SECTION 41 22 13.13

OVERHEAD AND GANTRY CRANES

EQUIPMENT AND COMPONENT NUMBERS

ID No.	Equipment Name
CRN-D536	Crane System No. 1: WAS RDT Gantry Crane
CRN-D537	Crane System No. 2: FSL RDT Gantry Crane
N/A	Portable Gantry Crane System No. 1: Grit Pump Room Portable Gantry Crane
N/A	Portable Gantry Crane System No. 2: Grit and Screenings Platform Portable Gantry Crane

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:
   1. American Society of Mechanical Engineers (ASME):
      a. B30.2, Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist).
      b. B30.10, Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings.
      c. B30.11, Monorails and Underhung Cranes.
      d. B30.16, Overhead Hoists (Underhung).
      e. B30.17, Cranes and Monorails (With Underhung Trolley or Bridge) Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings.
      f. HST-1, Performance Standard for Electric Chain Hoists.
      g. HST-2, Performance Standard for Hand Chain Manually Operated Chain Hoists.
      h. HST-4, Performance Standard for Overhead Electric Wire Rope Hoists.
   2. American Society for Testing and Materials (ASTM):
      a. A36/A36M, Standard Specification for Carbon Structural Steel.
   3. Canadian Standards Association:
      a. C22.1, Canadian Electrical Code.
      b. C22.1, Section 10, Grounding.
      c. C22.1, Section 40, Electric Cranes and Hoists.
      d. C22.2 No. 33, Construction and Test of Electric Cranes and Hoists.
   4. Crane Manufacturer’s Association of America (CMAA):
      a. 70, Specifications for Top Running Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes.
      b. 74, Specifications for Top Running and Under Running Single Girder Electric Overhead Traveling Cranes Utilizing Under Running Trolley Hoist.
   5. Electrical Equipment Manufacturers Advisory Council (EEMAC):
      a. M1-7, Motors and Generators.
   6. Material Handling Institute (MHI)

7. National Electrical Manufacturer's Association (NEMA):
   a. MG 1, Motors and Generators.
   b. 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
8. Province of Manitoba Occupational Health and Safety Regulations (OHSA).
9. 2010 National Building Code of Canada, with 2011 Manitoba Amendments (NBC).

1.2 DESIGN REQUIREMENTS

A. Top-Running Multiple-Girder Overhead Traveling Cranes: CMAA 70, ASME B30.2 and B30.17.

B. Top-Running and Underhung Single-Girder Overhead Traveling Cranes: CMAA 74, ASME B30.11.

C. Trolleys: ASME B30.17.

D. Hooks: ANSI 30.10.

E. Crane Service Class: CMAA 74.

F. Trolley Service Class: CMAA No. 70.

G. Wire Rope Hoist Service Class: ASME HST-4, CMAA 70 or 74.

H. Chain Hoist Service Class: ASME HST-1, CMAA 70 or 74.

I. Building Clearances: CMAA 70 and 74. Where bridge span exceeds 12 m, increase clearance to 150 mm and as indicated in Contract Documents.

J. Stress and Safety Factors: CMAA 70 and 74. Properly select materials of construction for stresses to which subjected.

K. Safety of Operation, Accessibility, Interchangeability, and Durability of Parts: ASME B30.2.0 and OHSA requirements. Design equipment for environment operated.

L. Design equipment, anchorage, and support systems for vertical and lateral loading in accordance with NBC.

1.3 SUBMITTALS

A. Action Submittals:
   1. Shop Drawings:
      a. Make, model, weight, and horsepower of each equipment assembly.
      b. Complete catalog information, descriptive literature, materials of construction, and specifications on crane drive system, end trucks, runway stops, footwalks 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, support brackets for electrical cables and accessories.

c. General arrangement drawings showing equipment dimensions, building clearances, hook approach, and hook travel.
d. Detailed crane load testing procedure, plan and sections showing temporary shoring arrangement for the floors below, staging area, material, size and loads used, temporary rails, temporary anchoring arrangement etc. as required for successful testing per application law.
e. Power and control wiring diagrams, including terminals and numbers.
f. Motor nameplate data in accordance with EEMAC M1-7 including any motor modifications.
g. Factory finish system.

B. Information Submittals:
1. Factory Functional Test Report.
2. Manufacturer's Certification of Compliance that the factory finish system is identical to the requirements specified herein.
3. Special shipping, storage and protection, and handling instructions.
4. Manufacturer's printed installation instructions.
5. Manufacturer's Certificate of Proper Installation.
6. Certified load test results.
7. Suggested spare parts list to maintain the equipment in service for a period of 5 years. Include a list of special tools required for checking, testing, parts replacement, and maintenance with current price information.
8. List of special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.
9. Operation and Maintenance Manuals.
10. Written certification from Professional Engineer licensed in province of Manitoba stating that support systems, anchorage, and equipment have been designed in accordance with requirements of NBC for post-disaster structures, at time of Shop Drawing submittals.

1.4 CONDITIONS OF SERVICE

A. Temperature:
1. Indoor Locations: Minimum 5 degrees C, maximum 35 degrees C.
2. Outdoor Locations: Minimum minus 35 degrees C, maximum 30 degrees C.

B. Humidity: 30 to 100 percent.

C. Hazardous Area Classification: As shown on Electrical Drawings and Data Sheets and end of section.

D. Equipment located outdoors shall be suitable for and capable of functioning with exposure to sun, wind, rain, snow, ice, and weather conditions typical of the project location.

1.5 EXTRA MATERIALS

A. Furnish for each remote controlled crane:
1. One transmitter.
2. One battery.

PART 2 PRODUCTS

2.1 GENERAL

A. Crane manufacturer to coordinate equipment requirements with steel structures, drive motors, control panels, trolley and hoist, hoisting cable or chain, hook, crane-mounted conductors, rails, stops, and electrical equipment controls.

B. Where adjustable speed drives or remote control systems are required, crane manufacturer to furnish a coordinated operating system.

C. Provide shoring system for all floors while performing crane load test. Ensure that loading indicated for structural members are not exceeded during testing time.

2.2 MANUFACTURERS

A. Crane systems, equipment, and accessories specified in this section shall be products of:
   1. Steelway/Zelus Material Handling.
   2. CRS CraneSystems Inc.
   3. Demag Cranes and Components.
   4. Konecranes/Morris Material Handling.

B. Portable gantry crane systems shall be product of:
   1. Easily Moved Equipment Inc. (EME).

C. No “or-equal” or substitute products will be considered.

2.3 SUPPLEMENTS

A. See supplements to this section for additional requirements.

2.4 GANTRY CRANES

A. Runways:
   1. Gantry crane runway rails shall be mounted on concrete curbs as shown on Drawings. Rails shall be secured to concrete with Gantrex W2 weldlock steel soleplates complete with MK 2 pads, or approved equal in accordance with B8, using adhesive anchor bolts. Leveling shall be achieved by use of threaded screws through sole plates, and removed after curing of epoxy grout under sole plate. Sole plates to be installed at 600 mm nominal centers. Final support centers to be determined by manufacturer.
   2. ASCE runway rails shall conform to cross-section and weight per metre as specified in CMAA 70 or 74. Furnish rails, crane stops, and conductors by crane manufacturer. Splice rails by bolting together with splice bars. Stagger rail splices by minimum of 300 mm. Amount of stagger shall differ from crane wheel spacing. Do not locate crane rail splice closer than 1200 mm from crane girder splice.
   3. Provide end stop fabricated from structural steel at both ends of each runway and bolted to top of concrete curb.

B. Gantry:
   1. Fabricated from structural shapes, ASTM A36/A36M, proportioned to resist vertical, lateral, and torsional forces.
   2. Construct crane end trucks in accordance with CMAA 70 or 74. For Class D and E cranes, design for impact loading and repeated duty cycle. Furnish end trucks with rail sweeps and impact-absorbing bumpers.
   3. 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 70 or 74. Wheel axles of alloy steel, machined and ground to receive inner bearing races. Use rotating axles and wheels mounted by press fit and keys. For top running cranes, fixed axles are also acceptable for idler wheels.
   4. Crane Drive: Dual motor arrangement with both end trucks driven by an electric motor through a gear reduction unit.
   5. Drive Gears: Helical, spur, or herringbone type, rolled or cast steel, with machine cut teeth.
   6. 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.
   7. Brakes: Electrically operated, adjustable, suitable for service class indicated, with rated torque capacities as specified in CMAA 70 or 74.

C. Trolleys:
   1. Frame: Welded steel, cast steel, or ductile iron construction, or combination thereof. Design to control deflection of trolley assembly while transmitting carrying load to crane rails.
   2. Drive shall consist of trolley drive shaft, driven by electric motor through gear reduction unit.
   3. Furnish safety lugs on single-girder trolley units.
   4. 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. For trolleys on single girder cranes, geared wheels with fixed axles are also acceptable.
   5. Drive Gears: Helical, spur, or herringbone type, rolled or cast steel, with machine cut teeth.
   6. 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.
   7. Brakes: Suitable for service class and rated torque capacities as specified in ASME B30.11. Furnish stops on trolley rails or beams.

D. Hoist:
   1. Hoisting machinery shall consist of rope drum driven through gear reductions, load blocks, hook, hoisting rope, sheaves, and hoist braking. Drum size and length sufficient for minimum two turns of cable remaining on drum when hook is at lowest position.
   2. Rope drum and surrounding members constructed to minimize abrasion, crushing or jamming of hoist rope. Load blocks enclosed type. Hoisting rope extra flexible, improved plow steel wire rope, made especially for hoist service. Large diameter rope drum with

minimum 36:1 drum-to-wire rope diameter ratio. Groove depth shall be minimum 35 percent of rope diameter. Equipped with rope guide to keep rope aligned in grooves.

3. Wire Rope: Galvanized steel, having minimum safety factor of 5.
4. Hook: Constructed 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.
5. Brakes: Electro-mechanical hoist brake and controls, designed in accordance with ASME HST-4, and adjustable to compensate for wear. Brake to have adequate torque to stop and hold over 125 percent of hoist rated load.
6. Lateral hook drift not to exceed 10 mm per m of vertical travel on single-reeved hoists.
7. Equipped with an electro-mechanical load limiting device that shall prevent lifting more than 110 percent of rated load.

E. Electrical:
1. Furnish electrical equipment including motors, motor starters, pendant control, control systems, wire, conduit, and wire/cable/conduit support brackets. Crane conductors may be removed for shipment. Crane wiring by crane supplier.
2. Electrical: In accordance with CSA 22.1.
3. Furnish motors for variable speed crane, trolley, and hoist drives to be inverter duty, compatible with adjustable frequency variable speed drive system, minimum 10 to 1 speed range for crane and trolley, minimum 40 to 1 speed range for hoist, specifically designed for hoist, trolley, and crane drive applications, with infinitely variable speed control for smooth acceleration and deceleration. Controls with 120-volt ac, microprocessor based, pulsed width modulation design, able to withstand 45 degree C temperatures, housed in NEMA 250, Type as indicated in Crane Data Sheets, and supplied with 200 percent overcurrent protection.
4. Crane and trolley conductor voltage drops from runway supply taps shall permit crane motors to operate within voltage tolerance of plus or minus 10 percent, when building supply voltage is at plus or minus 5 percent of design voltage.
5. Festooned Conductors: Flexible flat 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.
6. Cable Reel Conductors: Flexible cable, housed on circular wheel, counter-torque spring to dispense and retrieve cable, with sag not more than 0.9 m below connection point on crane at maximum travel. Mounting location for cable reel to be coordinated at time of Shop Drawing review.
7. Grounding: External in accordance with CSA C22.1 Section 10.
8. Limit Switches: Provide all necessary end-of-travel limit switches for hoist, trolley, and crane, including hoist slow-down prior to reaching upper limit and phase sequence supervision at upper limit.

F. Controls:
1. Furnish electric cranes with pendant control having constant pressure pushbuttons with 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 OFF position, or reset switch or button is operated. Furnish with under-voltage protection as a function of each motor controller, or by magnetic main line contactor.

2. Controls: Fully magnetic, plain reversing type, housed in NEMA 250 enclosure, Type as indicated on Crane Data Sheets, with contactors of sufficient size and quantity for starting, accelerating, reversing, and stopping duty for specified crane service class.
3. Pushbutton Control Stations: Heavy duty, oil-tight, plug-in type, with control transformers to supply 120-volt ac power to pushbutton control station. Suspend control station from independent track running full length of crane, allowing operator independent movement from trolley. Pushbutton enclosure supported with chain or wire rope. Control wire cable attached to support chain or wire rope at not more than 1.8 m intervals. Furnish control station buttons for control of crane, trolley, and hoist, ON/OFF main line contactor power switch which removes all power from crane and controls. Pushbutton station to control all hoist, trolley, and crane motions, and to serve as backup to remote control system.
4. Remote Control System: Frequency modulated (FM), radio controlled system, “belly box” type operator, capable of operating all hoist, trolley, and crane functions.
5. Control motions indicate 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. Controls to be clearly marked with hoist, trolley, and crane travel directions. Provide warning horn operated from control station.
6. Crane motions shall stop automatically when crane can no longer receive remote signals and designed to stop when control signal for any motion becomes ineffective.
7. Remote Control Crane Motions: Hook raise and lower, trolley movement, crane movement, and crane power up and power down. Furnish an EMERGENCY OFF momentary contact pushbutton station which will disconnect main line power via a remote switch, and manual reset function to activate all motions after an EMERGENCY OFF event.
8. Provide a hard-wired selector switch at pendant control to select either remote or pendant control.

2.5 PORTABLE GANTRY CRANES

A. General:
1. Fabricated from high strength corrosion resistant aluminum.
2. Lightweight, portable, and easily assembled and disassembled.
3. Beam height to be adjustable in 150 mm increments.
4. Minimum 150 mm diameter swivel lock casters.
5. Complete with low headroom locking beam trolley and light weight manual chain hoist.
6. Can be safely moved while under full rated load.
7. Shop Drawings to be signed and sealed by Professional Engineer.

B. Portable Gantry Crane System No. 1:
1. Location: Grit Pump Room.
2. Service: General equipment maintenance.
3. Rated Lifting Capacity: 1000 kg.
4. Beam Length: 3.05 m.
5. Minimum Height to Trolley Lifting Ring: 1680 mm.
6. Maximum Height to Trolley Lifting Ring: 2290 mm.
7. Manufacturer and Product: Easily Moved Equipment Inc.; 2200 Series.

C. Portable Gantry Crane System No. 2:
   1. Location: Grit and Screenings Platform.
   2. Service: General equipment maintenance.
   3. Rated Lifting Capacity: 2000 kg.
   4. Beam Length: 4.57 m.
   5. Minimum Height to Trolley Lifting Ring: 2490 mm.
   6. Maximum Height to Trolley Lifting Ring: 3500 mm.
   7. Manufacturer and Product: Easily Moved Equipment Inc.; 4400 Series.

2.6 ACCESSORIES

A. Equipment Identification Plates: In accordance with Section 40 05 53, Identification Labels for Equipment, Fabricated Tanks, Valves and Piping Systems.

B. Lifting Lugs: Equipment weighing over 45 kilograms.

C. Tie back system, clips for rail support, conduit/cable support brackets and all other accessories required for crane.

2.7 FACTORY FINISHING

A. Prepare and prime coat in accordance with Section 09 90 00, Painting and Coating.

B. Do not paint running rail surfaces in contact with wheels, wheel running surfaces, hoist wire rope, or conductor bar, festoon cables, and supports.

2.8 SOURCE QUALITY CONTROL

A. Factory Inspections: Inspect controls and equipment for required construction, electrical connection, and intended function.

B. Factory Tests and Adjustments: No-load run test all equipment furnished.

C. Factory test report shall include Test Data Sheets.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer’s printed instructions.

B. Provide lubrication and lubrication fittings.

3.2 FIELD FINISHING

A. Equipment as specified in Section 09 90 00, Painting and Coating.

3.3 FIELD QUALITY CONTROL

A. Functional Test: Conduct on each crane.
   1. Alignment: Test complete assemblies for proper alignment and connection, and quiet operation.

B. Performance Test:
   1. Conduct on each crane.
   2. Electrical Tests: Conduct in accordance with CSA C22.2, No. 33.
   3. Load Tests: In compliance with OHSA, ASME B30.11, and ASME B30.16.
   4. Running Tests: Demonstrate proper operation of all control devices, relays, limit switches, interlocks, and protective devices.
   5. Brake Tests: Test all brakes under full load conditions, from maximum speed to rest.

3.4 MANUFACTURER'S SERVICES

A. Manufacturer's Representative: Present at site or classroom designated by the City, for minimum person-days listed below, travel time excluded:
   1. 2 person-days for installation assistance and inspection.
   2. 1 person-days for functional and performance testing and completion of Manufacturer's Certificate of Proper Installation.
   3. 1 person-days for pre-startup classroom or site training.
   4. 1 person-days for facility startup.
   5. 1 person-days for post-startup training of the City's personnel. Training shall not commence until an accepted detailed lesson plan for each training activity has been reviewed by the City.

B. See Section 01 43 33, Contractor Field Services and Section 01 91 14, Equipment Testing and Facility Startup.

3.5 SUPPLEMENTS

A. The supplements listed below, following "End of Section," are a part of this Specification.
   1. Crane Data Sheets.
   2. Crane Dimension Sheets.
   3. Induction Motor Data Sheets.

END OF SECTION

CRANE DATA SHEET
CRANE SYSTEM NO. 1

Project: SEWPCC Upgrading/Expansion Project
Manufacturer: _____
Owner: City of Winnipeg
Model No.: _____
Service: General Maintenance
Number of Units: One
Equipment Name: WAS RDT Gantry Crane
Tag No.(s): CRN-D536

GENERAL REQUIREMENTS

Equipment Capacity: 1.5 tonne
Method of Control: Pendant and radio
Location of Control: _____
Equipment Location:
☒ Indoors ☐ Outdoors

Factory Testing:
☒ Functional ☐ Performance
Field Testing:
☒ Functional ☒ Performance

Power Supply:
Voltage 575
Phase 3
Frequency 60
Area Electrical Classification:
Unclassified

GANTRY

Type:
☒ Single Girder ☐ Double Girder
☒ Single Leg ☐ Double Leg
Service Class (CMAA):
☐ A (standby) ☐ B (light)
☒ C (moderate) ☐ D (heavy)
☐ E (severe) ☐ F (continuous)
Speed Control:
☐ Constant ☐ Two Speed
☒ Variable ☐ Hand Operated
Speed (m/min): 3.2 to 32
Motor kW: Two at 0.24 each
Electric Conductors:
☐ Bus Bar ☐ Festoon
☒ Cable Reel ☐ _____
Crane Drive System (CMAA):
☐ A1 ☐ A2 ☐ A3
☐ A4 ☐ A5 ☐ A6

TROLLEY

Type:
☐ Standard ☒ Low Headroom
☐ Top Running ☒ Under Running
Service Class (CMAA):
☐ A (standby) ☐ B (light)
☒ C (moderate) ☐ D (heavy)
☐ E (severe) ☐ F (continuous)
Speed Control:
☐ Constant ☐ Two Speed
☒ Variable ☐ Hand Operated
Speed (m/min): 2 to 20
Motor kW: 0.29
Electric Conductors:
☐ Bus Bar ☒ Festoon
☐ Cable Reel ☐ _____

HOIST

Type:
☒ Electric, Wire Rope
☐ Hand Operated, Chain
Service Class (ASME):
☐ H1 (standby) ☐ H2 (light)
☐ H3 (standard) ☒ H4 (heavy)
☐ H5 (severe)
Speed Control:
☐ Constant ☒ Two Speed
☐ Variable ☐ Hand Operated
Speed (m/min): 1 to 6
Motor kW: 2.2

SPECIAL REQUIREMENTS

Accessories:
☐ Service Platform
☐ Central Lubrication System
☒ OHSA Operating/Safety Devices
☐ Extended Grease Fittings

Remote Controls:
☐ Infrared, line-of-sight
☒ Frequency Modulated (FM)
Manufacturer: _____

Special Electrical Requirements:
_____
_____
_____
_____

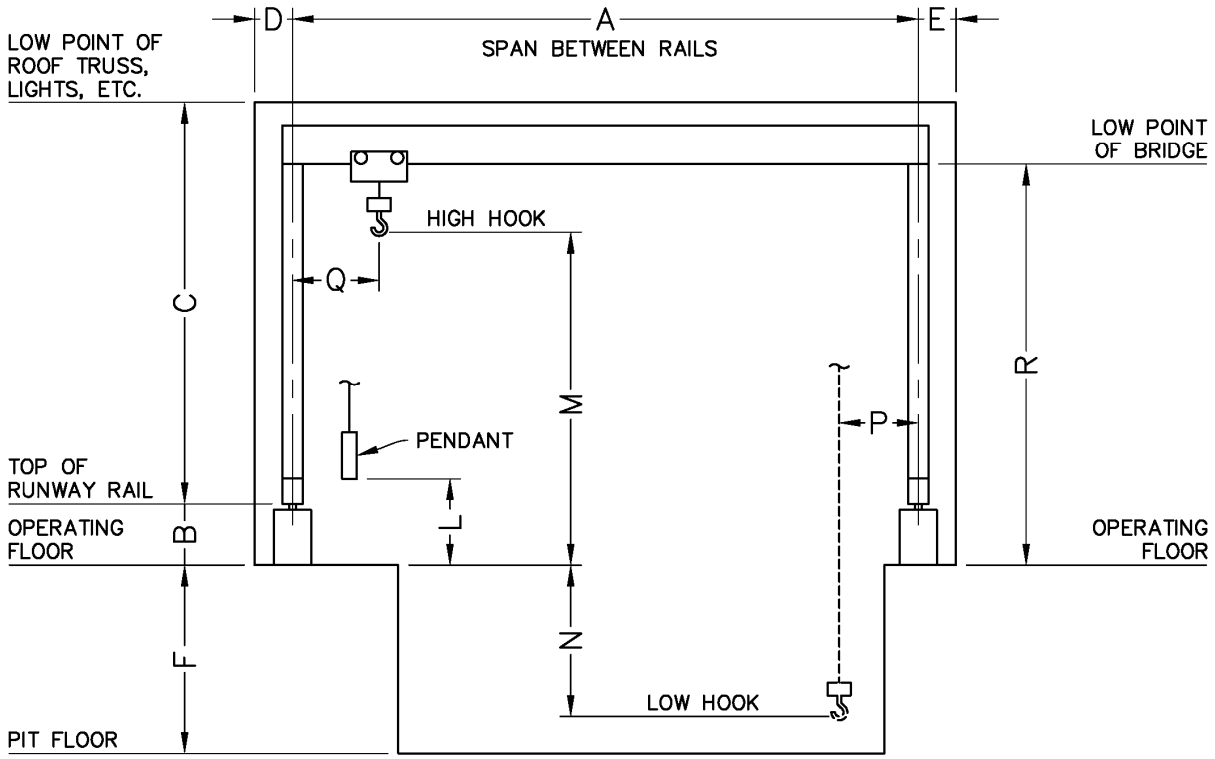
See Crane Dimension Sheet for clearances, lift distances, and details.

CRANE DIMENSION SHEET
CRANE SYSTEM NO. 1

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: WAS RDT Gantry Crane



A: 12,000 mm	E: ± 300 mm	N: N/A
B: ± 400 mm	F: N/A	P: ± 600 mm
C: ± 5,600 mm	L: 1,000 mm	Q: ± 600 mm
D: ± 1,250 mm	M: ± 4,900 mm	R: TBD by vendor

Length of Runways: As shown on Drawings.
Contractor to coordinate all dimensions with existing building structure, RDT equipment, and access platforms.

MOTOR DATA SHEET
CRANE SYSTEM NO. 1

Project: SEWPCC Upgrading/Expansion Project

Process/Facility: Sludge Thickening

Service: General Maintenance

Equipment Name: WAS RDT Gantry Crane

Equipment Tag Number(s): CRN-D536

Type: Squirrel-cage induction meeting requirements of NEMA MG 1.

Manufacturer: For multiple units of same type of equipment, furnish motors and accessories from single manufacturer.

Hazardous Location: ☐ Furnish motors for hazardous (classified) locations that conform to UL 674 and have an applied UL listing mark.

Motor Size (kW): _____ ☐ Min. ☐ Max.	Guaranteed Minimum Efficiency at Full Load (%): Per CAN/CSA-C390 Table 3
Voltage: 575	Guaranteed Minimum Power Factor at Full Load (%): Mfr.'s std.
Phase: 3	Service Factor (at rated max. ambient temperature): ☐ 1.0 ☒ 1.15
Frequency (Hz): 60	Enclosure Type: TEFC
Synchronous Speed (rpm): 1800 max.	Mounting Type: ☒ Horizontal ☐ Vertical
☐ Constant Speed	Vertical Shaft: ☐ Solid ☐ Hollow
☐ Two-speed Speed (rpm): Slow _____ Fast _____	Vertical Thrust Capacity (N): Up _____ Down _____
☒ Multi-speed Speed (rpm): Min. _____ Max. _____	☒ Adjustable Speed Application (inverter duty rated) In accordance with Section 26 29 23, Variable Frequency Drives. Operating Speed Range: _____ to _____ % of rated speed
Variable Speed Load Classification: ☐ Variable Torque ☐ Constant Torque ☐ Constant Power	☐ Thermal Protection: _____ ☐ Space Heater: _____ volts, single phase ☒ Oversize main terminal (conduit) box for motors ☒ Terminal for connection of equipment grounding wire in each terminal box
Winding: ☒ One ☐ Two	

ADDITIONAL REQUIREMENTS

☒ In accordance with Section 26 20 00, Low Voltage AC Induction Motors.

CRANE DATA SHEET
CRANE SYSTEM NO. 2

Project: SEWPCC Upgrading/Expansion Project
Manufacturer: _____
Owner: City of Winnipeg
Model No.: _____
Service: General Maintenance
Number of Units: One
Equipment Name: FSL RDT Gantry Crane
Tag No.(s): CRN-D537

GENERAL REQUIREMENTS

Equipment Capacity: 1.5 tonne
Method of Control: Pendant and radio
Location of Control: _____
Equipment Location:
☒ Indoors ☐ Outdoors

Factory Testing:
☒ Functional ☐ Performance
Field Testing:
☒ Functional ☒ Performance

Power Supply:
Voltage 575
Phase 3
Frequency 60
Area Electrical Classification:
Unclassified

GANTRY

Type:
☒ Single Girder ☐ Double Girder
☒ Single Leg ☐ Double Leg
Service Class (CMAA):
☐ A (standby) ☐ B (light)
☒ C (moderate) ☐ D (heavy)
☐ E (severe) ☐ F (continuous)
Speed Control:
☐ Constant ☐ Two Speed
☒ Variable ☐ Hand Operated
Speed (m/min): 3.2 to 32
Motor kW: Two at 0.24 each
Electric Conductors:
☐ Bus Bar ☐ Festoon
☒ Cable Reel ☐ _____
Crane Drive System (CMAA):
☐ A1 ☐ A2 ☐ A3
☐ A4 ☐ A5 ☐ A6

TROLLEY

Type:
☐ Standard ☒ Low Headroom
☐ Top Running ☒ Under Running
Service Class (CMAA):
☐ A (standby) ☐ B (light)
☒ C (moderate) ☐ D (heavy)
☐ E (severe) ☐ F (continuous)
Speed Control:
☐ Constant ☐ Two Speed
☒ Variable ☐ Hand Operated
Speed (m/min): 2 to 20
Motor kW: 0.29
Electric Conductors:
☐ Bus Bar ☒ Festoon
☐ Cable Reel ☐ _____

HOIST

Type:
☒ Electric, Wire Rope
☐ Hand Operated, Chain
Service Class (ASME):
☐ H1 (standby) ☐ H2 (light)
☐ H3 (standard) ☒ H4 (heavy)
☐ H5 (severe)
Speed Control:
☐ Constant ☒ Two Speed
☐ Variable ☐ Hand Operated
Speed (m/min): 1 to 6
Motor kW: 2.2

SPECIAL REQUIREMENTS

Accessories:
☐ Service Platform
☐ Central Lubrication System
☒ OHSA Operating/Safety Devices
☐ Extended Grease Fittings

Remote Controls:
☐ Infrared, line-of-sight
☒ Frequency Modulated (FM)
Manufacturer: _____

Special Electrical Requirements:
_____
_____
_____
_____

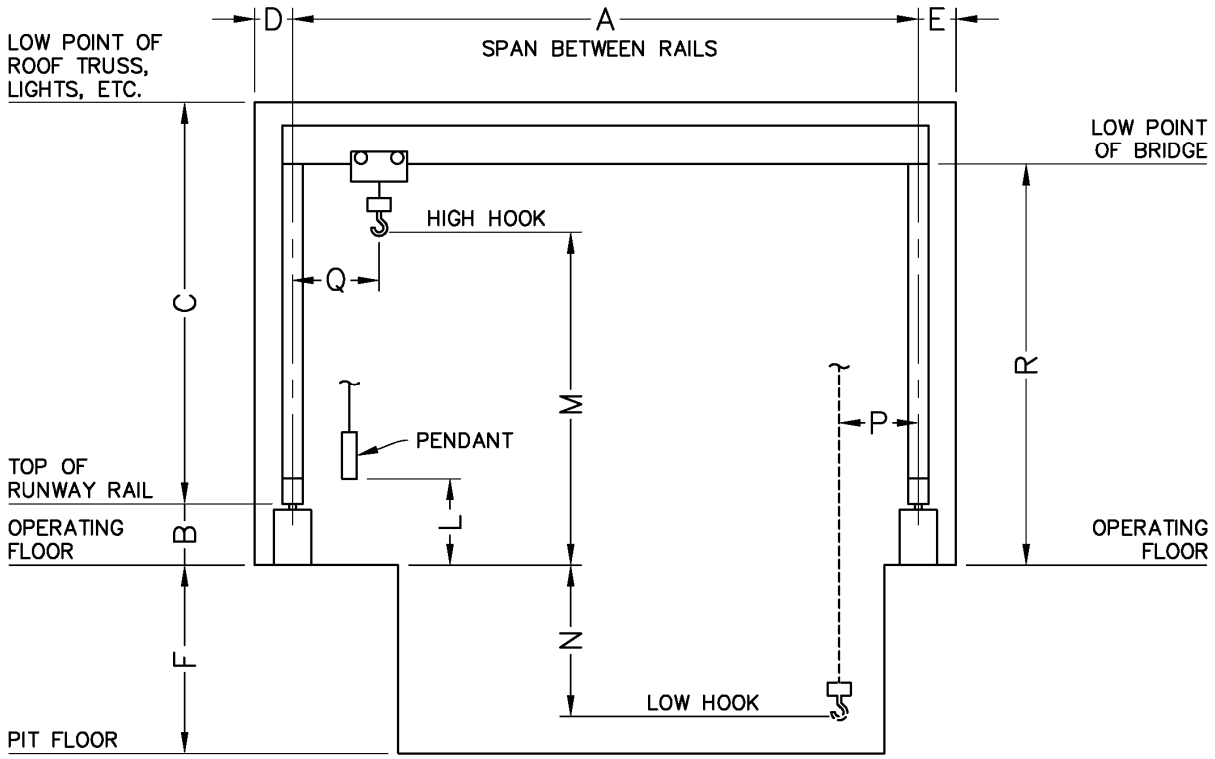
See Crane Dimension Sheet for clearances, lift distances, and details.

CRANE DIMENSION SHEET
CRANE SYSTEM NO. 2

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: FSL RDT Gantry Crane



A: 14,300 mm	E: ± 300 mm (min.)	N: N/A
B: ± 400 mm	F: N/A	P: ± 600 mm
C: ± 6,200 mm	L: 1,000 mm	Q: ± 600 mm
D: ± 1,250 mm	M: ± 5,500 mm	R: TBD by vendor

Length of Runways: As shown on Drawings.
Contractor to coordinate all dimensions with existing building structure, RDT equipment, and access platforms.

MOTOR DATA SHEET
CRANE SYSTEM NO. 2

Project: SEWPCC Upgrading/Expansion Project

Process/Facility: Sludge Thickening

Service: General Maintenance

Equipment Name: FSL RDT Gantry Crane

Equipment Tag Number(s): CRN-D537

Type: Squirrel-cage induction meeting requirements of NEMA MG 1.

Manufacturer: For multiple units of same type of equipment, furnish motors and accessories from single manufacturer.

Hazardous Location: ☐ Furnish motors for hazardous (classified) locations that conform to UL 674 and have an applied UL listing mark.

Motor Size (kW): _____ ☐ Min. ☐ Max.	Guaranteed Minimum Efficiency at Full Load (%): Per CAN/CSA-C390 Table 3
Voltage: 575	Guaranteed Minimum Power Factor at Full Load (%): Mfr.'s std.
Phase: 3	Service Factor (at rated max. ambient temperature): ☐ 1.0 ☒ 1.15
Frequency (Hz): 60	Enclosure Type: TEFC
Synchronous Speed (rpm): 1800 max.	Mounting Type: ☒ Horizontal ☐ Vertical
☐ Constant Speed	Vertical Shaft: ☐ Solid ☐ Hollow
☐ Two-speed Speed (rpm): Slow _____ Fast _____	Vertical Thrust Capacity (N): Up _____ Down _____
☒ Multi-speed Speed (rpm): Min. _____ Max. _____	☒ Adjustable Speed Application (inverter duty rated) In accordance with Section 26 29 23, Variable Frequency Drives. Operating Speed Range: _____ to _____ % of rated speed
Variable Speed Load Classification: ☐ Variable Torque ☐ Constant Torque ☐ Constant Power	☐ Thermal Protection: _____ ☐ Space Heater: _____ volts, single phase ☒ Oversize main terminal (conduit) box for motors ☒ Terminal for connection of equipment grounding wire in each terminal box
Winding: ☒ One ☐ Two	

ADDITIONAL REQUIREMENTS

☒ In accordance with Section 26 20 00, Low Voltage AC Induction Motors.

SECTION 41 22 23.19

MONORAIL HOIST AND LIFTING DAVIT SYSTEMS

EQUIPMENT AND COMPONENT NUMBERS

ID No.	Equipment Name
CRN-G571/G572	Monorail System No. 1: Grit and Screenings Building – Platform Monorails
CRN-K535	Monorail System No. 2: HRC Building – Gallery Access Monorail
CRN-R535	Monorail System No. 3: Blower Building – Gallery Access Monorail
CRN-S571	Monorail System No. 4: Secondary Clarifiers – Gallery Access Monorail
CRN-S572	Monorail System No. 5: Secondary Clarifiers – Pump Room Monorail
CRN-D535	Monorail System No. 6: Fermenters – Pump Gallery Monorail
N/A	Lifting Davit System No. 1: Portable Confined Space Lifting Davits
N/A	Lifting Davit System No. 2: Portable Equipment Lifting Davit

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:
   1. American National Standards Institute (ANSI):
      a. MH27.1, Specification for Patented Track Underhung Cranes and Monorail Systems.
      b. Z359.1, Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components.
   2. American Society of Mechanical Engineers (ASME):
      a. B30.10, Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings.
      b. B30.11, Monorails and Underhung Cranes.
      c. B30.16, Overhead Hoists (Underhung).
      d. B30.17, Cranes and Monorails (With Underhung Trolley or Bridge) Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings.
      e. HST-1, Performance Standard for Electric Chain Hoists.
      f. HST-2, Performance Standard for Hand Chain Manually Operated Chain Hoists.
      g. HST-4, Performance Standard for Overhead Electric Wire Rope Hoists.
   3. Canadian Standards Association:
      a. C22.1, Canadian Electrical Code.
      b. C22.1, Section 10, Grounding.
      c. C22.1, Section 40, Electric Cranes and Hoists.
      d. C22.2 No. 33, Construction and Test of Electric Cranes and Hoists.
   4. Electrical Equipment Manufacturers Advisory Council (EEMAC):
      a. M1-7, Motors and Generators.
   5. Material Handling Institute (MHI):

6. National Electrical Manufacturer's Association (NEMA):
   a. MG 1, Motors and Generators.
   b. 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
7. Province of Manitoba Occupational Health and Safety Regulations.
8. 2010 National Building Code of Canada, with 2011 Manitoba Amendments (NBC).

1.2 DESIGN REQUIREMENTS

A. Monorail Systems: ASME B30.11, B30.17, and ANSI MH27.1.

B. Hoists: ASME B30.10, B30.16, HST-1, HST-2, and HST-4.

C. Trolleys: ASME B30.17.

D. Hooks: ASME B30.10.

E. Wire Rope Hoist Service Class: ASME HST-4.

F. Chain Hoist Service Class: ASME HST-1.

G. Stress and Safety Factors: ASME B30.11 and ANSI MH27.1. Properly select materials of construction for stresses to which subjected.

H. Safety of Operation, Accessibility, Interchangeability, and Durability of Parts: ASME B30.11 and OHSA requirements.

I. Design equipment, anchorage, and support systems for vertical and lateral loading in accordance with NBC.

1.3 SUBMITTALS

A. Action Submittals:
   1. Shop Drawings:
      a. Make, model, weight, and horsepower of each equipment assembly.
      b. Complete catalog information, descriptive literature, materials of construction, and specifications on hoist, wheels, gears and bearing, trolley drive system, hoist motor and assemblies, hook, brakes, starting system, variable speed drive system, conductors (festoon), controls, remote control system, and accessories.
      c. General arrangement drawings showing equipment dimensions, building clearances, hook approach, and hook travel.
      d. Power and control wiring diagrams, including terminals and numbers.
      e. Motor nameplate data in accordance with EEMAC M1-7 including any motor modifications.
      f. Factory finish system.

B. Informational Submittals:
   1. Factory functional test report.
   2. Manufacturer's Certification of Compliance that the factory finish system is identical to the requirements specified herein.

3. Special shipping, storage and protection, and handling instructions.
4. Manufacturer's printed installation instructions.
5. Manufacturer's Certificate of Proper Installation.
6. Certified load test results.
7. Suggested spare parts list to maintain the equipment in service for a period of 5 years. Include a list of special tools required for checking, testing, parts replacement, and maintenance with current price information.
8. List of special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.
9. Operation and Maintenance Manual.
10. Written certification from Professional Engineer licensed in province of Manitoba stating that support systems, anchorage, and equipment have been designed in accordance with requirements of NBC for post-disaster structures, at time of Shop Drawing submittals.

1.4 CONDITIONS OF SERVICE

A. Temperature:
   1. Indoor Locations: Minimum 5 degrees C, maximum 35 degrees C.
   2. Outdoor Locations: Minimum minus 35 degrees C, maximum 30 degrees C.

B. Humidity: 30 to 100 percent.

C. Hazardous Area Classification: As shown on Electrical Drawings and Data Sheets and end of section.

D. Equipment located outdoors shall be suitable for and capable of functioning with exposure to sun, wind, rain, snow, ice, and weather conditions typical of the project location.

PART 2 PRODUCTS

2.1 GENERAL

A. Monorail system manufacturer to coordinate equipment requirements with steel structures, drive motors, hoisting cable or chain, hook, rails, stops, and electrical equipment controls.

B. Where adjustable speed drives or remote control systems are required, monorail system manufacturer to furnish a coordinated operating system.

C. See Drawings for monorail layouts.

2.2 MANUFACTURERS

A. Hoist and trolley systems, equipment, and accessories specified in this section shall be products of:
   1. Demag Cranes and Components.
   2. Steelway Material Handling.
   3. Konecranes/Morris Material Handling.
   4. CRS CraneSystems Inc.

B. Portable lifting davit systems shall be product of:
   1. Easily Moved Equipment Inc. (EME).

C. No “or-equal” or substitute products will be considered.

2.3 SUPPLEMENTS

A. See supplements to this section for additional requirements.

2.4 MONORAIL SYSTEMS

A. Track:
   1. Monorail track shall be furnished under Section 05 12 00, Structural Steel Framing. All other items and necessary accessories shall be supplied by monorail manufacturer. Contractor to coordinate.

B. Trolleys:
   1. Frame: Welded steel, cast steel, or ductile iron construction, or a combination thereof. Construct to control deflection of trolley assembly while transmitting the carrying load to running surface.
   2. Drive shall consist of trolley drive shaft, driven by an electric motor through a gear reduction unit.
   3. Furnish roller assembly stabilizers on single-girder trolley units to prevent tipping during load pickup.
   4. 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.
   5. Drive Gears: Helical, spur, or herringbone type, rolled or cast steel, with machine cut teeth.
   6. 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.
   7. Brakes: Suitable for service class and rated torque capacities as specified in ASME B30.11. Furnish stops on trolley rails or beams.

C. Hoists:
   1. Hoisting machinery shall consist of rope drum driven through gear reductions, load blocks, hook, hoisting rope, sheaves, and hoist braking. Drum size and length sufficient for minimum two turns of cable remaining on drum when hook is at lowest position.
   2. Rope drum and surrounding members constructed to minimize abrasion, crushing, or jamming of hoist rope. Load blocks enclosed type. Hoisting rope extra flexible, improved plow steel wire rope, made especially for hoist service. Large diameter rope drum with minimum 36:1 drum to wire rope diameter ratio. Groove depth shall be minimum 35 percent of rope diameter. Equipped with rope guide to keep rope aligned in grooves.
   3. 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.

4. Brakes: Mechanical and electric load brake and controls, designed in accordance with ANSI 4M, and adjustable to compensate for wear.
5. Lateral hook drift not to exceed 10 mm per m of vertical travel on single-reeved hoists
6. Equipped with an electro-mechanical load limiting device that shall prevent lifting more than 110 percent of the rated load.

D. Electrical:
1. Furnish electrical equipment including motors, motor starters, pendant control, control systems, wire, wire/cable/conduit support brackets and conduit. Trolley/hoist wiring by equipment supplier.
2. Electrical: In accordance with CSA C22.1.
3. Furnish motors for variable speed trolley and hoist drives to be inverter duty, compatible with adjustable frequency variable speed drive system, minimum 10 to 1 speed range for trolley, minimum 40 to 1 speed range for hoist, specifically designed for hoist and trolley applications. Controls with 120-volt ac, microprocessor based, pulsed width modulation design, able to withstand 45 degree C temperatures, housed in NEMA 250 enclosure, Type as indicated in Monorail Data Sheets, with 200 percent overcurrent protection.
4. Trolley conductor voltage drops from monorail track supply taps shall permit hoist and trolley motors to operate within voltage tolerance of plus or minus 10 percent, when building supply voltage is at plus or minus 5 percent of design voltage.
5. Festooned Cable Conductors: Flexible flat 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.
6. Grounding: External in accordance with CSA C22.1 Section 10.
7. Limit Switches: Provide all necessary end-of-travel limit switches for hoist and trolley, including hoist slow-down prior to reaching upper limit and phase sequence supervision at upper limit.

E. Controls:
1. Hoist and Trolley: Pendant control having constant pressure pushbuttons with 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 OFF position, or reset switch or button is operated. Furnish with under-voltage protection as a function of each motor controller, or by magnetic main line contactor.
2. Controls: Fully magnetic, plain reversing type, housed in NEMA 250 enclosure, Type as indicated on Monorail Data Sheets, with contactors of sufficient size and quantity for starting, accelerating, reversing, and stopping duty for specified hoist service class.
3. Trolley Drives: Soft start controls, 575-volt ac series device, installed between drive motor and motor starter with torque and acceleration rate adjustable, suitable for trolley drive service, and work in conjunction with pendant control system.
4. Pendant Control Stations: Heavy-duty, oil-tight, plug-in type, with control transformers to supply 120-volt ac power to pushbutton control station. Suspended from independent track running full length of monorail, allowing operator independent movement from trolley. Pushbutton enclosure supported with chain or wire rope. Control wire cable attached to support chain or wire rope at not more than 1.8 m intervals. Furnish control station buttons for control of hoist and trolley, and ON/OFF main line contactor power

switch which removes all power from controls. Pushdown station to control all hoist and trolley motions, and to serve as backup to remote control system.

5. Remote Control System: Frequency modulated (FM), radio controlled system, “belly box” type operator, capable of operating all hoist and trolley functions.
6. Control motions indicate direction of resultant trolley and hoist motion. Furnish spring-loaded switch motions, with return to OFF position when switch is released, and designed to prevent runaway situations. Controls to be clearly marked with hoist and trolley travel directions.
7. Hoist and trolley motions shall stop automatically when hoist or trolley can no longer receive remote signals. Designed to stop when control signal for any motion becomes ineffective.
8. Remote Control Functions: Hook raise and lower, trolley movement, and power up and power down. Furnish an EMERGENCY OFF momentary contact pushbutton station which will disconnect main line power via remote switch, and manual reset function to activate all motions after an EMERGENCY OFF event.

2.5 LIFTING DAVIT SYSTEMS

A. Lifting Davit System No. 1:
   1. Type 1: Provide four (4) portable confined space lifting davits and davit arm bases at locations shown on Drawings:
      a. Lifting Capacity: Man-rated at 140 kg.
      b. Self-retracting lifeline with retrieval 15.2 m, man rated.
      c. Mast disassembles into three pieces.
      d. One man setup.
      e. Anchorage point on mast tip for self-retracting lift line anchor point on mast.
      f. 360 degree swivel capable.
      g. Lightweight, corrosion-resistant, aluminum alloy construction, with powder coated finish.
      h. Complies with OSHA 1910 and ANSI Z359.1 (anchor point only) standards for confined space entry.
      i. Provide flush floor mount davit arm bases at locations shown on the Drawings, constructed from mild-steel tube, zinc-plated complete with cap.

B. Lifting Davit System No. 2:
   1. Type 2A – 1000 kg rated: Provide one portable lifting davit and sockets to be installed at the locations shown on Drawings:
      a. Lightweight, corrosion-resistant, aluminum alloy construction, with powder coated finish, five radius adjustments, Grade L9 fasteners.
      b. Minimum 1000 kg lifting capacity.
      c. 2.1 m available lifting height, 1800 mm radius.
      d. Model: EME 3300CH.
      e. 1050 mm in height side mount sockets, constructed from mild-steel and painted safety yellow per manufacturer’s standards. Quantity as follows:
         1) Four (4) in HRC building.
      f. 1050 mm in height floor mount sockets, constructed from mild-steel and painted safety yellow per manufacturer’s standards. Quantity as follows:
         1) Three (3) in bioreactors facility for servicing the submersible axial flow pumps.

g. The lifting davit shall be supplied with one (1) manual winch. Winch capacity shall be equal to the lifting capacity of the lifting davit specified.
   1) Provide 3 stainless steel lifting cables with appropriate length for a lifting height of 13 m. Coordinate lifting cables installation with the supplier of the submersible axial flow pumps supplied under Section 43 21 38, Submersible Axial Flow Pumps. One lifting cable shall be permanently installed for each pump. Lifting cable shall be easily installed on the winch drum for lifting the equipment.
   2) Supply 1 stainless steel lifting cable 15 m length each for general use.

2. Type 2B – 500 kg rated: Provide three portable lifting davits and sockets to be installed at the locations shown on Drawings:
   a. Lightweight, corrosion-resistant, aluminum alloy construction, with powder coated finish, five radius adjustments, Grade L9 fasteners.
   b. Minimum 500 kg lifting capacity.
   c. 2.1 m available lifting height, 1800 mm radius.
   d. Model: EME 1100W.
   e. 1050 mm in height floor mount sockets, constructed from mild-steel and painted safety yellow per manufacturer's standards. Quantity as follows:
      1) Thirty six (36) in bioreactors facility.
   f. The lifting davits shall be supplied each with one (1) manual winch. Winch capacity shall be equal to the lifting capacity of the lifting davit specified.
      1) Provide 36 stainless steel lifting cables with appropriate length for a lifting height of 13 m. Coordinate lifting cables installation with the supplier of the submersible mixers supplied under Section 46 41 23, Submersible Mixers. One lifting cable shall be permanently installed for each mixer. Lifting cable shall be easily installed on the winch drum for lifting the equipment.
      2) Supply 2 stainless steel lifting cables 15 m length each for general use.

2.6 ACCESSORIES

A. Equipment Identification Plates: In accordance with Section 40 05 53, Identification Labels for Equipment, Fabricated Tanks, Valves and Piping Systems.

B. Lifting Lugs: Equipment weighing over 45 kilograms.

2.7 FACTORY FINISHING

A. Prepare and prime coat in accordance with Section 09 90 00, Painting and Coating.

2.8 SOURCE QUALITY CONTROL

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

B. Factory Tests and Adjustments: No-load run test all equipment furnished.

C. Factory test report shall include Test Data Sheets.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's printed instructions.

B. Provide lubrication and lubrication fittings.

3.2 FIELD FINISHING

A. Equipment as specified in Section 09 90 00, Painting and Coating.

3.3 FIELD QUALITY CONTROL

A. Functional Tests:
   1. Conduct on each monorail system.
   2. Alignment: Test complete assemblies for proper alignment and connection, and quiet operation.

B. Performance Test:
   1. Conduct on each monorail system.
   2. Electrical Tests: In accordance with CSA C22.2 No. 33.
   3. Load Tests: In compliance with OHSA, ANSI B30.11, and ANSI MH27.1.
   4. Running Tests: Demonstrate proper operation of all control devices, relays, limit switches, interlocks, and protective devices.
   5. Brake Tests: Test all brakes under full load conditions, from maximum speed to rest.

3.4 MANUFACTURER'S SERVICES

A. Manufacturer's Representative (for monorail systems only): Present at Site or classroom designated by the City, for minimum person-days listed below, travel time excluded:
   1. One person-day for installation assistance and inspection.
   2. One person-day for functional and performance testing and completion of Manufacturer's Certificate of Proper Installation.
   3. One person-day for pre-startup classroom or Site training.
   4. One person-day for facility startup.

B. See Section 01 43 33, Contractor Field Services and Section 01 91 14, Equipment Testing and Facility Startup.

3.5 SUPPLEMENTS

A. The supplements listed below, following "End of Section," are a part of this Specification:
   1. Hoist/Monorail Data Sheets.
   2. Hoist/Monorail Dimension Sheets.
   3. Induction Motor Data Sheets.

END OF SECTION

HOIST/MONORAIL DATA SHEET
MONORAIL SYSTEM NO. 1

Project: SEWPCC Upgrading/Expansion Project

Manufacturer: _____

Owner: City of Winnipeg

Model No.: _____

Service: General Maintenance

Number of Units: Two

Equipment Name: Grit and Screenings Building – Platform Monorails

Tag No.(s): CRN-G571, CRN-G572

GENERAL REQUIREMENTS

Equipment Capacity: 2.0 tonne

Method of Control: Pendant and radio

Location of Control: _____

Equipment Location:

☒ Indoors ☐ Outdoors

Factory Testing:

☒ Functional ☐ Performance

Field Testing:

☒ Functional ☒ Performance

Power Supply:

Voltage 575

Phase 3

Frequency 60

Electrical Hazardous Area Classification

Unclassified

HOIST

Type:

☒ Electric, Wire Rope ☐ Hand Operated, Chain

Service Class (ASME):

☐ H1 (standby) ☐ H2 (light) ☒ H3 (standard)

☐ H4 (heavy) ☐ H5 (severe)

Speed (m/min): 0.3 to 12

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Hook: See Hoist/Monorail Dimension Sheet

Hook Manufacturer: _____

TROLLEY

Type:

☒ Electric ☐ Hand Operated, Chain

Service Class (ANSI):

☐ A (standby) ☐ B (light) ☒ C (moderate)

☐ D (heavy) ☐ E (severe) ☐ F (continuous)

Speed (m/min): 2 to 20

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Electric Conductors:

☐ Bus Bar ☒ Festoon ☐ Cable Reel

☐ _____

SPECIAL REQUIREMENTS

Accessories:

☐ Central Lubrication System

☐ Extended Grease Fittings

☒ OHSA Operating and Safety Devices

Remote Controls:

☐ Infrared, Line-of-Sight

☒ Frequency modulated (FM)

Manufacturer: _____

Special Electrical Requirements:

_____

_____

_____

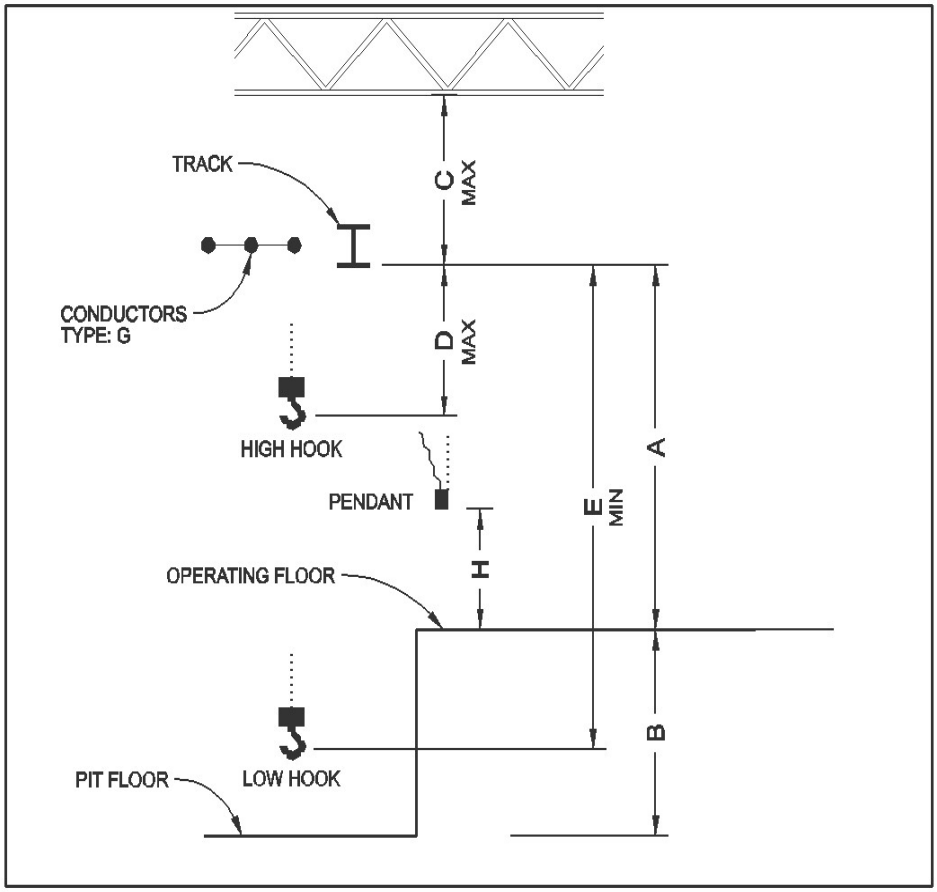
See Hoist/Monorail Dimension Sheet for clearances, lift distances, and details.

HOIST/MONORAIL DIMENSION SHEET
MONORAIL SYSTEM NO. 1
Building Clearances for Monorails

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: Grit and Screenings Building – Platform Monorails



A: ± 5,130 mm	D: ± 300 mm	G: Festoon
B: 4,300 mm	E: ± 9,500 mm	H: 1,000 mm
C: ± 350 mm		

INDUCTION MOTOR DATA SHEET
MONORAIL SYSTEM NO. 1

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: Grit and Screenings Building – Platform Monorail

Equipment Tag Number(s): CRN-G571, CRN-G572

Type: Squirrel-cage induction meeting requirements of NEMA MG 1 and EEMAC M1-7.

Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer.

Hazardous Location: ☐ Furnish motors for Class _____ Zone _____ hazardous (classified) locations in accordance with the Canadian Electrical Code.

Motor Horsepower: _____	Guaranteed Minimum Efficiency at Full Load: 90 percent
Voltage: 575 V	Guaranteed Minimum Power Factor at Full Load: _____ percent
Phase: 3	Service Factor (@ rated max. amb. temp.): ☐ 1.0 ☒ 1.15
Frequency: 60	Enclosure Type: TEFC
Synchronous Speed: _____ rpm	Mounting Type: ☐ Horizontal ☐ Vertical
☐ Multispeed, Two-Speed:	☐ Vertical Shaft: ☐ Solid ☐ Hollow
_____ / _____ rpm	☐ Vertical Thrust Capacity (kN): Up _____ Down _____
☐ Constant Horsepower	☒ Adjustable Speed Drive: In accordance with Section 26 29 23, Variable Frequency Drives
☐ Variable Torque	Variable Frequency Drives
☐ Constant Torque	Operating Speed Range: _____ to _____ % of Rated Speed
Winding: ☐ One ☐ Two	☐ Thermal Protection: _____
	☐ Space Heater: _____ volts, single phase
	☐ Oversize main terminal (conduit) box for motors
	☐ Terminal for connection of equipment grounding wire in each terminal box

Additional Motor Requirements: ☒ In accordance with Section 26 20 00, Low-Voltage AC Induction Motors

Special Features:

_____

_____

HOIST/MONORAIL DATA SHEET
MONORAIL SYSTEM NO. 2

Project: SEWPCC Upgrading/Expansion Project

Manufacturer: _____

Owner: City of Winnipeg

Model No.: _____

Service: General Maintenance

Number of Units: One

Equipment Name: HRC Building – Gallery Access Monorail

Tag No.(s): CRN-K535

GENERAL REQUIREMENTS

Equipment Capacity: 2000 kg

Method of Control: Pendant and radio

Location of Control: _____

Equipment Location:

☒ Indoors ☐ Outdoors

Factory Testing:

☒ Functional ☐ Performance

Field Testing:

☒ Functional ☒ Performance

Power Supply:

Voltage 575

Phase 3

Frequency 60

Hazardous Area Classification:

Unclassified

HOIST

Type:

☒ Electric, Wire Rope ☐ Hand Operated, Chain

Service Class (ASME):

☐ H1 (standby) ☐ H2 (light) ☒ H3 (standard)

☐ H4 (heavy) ☐ H5 (severe)

Speed (m/min): 1 to 6

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Hook: See Hoist/Monorail Dimension Sheet

Hook Manufacturer: _____

TROLLEY

Type:

☒ Electric ☐ Hand Operated, Chain

Service Class (ANSI):

☐ A (standby) ☐ B (light) ☒ C (moderate)

☐ D (heavy) ☐ E (severe) ☐ F (continuous)

Speed (m/min): 6 to 24

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Electric Conductors:

☐ Bus Bar ☒ Festoon ☐ Cable Reel

☐ _____

SPECIAL REQUIREMENTS

Accessories:

☐ Central Lubrication System

☐ Extended Grease Fittings

☒ OHSA Operating and Safety Devices

Remote Controls:

☐ Infrared, Line-of-Sight

☒ Frequency modulated (FM)

Manufacturer: _____

Special Electrical Requirements:

_____

_____

_____

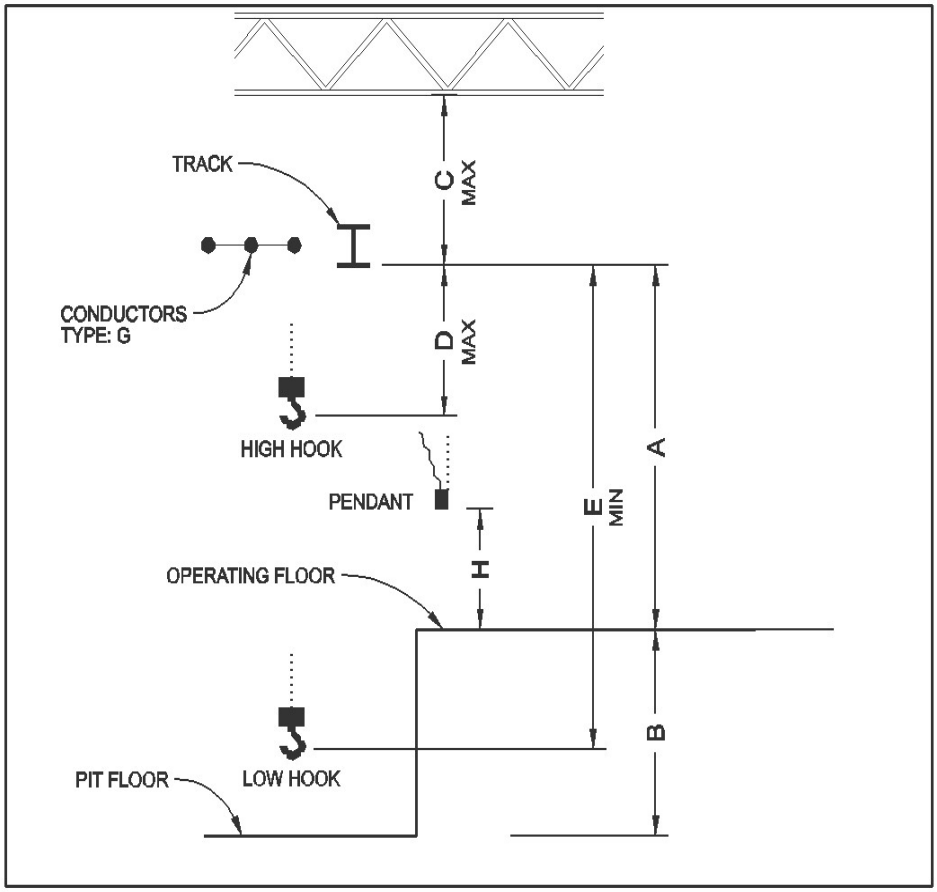
See Hoist/Monorail Dimension Sheet for clearances, lift distances, and details.

HOIST/MONORAIL DIMENSION SHEET
MONORAIL SYSTEM NO. 2
Building Clearances for Monorails

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: HRC Building – Gallery Access Monorail



A: 3800 mm	D: 250 mm	G: Festoon
B: 6800 mm	E: 10000 mm	H: 1000 mm
C: 300 mm	F:	I:

INDUCTION MOTOR DATA SHEET
MONORAIL SYSTEM NO. 2

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: HRC Building – Gallery Access Monorail

Equipment Tag Number(s): CRN-K535

Type: Squirrel-cage induction meeting requirements of NEMA MG 1 and EEMAC M1-7.

Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer.

Hazardous Location: ☐ Furnish motors for Class _____ Zone _____ hazardous (classified) locations in accordance with the Canadian Electrical Code.

Motor Horsepower: _____

Voltage: 575 V

Phase: 3

Frequency: 60

Synchronous Speed: _____ rpm

☐ Multispeed, Two-Speed:

_____ / _____ rpm

☐ Constant Horsepower

☐ Variable Torque

☐ Constant Torque

Winding: ☐ One ☐ Two

Guaranteed Minimum Efficiency at Full Load: 90 percent

Guaranteed Minimum Power Factor at Full Load: _____ percent

Service Factor (@ rated max. amb. temp.): ☐ 1.0 ☒ 1.15

Enclosure Type: TEFC

Mounting Type: ☐ Horizontal ☐ Vertical

☐ Vertical Shaft: ☐ Solid ☐ Hollow

☐ Vertical Thrust Capacity (kN): Up _____ Down _____

☒ Adjustable Speed Drive: In accordance with Section 26 29 23, Variable Frequency Drives

Variable Frequency Drives

Operating Speed Range: _____ to _____ % of Rated Speed

☐ Thermal Protection: _____

☐ Space Heater: _____ volts, single phase

☐ Oversize main terminal (conduit) box for motors

☐ Terminal for connection of equipment grounding wire in each terminal box

Additional Motor Requirements: ☒ In accordance with Section 26 20 00, Low-Voltage AC Induction Motors

Special Features:

_____

_____

HOIST/MONORAIL DATA SHEET
MONORAIL SYSTEM NO. 3

Project: SEWPCC Upgrading/Expansion Project

Manufacturer: _____

Owner: City of Winnipeg

Model No.: _____

Service: General Maintenance

Number of Units: One

Equipment Name: Blower Building – Gallery Access Monorail

Tag No.(s): CRN-R535

GENERAL REQUIREMENTS

Equipment Capacity: 3000 kg

Method of Control: Pendant and radio

Location of Control: _____

Equipment Location:

☒ Indoors ☐ Outdoors

Factory Testing:

☒ Functional ☐ Performance

Field Testing:

☒ Functional ☒ Performance

Power Supply:

Voltage 575

Phase 3

Frequency 60

Electrical Hazardous Area Classification

Unclassified

HOIST

Type:

☒ Electric, Wire Rope ☐ Hand Operated, Chain

Service Class (ANSI):

☐ H1 (standby) ☐ H2 (light) ☒ H3 (standard)

☐ H4 (heavy) ☐ H5 (severe)

Speed (m/min): 1 to 6

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Hook: See Hoist/Monorail Dimension Sheet

Hook Manufacturer: _____

TROLLEY

Type:

☒ Electric ☐ Hand Operated, Chain

Service Class (ANSI):

☐ A (standby) ☐ B (light) ☒ C (moderate)

☐ D (heavy) ☐ E (severe) ☐ F (continuous)

Speed (m/min): 6 to 24

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Electric Conductors:

☐ Bus Bar ☒ Festoon ☐ Cable Reel

☐ _____

SPECIAL REQUIREMENTS

Accessories:

☐ Central Lubrication System

☐ Extended Grease Fittings

☒ OHSA Operating and Safety Devices

Remote Controls:

☐ Infrared, Line-of-Sight

☒ Frequency modulated (FM)

Manufacturer: _____

Special Electrical Requirements:

_____

_____

_____

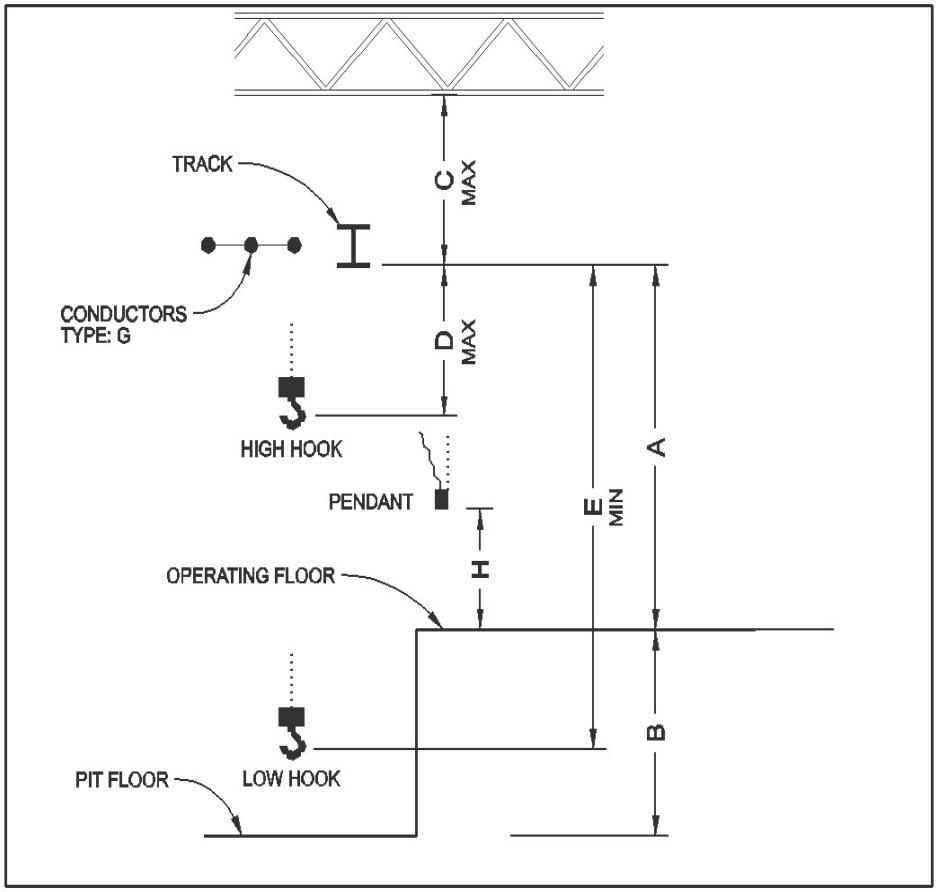
See Hoist/Monorail Dimension Sheet for clearances, lift distances, and details.

HOIST/MONORAIL DIMENSION SHEET
MONORAIL SYSTEM NO. 3
Building Clearances for Monorails

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: Blower Building – Gallery Access Monorail



A: 5200 mm	D: 250 mm	G: Festoon
B: 5700 mm	E: 10800 mm	H: 1000 mm
C: 300 mm	F:	I:

INDUCTION MOTOR DATA SHEET
MONORAIL SYSTEM NO. 3

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: Blower Building – Gallery Access Monorail

Equipment Tag Number(s): CRN-R535

Type: Squirrel-cage induction meeting requirements of NEMA MG 1 and EEMAC M1-7.

Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer.

Hazardous Location: ☐ Furnish motors for Class _____ Zone _____ hazardous (classified) locations in accordance with the Canadian Electrical Code.

Motor Horsepower: _____

Voltage: 575 V

Phase: 3

Frequency: 60

Synchronous Speed: _____ rpm

☐ Multispeed, Two-Speed:

_____ / _____ rpm

☐ Constant Horsepower

☐ Variable Torque

☐ Constant Torque

Winding: ☐ One ☐ Two

Guaranteed Minimum Efficiency at Full Load: 90 percent

Guaranteed Minimum Power Factor at Full Load: _____ percent

Service Factor (@ rated max. amb. temp.): ☐ 1.0 ☒ 1.15

Enclosure Type: TEFC

Mounting Type: ☐ Horizontal ☐ Vertical

☐ Vertical Shaft: ☐ Solid ☐ Hollow

☐ Vertical Thrust Capacity (kN): Up _____ Down _____

☒ Adjustable Speed Drive: In accordance with Section 26 29 23, Variable Frequency Drives

Variable Frequency Drives

Operating Speed Range: _____ to _____ % of Rated Speed

☐ Thermal Protection: _____

☐ Space Heater: _____ volts, single phase

☐ Oversize main terminal (conduit) box for motors

☐ Terminal for connection of equipment grounding wire in each terminal box

Additional Motor Requirements: ☒ In accordance with Section 26 20 00, Low-Voltage AC Induction Motors

Special Features:

_____

_____

HOIST/MONORAIL DATA SHEET
MONORAIL SYSTEM NO. 4

Project: SEWPCC Upgrading/Expansion Project

Manufacturer: _____

Owner: City of Winnipeg

Model No.: _____

Service: General Maintenance

Number of Units: One

Equipment Name: Secondary Clarifiers – Gallery Access Monorail

Tag No.(s): CRN-S566

GENERAL REQUIREMENTS

Equipment Capacity: 2000 kg

Method of Control: Pendant and radio

Location of Control: _____

Equipment Location:

☒ Indoors ☐ Outdoors

Factory Testing:

☒ Functional ☐ Performance

Field Testing:

☒ Functional ☒ Performance

Power Supply:

Voltage 575

Phase 3

Frequency 60

Electrical Hazardous Area Classification

Unclassified

HOIST

Type:

☒ Electric, Wire Rope ☐ Hand Operated, Chain

Service Class (ASME):

☐ H1 (standby) ☐ H2 (light) ☒ H3 (standard)

☐ H4 (heavy) ☐ H5 (severe)

Speed (m/min): 1 to 6

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Hook: See Hoist/Monorail Dimension Sheet

Hook Manufacturer: _____

TROLLEY

Type:

☒ Electric ☐ Hand Operated, Chain

Service Class (ANSI):

☐ A (standby) ☐ B (light) ☒ C (moderate)

☐ D (heavy) ☐ E (severe) ☐ F (continuous)

Speed (m/min): 6 to 24

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Electric Conductors:

☐ Bus Bar ☒ Festoon ☐ Cable Reel

☐ _____

SPECIAL REQUIREMENTS

Accessories:

☐ Central Lubrication System

☐ Extended Grease Fittings

☒ OHSA Operating and Safety Devices

Remote Controls:

☐ Infrared, Line-of-Sight

☒ Frequency modulated (FM)

Manufacturer: _____

Special Electrical Requirements:

_____

_____

_____

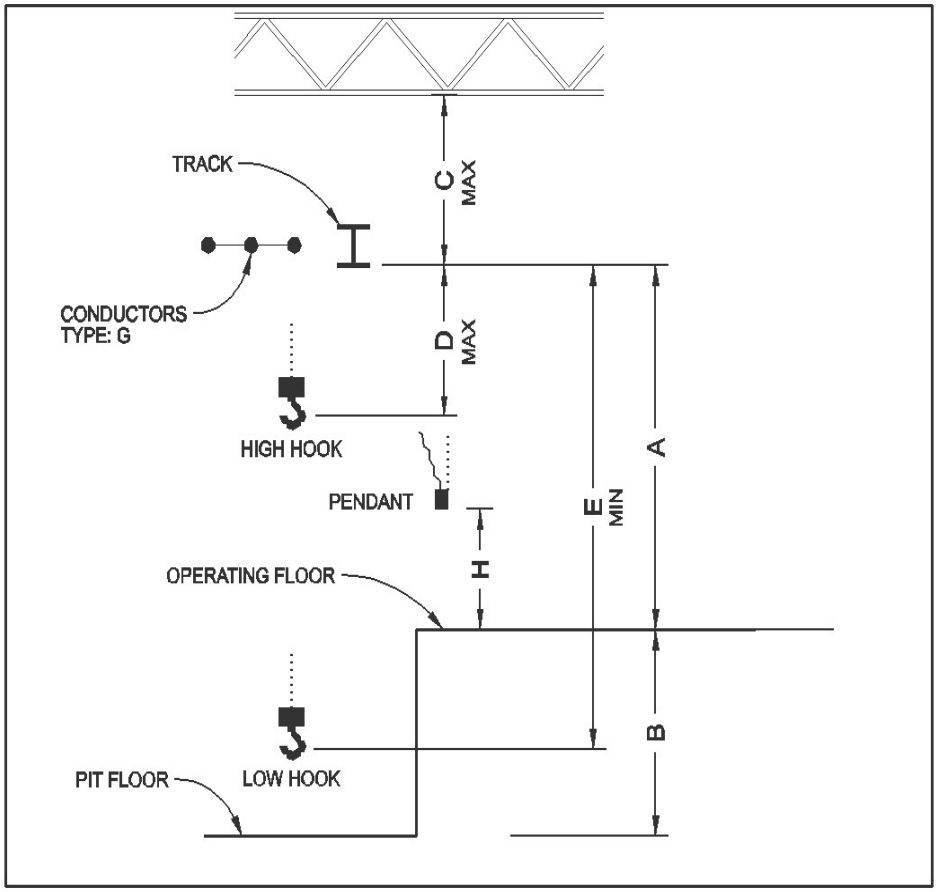
See Hoist/Monorail Dimension Sheet for clearances, lift distances, and details.

HOIST/MONORAIL DIMENSION SHEET
MONORAIL SYSTEM NO. 4
Building Clearances for Monorails

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: Secondary Clarifiers – Gallery Access Monorail



A: 4400 mm	D: 250 mm	G: Festoon
B: 7000 mm	E: 11400 mm	H: 1000 mm
C: 300 mm	F:	I:

INDUCTION MOTOR DATA SHEET
MONORAIL SYSTEM NO. 4

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: Secondary Clarifiers – Gallery Access Monorail

Equipment Tag Number(s): CRN-S566

Type: Squirrel-cage induction meeting requirements of NEMA MG 1 and EEMAC M1-7.

Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer.

Hazardous Location: ☐ Furnish motors for Class _____ Zone _____ hazardous (classified) locations in accordance with the Canadian Electrical Code.

Motor Horsepower: _____

Voltage: 575 V

Phase: 3

Frequency: 60

Synchronous Speed: _____ rpm

☐ Multispeed, Two-Speed:

_____ / _____ rpm

☐ Constant Horsepower

☐ Variable Torque

☐ Constant Torque

Winding: ☐ One ☐ Two

Guaranteed Minimum Efficiency at Full Load: 90 percent

Guaranteed Minimum Power Factor at Full Load: _____ percent

Service Factor (@ rated max. amb. temp.): ☐ 1.0 ☒ 1.15

Enclosure Type: TEFC

Mounting Type: ☐ Horizontal ☐ Vertical

☐ Vertical Shaft: ☐ Solid ☐ Hollow

☐ Vertical Thrust Capacity (kN): Up _____ Down _____

☒ Adjustable Speed Drive: In accordance with Section 26 29 23, Variable Frequency Drives

Variable Frequency Drives

Operating Speed Range: _____ to _____ % of Rated Speed

☐ Thermal Protection: _____

☐ Space Heater: _____ volts, single phase

☐ Oversize main terminal (conduit) box for motors

☐ Terminal for connection of equipment grounding wire in each terminal box

Additional Motor Requirements: ☒ In accordance with Section 26 20 00, Low-Voltage AC Induction Motors

Special Features:

_____

_____

HOIST/MONORAIL DATA SHEET
MONORAIL SYSTEM NO. 5

Project: SEWPCC Upgrading/Expansion Project

Manufacturer: _____

Owner: City of Winnipeg

Model No.: _____

Service: General Maintenance

Number of Units: One

Equipment Name: Secondary Clarifiers – Pump Room Monorail

Tag No.(s): CRN-S567

GENERAL REQUIREMENTS

Equipment Capacity: 2000 kg

Method of Control: Pendant and radio

Location of Control: _____

Equipment Location:

☒ Indoors ☐ Outdoors

Factory Testing:

☒ Functional ☐ Performance

Field Testing:

☒ Functional ☒ Performance

Power Supply:

Voltage 575

Phase 3

Frequency 60

Electrical Hazardous Area Classification

Unclassified

HOIST

Type:

☒ Electric, Wire Rope ☐ Hand Operated, Chain

Service Class (ASME):

☐ H1 (standby) ☐ H2 (light) ☒ H3 (standard)

☐ H4 (heavy) ☐ H5 (severe)

Speed (m/min): 1 to 6

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Hook: See Hoist/Monorail Dimension Sheet

Hook Manufacturer: _____

TROLLEY

Type:

☒ Electric ☐ Hand Operated, Chain

Service Class (ANSI):

☐ A (standby) ☐ B (light) ☒ C (moderate)

☐ D (heavy) ☐ E (severe) ☐ F (continuous)

Speed (m/min): 6 to 24

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Electric Conductors:

☐ Bus Bar ☒ Festoon ☐ Cable Reel

☐ _____

SPECIAL REQUIREMENTS

Accessories:

☐ Central Lubrication System

☐ Extended Grease Fittings

☒ OHSA Operating and Safety Devices

Remote Controls:

☐ Infrared, Line-of-Sight

☒ Frequency modulated (FM)

Manufacturer: _____

Special Electrical Requirements:

_____

_____

_____

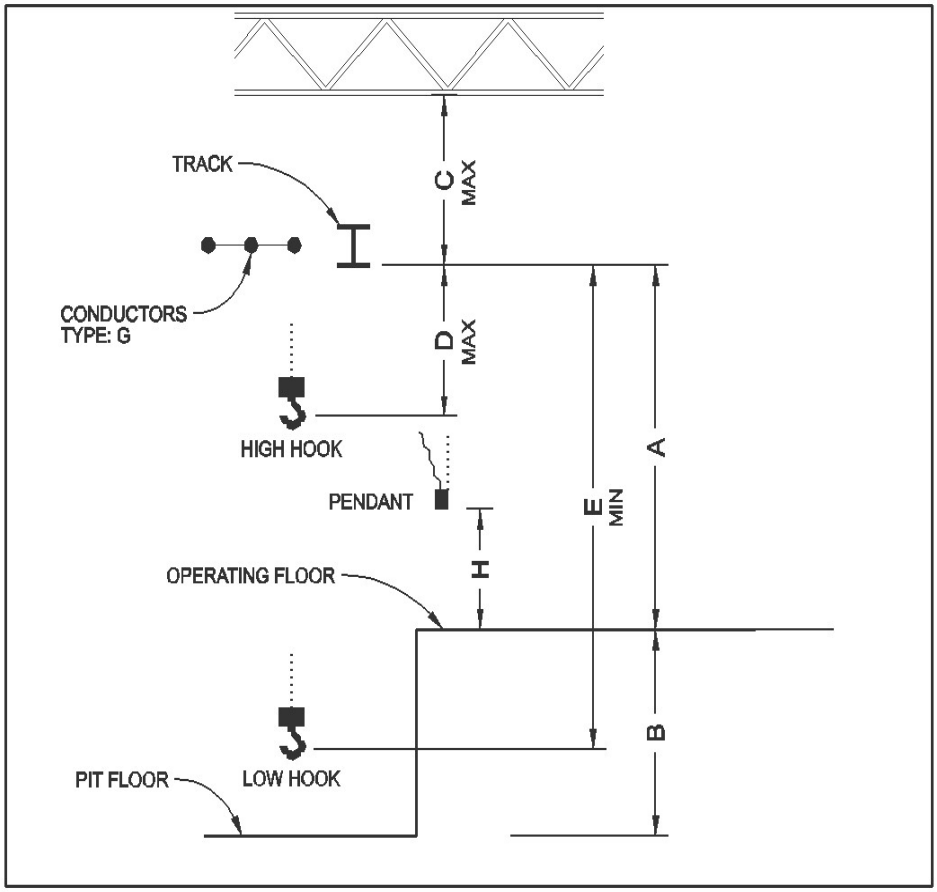
See Hoist/Monorail Dimension Sheet for clearances, lift distances, and details.

HOIST/MONORAIL DIMENSION SHEET
MONORAIL SYSTEM NO. 5
Building Clearances for Monorails

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: Secondary Clarifiers – Pump Room Monorail



A: 4297 mm	D: 250 mm	G: Festoon
B: N/A	E: 4000 mm	H: 1000 mm
C: 2294 mm	F:	I:

INDUCTION MOTOR DATA SHEET
MONORAIL SYSTEM NO. 5

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: Secondary Clarifiers – Pump Room Monorail

Equipment Tag Number(s): CRN-S567

Type: Squirrel-cage induction meeting requirements of NEMA MG 1 and EEMAC M1-7.

Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer.

Hazardous Location: ☐ Furnish motors for Class _____ Zone _____ hazardous (classified) locations in accordance with the Canadian Electrical Code.

Motor Horsepower: _____

Voltage: 575 V

Phase: 3

Frequency: 60

Synchronous Speed: _____ rpm

☐ Multispeed, Two-Speed:

_____ / _____ rpm

☐ Constant Horsepower

☐ Variable Torque

☐ Constant Torque

Winding: ☐ One ☐ Two

Guaranteed Minimum Efficiency at Full Load: 90 percent

Guaranteed Minimum Power Factor at Full Load: _____ percent

Service Factor (@ rated max. amb. temp.): ☐ 1.0 ☒ 1.15

Enclosure Type: TEFC

Mounting Type: ☐ Horizontal ☐ Vertical

☐ Vertical Shaft: ☐ Solid ☐ Hollow

☐ Vertical Thrust Capacity (kN): Up _____ Down _____

☒ Adjustable Speed Drive: In accordance with Section 26 29 23, Variable Frequency Drives

Operating Speed Range: _____ to _____ % of Rated Speed

☐ Thermal Protection: _____

☐ Space Heater: _____ volts, single phase

☐ Oversize main terminal (conduit) box for motors

☐ Terminal for connection of equipment grounding wire in each terminal box

Additional Motor Requirements: ☒ In accordance with Section 26 20 00, Low-Voltage AC Induction Motors

Special Features:

_____

_____

HOIST/MONORAIL DATA SHEET
MONORAIL SYSTEM NO. 6

Project: SEWPCC Upgrading/Expansion Project

Manufacturer: _____

Owner: City of Winnipeg

Model No.: _____

Service: General Maintenance

Number of Units: One

Equipment Name: Fermenters – Pump Gallery Monorail

Tag No.(s): CRN-D535

GENERAL REQUIREMENTS

Equipment Capacity: 2000 kg

Method of Control: Pendant and radio

Location of Control: _____

Equipment Location:

☒ Indoors ☐ Outdoors

Factory Testing:

☒ Functional ☐ Performance

Field Testing:

☒ Functional ☒ Performance

Power Supply:

Voltage 575

Phase 3

Frequency 60

Electrical Hazardous Area Classification

Unclassified

HOIST

Type:

☒ Electric, Wire Rope ☐ Hand Operated, Chain

Service Class (ASME):

☐ H1 (standby) ☐ H2 (light) ☒ H3 (standard)

☐ H4 (heavy) ☐ H5 (severe)

Speed (m/min): 1 to 6

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Hook: See Hoist/Monorail Dimension Sheet

Hook Manufacturer: _____

TROLLEY

Type:

☒ Electric ☐ Hand Operated, Chain

Service Class (ANSI):

☐ A (standby) ☐ B (light) ☒ C (moderate)

☐ D (heavy) ☐ E (severe) ☐ F (continuous)

Speed (m/min): 6 to 24

☐ Constant Speed ☐ Two Speed ☒ Variable Speed

Motor hp: _____

Electric Conductors:

☐ Bus Bar ☒ Festoon ☐ Cable Reel

☒ Double festoon system. Provide one festoon for the trolley/hoist and one festoon for the pendant so that they can be completely independent from a position/operation standpoint

SPECIAL REQUIREMENTS

Accessories:

☐ Central Lubrication System

☐ Extended Grease Fittings

☒ OHSA Operating and Safety Devices

Remote Controls:

☐ Infrared, Line-of-Sight

☒ Frequency modulated (FM)

Manufacturer: _____

Special Electrical Requirements:

_____

_____

_____

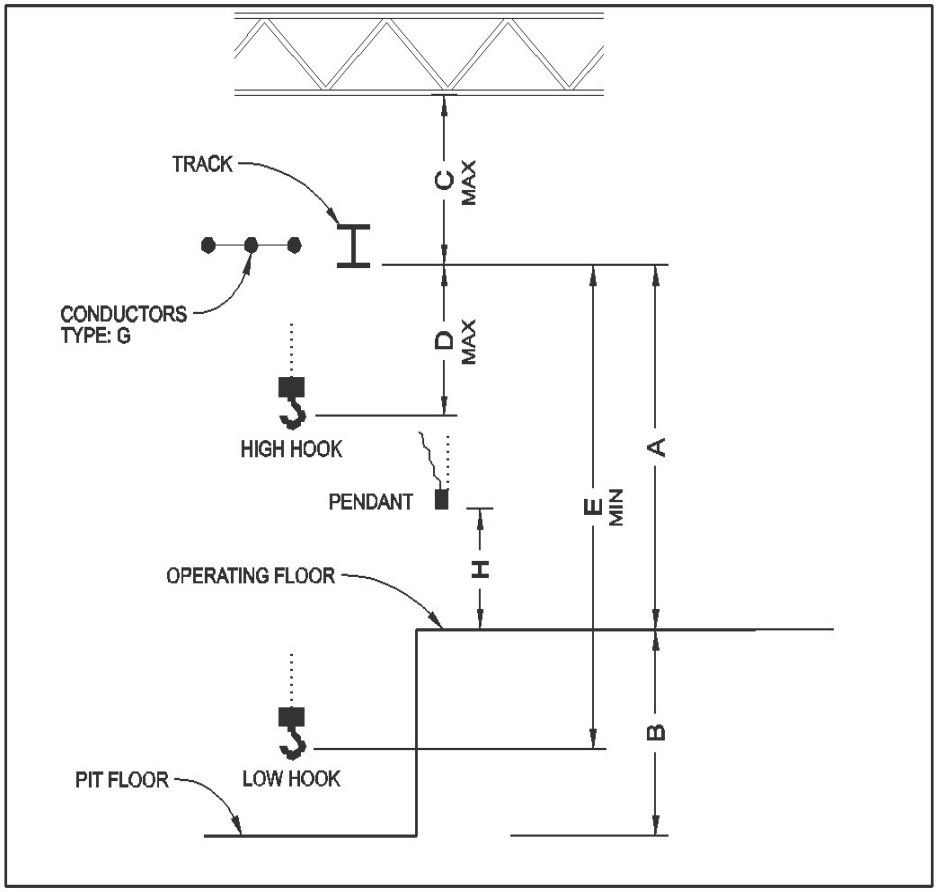
See Hoist/Monorail Dimension Sheet for clearances, lift distances, and details.

HOIST/MONORAIL DIMENSION SHEET
MONORAIL SYSTEM NO. 6
Building Clearances for Monorails

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: Fermenters – Pump Gallery Monorail



A: 5614 mm	D: 250 mm	G: Festoon
B: N/A	E: 5600 mm	H: 1000 mm
C: 330 mm	F:	I:

INDUCTION MOTOR DATA SHEET
MONORAIL SYSTEM NO. 6

Project: SEWPCC Upgrading/Expansion Project

Owner: City of Winnipeg

Equipment Name: Fermenters – Pump Gallery Monorail

Equipment Tag Number(s): CRN-D535

Type: Squirrel-cage induction meeting requirements of NEMA MG 1 and EEMAC M1-7.

Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer.

Hazardous Location: ☐ Furnish motors for Class _____ Zone _____ hazardous (classified) locations in accordance with the Canadian Electrical Code.

Motor Horsepower: _____

Voltage: 575 V

Phase: 3

Frequency: 60

Synchronous Speed: _____ rpm

☐ Multispeed, Two-Speed:

_____ / _____ rpm

☐ Constant Horsepower

☐ Variable Torque

☐ Constant Torque

Winding: ☐ One ☐ Two

Guaranteed Minimum Efficiency at Full Load: 90 percent

Guaranteed Minimum Power Factor at Full Load: _____ percent

Service Factor (@ rated max. amb. temp.): ☐ 1.0 ☒ 1.15

Enclosure Type: TEFC

Mounting Type: ☐ Horizontal ☐ Vertical

☐ Vertical Shaft: ☐ Solid ☐ Hollow

☐ Vertical Thrust Capacity (kN): Up _____ Down _____

☒ Adjustable Speed Drive: In accordance with Section 26 29 23, Variable Frequency Drives

Variable Frequency Drives

Operating Speed Range: _____ to _____ % of Rated Speed

☐ Thermal Protection: _____

☐ Space Heater: _____ volts, single phase

☐ Oversize main terminal (conduit) box for motors

☐ Terminal for connection of equipment grounding wire in each terminal box

Additional Motor Requirements: ☒ In accordance with Section 26 20 00, Low-Voltage AC Induction Motors

Special Features:

_____

_____

SECTION 41 24 40

STEEL PLATFORM TRUCK WEIGH SCALES

EQUIPMENT AND COMPONENT NUMBERS

ID No.	Equipment Description
WE-G2331	Weigh Scale
WE-G2341	Weigh Scale

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:
1. American Society for Testing and Materials (ASTM): A36/A36M, Standard Specification for Carbon Structural Steel.
2. American Welding Society (AWS): D1.1, Structural Welding Code.
3. International Electrotechnical Commission (ANSI/IEC): 60529, Degrees of Protection Provided by Enclosures (IP Code).
4. International Organization of Legal Metrology (OIML): R 60, Metrological Regulation for Load Cells.
5. National Electrical Manufacturers Association (NEMA): 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
6. National Institute of Standards and Technology (NIST): Handbook 44, Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices.
7. National Type Evaluation Program (NTEP).
8. Society for Protective Coatings (SSPC).
9. 2010 National Building Code of Canada, with 2011 Manitoba Amendments (NBC).

1.2 SUBMITTALS

A. Shop Drawings:
1. Make and model of each equipment assembly.
2. General arrangement drawings including dimensions, weight, size and location of connections to other work, and anchorage requirements.
3. Manufacturer’s catalog information, descriptive literature, specifications, and identification of materials of construction.
4. Details of weigh scale modules and load cells.
5. Control panel drawings showing construction, dimensions, placement of operator interface devices, internal layout, and external interfaces.
6. Power and control wiring diagrams, including terminal numbers.
7. Functional description of internal and external instrumentation and controls to be supplied including list of parameters monitored, controlled, or alarmed.

B. Quality Control Submittals:
1. Special shipping, storage and protection, and handling instructions.

2. Manufacturer's printed installation instructions.
3. Routine maintenance requirements prior to system startup.
4. Manufacturer's Certificate of Proper Installation in accordance with Section 01 43 33, Contractor Field Services.
5. Functional and Performance Test Reports.
6. Operation and Maintenance Data: As specified in Section 01 78 23, Operation and Maintenance Data.
7. NTEP Certification of Conformance.
8. Submit written certification from Professional Engineer licensed in Province of Manitoba stating that support systems, anchorage, and equipment have been designed according to requirements of NBC for post-disaster structures, at time of Shop Drawing submittals.

1.3 EXTRA MATERIALS

A. Furnish, tag, and box for shipment and storage the following spare parts and special tools:

Item	Quantity
Load cells	Two
Load cell cables	Two
Special tools required to maintain or dismantle equipment	One complete set

B. Delivery: In accordance with Section 01 61 00, Common Product Requirements.

PART 2 PRODUCTS

2.1 GENERAL

A. Design equipment, anchorage, and support systems for vertical and lateral loading in accordance with NBC.

2.2 MANUFACTURERS

A. Materials, equipment, and accessories specified in this section shall be products of:
   1. Mettler-Toledo, Inc.; Model VTS231 or approved equal in accordance with B8.

2.3 CONDITIONS OF SERVICE

A. Equipment shall be suitable for the following conditions of service:

	WE-G2331, WE-G2341	
Application	Standard roll-off type containers for handling wastewater grit and screenings	
Location	Indoors	
Ambient Temperature (degrees C)	5 to 40	
Humidity (%)	Up to 100	
Other	Exposed to frequent wash down with plant effluent water	

2.4 DESIGN REQUIREMENTS

A. Equipment shall be designed for the following requirements:

	WE-G2331, WE-G2341	
Minimum Gross Weighing Capacity (kg)	90,000	
Minimum Concentrated Load Capacity (kg)	45,000	
Overall Scale Length (m)	9.14	
Scale Width (m)	3.35	
Deck Material	Steel	

2.5 EQUIPMENT DESCRIPTION

A. Fully electronic, steel deck truck scale generally consisting of scale modules, load cells, load cell cables, base plates, anchor bolts, digital scale instrument, and all appurtenances required for a complete operating system.

B. General:
   1. Flat top design without any side rail support beams.
   2. Conforming to NIST Handbook 44.
   3. Maximum depth profile of 370 mm from top of scale to top of foundation at load cell bearing points.
   4. Suitable for installation on concrete pit foundation as shown on Drawings.

5. Capable of withstanding, without damage, horizontal and vertical forces generated by standard roll-off containers as they are pushed onto and pulled off of scale by haulage truck.

C. Scale Modules:
1. Fabricated from steel plate and shapes, ASTM A36/A36M, with longitudinal members continuously welded.
    1. Orthotropic rib design.
    2. All welding shall comply with AWS D1.1 and shall be performed by welders certified to AWS D1.1.
3. All enclosed chambers of scale structure shall be hermetically sealed to prevent internal corrosion.
4. Designed to allow access to load cell cables, base plates, and foundation anchor bolts from top of scale platform.
5. Provide minimum of two access openings with covers to allow operator to access underside of scale.
6. No bolted connections between load cell and scale modules.
7. Complete with steel wear plates and guide rails continuously welded to scale deck to resist abrasion from container rollers, protect scale elements from forces generated by rolling action of container rollers, and to guide container into position on scale.
8. Coordinate dimensions and positioning of wear plates and guide rails with Contract Administrator prior to fabrication.

D. Load Cells:
1. Digital type with integral microprocessor and analog-to-digital converter located within load cell housing.
2. Certified by NTEP and conforming to NIST Handbook 44.
3. Performance Requirements:
    a. Load Capacity (each): 49,895 kg minimum.
    b. Ultimate Overload Rating: 300 percent.
    c. Accuracy Class: Class III L in accordance with NIST Handbook 44.
    d. Minimum Verification Interval (Vmin): 2.27 kg maximum.
    e. Hysteresis: plus or minus 0.025 percent of full scale.
    f. Non-Linearity: plus or minus 0.015 percent of full scale.
    g. Creep (30 minutes): plus or minus 0.017 percent of applied load.
4. Fabricated from stainless steel, hermetically sealed, and rated NEMA 6P and ANSI/IEC IP68 and IP69K.
5. Designed and constructed to perform as rocker pin with no fixed mechanical connections to scale module or base plate.
6. Shall not require check rods, flexures, chain links, or similar devices for stabilization.
7. Integral transient voltage surge suppressors with self-resetting thermal breakers to protect load cell components from voltage and current surges.
8. Neoprene rubber boot to prevent debris from contaminating lower bearing surface.
9. Integral, hermetically sealed, positively locking quick connector for connection of load cell cable.
10. Designed to permit load cell cable to be replaced without requiring splicing of cable, replacement of load cell, or recalibration of scale.
11. Mettler-Toledo Powercell PDX or approved equal in accordance with B8.

E. Load Cell Cables: Stainless steel sheathed and continuous from load cells to scale instrument with no splices or junction boxes.

F. Base Plates: Fabricated from Type 304 or 316 stainless steel.

2.6 SCALE INSTRUMENT

A. Provide scale instrument for each weigh scale with following features:
   1. Stainless steel NEMA 4X enclosure, UL/cUL listed, and suitable for wall mounting.
   2. Graphic display screen showing weight, units, time and date, as a minimum.
   3. Keypad for navigating screens and menus and for entering configuration parameters.
   4. External Interfaces: One Profibus communication port.

2.7 APPURTENANCES

A. Lifting Lugs: Provide suitably attached for all equipment assemblies and components weighing over 45 kg.

B. Equipment Anchor Bolts: Type 316 stainless steel, sized by equipment manufacturer, and as specified in Section 05 50 00, Metal Fabrications (Basic).

C. Equipment Identification Plates: In accordance with Section 40 05 53, Identification Labels for Equipment, Fabricated Tanks, Valves and Piping Systems.

2.8 FACTORY FINISHING

A. Prepare, prime, and finish coat in accordance with manufacturer’s standard high-build epoxy coating system.

2.9 SOURCE QUALITY CONTROL

A. Factory Functional Test: Perform manufacturer’s standard production tests.

PART 3 EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Install in accordance with manufacturer’s printed instructions.

3.2 FIELD QUALITY CONTROL

A. Functional Test:
   1. Conduct on each unit.
   2. Test for continuous 3-hour period.

3.3 MANUFACTURER'S SERVICES

A. Manufacturer's Representative: Present at Site or classroom designated by the City for minimum person-days listed below, travel time excluded:
   1. One person-day for installation assistance and inspection.
   2. One person-day for functional and performance testing and completion of Manufacturer's Certificate of Proper Installation.
   3. One person-day for pre-startup classroom or Site training.
   4. One person-day for facility startup.
   5. One person-day for post-startup training of the City's personnel. Training shall not commence until an accepted detailed lesson plan for each training activity has been reviewed by the City and Contract Administrator.

B. See Section 01 43 33, Contractor Field Services and Section 01 91 14, Equipment Testing and Facility Startup.

END OF SECTION