



Addendum No. 2

EchoWater Project Tertiary Treatment Facilities (TTF) Project

Request for Proposal for TTF Screening System Pre-Contract With Assignment to Contractor

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
SACRAMENTO COUNTY, CALIFORNIA

**RECEIPT OF THIS ADDENDUM MUST BE ACKNOWLEDGED IN THE
SPACE PROVIDED ON THE REQUEST FOR PROPOSAL SUBMITTAL FORM**



November 21, 2016

Addendum No. 2 is hereby made part of the Regional San Request for Proposal for TTF Screening System Pre-Contract with Assignment to Contractor Dated October 12, 2016.

Addendum No. 2
to the Request for Proposal for TTF Screening System Pre-Contract
with Assignment to Contractor

November 21, 2016

Bold indicates added or revised text and strikethroughs indicate deleted text.

| Addendum Item | Section and Page or Drawing No. | Location and Description of Change |
|----------------------|--|---|
| 2.001 | 00 11 19-1 | Revise Proposal Due Date from Addendum No. 1 as follows: November 22, 2016 November 29, 2016 |
| 2.002 | 00 42 13-2 | Revise the date in the fourth paragraph as follows: “The expected date of assignment of this Procurement Agreement is currently planning for February May 9, 2018. ” |
| 2.003 | 00 52 11-2 | Revise Milestone Number 2 Milestone Date as follows: “Date: _____ (Estimated March 2019 - August 2019) ” |
| 2.004 | 00 52 11-2 | Revise Milestone Number 3 Milestone Date as follows: “ September 21, 2022 July 1, 2022 ” |
| 2.005 | 00 52 11-2 | Revise Milestone Number 4 Milestone Date as follows: “ October 22, 2022 November 18, 2022 ” |
| 2.006 | 00 52 11-5 | Revise the first sentence in paragraph 9.01.F as follows: “Seller understands that the Goods and Special Services provided under this agreement will become part of the work of the Tertiary Treatment Facilities Project and the cost listed in Article 6 shall be guaranteed through October 22 November 18, 2022. ” |
| 2.007 | 00 52 11-8 | Revise the second sentence in paragraph 11.03.A.1 as follows: “The assignment will occur on the effective date of the agreement between Buyer and the Installation Contractor, which is expected to occur on or about February 21 May 9, 2018. ” |
| 2.008 | 00 73 10-7 | Revise second sentence of paragraph PSC-4.4.01.A as follows: “These Bonds shall remain in effect until one year after the date of field acceptance (7/16/16 through 4/30/19 estimated field acceptance: July 2022.)” |
| 2.009 | 40 61 13-1 | Revise the page footer as follows: “ 40-06-60.13-1 40 61 13 - 1 ” |

| Addendum Item | Section and Page or Drawing No. | Location and Description of Change |
|---------------|---------------------------------|--|
| 2.010 | 40 61 13-5 | Revise paragraph 1.01.B.3.a.20 as follows: “Provide training specific to ControlLogix and/or CompactLogix PLC, Ethernet and Profibus fieldbus, instrumentation, valve actuator, smart motor starter, and motor drive operation, programming, maintenance and troubleshooting specified in the PROCESS CONTROL SYSTEM TRAINING Section (40 61 26).” |
| 2.011 | 40 61 96.20.12 | Delete this specification section in its entirety. |
| 2.012 | 40 61 96.20.12 | A revised Section 40 61 96.20.12 is attached to this Addendum No. 2 in Attachment No. 1. Insert revised Section 40 61 96.20.12 into RFP after Section 40 61 96.20. |
| 2.013 | 40 63 43-5 | Under section 2.01.A. delete the line “Compact Logix 1769 L3, no others allowed” listed under Model. |
| 2.014 | 40 70 00-5 | Revise the first sentence in paragraph 2.02.A.2.d as follows: “Transmitter shall be provided with a plug-in data link interface module which allows the transmitter to be connected directly to an Allen-Bradley ControlLogix or CompactLogix PLC over a Profibus DP network.” |
| 2.015 | 40 70 00-6 | Revise the first sentence in paragraph 2.02.B.2.g as follows: “Transmitter shall be provided with a plug-in data link interface module which allows the transmitter to be connected directly to an Allen-Bradley ControlLogix or CompactLogix PLC over a Profibus DP network.” |
| 2.016 | 41 12 13.36-5 | Revise section 2.01.A as follows: 1. Custom Conveyor Corporation. 2. JDV Equipment. 3. Spirac. 4. Ovivo. |
| 2.017 | 46 43 33.14 | Delete this specification section in its entirety and replace with revised Section 46 43 33.14 attached to this Addendum No. 2 in Attachment No. 2. |

Notice: All revised dates following Contract assignment are approximate and are contingent upon the Installation Contractor’s progress throughout the project. Supplier assumes all risk for screening system delivery schedule.

This Addendum No. 2 is hereby made part of the Regional San Request for Proposal for TTF Screening System Pre-Contract with Assignment to Contractor Dated October 12, 2016.

END OF ADDENDUM

CONTROL NARRATIVE 40 61 96.20.12
FILTER INFLUENT PUMPING STATION SCREENING SYSTEM

| DATE: | REVISION | DESCRIPTION: |
|------------|----------|--------------|
| 10/12/2016 | A | FINAL |
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| | | |

CONTROL NARRATIVE 40 61 96.20.12

FILTER INFLUENT PUMPING STATION SCREENING SYSTEM

DESCRIPTION:

Prior to entering the Filter Influent Pumping Station (FIPS) wet wells, the Secondary Effluent (SE) will be screened to remove birds, algae “ropes,” and other debris to protect the Granular Media Filters (GMF). One drum screen with a capacity of 343 mgd is included with the second drum screen installed in the future plant buildout phase.

Ultrasonic water level sensors will be located upstream and downstream of the drum screen. These level sensors will provide the head loss across the drum screen and the screen bypass.

The drum screen can be operated in the automatic mode by level differential or timer, and also continuously in manual. Time with differential override is the recommended mode of operation

- Operation on timer: The screen operates on a regular time schedule, operator adjustable. If the screen is not operating because of program time schedule and the head loss across the screen exceeds a pre-set differential, the CS will override the time schedule and operate the screen until the head loss across the screen meets a pre-set differential. At this point, the screen will go back to its programmed time schedule.

The drum screen drive is equipped with a VFD that is interlocked with differential level across the drum screen to go from its normal operating speed to a high speed at a high differential. The drum screen speed can also be adjusted manually

A PLC based local control panel with ~~an Ovation-OT~~ a **PanelView HMI** for operation of the drum screen system will be provided by the screen manufacturer. Status, differential water level, and alarms (high torque, motor failure, etc.) information will be sent to the PCCS. This control panel will also integrate the controls for the brush screens and the conveyors.

Water for the drum screen spray system, supplied by both the High (WRH) and Low (WRL) Pressure Reclaimed Water system with WRL being the main source of water . An electric motor operated ball valve will open to provide spray water when the drum screen is operating. Control of the spray water valve will be provided through the screen control panel. The WRL piping system will include a pressure reducing valve and flow meter.

Two brush screens will be used to dewater drum screen screenings. Each brush screen is equipped with an inclined screw conveyor used to transfer the dewatered screenings to dumpsters. This equipment will be interlocked with the drum screen CS. Status and alarm signals will be sent to the PCCS. Operators will routinely check the level of screenings in the dumpster and decide when the dumpster is full and needs to be removed. No automatic monitoring of the screenings dumpster is proposed.

The drum screen operation is interlocked with the brush screens and their dedicated screw conveyor so that one or two brush screens and dedicated conveyor all start when the drum screen starts. Operators can select one or two brush screens to be in the operating sequence. Each brush screen is isolated by an electrically actuated knife gate valve. The valve to the selected brush screens(s) opens when the drum screen is started. If one brush is selected and either the screen or conveyor fails, the second brush screen and associated isolation valve and conveyor will automatically start and washwater sequencing will resume. Each brush screen and conveyor will run for a set but adjustable time after the drum screen stops and conveyor will stop after a set but adjustable time after the brush screen stops.

The drum screen is equipped with a screen bypass arrangement to allow continuous operation of the FIPS if the installed drum screen fails or is out of service for maintenance. The bypass system consists of two 42" x 68" electric motor operated slides gates and two 42" electric motor operated knife gate valves. The bypass gates and valves will automatically open at a rate of 12 inches per minute on failure of the drum screen.

Major equipment and systems associated with the process:

SCRN731010 Drum Screen 1 (Wet Well 1)
SCRN731011 Brush Screen 1 (Drum Screen 1 Screenings Handling)
SCRN731012 Brush Screen 2 (Drum Screen 1 Screenings Handling)

CON731011 Conveyor 1 (Drum Screen 1 Screenings Handling)
CON731012 Conveyor 2 (Drum Screen 1 Screenings Handling)

LE1020A Drum Screen 1 Differential Level Transmitter (Upstream)
LE1020B Drum Screen 1 Differential Level Transmitter (Downstream)

G731041 Drum Screen 1 Bypass Gate (East)
G731042 Drum Screen 1 Bypass Gate (West)

| | |
|---------|---|
| LE1013 | SE Confluence Level Transmitter |
| LE1021A | FIPS Screen Channel 1 Level Transmitter |
| LE1021B | FIPS Screen Channel 1 Bubbler |
| LE1022A | FIPS Screen Channel 2 Level Transmitter |
| LE1022B | FIPS Screen Channel 2 Bubbler |

CONTROL FROM THE PCCS:

Supervisory Control:

None.

PCCS HMI:

General:

Drum Screens: Operator-adjustable setpoints for differential level or time can be input from the HMI graphics.

Conveyor: The conveyor can be operated from the PCCS HMI graphics in the remote-manual or remote-auto control modes. The hand-off-auto (HOA) switch must be in the auto position, and there must be no active alarms. Status and commands are communicated via the area PLC.

Brush Screen: The brush screen can be operated from the PCCS HMI graphics in the remote-manual or remote-auto control modes. The hand-off-auto (HOA) switch must be in the auto position, and there must be no active alarms. Status and commands are communicated via the area PLC.

Knife-gate Valves: The knife-gate valves can be opened and closed from the PCCS HMI graphics in the remote-manual or remote-auto control modes. The local-off-remote (LOR) switch must be in the remote position, and there must be no active alarms. Status and commands are communicated via the area PLC.

Manual Operation:

In remote-manual, the operator will start and stop the conveyor and brush screen from the HMI graphic screen. The operator will open or close the knife-gate from the HMI graphic screen.

Automatic Operation:

In remote-auto, the conveyor and brush screen will run based on a run signal from the drum screens. The knife-gate valve will open or close based on a signal from the drum screen.

CONTROL FROM THE PLC:

Manual Operation:

None.

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40 61 96.20.12 - 4

Automatic Operation:

Drum Screens: Under normal conditions, the drum screen will be operated in remote-auto mode. The PLC will command the conveyor to start and run based on a schedule maintained by the PCCS. This schedule can be overridden if the level differential exceeds the differential set point. Once the differential level achieves the preset set point, the timer schedule will resume control of the drum screen. The drum screen will operate at low speed when the differential head loss across the screen is at the low pre-set point and at high speed when the head loss across the screen is at the high pre-set point. When the drum screen is operating, a solenoid will be enabled to activate the spray wash system. The drum screen is interlocked with the conveyor, spray wash, and fine screen brush and will not operate when disabled.

Conveyor: Under normal conditions, the conveyor will be operated in remote-auto mode. The PLC will command the conveyor to start and run for an operator-adjustable time based on signals from the drum screens.

Brush screen: Under normal conditions, the brush screen will be operated in remote-auto mode. The PLC will command the brush screen to start and run for an operator-adjustable time based on signals from the drum screens.

Knife-gate valve: Under normal conditions, the knife-gate valve will be operated in remote-auto mode. The PLC will command the knife-gate valve to open for an operator-adjustable time based on signals from the drum screens.

When the HOA switch is in the auto position and remote-auto mode is selected from the PCCS, the PLC will accept drum screen start and stop commands from the PCCS and will provide logic to initiate a conveyor/brush screen run request and open the knife-gate valve.

INTERLOCKS:**Hardwired Interlocks:**

None.

Software Interlocks:

Drum Screens:

- Moisture protection.
- Thermal Overload protection.

Brush Screens:

- Moisture protection.
- Thermal Overload protection.

Knife-gate Valves:

- None.

Conveyors:

- Thermal Overload protection.
- High Torque

- Emergency stop

FIELD CONTROL:

Drum Screens: Each drum screen has a three position HOA selector switch at the local control panel (CPNL). When the HOA switch is in the off position, the drum screen will stop. When the HOA switch is in the on position, the drum screen will start.

Brush Screens: Each brush screen has a three position HOA selector switch at the local control panel (CPNL). When the HOA switch is in the off position, the brush screen will stop. When the HOA switch is in the on position, the brush screen will start.

Local (hand) control of each knife-gate valve will be provided via control switches at each valve actuator.

Conveyor: The conveyor has a three position HOA selector switch at the CPNL. When the HOA switch is in the OFF position, the conveyor and brush screen will stop. When the HOA switch is in the ON position, the conveyor and brush screen will start.

SECTION 46 43 33.14

DRUM SCREEN AND APPURTENANCES

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

- A. Provide and test drum screen, gear reducers, motors, controls, brush screen, and appurtenances as indicated and specified.
- B. Seller PLC programmer shall attend a programming workshop with the District's programming team as specified herein.

1.02 REFERENCES

- A. **REFERENCE STANDARDS:** The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of the referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed references, the requirements of this section shall prevail.

| <u>Reference</u> | <u>Title</u> |
|------------------|--|
| ANSI S1.11 | Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets |
| ASTM A48 | Specification for Gray Iron Castings |
| NEMA MG1 | Motors and Generators |
| SECTION 051000 | Structural Metal Framing |

1.03 SUBMITTALS

- A. The following information shall be submitted for review in accordance with SUBMITTAL PROCEDURES Section (01 33 00):
 - 1. A copy of this specification section with addenda and all referenced specification sections with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
 - a. If deviations and clarifications from the specifications are indicated, therefore requested by the Seller, provide a detailed written justification for each deviation and clarification.
 - b. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in

submittal return without review until marked up specifications and justifications are submitted in a complete package.

2. Manufacturer's information and catalog data showing compliance with this specification and a full description of the product.
3. Certified shop and erection drawings. Submit electronic files of the proposed equipment in the capacity, size, and arrangement as indicated and specified.
 - a. Electronic files shall conform to the following minimum requirements:
 - 1) Electronic Files: AutoCAD latest version, 3D, drawn to scale.
 - 2) Submit electronic files as part of the Shop Drawing submittal.
 - 3) Submit electronic files on CD or DVD.
 - 4) Drawings shall include plan views, sectional views, title block, Tag Numbers, serial numbers, Parts List (identifying each component), dimensions, connection sizes and types and all details of all related items. In cases where certain information is proprietary and is omitted, provided a statement indicating that the information is proprietary and is being omitted.
 - 5) Plan, section and P&ID Drawings including location of all piping, electrical, instrumentation, supports, and structural connections.
 - 6) Drawings shall be in conformance with all other requirements as specified in this specification.
4. Data regarding equipment performance and motor characteristics and performance:
 - a. Prior to fabrication and testing, provide guaranteed performance curves for flow vs headloss for cleaned to 100 percent blinded conditions. **Performance curves shall show the calculated data for 25%, 50%, 75%, and 100% clean data points. Performance curves shall be provided at minimum and maximum water levels at flow rates of 343 MGD and 171.5 MGD.**
 - b. Results of shop performance tests as specified.
 - c. Submit curves for guaranteed performance at the operating levels and flow rates specified on 8-1/2-inch by 11-inch sheets, one curve per sheet.
5. Drawings showing materials of construction, thicknesses, operating and maintenance envelope and assembly weight.
6. Hydraulic calculations verifying compliance to the design criteria.
7. Strength calculation verifying compliance to the specified criteria.

8. Shop drawing data for accessory items.
9. Certified setting plans, with tolerances, for anchor bolts.
10. Manufacturer's literature as needed to supplement certified data.
11. Operating and maintenance instructions and parts lists.
12. Listing of reference installations as specified with contact names and telephone numbers.
13. Bearing temperature operating range for the service conditions specified.
14. List of recommended spare parts other than those specified.
15. Shop and field inspection reports.
16. Bearing Life: Certified by the equipment manufacturer. Include design data.
17. Equipment shop test results.
18. Motor shop test results.
19. Qualifications of field service engineer.
20. Recommendations for short and long-term storage.
21. Shop and field testing procedures, set up and equipment to be used.
22. Fabrication plan and schedule.
23. Special tools.
24. Gear reducer data including service factor, efficiency, torque rating, service factor, AGMA classification and materials
25. Schematic control and power wiring diagrams including interconnecting and internal wiring diagrams
26. Control panel drawings
27. Number of service person-days provided and per diem field service rate.
28. Manufacturer's product data, specifications and colorcharts for shop painting.
29. Provide listing of reference installations with contact names, mail addresses, and telephone numbers.
30. Equipment weight and lifting points for installation and removal purposes.

31. Provide a listing of the materials recommended for each service specified and indicated. Provide documentation showing compatibility with process fluid and service specified and indicated.
 32. The latest ISO 9001 series certification.
 33. Number, size and weight of pieces shipped or site fabrication plan.
 34. Spray water system component and spray nozzle data
 35. A copy of the manufacturer's warranty.
 36. Catalog data on all ancillary electrical components. Include wiring and interconnection diagrams for all devices provided with the equipment.
 37. Detailed written control sequence of operation.
 38. Manufacturer's recommended downstream water level control set point and a curve showing headloss versus flow rate at varying screen fouling from clean to 100% fouled.
 39. Material Certification:
 - a. Provide certification from the equipment manufacturer that the materials of construction specified are recommended and suitable for the service conditions specified and indicated. If materials other than those specified are proposed based on incompatibility with the service conditions, provide technical data and certification that the proposed materials are recommended and suitable for the service conditions specified and indicated including an installation list of a minimum of three (3) installations in operation for a minimum of five (5) years. Provide proposed materials at no additional cost to the District.
 - b. Where materials are not specified, provide technical data and certification that the proposed materials are recommended and suitable for the service conditions specified and indicated.
 40. Certificate of Unit Responsibility.
- B. A copy of the contract mechanical process, electrical and instrumentation drawings, with addenda that are applicable to the equipment specified in this section, marked to show all changes necessary for the equipment proposed for this specification section. If no changes are required, mark all drawings with "No changes required" or provide a statement that no changes are required.
1. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

1.04 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Submit operation and maintenance (O&M) instructions in accordance with the OPERATION AND MAINTENANCE DATA Section (01 78 23) by submitting a copy of the OPERATION AND MAINTENANCE DATA Section (01 78 23) with each paragraph check marked to show compliance. O&M instructions shall be submitted after all submittals specified above have been returned marked “No Exceptions Taken” or “Make Corrections Noted.” O&M instructions shall reflect the approved materials and equipment.

1.05 UNIT RESPONSIBILITY

- A. Equipment systems made up of two or more components shall be manufactured and assembled as a unit by the responsible manufacturer. The responsible manufacturer shall select all components of the system to assure compatibility, ease of construction and efficient maintenance. The responsible manufacturer shall coordinate selection and design of all system components such that all equipment furnished under the specification for the equipment system, including equipment specified elsewhere but referenced in the specification, is compatible and operates as specified and indicated to achieve the performance requirements specified. Sales agents, representatives, or distributors who are not a direct component of the manufacturing corporation will not be acceptable as a substitute for the manufacturer's corporation in meeting this requirement. Equipment specified shall be manufacturer's standard cataloged product and modified to provide compliance with the drawings, specifications and the service conditions specified and indicated. This requirement for unit responsibility shall in no way relieve the Seller of his responsibility for performance of all systems as provided in the STANDARD GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS Section (00 72 10) and PROCUREMENT SUPPLEMENTARY CONDITIONS (Section 00 73 10).
- B. The Seller shall ensure that all equipment systems provided for the project are products for which unit responsibility has been accepted by the responsible manufacturer. Certificates of Unit Responsibility shall be signed by an officer of the manufacturer's corporation.

1.06 SPARE PARTS

- A. Comply with the requirements specified in the SPARE PARTS Section (01 78 43).
- B. Provide list of required spare parts that are identical to and interchangeable with similar parts installed.
 - 1. Furnish list of required spare parts for each drum screen, at a minimum:
 - a. Two (2) sets of seals.
 - b. One (1) complete motor and gear reducer for drum screen drive.

- c. Two (2) screening panels.
 - d. One (1) full set of spray nozzles.
2. Furnish list of required spare parts for each brush screen, at a minimum:
 - a. Two (2) sets of brushes.
 - b. Three (3) sets of scraper blades.
 3. One set of all special tools required.

1.07 NAMEPLATES

- A. Nameplates shall be provided on each item of equipment. Equipment nameplates shall be 16-gauge Type 316 stainless steel bearing the equipment name and equipment number legibly engraved in 3/4-inch high letters. Nameplates shall be attached to the equipment in an accessible location with Type 316 stainless steel screws.

1.08 QUALITY ASSURANCE:

- A. Screening equipment specified shall be the product of one manufacturer.
- B. Provide drum screens, brush screens, conveyors, gear reducers, motors, controls and appurtenances from the drum screen manufacturer, as a complete and integrated package to insure proper coordination and compatibility and operation of the system.
- C. Welding: In accordance with latest applicable American Welding Society Code or equivalent.
- D. Materials: In accordance with latest applicable ASTM Standards or equivalent.
- E. Shop tests as specified.
- F. Services of Manufacturer's Representative as stated in the TRAINING Section (01 79 10) and COMMISSIONING Section (01 91 00) and as specified herein.
- G. Provide services of factory-trained Service Technician, specifically trained on type of equipment specified:
 1. Service Technician must have a minimum of five (5) years of experience, all within the last seven (7) years, on the type and size of equipment.
 2. Service Technician must be present on site for all items listed below. Person-day requirements listed are exclusive of travel time, and do not relieve Seller of the obligation to place equipment in operation as specified.
 3. Installation: Inspect grouting, location of anchor bolts; setting, leveling, alignment, field erection; coordination of electrical and miscellaneous utility connection:

- a. 10 person-days.
 - 4. Functional Testing: Calibrate, check alignment and perform a functional test. Tests to include all items specified.
 - a. 5 person-days.
 - 5. Field Performance Testing: Field performance test equipment specified.
 - a. 5 person-days.
 - 6. Vendor Training: Provide classroom and field operation and maintenance instruction including all materials, slides, videos, handouts and preparation to lead and teach classroom sessions.
 - a. 5 person-days, 2 trips
 - 7. Credit to the District, all unused service person-days specified above, at the manufacturer's published field service rate.
 - 8. Any additional time required of the factory trained service technician to assist in placing the equipment in operation, or testing or to correct deficiencies in installation, equipment or material shall be provided at no additional cost to the District.
- H. Manufacturer of specified equipment shall have a minimum of three (3) operating installations with equipment 25 foot diameter or larger of the type specified and in wastewater service operating for not less than five (5) years.
- 1. Provide contact names, numbers, mail addresses, and email for each installation.
- I. If equipment proposed is heavier or taller, different diameter, different width, or physical arrangement than specified and indicated; provide all structural, architectural, mechanical, electrical and plumbing revisions at no additional cost to the District.
- J. Electrical Equipment Labeling Requirements:
- 1. Provide equipment labeled by a nationally recognized testing company where standards have been established. Where equipment is not available with label, provide service of a nationally testing company to examine the equipment and certify in writing that it complies with its safety standards. Tests and inspections of equipment shall be at no additional cost to the District.

- K. Provide all components made of stainless steel passivated by full submergence in a pickling bath for perfect surface finishing. No stainless steel components may be fabricated or assembled in a factory where carbon steel products are also fabricated, in order to prevent contamination by rust.
 - 1. Fully submerge all stainless steel parts in a pickling bath for at least 8 hours to remove welding spots and to protect the stainless steel against corrosion. Sand or glass bead blasted or brushed or otherwise not equivalently treated stainless steel is not acceptable.
- L. Provide fabrication in compliance with all applicable ASTM standards or equivalent international standards.
- M. Factory welding to use shielded arc, inert gas, MIG or TIG method.
 - 1. Filler wire: Add to all welds to provide for a cross section equal to or greater than the parent metal.
 - 2. Butt welds: Fully penetrate to the interior surface and gas shielding to interior and exterior of the joint.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the requirements specified in the PRODUCT DELIVERY REQUIREMENTS Section (01 65 00).

PART 2 -- PRODUCTS

2.01 SYSTEM DESCRIPTION-DRUM SCREENS

- A. Screening system capacities and operating data are indicated in the Drum and Brush Screen Schedules.
- B. Screen will be installed outdoors in the channel as specified and indicated.
- C. Service: Screen Secondary Effluent
- D. Screenings will discharge to troughs and to brush screens and conveyors as indicated.
- E. Provide a drum screen capable of operating with the screen 50 percent blinded and structurally capable of 100 percent blinded. With a water level differential as specified in the Drum Screen Schedule.
- F. Interface:
 - 1. Provide driving mechanism, trough location and spray housing arranged in accordance with limitations imposed by space available.

2. Provide room for inspection, adjustment and repair of equipment.

2.02 MANUFACTURERS

- A. Ovivo
- B. Ham Baker Adams
- C. Or acceptable equivalent product

2.03 SEISMIC DESIGN REQUIREMENTS

- A. Conform to the requirements indicated on the structural drawings and as specified in the PROJECT SPECIFIC DESIGN CRITERIA Section (01 81 20).
- B. The Seller shall conform to the seismic design requirements for this project and for the work of this specification section.
- C. Provide all equipment bases, anchorage, supports and foundations designed in accordance with the seismic requirements indicated and specified.
- D. Additionally, provide with the Certificate of Unit Responsibility, certification for all equipment signed by a registered structural engineer stating that computations were performed and that all components have been sized for the seismic forces specified and indicated.

2.04 SCREEN CONSTRUCTION

- A. Drum Screens - General:
 1. Type:
 - a. Single Entry, the flow stream being screened flows from one open end of the screen into the center of the drum and outwards through the panels.
 2. Screening to be lifted above the deck level by elevating trays and washed off into collecting hoppers and carried out in debris troughs to brush screens.
 3. The revolving and cleaning mechanism is automatically initiated by a timer and a timer override at a preset high differential liquid level across the screen. Screens operating continuously or via timer only are not acceptable.
 4. Screenings discharged on downstream side of screen through discharge chute to troughs.
 5. Provide the drum screen consisting of a revolving cylindrical structure with mesh screen panels attached to the periphery.

6. Provide the control system designed such that the cleaning characteristics of the screen and spray wash system can be changed via the programmable controller.
7. Provide the spray wash system enclosed such that spray water, aerosols or leakage is contained within the spray bar housing.
8. To minimize odors and nuisance, provide the screening and conveyance zones completely enclosed. Provide covers sealed with neoprene gaskets.

B. Screen Structure:

1. Provide the screen structure and screening panels designed and built to withstand static and hydraulic forces exerted by the liquid to the screen.
2. Provide all structural and functional parts sized for the loads encountered during the start-up process, screening, conveying and spray washing operations with a minimum of 3 feet differential liquid level across the screen under all operating conditions up to maximum floor elevation.
3. All metal components: Type 316L stainless steel construction.
4. Provide the revolving structure constructed so that the finished drum is true to within +/- 0.50 inches.
5. Provide the structure supported by members radiating from two (2) central hubs, mounted near the ends of the main shaft, commonly known as an "A Frame" design.
6. Provide the main shaft supported by self-aligning double roller bearings at each end with food grade oil or water lubrication. Provide bearings with oil lubrication enclosed in a Type 316L stainless steel watertight housing.
7. All structural stainless steel components of the screen: Minimum thickness of 0.375 inches, plates 0.50 inches.

C. Screen:

1. Provide the screening panels designed to be mesh plates with opening size and thickness as specified in the Drum Screen Schedule and manufactured from polyurethane or polypropylene. Provide all panels with additives for UV stabilization for outdoor use in direct sunlight.
2. Provide the screening panels arranged such that individual panel section can be attached to and removed from the screen structure at the operating deck level without dismantling other parts of this equipment.
3. Provide sealing strips sandwiched between the screen panels and the screen structure.

4. Support the screen mesh panels on both sides with Type 316L stainless steel structural support bracing and/or anchor plates.

D. Debris Elevating Trays:

1. Provide structure cross bars, with a minimum 0.125 inch thickness, fitted to the horizontal arms inside the screen to lift large debris, which does not adhere to the mesh panels, up to deck level to be deposited in the debris hopper.

E. Debris Hoppers:

1. Provide debris hoppers located inside the screen structure and arranged so that water from the spray wash system, together with debris, is collected and deflected into the debris trough.
2. Provide the debris hopper formed into such a shape in order to prevent debris build up. Provide a cleaning-type mechanism to clean the hopper.
3. Support the debris hopper from the concrete slab or the equipment guard structure.

F. Debris Trough:

1. Provide Type 316L stainless steel debris troughs connected to each debris hopper inside the screen structure and arranged so that water from the spray wash system together with debris collected in the hopper flows freely by gravity into the trough at its operating level as indicated.
 - a. Flow Velocity: 4 to 5 ft/s
 - b. Minimum Trough Width: 12 inches
 - c. Trough Radius: 6 inches
 - d. Minimum Trough Depth: 11 inches
2. Install troughs sloped with a minimum 1/8 inch drop per foot, supported, routed to the brush screens as indicated.
3. Provide trough covers clamped to the trough on both sides and easily removable. Provide one (1) hinged inspection door for each run of trough to each brush screen.
 - a. All materials and hardware: Type 316/316L stainless steel.
4. Provide additional spray stations as indicated
 - a. Provide a 1-inch flanged connection, Type 316L stainless steel

G. Seals:

1. Provide sealing between the screen and the screen chamber wall using an adjustable, flexible seal attached to the outer ring members of the screen, which runs in contact with a low friction sealing face mounted on a fixed sealing plate or angle, attached to the chamber's wall.
2. Seal Material: Neoprene, 55 to 65 durometer.

H. Spray Water System:

1. Provide spray header piping installed across the top of the drum screen, equipped with non-clogging, overlapping Type 316 stainless steel spray nozzles to provide a spray pattern covering the entire width of the screen.
 - a. Minimum Header Size: 3-in
 - b. Provide provisions to add a second spray bar. Provide flanged connections with blind flanges at each end.
2. Piping: Type 316L stainless steel pipe and fittings supported from the spray bar housing.
3. Spray system controlled by an electric motor actuated ball valve by Installation Contractor.
4. Provide each nozzle mounted to the spray header with NPT thread for easy removal.
5. Provide flanged ends for the spray headers with one end connecting to the supply and the other equipped with a 2-inch stainless steel ball valve piped to drain for flushing.
6. Provide all connections, supports and space for a second spray header to be installed if needed.

I. Anchor Bolts, Bolts and Nuts:

1. By Installation Contractor
2. 0.75-inch minimum

J. Overload Protection:

1. Provide an electronic or electro-mechanical torque overload protection device to stop the screen and alarm on over current.
 - a. Provide contacts for screen failure (overload).

2.05 SCREEN DRIVE SYSTEMS:

A. Motor:

1. Provide in accordance with the COMMON MOTOR REQUIREMENTS FOR PROCESS EQUIPMENT Section (40 05 93) and as specified and indicated.
2. Horsepower rating of motors: Not less than maximum brake horsepower requirements of equipment under any condition of operation specified and indicated without operating in the motor service factor.
3. Motor enclosure and motor speed: As indicated in the Drum Screen Schedule.
4. In addition to the requirements for bearings specified under Electric Motors in the COMMON MOTOR REQUIREMENTS FOR PROCESS EQUIPMENT Section (40 05 93), provide pump motors with ball or roller bearings. Provide vertical motors with at least one bearing designed for thrust with bearings. Provide bearing with a minimum B-10 life of 100,000 hours.
5. Overall sound-pressure level of each motor shall not exceed 88 decibels when measured on flat network using an octave-band frequency analyzer conforming to ANSI S1.11. Determine overall sound-pressure level as average of four or more readings at evenly spaced points, 3 feet from motor.
6. Operate without overheating at the speeds specified and indicated.
7. Service Factor: 1.15, with 1.0 inverter duty rating for drum screens equipped with variable frequency motor conditions.
8. Premium efficiency with nominal and minimum efficiencies per NEMA MG1.
9. Rating: 460V, 3-phase, 60 Hertz.
10. Insulation: Class H with Class F temperature rise, 40 degrees C ambient.
11. Site Altitude: Less than 3,300 feet above sea level.
12. Integral gear reduction units are not acceptable.
13. Provide capacity sufficient to start and operate screen 50 percent blinded without exceeding nameplate ratings for current and power and without operating in the service factor.
14. Provide the drum screen driven by a pinion mounted on the end of a drive shaft, engaging with the spur gear mounted around the periphery of the drum screen.
 - a. Provide the drive shaft connected to a gear reducer and provide a pair of split roller bearings and flexible coupling or flange mounted. Position the drive unit to facilitate maintenance work.

b. Driving Rack: Cast Nylon or cast iron rack and nylon pinion.

B. Gear Reducer:

1. Provide parallel shaft arrangement classified for continuous, AGMA Class II, 24-hour duty.
2. Provide ASTM A48 Class 30 cast iron housing.
3. Gears: Case hardened alloy steel forgings with precision ground gear teeth minimum AGMA quality 12.
4. Provide horizontal parallel or bevel right angle shafting, arrangement or as indicated in the Drum Screen Schedule.
5. Design reducer to match output speed requirements of screens.
6. Match torque-rating of driven equipment.
7. Minimum gear reducer service factor 1.75 minimum, based on motor horse power rating.

2.06 CONTROLS AND INSTRUMENTATION:

- A. Provide all controls for the fully automatic operation of each screen in accordance with PROCESS CONTROL SYSTEM GENERAL PROVISIONS Section (40 61 13). Factory wire so that the Installation Contractor is only required to make the electrical connections to the Screen Control Panel and from the control panel to a junction box at the screen.
- B. Screen controls shall be separated into panels for motor control and for the PLCs. The individual motor control panels will include the starters, VFDs and associated motor controls. The subsystem control panel will include the PLCs and communication systems.
- C. Manufacturer provided Screen VFD Starter Control Panel, factory wired NEMA 4 with interlocks for the operation of each screen per section 40 67 00.
 1. Manufactured by a UL listed company and bear a U.L. label.
 - a. Control panel wiring: Colorcoded, neatly cabled and supported in non-flammable wiring tracks. Wiring: Minimum 14 gage MTW stranded wire.
 - b. Thermal management
 - c. In accordance with CONTROL SYSTEM EQUIPMENT PANELS AND RACKS Section (40 67 00).

2. Control relays, wiring and circuitry required to implement the control logic per section 26 09 16.
 - a. Provide a door mounted LOCAL- REMOTE, HAND-OFF-AUTO switch, and a FORWARD-OFF-REVERSE spring return to center selector switch.
 - b. Mushroom head EMERGENCY STOP push button. Provide the EMERGENCY STOP pushbutton configured to cascade to all downstream pieces of equipment.
 - c. Red pilot light for “Screen Run” indication; Amber pilot light for “Overload” indication; Amber pilot light for “High Water Level” indication; White pilot light for “Control Power” indication.
 - d. Provide all controls suitable for outdoor installation.
3. Provide interface terminal strip for external wiring connections.
4. Provide a VFD in accordance with the VARIABLE-FREQUENCY MOTOR CONTROLLERS Section 26 29 23.
5. Main circuit breaker:
 - a. 480VAC, 3-phase, 3-wire, 60 Hertz.
 - b. Rated to withstand the available fault current as indicated in the electrical system study.
 - c. Flange-mounted operator.
 - 1) Pad-lockable in the off position.
 - d. Disconnects all power to the panel.
 - e. Defeatable interlock with the panel door.
 - f. In accordance with the ELECTRICAL CONTROL AND RELAYS Section (26 09 16) and the CONTROL SYSTEM EQUIPMENT PANELS AND RACKS Section (40 67 00).
6. Control power transformer:
 - a. Primary voltage: 480VAC
 - b. Secondary voltage: 120VAC
 - c. Sized for all panel components plus 10 percent spare capacity.
 - d. Primary and Secondary fuses.

7. Door-mounted elapsed time meter.
8. Rectifier with all necessary equipment for the counter for motor operation time.
9. Alarm silence and reset push buttons.

D. Manufacturer provided Screen PLC Control Panel per Section (40 67 00):

1. Manufactured by a UL listed company and bear a U.L. label.
2. Control panel wiring: Color coded, neatly cabled and supported in non-flammable wiring tracks. Wiring: Minimum 14 gage MTW stranded wire.
3. Manufacturer supplied subsystem control panels supplied with PLCs, the PLCs must be redundant (primary and secondary) ControlLogix PLCs.. A manufacturer's standard PLC is not allowed and must be replaced with a ControlLogix PLC meeting the requirements of Section (40 63 43).
 - a. PLC I/O per the Contract Drawings and Section (40 61 93.20).
 - b. PLC communication shall be as described below and in PROCESS CONTROL SYSTEM GENERAL PROVISIONS Section (40 61 13).
 - 1) Subsystem control panels connect to both PLC-A and PLC-B network switches.
 - 2) Subsystem control panels connect to smart motor starters, smart variable frequency drives, and power monitors over Ethernet TCP/IP using either EtherNet/IP or Open Modbus TCP protocol.
 - 3) Subsystem control panels are required to have a minimum of three Ethernet communications modules (EN2T modules) to communicate to the following VLANs, PLC-PCCS communications, PLC-PLC communications, PLC-Field communications.
 - 4) Subsystem control panels connect to smart instruments and smart motorized actuators using Profibus fieldbus networks.
4. Control panel shall contain all power and control devices necessary for the function of the screen and include the following:
 - a. Control relays, wiring and circuitry required to implement the control logic per section 26 09 16.
 - b. Operator Interface Terminal:
 - (1) Provide an Operator Interface Terminal for subsystem control panels.

- (2) Operator Interface Terminals shall be Rockwell Automation 15” PanelView Plus 7 Performance Part number 2711P-T15C22A9P.
 - (3) The Supplier shall program the Operator Interface Terminals as indicated on the Drawings and as specified in Section 40 61 96.20.
- c. PROGRAMMABLE LOGIC CONTROLLERS Section (40 63 43).
- (4) An electronic ACD file and PDF file of PLC program. The PLC program shall be fully annotated. An explanation shall be provided for each rung, and every contact, coil, network and function block and shall be identified and its functionality fully described.
 - (5) Programming documentation including Profibus and Ethernet networks for all field devices monitored and controlled by the vendor furnished PLC.
 - (6) An I/O list that includes all the relevant parameters for each I/O point such as range, active state, contact orientation, limits, incremental limits. I/O card addresses and PLC assignment.
 - (7) The I/O database shall include the District’s standard tag name in the alias field, the District standard tag names are shown on the P&IDs.
- 1) Provide UPS installed within each screen control panel per Control System Equipment Panels and Racks Section (40 67 00).
- d. Provide interface terminal strip for all the external signals wiring connections indicated on contract P&ID drawings.
- e. Provide all controls suitable for outdoor installation.
- f. Screening System Operation:
- 1) Provide control system programming per PROGRAMMABLE LOGIC CONTROLLER NARRATIVE Section (40 61 96.20)
 - 2) The drum screen motor starts automatically on a timer or as soon as a preset differential has been reached. Provide a manual override, as well as a dry contact for remote indication
 - 3) Interlock the spray wash water supply control valve (electric motor operated ball valve) with the screen drive motor. Provide a manual override as well as a dry contact for remote indication.
 - 4) Interlock drum screen operation with the brush screens and their dedicated screw conveyor so that one or two brush screens and dedicated conveyor all

start when the drum screen starts. Provide selection for one or two brush screens operating.

a) Each brush screen will be isolated by an electrically actuated knife gate valve. The valve to the selected brush screens(s) will open when the drum screen is started. If one brush is selected and fails, all washwater stops, the second brush screen and associated valve and conveyor will automatically start and washwater sequencing will resume.

5) Each brush screen and conveyor will run for a set but adjustable time after the drum screen stops and conveyor will stop after a set but adjustable time after the brush screen stops.

g. Programming Coordination Workshops:

1) For vendor furnished subsystem control panels with PLCs, a minimum of two 4-hour programming coordination workshops shall be held at the Project site to coordinate HMI design with vendor provided PLC application software and resolve any issues. The following attendees shall be included as a minimum:

a) Manufacturer PLC programmer

b) The District HMI programmer

c) Seller and PMO representative

2) The first workshop shall be held prior to the first programming submittal to review the control strategies, the District submittal requirements including level of annotation, I/O database and network interfaces.

3) The second workshop shall be held after the programming submittal has been approved and prior to the Factory Demonstration Test. The vendor shall provide preliminary factory test procedures for review 4 weeks prior to the workshop.

2.07 DRUM SCREEN SCHEDULE

| Secondary Effluent Screen | |
|---|--------------------------|
| System Capacity, mgd | 343 |
| Number of Screens | 1 |
| Number Operating | 1 |
| Number of Standby | 0 |
| Screen Capacity, mgd | 343 |
| Screen Arrangement | Single Entry |
| Nominal Screen Panel Clear Openings, (mm) | 6 |
| Screen Diameter, ft | 36.00 |
| Design Differential, ft | 5.00 |
| Screen Overall Width, ft | 19.28 |
| Effective Screening Length, ft | 16.08 |
| Drum Screen Centerline EL | 118.08 |
| Screen Structure Length, ft | 40.00 |
| Screen Structure Width, ft | 19.28 |
| Deck Level EL (High Point,Low Point) | 117.00 HP, 116.50 LP |
| Screen Structure Invert EL | 99.08 |
| Debris Discharge EL | 125.91 |
| Nominal Spray Water Flow Rate, gpm (1) | 216 |
| Spray Water Connection Size, in | 4 |
| Spray Water Pressure Required at Spray Pipe, psig | 30 |
| Spray Water Pressure Available, psig | 60 |
| Number of Spray Pipes | 1 |
| Nominal Number of Spray Nozzles/Spray Pipe (1) | 36 |
| Nozzle Type | Vee Jet |
| Performance Maximum WSE | |
| Flow Rate, mgd | 343 |
| Upstream WSE | 112.00 |
| Total Headloss (clean screen), in | 5.00 |
| Performance Design WSE | |
| Flow Rate, mgd | 343 |
| Upstream WSE | 110.50 |
| Total Headloss (25% blinded), in | 6.20 |
| Performance Minimum WSE | |
| Flow Rate, mgd | 343 |
| Upstream WSE | 109.50 |
| Total Headloss (50% blinded), in | 9.60 |
| Drive Type | Gear Reducer |
| Speed Control | Variable Frequency Drive |
| Screen Rotational Speed Range, ft/min | 45 to 74 (2) |
| Maximum Motor HP (1) | 20 |
| Motor Speed, rpm | 1800 |
| Motor Enclosure | TEFC |

(1) To be determined by screen manufacturer

(2) To be confirmed by screen manufacturer

(3) EL. – Elevation; WSE – Water Surface Elevation

2.08 BRUSH SCREENS:

- A. Provide brush screens consisting of a curved screen element and a rotating brush mechanism, assembled in a self-contained unit.
- B. The screen element is cleaned by a brush mechanism consisting of adjustable polypropylene brushes fitted to a rotating arm assembly.
- C. Provide the screen element formed to a radius and bolted to a frame fabricated from folded plate.
- D. Provide the rotating arm assembly fabricated from a folded section, stiffened and braced and attached to a horizontal shaft. Support the shaft with self-aligning roller bearing pillow blocks at each end, mounted on the screen frame.
- E. Provide a pivoted scraper assembly arranged to clean the screenings from the brushes and deposit them via a debris plate into the screw conveyor. Provide the return action of the scraper controlled by cams fitted to the shaft of the rotating arm assembly, through nylon rollers attached to the scraper arms which lower it back to the rest position.
- F. Provide the screen with support legs as a freestanding unit.
- G. Provide the screen enclosed by a fiberglass cover
 - 1. Provide three (3) clear Lexan viewing ports.
 - 2. Provide two (2) lifting lugs
 - 3. Provide three (3) lifting handles on each side of the cover
- H. Screen Inlet: Flanged trough connection in one end plate of the framework.
- I. Provide a fabricated collection tank below the screen with a flanged outlet connection with 150-lb ANSI flange.
- J. Materials:
 - 1. All stainless steel shapes: 3/16-in minimum thickness

| | |
|--------------------|--------------------------------------|
| Screen Element | Type 316 Stainless Steel Wedge Wire |
| Support Frame/Body | ASTM A-240 Type 316L Stainless Steel |
| Brushes | Polypropylene |
| Rotating Arms | ASTM A-240 Type 316L Stainless Steel |
| Shaft | ASTM A-276 Type 316 Stainless Steel |
| Scraper Assembly | ASTM A-240 Type 316L Stainless Steel |
| Scraper Blade | High Density Polyethylene |
| Cams | ASTM A-240 Type 316 Stainless Steel |
| Debris Plate | ASTM A-240 Type 316L Stainless Steel |
| Guard | Type 316 stainless steel |
| All Hardware | Type 316 stainless steel |

K. Manufacturer provided Brush Screen Starter Control Panel, factory wired NEMA 4 with interlocks for the operation of each screen per section 40 67 00.

1. Manufactured by a UL listed company and bear a U.L. label.
 - a. Control panel wiring: Colorcoded, neatly cabled and supported in non-flammable wiring tracks. Wiring: Minimum 14 gage MTW stranded wire.
 - b. Thermal management
 - c. In accordance with CONTROL SYSTEM EQUIPMENT PANELS AND RACKS Section (40 67 00).
2. Control relays, wiring and circuitry required to implement the control logic per section 26 09 16.
 - a. Provide a door mounted LOCAL- REMOTE, HAND-OFF-AUTO switch, and a FORWARD-OFF-REVERSE spring return to centerselector switch.
 - b. Mushroom head EMERGENCY STOP push button.
 - c. Red pilot light for “Screen Run” indication; Amber pilot light for “Overload” indication; Amber pilot light for “High Water Level” indication; White pilot light for “Control Power” indication.
 - d. Provide all controls suitable for outdoor installation.
3. Provide interface terminal strip for external wiring connections.
4. Power Supply:
 - a. 480VAC, 3-phase, 3-wire, 60 Hertz.
 - b. Rated to withstand the available fault current as indicated in the electrical system study
5. Motor Starter for motor:

- a. Motor circuit protector circuit breaker as specified in the ELECTRICAL CONTROL AND RELAYS Section (26 09 16).
 - b. Full voltage non-reversing magnetic starter, NEMA rated.
 - 1) Thermal or electronic overloads.
 - c. Motor starter as specified in the ELECTRICAL CONTROL AND RELAYS Section (26 09 16).
6. Main circuit breaker:
- a. Flange-mounted operator.
 - 1) Pad-lockable in the off position.
 - b. Disconnects all power to the panel.
 - c. Defeatable interlock with the panel door.
 - d. In accordance with the ELECTRICAL CONTROL AND RELAYS Section (26 09 16) and the CONTROL SYSTEM EQUIPMENT PANELS AND RACKS Section (40 67 00).
7. Control power transformer:
- a. Primary voltage: 480VAC
 - b. Secondary voltage: 120VAC
 - c. Sized for all panel components plus 10 percent spare capacity.
 - d. Primary and Secondary fuses.
8. Door-mounted elapsed time meter.
9. Rectifier with all necessary equipment for the counter for motor operation time.
10. Alarm silence and reset push buttons.
- L. Brush Screen Drive
- 1. Motor:
 - a. Provide in accordance with the COMMON MOTOR REQUIREMENTS FOR PROCESS EQUIPMENT Section (40 05 93) and as specified and indicated.

- b. Horsepower rating of motors: Not less than maximum brake horsepower requirements of equipment under any condition of operation specified and indicated without operating in the motor service factor.
 - c. Motor enclosure and motor speed: As indicated in the Brush Screen Schedule.
 - d. In addition to the requirements for bearings specified under Electric Motors in COMMON MOTOR REQUIREMENTS FOR PROCESS EQUIPMENT Section (40 05 93), provide pump motors with ball or roller bearings. Provide vertical motors with at least one bearing designed for thrust with bearings. Provide bearing with a minimum B-10 life of 100,000 hours.
 - e. Overall sound-pressure level of each motor shall not exceed 88 decibels when measured on flat network using an octave-band frequency analyzer conforming to ANSI S1.11. Determine overall sound-pressure level as average of four or more readings at evenly spaced points, 3 feet from motor.
 - f. Operate without overheating at the speeds specified and indicated.
 - g. Service Factor: 1.15.
 - h. Premium efficiency with nominal and minimum efficiencies per NEMA MG1.
 - i. Rating: 460V, 3-phase, 60 Hertz.
 - j. Insulation: Class F with Class B temperature rise, 40 degrees C ambient.
 - k. Site Altitude: Less than 3,300 feet above sea level.
 - l. Provide capacity sufficient to start and operate screen fully loaded without exceeding nameplate ratings for current and power and without operating in the service factor.
2. Gear Reducer:
- a. Provide parallel shaft arrangement classified for continuous, AGMA Class II, 24-hour duty.
 - b. Provide a shaft mounted gear reducer and flange mounted electric motor, keyed directly to the shaft of the rotating brush assembly and connected via a torque reaction arm to the screen frame.
 - c. Provide ASTM A48 Class 30 cast iron housing.
 - d. Gears: Case hardened alloy steel forgings with precision ground gear teeth minimum AGMA quality 12.
 - e. Provide bevel right angle shafting.

- f. Design reducer to match output speed requirements of screens.
 - g. Match torque-rating of driven equipment.
 - h. Minimum gear reducer service factor 1.50 minimum, based on motor horse power rating.
3. Provide torque overload protection of the screen drive unit by means of a current sensing device.

2.09 BRUSH SCREEN SCHEDULE:

| Brush Screens | |
|--------------------------------------|----------------------------------|
| System Capacity, gpm | 250 |
| Solids Capacity, ft ³ /hr | 67 |
| Number of Screens | 2 |
| Number Operating | 1 |
| Number of Standby | 1 |
| Screen Length, ft | 3.94 |
| Screen Radius, ft | 1.64 |
| Screen Openings or Perforations, in | 3/16" wide slots or perforations |
| Inlet Connection | Flanged, match trough size |
| Outlet Connection, in | 8 |
| Discharge | To dedicated screw conveyor |
| Nominal Operating Speed, rpm | 2 |
| Gear Ratio | 910:1 |
| Motor hp | 0.5 |
| Motor Speed, rpm | 1800 |
| Motor Enclosure | TEFC |
| Drive | Constant Speed |

2.10 DEBRIS CONVEYORS:

- A. Provide in accordance with the SCREW BULK MATERIAL CONVEYORS Section (41 12 13.36)
- B. Manufacturer provided Conveyor Starter Control Panel, factory wired NEMA 4 with interlocks for the operation of each screen per section 40 67 00.
 - 1. Manufactured by a UL listed company and bear a U.L. label.
 - a. Control panel wiring: Colorcoded, neatly cabled and supported in non-flammable wiring tracks. Wiring: Minimum 14 gage MTW stranded wire.
 - 2. Control relays, wiring and circuitry required to implement the control logic per section 26 09 16.
 - a. Provide all controls suitable for outdoor installation.
 - 3. Provide interface terminal strip for external wiring connections.

4. Provide an across the line starter per Section 26 29 23,
5. Provide a flange mounted disconnect switch
6. 480 – 120 Volt control power transformer.
7. Door-mounted elapsed time meter.
8. Rectifier with all necessary equipment for the counter for motor operation time.
9. Alarm silence and reset push buttons.

2.11 KNIFE GATE VALVES

A. Manufacturers:

1. Hilton
2. Orbinox

B. Valve Construction:

1. Open type

C. Valves Port Design:

1. Metal Seated Valves: Full-ported, with the clear port ID equal to or greater than the pipe ID and coordinated with trough dimensions.
2. Provide uni-directional metal seated valves machined to provide shut-off that meets or exceeds the MSS standard of 40cc per minute per inch of nominal diameter, at 40 psi.
3. Provide all valves suitable for “dead end” service.

D. Provide stem packing replaceable without disassembling the valve or removing the valve from the pipeline

E. Body Types:

1. Provide body without recesses or cavities.

F. Provide valves with OPEN and CLOSE lockout position devices.

G. Materials:

1. Body and Flanges: Cast Type 316L stainless steel.

- H. Gate: Type 316L Stainless Steel with a 32 micro-inch RMS surface finish.
- I. Stem: Type 316 Stainless Steel
 - 1. Seats: Uni-Directional Valves: Provide a Viton resilient seat with Type 316L stainless steel gate wedges.
 - a. Provide Viton resilient seats installed in a self-retaining groove that is cut into the Type 316L stainless steel seat ring, and replaceable without removing the valve from the pipeline. Fasteners or adhesives used to hold the seal in place are not acceptable.
- J. Packing: Teflon impregnated synthetic fiber.
- K. Yoke: Fabricated solid Type 316L stainless steel.
- L. Hardware: Type 316 stainless steel.
- M. Stem Nut and Thrust Washer: Acid resistant bronze.
- N. Provide all valves marked to indicate the correct installation orientation.
- O. Ends: Flanged:
 - 1. ASME B16.1 Class 125.
 - 2. Provide all flange bolt holes threaded, unless otherwise specified or indicated.
 - 3. Provide all flange gasket surfaces fully machined with a spiral serrated finish.
- P. Valve Pressure Rating: 25 psi.
- Q. Valve Actuators: Electric, 3 Phase:
 - 1. Provide valve actuators per ACTUATORS FOR PROCESS VALVES AND GATES Section (40 05 57).
 - 2. Each actuator shall include electric motor, reduction gearing, reversing starters, thermal overloads, controls transformer, limit controls, non-intrusive local controls as a complete integrated package to ensure proper coordination, compatibility, and operation of the system.
 - 3. Provide actuators capable of setting of torque, turns, and configuration of indication contacts, through the use of a non intrusive infra red setting tool without the necessity to remove any electrical compartment covers. The setting tool must be the means for adjustment. The use of control knobs for programming the actuator is not acceptable.

4. Provide actuators with torque capability 150 percent above the maximum operating torque required by each valve, gate or equipment.
5. Enclosure:
 - a. Watertight to IP68, classification. Enclosure must be certified NEMA 6 for all units.
 - b. IP 67 cable glands
6. Provide an internal watertight compartment to protect switches, contacts, motor and internal electronics from ingress of moisture and dust when the external terminal cover is removed.
7. Breathers, drains and or heaters are not permitted, enclosure must be totally sealed.
8. Provide each actuator with a handwheel for manual operation. Provide a hammerblow device which permits motor to come up to speed before picking up load and unseating valve.
9. Motors: Class F with 15 minute duty rating.
 - a. Motor: Low inertia, high torque type, specifically designed for use with motor actuators, to prevent over travel.
10. Provide internal clutch that cannot engage handwheel operating mechanism and motor-operating mechanism at the same time. Friction type declutching is not acceptable.
11. Provide handwheel with arrow and the word CLOSE or SHUT cast on handwheel to indicate turning direction to close.
 - a. Handwheel must not rotate during power operation.
 - b. Provide handwheel and low gear ratio combined to give maximum rate of movement possible with 80 lb (36 kg) rim pull.
12. Drive Unit:
 - a. Metal worm wheel and worm shaft type.
 - b. Provide an oil filled drive housing. Grease lubrication is not acceptable.
 - c. Worm shaft to operate in ball or roller bearings and be machine cut, ground, and highly polished, hot rolled steel, hardness 50-60 Rockwell Scale C bronze worm wheel with large contact area. Provide mating surfaces of dissimilar metals to prevent galling. Cast metals or gears manufactured from non-metallic materials are not acceptable.

- d. Worm and shafts: Heat treated steel and accurately machined. Output or driving shaft to operate in bronze bearing or in ball or roller bearings.
 - e. Make provisions to take thrust in both directions.
 - f. Worm and wheel to be oil lubricated at all times.
 - g. Drive housing: Cast iron or aluminum depending on size of actuator offered, all thrust or torque bearing components shall be ductile iron.
 - h. Provide drive bushing as part of a detachable thrust base making for easy retrofit.
13. Fully wire electric motor operators at factory and furnish complete with terminal strips for external power and control connections. Wiring: copper with tropical grade PVC cover. Internal wiring to remain in a water tight compartment with external cover removed.
14. Provide Profibus DP automatic control as indicated and specified.
15. Operating Speed: 24 inches per minute
16. Manual Control: Provide the following Control, Status, Alarm and Diagnostic capabilities locally, at the actuator:
- a. Control:
 - 1) Open/Stop/Close.
 - 2) Desired Valve Position Control 0-100 percent.
 - b. Status:
 - 1) Motor Running Open Direction.
 - 2) Motor Running Close Direction.
 - 3) Fully Open.
 - 4) Fully Closed.
 - 5) Percentage Open 0-100 percent in 1 percent increments.
 - 6) Percentage Output Torque 0-100 percent in 1 percent increments.
 - c. Alarms:
 - 1) Remote Control Communications Failure.

- 2) Actuator Alarm.
- 3) Valve Alarm.
- 4) Battery Low Alarm.

17. Diagnostics:

- a. Provide an integral diagnostic module, which will store and enable download of historical actuator data to permit analysis of changes in actuator, gate or valve performance. Access to data shall be via a non-intrusive an IrDA™ port to an appropriate device capable of standard IRDA communications i.e. Notebook PC, Windows CE based “Personal Digital Assistant (PDA)” or an IrDA™ compatible cellular telephone.
- b. Provide diagnostic software from actuator manufacturer to allow configuration and diagnostic information to be reviewed, analyzed and reconfigured. Provide diagnostic status screens capable of showing multiple functions simultaneously so troubleshooting can be affected rapidly and efficiently.

18. Provide each actuator fitted with four (4) hard-wired configurable contacts. Each Contact shall be rated at 5A, 250VAC, 30VDC and able to provide any one of the following:

a. Status:

- 1) Valve Fully Open.
- 2) Valve Fully Closed.
- 3) Valve Opening or Closing.
- 4) Valve Moving (Continuous or Pulsing).
- 5) Local Stop Selected.
- 6) Local Selected.
- 7) Remote Selected.
- 8) Open or Close Interlock Active.
- 9) ESD Active.

b. Alarms:

- 1) Motor Tripped on Torque in Mid-Travel.
- 2) Motor Tripped on Torque Going Open.

- 3) Motor Tripped on Torque Going Closed.
 - 4) Pre-Set Torque Exceeded.
 - 5) Valve Jammed.
 - 6) Actuator Being Operated by Handwheel.
 - 7) Lost Main Power Phase.
 - 8) Customer 24V DC or 120V AC Supply Lost.
 - 9) Battery Low.
 - 10) Internal Failure Detected.
 - 11) Thermostat Tripped.
19. Provide a back-up power source integral to the actuator to ensure that in the event of a main power supply loss or failure that the LCD display indication contacts must remain operational for a minimum of 24 hours and still function on change of status.
20. Provide contacts and operating parts made of non-corrodible metal and suitable for a sea atmosphere and for contact with H₂S.
21. Control
- a. Provide non-intrusive selectors on actuator electrical controls cover. One for Local/Stop/Remote selection, pad-lockable in each position and the other for local Open/Close control. Switches penetrating the housing are not acceptable.
 - b. Starters/transformers: Consists of two relay contactors, 3-pole, mechanically interlocked, reversing with suitable arc suppressors.
 - c. Electrical Service: 460V, 3 phase, 60 Hz.
 - d. Provide inverse time element overload relays.
 - e. Provide a control transformer capable of generating 110VAC or 24VDC.
 - f. Provide electromechanical starter capable of OPEN/CLOSE sixty starts per hour or solid state starter for modulating service capable of 1200 starts per hour.
 - g. Provide replaceable fuses to protect wiring, fuses must be locally available.
 - h. Provide automatic phase correction.

22. Limit Controls:

- a. Type: Positive in action ensuring tight seating and full openings.
- b. Position Setting Range: 2.5 to 100,000 turns, with resolution of 7.5 degrees of one actuator output revolution.
- c. Provide mechanism designed to minimize drift or over-travel and to open or close valve, gate or equipment to fixed, predetermined limits of opening and closing travel.
- d. Provide controls that disconnect driving mechanism from stem utilizing Hall effect magnetic pulse system or similar technology. Measurement of torque shall be by direct measurement of force at the output of the actuator. Methods of measuring torque derived from the motor such as motor speed, current, flux, are not acceptable. Position and torque sensor shall accurately measure and control the position of the actuator without the use of mechanical gears. Potentiometers for position transmission are not acceptable.
 - 1) Provide torque switches for both directions of travel.
 - 2) Sensing to be independent of voltage fluctuation.
 - 3) Provide torque protection to prevent repeated starting in the same direction.
 - 4) The initial unseating hammer blow shall not cause overtorque.
 - 5) Provide torque switch settings independent of OPEN/CLOSE position switches.

23. Provide output drive coupling to accept rising stem for rising spindle valves and include roller and ball type thrust bearings.

24. Provide actuator sized to close valve against required differential. Size actuator motor to seat and unseat valve and ensure torque switch trip at maximum valve torque when supply voltage is 10 percent below normal. Size motor to open or close valve, gate or equipment to satisfy the process dynamics.

25. All fasteners and hardware: Type 316 stainless steel.

26. Secondary Gear Boxes:

- a. Secondary gearing shall be provided for multi turn or quarter-turn applications where operating times, thrust or torque considerations require. Secondary gearing shall be bevel or spur, totally enclosed in a cast iron housing, fully sealed and suitably lubricated for the service intended.

- b. Each gear assembly shall be manufacturer's standard selection or combination of as detailed in published product literature. Each gearbox shall be provided with a removable output drive coupling suitably sized for the intended service.
- c. Provide quarter-turn gearboxes equipped with adjustable mechanical stops (at 0 and 90 degrees +/- 5 percent) to permit limiting open and closed travel during manual operation.

2.12 OPERATING PLATFORMS:

- A. Drum Screen manufacturer to provide work station platforms and access stairway to elevated operational and maintenance equipment.
- B. Work platform: Provide operational equipment and platform guard railing to the extent indicated on the drawings or modified for maintenance of the screening system. Design platform for 150 PSF live load.
- C. Stairway: Provide stairway from structure support slab at EL 117.0, plant datum, to access platform. Minimum clear stair width to be 36 inches. Stair rise and run shall conform to CBC requirements
- D. Guard railing: Railing shall consist of two (2) rails with top rail at 42 inches above walkway surfaces. Provide kick plates per code.
- E. All structural material for stairway and platform to consist of 316L stainless steel. Grating treads and guard railing may consist of aluminum materials.

2.13 ANCHOR BOLTS AND HARDWARE

- 1. By Installation Contractor
 - a. 3/4-inch minimum Type 316 stainless steel.
 - b. Side seal anchor bolts 1/2-inch minimum Type 316 stainless steel.

2.14 SHOP PAINTING:

- A. Primer and Finish Paint: Shop apply to all exterior ferrous surfaces, high solids epoxy in accordance with the PAINTING AND COATING Section (09 90 00).
- B. Ferrous surfaces which are not to be painted shall be given a shop applied coat of grease or rust resistant coating.
- C. Provide additional shop paint coating for touch-up to all surfaces after installation and testing is completed and equipment accepted.

2.15 SHOP TESTING:

- A. Provide motor shop testing in accordance with the COMMON MOTOR REQUIREMENTS FOR PROCESS EQUIPMENT Section (40 05 93).
- B. Screen Testing:
 - 1. Control Panel Tests:
 - a. Test all functions and alarms of each control panel. After acceptance and prior to shipping apply dielectric grease and install corrosion inhibitors as specified.
- C. Repeat tests until specified results are obtained.
- D. In event that specified tests indicate that equipment will not meet the specifications, the District has the right to require complete witnessed tests for all equipment at no additional cost.
- E. Correct or replace promptly all defects or defective equipment revealed by or noted during tests at no additional cost to the District.
- F. Provide a 30 day minimum notice prior to testing.

PART 3 -- EXECUTION

3.01 GENERAL (NOT USED)

3.02 INSTALLATION

- A. By Installation Contractor.
- B. Drum Screen manufacturers field service engineer shall be on site during installation and setting of the drum screen and brush screens.

3.03 FIELD TESTING

- A. Comply with the requirements specified in the COMMISSIONING Section (01 91 00) and as specified herein.
- B. Field testing will not be conducted without a procedure with no exceptions noted, calibration certificates for all testing equipment, and a completed and signed pretesting check list.
- C. After installation of equipment, and after inspection, operation, testing and adjustment have been completed by the manufacturer's field service technician, conduct a dry running test and a performance test for each unit in presence of the Engineer to determine its ability to deliver its rated capacity under specified conditions.

1. Dry Testing:
 - a. Make all necessary adjustments and settings to the drive mechanism and tripping device at the time of the test to ensure that the drum screen, brush screens and conveyors will stop at the appropriate trip setting.
 - b. Perform a dry test on each drum screen, brush screen and conveyor to demonstrate the correct alignment, smooth operation, freedom from vibration, excessive noise and overheating of the moving parts and bearings.
 - c. Perform a dry test on each drum screen, brush screen and conveyor line-up to demonstrate the correct operating and shutdown sequence and alarms including brush screen failure and alternation of brush screens and conveyors
 - d. Perform a dry test on each drum screen, brush screen and conveyor to demonstrate the ability of the screen to successfully operate without vibration or jamming.
 - e. All defects recorded during the above field tests and all defects and failures occurring within the first year of operation shall be corrected at no additional cost to the District.
 - f. Dry tests on each screen shall be witnessed by Engineer.
 2. Performance Test:
 - a. During tests, observe and record flow rates to drum screen, water flow rates for washwater, channel water depths, headloss, and motor inputs.
 - b. Test Duration: Determined by the Engineer, but not less than ten cycles.
 - c. Each drum screen, brush screen and conveyor must demonstrate 10 day clean water test and a thirty (30) day test with secondary effluent both tests of continuous, defect-free operation prior to final acceptance.
 - d. Immediately correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the District.
 3. Repeat tests until specified results are obtained.
- D. Make all adjustments necessary to place equipment in specified working order at time of above tests.
- E. Remove all replace equipment at no additional cost to the District with equipment that will meet all requirements specified and indicated if unable to demonstrate to the satisfaction of the Engineer that equipment will perform the service specified, indicated and as submitted.

3.04 TRAINING

A. Training shall conform to TRAINING Specification Section (01 79 10).

3.05 FIELD TOUCH-UP PAINTING

A. By Installation Contractor.

****END OF SECTION***