

**ADDENDUM NUMBER 2  
OCTOBER 3, 2017**

Jackson County Utility Authority Project No. 20150619124

Pascagoula/Moss Point WWTP Escatawpa WWTP Repairs – Year 2

FROM:

**BURK-KLEINPETER, INC.**

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TO: PROSPECTIVE BIDDERS

This addendum forms a part of the Contract Documents and modifies Specification sections and Drawings as denoted below. Acknowledge receipt of this addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification. Bidder is responsible to disseminate this addendum to all subcontractors and material suppliers concerned.

Sealed bids will be received by the JACKSON COUNTY UTILITY AUTHORITY at 1225 Jackson Avenue, Pascagoula, Mississippi 39567, until **1:00 pm, October 12, 2017** at which time they will be publicly opened and read aloud.

CHANGES TO SPECIFICATIONS

- A1. Delete Section 11182 – Mechanically Cleaned Automatic Bar Screen and replace with the attached Section 11182- Mechanically Cleaned Automatic Bar Screen and Washer Compactor.

END OF ADDENDUM NO. 2



*Robert D. Bredberg* 10/3/17  
Robert D. Bredberg, P.E. Date

SECTION 11182

MECHANICALLY CLEANED AUTOMATIC BAR SCREEN  
AND WASHER COMPACTOR

PART 1      GENERAL

1.01          SCOPE

- A.            **This section includes the furnishing of a front-cleaning, front-return link driven mechanically cleaned bar screen assembly, dual auger washer compactor, control panels and any auxiliary equipment or accessories to be installed in the location as indicated on the drawings and as specified herein.**

Number of units: 1

Equipment designation: Full Penetration Fine Screen Model FlexRake® with Dual Auger Washer Compactor

Equipment location: Pascagoula/Moss Point WWTP

- B.            All equipment supplied under this section shall be furnished by or through a single Screening System Supplier who shall coordinate with the Contractor, the design, fabrication, delivery, installation and testing of the screening components. The Screening System Supplier shall have the sole responsibility for the coordination and performance of all components of the screenings system with the performance and design criteria specified herein.
- C.            The Contractor shall be responsible to coordinate all details of the screening equipment and dual auger washer compactor with other related parts of the Work, including verification that all structures, piping, wiring, and equipment components are compatible. The Contractor shall be responsible for all structural and other alterations in the Work required to accommodate the equipment differing in dimensions or other characteristics from that contemplated in the Contract Drawings or Specifications.

1.01          RELATED SECTIONS

- A.            The following list of related sections is provided for the convenience of the Contractor and is for reference only to support commonly referenced sections that are in-general applicable to all equipment supplied. (For complete list of sections see specification index.)

1.            All sections of Division 1 including but not limited to Submittal Procedures, Shop Drawings, Product Data and Samples, Operating and maintenance information, Protection of Materials and Equipment, Installation, Testing, and Commissioning, Instruction of

Operations and Maintenance Personnel, and Spare Parts  
Maintenance Manuals.

1.02 RELATED WORK

- A. DIVISION 1 - GENERAL REQUIREMENTS
- B. DIVISION 5 - METALS
- C. DIVISION 16 - ELECTRICAL

1.03 REFERENCE STANDARDS

- A. American National Standards Institute (ANSI)
- B. American Society for Testing and Materials (ASTM)
- C. American Welding Society (AWS)
- D. American Institute of Steel Construction (AISC)
- E. American Bearing Manufacturers Association (ABMA)
- F. American Gear Manufacturers Association (AGMA)
- G. National Electrical Manufacturers Association (NEMA)
- H. Underwriters Laboratory (UL)

1.04 SUBMITTALS

- A. The equipment manufacturer shall submit the following items:
  - 1. (4) Sets of General Arrangement drawings that illustrate the layout of the equipment, equipment weight, principal dimensions with related verifications required for installation including anchorage locations. Other related data including descriptive literature, Electrical Control Drawings, Catalog Cut Sheets for individual components and Drive Motor Data.
  - 2. A list of recommended Spare Parts including any Special Tools required for routine maintenance of the equipment is provided in Section 2.5.
  - 3. (4) Sets of O & M Manuals including As-Built Drawings of the Mechanically Cleaned Bar Screen Arrangement, Dual Auger Washer Compactor, Controls and Accessories shall be provided in digital format after equipment ship for inclusion in the Close-Out Submittal process.
  - 4. For sites that have (3) ft or greater head differential, equipment manufacturer shall provide Structural Certification from licensed Civil engineer.

#### 1.04 QUALITY ASSURANCE

- A. The Mechanically Cleaned Bar Screen and Dual Auger Washer Compactor shall be fully assembled and shop tested at the manufacturing facility prior to shipment. Shop testing shall include a minimum of 4 hours of run time. The contractor, the engineer, the owner or the owner's designated representative reserves the right to witness the shop test. A minimum three (3) week notice shall be provided prior to the test to allow for travel coordination.
- B. To assure quality and performance: All equipment furnished under this Section and related sections shall be of a single manufacturer who has been regularly engaged in the design and manufacture of the equipment and demonstrates, to the satisfaction of the Engineer, that the quality is equal to equipment made by those manufacturers specifically named herein. And the screen manufacturer shall have at least 25 installations of the specified model of mechanically cleaned bar screen equipment that has been in successful operation, at similar installations, for at least five (5) years. Upon request, the manufacturer shall provide a reference of such installation sites along with the relevant contact information.
- C. Possible consideration may be given to manufacturers with less installation experience but only upon submission and approval of dimensional and installation drawings and O & M Manuals. Additionally, a complete product development plan with dates indicating all applicable alpha and beta testing shall be provided for review and acceptance. Approval of any manufacturer that does not meet the installation experienced defined herein shall be contingent upon submission and approval of the previously defined information. Additionally, such manufacturers shall be required to provide a performance bond issued in favor of the owner, covering the full amount of the manufacturer's offering and for the entire warranty period of the project.
- D. The equipment furnished shall be fabricated, assembled, installed and placed in proper operation condition in full conformity with approved drawings, specifications, engineering data, and/or recommendations furnished by the equipment manufacturer.

#### 1.05 WARRANTY

- A. Manufacturer shall provide a written one year standard warranty from the date of use of the mechanically cleaned bar screen or dual auger washer compactor equipment to guarantee that there shall be no defects in material or workmanship in any item supplied.
- B. Manufacturer shall warrant for the period of 5 years all rotating parts of the Mechanically Cleaned Bar Screen including the gear motor, bearing, drive head, and the link system including the links, castings, pins and

retaining rings. Manufacturer warrants that these components shall be replaced if damaged or defective in the normal use of the equipment.

PART 2      PRODUCTS

2.01      MANUFACTURERS

A.      Screen and washer compactor shall be as manufactured by Duperon Corporation, 1200 Leon Scott Court, Saginaw, Michigan, TF 800.383.8479. The screen shall be the FlexRake® Model, Full Penetration Fine Screen.

B.      Or pre-approved equal. Screen manufacturer seeking pre-approval must submit application a minimum of three (3) weeks prior to bid day. Charges for additional engineering to alter site drawings to meet the intention of the specification shall be at the cost of the manufacturer requesting such change. The necessary submission to be considered a pre-approved equal shall include the following information:

- a.      Product data sheet
- b.      Site Specific Proposal Drawing
- c.      Installation drawings and instructions
- d.      O & M Manual
- e.      An employee list of in-house design engineers along with their respective locations and resumes.
- f.      An employee list of in-house controls engineers along with their respective locations and resumes.
- g.      An employee list of in-house application engineers along with their respective locations and resumes.
- h.      An employee list of in-house project managers along with their respective locations and resumes.
- i.      An employee list of in-house field service technicians along with their respective locations and resumes.

C.      Dual Auger Washer Compactor Design Features

a.      Compacting Action: Dual augers provide positive displacement action, are oriented on top of each other and rotate in opposing directions. The augers are intermeshed and are of one left hand and one right hand lead. Compactor augers shall be designed with a limited float on top of a perforated plate strainer, allowing them to accommodate irregular debris.

- b. Washing Action: The wash water manifold shall be integrated into the main housing. Two ports inside the unit emit a medium pressure stream. Water supply shall be capable of 3 to 5 GPM at a pressure of 40 to 60 PSI. A ½ inch NPT connection is provided for attaching water source. Water may be filtered effluent or municipal water. Drain connection shall be 3” NPT mail.
- c. Operation: Washer Compactor is designed to be continuous run, not requiring an operator. Washer Compactor is equipped with a self-regulating, active pressure zone design to accept non-standard wastewater debris in its original form, such as rocks, broken concrete, and metal (bolts, short pipe, etc.) up to 4 inches long. Washer Compactor shall have the ability to process multiple pieces of clothing, variable volumes of debris, and unprocessed septage or grease. Compactor moves at normal operating speed of 0.5 to 2.2 RPM and can run intermittently to sync with upstream equipment.

2.02 BASIS OF DESIGN

- A. The mechanically cleaned bar screen shall have a head sprocket only, with no sprockets, bearings, idlers, or similar drive components under water to trap the chain. Equipment featuring reciprocating rake arms or lower bearings/sprockets/tracks below the water is not acceptable.
- B. The mechanically cleaned bar screen shall meet the total screen debris removal capacity of:

Scraper Ratio below Water Level:

Upstream Water Level (ft) =

Number of Scrapers below Water level 1.745 ft

Debris Volume per Linear Foot =

0.152 ft<sup>3</sup> /hr (0.046 m<sup>3</sup>/m)

Total Screen Debris Removal Capacity on Low (ft<sup>3</sup>/hr) =

(0.152 ft<sup>3</sup>/ft) x (Screen Width) x 60 x (Number of Scrapers below Water Level)

Total Screen Debris Removal Capacity on High (ft<sup>3</sup>/hr) =

(0.152 ft<sup>3</sup>/ft) x (Screen Width) x 260 x (Number of Scrapers below Water Level)

- C. The flow ability of the screen area, specifically, shall be defined as follows: A composite number representing the specific flow- ability of a screen area composed of the bars' Hydraulic Headloss Coefficient Shape Factor, the bar width and the clear opening of the screen field per formula below.

$$\text{(Coefficient Shape Factor)} \times \left( \frac{\text{Bar Width}}{\text{Clear Opening}} \right) = \left( \frac{0.190}{\text{Clear Opening}} \right)$$

- D. The mechanically cleaned bar screen shall be designed to run continuously (24/7), without operator.
- E. The equipment shall have multiple scrapers on the bar screen at one time cleaning continuously from bottom to top, the entire width of the bar screen. The drive output shaft rotation shall be constant and in one direction in order to reduce maintenance and increase product life. Units which have single raking arms or that require cycle times shall not be allowed. Cleaning mechanisms that utilize shock absorbers, springs or other dampening or hydraulic actuations are unacceptable.
- F. The link system shall have jam evasion capability by flexing around and collecting large objects such as a 2 X 4, bowling ball, grease balls and surges of solids at peak loading times without overloading and shutting down the unit. The link system shall be such that it bends in one direction only which allows it to become its own lower sprocket and frame and shall have a 1,000 pound lifting capacity.
- G. Designs employing the use of endless moving media or cables and hydraulic cylinders to remove debris from the channel and units utilizing proximity or limit switches for reverse cycles are not acceptable.
- H. Equipment utilizing a greater than 1/2 HP motor or two or more motors to complete a screen cleaning cycle is not acceptable.
- I. The design shall be such to ensure that all maintenance can be accomplished at the operating floor level or above. No part of the drive system including sprockets shall be located below the water surface at maximum design flow.
- J. Design Conditions:

Site Installation Information:	
Channel Width:	6 ft
Channel Height:	5.08 ft.
(upstream clearance) Channel Depth:	4.0
Bar Opening Size:	1/4"
Angle of Installation:	10
Average Flow:	4 MGD
Average Water Level:	1.0 ft.

Maximum Flow:	13.5 MGD
Maximum Water Level:	2.60 ft.
Maximum Head Differential:	0.31 ft.
Equipment Location:	Outdoors
Outdoor Installation:	
Site Access Constraints:	Yes
Below Freezing Temperatures:	
Installation Area (Envelope) Classification:	Class I Div I
Collection and Conveyance	
Containment Height:	By others
Debris Bin:	<i>n/a</i>
Conveyor:	<i>n/a</i>
Washer/Compactor:	Included with Bar Screen Assbembly
Other:	<i>n/a</i>

## 2.03 BAR SCREEN COMPONENTS

A. **Bar screen assembly:** Bar screen assembly shall be of stainless steel and designed to withstand 1 foot head differential unless noted otherwise in Section 2.2 J Design Conditions. Unless noted otherwise materials of construction shall be 304 Stainless Steel. A stainless steel channel bottom plate shall be an integral part of the bar screen assembly to fully engage scrapers in the bar screen at the base of the unit and assure that the raking mechanism reaches the bottom of the screen to prevent debris accumulation. The Bar screen assembly shall be shipped in one piece.

1. **Screen Bars:** Bars shall be 316L stainless steel and be tear-shaped with a Hydraulic Coefficient shape factor of 0.76 and the minimum dimensions of 0.25 inch x 0.75 inch x 0.13 inch. Bars shall be individually replaceable without welding.
2. **Side Fabrication:** The screen framework shall be 304 stainless steel bent plate with minimum of 3/16 inch cross section. Horizontal members shall be of stainless steel bent plate or stainless steel pipe. Support members and frame shall adequately support the bar screen based on site specific requirements.
3. **Dead Plate:** Dead plate shall be 0.25 inch thick 304 stainless steel. The dead plate shall be flat and true; span the entire width of the unit; and transition from bar screen to discharge point.
4. **Discharge Chute:** The discharge chute shall be 11ga. (0.12 inch) 304 stainless steel. The discharge chute shall be bolted to the dead plate and shall be designed to allow debris to be transferred from discharge point into the debris containment.



5. **Link Slides:** Link slide assembly shall be provided per manufacturer standard design and shall be constructed of UV Stable UHMW PE rollers and 304 stainless steel supports and components.
  
- B. **Return Guide/Closeouts:** Return guide/Closeouts shall be 304 stainless steel and shall assure proper alignment of scrapers as they enter the bar screen and assure that there is no space wider than the clear opening between bars to prevent passage of larger solids than allowed through the screen.
  
- C. **Debris Blade:** A 304 stainless steel and UV Stable UHMW-PE debris blade assembly, which does not require a separate drive, shall be installed to assist in removing debris from the scraper on the mechanically cleaned bar screen unit as recommended by the manufacturer. Hydraulic, shock, or spring controlled debris blade mechanisms are not acceptable.
  
- D. **Screen Enclosure:** A 14ga. #4 brushed satin finish 304 SSSL Enclosure shall be installed to cover the screen above the operating deck level. Front Enclosure shall have removable panels for access to equipment. Removable panels shall be 16ga. 304 SSSL and shall be provided with knurled knobs for "no tool required" access. Alignment notches shall be included to support repositioning of removable panels. The top of the Front enclosure shall include a knock out for a customer site option to install a 6-inch diameter pipe stub. (The option of connecting to the site's exhaust system, to provide a positive air exchange from interior of enclosure, by Others.) Rear Enclosure shall have hinged removable doors and shall be secured with a lift-slide-latch handle. Rear removable door shall include an integral viewing door that shall be secured with a lift-slide-latch handle to provide access for a quick look inside.

For multi-deck applications, 14ga. #4 brushed satin finish 304 SSSL side shields will also be provided.

1. Front Enclosure Design Options:

<b>Fabrication Options:</b>
<ul style="list-style-type: none"> <li>○ <i>SSSL removable panels (standard).</i></li> </ul>

- E. **Link System:** The link system shall be passivated stainless steel castings and have a minimum ultimate strength of 60,000 lbs with a minimum cross section of 1.5 inches and weighing a minimum of 4.5 lbs each. Parts must meet ASTM A380 specification for surface finish.
  1. 304 stainless steel system includes 302 stainless steel retaining rings and 304 stainless steel pins.

- F. **Scrapers:** Scrapers shall be spaced 21 inches apart. To provide long product life the scraper shall move at no greater than 28 inches per minute at standard operating speed of ½ rpm allowing for approximately 1 debris discharge per minute. Staging Scrapers and Thru Bar Scrapers shall be a maximum ratio of 3:1 per manufacturer recommendations. At least one scraper every 84 inches shall fully penetrate the bar screen, cleaning all three sides of the bars as well as through to the cross members in openings of 0.25, 0.375 and 0.50 inches.
1. **Staging Scrapers;** Staging Scrapers shall be 1 inch thick x 4 inches x screen width UV Stable UHMW-PE with a serrated edge.
  2. **Thru Bar Scrapers:** Thru Bar Scrapers shall be minimum .375 inch thick x 5 inches x screen width 304 stainless steel.
- G. **Drive Head:** The Drive Head shall be located at the top of the mechanically cleaned bar screen.
1. **Drive Unit:** Each mechanically cleaned bar screen unit shall operate independently and shall have its own drive unit and driven components.
    - a. Drive Sprockets and end castings shall be cast 304 stainless steel.
    - b. Drive Shaft shall be 304 stainless steel.
    - c. Gearbox shall be shaft-mounted, right angle type and include spiral bevel gearing. The output shaft speed shall be controlled by a vector type inverter or per rake manufacturer's recommendation. It shall have at least a 1.52 or greater service factor based on machine torque requirements. The gearbox shall not be vented to the outside atmosphere. The gearbox shall be grease filled. Oil filled gearboxes are not allowed.
    - d. The motor shall be AC induction type, inverter duty, phase 240/480 volt and mounted to the gear reducer. The motor shall be ½ hp, designed for 1800 RPMs base speed and rated for Class I, Groups C & D, Class II Groups F & G environments. The motor shall have an EPNV enclosure, NEMA design B with a 56C frame size. Service factor shall be 1.15 or greater, Class F insulation and be optimized for IGBT type inverters. The motor must be UL listed and designed for continuous operation.
    - e. Motor shall have built in, normally closed, thermostat to protect from overheating that is to be field wired to

corresponding terminal in control panel for redundant (ambient) overload protection.

- f. All drive head components shall be of components available in the United States.
  - 2. **Bearing:** Bearing shall be greased ball bearing type, non self-aligning, sealed and lubricated and shall have a 24/7/365 L10 life of 20 years when in compliance with stated O&M recommendations. Non-sealed bearings are not acceptable.
  - 3. **Speed Reducer:** Speed reducer shall be a double-reduction, cycloidal style and shall comply with all applicable AGMA standards. The speed reducer shall be capable of a 4/1 speed range with variable output speeds between 0.50 to 2.2 output RPMs (in high flow conditions). The speed reducer shall produce an output torque of 11,417 in.lb. and have a gear ratio of 809:1.
- H. **Standard Coating:** All non-stainless bar screen components shall be coated in strict accordance with the paint manufacturer's specification. Surface Preparation shall be done in accordance with SSPC-SP-10 Near White. The three-part coating system shall be manufactured by Tnemec as follows: Prime Coat Series 90-97 Tnemec Zinc at 2.5-3.5 mils DFT, Intermediate Coat Series 27 F.C. Typoxy at 3.0-5.0 mils DFT, and Top Coat Series 1075U Endura-Shield II at 2.0-3.0 mils DFT. Standard color is 11SF Safety Blue. Material shall meet all state and federal VOC and other regulatory requirements.

#### 2.04 DUAL AUGER WASHER COMPACTOR COMPONENTS

- A. **Main Housing:** The main housing of the compactor shall be constructed of 304 stainless steel and be a minimum of 11 gage and connect to 3/8 inch flanges.
- B. **Augers:** Augers shall be of 304 stainless steel with 8 inch diameter flights 3/8 inch thick and have a 4 inch flight pitch. Augers shall be coupled to a transmission at the drive end and supported at the compaction end with UHMW plan bearings. Such arrangement allows movement for accommodation of irregular debris.
- C. **Compaction Housing:** The compaction housing shall be ¼ inch 304 stainless steel and shall house a spring and gate assembly which provide the resistance for compaction. The housing shall contain the auger supports.
- D. **Water Supply:** Water supply shall connect at a single point with a ½ inch NPT female connector. Ball valves shall be provided to distribute flow to the washing and trough sprayer connections.

- E. **Drain Trough:** A removable pan shall be provided under the main housing. It will collect the washwater and drain it out a 4 inch NPT male drain port. The pan will be minimum 11 gage 304 stainless steel.
- F. **Drive Assembly:**
- a. Each Wash Compactor unit shall operate independently and will have its own drive unit and driven components. The gearbox shall not be vented to the outside atmosphere.
  - b. The gearbox shall be grease lubricated and designed for 20,000 hours of operating between recommended clean and re-grease services. The gearbox shall be right angle type and shall incorporate cycloidal and spiral bevel gearing with a total ratio of 809:1. The gear reducer output shaft speed shall be 0.5 RPM minimum to 2.2 RPM maximum and controlled by an AC Tech, vector type inverter or greater service factor based on unit torque requirements. It shall be shaft mounted utilizing the keyless Taper-Grip bushing.
  - c. The motor shall be mounted to the gear reducer by utilizing a quill, C-Face mounting style. The motor shall be AC induction type, 0.75 HP, 3/60/230/460 volt, explosion proof, inverter duty model.
  - d. The drive assembly shall incorporate the Duperon standard coating system.
- G. **Auger Transmission:**
- a. The Drive Assembly shall be coupled to a dual gear transmission which drives the augers in counter rotation.
  - b. The spur gears are contained in a stainless steel housing and supported by Delrin (or equivalent) plane bearings.
  - c. Grease fittings shall be located outside of the transmission housing to provide lubrication to the gears.
- H. **Speed Reducer:** Shall have a maximum output of 2.2 RPM, 809:1 reduction ratio with 18,900 in-lb. of output torque.
- I. **Thrust Bearings:** Shall be Delrin (or equivalent), self-lubricating and be capable of withstanding minimum 2,000 lb. thrust load (each auger) at 2.2 RPM for lift of machine.
- J. **Screw Supports:** Shall be UHMW plane type, self-lubricating and fastened into place using stainless steel fasteners.
- K. **Spur Gears:** Shall be 17-4 PH stainless steel.

2.05

ELECTRICAL, CONTROLS, INSTRUMENTATION

- A. **General:** Controls for each rake shall be in enclosures provided by the bar screen manufacturer. The bar screen manufacturer shall be responsible for proper sizing and function of the controls at 480V, unless specified otherwise.
1. Main control panels require shading from the sun and shall be operated within a temperature range between 35°F and 104°F. Contractor to provide sunshield, visor or other structures needed to provide shade to the control panel. (If the controls will experience temperatures outside this range, then Contractor will provide appropriate climate control system to the panel.)
  2. Controls shall be designed to accept incoming power supply per plans/specs and shall include a step-down transformer as needed to achieve 120V.
  3. Control Panel(s) shall be constructed to meet the appropriate NEMA classification requirements and will include a main, lockable disconnect. The panel will be constructed by a UL certified control panel build facility and will be supported by the appropriate UL labeling.
  4. Controls shall be tested prior to shipment to owner. The rake manufacturer shall verify all overload settings in the rake controller to insure proper overload and speed settings required for the application are properly programmed.
  5. Control panel(s) shall be wired complete with a minimum of #16 MTW wire in the appropriate colors for the circuits being supplied. 120VAC control shall be red, grounded AC neutral shall be white, DC control shall be blue, DC neutral shall be blue with a white tracer, equipment ground shall be green and all incoming and outgoing external power source wires shall be a yellow configuration. All AC power wiring shall be a minimum of #12 Black. All wires shall be labeled at both ends with heat-shrink wire markers. Internal panel wiring shall be contained in non-flammable, covered wire way.
  6. All panel(s) and panel mounted devices shall be labeled with engraved I.D. markers that reference back to the system schematics. Tags shall be white with black core, engraved as required.
  7. All field wiring and power cables between the bar screen Main Control Panel and the Local Push Button Station shall be provided by others under the Electrical Section. VFD rated motor cable

(Belden #29502 or equal) is recommended for all motors. Motor cables shall be less than 80 ft unless otherwise specified.

**B. Components:**

**1. Main Control Panel**

- a. Enclosure(s) shall be NEMA 4X 304 SSSL for outdoor installations.
- b. Enclosure shall not be located in an explosive environment.
- c. Main Control Panel shall be designed with a SCCR rating of 18KA at 480VAC minimum and labeled as such, unless otherwise specified.
- d. All terminals utilized in the main panel shall be 600V rated terminals and 20% spare terminal space shall be provided for any potential future revisions.
- e. The Main Control Panel shall include at a minimum the following
  - Main fusible disconnect with lockable operator, unless otherwise specified.
  - Physical or virtual Hand/Off/Auto (HOA) Selector and Push/pull E-Stop button.
  - Elapsed run-time meter
  - Indication for "Power On", "Forward" and necessary faults.
- f. PLC Based Controls shall included the following:
  - Programmable Logic Controller (PLC)
  - Variable Frequency Drive (VFD)
  - HMI programmable functions as required
  - SCADA Interlocking via Hard Contact and/or Ethernet Communications Protocols as required.

**2. Local Control Push Button Station**

- a. Enclosure shall be NEMA 4X rated for unclassified installation. Local push button station must be local to the equipment to maintain requirements of local safety codes as determined by the Engineer.
- b. Local station shall be mounted within 10 feet or as close to the equipment as safely possible and be field wired by the electrical subcontractor to the corresponding terminal inputs in the main control panel.

- c. The remote pushbutton station shall include Forward, Jog Reverse and E-Stop buttons.
3. **Instrumentation:** Each raking assembly shall have a separate level system that shall be installed and field wired by others per the manufacturer's instructions. Note that the HydroRanger can be installed in the control panel or remotely and wired to the control panel.
- a. Single Level/Speed Control: When the level switch trips, the rake runs. When the level switch returns to the normal position, an off-delay timer is initiated to prevent intermittent equipment starting/stopping. Cycle timing logic shall also be included that shall function in parallel with the level control for optimal rake run time.
    - (1) Siemens HydroRanger 200 with (1) upstream Ultrasonic Level Transducers and (1) intrinsically safe hand-held programmer rated for 20ft range and for Class I Div I hazardous environments. Transducer shall be installed upstream of the rake, at least 1 foot above the highest anticipated water elevation and the beam angle shall not have obstructions between the transducer face and the water surface. The HydroRanger will be configured with one level setpoint. A mechanical float switch can be used in conjunction with the HydroRanger as backup control.
  - b. Two Level/Two Speed Control: When the lower level switch trips, the rake runs. When the upper level switch trips the rake runs at high speed. When the level switch returns to the normal position, an off-delay timer is initiated to prevent intermittent equipment starting/stopping. Cycle timing logic shall also be included that shall function in parallel with the level control for optimal rake run time.
    - Siemens HydroRanger 200 with (1) Ultrasonic Level Transducers and (1) intrinsically safe hand-held programmer rated for 20ft range and for Class I Div I hazardous environments. Transducer shall be installed upstream of the rake, at least 1 foot above the highest anticipated water elevation and the beam angle shall not have obstructions between the transducer face and the water surface. The HydroRanger will be configured with two level setpoints. A mechanical float switch can be used in conjunction with the HydroRanger as backup control.

- c. Differential Level Control: Shall use a Relay based logic control with a HydroRanger 200. The rake will automatically start/stop based on the headloss across the screen. Cycle timing logic shall also be included in the program that shall function in parallel with the differential level control logic for optimal rake run time. Level sensing instrumentation shall be a Siemens HydroRanger 200 with (2) Ultrasonic Level Transducers and (1) intrinsically safe hand-held programmer rated for 20ft range and for Class I Div I hazardous environments. Transducers shall be installed upstream and downstream of the rake, at least 1 foot above the highest anticipated water elevation and the beam angle shall not have obstructions between the transducer face and the water surface. The HydroRanger will be configured with two level setpoints, differential level and provide a run command based on the differential level. A mechanical float switch can be used in conjunction with the HydroRanger as backup control.
- d. Differential Level Control: Shall use a Unitronics PLC with a built-in HMI. Program shall include differential setpoints used to automatically start/stop the rake based on the headloss across the screen. The logic shall also include a “Rake Off” setpoint which shall be lower than the initial run setpoint. This setpoint is required to help avoid intermittent starting/stopping caused by the differential level equalizing with minimal rake run time. Cycle timing logic shall also be included in the program that shall function in parallel with the differential level control logic for optimal rake run time. Level sensing instrumentation shall be installed upstream and downstream from the rake and shall be one of the following types:
- Siemens HydroRanger 200 with (2) Ultrasonic Level Transducers and (1) intrinsically safe hand-held programmer rated for 20ft range and for Class I Div I hazardous environments. Transducers shall be installed upstream and downstream of the rake, at least 1 foot above the highest anticipated water elevation and the beam angle shall not have obstructions between the transducer face and the water surface. A mechanical float switch can be used in conjunction with the HydroRanger as backup control



C. **Controls Design Conditions:**

Incoming Power: (Voltage/Phase)	Contractor to Verify at Site
Enclosures:	Separate
Installation location:	Outdoors
Approx. distance between main panel and equipment motor	6 ft.
Climate controlled location:	No
Outdoor location (must be shaded): For temperatures below 35° F select Outdoors Option 1. For temperatures above 104° F select Outdoors Option 2	To be provided by Contractor
Outdoors Option 1: thermostat, heater and fan w/grilles and rain hoods for ventilation. Appropriate N4X rating by the addition of grilles is acceptable, if is rated N4X prior to install of grilles.	<i>n/a</i>
Outdoors Option 2: Thermostat, air conditioner and heater	To be provided by Contractor
Transducer/Float cable length (50 ft standard):	To be provided by Contractor

2.06 DUAL AUGER WASHER COMPACTOR CONTROLS

- A. **General:** Controls shall be provided by Washer Compactor manufacturer. Controls shall be designed to accept 3PH 240/480 volt incoming power supply per plans/specs. Control panel power shall be 1PH/120VAC and shall include a step-down transformer to achieve 120V.
- B. Controls shall be built by a UL-approved panel builder and bear the UL-approved logo. Controls shall be tested by panel builder and by the Washer Compactor manufacturer prior to shipment to owner. The Washer Compactor manufacturer shall verify all overload settings in the Washer Compactor controller to insure proper overload and speed settings required for the application are properly programmed.
- C. **Main Panel:**
1. Main control panels require shading from the sun and shall be operated within a temperature range between 35 and 104 F. Sunshields, visors, or other structures necessary to provide shade

- are by others. (If the controls will experience temperatures outside this range, then special climate provisions are available.)
2. The controls shall be rated NEMA 4X, yet be located in a climate-controlled environment and be mounted per plans.
  3. Control panel shall have an inner door pocket that includes a copy of As-Built drawings from the manufacturer, as well as any other pertinent documentation necessary to properly operate the controls.
  4. The control package shall include the following and utilize the panel builder's standard component manufacturers, unless otherwise approved by the Washer Compactor manufacturer:
    - a. N4X 304 SSSL enclosure with continuous hinge, exterior, lockable door.
    - b. High volt transformer.
    - c. HOA Selector where Hand mode shall enable the local station and Auto receives a Run signal from a remote/discrete source. When input signal is cut, the Washer Compactor shall then utilize an off-delay timer to allow debris to finish depositing.
    - d. Duperon<sup>®</sup> speed controller (based on vector drive technology), pre-programmed for speed/overload control by the panel builder and verified by the Washer Compactor manufacturer.
    - e. Dry contact input for motor thermostat to shut down equipment if motor overtemp condition occurs.
    - f. Dry contact output signals for "Run", "Start Solenoid", "Common Fault", and "In Auto" conditions.
    - g. 120 VAC output power to wash water solenoid.
    - h. Dry contact input terminals for "Remote Run", "Motor Thermostat", and remote station.
    - i. Main control power breaker with lockable, thru-door operator.
    - j. Elapsed run-time meter.
    - k. "Push-to-Test" type indicator lights for "Power On", "Forward", "VFD Fault", and "Motor Overtemp".
    - l. Phenolic label on outer door indicating equipment identification number (as required by owner).
    - m. Push/Pull E-Stop on outside of enclosure.

D. **Remote Panel:**

1. A NEMA 7/9 remote push button station is required to maintain equipment requirements and local safety codes.
2. The remote station shall be rated NEMA 7/9 and include Forward, Jog Reverse, and E-Stop buttons. The remote station shall be mounted as close to the equipment as safely possible and be field-wired by the electrical subcontractor to the corresponding terminal inputs in the main control panel. Jog Reverse shall only function

for a period of one second (or less) when button is depressed to stay within manufacturer's operational and design parameters.

E. **Sequence of Operations:**

1. The controls shall enable the remote push button station installed near the Washer Compactor when in Hand mode and utilize an input signal from a remote source when in Auto mode. Upon receiving a stop signal in Auto mode, the Washer Compactor shall utilize an off-delay timer to allow debris to finish depositing.
2. The Duperon<sup>®</sup> speed controller fault shall be cleared by turning off the Washer Compactor, then waiting approximately three minutes (or time designated per current UL standards) and then turning the HOA back to the desired setting. A motor over temp fault shall clear automatically when the motor cools to be within normal operating range.

F. **Miscellaneous**

1. The following shall be provided by the electrical contractor and are not part of the Washer Compactor manufacturer's scope of supply:
  - a. Mounting stands
  - b. Mounting hardware
  - c. Field wiring and conduit
  - d. Junction boxes
  - e. Installation
2. The field wiring shall include (but not be limited to) the following connections as applicable:
  - a. Incoming power supply to the main control panel
  - b. All required grounding of the motor and controls
  - c. Motor to the main control panel
  - d. VFD rated motor cable (Belden #29502 or equal) is recommended for all motors.
  - e. Motor cables shall be less than 80 ft. long unless specified otherwise.
  - f. Motor thermostat to the terminal inputs in the control panel
  - g. Input and output signal wiring for remote start/stop as required by plans/specs
  - h. Remote station contacts to the corresponding terminal inputs in the main control panel

2.07 **SPECIALTY TOOLS, SPARE PARTS AND LUBRICATION**

A. Manufacturer shall provide any specialty tools and recommend spare parts required for maintaining the equipment as follows:

1. Drive Clevis Pin (1)

2. Snap/Retaining Rings (10)
3. Link Clevis Pins (4)
4. Scraper Bolts (4)
5. Scraper Nuts (4)
6. Snap Ring Tool (1)
7. Never Seez, 1 oz. tube(1)
8. Plane bearing kit for dual auger washer compactor

- B. Manufacturer shall provide one tube of Multi-Purpose grease which is a 5-year supply of lubrication, required for maintaining all bar screen components.

PART 3 EXECUTION

3.01 SHIPMENT

- A. Shipment of all equipment shall be coordinated to allow the screen shipment as one complete integrated assembly unless otherwise specified by the customer, contractor, or engineer.

3.02 INSTALLATION

- A. Equipment shall be installed in strict conformance with the manufacturer's installation instructions, as submitted with Shop Drawings, Operation and Maintenance Manuals and/or any pre-installation checklists. Installation shall utilize standard torque values and be installed secure in position and neat in appearance. Installation shall include any site preparation tasks as required by the engineer or manufacturer; such as unloading, touch-up painting, etc. and any other installation tasks and materials such as wiring, conduit, controls stands as determined by the customer and/or specified by the manufacturer.

- B. **Anchor Bolts:** Anchor bolts and nuts shall be 304 stainless steel and furnished for each item of equipment by the CONTRACTOR.

1. Anchor bolt template drawings shall be included in the submittal to permit verification of the location structural elements, new or existing in the concrete.
2. Anchor bolt sizes, quantity and requirements will be indicated on the submittal drawings. Quantity is site specific but typically each Barscreen assembly requires (8) to (12) 1/2" dia. x 4 1/2" Lg. embed HILTI HAS RODS w/ RE-500 SD Adhesive system anchor bolts for Mechanical Screen anchorage and typically (8) to (12) 3/8" dia. x 3 3/8" Lg. embed HILTI HAS RODS w/ RE-500 adhesive system anchor bolts for the Return Guide/Closeouts anchorage.

### 3.03 TESTING

- A. After completion of installation, CONTRACTOR shall provide for testing and shall be performed in strict conformance with the manufacturer's start up instructions. Testing of the bar screen shall demonstrate that the equipment is fully operational by picking up and depositing materials into specified containment.
- B. Field certification shall include inspection of the following:
  - 1. Verify equipment is properly aligned and anchored per the installation instruction and drawings. Assure the bar screen unit is square, flat and unobstructed with required clearances maintained.
  - 2. Assure controls and instrumentation work in all modes.
  - 3. Check equipment for proper operation of debris blade, scrapers, etc as well as completion of the Start-Up requirements in the installation guide.

### 3.4 ONSITE TECHNICAL ASSISTANCE

- A. Manufacturer shall provide services to include Installation Certification, and shall include (1) day for Start-Up and (1) day for Training. Manufacturer shall be given minimum 14 days notification prior to the need for such services. To assure the best outcome for the Owner and Contractor, the Contractor shall provide certification for completion of the PRE-COMMISSIONING CHECKLIST.

END OF SECTION