flanges with 2 degrees taper to center truck within track. Flat, non-centering track bridges are not acceptable.

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**\*\*\*\*\* Include the following paragraph to specify an aluminum track bridge. \*\*\*\*\***

- 8. Bridge: Extruded aluminum enclosed track reinforced with extruded aluminum T-beam.
  - a. Provide as either one piece extrusion or with separate T-beam bolted to track.
  - b. Track: Enclosed, box track designed for trolleys and festoon carriers to ride on lower inside flanges. Fabricate lower running flanges with 2 degrees taper to center trolley within track. Flat, non-centering tracks are not acceptable.

\*\*\*\*\*

- 9. End trucks: Rigid frame end truck designed to ride inside enclosed runway



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track and connect to and suspend bridge.

- a. Construction: Stamped steel fabrication with both vertical and horizontal wheels to prevent binding in runway. Designs with welds in tension are not acceptable.
  - b. Wheels: Removable, self-centering wheels with sealed lifetime lubricated bearings. Vertical wheels shall be tapered 2 degrees to match track profile. Non-removable or non-tapered wheels are not acceptable. Duracomp 4® wheel material is preferred. Steel wheels are not acceptable.
  - c. Drop lugs: Provide on both sides of truck to limit truck drop to 1 inch maximum in event of wheel, axle, or load bar failure.
  - d. Connection to the bridge: Provide a rigid connection between bridge and end truck. Articulating connections with threaded hardware are not acceptable.
10. Hoist trolley: Rigid-body trolley designed to ride inside enclosed track of bridge and carry hoist and load. Articulating trolleys are not acceptable.
- a. Construction: Two-piece stamped steel body with two wheels each side and tapered clevis positioning hoist hook at center of trolley so load weight is evenly distributed to all four trolley wheels. Provide removable clevis pin of type and size determined by manufacturer for specified capacity. Trolleys with non-removable clevis pins are not acceptable.
  - b. Wheels: Removable, self-centering wheels with sealed lifetime lubricated bearings. Vertical wheels shall be tapered 2 degrees to match track profile. Non-removable or non-tapered wheels are not acceptable. Duracomp 4® wheel material is preferred. Steel wheels are not acceptable.
  - c. Drop lugs: Provide on both sides of trolley to limit trolley drop to 1 inch maximum in event of wheel, axle, or load bar failure.
11. End stops: Molded composite, resilient bumper installed in runway and bridge tracks to prevent end trucks, hoist trolley, and festoon carriers from rolling out of track. Bolt stops without energy absorbing bumper are not acceptable.

### **2.3 TRACTOR DRIVE**

**\*\*\*\*\* Hoist trolley and end truck can be motorized using Gorbel® Tractor Drive. Include this article for this option. \*\*\*\*\***

- A. Provide electric tractor drive for motorized operation of [hoist trolley] [and] [end truck]; Tractor Drive as manufactured by Gorbel, Inc.

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- B. Type: Variable frequency drive assembly with worm gear reducer, molded polyurethane tread, and adjustable counter-balance to ensure proper drive wheel alignment.

**\*\*\*\*\* Standard drive speeds are 70, 90, and 120 feet per minute. Other speeds are available as options. \*\*\*\*\***

- C. Speed: [70] [90] [120] feet per minute.

- D. Motor: 1/3 HP, 1800 RPM, 3 phase, 208-460 volt, with thermal overload protection.

**\*\*\*\*\* Either 120 volt or 24 volt controls can be provided. Control panel is typically field wired to drive motor. As an option, the system can be factory wired. \*\*\*\*\***

- E. Controls: [120] [24] volt control package with transformer, terminal strips, fusing, enclosure, and mounting brackets to be [field] [factory] wired to drive motor.

### **2.4 ACCESSORIES**

**\*\*\*\*\* Several accessories are provided as options for ceiling mounted work station bridge cranes. Select required options from the following. Contact Gorbel, Inc. or refer to product literature if other types of accessories are required. \*\*\*\*\***

**\*\*\*\*\* If motorized tractor drive or electric or air-powdered lifting device is used, a length of cable or hose can be provided for installation on runway and bridge. Include the following to specify hose or cable. \*\*\*\*\***

- A. Provide length of [[flat] [round] electrical cable] [[1/2] [3/8] inch diameter air hose] to supply lifting device and festoon along bridge and runway

**\*\*\*\*\* Either festoon trolleys or gliders can be provided to support electrical cable, air hose, or vacuum hose on bridge and runway and allow festooning as hoist trolley and end trucks travel. Electrical and air trolleys are equipped with U-bolt clamps. Vacuum trolleys have straps with velcro. Include the following paragraph to specify festoon trolleys. \*\*\*\*\***

- B. Festoon trolleys: Four-wheeled trolleys with pivoting saddle and [U-bolt clamp] [velcro strap] to support [electrical cable] [air hose] [vacuum hose] on runway or bridge and allowing festooning as end truck or hoist trolley travels.

**\*\*\*\*\* Include the following paragraph to specify festoon gliders. Electrical and air gliders are equipped with clamps. Vacuum gliders have straps with velcro. \*\*\*\*\***

- C. Festoon gliders: [\_\_material\_\_], T-shaped gliders with adjustable [clamp bar] [velcro strap] to support [electrical cable] [air hose] [vacuum hose] on runway or bridge and allowing festooning as end truck or hoist trolley travels.

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**\*\*\*\*\* Festoon clamps are required for festooning electrical cable, air hose, or vacuum hose to prevent festoon trolleys and gliders exiting track. \*\*\*\*\***

- D. Festoon clamp: Steel clamp assembly attached to track to prevent festoon [trolleys] [gliders] exiting track.

**\*\*\*\*\* Telescoping bridges and interlock/transfer cranes can also be provided for ceiling mounted work station bridge crane systems. Contact Gorbel, Inc. for product information and assistance in specifying these accessories. \*\*\*\*\***

### **2.5 SHOP FINISHING**

- A. Steam wash steel crane components with iron phosphate solution and apply baked enamel finish. Colors shall be:
  - 1. Hanger assemblies and runways: Blue. Other colors available upon request.
  - 2. Bridge: Yellow. Other colors available upon request.
- B. Provide spray cans of matching colors, air-drying paint for field touch-up. Blue and yellow only.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Coordinate provision of crane with:

**\*\*\*\*\* Steel beam or other type of overhead supporting structure must be designed by architect/engineer to resist applied forces from crane; detailed on drawings; and specified in other sections. Except for flush mounted crane runway systems, sway bracing must be designed by architect/engineer. \*\*\*\*\***

- 1. Design and construction of overhead [steel beam] [\_\_\_\_\_] framing to receive ceiling mounted crane [and sway bracing] as detailed on Drawings and specified in other sections. Ensure that accurate crane applied forces are provided for structural support design.

**\*\*\*\*\* Include the following paragraph if electric lifting device or motorized tractor drive for end truck or hoist trolley is being used. \*\*\*\*\***

- 2. Provision of electrical supply, conduit, wiring, and other electrical components for powering [motorized tractor drives] [electrically operated lifting device].
- B. Prior to installation:
  - 1. Verify overhead support structure is ready to receive ceiling mounted work

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station bridge crane.

2. Verify type and location of power supply.
3. Inventory parts. Verify all required components are available and undamaged.

### **3.2 INSTALLATION**

- A. Install crane and accessories in accordance with manufacturer's instructions and shop drawings.
- B. Do not modify crane components in any manner without advance, written approval from crane manufacturer.
- C. Clearances for moving crane components:
  1. 3 inches minimum vertical clearance from any overhead obstruction.
  2. 2 inches minimum horizontal clearance from any lateral obstruction.
- D. Tighten mounting bolts to manufacturer recommended torque ratings.
- E. Mark hanger placement on overhead support structure and on runways in accordance with shop drawings.

**\*\*\*\*\* Include the following paragraph if sway brace fittings are being specified. \*\*\*\*\***

- F. Sway brace fittings: Attach to runways at locations indicated on drawings and installation manual.

**\*\*\*\*\* Include the following two paragraphs if suspension type hangers with threaded rods are used. \*\*\*\*\***

- G. B7 Alloy threaded suspension rod hanger assemblies: Assemble upper hanger bracket and bolt beam clips to steel support beams. Shim as required to ensure hanger is plumb. Attach lower hanger brackets to runways.
- H. Lift runways into place and temporarily support. Connect threaded rod on upper hanger bracket to lower bracket. Ensure two minimum threads are beyond hexnut and rods are plumb and not bent.

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**\*\*\*\*\* Include the following two paragraphs if flush mounted hanger assemblies are used. \*\*\*\*\***

- I. Flush mounted hanger assemblies: Bolt onto runways.

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- J. Lift runways into place and temporarily support. Bolt hanger beam clips to support beams.

\*\*\*\*\*

- K. Prior to torquing bolts, ensure runways are accurately spaced and:

1. Level to within plus or minus 1/8 inch in 20 feet.
2. Parallel with opposite runway to within plus or minus 1/8 inch in 20 feet.
3. Track splice transitions are smooth with no raised areas to inhibit end truck operation.

- L. End stops: Bolt stops into runway track end opposite festooning end.

**\*\*\*\*\* Only one end truck is firmly clamped to bridge. Other truck floats freely. This compensates for minor misalignment of runways and allows smooth bridge movement. Edit the following paragraph to reflect if one end truck is to be moved with motorized tractor drive. \*\*\*\*\***

- M. End trucks: [Mount bracket and drive to end truck] Slide one end truck onto festooning end of bridge track and clamp firmly into place. Slide other non-clamping truck onto end opposite festooning end (do not clamp this end truck into place).

- N. Prior to installing bridge, use clean dry cloth to clean inside flanges of runway and bridge tracks. Bolt end stop in bridge track opposite festooning end.

- O. Bridge: Lift bridge with end trucks to runways and insert end trucks into open ends of runways. Roll bridge down length of runway. Verify and adjust for smooth travel.

**\*\*\*\*\* Include the following paragraph if end truck is to be moved with motorized tractor drive. \*\*\*\*\***

- P. End truck tractor drive: Insert tractor drive into runway track such that tow arm faces end truck drive bracket. Adjust drive counterweight so drive frame hangs level from track. Adjust drive wheel to contact underside of top surface of track. Position end truck up to tractor drive and install self locking pin connecting tow arm to bracket on truck.

**\*\*\*\*\* Edit the following paragraph to reflect if hoist trolley truck is to be moved with motorized tractor drive. \*\*\*\*\***

- Q. Hoist trolley: [install drive bracket] Attach lifting device to hoist trolley saddle

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clevis. Secure clevis pin with cotter pin. Roll hoist trolley into open end of bridge track.

**\*\*\*\*\* Include the following paragraph if hoist trolley is to be moved with motorized tractor drive. \*\*\*\*\***

- R. Hoist trolley tractor drive: Insert tractor drive into bridge track such that tow arm faces hoist trolley drive bracket. Adjust drive counterweight so drive frame hangs level from track. Adjust drive wheel to contact underside of top surface of track. Position trolley up to tractor drive and install self locking pin connecting tow arm to bracket on trolley.

**\*\*\*\*\* Include the following paragraph if festoon stack section is required for runway track. \*\*\*\*\***

- S. Festoon stack section: Install section to end of runway track. Use leveling screws to align section and runway track. Position end stop and make welded connection as indicated on shop drawings.

**\*\*\*\*\* Include the following if electric, air, or vacuum festoon system is used. \*\*\*\*\***

- T. Festoon system: Install on runway and bridge.
1. Bolt festoon clamps to enclosed tracks. Slide festoon [trolleys] [gliders] through open end of tracks. Thread [electrical cable] [air hose] [vacuum hose] through festoon [trolleys] [gliders].
  2. Equally space [trolleys] [gliders] along track and secure [cable] [hose] with [clamps] [velcro straps].
    - a. Runway: 72 inches spacing.
    - b. Bridge: 36 inches spacing.

**\*\*\*\*\* Include the following paragraph if motorized tractor drives are used. \*\*\*\*\***

- U. Make electrical connections from tractor drive to power source and install controls.

### **3.3 FIELD QUALITY CONTROL**

- A. Move bridge and hoist trolley through entire travel to ensure crane is clear of obstructions and moves freely and smoothly.
- B. Inspect installed crane. Verify all bolts are tight and lock washers fully compressed.

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- C. Field test crane and accessories for operating functions. Ensure crane movement is smooth and proper. [Verify motorized operation and controls function properly.] Adjust as required and correct deficiencies.
- D. Clean surfaces. If necessary, touch-up paint damage, scratches, and blemishes with manufacturer provided matching paint.
- E. Protect crane from other construction operations.

### **3.4 DEMONSTRATING AND TRAINING**

- A. In accordance with Section 01755 - Starting, Adjusting, and Demonstrating, provide demonstration and training session for Owner's representative covering operation and maintenance of ceiling mounted work station bridge crane.

**END OF SECTION**