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SECTION 14661

FREE STANDING WORK STATION JIB CRANE

******* Gorbel, Inc. manufacturers 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 free standing work station jib cranes into a competitively bid construction project.

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

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

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.**

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PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Free standing, manually operated, work station, jib crane including hoist trolley.

B. Related sections:

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

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1. Section 03300 - Cast-in-Place Concrete: Concrete foundation to receive free standing work station jib crane.

******* Hoist trolley to support and move lifting device along boom is provided as part of work station jib crane. However, 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.

3. Section 16100 - Wiring Methods: Electrical supply, conduit, wiring, and other electrical components for powering lifting device.

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.

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 consist of free standing mast requiring only foundation support and rotating boom covering circular work area around mast.

1. Rotation: 360 degrees.

2. Crane shall be designed for minimum effort manual rotation.

3. Boom shall not drift when at rest.

4. Maximum deflection at boom end: 1/150 span based on capacity plus 15 percent for hoist and trolley weight.

5. Trolley operating temperature: 5 to 200 degrees F.

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

B. Crane shall be designed to withstand:

1. Crane and hoist dead load.

2. Live load capacity equal to net rated hook load: [100] [150] [250] [500] [1000] pounds.

3. Inertia forces from crane and load movement.

******* Typically cranes are designed for normal interior operation. Contact Gorbel, Inc. 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, 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 on live load capacity plus 15 percent for hoist and trolley weight and 25 [_____] percent for impact.

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

A. Provide under provisions of Section 01780 - Closeout Submittals: 5 years warranty for crane to cover defects in materials and workmanship.

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.

B. Requests to use equivalent products of other manufacturers shall be submitted in accordance with Section 01630 - Product Substitution Procedures.

2.2 FREE STANDING WORK STATION JIB CRANE

******* Refer to Gorbel® pre-engineered crane tables in product literature for complete model number based on capacity, span, and height under boom. Cranes with other spans and heights are available using programs at www.gorbel.com or contacting Gorbel, Inc. Edit the following and complete model number to indicate specific crane and accessories to be specified. *******

A. Type: Free standing, base plate mounted, manually operated, steel work station jib crane consisting of stationary mast and rotating boom and equipped with pivot pin, trunnion roller assembly, enclosed track, hoist trolley, [electrical entry collector,] [compressed air swivel,] [electrical cable] [air hose] [festoon gliders] [festoon trolleys] [vacuum hose trolleys] and other accessories; Model No. WSJ360-[__capacity in pounds__]- [__height under boom__]-[__span__] as manufactured by Gorbel, Inc.

B. Span: [4] [6] [8] [10] [12] [14] [16] feet.

C. Under boom height: [8] [10] [12] [14] feet.

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

1. Mast: Stationary steel pipe, perpendicular to boom. Equip mast with:

a. Baseplate: Square or hexagonal steel base plate welded to mast for anchoring crane to concrete foundation. Weld triangular, full-web gusset plates to mast and base plate for stability and reinforcement. Cranes with open gussets or base plates made from rings and subject to warping are not acceptable.

b. Top plate: Circular steel plate with pivot pin to receive boom. Provide retaining pin to prevent accidentally dislodging boom. Cranes without retaining pin are not acceptable.

2. Boom: Open truss construction fabricated from rectangular steel tubes and enclosed steel track.

a. Configuration: L-shape with horizontal boom and vertical leg to hold trunnion rollers.

b. Trolley track: Enclosed, cold formed, steel box track which serves as bottom cord of horizontal boom and permits 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.

c. Trunnion roller assembly: Designed to rotate around mast and transmit moment load from boom to mast. Assembly is bolted to steel attachment angle welded to bottom leg of boom and consists of two rollers held in steel bracket with bolts. Assembly shall rotate around mast with full roller face contact. Roller surface shall be sufficiently large to prevent cutting into mast.

d. Pivot assembly: Attached to extended top cord of boom and fits over mast pivot pin. Provide with tapered roller pivot bearings.

3. Hoist trolley: Rigid-body trolley designed to ride inside enclosed track 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 manufacture for specified capacity. Trolleys with non-removable clevis pins are not acceptable.

b. Wheels: Four, removable, self-centering wheels with sealed lifetime lubricated bears and tapered 2 degrees to match track profile. Non removable or non-tapered wheels are not acceptable.

c. Drop lugs: Provide on both sides of trolley to limit trolley dropping 1 inch maximum in event of wheel, axle, or load bar failure.

4. End stops: Molded composite, resilient bumper installed in track at boom end to prevent hoist trolley and festoon carriers from rolling out of track. Bolt stops without energy absorbing bumper at not acceptable.

2.3 ACCESSORIES

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

******* Electrical power can be provided for lifting devices with either bottom or top entry collector. Include the following to specify bottom entry electrical power supply. *******

A. Electrical bottom entry collector: Provide electrical collector installed above mast on boom to conduct electrical power from inside mast through mast pivot pin to electrically operated lifting device suspended from trolley. Collector shall allow continuous 360 degrees crane rotation.

******* Include the following to specify top entry electrical power supply. *******

B. Electrical top entry collector: Provide electrical collector installed on boom to

conduct electrical power from overhead electrical source to electrically operated lifting device suspended from trolley. Collector shall be fitted with pivot arm connected to source conduit and allow continuous 360 degrees crane rotation.

******* Compressed air for air-powered lifting devices can be supplied with either bottom or top entry air swivel. Include the following to specify bottom entry compressed air supply. *******

C. Bottom entry compressed air swivel: Provide air swivel installed above mast on boom to convey compressed air supply inside mast through mast pivot pin to air powered lifting device suspended from trolley. Swivel shall allow continuous 360 degrees crane rotation.

******* Include the following paragraph to specify top entry compressed air swivel. *******

D. Top entry compressed air swivel: Provide air swivel installed on boom to convey compressed air from overhead source to air-powered lifting device suspended from trolley. Swivel shall allow continuous 360 degrees crane rotation.

******* If electric or air-powdered lifting device is used, a length of cable or hose can be provided for attachment to boom. Include the following to specify hose or cable. *******

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

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

F. Festoon trolleys: Four-wheeled trolleys with pivoting saddle and [U-bolt clamp] [velcro strap] to support [electrical cable] [air hose] [vacuum hose] on boom and allowing festooning as 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. ******

G. Festoon gliders: [__material__], T-shaped gliders with adjustable [clamp bar] [velcro strap] to support [electrical cable] [air hose] [vacuum hose] on boom and allowing festooning as hoist trolley travels.

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

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

******* Include the following paragraph to specify rotation stops to limit boom rotation to less than 360 degrees. *******

I. Rotation stops: Provide steel angle rotation stops welded to mast to limit boom rotation to less than 360 degrees.

******* Free standing work station jib cranes can be provided with a base assembly capable of being lifted with lift truck and transported to multiple locations. *******

J. Portable base: Provide steel base assembly to anchor mast and allow crane to be transported to multiple locations with lift truck.

2.4 SHOP FINISHING

A. Steam wash steel crane components with iron phosphate solution and apply blue baked enamel finish.

B. Provide spray can of matching color, air-drying paint for field touch-up.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate provision of crane with:

******* Reinforced concrete foundations supporting crane must be designed, detailed on drawings, and specified by architect/engineer to accommodate crane type, capacity, span, height under boom, soil bearing pressure, and other project specific conditions. Free standing work station jib cranes with portable bases do not require foundation with anchor bolts. However, floor slabs where crane will be positioned must be reinforced to support imposed loads. *******

1. Design and construction of reinforced concrete [footings] [slabs] as detailed on Drawings and specified in other sections. Ensure that accurate crane applied forces [and anchor bolt patterns] are provided for foundation design.

******* Include the following paragraph if electric lifting device is being used. *******

2. Provision of electrical supply, conduit, wiring, disconnect switch, and other electrical components for powering electrically operated lifting device.

B. Prior to installation:

1. Verify reinforced concrete [foundations] [slabs] have cured 7 days minimum. Ensure that [foundations] [slabs] have cured 28 days minimum prior to using crane to full capacity.

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 by 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.

******* Include the following if mast base plate is permanently anchored to concrete foundation. Delete paragraph if portable base is provided for jib crane. *******

D. Mast: Cover base plate foundation area with 1 inch grout. Set mast into place and completely seat base plate in grout. Use plumb bob with 48 inches minimum line to plumb mast. Check alignment at 60 degree points. When mast is plumb and grout cured, tighten anchor bolts to full compression of lockwasher.

******* Edit the following to reflect if electrical collector or air swivel is required. *******

E. Boom assembly: Install on mast [in conjunction with [electrical entry collector] [entry compressed air swivel].

1. Place pivot bearing on mast pivot pin. Place boom assembly onto mast pin. Secure with retaining pin inserted through pivot pin.

******* Include the following paragraph if electrical collector or air swivel is required. *******

2. Install [electrical] [compressed air] entry collectors and make connections to [power] [air] source.

3. Trunnion rollers: Bolt to support angle at bottom of vertical boom assembly leg. Ensure rollers have full contact with mast.

4. Level boom with shims and adjusting trunnion roller assembly. Adjust to eliminate boom drift.

5. Set boom rotation speed by adjusting friction brake bolts. Do not overtighten

friction bolts and cause higher pull forces.

***** **Include the following paragraph if boom rotation stops are required.** *****

F. Rotation stops: Swing boom to farthest position of use on one side. Weld stop to mast approximately 6 inches above trunnion roller assembly with stop flush against boom vertical leg. Repeat procedure for other side.

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

G. Festoon system: At inside boom end, bolt festoon clamp to enclosed track. Slide festoon [trolleys] [gliders] through open end of boom track. Thread [electrical cable] [air hose] [vacuum hose] through festoon [trolleys] [gliders]. Equally space [trolleys] [gliders] along boom and secure [cable] [hose] with [clamps] [velcro straps].

H. Hoist trolley: Attach lifting device to hoist trolley saddle clevis. Secure clevis pin with cotter pin. Roll hoist trolley into open end of track.

I. End stop: Install stop on open end of boom track.

3.3 FIELD QUALITY CONTROL

A. Move boom through entire travel to ensure boom is clear of obstructions, rotates freely, and does not drift.

B. Inspect installed crane. Verify all bolts are tight and lockwashers fully compressed. Verify mast is plumb and boom is level.

C. Field test crane and accessories for operating functions. Ensure crane movement is smooth and proper. 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.

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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 free standing work station jib crane.

END OF SECTION