SECTION 14630 - BRIDGE CRANES

City of San Diego, CWP Guidelines

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing electrically operated bridge cranes of the low headroom type, designed for travel in both directions and mounted on structural sections.

1.2 RELATED SECTIONS

A. The WORK of the following Section applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 14600 Hoists and Cranes, General

1.3 SERVICES OF MANUFACTURER

A. Services of manufacturer shall comply with Section 14600. The authorized manufacturer's representative shall visit the site for not less than [ ] days.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. **Requirement:** The bridge crane system shall be controlled from a pendant pushbutton station and shall include safety devices and overload protection. The power supply shall be from enclosed, UL-approved conductor bar systems. The rails shall be standard I-beams, or fabricated steel sections anchored to the structure as indicated and as required by the UBC for seismic loads. The track deflection shall not exceed 1/800 of the span, or 1-1/4 inches, whichever is less. The crane system, except the tracks, shall be the product of a crane manufacturer regularly engaged in the manufacture of such equipment.

B. **Site Conditions:** The bridge crane shall comply with the following:

Equipment No. - [ ]

Location - [ ]

Atmosphere - [outdoors] [indoors] [chlorine gas]

C. **Design Criteria:** The bridge crane system shall comply with the following:

Equipment No. - [ ]

Type of Crane	-	[top running] [underhung]	
Type of Bridge	-	[single beam] [double girder]	
Capacity (tons)	-	[ ]	
Maximum lift (feet)	-	[ ]	
Length of track (feet)	-	[ ]	
Length of bridge (feet)	-	[ ]	
Span between tracks (feet)	-	[ ]	
Speed Control	-	[Single Speed] [Multiple Speed]	
Lifting Speed (fpm)	-	[15]	[ ]
Trolley Speed (fpm)	-	[65]	[ ]
Bridge Speed (fpm)	-	[65]	[ ]
Hoist Motor (hp)	-	[ ]	
Trolley Motor (hp)	-	[ ]	
Bridge Motor (hp)	-	[ ]	
Power Supply (V-ph-Hz)	-	[480-3-60]	

2.2 FABRICATION

A. **Hook and Wire Rope:** The lifting hook shall be fabricated of drop-forged, heat-treated steel and shall include 360-degree swivel on a shielded roller thrust bearing with safety spring latch. The wire ropes shall be fabricated of plow steel with steel center complete and shall include swaged fittings.

B. **Hoist and Drive:** The hoisting drum shall be deep grooved flanged drum with at least 2 full turns of rope remaining on the drum at the lowest hook position and shall include heavy-duty pre-lubricated sealed bearings. The drum shall be driven by a helical gear reducer with external spur drum gear enclosed in an oil-tight housing. The housing motor shall be a standard, 30-minute duty-motor, 1750 rpm, with NEMA-type shaft extension. The hoisting mechanism shall include dc magnet-actuated disc motor brake with hook drift. The motor shall be rated at minimum of 150 percent of full load torque, with gravity type upper and lower hook limit switch, and an overload cut-off switch designed to interrupt the raising circuit.

C. **Trolley Assembly:** The trolley assembly shall be a [top-running type with structural frame welded into an assembly for proper wheel and bearing alignment] [underhung type]. The trolley assembly shall be supported by trolley wheels with tapered tread surfaces hardened to 375 to 425

Brinell. Each wheel shall be supported on tapered roller bearings suitable to take radial and thrust loads. The wheel mounting shall be designed so that axles and wheels can be removed without affecting alignment. The wheel tread shall be smooth, true, and uniform within 0.010-inch tread diameter on all wheels.

D. **Trolley Drive**: The trolley shall be driven by a 30-minute-duty-cycle rated motor with oil-tight gear reducer conforming to NEMA Specifications. The motor shall include cushion start and controller designed for smooth travel and load control. The driver shall provide synchronous drive from gear reducer to both drive wheels. The trolley drive shall include integrally mounted spring set and an electrically-released drag brake.

E. **Crane Bridge Assembly:** The crane bridge assembly shall be a single beam over-riding or top-running double beam center-drive type. The bridge beam shall be designed in accordance with the specifications of the Crane Manufacturers Association of America. It shall be fabricated of standard structural shapes complying with AISC Specifications. At full load, the beam shall be designed to limit the deflection to 1/600 of the span, but not to exceed 1-1/4-inch maximum deflection. An ASCE rail shall be provided on top of the beam securely fastened in place to maintain center distance. Provision shall be made to prevent creeping of bridge rails by means of positive stops at the ends of the rails. Crane shall be reinforced with outrigger to provide squareness with end truck, adequate lateral stiffness with a minimum lateral moment of inertia of 1/20 that of the vertical beam. Outrigger shall be designed to support squaring shaft and the crane drive motor and gear reducer assembly.

F. **End Trucks:** The end trucks shall be traversed by stable assembly of structural shapes welded together to provide proper wheel and bearing alignment. The end truck wheel base shall be minimum of 1/7 of the crane span. One wheel of each end truck shall be geared and meshed with the pinion mounted on the crane squaring shaft. The crane and trucks shall contain diaphragm members welded to truck frames to maintain alignment and distribute truck loads on inner and outer truck members. The truck shall be designed so that, in case of a wheel axle or wheel failure, the drop of the load will be limited to one inch. The end trucks shall be fastened to the bridge beams with bolts to ensure alignment.

G. **Crane Wheels:** Crane wheels shall have tread surfaces hardened to 375 to 425 Brinell. Treads shall be tapered to provide proper running alignment. Each wheel shall be supported on tapered roller bearings mounted on stationary axles, designed for radial and thrust loads. The wheels shall be lubricated at the factory with a sodium base grease, and shall include adequate reservoir of lubricant to eliminate the need for field lubrication. Wheel axles must have mounting nuts for bearing adjustment. Wheel mounting shall be designed so that axles and wheels can be removed without disturbing alignment. Wheel treads shall be smooth, true, and uniform within 0.01-inch tread diameter on all wheels.

H. **Crane Drive:** The crane drive motor shall be totally enclosed, 30-minute cycle rated. The motor shall be integral with a fully enclosed oil splash lubricated gear reduction. The motor, the drive shaft, and the gear reduction shafts shall be supported by permanently lubricated precision ball or roller bearings. The drive shaft shall provide synchronous drive from the gear reduction to both end trucks. The crane drive shall include integrally-mounted spring set electrically released dc rectified disc brake.

I. **Drive Shaft:** The drive shaft of the crane shall be supported on lubricated, precision, ball-bearing pillow blocks on 10-ft maximum centers. Pillow blocks shall be lubricated through pressure grease fittings. The crane drive shaft shall be steel and designed to limit torsional shaft stress to 6,000 psi. Maximum torsional twist angle in the drive shaft shall not exceed one degree of the wheel rotation under maximum rated load.

J. **Bearing Life:** Bearings in crane wheels and bearings supporting the drive and gear reduction shafts shall be designed for 5,000 hrs L-10 bearing life minimum.

K. **Gearing:** Gears shall be cut from solid blanks with 20-degree pressure angle involute shape for high strength and shall comply with AGMA specifications for load ratings. Gears operating at higher than 20 fpm pitch line speed shall be fully enclosed in oil-tight housings and lubricated by splash principle. Gear teeth shall have ductile cores and be surface hardened to RC40 minimum. The gear shall provide for a minimum service of 4,000 hr.

L. **Bridge Stops:** The bridge shall be provided with bumpers capable of stopping the crane (not including the lifted load) at a rate of deceleration not to exceed 3 fps^2 when traveling in either direction at 20 percent of rated speed. The bumpers shall have sufficient energy absorbing capacity to stop the crane when traveling at a speed of at least 40 percent of the rated load speed. Bridge trucks shall be equipped with sweeps which extend below the top of the rail and project in front of the crane wheel.

M. **Runway Beams and Rails:** The runway beams and rails shall comply with the indicated requirements. The rails shall be an ASCE type securely fastened into the runway beams. The runway beams shall be designed from an ASTM A36 structural steel shape and shall have a maximum deflection not to exceed 1/800 of the span. The beams shall be equipped with stops on both ends capable of withstanding the impact of the fully loaded crane at 50 percent of rated speed, and shall be field-adjustable. Necessary column supports or clamps, hanger rods, bolts, and fittings shall be provided.

N. **Electrical Controls:** Electrical controls shall be single-speed or multiple-speed as recommended by the manufacturer. Bridge control shall include a mainline magnetic contactor, manually-operated fused mainline disconnect with lock-out provisions, branch circuit fuses, reversing bridge control, and transformer with fused secondary. Bridge control shall be mounted on bridge in an enclosure, NEMA rated in accordance with the area designations of Section 16050, actuated from a pendant pushbutton station suspended from movable trolley, by means of a retractable cable to permit operation at 4 feet above all floor levels. Motors shall include cushion start.

O. **Conductor and Wirings:** The runway shall be provided with enclosed conductor base electrification. The bridge shall have a rigid truck festoon type electrification. Other wiring of the crane shall be in rigid or flexible conduit and in accordance with National Electrical Code and complying with Fire Underwriters specifications. When a crane is shipped knocked down, the wiring shall terminate in terminal boxes and the wire end shall be provided with permanent marking tags.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Bridge cranes shall be installed in accordance with Section 14600.

** END OF SECTION **