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APPLICABLE TXDOT STANDARD SPECIFICATIONS

TxDOT Item 666 Retroreflectorized Pavement Markings

¹ – TXDOT - 2014 Texas Department of Transportation Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, available on TxDOT Website

- END OF SECTION -

SECTION 26 05 43

UNDERGROUND DUCTS AND RACEWAYS

FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install concrete encasement around underground electrical raceways as shown on the drawings and as specified herein.

1.02 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Other sections that may relate to the work in this section include, but are not limited to, the following:
1. 01 33 00 - Submittal Procedures.
 2. 26 00 00 – Electrical.
 3. 31 00 00 – Earthwork.
- C. Excavation, backfilling, fill and grading are included in Division 31.
- D. Concrete formwork, concrete joints, joint accessories and cast in place concrete are included in Division 3.
- E. Furnishing and installing electrical conduit and furnishing and placing electrical warning tape are included in Division 26.

1.03 SUBMITTALS

- A. Submit to the Owner’s Representative, in accordance with Division 1, detailed catalog information or drawings describing electrical and physical characteristics of all equipment specified.
- B. Submittal shall be clearly marked showing only equipment provided. Mark through equipment option not provided.
- C. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, to indicate full conformance with the Specifications.
- D. Submit a letter certifying full and complete compliance with the Specifications, Drawings and other project requirements. The letter shall list any exceptions or deviations from specified requirements, if any and reasons for same. Exceptions or deviation shall also be clearly marked in a separate color in submittals.

1.04 REFERENCE STANDARDS

A. The following standards shall apply as if written here in their entirety:

1. ANSI C80.1, Specifications for Zinc-Coated Rigid Steel Conduit.
2. ANSI/ACI 301, Specifications for Structural Concrete for Buildings.
3. ANSI/ASTM A615, Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
4. ANSI/NEMA TC6, PVC and ABS Plastic Utilities Duct for Underground Installation.
5. ANSI/NEMA TC9, Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation.

1.05 QUALITY ASSURANCE (NOT USED)

1.06 SYSTEM DESCRIPTION / DESIGN REQUIREMENTS (NOT USED)

1.07 DELIVERY, HANDLING AND STORAGE (NOT USED)

1.08 MAINTENANCE / SPARE PARTS (NOT USED)

1.09 EXTENDED WARRANTY (NOT USED)

PART 2 PRODUCTS

2.01 MATERIALS

A. Ducts and Fittings

1. Unless otherwise noted, provide Schedule 40 PVC conduit encased in concrete. Provide fittings of the same type material as the conduit.
2. Provide direct buried galvanized steel conduit systems for outdoor lighting circuits where those do not cross roadways. At intersection with roadways, provide schedule 40 PVC conduit encased in concrete and reinforced with rebar. Extend rebar 5' on both sides of the road.

B. Conduit and Fittings

1. Provide PVC conduit to PVC coated galvanized steel adapter fitting in order to convert to metal conduit before surfacing from the underground duct bank.
2. Expansion/deflection fillings to be installed on all stub-up above grade from duct banks.

C. Concrete

1. Provide concrete conforming to the following.
 - a. Compressive strength: 3,000 psi at 28 days.
 - b. Slump: Not exceeding six inches.
 - c. Aggregate size: Use pea gravel.
 - d. Additive: Red ferrous oxide concrete coloring pigment mixed at the rate of 1-1/2 pounds per sack of cement. Sprinkled color on the top of the duct bank will not be acceptable.

- e. All raceway concrete placements shall be continuous and water tight between manholes or handholes and between manholes or handholes and structures.
- f. Encasement shall be reinforced at all road crossings and where indicated on the drawings.
- g. Encasement shall be laid in trenches as and where indicated on drawings.
- h. Provide not less than 4 inches of concrete between the outside of a raceway and the earth unless otherwise noted on the drawings. Provide not less than 2 inches of concrete between adjacent raceways unless otherwise noted on the Drawings. Form as specified in division 3.
- i. Where raceways pass through concrete walls, concrete encasements shall be extended through the finished flush with inside surfaces. Watertight construction joints with waterstops conforming to division 3 shall be provided.

D. Reinforcing Bars

- 1. Provide Grade 40 steel reinforcing bars, for all duct banks.

E. Identifying Tape

- 1. Refer to specification section 26 05 53 Identification for Electrical Systems for detectable warning tape characteristics.

2.02 FABRICATION (NOT USED)

2.03 CONTROLS (NOT USED)

2.04 FACTORY TESTS (NOT USED)

PART 3 EXECUTION

3.01 DEMOLITION/PREPARATION

A. Location and Inspection

- 1. Before beginning trenching operations stake out the proposed duct bank routing and obtain approval of the Owner. After trenching has begun and before any ducts or conduits are placed, notify the Owner so that the trenching and installation may be inspected. Also notify the Owner prior to any placement of concrete for duct banks, so that he may observe the placing. Placing concrete on muddy trench bottoms will not be acceptable.

3.02 INSTALLATION

A. Construction

- 1. Duct bank configurations are detailed on the drawings. A minimum of 3-inch concrete cover shall be required on all sides of the conduits. Conduits shall be spaced with 3-inch clearance on all sides.

B. Excavation and Backfill

- 1. Excavation: Excavate trenches for installation of duct banks. Form the trench bottom to follow closely the specified grade and depth for the duct banks.

2. Backfill: Trenches may be backfilled with excavated soil and supplemented as necessary with select materials. Compact the backfill and mound slightly above natural grade, compact to 95%.
3. Restoration: Restore adjacent areas disturbed by trenching or backfilling to a condition equal to the original.

C. Placing of Duct Banks

1. Cover: Unless otherwise shown, provide a minimum 18" of earth and select materials cover. Coordinate grade with other work, if in conflict, rework grade at no cost to Owner.
2. Grade: Place duct banks with a minimum grade of four inches per 100 feet. Grade between manholes may be from one manhole to the next manhole or from a high point between manholes. Where terminating ducts inside of buildings, always slope the grade away from building to the nearest manhole.
3. Changes in Direction: Make changes in direction of runs exceeding a total of 10 degrees, either horizontal or vertical, by using long sweep bends. Long sweep bends must have a minimum radius of curvature of 3 feet and may be made up of one or more curved or straight sections. Manufactured bends having a minimum radius of curvature of three feet may be used at the ends of duct runs which are less than 100 feet in length.
4. Joints: Make joints in ducts and conduits watertight, in accordance with manufacturers recommendations. Stagger joints in adjacent ducts and conduits a minimum of six inches. Make joints between ducts and conduit with appropriate no-thread-to-threaded adapters. Use appropriate sealant.
5. Spacing: Unless otherwise shown, space ducts and conduits with 3" spacers. Place spacers or separators on not greater than five-foot centers. Use spacers or separators made of plastic, concrete or a suitable nonmetallic, nondecaying material.
6. Drainage: All conduit duct banks shall be sloped sufficiently to drain into manholes, pull boxes or sumps.

D. Placing of Concrete

1. Place concrete using chutes and tremies as necessary to limit the free drop of the mix to a maximum of two feet. Carefully rod or vibrate the concrete to aid uniform encasement of the ducts. Smooth the top of the pour with a float. Encase the conduits in concrete, a minimum thickness of three inches, on all sides.

E. Special Project Requirements

1. Contractor shall employ hand trenching at locations where existing underground utilities are present.
2. All damaged utilities should be repaired immediately in manner acceptable to the Owner at Contractor's expense. Any damaged cables shall be replaced in full. Splices shall not be acceptable. Damaged conduits shall be replaced between the two closest manholes and cables repulled.
3. Install a #4/0 bare copper grounding conductor centered over the ductbank and located 3" above the ductbank in the backfill. Bond ductbank grounding conductor

to building or transformer ground loop at one end and to the manhole ground electrode at the other end.

3.03 INSPECTION (NOT USED)

3.04 FIELD TESTING (NOT USED)

3.05 FIELD PAINTING (NOT USED)

3.06 CLEANING

- A. Thoroughly clean all ducts and conduits before placing. During construction and after the duct line is completed; plug open ends of ducts and conduits to prevent the entrance of foreign matter. After the duct line has been completed, pull a flexible mandrel through each duct and conduit. The mandrel must not be less than 12 inches long with a diameter approximately 1/4 inch less than the inside diameter of the duct or conduit. After cleaning, place in each duct and conduit a No. 30 nylon line with a plastic tag on each end reading "Pulling Line", and a tag identifying the location of the other end.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. No separate measurement is required for underground ducts and raceways for electrical systems as it shall be considered a subsidiary obligation to Pay Item 26 05 33-1 in this contract.

4.02 PAYMENT

- A. No separate payment shall be made for underground ducts and raceways for electrical systems as this work shall be considered a subsidiary obligation to Pay Item 26 05 33-1 in this contract.

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SECTION 43 22 70

AIRPORT RECEIVING STATION SYSTEM

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish, install, place into satisfactory operation, and warrant the Airport Receiving System for shredding airplane lavatory wastewater solids, as shown on the Plans and described by the Specifications. All items detailed in this section shall be provided by the same manufacturer.
- B. The following items shall be considered subsidiary to the airport receiving station as shown on the plans.
 - 1. Traffic Loop Detector (See Sheet E104).
 - 2. Hose Hanger Assembly (See Sheet C109).
 - 3. Bollards (See Sheet C109).
 - 4. Electrical Panel and Wiring for the Airport Receiving Station (See Sheet E103).
 - 5. Pipe supports (See Sheet C105 and See Sheet C110).
 - 6. Galvanic Anode Cathodic Protection (See Sheet C105).

All subsidiary items mentioned above in Section B, with the exception of the Electrical Panel, shall be supplied by the general contractor. The Electrical Panel shall be supplied by Airport Receiving Station manufacturer.

1.02 RELATED WORK

- A. Division 1 - General Requirements: Submittals.
 - 1. 01 79 00 – Demonstration and Training
 - 2. 01 91 00 – Commissioning
 - 3. 01 91 00.13 – Preliminary Commissioning Plan
- B. Division 2 – Existing Conditions
 - 1. 02 41 13 – Selective Site Demolition
 - 2. 02 41 13-A – Approved Disposal Facilities
- C. Division 9 – Finishes
 - 1. 09 90 00 – Painting
- D. Division 22 – Plumbing.
- E. Division 26 – Electrical
 - 1. 26 29 00 – Common Control Panel Requirements for Equipment
 - 2. 26 42 00.16 – Galvanic Anode Cathodic Protection
- F. Division 31 – Earthwork
 - 1. 31 23 33 – Trenching, Backfilling, Embedment and Encasement
- G. Division 32 – Site Improvements
 - 1. 32 11 00 – Controlled Low-Strength Material (CLSM)

H. Division 33 – Utilities.

1.03 REFERENCE STANDARDS

- A. Equipment shall, as applicable, meet the requirements of the following industry standards:
1. American Society for Testing and Materials (ASTM) A36 Carbon Steel Plate
 2. American Society for Testing and Materials (ASTM) A536-84 Ductile Iron Castings
 3. American Iron and Steel Institute (AISI) 4130 Heat Treated Alloy Steel
 4. American Iron and Steel Institute (AISI) 4140 Heat Treated Alloy Steel
 5. American Iron and Steel Institute (AISI) 8620 Heat Treated Alloy Steel
 6. American Iron and Steel Institute (AISI) 303 Stainless Steel
 7. American Iron and Steel Institute (AISI) 304 Stainless Steel
 8. American Iron and Steel Institute (AISI) 316 Stainless Steel
 9. American Iron and Steel Institute (AISI) 17-4 PH Stainless Steel
- B. B. Controllers shall, as applicable, meet the requirements of the following Regulatory Agencies:
1. National Electrical Manufacturer's Association (NEMA) Standards
 2. National Electrical Code (NEC)
 3. Underwriters Laboratory (UL)

1.04 1.03 QUALITY ASSURANCE

- A. Identification
1. Equipment shall be identified with a corrosion-resistant nameplate affixed in a conspicuous location.
 2. Nameplate information shall include manufacturer's name and address, equipment model number, and serial number.
- B. Manufacturer
1. Supplier shall be ISO9001 certified and have a minimum 10 years experience as a manufacturer of municipal wastewater equipment and a minimum 250 prior installations of similar equipment.
 2. Supplier shall, at request, provide a list of reference sites of similar equipment for verification by the Engineer or Owner's representative.
 3. Supplier shall conduct factory testing and verification of equipment prior to shipment.
 4. Supplier shall have an exchange/repair service program.

1.05 SUBMITTALS

- A. Approval Documents
1. Submittals shall include equipment descriptions, functional descriptions, dimensional and assembly drawings, catalog data, job specific drawings, manufacturer's instructions in accordance with Section 01 33 23 Shop Drawings, Product Data, and Samples.
- B. Operation and Maintenance Manuals

1. The manuals shall include equipment descriptions, operating instructions, drawings, troubleshooting techniques, a recommended maintenance schedule, recommended lubricants, and recommended spares in accordance with Section 01 33 23 Shop Drawings, Product Data, and Samples.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Packaging and Shipment

1. Equipment shall be packaged in containers or on skids suitable for normal shipping, handling, and storage.
2. Equipment shall be protected from rain, snow, impact and abrasion while in the possession of the carrier.

B. Delivery and Acceptance Requirements

1. Contractor shall review the contents of the shipment at time of delivery and promptly notify the carrier and supplier of any discrepancies.

C. Storage and Handling Requirements

1. Equipment shall remain in the packaging provided by the supplier until it is installed.
2. Equipment shall be stored in a dry environment per manufacturer's recommendations.

D. Packaging Waste Management

1. Contractor shall be responsible for discarding all packaging materials in an environmentally-friendly manner and in accordance with local regulations.

1.07 WARRANTY

- A. The supplier shall submit a warranty statement clearly identifying the scope for a term of 2 years following substantial completion.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- B. Equipment shall be in accordance with these plans and specifications and shall be supplied by one of the following manufacturers:

1. JWC Environmental, LLC
 - a. Monster Airport Septage Receiving System Model ARS1204
 - b. Motor Controller Model PC2420
2. Franklin Miller, Inc.
 - a. Taskmaster Airport Receiving System Model TM851204
 - b. Automatic Reversing Controller Model S25060
3. Approved equal.

2.02 PERFORMANCE REQUIREMENTS

A. General

1. Grinder shall reduce or shred influent solids for protection of downstream equipment. Inlet piping shall receive waste flow by delivery vehicles and measure

and control amount of waste delivered to grinder.

B. Design Summary

1. Number of grinders1
2. Number of motor controllers.....1
3. Environment rating for grindersHazardous
4. Environment rating for motor controllersHazardous
5. Supply power characteristics..... 460 Volt / 3 phase / 60 Hertz
6. Housing flange size..... 4" ANSI Class 150 bolt pattern
7. Nominal stack height.....12"
8. Maximum liquid handling capacity per grinder.....450 GPM
9. Maximum head drop across cutter stack . .0.52 psi (.036 bar) at maximum capacity
10. Cutter type7-tooth
11. Spacer type..... Smooth
12. Shaft seal type Mechanical, Tungsten Carbide
13. Seal maximum pressure 90psi
14. Speed Reducer Type and Ratio Cycloidal, 29:1
15. Installed horsepower..... 5 hp (3.7 kW)
16. Motor type..... TEFC
17. Motor service factor 1.15
18. Minimum motor efficiency (at full load)85.5%
19. Minimum motor power factor (at full load)80%
20. Minimum peak shaft torque 4,246 lbf-in/hp
21. Minimum peak force at cutter tip 1,803 lbf /hp

2.03 INLET PIPING

A. General

1. Inlet piping shall provide connection between modulating valve and grinder tank.
Piping shall include at least one point for periodic clean water flushing.

B. Components

1. A 4-inch cast aluminum male cam & groove fitting with removable cap shall provide connection to inlet feed hoses.
2. Inlet Piping shall be constructed of passivated AISI 316 stainless steel.
3. Pipe segments shall have 4-inch Class 150 lb weld neck flanges.
4. Gaskets shall be constructed of 1/8 neoprene rubber.

5. Fasteners shall be constructed of 316 stainless steel.

2.04 GRINDER ENCLOSURE (TANK)

A. General

1. The two-compartment tank shall provide a method for housing and properly securing the grinder for receiving lavatory waste as well as internal piping to direct

ground solids to external discharge piping. The tank shall be vented above the mid-floor and a spill hood provided over the vent opening in the lid to prevent possible spillage from directly entering the tank. A floor drain shall be located in the mid-floor and be equipped with a backflow valve to reduce the chance of flooding the grinder compartment. An inspection port shall be located on top of the tank.

B. Components

1. Tank shall be fabricated of 1/4" inch thick passivated AISI 304 stainless steel.
2. Piping for the inspection flush port shall be 3 inch nominal and all others shall be 4 inch nominal. Piping below the midfloor shall be schedule 40 ABS pipe with DWV fittings. Piping above midfloor shall be schedule 40 stainless steel pipe and fittings.

2.05 GRINDER

A. General

1. Grinder shall be of two-shafted design consisting of individual cutters and spacers driven by hexagonal shafts. The cutters shall actively grab and pull material into the stack for shredding. Grinder shall have a main body housing with integral side rails, bottom end housing, top cover, and bottom cover. Grinder shall have a motor and speed reducer to drive the cutter shafts. The equipment shall operate at low speed with a maximum cutter shaft speed of 60 rpm.

B. Components

1. Cutters and Spacers
2. Cutting stack shall be of 12" height.
3. Cutters shall have 7 teeth and be 0.438" thick
4. Spacers shall be 0.446" thick
5. Cutters and spacers shall be individual disks constructed of heat treated alloy steel.
6. Cutter tooth height shall be not greater than 1/2-inch above the root diameter of the cutter.
7. Cutter outside diameter shall not exceed a maximum 4.71" diameter.
8. Cutter thickness tolerance shall be +.000/-.001". Spacer thickness tolerance shall be +.001/-.000".
9. Cutters shall be heat treated to 45-52 HRc.
10. Spacers shall be heat treated to 34-52 HRc.
11. Spacers shall have a smooth outside diameter.
12. Cutter to cutter clearance shall be a maximum of 0.010".
13. Clearance between any cutter tip and adjacent spacer shall be nominal 0.025".

C. Shafts

1. Shafts shall be hexagonal, 2" across flats.
2. Shafts shall be of heat treated 4140 alloy steel with a minimum tensile strength of 149,000 psi.
3. Shaft hardness shall be 38-48 Rockwell C.

D. Shaft Bearings and Seals

1. Radial and axial loads shall be borne by sealed, oversized, deep-groove ball bearings.

2. Shaft seal type shall be mechanical.
3. Each bearing and seal arrangement shall be incorporated into a cartridge-style housing.
4. Cutter shafts shall be supported on both ends. Cantilever-style arrangements shall not be permitted.
5. Dynamic and rotating seal faces shall be Tungsten Carbide with 6% Nickel binder.
6. Seal cartridges shall be rated to a maximum pressure of 90 psi.
7. O-rings shall be of BUNA-N.
8. Seal cartridges shall not require flushing.
9. Seals shall be rated to operate wet or dry.

E. Housings and Covers

1. Housings and covers shall be of ASTM A536 ductile iron.
2. Main body housing shall have integral inlet and outlet flanges.
3. Flange bolt pattern shall be as listed in Performance Requirements.
4. Main body housing shall have integral side wall deflectors to direct solids into cutters.
5. Inspection port covers shall be on both inlet and outlet sides of main body housing.
6. End housings shall have integral bushing deflectors to guide solids away from seal cartridges.
7. Housings shall not contain grit or debris traps requiring periodic cleaning.

F. Transfer Gears

1. Transfer gears shall be of involute profile and fabricated from heat treated alloy steel.
2. Transfer gear tooth design, thickness and hardness shall be suitable to transfer torque between shafts up to the rated breakdown torque of the motor.
3. The interface between transfer gears shall be factory lubricated with grease to minimize wear.
4. The transfer gear ratio shall be such that the ratio of cutter tip speed of the low speed shaft to cutter tip speed of the high speed shaft shall be greater than 0.90 and less than 1.00 to promote tearing of material as it passes through the cutter stack and at the same time facilitate cleanout of material from between the cutters.

G. Low Speed Coupling

1. Low speed coupling shall be a 3-jaw type and of heat treated alloy steel.
2. Each low speed coupling half shall be encapsulated on its mating shaft to facilitate proper engagement of coupling lobes (1/16" – 1/8").
3. The interface between low speed coupling halves shall be factory lubricated with grease to minimize wear.

H. Speed Reducer

1. Speed reducer shall be manufactured by Sumitomo Machinery Corporation of America.
2. Speed reducer shall be a cycloidal type.
3. Gear motor speed reduction ratio shall be 29:1.
4. Speed reducer shall be grease lubricated.

- I. Motor
 - 1. Motor shall be manufactured by Baldor Electric Company.
 - 2. Shall have the characteristics as listed in Performance Requirements.
- J. High Speed Coupling
 - 1. High speed coupling shall be a 3-jaw type with elastomer spider.
 - 2. The 3-jaw halves shall be of sintered iron.
 - 3. The spider shall be of BUNA-N.
- K. Lifting Brackets
 - 1. Grinder shall be fitted with two (2) fabricated lifting brackets.

2.06 MOTOR CONTROLLER

- A. Description
 - 1. Controller shall provide control of the airport receiving station system components. The operator enclosure shall have an Operator Interface Terminal and control devices for operating the system. The enclosure shall have indicator lights, switches and other control devices.
- B. Components
 - 1. Enclosures
 - a. Main enclosure shall be AISI 316 stainless steel NEMA 4X painted white and house the control devices, motor starters, Emergency Stop and PLC.
 - 2. Operator Interface Terminal (Operator Enclosure)
 - a. OIT shall be manufactured by Franklin Miller.
 - b. OIT shall be rated for outdoor use and classified environment.
 - c. OIT shall display fail, service reminder and operational messages.
 - d. OIT shall display liquid volume when processing a transaction.
 - e. Recorder shall store transaction data and provide transfer of the data via a memory card reader as a CSV file to a Personal Computer.
 - f. A custom template that formats the data shall be provided on CD.
 - 3. Start & Stop Pushbuttons
 - a. Pushbuttons shall be rated NEMA 7.
 - b. Start pushbutton shall initiate operation of the system.
 - c. Stop pushbutton shall initiate a stop of the system and immediately stop the grinder motor. Transaction data shall be written to the PLC data register.
 - 4. Grinder ON/OFF/AUTO three-position keyed selector switch. (Main Enclosure)
 - a. In the ON position, the grinder shall run continuously.
 - b. In the AUTO position, the grinder shall operate as controlled by the START and STOP pushbuttons.
 - 5. RESET momentary pushbutton (main enclosure)
 - a. Switch shall be rated NEMA 4X
 - b. Reset switch shall clear any fault condition and rest system for operation.
 - 6. Pilot Lights (main enclosure)
 - a. Lights shall be LED type rated NEMA 4X.
 - b. Lights shall indicate GRINDER RUN and FAIL.

7. Emergency Stop Pushbutton (main enclosure)
 - a. Emergency Stop Pushbutton shall be rated NEMA 4X.
 - b. When activated Emergency Stop shall stop grinder motor.
8. Motor Starter and Control Transformer
 - a. Starter shall be a full-voltage reversing type with 120 volt operating coils.
 - b. Overload relays shall be adjustable and sized to full load amperes (FLA) of the motor.
9. Programmable Logic Controller
 - a. PLC shall be manufactured by Franklin Miller.
 - b. PLC shall have a minimum of 16K of memory.
 - c. PLC shall be able to store 1000 transactions.

C. Operation

- ~~1.~~ Flow shall be measured and recorded for the transaction. The data shall be stored in the controller's PLC and the data shall be accessible through either a compact flash drive or downloaded via Ethernet connection.
- ~~2.~~1. Grinder control shall be in accordance with the setting of the On-Off-Auto selector switch.
- ~~3.~~2. In the OFF position the grinder shall not run. Motor controller faults shall be cleared.
- ~~4.~~3. In the ON position, the grinder shall run forward.
- ~~5.~~4. In the AUTO position, the grinder shall operate as controlled by a remote start/stop dry contact.
- ~~6.~~5. When an obstruction jams the grinder, the controller shall stop the grinder and reverse the rotation to clear the obstruction. If the obstruction is cleared, the controller shall return the grinder to normal operation. If three (3) reverses occur within a 30 second interval, the controller shall stop the grinder motor and activate the grinder FAIL indicator and relay.
- ~~7.~~6. When a motor overload or motor over-temperature condition occurs, the motor shall be de-energized, the MOTOR FAULT indicator lamp shall be illuminated and the FAIL contact shall be closed.
- ~~8.~~7. When a power failure occurs while the system is operating, the transaction shall terminate.
- ~~9.~~8. When a power failure occurs while the grinder is in a fail condition, the system shall return to a fail state when power is restored. The fail state shall not be cleared until reset.
- ~~10.~~9. Reset of the grinder shall be accomplished from the main controller only.

2.07 CONTROL PANEL

- A. Provide NEMA 4X 316 stainless steel enclosure painted white, with air conditioning. Panels shall be located as shown on the Drawings. Panel shall meet the herein specified requirements and the general requirements of Division 26.
- B. Provide a main circuit breaker for incoming power disconnection and one circuit breaker for each individual equipment power feed. All circuit breakers shall be properly sized per NEC to meet the equipment load requirements. Provide incoming power surge protective devices as specified under Division 26. Provide breaker, starter, control

transformer, fuse and other controls for each motor.

- C. Provide heavy duty rated door mounted controls. The controls shall include pushbuttons, select switches, indication lights, motor elapsed time meters. Provide control power supplies, transformers, control relays, timers, strobe and horn, and other controls as specified in the Division 26.
- D. Control panel shall have PLC with graphic touch color Operation Interface Unit (OIU) or hardwired relay control. The OIU shall be door-mounted NEMA 4X outdoor rated and minimum size shall be 7”.
- E. The OIU shall be configured and programmed with some process graphic screens for station operation. Provide screens for equipment alarms, equipment control setting. OIU shall be password protected for operation and setting adjustment.
- F. Provide explosion-proof rated local operation station with start push button, stop pushbutton, and Estop.
- G. The control panel shall have following minimum controls.
 - 1. Panel Power ON pilot light (Amber)
 - 2. Door-mounted Graphic Interface Unit
 - 3. Estop pushbutton
 - 4. Local Operation Station On-Off-Auto at Auto position pilot light (Amber)
 - 5. Grinder Running pilot light (Red) and Stop pilot light(Green)
 - 6. Alarm horn and Beacon
- H. The control panel shall have loop detector controllers installed inside panel. Loop detector basis of design is model LMA-1250. Any change on loop detector model LMA-1250 and any associated panel footprint increase will be the sole responsibility of the contractor. Panel vendor shall coordinate with the loop detector vendor for specific requirements.
- I. Control Description: Provide following grinder control and field adjust control as required.
 - 1. Station has two detection loops: Loop 1 and Loop 2. Loop 1 is to detect vehicle entry event and Loop 2 for exit event.
 - 2. Vehicle crosses Loop 1 (entry loop) airport receiving station turns on. When vehicle crosses Loop 2 (exist loop) airport receiving station turns off.
 - 3. Vehicle crosses Loop 1 and Loop 2 immediately or within 5 seconds airport receiving station doesn't turn on.
 - 4. If vehicle crosses Loop 2 and Loop 1 has not been crossed airport receiving station does not turn on.
 - 5. All controls should turn off equipment if airport receiving station overheats or is jammed.
 - 6. All delay times and timer should be field configurable.
 - 7. Elapsed time meter.
- J. Provide control panel submittal. Submittal shall include panel drawings, control descriptions, bill of material, equipment data sheet, PLC and OIU program and graph screens.

- K. Provide Owner's Manual. Owner's Manual shall include all panel design documents including drawings, equipment data sheets, operation instruction, control function description, system maintenance and troubleshooting instruction, setting list, manufacturer contact information.

2.08 FINISHES

- A. Paint Coatings (Ferrous Materials)
 - 1. Ferrous metal surfaces shall be prepared to SSPC-SP6 (Commercial Blast Cleaning) and coated with minimum 6-8 mils TDFT (total dry film thickness) of aliphatic acrylic polyurethane paint.
- B. Paint Coatings (Previously-Coated Components)
 - 1. Previously-coated components (motors, speed reducers, etc.) shall be prepared to SSPC-SP1 (Solvent Cleaning) and SSPC-SP2 (Hand Tool Cleaning) and coated with minimum 6-8 mils TDFT (total dry film thickness) paint of aliphatic acrylic polyurethane paint.

2.09 MISCELLANEOUS EQUIPMENT

- A. TRAFFIC LOOP DETECTORS
 - 1. Install item as shown on the plans.
- B. HOSE HANGER ASSEMBLY
 - 1. Install item as shown on the plans.
- C. BOLLARDS
 - 1. Install item as shown on the plans.
- D. ELECTRICAL PANEL AND WIRING FOR THE AIRPORT RECEIVING STATION
 - 1. Install item as shown on the plans.
- E. PIPE SUPPORTS
 - 1. Install item as shown on the plans.
- F. GALVANIC ANODE CATHODIC PROTECTION
 - 1. Install item as shown on the plans.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor shall coordinate installation of the equipment in accordance with the manufacturer's installation instructions, drawings and related specification sections, and in accordance with all OSHA, local, state, and federal codes and regulations.

3.02 SYSTEM START-UP

- A. The equipment supplier shall provide the services of a factory or manufacturer's representative for a minimum of one (1) day to inspect the equipment for proper installation, apply power for the first time and check for proper motor rotation, oversee the initial introduction of material into the system and confirm the equipment operates as intended. Representative shall also provide services as detailed in Training below.

3.03 TRAINING

- A. Field training shall be provided for operations, maintenance and supervisory staff members. Field instruction shall cover key components of the equipment, operating and maintenance requirements and troubleshooting techniques.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Airport Receiving Station System shall be measured per Lump Sum (LS).
- B. The following miscellaneous equipment shall be considered subsidiary to the Airport Receiving Station and shall not be measured individually.
 - 1. Traffic Loop Detector (See Sheet E104)
 - 2. Hose Hanger Assembly (See Sheet C109)
 - 3. Bollards (See Sheet C109)
 - 4. Electrical Panel and Wiring for the Airport Receiving Station (See Sheet E103)
 - 5. Pipe supports (See Sheet C105 and See Sheet C110).
 - 6. Galvanic Anode Cathodic Protection (See Sheet C105).
 - 7. All other items necessary to construct a fully operational Airport Receiving Station system not specified for separate measurement and payment.

4.02 PAYMENT

- A. Airport Receiving Station System shall be paid per Lump Sum (LS). The price shall include full compensation for all materials, labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

Item 43 22 70-1 Airport Receiving Station System Complete, Including Traffic Loop Detectors, Hose Hanger Assembly, Bollards, Pipe Supports, Galvanic Anode Cathodic Protection and Electrical Panel and Wiring.....per Lump Sum (LS)

END OF SECTION

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