

100% PROJECT MANUAL

COMMERCE 2.0 MGD GROVE CREEK WPCP

COMMERCE, GEORGIA

for

CITY OF COMMERCE

BID DOCUMENTS

March 2025



Prepared By



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GMC PROJECT NUMBER: CATL230033



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ARCHITECTURE ■ ENGINEERING ■ ENVIRONMENTAL ■ GEOTECHNICAL ■ INTERIOR
DESIGN LANDSCAPE ARCHITECTURE ■ PLANNING ■ SURVEYING ■ TRANSPORTATION

**COMMERCE 2.0 MGD GROVE CREEK
WATER POLLUTION CONTROL PLANT**

FOR

CITY OF COMMERCE

COMMERCE, GEORGIA

GMC PROJECT NO. CATL230033

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SECTION 41 15 13 – CHEMICAL IBC TOTE SCALES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes Chemical IBC Tote Scales and transmitters for measuring chemical usage.
- B. Related Requirements:
 - 1. Division 40 - Process Interconnections: for integration of the equipment by this Section.

1.2 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections
- B. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for tote scales and accessories.
- C. Operation and Maintenance Data: For Tote Scales to include in maintenance manuals.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.4 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.5 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
 - 1. Furnish five-year manufacturer's warranty for equipment and accessories.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Manufacturers:
 - 1. Force Flow – Concord, CA Model 50-DR – Solo G2
 - 2. Scaletron Industries Ltd – Plumsteadville, PA
 - 3. Approved equal.
- B. System Description:
 - 1. Scale platform shall be sized to accept a 48 by 40-inch tote. The platform shall be a maximum height of 3 inches and include an adjustable backstop to accommodate easy loading and unloading of chemical tote bins.
 - 2. Components: The system shall include a complete package system that includes a scale platform and remote-mounted indicator transmitter.

2.2 TOTE SCALE

- A. Scale shall be of the single load cell design. Weight shall be transferred via a pivoted platform to a single, NTEP approved load cell of the shear beam strain gauge type. Flexible cable shall connect load cell to indicator to allow easy remote installation of the readout. Platform scale coating system shall be a minimum dry thickness of 80 mils and be resistant to moisture, chemicals, abrasion, impact and UV light.
- B. Materials of Construction: 316 stainless steel

2.3 INDICATOR-TRANSMITTER

- A. The remote mounted LCD indicator shall carry CE marking and shall be housed in a NEMA 4X, UL approved enclosure. All operations shall be keypad operated & menu driven in order to avoid compromising the NEMA 4X seal at any time. The alphanumeric LCD readout shall have backlighting for readability in low light conditions. Power requirement shall be 120 VAC.
- B. A 6 digit numerical display shall give operator the ability to monitor chemical by weight (lb or kg) or volume (gallons or liters). A bar graph display shall read 0-100% for the net contents. A dual mode TARE key shall allow user to enter the tare weight of the vessel or enter the net weight of the chemical depending on application needs. A diagnostics menu shall allow recalibration without the need to apply field test weights. A user adjustable filter function shall stabilize display in the event of vibration from pumps or mixers in the immediate vicinity of the scale.

- C. Indicator shall output net weight via a 4-20mA signal and full-scale output shall be user adjustable via the keypad. Indicator shall have four adjustable set points to display low or high level conditions on the indicator.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

3.2 INSTALLATION

- A. Install Tote Scales and transmitters in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 41 15 13

SECTION 41 22 14 – JIB CRANES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Free standing jib crane and accessories for Reuse Water Pump Station and Post Aeration Basin.
 - a. 360-degree rotating boom and mast
 - b. Rotating collector assembly with service entrance and festoon service support

B. Related Requirements:

1. Section 05 12 00 - Structural Steel Framing
2. Division 03 - Concrete
3. Division 26 - Electrical.

1.2 REFERENCES

- A. HMI Standard Specifications for Hoists
- B. AISC – Manual of Steel Construction
- C. ANSI B30.11- Monorails and Underhung Cranes
- D. ASTM A36 - Carbon Structural Steel
- E. ASTM A325 - Structural Bolts, Steel, Heat Treated, 120/150 ksi Minimum Tensile Strength
- F. ASTM A490 - Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
- G. ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube
- H. AWS D1.1 - Structural Welding Code
- I. OSHA - Specification 1910.179 - Overhead and Gantry Cranes

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 1. Describe capacities, performance, operation, and applied forces to foundation.
 2. Preparation instructions and recommendations.
 3. Storage and handling requirements and recommendations.

4. Installation methods.

C. Shop Drawings:

1. Shop drawings showing configuration, dimensions, service area, and construction and installation details.

D. Source Quality-Control Submittals: Indicate results of shop/factory tests and inspections.

E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

F. Manufacturer Reports: Indicate that equipment has been installed according to manufacturer's instructions.

1.4 COORDINATION/SCHEDULING

A. Section 01 31 00 - Project Management and Coordination: Requirements for coordination.

B. Coordinate installation and startup of Work of this Section with plant operations.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of installed bridge crane.

C. Operation and Maintenance Data: Submit maintenance instructions for equipment and accessories.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.

B. Operation data: Submit manufacturer's instructions, troubleshooting checklists and repair data

C. Maintenance data: Include manufacturers literature, cleaning procedures, and replacement parts list

D. Spare Parts:

1. Furnish one set of manufacturer's recommended spare parts.

E. Tools: Furnish special wrenches, tools, etc. and other devices required for Owner to maintain equipment reference herein.

1.7 QUALITY ASSURANCE

- A. The manufacturer of equipment shall have a minimum of 5 years experience in the manufacturing for this equipment and be able to provide 5 reference installations of similar equipment.
- B. The equipment supplier shall provide the services of a factory-trained representative for a minimum of one eight-hour day for system checkout and operator training, or until the complete chemical feed system is functioning properly.

1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
 - 1. Included on manufacturer's standard form and outlines the manufacturer's agreement to repair or replace assemblies and components that fail in materials and/or execution within warranty period from date of substantial completion.
 - 2. Warranty covers ten (10) years or 20 thousand (20,000) hours for manual push-pull Crane products to cover defects in materials and execution.

PART 2 - PRODUCTS

2.1 JIB CRANE

- A. Floor Mounted Jib Cranes; manufactured by
 - 1. Spanco
 - 2. Gorbel
 - 3. Contrx Cranes
 - 4. Approved equivalent.
- B. Designed in conformance with the following applicable standards:
 - 1. AISC Steel Construction Manual
 - 2. OSHA 1910.179
 - 3. ANSI B30.11
 - 4. CMAA 74
- C. Design Criteria:
 - 1. Model: Foundation Mounted Crane
 - 2. Capacity 2,000 pounds
 - 3. Span: 20 feet
 - 4. Height Under Boom: 16 feet
 - 5. Area of Rotation: 360 degrees
 - 6. Construction: Fabricated from ASTM A36 steel sections with finished ends and surfaces.

D. Design Factors:

1. Designed with a factor of 15 percent of the rated capacity for hoist and trolley weight and 25 percent of the rated capacity for impact.
2. 50 percent impact factor used for vacuum or magnet applications.
3. The pipe mast is designed to give maximum strength and minimum deflection to resist bending, buckling, and crushing, as well as wear by the trunnion roller assembly.
4. The bearings are designed for a 5,000 hour B-10 design lift.
5. No crane should ever be loaded beyond its rated capacity.

E. Service Factor:

1. Designed for moderate usage (Class C Moderate Service) as defined by CMAA 74.2
2. System or equipment is used where lifted loads average 50 percent of the rated capacity with five to ten lifts per hour, averaging 15 feet, not over 50 percent of the lifts at rated capacity.

F. Support Structure:

1. Mounted to permanent concrete foundation.
2. Foundation mount: Square steel plate welded to the bottom of column.

G. Head Assembly:

1. Construction: Standard plate, angles, and channels.
2. Plate: Reinforced using angles to limit compression and buckling stresses.
3. Lower trunnion assembly: Mounted on a channel, which transfers the load to the top of the box.
4. Head Assembly: Designed to inhibit dislodgement due to motion. Allows bottom entry electrification inside the head and allows mounting above the boom for top entry electrification.

2.2 SYSTEM OPTIONS

A. Installation Capabilities

1. Foundation Mounted

B. Collectors

1. Electrical power provided for motorized cranes and hoists with either bottom entry collector or top entry collector
 - a. Bottom entry collector: Electrical collector installed in weight bearing channel of head assembly to conduct electrical power from inside mast through mast pivot pin to motor operator head assembly and electrically operated hoist on boom. Collector allows continuous 360-degree rotation.

- b. Top entry collector: Electrical collector installed on top flange of boom to conduct electrical power from overhead electrical source to motor operator on head assembly and electrically operated hoist on boom. Collector is fitted with pivot arm connected to source conduit and allows continuous 360-degree rotation.

C. Tagline Festoon System

1. Attached to boom for supporting electrical cable or compressed air hose supplying trolley hoist. Either S-hooks or wire rope trolleys can be used.
2. Includes system of wire rope tagline (S-hooks or wire rope trolleys), brackets, and eyebolts for attachment to boom. System supports electrical cable and air hose supplying trolley hoist moving along boom.

D. Rotation Stops

1. Limit boom rotation
2. Steel plate stops are welding to formed channels of top and bottom brackets.

E. Power Rotation

F. Anchor Bolts

2.3 SYSTEM COMPONENTS

A. Mast:

1. Stationary steel pipe perpendicular to boom.
2. Equip mast top with plate and pivot pin to receive head assembly.

B. Boom:

1. Horizontal, standard I-beam bolted to head assembly and designed for hoist trolley travelling on bottom flange.
2. Reinforce with cap channel as required for lateral stability.
3. Equip booms with stops to limit movement of trolley.

C. Head Assembly

1. Utilizes a tapered roller bearing provided with grease fitting for proper lubrication.
2. Welded steel plate and channel fabrication fitted over mast, bolted to boom, and designed to transfer boom load to mast and allow for rotation.
3. Bearings are designed for 5,000-hour, B-10 design lift.
4. Allows for installation of head assembly prior to boom attachment and provides maximum hoist lift.

- a. Top pivot bearing assembly: Designed to connect head assembly to mast and transfer load from boom. Weight bearing channel connects the sides of the head assembly and contains tapered roller bearings that allow for easy rotation.
- b. Retaining clip: Inserted through mast pivot pin above weight bearing channel to prevent accidentally dislodging head assembly.
- c. Trunnion roller assembly: Designed to rotate around mast and transmit moment force from boom to mast. Includes trunnion rollers with tapered bearings held in steel channel with bolts. A mast that is less than 18 inches in diameter will have two rollers, and larger masts will have four rollers. Assembly rotates around mast with full roller face contact. Roller surface is sufficiently large to prevent cutting into mast. Cranes with small rollers or cams requiring wear band on mast are not acceptable.

2.4 GENERAL EQUIPMENT SPECIFICATION

- A. Motors will be Standard NEMA C face, Class F insulation, TENV motors are provided commercial power supplies. The motor has a standard NEMA shaft extension.
- B. Automatic reset thermostats protect both single speed and two-speed motor. This complies with applicable NEC requirements and relieves the user from providing motor running overcurrent protection.
- C. Three single speed phase motors are induction type, reconnectable for 230 volt or 460 volt, 60-hertz power supply, rated at 30-minute duty with $\pm 10\%$ voltage variation.
- D. The Overload Cutoff shall be electro-mechanical device designed to interrupt the hoist lifting circuit if the load it senses exceeds the preset capacity of the cutoff device. When the device interrupts the hoist lifting circuit, the lowering circuit remains intact to allow the hoist load to be lowered or removed. When the excessive overload, that has caused the device to trip, is removed from the hoist, the hoist lifting circuit is automatically restored.
- E. Controls shall be single speed completely enclosed controls are 3 pole magnetic reversing type, mechanically interlocked rated at 600 volts. Included is control transformer or 115 Volt control circuit. All wiring conforms to applicable NEC and CSA requirements. Housed in NEMA type 3R enclosure with lightweight, impact resistant Lexan resin cover, deep molded for maximum accessibility.
- F. Pushbutton stations shall be NEMA type 4X and molded impact resistant thermo-plastic units with momentary contact type buttons. Push button operating voltage

is 115 volts. The thermoplastic enclosure is designed for one hand operation and is supported by a strain relief chain.

- G. Motor brake is direct acting, short stroke, AC magnet actuated disc type with a minimum torque rating of 150% of the full load motor torque. Provides accurate spotting and control of the load by quickly stopping the motor when power is interrupted.
- H. Mechanical load brake is Weston type, multiple discs can hold a full capacity load independent of motor brake and can hold the load stationary in any position.
- I. Geared limit switch interrupts the control circuit to stop the motor and applies the motor brake when hook reaches its upper and/or lower limits of travel. Fully adjustable in both upper and lower directions. Includes reversing circuit to prevent hook overtravel in either direction.
- J. Load chain is close link coil type, electric welded alloy steel, heat-treated for wear resistance and ability to withstand impact. All links precisely calibrated for uniform size and shape, free from scale and lamination to permit proper seating in load sheave pockets. Zinc plated load chains are embossed with "W" on each link for proper identification. The dead end of the chain is securely attached to the hoist in a manner which will permit ease of replacement. Provide chain container of galvanized steel with drain holes.
- K. The hooks are drop forged, heat treated, ductile, alloy steel, and equipped with spring latches. The lower hook is supported on a lifetime pre-lubricated thrust bearing which permits the hook to rotate 360 degrees under capacity load. The top hook is free to rotate for each attachment to support.
- L. Precision cast, heat treated, alloy steel, four-pocket load sheave for smoother operation and increased chain life.
- M. Gear train combination of helical and spur gears, with all contact surfaces hardened for wear resistance and designed in accordance with AGMA standards. All gears and pinion shafts supported on both ends by anti-friction ball bearings. Gears operate in a sealed oil bath.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver materials in manufacturer's packaging, including application instructions.
- C. Inspection: Accept materials on-Site in original packaging. Inspect for damage.

- D. Store materials according to manufacturer's instructions.
- E. Protect materials from water and wet weather.

3.2 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. The services of a qualified representative of the manufacturer shall be provided to inspect the installation, place the equipment in operation, make any necessary adjustments, and instruct the operating personnel in the operation and maintenance of the equipment.

3.3 INSTALLATION

- A. Install trolley/hoists on rail systems as indicated on the Drawings.
- B. Mast/Base Assembly
 - 1. Install one set of nuts on anchor bolts with top surface approximately one inch above foundation. Place mast/base unit over anchor bolts resting on leveling nuts.
 - 2. Install second set of nuts loosely and insert plumb line arm in pivot shaft located on top of mast. Select position on arm to hang plumb line that is two inches from edge of mast. Measure 60 inches down from top of mast and use that point to check plumb. Locate arm directly over one anchor bolt (or pairs when 12 bolts are used). Measure from plumb line to edge of mast. Measurement should be two inches. If not, adjust leveling nut. Rotate arm 180 degrees and check distance. If distance is more or less than two inches, adjust leveling nuts to the same distance on both sides of mast.
 - 3. Repeat operation at each anchor bolt (90-degree increments). When mast is plumb, apply grouting compound under base plate and tighten locking nuts.
 - 4. Install three braces from top of mast to ground at 120 degrees apart to prevent mast from shifting when concrete foundation is poured. After concrete has hardened proceed with jib assembly.
- C. Box/ Head assembly
 - 1. Box/ head assembly is mounted on main bearing of pivot shaft.
 - 2. To level box assembly, adjust hex nuts to adjust the position of roller assembly to mast. When box is fairly level, place flat washer over pivot shaft protruding through head assembly of box, and secure with remaining snap ring.
- D. Boom assembly
 - 1. Mount boom assembly to box securing at back plate and beam support angle.
 - 2. Modify boom by adjusting the roller adjustment nut; lock into position with lock nuts.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.
- B. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- C. Perform field quality control testing as recommended by manufacturer.
- D. Inspect installed crane. Verify all bolts are tight and lock washers fully compressed.
- E. Field test crane and accessories for operating functions. Ensure crane movement is smooth and proper. Adjust as required and correct deficiencies.
- F. Clean surfaces. If necessary, touch-up paint damage, scratches, and blemishes with manufacturer provided matching paint.
- G. Protect crane from other construction operations.

3.5 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.
- B. Check control module functions and adjust as required.

3.6 DEMONSTRATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.

3.7 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion

END OF SECTION 41 22 14

SECTION 41 22 24 – ELECTRIFIED MONORAIL HOIST

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes runway track, hoist, hook, trolley and electrification.
- B. Related Requirements:
 - 1. Division 05 - Metals
 - 2. Section 09 96 00 – High-Performance Coatings.

1.2 REFERENCE STANDARDS

- A. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
- B. ASME International:
 - 1. ASME B30.11 – Monorails and Underhung Cranes - Safety standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks and Slings.
 - 2. ASME B30.16 – Overhead Underhung and Stationary Hoists.
 - 3. ASME HST-1 – Performance Standard for Electric Chain Hoists.
- C. ASTM International:
 - 1. ASTM A275 - Standard Practice for Magnetic Particle Examination of Steel Forgings.
 - 2. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat treated, 120/105 ksi Minimum Tensile Strength.
 - 3. ASTM A563 – Standard Specification for Carbon and Steel Alloy Nuts
 - 4. ASTM F436 – Hardened Steel Washers
- D. Crane Manufacturers Association of America (CMAA):
 - 1. CMAA 74 – Specifications for Single Girder Cranes.
- E. Material Handling Industry of America (MHI):
 - 1. MHI M27.1 – Specifications for Underhung Cranes and Monorail Systems.
- F. National Electrical Manufacturers Association (NEMA)
 - 1. NEMA ICS 8- Crane and Hoist Controllers
- G. National Fire Protection Association (NFPA):

1. NFPA 70 – National Electrical Code.

1.3 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
- B. Shop Drawings:
 1. Include plans, elevations, sections, and large-scale details indicating attachment to existing and new building structure.
 2. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Design Data:
 1. Loading and sizing calculations
- D. Test Data:
 1. 125 percent rated load test
 2. Post Erection Inspection
 3. Load Chain Proof test

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates: Signed by Monorail Hoist manufacturer certifying that monorail, hoist and electrification system and dimensions, are adequate for hoist system loading and service being provided.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For monorail hoist to include in emergency, operation, and maintenance manuals.
 1. Submit manufacturer's standard operation and maintenance manual, according to ASME B30.16.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.6 QUALITY ASSURANCE

- A. Certification that the hoist, hook and trolley system design and fabrication is in compliance with the listed standards.
- B. Certification that the runway straightness/levelness and elevation of the monorail systems meet M27.1 requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.8 COORDINATION

- A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for monorail hoist equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of other work specified in other Sections that relates to monorail hoist, including electrical service.

1.9 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace monorail hoist work that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. Warranty Period: Minimum one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Saturn
- B. Or Approved Equal

2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with:
 - 1. ASME HST-1, Duty Class H2.
 - 2. ASME B30.11 & B30.16
 - 3. MH1 M27.1, for indoor service, infrequent usage.

2.3 ELECTRIFIED MONORAIL HOIST

- A. General: Indoor service, infrequent usage, electrified chain hoist mounted on a movable electric motor operated trolley complete with controls.
- B. Hoist shall be of the ultra-low headroom model.
- C. Capacity and Speed:
 - 1. Minimum Rate Capacity: 3 tons.
 - 2. Max. lift height: 14'-2" (measured from invert of monorail beam to finished floor)
 - 3. Max. headroom: 20"

2.4 MATERIAL AND DESIGN REQUIREMENTS

- A. Design Requirements.
 - 1. Powered hoists shall include a brake and a controlled braking means, and an overload limiting device.
 - 2. Directional contactors shall include electrical and mechanical interlocks. Design the mainline contactor, along with the power-off/power-on circuitry to remove power from the drive motors, brakes and control circuit. The control circuit shall not operate unless a power-on button is depressed.
 - 3. Overcurrent protection for the control circuit and control circuit transformer; fuse or circuit breaker protection for branch circuit short circuit and ground fault protection; and overload protection for each motor, motor controller, and branch circuit conductor shall all conform to the NFPA 70.
 - 4. Provide safety (drop) lugs or a functional equivalent on the trolley frame to prevent derailment in the event of wheel failure.
 - 5. The hoist and trolley shall be capable of protected indoor (38 degrees F -100 degrees F working conditions).
 - 6. Provide monorail system operating on 480V, 3, phase, 60 Hz power supply
 - 7. Provide a non-resettable hour meter, connected across the main line contactor, readable from the exterior of the main control panel, to indicate the elapsed number of hours the crane is energized.
- B. Monorail Track System: Provide the track beam system with trolley stops at all open-end locations. The stops shall retain the hoist on the track. Stops shall contact the wrap-around type trolley frame.
 - 1. Electrification- Provide runway electrification of the enclosed safety bar type with four continuous copper conductors. Provide electrical work for the monorail system in accordance with NFPA 70.
- C. Track Suspension System:

1. Provide rigid type monorail suspension. Design and installation of the monorail track beam suspension system is the responsibility of the Contractor. Support monorail track system using only the structural members indicated on the drawings. Provide additional supports as required to carry lateral and longitudinal monorail track system loads to the structural members shown. Additional material supports shall conform to the material requirements contained in Section 05 12 00 - Structural Steel
 2. Suspend the monorail track beam with the system manufacturer's standard cataloged suspension products. Submit manufacturer's published tables verifying the sizing of any track beam and suspension system.
 3. Make bolted connections to supporting structure, excluding hanger rods, with ASTM A325 bolts, ASTM A563 nuts, and ASTM F436 hardened washers. ASTM A325 bolts shall be fully pre-tensioned.
- D. Electric Chain Hoist: Electric chain hoist shall conform to ASME HST-1 and NEMA ICS 8, except as modified herein. Provide load chain proof test results.
1. Provide chain hoists with a load chain bucket.
 2. Provide safety hook fitted with self-closing, spring loaded steel safety latch, and with hook nuts keyed to hook shanks by means of a setscrew installed in a plane parallel to the longitudinal axis of the hook shank, or by any other similar easily removable securing device. Provide unpainted hook and hook nut, permanently marked with an identification number. Clearly mark the hook and hook nut with a unique identification number corresponding to the number used in non-destructive test (NDT) reports.
- E. Trolley: Provide a trolley drive designed to operate from the track beam section furnished under this section.

2.5 CONTROLS

- A. Provide wireless electronic control of electric hoist and trolley. Arrange pushbuttons in accordance with ASME B30.11 recommendations.
- B. Equip hoists with adjustable limit stops for chain to prevent over-travel in both the raising and lowering directions.
- C. Hoist Load Brake: Provide hoist load brake that is capable of stopping and holding a 125 percent test load. If dynamic braking is not included, provide a hoist mechanical load brake that is capable of stopping and holding a 125 percent test load. If the hoist has more than one brake, each brake shall independently stop and hold 125 percent of rated capacity.
- D. Trolley Brake: Provide trolley with either a non-coasting worm drive or with an electro mechanical brake that is spring applied, electrically released Trolley brake shall have a torque rating equal to or greater than 50 percent of the drive motor rated torque and be adjustable from 85 percent to 100 percent of its torque rating. Equip trolley brake with a manual release. Design to permit easy access for wear, inspection and setting.

2.6 FINISHING

- A. Provide manufacturer's standard painting brilliant yellow of components. Provide a primer and a finish coat. Blast-clean all components prior to painting. Primer shall be inorganic zinc type. Provide epoxy finish coat formulated for corrosive environments. Paint coats shall be smooth and even, free of runs, sags, orange peel, or other defects.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine monorail hoist areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify critical dimensions and examine supporting structure and other conditions under which monorail hoist work is to be installed.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install according to manufacturer's instructions.

3.3 FIELD QUALITY CONTROL

- A. After erection and inspection, test the monorail system, hoist, and trolley as specified herein. Test the systems in service to determine that each component of the system operates as specified, is properly installed and adjusted, and is free from defects in material, manufacturing, installation, and workmanship. Rectify all deficiencies disclosed by testing and retest the system or component to prove the monorail system is operational.
- B. Furnish test loads, operating personnel, instruments, and other apparatus as necessary to conduct field tests on hoist and monorail. Perform test and final adjustments of the equipment under the supervision of the Engineer.
- C. Trolley Test: With test load hoisted to a height of one foot above the floor, operate trolley the full distance of the monorail in both directions. Observe for any malfunctioning of the trolley assembly and monorail system.
- D. Rated Load Speed Test: With the hoist loaded to rated capacity, raise and lower the load verifying that the hoisting and lowering speeds are provided as specified. With the hoist loaded to rated capacity, operate trolley along the monorail beam verifying that the trolley speed is provided as specified. Further, verify that the trolley stops in each direction within a distance in feet equal to 10 percent of rated capacity high speed feet per minute when initially traveling at high speed and

carrying the rated capacity load. Record voltage, amperage, hoisting and lowering speeds, trolley travel speed, and motor speed for each motor.

END OF SECTION 41 22 24