

SECTION 41 12 13.19

BELT BULK MATERIAL CONVEYORS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope:
1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install a belt bulk material conveyor system complete and operational in accordance with the Contract Documents.
 2. Included are conveyors, anchorage systems, and all appurtenances.
 3. Provide two conveyors at locations as follows:
 - a. One Conveyor at Regional WWTP ESD Lift Station
 - b. One Conveyor at Lake St Influent Facility.
- B. Coordination:
1. Review installation procedures under this and other Sections and coordinate installation of items that will be installed with or before belt bulk material conveyor Work.
 2. Notify other contractors in advance of the installation of belt bulk material conveyor to provide other contractors with sufficient time for installing items included in their contracts that must be installed with or before the belt bulk material conveyor Work.
- C. Related Sections:
1. Section 03 60 00, Grouting.
 2. Section 05 05 33, Anchor Systems.
 3. Section 05 50 13, Miscellaneous Metal Fabrications.
 4. Section 40 05 93, Common Motor Requirements for Process Equipment.
 5. Section 46 21 16, Flexible Rake Bar Screens
 6. Section 46 23 23, Vortex Grit Removal Equipment

1.2 REFERENCES

- A. Standards referenced in this Section are:
1. ABMA STD 9, Load Rating and Fatigue Life for Ball Bearings.
 2. ABMA STD 11, Load Ratings and Fatigue Life for Roller Bearings.
 3. ABMA STD 20, Radial Bearings of Ball, Cylinder Roller and Spherical Roller Types - Metric Design.
 4. AGMA Gearmotor Load Classifications.
 5. AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.
 6. ASTM A36/A36M, Specification for Carbon Structural Steel.

7. ASTM A48/A48M, Specification for Gray Iron Castings.
8. ASTM A123/A123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
9. ASTM A193/A193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
10. ASTM A194/A194M, Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both.
11. ASTM A666, Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
12. ASTM B117, Practice for Operating Salt Spray (Fog) Apparatus.
13. AWS D1.1/D1.1M, Structural Welding Code - Steel.
14. Conveyor Equipment Manufacturer's Association (CEMA), CEMA 402, Belt Conveyors.
15. IEEE 112, Standard Test Procedures for Polyphase Induction Motors and Generators.
16. IEEE 117, Standard Test Procedure for Evaluation of Systems of Insulating Materials for Random-Wound AC Electric Machinery.
17. IEEE 841, Standard for Petroleum and Chemical Industry-Totally Enclosed Fan Cooled (TEFC) Squirrel Cage Induction Motors – Up to And Including 500 HP.
18. NEMA ICS 2, Industrial Control and Systems Controllers, Contactors and Overload Relays, Rated at 600 Volts.
19. NEMA ICS 6, Industrial Controls and Systems Enclosures.
20. NEMA 250, Enclosures for Electrical Equipment (1,000 volts maximum).
21. NEMA MG 1, Motors and Generators.
22. UL 674, Electric Motors and Generators for Use in Division 01 Hazardous (Classified) Locations.
23. UL 1004, Electric Motors.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer shall have a minimum of five years' experience producing substantially similar equipment to that specified in this Section and shall be able to document at least five installations in satisfactory operation for at least five years.
2. Welding Qualifications: Equipment manufacturer's shop welds and welding procedures and personnel shall be qualified and certified per AWS D1.1/D1.1M.

B. Component Supply and Compatibility:

1. Obtain all products included in this Section regardless of component manufacturer from a single belt bulk material conveyor manufacturer.
2. Equipment manufacturer shall prepare, or review, and approve all Shop Drawings and other submittals for components furnished under this Section.

3. Components shall be suitable for specified service conditions and be integrated into overall assembly by belt bulk material conveyor equipment manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Drawings showing fabrication methods, assembly, accessories, installation details, and wiring diagrams.
 - b. Listing of conveyor components and materials.
 - c. List of deviations from the Contract Documents.
 - d. Drawings and information for local control stations and instruments per this Section.
 - e. Coordination Drawings showing the arrangement and critical dimensions at the discharge of other equipment to the Conveyor.
2. Product Data:
 - a. Manufacturer's literature, illustrations, specifications, and engineering data including materials, dimensions, weights, performance data, and part lists for all components in sufficient detail to allow an item by item comparison with the Contract Documents.
 - b. Motor test reports for furnished motors or for a previously manufactured electrically duplicate motor that was tested, including running light current, locked rotor current, winding resistance measurement, high potential test, bearing inspection, and efficiency at 1/2, 3/4, and full load.
 - c. Provide a copy of the manufacturer's standard warranty for parts and labor.
3. Testing Plans: Prior to performing tests, submit and obtain ENGINEER's approval of test procedures for shop test and field operating tests.

B. Informational Submittals: Submit the following:

1. Certificates:
 - a. Welding certifications.
2. Source Quality Control Submittals: Written reports of shop tests, submitted prior to shipment from factory.
3. Field Quality Control Submittals: Written reports of operating tests and other field quality control tests required.
4. Manufacturer's Instructions: Submit manufacturer's instructions and recommendations for:
 - a. Storage.
 - b. Handling.
 - c. Setting drawings, templates, and directions for installing anchor bolts and other anchorages.
 - d. Installation.

5. Manufacturer's Reports: Submit a written report of results of each visit to Site by Supplier's service technician, including purpose and time of visit, tasks performed, and results obtained.
 6. Qualifications Data:
 - a. Manufacturer, when requested by ENGINEER.
 - b. Welders.
- C. Closeout Submittals: Submit the following:
1. Operational and Maintenance Data:
 - a. Submit complete operation and maintenance manuals, including copies of test reports, maintenance data, and schedules, descriptions of operation, and spare parts information.
 - b. Furnish operation and maintenance manuals per Section 01 78 23, Operations and Maintenance Data.
 2. Spare Parts:
 - a. Furnish the following spare parts:
 - 1) Carrying idlers, six of each size used.
 - 2) Return idlers, six of each size used.
 - 3) Polyurethane scraper blade, three for each scraper.
 - 4) Twenty-five feet of each belt width to be used for repairing belts.
 - 5) Stainless steel mechanical belt splice kit, complete with necessary tools.
 - b. Furnish an initial supply of all greases and lubricants required. Provide grease and lubricants sufficient for first year of operation.
 - c. Furnish maintenance repair kit for belts and repairable wear items as recommended by equipment manufacturer.
 - d. Furnish and deliver spare parts, consumables, and special tools carefully packed in sturdy containers with clear indelible identification markings. Properly store spare parts, consumables, and special tools until transferred to OWNER.
 3. Special Tools: Furnish two sets of special tools required for normal operation and maintenance. Tools shall include those required to replace, repair, and splice conveyor belts, including templates.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
1. Deliver products to Site to ensure uninterrupted progress of the Work. Deliver anchorage products that are to be embedded in concrete in ample time to prevent delaying the Work.
 2. Comply with Section 01 65 00, Product Delivery Requirements.
- B. Storage and Protection:
1. Protect steel, packaged materials, and electronics from corrosion and deterioration.
 2. Comply with Section 01 66 00, Product Storage and Handling Requirements.

PART 2 – PRODUCTS

2.1 EQUIPMENT PERFORMANCE

A. Description:

1. Provide troughed belt bulk material conveyor system and accessories, including framework, supports, drive, skirts, drip pans, and other appurtenances required to convey the material specified. Conveyor system shall be designed to operate with direction capability as specified, and, for systems with multiple belts, with belts operating together and independently to convey material.
2. System Description, both locations: Belt bulk material conveyors shall convey screenings and grit from three flexible rake bar screens and two grit classifiers to the dumpster.
3. System Operation, both locations: Run at user-defined time interval between user-defined pauses. Run continuous plus one minute when grit pumps are running and/or when all three screens are in operation.

B. Service Conditions:

Parameter (Regional WWTP ESD Lift Station)	Service Condition
Designation	CB-11-01
Location	Screen Room
Number of Belt Conveyors	1
Number of Diversion Plows per Belt Conveyor	0
Number of Drive Motors per Belt Conveyor	1
Number of Diverter Gates per Belt Conveyor Discharge Chute	0
Conveyed Material	Wastewater screenings and grit
Maximum Conveying Capacity (pounds per hour)	2000
Minimum Belt Width (inches)	24
Approximate Belt Length* (feet)	50
Inclination* (degrees)	5
Conveyor Drive Motor Size and Electrical Power (horsepower, volts, frequency, phase)	3, 460, 60, 3
Maximum Belt Speed (feet per minute)	100
Belt Direction Capability	Single Direction
* Data provided is approximate and subject to change with CONTRACTOR's final layout. Field-verify required length and inclination and submit final layout with Shop Drawings. No extra compensation will be paid for minor revisions to belt conveyor length and inclination required. Extra compensation will not be paid for changes required for CONTRACTOR substitutions or alternatives awarded.	

Parameter (Lake Street Influent Facility)	Service Condition
Designation	CB-10-01
Location	Lake Street Influent Building
Number of Belt Conveyors	1
Number of Diversion Plows per	0

Parameter (Lake Street Influent Facility)	Service Condition
Belt Conveyor	
Number of Drive Motors per Belt Conveyor	1
Number of Diverter Gates per Belt Conveyor Discharge Chute	0
Conveyed Material	Wastewater Screenings and Grit
Maximum Conveying Capacity (pounds feet per hour)	2000
Minimum Belt Width (inches)	24
Approximate Belt Length* (feet)	45
Inclination* (degrees)	3
Conveyor Drive Motor Size and Electrical Power (horsepower, volts, frequency, phase)	3, 460, 60, 3
Maximum Belt Speed (feet per second)	100
Belt Direction Capability	Single Direction
* Data provided is approximate and subject to change with CONTRACTOR's final layout. Field-verify required length and inclination and submit final layout with Shop Drawings. No extra compensation will be paid for minor revisions to belt conveyor length and inclination required. Extra compensation will not be paid for changes required for CONTRACTOR substitutions or alternatives awarded.	

2.2 MANUFACTURERS

- A. Manufacturers: Provide equipment of one of the following:
1. JDV Equipment Corporation.
 2. Keystone Conveyor Corporation.
 3. KWS Manufacturing Company.
 4. Or equal.

2.3 DETAILS OF CONSTRUCTION

- A. General:
1. Conveying equipment shall be suitable for continuous operation without excessive wear.
 2. Provide all devices required for compliance with safety Laws and Regulations.
 3. Prior to fabricating belt conveyor, determine requirements for and furnish brackets, chutes, and hardware required for complete system.
 4. Belt bulk material conveyors shall conform to CEMA 402.
 5. All components shall be rated for explosion proof operation in a Class 1, Division 1 area.
 6. Construction of conveyor shall be coordinated with installation of flexible rake bar screens and vortex grit classifiers to avoid conflicts.
- B. Conveyor Belting:
1. Belt conveyor shall include two-ply synthetic carcass belt with rated tension of 220 pounds per square inch-width (PIW) and 1/8-inch by 1/16-inch moderately oil-resistant nitrile covers.

2. Provide belt with factory-installed AISI Type 304 stainless steel, hinged, bolted mechanical fasteners, drawn and recessed into belt cover.
- C. Conveyor Construction:
1. Pulleys:
 - a. Pulleys shall be welded steel or cast-iron drum-type with necessary shafting, bearings, and take-up devices with ample adjustment.
 - b. Head pulleys shall be minimum of 12-inch diameter and two inches wider than width of belt. Provide minimum 1/4-inch thick vulcanized rubber lagging on head pulleys to resist belt slip.
 - c. Tail pulleys shall be minimum of 12-inch diameter and two inches wider than width of belt.
 - d. Secure pulleys to shafts with compression bushings.
 2. Bearings:
 - a. Bearings shall be at least 1-15/16-inch diameter, self-aligning roller-type.
 - b. Drive pulley bearings shall be pillow block-type and include push bolts for minor alignment adjustment.
 - c. Tail pulley bearings shall be supported by protected screw take-ups with 12-inch travel length, minimum. Take-ups shall incorporate stainless steel adjusting rods with brass bearing capture nuts.
 3. Idlers:
 - a. Idlers shall conform to CEMA 402, Series C standards, be five-inch diameter rollers, covered with a corrosion-resistant and wear-resistant 1/8-inch thick urethane coating, and supported from frame by hot-dipped galvanized brackets.
 - b. Carrying idlers shall be 20-degree trough-type with maximum spacing of one foot on centers at conveyed material discharge or loading points and four feet on centers at other locations.
 - c. Return idlers shall be flat-type with a maximum spacing of ten feet on centers.
 - d. Idler bearings shall be permanently lubricated and double-shielded. Shaft bearings shall be grease lubricated.
 - e. Belts shall have self-aligning side guide idlers at maximum spacing of 25-feet on centers.
 4. Shafting:
 - a. Shafting shall have structural capacity to resist torsional bending and shock loads imposed by normal conveyor loading.
 - b. Combined shock and fatigue factors of 1.5 shall be applied to shaft torsion and bending moments in system's design.
 - c. Maximum shearing stress of shafting shall be 6,000 psi for combined loading conditions and 12,000 psi for maximum bending stress for non-driven shafts.
 - d. Pulley shafting shall be at least 1-15/16-inch diameter.
 - e. Drive shafts shall be keyed.

5. Belt Scrapers:
 - a. Provide two spring tensioned belt scrapers at the discharge end of each conveyor. Scrapers shall have polyurethane blades actuated by two separate, adjustable springs so that each blade operates independently.
 - b. Position scrapers at the discharge end of the conveyor so that the upstream scraper is a pre-cleaner and the downstream scraper is a secondary belt cleaner.
 - c. Products and Manufacturers:
 - 1) Martin Engineering, QC#1 Conveyor Belt Pre-cleaner and QC#2 Secondary Belt Cleaning System.
 - 2) Argonics, Inc., Accuflo Eraser™ Primary Conveyor Belt Cleaner and Accuflo Super-G Eraser™ Secondary Conveyor Belt Cleaner.
 - 3) Or equal.
6. Deck Plate:
 - a. Deck plate shall be minimum 16 Gauge, AISI Type 304 stainless steel, located under the top belt and below carrying idlers, for entire length of each conveyor.
 - b. Deck plate shall protect underside of conveyor belt from material falling off of carrying side of conveyor belt. Conveyed material deposited onto deck plate shall fall into the drip pans.
 - c. Conveyor framework shall support deck plate.
7. Drip Pans:
 - a. Provide drip pans at least 6 inches beneath end section of each conveyor, extending from the discharge end of the conveyor to the closest flow channel. Drip pans shall be at least 1/8-inch thick AISI Type 304 stainless steel, center-pitched, and six inches wider than overall belt width.
 - b. Drip pans shall slope at 1/4-inch vertical per foot horizontal downward toward closest flow channel.
 - c. Turn up drip pan edges at least four inches.
 - d. Support drip pans from conveyor frame using stainless steel hardware.
 - e. Horizontal and inclined conveyors shall allow for support height adjustment.
8. Skirting:
 - a. Provide minimum 1/8-inch thick AISI Type 304 stainless steel skirting continuous over entire length of conveyor to guide and contain material conveyed on the belt.
 - b. Skirting shall be flared outward and be at least eight inches high.
 - c. Provide adjustable 3/8-inch thick solid neoprene seal strips at belt surface. Strips cut from belting are not allowed for skirts.
 - d. Skirting shall be supported from conveyor frame by stainless steel support legs.
9. Guards:
 - a. Provide minimum ten-gauge AISI Type 304 stainless steel screen guard at motor-driven rotating components, including motor, and head and tail pulleys.

10. Conveyor Supports:
 - a. Belt conveyor frame, supports, and spreaders shall be formed structural shapes and plates constructed of ASTM A36 steel conforming to AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings, except that minimum thickness specifications shall not apply to conveyor deck plates.
 - b. Shop connections shall be welded or riveted.
 - c. Structural steel shall be hot-dipped galvanized per ASTM A123 after fabrication.
 - d. Supports for conveyor system shall be spaced at a maximum of 12 feet on centers along entire length of conveyor.
 - e. Conveyor manufacturer shall design and provide structural support legs sufficient for the equipment provided. Size support legs to properly support all loads associated with conveyor system, including live loads from the material conveyed.
 - f. Each support leg shall have base plate anchored to the floor at the Site.

D. Conveyor Drive:

1. Drive assembly shall be rigidly supported to conveyor framework so that there is no visible movement under all operating conditions. Drive system shall be capable of starting belt conveyor fully loaded with material conveyed. Drive system shall be at least 24" from the top of the conveyor belt.
2. Based on drive system, provide finished, hardened steel, roller chain for conveyor head shafts.
3. Based on drive system, sprockets shall have accurately machined teeth of chilled cast-iron.
2. Gear Reducers:
 - a. Gear reducers shall be helical and shall be mounted to an adapter flange mounted to conveyor drive shaft.
 - b. Gear reducers shall be close coupled to the motor or connected to the motor by a V belt drive.
 - c. Belt drive size shall be based on electric motor drive horsepower at sheave RPM, with safety factor of 1.5 times horsepower of electric motor drive. Speed reduction ratio of V-belt drive shall not exceed four-to-one.
 - d. Size gear reducers based on input power to each gear reducer, with resulting torque calculated at output shaft RPM, with safety factor of 1.5 times calculated torque. Nominal rated output torque (AGMA Class II gearmotor load classification) shall be greater than or equal to calculated output torque and its associated safety factor.
 - e. Nominal related output torque shall not exceed electric motor nameplate horsepower equivalent torque at gear reducer output shaft maximum rated RPM.
 - f. Housing of speed reducer shall be 30,000 psi cast iron with removable inspection covers, oil breathers, and oil level indicators. Removal of inspection covers shall not necessitate draining lubricating oil.

3. Electric Motor:
 - a. Motors shall conform to the requirements of Section 40 05 93, Common Motor Requirements for Process Equipment. Drive motors shall operate on electrical service specified in Section 2.1 above and under the Service Conditions.
 - b. Motors shall be totally enclosed, fan cooled, severe duty, chemical service type suitable for use in a Class 1, Division 2, Group D Area.
 - c. Provide with 1.15 service factor and comply with ABMA STD 9, ABMA STD 11, ABMA STD 20, AGMA, IEEE 112, IEEE 117, IEEE 841, NEMA 250, NEMA MG 1, UL 674, and UL 1004.
 - d. Motor thrust bearings shall be adequate to carry continuous thrust loads under all service conditions and have minimum B-10 life of 30,000 hours.

2.4 FABRICATION

A. Materials:

1. Fabricate parts and assemblies specified as stainless steel from sheets and plates of AISI Type 304 stainless steel with a 2D finish conforming to ASTM A666, unless noted otherwise.
2. Projecting set screws or other sharp, protruding edges are not allowed.
3. Bolts, nuts, and washers shall be AISI Type 316 stainless steel furnished per ASTM A193/A193M and ASTM A194/A194M.

B. Welding:

1. Perform factory welding using shielded arc, inert gas, MIG or TIG method. Add filler wire to all welds to provide cross section and weld metal equal to or greater than parent metal. Fully penetrate butt welds to interior surface and provide gas shielding to interior and exterior of joint.
2. All welded stainless steel shall be Type 304L or Type 316L.
3. Field welding of stainless steel is not allowed.

2.5 INSTRUMENTATION AND CONTROLS

A. Controls:

1. The equipment provided under this Section will be controlled by hardwired logic as shown on the Electrical Drawings and by a programmable logic controller (PLC) panel provided as part of the Supervisory Control and Data Acquisition (SCADA) system specified in Division 40 and shown on the Instrumentation Drawings. Field signals shall be wired in accordance with the Electrical Drawings.
2. Local control stations shall be provided by the Electrical Contractor as shown on the Instrumentation drawings and specified in Division 26.

B. Motion Failure Alarm:

1. Provide each belt conveyor with motion failure alarm system consisting of non-contacting heavy-duty motion sensor installed to detect motion of tail

pulley shaft. Provide motion sensor alarm circuitry, and install as shown on the Electrical and Instrumentation Drawings.

2. Motion sensors shall utilize inductors; magnets are not allowed. Sensor's inductor shall pick up on the ferrous material of tail pulley shaft to detect conveyor motion.
 3. Motion sensors shall include phenolic body and internal pre-amp.
 4. Provide stainless steel motion sensor mounting bracket.
 5. Motion sensor controller shall have built-in zero to sixty-second time delay, to allow monitored equipment to reach normal operating speed after conveyor start or reverse command.
 6. Product and Manufacturer: Milltronics MFA-4P controller with MSP 12 motion sensor, or equal.
- C. Emergency Stop Switch:
1. Provide each belt conveyor with an emergency pull cord and safety stop switch system. Cord shall be provided around full perimeter of belt conveyor. Pulling cord shall activate emergency stop circuit causing belt conveyor to immediately stop.
 2. Install emergency stop switches in accordance with manufacturer's instructions.
 3. Products and Manufacturers: Provide products of one of the following:
 - a. Scientific Technologies, Inc., Model ER4020.
 - b. Conveyor Components Company, Model RS.
 - c. Or equal.

2.6 ANCHORAGE DEVICES

- A. Provide anchorages and fasteners of AISI Type 316 stainless steel of ample size and strength for purpose intended, sized by equipment manufacturer.
- B. Anchorage devices shall comply with Section 05 05 33, Anchor Systems.

2.7 LUBRICANTS

- A. Provide lubricants required for initial operation. Products shall be by Lubrication Engineers, or equal, and recommended by belt conveyor manufacturer.

2.8 SOURCE QUALITY CONTROL

- A. Upon completion of manufacture of belt conveyor and appurtenances, conduct manufacturer's standard shop tests prior to shipment. Shop tests shall be conducted using products to be provided for the Project, including job motors and screws to be provided for the Project. For belt conveyors to be shipped in sections and field-assembled at the Site, tack-weld sections together in the shop for testing.
- B. At minimum, operate each belt conveyor in the shop in forward and reverse (if applicable) modes for at least five minutes of continuous operation per direction at

proposed design operating speed. Equipment shall operate in satisfactory manner without mechanical defects, excessive vibration or noise, and without operational irregularities.

- C. Defects revealed during tests shall be corrected or replaced and the products retested until satisfactory results are achieved. Do not ship equipment from the shop until tests are satisfactorily completed and test report accepted by ENGINEER.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which products are to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install products in accordance with Laws and Regulations, applicable standards, manufacturer's instructions and recommendations, and the Contract Documents.
- B. Anchorages and Base Plates:
 - 1. Provide anchorages in new or existing concrete, as applicable, per equipment manufacturer's recommendations and the Contract Documents.
 - 2. Where used, pour concrete bases up to one inch below equipment baseplate or support leg as applicable. Base with equipment mounted thereon shall then be accurately shimmed to grade and spaces between filled with non-shrink grout per Section 03 60 00, Grouting. After grout has reached its initial set, exposed edges shall be neatly cut back 1/2-inch.
- C. General:
 - 1. Perform all drilling and fitting required for installation. Set products accurately in location, alignment, and elevation, plumb, true, and free of rack.
 - 2. Making plate cutouts or openings in the field is not allowed.
 - 3. Fit exposed connections accurately together to form tight hairline joints.
 - 4. Secure plates to supporting members or frames with zinc or cadmium coated machine screws for steel and stainless steel screws for aluminum and stainless steel. Place screws not more than three inches from each plate section end and not more than 24 inches on center, unless otherwise shown.
 - 5. For contact surfaces between aluminum and dissimilar surfaces, use a coat of bituminous paint or other approved insulating material.
 - 6. Provide utility connections per the Contract Documents.
 - 7. Align and adjust equipment including shafting, motors, belts, drives, chutes, hoppers, and drains in presence of ENGINEER.

8. Provide motion sensor for each equipment item, including appropriate mounting brackets, coordinating location of sensors, and installing sensors.
9. Prior to energizing electric motor drive equipment, rotate drive motor by an external source to demonstrate free operation of all mechanical parts. Do not energize equipment until safety devices are installed, connected, and functional.

D. Comply with Section 01 75 11, Checkout and Startup Procedures.

3.3 FIELD QUALITY CONTROL

A. Site Tests:

1. Following installation, CONTRACTOR and qualified field service representative of Supplier shall conduct operating tests of all equipment, functions, and controls at the Site in presence of ENGINEER.
2. Field Operating Test:
 - a. Field test equipment and its controls in local mode, followed by demonstrating proper operation and controls in automatic mode. Demonstrate that each part individually and all parts together function properly in manner intended. Total duration of testing shall be 2 hours, continuous and uninterrupted, in automatic mode. All testing equipment and labor shall be by CONTRACTOR.
 - b. Should tests result in malfunction, make necessary repairs, revisions, and adjustments and restart test from the beginning. Repeat tests and repairs, revisions, and adjustments until, in opinion of ENGINEER, installation is complete and equipment is functioning properly and accurately, and is ready for permanent operation.

B. Manufacturer's Services: Provide a qualified, factory trained serviceman representative to perform the following:

1. Supervise unloading and installation of equipment.
2. Instruct CONTRACTOR in installing equipment.
3. Inspect and adjust equipment after installation and ensure proper operation.
4. Instruct OWNER's personnel in operating and maintaining the equipment.
5. Manufacturer's representative shall make a minimum of 4 visits, 2 at each site, with a minimum of 4 hours onsite for each visit, per installation. First visit shall be for unloading supervision and instruction of CONTRACTOR in installing equipment; it shall be for assistance in installing equipment. The second visit shall be for checking completed installation and start-up of system and shall be to instruct operations and maintenance personnel. Representative shall revisit the Site as often as necessary until installation is acceptable.
6. Training: Furnish services of Supplier's qualified factory trained specialists to instruct OWNER's operations and maintenance personnel in recommended operation and maintenance of products. Training requirements, duration of instruction, and qualifications shall be per Section 01 79 23, Instruction of Operations and Maintenance Personnel.

7. All costs, including expenses for travel, lodging, meals and incidentals, and cost of travel time, for visits to the Site shall be included in the Contract Price.

+ + END OF SECTION + +

SECTION 41 22 23

HOISTS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
1. CONTRACTOR shall provide all professional services, labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install hoist systems complete and operational.
- B. Coordination:
1. Review installation procedures under this and other Sections and coordinate installation of items that must be installed with or before hoist systems Work.
 2. Notify other contractors in advance of the installation of hoisting equipment to provide them with sufficient time for installing items included in their contracts that must be installed with or before hoist systems Work.
- C. Related Sections:
1. Section 05 12 00, Structural Steel Framing.
 2. Section 09 91 00, Painting.

1.2 REFERENCES

- A. Standards referenced in this Section are:
1. ANSI/AGMA 6013-A, Standard for Industrial Enclosed Gear Drives.
 2. ANSI MH 27.1, Specifications for Underhung Cranes and Monorail Systems.
 3. AISC Specification for Structural Steel Buildings.
 4. AISC Code of Standard Practice for Steel Buildings and Bridges.
 5. ASME B30.11, Monorails and Underhung Cranes.
 6. ASME B30.16, Overhead Hoists (Underhung).
 7. ASME HST-1, Performance Standard for Electric Chain Hoists.
 8. ASME HST-2, Performance Standard For Hand Chain Manually Operated Chain Hoists.
 9. ASME HST-4, Performance Standard for Overhead Electric Wire Rope Hoists.
 10. ASTM A36/A36M, Specification for Carbon Structural Steel.
 11. ASTM A325, Specification for Structural Bolts, Steel, Heat-Treated, 120/105 KSI Minimum Tensile Strength.
 12. ASTM A563, Specification for Carbon and Alloy Steel Nuts.
 13. ASTM A572/A572M, Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 14. ASTM F436, Specification for Hardened Steel Washers.
 15. AWS D1.1, Structural Welding Code – Steel.
 16. AWS D14.1, Specification for Welding of Industrial and Mill Cranes and

- other Material Handling Equipment.
17. NFPA 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities.
 18. Research Council on Structural Connections (RCSC), Specification for Structural Joints Using ASTM A325 or A490 Bolts.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:
 - a. Minimum of five years of experience producing substantially similar equipment and able to provide documentation of at least five installations in satisfactory operation for at least five years in the United States.
 - b. Equipment shall conform to requirements of the American Iron and Steel (AIS) provision.
2. Professional Engineer:
 - a. Engage registered professional engineer legally qualified to practice in the same state as the Site and experienced in providing engineering services of the kind indicated.
 - b. Submit qualifications data.
 - c. Responsibilities include:
 - 1) Carefully reviewing monorail system performance and design criteria stated in the Contract Documents.
 - 2) Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to ENGINEER by CONTRACTOR.
 - 3) Preparing or supervising preparation of design calculations and related drawings, Shop Drawings, and a comprehensive engineering analysis verifying compliance of monorail system with requirements of the Contract Documents.
 - 4) Signing and sealing all calculations and design drawings, and Shop Drawings.
 - 5) Certifying that:
 - a) it has performed the design of the monorail system in accordance with performance and design criteria stated in the Contract Documents, and
 - b) the said design conforms to all local, state and federal Laws and Regulations and to prevailing standards of practice.
3. Installer Qualifications:
 - a. Engage an experienced installer to perform the Work under this Section, who is experienced in installing hoisting equipment similar to that required for the Project, and is acceptable to hoisting equipment manufacturer.
 - b. Submit name and qualifications, and the following information for at least three successful, completed projects:
 - 1) Names and telephone numbers of each owner and architect or engineer responsible for project.

- 2) Approximate contract cost of hoisting equipment.
- 3) Number of installations.

B. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of component manufacturer, from single hoisting equipment manufacturer.
2. Hoisting equipment manufacturer shall review and approve or prepare all submittals for components furnished under this Section.
3. Components shall be specifically constructed for specified service conditions and shall be integrated into overall equipment assembly by hoisting equipment manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Complete description of materials and equipment in sufficient detail to allow comparison with requirements of this Section.
 - b. Drawing showing arrangement of system and clearances, including plan and sections.
 - c. Specialized wiring diagrams, if applicable.
2. Product Data:
 - a. Manufacturer's literature, illustrations, specifications identification of materials of construction, rated capacities, dimensions of individual components, and finishes.
 - b. Make, model, weight and horsepower of each component.
 - c. External power requirements for each component.
3. Testing Plans: Plan for load testing at the Site.

B. Delegated Design Submittals: Submit the following:

1. Detailed structural design drawings showing details of monorail and support systems, including:
 - a. Bracing details.
 - b. Member loads and design stresses.
 - c. Calculations used for determining member stresses.
 - d. Connection details.
 - e. Maximum allowable and calculated deflections.
2. Clearly show dimensions and assumptions on which design is based. Indicate referenced standards and codes. Information shall be project-specific.

C. Informational Submittals: Submit the following:

1. Certificates:
 - a. Manufacturer's installation certification.
 - b. Professional engineer's certification.

2. Manufacturer's Instructions:
 - a. Special shipping, storage and protection, and handling instructions.
 - b. Routine maintenance requirements prior to start-up.
 3. Field Quality Control Submittals:
 - a. Load test report, including copy of certifications of test weights.
 4. Manufacturer's Reports: Submit written report of results of each visit to Site by Supplier's service technician, including purpose and time of visit, tasks performed, and results obtained.
 5. Qualifications Statements:
 - a. Manufacturer, when qualifications are requested by ENGINEER.
 - b. Professional engineer.
 - c. Installer, when qualifications are requested by ENGINEER.
- D. Closeout Submittals: Submit the following:
1. Operation and Maintenance Data:
 - a. Furnish operation and maintenance manuals in accordance with Section 01 78 23, Operations and Maintenance Data.
 - b. Include acceptable test reports, maintenance data and schedules, description of operation, wiring diagrams, and list of spare parts recommended for one year of operation with current price list.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
1. Deliver materials and equipment to Site to ensure uninterrupted progress of the Work. Deliver anchorage materials to be embedded in concrete in ample time to prevent delaying the Work.
 2. Inspect all boxes, crates, and packages upon delivery to Site and notify ENGINEER in writing of loss or damage to materials or equipment. Promptly remedy loss and damage to new condition in accordance with manufacturer's instructions.
 3. Conform to Section 01 65 00, Product Delivery Requirements.
- B. Storage and Protection:
1. Keep materials and equipment off ground using pallets, platforms, or other supports. Protect steel, packaged materials, motors, and electronics from corrosion and deterioration.
 2. Conform to Section 01 66 00, Product Storage and Handling Requirements.

1.6 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive OWNER of other rights or remedies OWNER may otherwise have under the Contract Documents and shall be in addition to and run concurrent with other warranties made by CONTRACTOR under the Contract Documents. Obligations of CONTRACTOR under the Contract Documents shall not be limited in any way by provisions of specified special warranty

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. System Description:
 - 1. Hoists shall conform to headroom, hook elevation, and side clearance requirements shown and indicated in the Contract Documents, and shall provide required available lift height and capacity.
 - 2. Electrical equipment and controls shall be rated NEMA 4X.

- B. Special Service Conditions:
 - 1. Hoists in areas classified as hazardous shall be suitable for operation in the specific environment as defined in NFPA 820. Specific area requirements are in the Contract Documents.
 - 2. Electric motors and components shall be rated explosion-proof. Exposed mechanical equipment shall be non-sparking.

- C. Design Criteria:
 - 1. Patented Track Monorail Systems:
 - a. Patented track monorail systems, including bracing and attachment to supporting structure, shall conform to ANSI MH 27.1, AISC Specification for Structural Steel Buildings, and AISC Code of Standard Practice for Steel Buildings and Bridges, and shall conform to Specifications in Division 5, Metals.
 - b. Monorail track, hangers, supports, plates and connection elements shall conform to ASTM A36 or A572 Grade 50 steel.
 - c. Welding shall conform to AWS D1.1.
 - d. Bolts shall conform to ASTM A325, with ASTM A563 nuts and ASTM F436 hardened washers. Connections shall conform to the RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts.
 - e. Deflection of monorail track under rated load (not including impact) shall not exceed 1/450 of span.

- D. Performance Criteria:
 - 1. Electrically-operated Hoists:

Designation:	Lake Street Influent Facility Monorail	Sewer District 1 Lift Station Monorail
General Location:	Lake Street – Above Screw Pump bearings	SD1 – Above Screw Pump bearings
Hoist Type:	Monorail, wire	Monorail, wire
Ambient Conditions (deg F, Indoor/Outdoor):	0 to 90, Outdoor	0 to 90, Outdoor
Number Required:	1	1
Capacity (tons):	1	1
Required Lift (feet):	40	40
Lift Speed (fpm):	Single speed, 20	Single speed, 20

Designation:	Lake Street Influent Facility Monorail	Sewer District 1 Lift Station Monorail
Hoist Horsepower:	2	2
Trolley Type:	Motor driven	Motor driven
Trolley Speed (fpm):	35	35
Trolley Horsepower:	1/3	1/3
Volts:	480	480
Phase:	3	3
Frequency (Hertz):	60	60
Control:	Pendant	Pendant
Electrification:	8-Bar	8-Bar

2.2 MANUFACTURERS

- A. Manufacturers: Provide equipment of one of the following:
1. Columbus McKinnon.
 2. Saturn Hoists, by FS Industries
 4. Cleveland Tramrail, by Gorbelt
 5. Or equal.

2.3 DETAILS OF CONSTRUCTION

- A. Electric-powered Wire Rope Hoists:
1. Comply with ASME B30.16 and ASME HST-4. Welding shall comply with AWS D14.1.
 2. Design Stresses: Provide load bearing components so that stresses at rated load shall not exceed 20 percent of average ultimate strength of material.
 3. Load Blocks: Load blocks shall be enclosed type, constructed to prevent rope jamming.
 4. Hooks: Provide latch-type hooks, free to rotate through 360 degrees under all loading conditions. Hooks shall be heat treated drop forged steel or spark resistant bronze, depending on the area classification.
 5. Hoisting Rope: Rated load shall be based on factor of safety of five on the rope's nominal breaking strength. Attach rope ends to hoist drum to prevent rope from coming off drum on full extension. Rope shall be stainless steel.
 6. Rope Sheaves: Sheave grooves shall be smoothly finished to close, form-fitting saddle for rope with sides of groove tapered outward. Provide running sheaves with means for lubrication. Pitch diameter of running sheaves shall not be less than 16 times rope diameter, and for non-running sheaves not less than 12 times rope diameter.
 7. Drum: Rope drum diameter shall not be less than 18 times rope diameter. At least one complete wrap of rope shall remain on drum after rope's full rated extension.
 8. Gearing: Machined and heat-treated helical gear system. Hoist gear box shall be in accordance with AGMA 6013-A. Provide means for adequate lubrication of gearing.
 9. Bearings: Bearings shall be permanently-lubricated type.
 10. Hoist Brakes: Hoist shall have two brakes: motor brake and load brake. Each

brake shall be capable of supporting and holding 125 percent of full rated load without electrical power.

11. Provide overload protection device that prevents lifting of loads beyond rated capacity.
12. Motor: Motor shall be specifically constructed for reversing and hoisting service and capable of operating at specified loads. Motor shall be heavy-duty, thermally protected, 30-minute rated, H4 duty cycle, with Class F insulation, and explosion proof if required by area classification. Motor at rated frequency shall be capable of operation at plus ten percent of rated motor voltage.
13. Limit Switch: Block operated upper limit switch with automatic plugging reverse.
14. Housing and Covers: Cast aluminum.
15. Provide supports, fasteners, brackets and all accessories required.

B. Electric-powered Trolleys:

1. Trolley shall be constructed to accept the specified hoist using lug-mounted suspension, and shall be of sufficient size and strength to transport rated load of the associated hoist.
2. Trolley frame shall have steel side plates that wrap around trolley to provide protective lug to prevent trolley from falling off monorail in event of wheel axle failure.
3. Wheels: Wheels shall be fabricated of stainless steel and shall be constructed to run on specified beam. Wheels shall have uniform surface hardness and capable of carrying maximum applied load.
4. Trolley motor shall be thermally protected, with Class B insulation, and explosion proof if in Classified environment.
5. Gearing: Machined and heat treated spur gear system. Gearbox shall be in accordance with AGMA 6013-A. Provide means for adequate lubrication of gearing.
6. Bearings: Bearings shall be ball or roller type, permanently lubricated.

2.4 CONTROLS FOR ELECTRIC HOIST AND TROLLEY

A. Hoist Speed Control:

1. Hoist motor shall be single-speed, as specified in Article 2.1 of this Section, with magnetic control.
2. Each magnetic control shall have contactors sized for specified class of service. Reversing contactors shall be mechanically and electrically interlocked to prevent line-to-line faults, and shall be provided with automatic reset thermal overloads for hoist motor.

B. Control Station:

1. Control station shall be rated in accordance with Paragraph 2.1.A of this Section. Motion control pushbuttons shall spring return to "Off" position when released. Function of each pushbutton shall be clearly marked and indicate direction of resultant motion.
 - a. For single-speed hoists, control station shall contain the following

functions:

- 1) "POWER ON"
- 2) "POWER OFF"
- 3) "HOIST UP"
- 4) "HOIST DOWN"
- 5) "TROLLEY – FORWARD"
- 6) "TROLLEY – REVERSE"

2. Pendant Control:

- a. When specified in Article 2.1 of this Section, control of hoist and trolley shall be by pendant pushbutton control station.
- b. Pendant mounting shall include steel cable to provide strain relief for pendant's electric control cable. Provide isolating transformer to reduce voltage to 120 volts (or less) in control circuits.
- c. Mount control pendant and cable on 12-gage stainless steel C-track festoon system that allows hoist and trolley to move independently of control station.

2.5 ELECTRIFICATION

A. Eight-bar Conductor:

1. When specified in Article 2.1 of this Section, provide enclosed rigid type contact conductor system mounted parallel to crane runway or track. Conductors shall comply with NEC Article 610. Contact conductors shall be sized to carry required current to all motors when operating at rated conditions. Collectors shall be shoe-type and be constructed to reduce to a minimum sparking between shoe and contact conductor.
2. System Components: Electrification system shall include the following:
 - a. Conductor bars.
 - b. Hanger clamps for conductor bars.
 - c. Power feeds to conductor bars.
 - d. End caps for conductor bars.
 - e. Torsion spring collectors.
 - f. Special tooling to install electrification system.
 - g. Cable and connectors for power and control connections.

2.6 FINISHING

A. Surface Preparation and Painting:

1. Surface preparation and shop painting is required for ferrous metals, equipment, and accessories. Do not paint stainless steel and machined surfaces.
2. Clean and apply in the shop prime coat in accordance with Section 09 91 00, Painting.
3. Apply in the shop finish coat in accordance with Section 09 91 00, Painting.

- B. Gears, bearing surfaces, and other machined surfaces shall receive a heavy application of rust-inhibiting coating that shall be maintained during storage and until equipment is placed into operation.

2.7 IDENTIFICATION

- A. Identify component subassemblies with stainless steel nameplates and each labeled with the following:
 - 1. Manufacturer and model number.
 - 2. Date of manufacture with pertinent ratings, operation, and maintenance information.
 - 3. Certification, stamp, or approval to applicable Laws and Regulations.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which materials and equipment are to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.
- B. Inspect and verify that no part of the building, structure, piping, mechanical systems including ductwork, electrical systems including lighting and conduit, or other elements that will interfere with proper operation of hoist along the entire length of monorail track.

3.2 INSTALLATION

- A. Install materials and equipment in conformance with Laws and Regulations, applicable standards, manufacturer's instructions and recommendations, and the Contract Documents.
- B. Refer to Section 05 12 00, Structural Steel Framing, for requirements for hoisting system's supporting steel.

3.3 FIELD QUALITY CONTROL

- A. Site Tests:
 - 1. After installing equipment and associated controls, perform at the Site running tests for hoisting equipment and appurtenances. Should testing indicate malfunction, make repairs and adjustments as required. Repeat testing and adjusting until, in ENGINEER's opinion, installation is complete and equipment is functioning properly and accurately, and is Substantially Complete.

2. Load Test:
 - a. Perform load tests under supervision of manufacturer's factory-trained service technician, in presence of ENGINEER.
 - b. Weights used in load testing shall be certified by a state or local bureau of weights and measures. Submit weight certification as part of the load test report.
 - c. Load testing shall conform to ASME B30.11, ASME B30.16, and the following:
 - 1) For electric hoists, power failure test with rated load: Load shall be held suspended when power is removed.
 - 2) Trolley travel full length of monorail with rated load, while verifying that all functions operate properly.
 - 3) Hoist brake drift test with rated load: Lift weight, measure distance to floor, allow five minutes to elapse, and re-measure. Record the results measured. Criteria for Acceptance: No difference in measurements.
 - 4) Upper/lower limit switch test with no load.
 - 5) Emergency stop test with no load.
 - 6) Deflection Test: With hoist positioned at center of longest monorail span, and at tip of longest cantilever (if any), while hoisting rated load, measure distance from hook to floor. Remove load and measure distance from hook to floor. Criteria for Acceptance: Difference in measurements shall conform to manufacturer's specifications and Paragraph 2.1.B.1.d of this Section.
 - d. Load Test Report: Submit results of load testing as report that lists tests performed, data collected, results of each test, and corrective actions taken (if any). Test report shall be signed by manufacturer's service technician present during testing.
- B. Manufacturer's Services: Provide a qualified, factory-trained service technician to perform the following:
 1. Instruct CONTRACTOR in installing equipment and assist in the installation of equipment.
 2. Inspect and adjust equipment after installation and ensure proper operation, and supervise initial operations and load tests.
 3. Instruct OWNER's personnel in operating and maintaining the equipment.
 4. Manufacturer's technician shall make a minimum of 3 visits, with minimum number of hours on-Site for each visit as specified.
 - a. First visit shall be for instructing CONTRACTOR in proper equipment installation, and assisting in installing equipment. Minimum number of hours on-Site: 4 hours.
 - b. Second visit shall be for checking completed installation, start-up of system; and performing field quality control testing. Minimum number of hours on-Site: 4 hours.
 - c. Third visit shall be to instruct operations and maintenance personnel. Number of hours on-Site shall be in accordance with Section 01 79 23, Instruction of Operations and Maintenance Personnel.

- d. Technician shall revisit the Site as often as necessary until installation is acceptable.
- 5. Manufacturer's Installation Certification: Submit certification that manufacturer's technician has checked completed installation and equipment, as specified in the Contract Documents, has been provided in accordance with manufacturer's recommendations, and that operation of equipment is satisfactory. Certification shall be signed by manufacturer's technician present at the Site and CONTRACTOR.
- 6. Training: Furnish services of Supplier's qualified factory trained specialists to instruct OWNER's operations and maintenance personnel in recommended operation and maintenance of equipment. Training requirements, duration of instruction, and qualifications shall be in accordance with Section 01 79 23, Instruction of Operations and Maintenance Personnel.
- 7. All costs, including expenses for travel, lodging, meals and incidentals, and cost of travel time, for visits to the Site shall be included in the Contract Price.

+ + END OF SECTION + +

SECTION 41 67 00

PLANT MAINTENANCE EQUIPMENT

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install plant maintenance equipment complete and operational.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items that must be installed with or before plant maintenance Work.
2. Notify other contractors in advance of the installation of plant maintenance equipment to provide them with sufficient time for installing items included in their contracts that must be installed with or before plant maintenance Work.

C. Related Sections:

1. Section 09 91 00, Painting.

1.2 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:
 - a. Minimum of five years of experience producing substantially similar equipment and able to provide documentation of at least five installations in satisfactory operation for at least five years in the United States.
2. Installer Qualifications:
 - a. Engage an experienced installer to perform the Work under this Section, who is experienced in installing plant maintenance equipment similar to that required for the Project, and is acceptable to plant maintenance equipment manufacturer.
 - b. Submit name and qualifications, and the following information for at least three successful, completed projects:
 - 1) Names and telephone numbers of each owner and architect or engineer responsible for project.
 - 2) Approximate contract cost of hoisting equipment.
 - 3) Number of installations.

- B. Component Supply and Compatibility:
1. Plant maintenance equipment manufacturer shall review and approve or prepare all submittals for components furnished under this Section.
 2. Components shall be specifically constructed for specified service conditions and shall be integrated into overall equipment assembly by plant maintenance equipment manufacturer.

1.3 SUBMITTALS

- A. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. Complete description of materials and equipment in sufficient detail to allow comparison with requirements of this Section.
 - b. Drawing showing arrangement of system and clearances, including plan and sections.
 - c. Specialized wiring diagrams, if applicable.
 2. Product Data:
 - a. Manufacturer's literature, illustrations, specifications identification of materials of construction, rated capacities, dimensions of individual components, and finishes.
 - b. Required clearances
 - c. Weights
 - d. Electrical requirements
 - e. Performance characteristics
 - f. Manufacturer's installation and testing instructions
- C. Informational Submittals: Submit the following:
1. Certificates:
 - a. Manufacturer's installation certification.
 2. Manufacturer's Instructions:
 - a. Special shipping, storage and protection, and handling instructions.
 - b. Routine maintenance requirements prior to start-up.
 3. Field Quality Control Submittals:
 - a. Load test report, including copy of certifications of test weights.
 4. Manufacturer's Reports: Submit written report of results of each visit to Site by Supplier's service technician, including purpose and time of visit, tasks performed, and results obtained.
 5. Qualifications Statements:
 - a. Manufacturer, when qualifications are requested by ENGINEER.
 - c. Installer, when qualifications are requested by ENGINEER.
- D. Closeout Submittals: Submit the following:
1. Operation and Maintenance Data:
 - a. Furnish operation and maintenance manuals in accordance with Section 01 78 23, Operations and Maintenance Data.
 - b. Include acceptable test reports, maintenance data and schedules, description of operation, wiring diagrams, and list of spare parts

recommended for one year of operation with current price list.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
 - 1. Deliver materials and equipment to Site to ensure uninterrupted progress of the Work. Deliver anchorage materials to be embedded in concrete in ample time to prevent delaying the Work.
 - 2. Inspect all boxes, crates, and packages upon delivery to Site and notify ENGINEER in writing of loss or damage to materials or equipment. Promptly remedy loss and damage to new condition in accordance with manufacturer's instructions.
 - 3. Conform to Section 01 65 00, Product Delivery Requirements.
- B. Storage and Protection:
 - 1. Keep materials and equipment off ground using pallets, platforms, or other supports. Protect steel, packaged materials, motors, and electronics from corrosion and deterioration.
 - 2. Conform to Section 01 66 00, Product Storage and Handling Requirements.

1.5 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive OWNER of other rights or remedies OWNER may otherwise have under the Contract Documents and shall be in addition to and run concurrent with other warranties made by CONTRACTOR under the Contract Documents. Obligations of CONTRACTOR under the Contract Documents shall not be limited in any way by provisions of specified special warranty.

PART 2 – PRODUCTS

2.1 PORTABLE DAVIT CRANE

- A. System Description:
 - 1. Portable davit crane shall conform to headroom, hook elevation, and side clearance requirements shown and indicated in the Contract Documents, and shall provide required available lift height and capacity.
 - 2. Electrical equipment and controls shall be rated NEMA 4X.
- B. Special Service Conditions:
 - 1. Cranes in areas classified as hazardous shall be suitable for operation in the specific environment as defined in NFPA 820. Specific area requirements are in the Contract Documents.
- C. Performance Criteria:
 - 1. Equipment description: portable stainless steel davit crane.

2. Quantity: 1.
3. Hoist Type: overhead portable.
4. Winch Type: spur gear hand winch.
5. Controls: Manual.
6. Rated Capacity: 1,200 lbs.
7. Required Lift: 100 feet.

D. Manufacturers

1. Provide equipment of:
 - a. Thern Model Ensign 5PA10S

2.2 CRANE BASE

- A. Provide all portable davit crane bases compatible with existing Thern model Ensign 5PA10S.
- B. Contractor shall furnish and install crane bases on each of the following equipment and quantity:
 1. Two (2) at the Solids Contact Tank
 2. Two (2) at each Primary and Secondary Clarifier
 3. One (1) at the Sludge Holding Tank
 4. Three (3) at the Moving Bed Biofilm Reactor (MBBR)
- C. Coordinate locations with OWNER and ENGINEER.

2.3 ADJUSTABLE HEIGHT GANTRY CRANE AND TROLLEY

- A. Contractor shall furnish and install one gantry crane and trolley for the Lake Street Influent Facility.
- B. Obtain all gantry crane and trolley equipment included in this specification regardless of component manufacturer, from a single equipment manufacturer.
- C. Performance Criteria:
 1. Equipment description: adjustable-height mobile aluminum gantry crane
 2. Quantity: 1
 3. Trolley Type: Manual geared
 4. Rated Capacity: 4000 lbs
 5. Lift: As required to lift screw pump motors
 6. Gantry Crane
 - a. Minimum clear span: 114 inches
 - b. Minimum tread width: 12 feet
 7. Comply with ASME B30.17.
- D. Details of Construction:
 1. Manufacturer: Provide products of one the following
 - a. Spanco Inc.

- b. Gorbel Inc.
- c. Or equal.
- 2. General:
 - a. Material of Construction: Aluminum

2.5 ROLLING STAIRS

- A. Furnish rolling stairs with handrail at the following locations:
 - 1. One (1) at the Lake Street Influent Facility
 - 2. One (1) at the ESD Lift Station
- B. System Description
 - 1. Stairs are intended to access the flexible rake bar screen motors
 - 2. Platform height: 36"
 - 3. Platform width: 36"
 - 4. Stair width: 36"
 - 5. Capacity: 350 lbs minimum
 - 6. Material shall be aluminum, with industrial grade welds.
 - 7. Provide casters compatible with rollable grating as specified in Section 05 53 16 Aluminum Grating.
 - 8. Conform to OSHA 1910.29 and ANSI 14.7 Standards

2.6 DEWATERING PUMP

- A. CONTRACTOR shall furnish four (4) dewatering pumps and accessories.
- B. Pump Description
 - 1. Maximum Flow: 100 gpm
 - 2. Maximum Head: 50 feet
 - 3. Motor Horsepower: 1
 - 4. Motor Voltage: 115V
- A. Manufacturer: Provide one of the following:
 - 1. BJM R750-115
 - 2. Flygt
 - 3. Or equal.
- B. Accessories
 - 1. 2-inch NPT-M to 1.5-inch Male NST fire hose thread adaptor compatible with existing OWNER 1.5-inch NST hoses.

2.7 FINISHING

- A. Surface Preparation and Painting:
 - 1. Surface preparation and shop painting is required for ferrous metals, equipment, and accessories. Do not paint stainless steel and machined surfaces.

2. Clean and apply in the shop prime coat in accordance with Section 09 91 00, Painting.
 3. Apply in the shop finish coat in accordance with Section 09 91 00, Painting.
- B. Gears, bearing surfaces, and other machined surfaces shall receive a heavy application of rust-inhibiting coating that shall be maintained during storage and until equipment is placed into operation.

2.9 IDENTIFICATION

- A. Identify component subassemblies with stainless steel nameplates and each labeled with the following:
1. Manufacturer and model number.
 2. Date of manufacture with pertinent ratings, operation, and maintenance information.
 3. Certification, stamp, or approval to applicable Laws and Regulations.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which materials and equipment are to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.
- B. Inspect and verify that no part of the building, structure, piping, mechanical systems including ductwork, electrical systems including lighting and conduit, or other elements that will interfere with proper operation of hoist along the entire length of monorail track.

3.2 INSTALLATION

- A. Install materials and equipment in conformance with Laws and Regulations, applicable standards, manufacturer's instructions and recommendations, and the Contract Documents.

3.3 FIELD QUALITY CONTROL

- A. Site Tests:
1. After installing equipment and associated controls, perform at the Site running tests for plant maintenance equipment and appurtenances. Should testing indicate malfunction, make repairs and adjustments as required. Repeat testing and adjusting until, in ENGINEER's opinion, installation is complete and equipment is functioning properly and accurately, and is

Substantially Complete.

- B. Manufacturer's Services: Provide a qualified, factory-trained service technician to perform the following:
1. Instruct CONTRACTOR in installing equipment and assist in the installation of equipment.
 2. Inspect and adjust equipment after installation and ensure proper operation, and supervise initial operations and load tests.
 3. Instruct OWNER's personnel in operating and maintaining the equipment.
 4. Manufacturer's Installation Certification: Submit certification that manufacturer's technician has checked completed installation and equipment, as specified in the Contract Documents, has been provided in accordance with manufacturer's recommendations, and that operation of equipment is satisfactory. Certification shall be signed by manufacturer's technician present at the Site and CONTRACTOR.
 5. Training: Furnish services of Supplier's qualified factory trained specialists to instruct OWNER's operations and maintenance personnel in recommended operation and maintenance of equipment. Training requirements, duration of instruction, and qualifications shall be in accordance with Section 01 79 23, Instruction of Operations and Maintenance Personnel.
 6. All costs, including expenses for travel, lodging, meals and incidentals, and cost of travel time, for visits to the Site shall be included in the Contract Price.

++ END OF SECTION ++