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| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | November 26, 2007 | Correct document uploaded. |
| 3 | November 16, 2009 | Modified ‘Related Sections’ and approved suppliers |
| 4 | October 29, 2014 | First draft review (AV) |
| **5** | **March 2, 2015** | **Updated, Finalized Specification – Legal Reference eDOCS #5793239 v9 (AV)** |
| 6 | November 11, 2016 | Updated NEMA MG-1 reference to 2016 new version and NFPA 70 to 2017 Edition (AV) |

NOTE:

This is a CONTROLLED Document. Any documents appearing in paper form are not controlled and should be checked against the on-line file version prior to use.

**Notice:** This Document hardcopy must be used for reference purpose only.

**The on-line copy is the current version of the document.**

# GENERAL

## Work of This Section

### The work of this Section includes providing the overhead travelling cranes and accessories for a complete functional system.

### Unit Responsibility: The work requires that the overhead travelling cranes, complete with all accessories and appurtenances (including, but not necessarily limited to, electric motors, pendant controls, conductors and components), be the end product of one responsible system manufacturer or responsible system supplier. Unless otherwise indicated, the Contractor shall obtain each system from the responsible supplier of the equipment, which supplier shall furnish all components and accessories of the system to enhance compatibility, ease of operation and maintenance, and as necessary to place the equipment in operation in conformance with the specified performance, features and functions without altering or modifying the Contractor’s responsibilities under the Contract Documents. The Contractor shall provide the equipment system as specified in this Section.

## Related Sections

*[Under "Related Sections", identify other Sections that are related to, and/or dependent on, the work results or information specified elsewhere. The list should be limited to Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance Section, a cross-reference would be appropriate in the finish hardware Section. The purpose of this cross-referencing is for information only, to aid in finding those other requirements—not to define the scope of the Section.*

*Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple Sections and which must meet certain performance requirements as an assembly or system.*

*Consultant to ensure all aspects of the Ontario Building Code (OBC) pertaining to cranes and hoists are adequately addressed in other specifications so that compliance with OBC is not required in these specifications.*

*Contractor is responsible for coordination of the Work.*

*This Section is to be completed/updated during the design development by the Consultant. If it is not applicable to the section for the specific project it may be deleted.]*

*[List Sections specifying installation of products supplied but not installed under this Section and indicate specific items.]*

Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Execution requirements for ...[item]... specified under this Section.

*[List Sections specifying products installed but not supplied under this Section and indicate specific items.]*

Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Product requirements for ...[item]... for installation under this Section.

*[List Sections specifying related requirements.]*

Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: [Optional short phrase indicating relationship].

#### Section 01300 – Submittals

#### Section 01425 - Computerized Maintenance Management System Data Requirements

#### Section 01430 - Operation and Maintenance Data

#### Section 01640 - Manufacturer's Services

#### Section 01810 – Equipment Testing and Facility Commissioning

#### Section 01820 - Demonstration and Training

#### Section 09900 – Painting and Protective Coating

#### Section 16010 – Electrical General Requirements

#### Division 1 – General Requirements

#### Section 21 – Development and Maintenance of Asset Inventory and Tagging

## References

*[Delete .1 if Section 01060 – Regulatory Requirements is included in Contract Documents.]*

### Comply with the latest edition of the following statutes, codes, standards, and all amendments thereto:

#### American National Standards Institute (ANSI) and American Society of Mechanical Engineering (ASME):

##### ANSI/ASME B30.17-2006 (R2012), Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist).

##### ASME B30.2/ASME B30.11/ANSI/ASME B30.17, Cranes Package.

##### ASME B30.10-2014, Hooks.

##### ASME B30.11-2010, Monorails and Underhung Cranes – Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks and Slings.

##### ASME B30.2-2011, Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist).

##### ASME B30.16-2012, Overhead Hoists (Underhung).

##### ASME HST-1-2012, Performance Standard for Electric Chain Hoists.

##### ASME HST-22014, Performance Standard for Hand Chain Manually Operated Chain Hoists.

##### ANSI/ASME HST4-1999, Performance Standard for Overhead Electric Wire Rope Hoists.

#### Underwriters Laboratory (UL), ULC (Canada)

##### UL 674, Electric Motors and Generators for Use in Hazardous (Classified) Locations.

#### Crane Manufacturer’s Association of America (CMAA):

##### Specification No. 70-2010, Multiple Girder Cranes.

##### Specification No. 74-2010, Single Girder Cranes.

#### National Electrical Manufacturer’s Association (NEMA):

##### ANSI/NEMA MG 1-2016, Motors and Generators.

##### NEMA 250-2014, Enclosures for Electrical Equipment (1,000 V Maximum).

#### Occupational Health and Safety Act (Ontario)

##### R.R.O. 1990, Regulation 851/90, Industrial Establishments as amended by Ontario Reg. 98/11

#### CSA

##### CSA B167-08 (R2014), Overhead Travelling Cranes – Design, Inspection, Testing, Maintenance, and Safe Operation.

#### National Fire Protection Association (NFPA): 70, National Electrical Code (NEC) 2017 Edition:

##### Chapter 2, Article 250, Grounding and Bonding

##### Chapter 6, Article 610, Cranes and Hoists.

## Measurement and Payment

*[Choose one of the following payment language provisions that best suits the individual project.*

*If this Section is not specifically referenced by an item in the Bid Form, please use the following language:*

.1 The work of this Section will not be measured separately for payment. All costs associated with the work of this Section shall be included in the Contract Price.

*OR If this Section is specifically referenced in the Bid Form, use the following language and identify the relevant item in the Bid Form:*

.1 All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in the Bid Form.

*If the work of this Section is to be measured and paid for by several different methods, please amend the standard wording given above to reflect the different methods of measurement and payment.*]

## Submittals

### Action Submittals, in accordance with Section 01300 - Submittals:

#### Shop Drawings:

##### Make, model, weight, and kW (horsepower) of each equipment assembly.

##### Complete catalogue information, descriptive literature, materials of construction, and specifications on bridge drive system, end trucks, runway stops, foot-walks and platforms, wheels, shafting, drive motor, gears and bearing, steel framing, trolley drive system, hoist motor and assemblies, hook, brakes, starting system, variable speed drive system, conductors (bus bar, festoon, cable reel), controls, remote control system, and accessories.

##### Structural design calculations for runway beams and support system and calculations of deflection and loads on building steel certified correct by a professional engineer licensed to practice in the Province of Ontario.

##### Detail shop drawings of crane runways, brackets, hangers, and their attachments to building structural steel.

##### Power and control wiring diagrams, including terminals and numbers.

##### Motor nameplate data in accordance with ANSI/NEMA MG 1-2016 and include any motor modifications.

##### Factory finish system.

##### Certified test results of load tests for overhead travelling cranes.

##### All equipment information in accordance with Section 01425 - Computerized Maintenance Management System Data Requirements.

### Informational Submittals, in accordance with Section 01300 - Submittals:

#### Factory Acceptance Test Report.

#### Manufacturer’s Certification of Compliance that the factory finish system is identical to the requirements specified in this Section.

#### Special shipping, storage and protection, and handling instructions.

#### Manufacturer’s printed installation instructions.

#### Manufacturer’s Certificate of Proper Installation.

#### List of suggested spare parts required to maintain the equipment in service for a minimum period of five years. Include a list of special tools required for checking, testing, parts replacement, and maintenance with current price information.

#### List of special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.

#### General arrangement engineering description and complete list of materials of the crane.

#### Details of runway beams, track rails, safety stops and bumper.

#### Details of trolleys and wheel load data.

#### Details of hoists, cable and hooks.

#### Details of electrical conductors and collectors.

#### Control details, control panel layout, schematic and wiring diagrams.

#### Operation and Maintenance Data: As specified in Section 01430 - Operation and Maintenance Data.

# PRODUCTS

## General

### The Contractor shall ensure that the crane manufacturer will coordinate equipment requirements with steel structures, panels, drive motor, control panel, trolley and hoist, hoisting cable or chain, hook, crane mounted conductors, rails, stops, and electrical equipment controls.

### Where adjustable speed drives or remote control systems are required, the Contractor shall ensure that the crane manufacturer will furnish a coordinated operating system.

## Approved Suppliers

### Hoist and Crane:

#### Kito Canada Inc. (Subsidiary of Kito Corporation).

#### Lift-Tech International. A Division of Columbus McKinnon Corporation (Yale Shaw-Box brand).

#### Richards-Wilcox Inc.

#### Demag Cranes & Components Corp.

#### Approved Equivalent

## Design Requirements

### Top Running Multiple Girder Overhead Traveling Crane: CMAA Specification No. 70-2010, Multiple Girder Cranes and ASME B30.2-2011 and ASME B30.17-2006 (R2012).

### Top Running and Underhung Single Girder Overhead Traveling Cranes: CMAA Specification No. 74-2010, and ANSI B30.11-2010.

### Crane Service Class: CMAA Specification No. 74-2010.

### Trolley Service Class: CMAA Specification No. 70-2010, Multiple Girder Cranes.

### Wire Rope Hoist Service Class: ANSI/ASME HST 4-1999 and CMAA Specification No. 70-2010 or Specification No. 74-2010.

### Chain Hoist Service Class: ANSI HST 1-2012 and CMAA Specification No. 70-2010 or Specification No. 74-2010.

### Hook: ANSI 30.10-2014.

### Building Clearances: CMAA Specification No. 70-2010 and Specification No. 74-2010. Where bridge span exceeds 40 feet, increase clearance to 6 inches.

### Stress and Safety Factors: CMAA No. Specification 70-2010 and Specification No. 74-2010. Properly select materials of construction that can withstand the stresses the materials will be subjected to.

### Safety of Operation, Accessibility, Interchangeability, and Durability of Parts: ANSI B30.2-2011 and applicable OH&SA requirements *[Consultant to specify applicable provincial OH&SA requirements]*

### In accordance with CSA B167-08 (R2014). *[Consultant to specify applicable sections of CSA B167-08 (R2014) requirements]*

### Design the equipment so that it is suitable for the operational environment.

## Runway

### Furnish runway beams, brackets, and associated framework in accordance with Section [      ] - Structural Steel.

### Runway rails shall conform to cross sections and weights per yard as specified in CMAA Specification No. 70-2010 or Specification No. 74-2010. Furnish rails, crane stops, and conductors by crane manufacturer.

### Support underhung crane runway rails by a suspension system of hanger rods and joints which will permit runway rails to adjust to normal fluctuations of weight occurring as crane travels along rails. Design the suspension system for minimal support rod bending stresses. Furnish slotted holes and shims for lateral and vertical rail adjustment. Brace one rail laterally to prevent excess motion of runway. Brace both rails longitudinally.

## Bridge

### Furnish girders from structural shapes proportioned to resist vertical, lateral, and torsional forces.

### Construct bridge end trucks in accordance with CMAA No. Specification 70-2010 or Specification No. 74-2010. Furnish end trucks with rail sweeps and impact absorbing bumpers.

### Furnish runway stops attached to resist force applied when contacted and locate at limit of travel of bridge. Runway stops shall not engage the wheels.

### Construct foot-walk of anti-slip plate, with toe guard, trussed handrails, and live load in accordance with CMAA Specification No. 70-2010 or Specification No. 74-2010. Walkways full crane width. Furnish access doors to building platforms and ladders.

### Wheels: Rolled or forged steel with treads and flanges heat treated, or cast iron wheels with chilled tread. Minimum tread hardness 200 Brinell. Clearances, wheel loads, and tolerances in accordance with CMAA Specification No. 70-2010 or Specification No. 74-2010. Wheel axles of alloy steel, machined and ground to receive inner bearing races. Use rotating axles and wheels mounted by press fit and keys.

### Bridge driving machinery shall consist of a cross shaft (the shaft extending across the bridge used to transmit torque from the motor to bridge drive wheels) driven by an electrical motor through a gear speed reducer unit. The cross shaft shall be composed of high grade steel and be machine turned, ground, polished, and adequately supported on the crane structure with self-aligning bearings. The  cross shaft shall be strong enough to resist torsional strains when the bridge is traveling under full load, or when stopped suddenly. Furnish oil tight speed reducer gear case and support on a common base with the bridge brake.

### Drive Gears: Helical, spur or herringbone type, rolled or cast steel, with machine cut teeth.

### Bearings: Combination radial and thrust type, double row, spherical ball, either pre-lubricated and sealed or fitted for pressure lubrication. Pressure lubrication fittings for maintenance accessibility.

### Brakes: Electrically operated, adjustable, suitable for the service class indicated, with rated torque capacities as specified in CMAA Specification No. 70-2010 or Specification No. 74-2010.

## Trolley

### Frame: Welded steel, cast steel, or ductile iron construction, or a combination thereof. Design to control deflection of trolley assembly while transmitting the carrying load to bridge rails.

### The drive shall consist of a trolley drive shaft, driven by an electric motor through a gear reduction unit.

### Furnish roller assembly stabilizers on single girder trolley units to prevent tipping during load pickup.

### Wheels: Rolled or forged steel, accurately machined and ground to receive inner bearing races. Furnish alloy steel axles. Rotating axles with wheels mounted press fit and keys, or with keys alone. Minimum tread hardness 210 Brinell.

### Drive Gears: Helical, spur or herringbone type, rolled or cast steel, with machine cut teeth.

### Bearings: Combination radial and thrust type, double row, angular contact ball bearings or single row tapered roller bearings. Bearings pre-lubricated and sealed, or fitted for pressure lubrication. Locate pressure lubrication fittings for accessibility during maintenance.

### Brakes: Suitable for service class and rated torque capacities as specified in ANSI B30.11-2010. Furnish stops on trolley rails or beams.

## Hoist

### Hoisting machinery shall consist of rope drum driven through gear reductions, load blocks, hook, hoisting rope, sheaves, and hoist braking. Drum size and length shall be sufficient for a minimum of two turns of cable remaining on the drum when the hook is at lowest position.

### Rope drum and surrounding members shall be constructed to minimize abrasion, crushing or jamming of hoist rope. Load blocks enclosed type. Hoisting rope shall be extra flexible, improved plow steel wire rope, made especially for hoist service.

### Hook: Construct with sufficient ductility to open noticeably before hook failure, equipped with safety latch, free to rotate 360 degrees with rated load and positively held in place with locknuts, collars or other devices.

### Brakes: Mechanical and electric load brake and controls, shall be designed in accordance with ASME/ANSI HST-4-1999, and adjustable to compensate for wear.

## Catwalk

### For bridge crane (as applicable) *[Consultant to specify applicable facility locations]* provide a catwalk hanging from the bridge.

### The top elevation of the catwalk should match the floor elevation of the re-lamping platform (as applicable) at Elev. *[Consultant to specify applicable elevation].*

## Electrical

### Furnish electrical equipment including motors, motor starters, pendant control, control systems, wire, and conduit. Bridge conductors may be removed for shipment. Ensure that crane wiring is provided by the crane supplier.

### Electrical: In accordance with NFPA 70, 2017 Edition, National Electrical Code, Chapter 6, Article 610, Cranes and Hoists.

### Furnish motors suitable for hoist, trolley, and bridge drive applications. Controls with 120 volt ac, microprocessor based, pulsed width modulation design, withstand 45 degrees Celsius temperatures, housed in NEMA 250-2014, Type 4 enclosure, and supplied with 200 percent overcurrent protection.

### Bridge and trolley conductor voltage drops from runway supply taps shall permit the crane motors to operate within voltage tolerances of plus or minus 10 percent, when building supply voltage is at plus or minus 5 percent of design voltage.

### Enclosed Bus Bar Conductors: Stainless steel clad hard copper enclosed in insulation. Collector sliding non-copper bearing, carbon shoe type, with adjustable spring tension arms for contact between bus bar and controls. Collector mechanism components shall be made of aluminum, stainless steel, plastic, or other non-corrosive materials.

### Festooned Flat Cable Conductors: Flexible cable, carried by heavy duty roller, permanently lubricated roller bearings, with monorail support system that will dispense and retrieve flexible cable without twisting or tangling, and 20 percent spare conductor in each cable assembly.

### Grounding: External in accordance with NFPA 70, 2017 Edition, National Electrical Code, Chapter 2, Article 250.

## Controls

### Option 1: Furnish electric cranes with pendant control having momentary contact pushbuttons with a device which will disconnect motors from line on failure of power. Device shall not permit any motor to be restarted until controller handle is brought to the OFF position, or a reset switch or button is operated. Furnish with under-voltage protection as a function of each motor controller, or by magnetic main line contactor.

### Option 2: Electric crane control by remote radio control.

### *[Consultant to choose which option is to be employed (in consultation with the Region) and amend specification as appropriate to the option chosen.*

### Controls: Fully magnetic, plain reversing type, housed in NEMA 250-2014, Type 4 enclosure, with contactors of sufficient size and quantity for starting, accelerating, reversing, and stopping duty for specified crane service class.

### Bridge and Trolley Drives: Soft start controls, 600/240 volt ac series device, installed in between drive motor and motor starter with torque and acceleration rate adjustable, suitable for crane service, and work in conjunction with crane controls.

### Pushbutton Control Stations (Pendant): Heavy duty, oil tight, suspended from bridge, with control transformers to supply 120 volt ac power to pushbutton control station. Pushbutton enclosure shall be supported with chain or wire rope. Control wire cable shall be attached to support wire rope at a maximum of 6 foot intervals. Furnish control station buttons for control of bridge, trolley, and hoist, ON/OFF main line contactor power switch which removes all power from crane and controls.

### Remote Control System: Frequency modulated (FM), radio controlled system, belt mounted operator and capable of operating all crane functions.

### Control motions shall indicate the direction of resultant crane motion. Furnish spring-loaded switch motions, with return to OFF position when switch is released and designed to prevent runaway crane situations.

### Crane motions shall stop automatically when the crane can no longer receive remote signals and designed to stop when control signal for any motion becomes ineffective.

### Remote Control Crane Motions: Hook raise and lower, trolley movement, bridge movement, and crane power up and power. Furnish an EMERGENCY OFF pushbutton station which will disconnect the main line power via a remote switch, and manual reset function to activate all motions after an EMERGENCY OFF event.

## Accessories

### Equipment Identification Plate: 16 gauge stainless steel with 1/4 inch die stamped equipment tag number securely mounted in a readily visible location. Mounted on separate components of each crane assembly, to facilitate assembly in the field.

### Lifting Lugs: Equipment weighing over 45 kg (100 pounds).

## Shop Fabrication

### Shop/Factory Coatings: Prepare and prime coat in accordance with Section 09900 – Painting and Protective Coating.

## Source Quality Control

### Factory Inspections: Inspect control panels and equipment for required construction, electrical connection, and intended function.

### Factory Acceptance Tests and adjustments: “No load” run test all equipment furnished.

### Factory Acceptance Test report shall include Test Data Sheets *[Consultant to create and provide to Contractor Test Data Sheets as approved by the Region]*.

# EXECUTION

## Installation

### Install in accordance with the manufacturer’s printed instructions.

### Provide lubrication and lubrication fittings.

## Painting

### Field applied painting of equipment as specified in Section 09900 – Painting and Protective Coating.

## Field Quality Control

### Immediately upon completion of installation, perform complete tests of the crane elements with the manufacturer's technical representative.

### Apply test loads of 125 percent of indicated operating loads in the presence of the Consultant.

### Test the crane and adjust to operate in accordance with the manufacturer’s specifications to full rated capacity in the room for all directions of designed travel and hoisting locations.

### Comply with the requirements of section 55 of the Occupational Health and Safety Act, and Regulation 851 - Industrial Establishments.

### Provide weights and suitable means for connecting the test weight to the hoist hooks.

### Submit certified in-place load test results for hoists.

### Functional Test: Conduct on each crane.

#### Alignment: Test complete assemblies for proper alignment and connection, and quiet operation.

### Performance Test:

#### Conduct on each crane.

#### Load tests in compliance with ANSI B30.11-2010, and ASME B30.16-2012.

## Manufacturer’s Services

### Manufacturer’s Representative: Present the manufacturer’s representative at Site or classroom designated by the Region for training, in accordance with Section 01820 - Demonstration and Training, for the minimum number of person days training listed below, travel time excluded.

#### Contract :

##### 1 person-day, 1 trip for installation assistance and inspection.

##### 1 person-day, 1 trip for functional and performance testing, and completion of Manufacturer’s Certificate of Proper Installation

##### 1 person-day, 1 trip for pre-startup classroom or site training.

##### 1 person-day, 1 trip for facility startup.

##### 1 person-day, 1 trip for post-startup training of Region’s personnel.

### See Section 01640 - Manufacturer's Services and Section 01810 – Equipment Testing and Facility Commissioning.

## Supplements

### The supplements listed below, following “End of Section,” form part of this Section.

#### 14630-01 Overhead Travelling Cranes

##### Crane Data Sheet – Overhead Traveling Cranes.

##### Crane Dimension Sheet: Clearances For Top-Running Cranes.

##### Induction Motor Data Sheet.

**END OF SECTION**