ADDENDUM NO. 5

FOR

WASTEWATER TREATMENT SYSTEM UPGRADE

AND DISCHARGE RELOCATION FOR

THE TOWN OF CROSSVILLE

CW ARPA PROJECT NO. CS0110326

AUGUST 22, 2025

TO: ALL PLAN HOLDERS AND INTERESTED PARTIES

SUBJECT: Plans, Specifications and Contract Documents are hereby amended, modified, and changed as follows:

I. Reference Part II – Bid Page II-2

A. Replace Page II-2 with the attached Revised Bid Schedule, updating Bid Item No. 5 – Stated Allowance to $878,775.00

II. Reference Part VI – Technical Specifications, Division No. 11, Specification Section 11311-Submersible Sewage Pump Facility

A. Replace specification 11311 with the attached specification 11388 marked Addendum No. 5.

III. Reference Part VI – Technical Specifications, Division No. 11, Specification Section 11368– Internally Fed Rotary Drum Screen

A. Replace 2.11.C. to read The system shall be complete with standard high level conductive probe to detect overflow condition of the screen and alert the control panel. *The probe shall be designed, listed and installed for operation in a Class I Division 2 environment.*

B. Replace 2.17.E to read Control Panel: The controls for the one (1) RotoSieve 24 Drum Screen and one (1) SCP-220 Compactor shall be provided in one (1) NEMA 4x 304SS Wall Mounted Control Panel. Supply to the panel shall be 480V, 60Hz, 3 ph. *Auxiliary contacts shall be dry contacts rated 10 Amps resistive at 120 VAC.* The control panel shall include the following:

1. NEMA 4x 304SS Enclosure
2. UL Label, *suitable for the intended use*
3. Fusible Disconnect Switch
4. Heater with Thermostat
5. Breather/Drain
6. Motor Fuses

7. ABB Soft Start Screen Motor Starter
8. IEC Rated Compactor Motor Starter
9. Primary Transformer Fuses
10. Control Transformer
11. Control Circuit Breakers (2)
12. Emergency Stop Pushbutton
13. HOA Switches (2)
14. Run Pilot Lights (2)
15. Aux. Run Contacts (2)
16. Compactor Repeat cycle Timer
17. Compactor Off Delay Timer
18. Elapsed Run Time Meters (2)
19. Overload Alarm Pilot Lights (2)
20. Overload Aux. Contacts (2)
21. Screen Off Delay Timer
22. Screen Overflow Probe Relay – Non Intrinsic
23. Screen Overflow Alarm On Delay Timer
24. Screen Overflow Alarm Pilot Light
25. Screen Overflow Alarm Aux. Contract
26. Manual Reset Pushbutton
27. Wash Valve OCA Switches (2)
28. Wash Valve Energized Pilot Lights (2)
29. Wash Valve Repeat Cycle Timers (2)
30. Terminals for Remote Start Contact
31. Two (2) NEMA 4x remote pushbutton emergency step stations shall be supplied. Each to be installed in the field by the Contractor near the screen and compactor

IV. Reference Addendum No. 2 Technical Specifications, Division No. 11,Specification Section 11370 – Open Channel Ultraviolet Wastewater Disenfection

A. Add 2.12.A.8. to read *All conductors between the UV disinfection unit and its associated control panel shall be furnished by the UV system manufacturer/supplier for installation in empty conduit furnished under other sections of these specifications. The manufacturer shall coordinate the required cable length prior to bid.*

B. Add attached sheet 11370-5 marked addendum No. 5 (Sheet 11370-5 was left out of Addendum No.2).

V. Reference Part VI – Technical Specifications, Division No. 11, Specification Section 11388– Sequencing Batch Reactor (SBR) Wastewater Treatment Plant

A. Replace specification 11388 with the attached specification 11388 marked Addendum No. 5.

VI. Reference Exhibit "A"– Stated allowance for SBR, Rotosieve Screen, Screenings Compactor, and Evoqua UV Units

A. Replace Exhibit A stated allowance with the attached stated allowance marked Addendum No. 5

VII. Reference Plans

A. Replace Plan Sheet 14 with the attached Plan Sheet 14 marked as "Addendum No. 5".

B. On Plan Sheet 10, detail A/10. Replace the note on two center pipes *"8" Air piping"* to read *"8" D.I. Force main piping"*.

C. On Plan Sheet E-7, add conduit and wire (2#14,1#14G,0.75") for each of 2 "Emergency Stop" pushbuttons (to be furnished with "Screen" and "Compactor"). Conduit and wire shall extend from each pushbutton to "CP-SC". One pushbutton shall be located near each piece of equipment in accordance with the manufacturer's suggestions and regulatory requirements; for bid purposes, assume the location will maximize the length of the conduit and wire and be within the "hazardous environment" of the "classified" area.

D. On Plan Sheet E-6, append the following text to "keyed note" #8" Flexible cables installed within, or passing through, the classified area shall be terminated either a) at the boundary of the classified area, with sealing cable connectors or b) in a junction box, in the classified area, with sealing fittings installed, at the boundary of the classified area, in the associated conduit run.

THIS ADDENDUM ISSUED THIS 22th DAY OF AUGUST, 2025.

LADD ENVIRONMENTAL CONSULTANTS, INC.

Adam Lea

Adam Lea, P.E.

ALABAMA LICENSED NO. 30411 PROFESSIONAL ENGINEER ADAM JARED LEA 08/22/25

BIDDER agrees to perform all the work described in the Drawings, Bid Documents and Specifications for the following unit prices or lump sum. **NOTE:** BIDS shall include sales tax and all other applicable taxes and fees. (PART II, for explanation of Bid Items.)

BASE BID SCHEDULE (REVISED)

WASTEWATER TREATMENT SYSTEM UPGRADE AND DISCHARGE RELOCATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL
1.	250,000 GPD SBR Wastewater Treatment Plant, Concrete, Equipment, Sitework, Piping, Control Building, and Influent Pump Station	1	LS	$	$
2.	10" CL 200 PVC Effluent Line	2,500	LF		
3.	Road Bore and Case with 18" Steel Casing	30	LF		
4.	Concrete Step Aerator Outfall	1	LS		
5.	Stated Allowance for the SBR Wastewater Equipment, Drum Screen and UV Units	1	LS	$ 878,775.00	$ 878,775.00

TOTAL BASE BID SCHEDULE: $_____

ADDITIVE ALTERNATE NO. 1

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL
6.	Generator	1	LS		

TOTAL BASE BID SCHEDULE PLUS ADDITIVE ALTERNATE NO. 1: $_____

Respectfully submitted:

_____ Company Name

_____ Signature

_____ Title

_____ License No.

_____ Date

_____ Mailing Address

_____ City State

_____ Street Address

_____ City State

_____ Phone No. _____ FAX No.

_____ E-Mail Address

(If BID by a Corporation)

[SEAL]

SECTION 11311

SUBMERSIBLE SEWAGE PUMP FACILITY

PART 1 GENERAL

1.01 Section Includes

A. Submersible sewage pumps.

B. Access frame and guide.

C. Electrical and controls.

D. Valves, discharge piping, fittings and related items.

1.02 Related Sections

A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 Submittals

A. Submit under provisions of Section 01300.

B. Product Data: Descriptive literature, shop drawings, details, dimensions, specified operating parameters, materials of construction, connections, electrical and control facilities, piping, valves, fittings and all related items.

C. Manufacturer's Installation Instructions: Indicate special installation requirements, configurations, elevations, dimensions, equipment and related items.

1.04 Operation and Maintenance Data

A. Submit under provisions of Section 01700.

B. Maintenance Data: Include all required start-up, operational, routine maintenance requirements, troubleshooting, including specific operational and maintenance instructions.

1.05 Spare Parts

A. One complete set of spare parts as recommended by manufacturer shall be furnished (See Paragraph 2.07).

1.06 Delivery, Storage and Handling

A. Deliver Products to site under provisions of Section 01600.

B. Store and protect Products under provisions of Section 01600.

1.07 Project Record Documents

A. Accurately record actual location of all equipment and concealed utilities in accordance with Section 01700.

1.08 Quality Assurance

A. In accordance with Section 01400.

1.09 Qualifications

A. Manufacturer: Must have minimum five years documented experience in manufacturing the specified equipment.

B. Installer: Must have minimum five years documented experience in the installation of the equipment and facilities.

1.10 Regulatory Requirements

A. All components and the completed total assembly installation shall comply with all OSHA Requirements, National Electrical Code (Latest Edition), International Mechanical Code (Latest Edition) and all other applicable codes, regulations and guidelines.

1.11 Field Measurements

A. Verify that field measurements are as shown on Drawings and as instructed by manufacturer.

B. Verify that all concrete work, shape, configuration, elevations and dimensions meet equipment manufacturers' approval prior to installation of equipment.

1.12 Warranty

A. Provide minimum one year warranty in accordance with Section 01700 on all equipment furnished, plus a five (5) year municipal warranty on the pump. Warranty period begins at date of written acceptance of the facility by Owner.

PART 2 PRODUCTS

2.01 General Description

A. Submersible, non-clog, sewage pumps capable of handling raw unscreened sewage and wastewater. Pumps shall provide reliable, trouble free operation, free from nuisance tripping.

B. The pump facilities shall generally operate as duplex alternating, lead/lag or triplex alternating, lead/lag/lag pumping systems with low water cut-off and high water alarm (see Schedule at end of this Section; see Drawings).

C. The pump facilities will be subject to the hazardous substances associated with commercial raw sewage as described by NFPA 820. All equipment and installation practices shall be suitable for the environment installed and carry the appropriate UL listings and labels.

D. Manufacturer: The pumping facility shall be the Sulzer Submersible Motor Pump Facility as manufactured by Sulzer, Easley, South Carolina or approved equal (see Schedule at end of this Section for specific model number). Equal manufacturers include KSB and Flygt.

2.02 Pump Design

A. The Pumps shall be of the submersible design capable of handling raw unscreened sewage. Pumps and Motors shall come from a single manufacture and be assembled at the factory. The entire pumping unit shall be capable of continuous submergence to a depth of 65 feet. The entire

pumping unit shall be designed, listed and installed for operation in a Class I Division 2 atmosphere.

B. Major pump components shall be of gray cast iron, ASTM A-48, Class 30B, with smooth surfaces free of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel.

C. Cable/Entry Seal. Each Pump shall have a power cable sized in accordance with NEC and ICEA standards and have sufficient length to reach junction box with no splices. **For long service life and reliability Power and Control cords shall be triple sealed in the motor housing.** Single grommet protection shall not be considered equal or acceptable. . The power and control conductor shall be single strand sealed with epoxy potting compound and then clamped in place with a rubber seal bushing to seal outer jacket against leakage an to provide for strain pull. A third sealing area shall be provided by a terminal board to separate the cable chamber from the motor chamber. Cords shall withstand a pull of 300 pounds. Insulation of power and control cords shall be type SO or SOOW. Both control and power cords shall have a green carrier ground conductor that attaches to motor frame.

D. Motor: Motor shall be oil filled.

Motor shall be of the sealed submersible type and shall be dual voltage 460-230V 60Hz 3 phase. **All motors shall be standard inverter duty from the factory capable of soft starter.**

1. Motor horsepower shall be adequate so that pump is non-overloading at any point on the performance curve. Motor shall have service factor of 1.3 and voltage tolerance of +/- 10%.

2. Stator winding shall be of the open type with class H insulation good for 180 degrees C maximum operating temperature. Winding housing shall be filled with clean high dielectric oil that lubricates bearing and seals and transfer heat from windings and rotor to outer shell.

3. Motor shall have tow heavy duty ball bearings to support pump shaft and take radial and trust loads and a sleeve guide bushing directly above the lower seal to take radial load and act a flame path for the seal chamber. Ball bearings shall be designed for 50,000 hours B-10 life. For superior pump shaft alignment and extended service life stator shall be heat shrunk and press fit to the motor housing.

4. A heat sensor thermostat shall be attached to and imbedded in the winding and be connected in series with the motor starter contactor coil to stop motor if temperature of winding is more than 302°F. Thermostat to reset automatically when motor cools to safe operating temperature. Three heat sensors to be used on 3 phase motors.

5. The Motor and Pump shall be designed by same manufacturer.

E. Seals. Each pump shall be provided with tandem mechanical seals consisting of two seal sets of standard carbon-ceramic seals. Seals shall operate in a lubrication reservoir. Seal shall be of a standard type 21 design and readily available.

1. Motor shall be protected by two mechanical seals mounted in tandem with a seal chamber between the seals. Seal chamber shall be oil filled to lubricate seal face and to transmit heat from shaft to outer shell.

2. Seal face shall be carbon and ceramic and lapped to a flatness of one light band.

3. A double electrode shall be mounted in the seal chamber to detect any water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor but shall act as a warning only, indicating service is required.

F. Pump Shaft. Pump and motor shaft shall be same unit and be of 416 stainless steel.

G. Impeller shall be of the semi-open, 1 vane Contrablock Plus type. Impeller shall be Class 65 ASTM A-48 cast iron and be dynamically balanced. Impeller shall be equipped with pump out vanes. Impeller neck shall run in a renewable brass wear ring. Impeller shall be keyed to shaft retained with any impeller bolt. Impeller shall pass 3.15" diameter solid.

H. Volute shall be cast iron, ASTM A-48 Class 35B single piece design with smooth passages large enough to pass any solids that may enter the impeller. Discharge shall be 4" of the centerline type. Discharge flange shall be of the 125# ANSI type as to ease serviceability.

I. Pump Curve. Each pump will have certified factory generated test curve that is specific for each pump. Catalog pump curves will not be acceptable.

J. Warranty. Each pump shall be covered by a five (5) year municipal warranty.

2.03 Pump Control Panel

A. General

1, Pump Control Panel will be of Duplex type. Control system will be of alternating lead-lag design with high water alarm. Pumps shall be controlled by mercury floats.

2. Control Panels shall be Underwriters Laboratories labeled for the intended use, including but not limited to UL 508A and UL 698A, by the panel manufacturer.

3. Control Panels shall be constructed in accordance with NEC Article 409 and shall have a Short Circuit Current Rating (SSCR) greater than or equal to that shown on the drawings. Manufacturer shall verify available fault current with the serving utility and provide increased SSCR's where required.

4. Control panel shall be designed for single point electrical feed and shall contain all local disconnecting means required by NEC 430 for both motor controllers and associated motors.

5. All electrical equipment shall be designed for year round all-weather operation.

6. Panel shall be equipped with adjustable soft starters with shorting contactors. Coordinate with Division No. 16.

7. Power shall be 460V/60Hz/3pH.

B. Functional Requirements

1. On basin rise to pre-set (adjustable) level, lead pump will start. With lead pump operating, if level drops to pre-set (adjustable) low level, pump will stop.

2. If basin continues to rise when lead pump is operating, at a pre-set point (adjustable) level lag pump will start. Both pumps will run until level drops to low-level then they will shut off.

3. Alarm will be initiated if level continues to rise.

4. At next start lag pump will alternate as lead pump.

5. If one pump should fail second pump shall override control.

C. Electric Components. All electrical components and materials supplied shall function as a complete unit to automatically control the pump down of the sewage pump station wet well. All devices and material shall be new and of standard product design.

All components used in the panel shall be Underwriters' Laboratory approved for the application. Electrical work shall be in accordance with the latest edition of the National Electrical Code (NEC) and subject to local codes.

All power wire shall be stranded copper and sized as required for load and application according to NEC. All control and signal wire shall be a minimum of #14 AWG, 90 degree C insulated and color-coded. Colors shall be red for all AC control, blue for all DC control, yellow for external source control, white for AC neutral and green for equipment ground wiring. All wiring on the rear of the inner door shall be neatly bundled using tie wraps or other means. All internal wiring on the backplate shall be neatly routed in wire duct with removable covers. All wiring shall be continuous point to point (no splices) and be totally accessible.

D. Scope and Panel Operation. The control panel shall provide power and logic control to operate two submersible pumps at the rated voltage and FLA of the pump motors. The control voltage shall be 120-Volt, single phase. Where Float Switches are installed in the Class 1 hazardous area, the associated circuits shall utilize intrinsically safe isolation barriers.

The control logic shall provide for the automatic operation and alternation of the lead pump under normal conditions. If the incoming flow exceeds the pumping capacity of the lead pump, the lag pump shall automatically operate to handle the increased flow. As the wet well level decreases, both pumps shall shut off at the pumps off level. In the event of a pump failure or a flow that exceeds the capacity of both pumps, a high alarm level shall operate a red flashing alarm light. The pump designated as lead pump shall alternate each duty cycle. The alarms covered herein shall be operational at all times to monitor the pumps operation and protect the pumps.

E. Enclosure Construction and Materials. The pump controls shall be housed in a NEMA 4X Stainless Steel enclosure sized to house all the required components and allow adequate space for testing and maintenance as necessary. The enclosure shall have a drip shield, padlockable latch, steel back plate, continuous door hinge, and an aluminum inner door with continuous hinge to protect all live internal wiring from operator personnel. The inner door shall be able to open a minimum of 150 degrees to allow safe access to the components. All controls, switches, indicator pilot lights, and elapsed time meters shall be mounted through the inner door.

All other components shall be securely mounted to the backplate with stainless steel hardware through machine thread tapped holes in the backplate. The screws shall be of adequate size for the device being secured. Permanent marking to identify each component as shown on the drawing shall be provided on the back plate and schematic laminated on inside of enclosure door.

F. Duplex Pump Controller. The Duplex Float Switch Controller shall be a dedicated solid-state controller, easily replaceable, that automatically controls one or two water pumps. The controller shall accept four normally open floats as level sensing inputs so when the tank is empty all of the floats are open. On rising water the Off float closes first which causes the controller to take no action. The Lead float will close next as the water rises. The controller will then turn on the lead pump. If this pump causes the water level to fall the lead pump will be turned off when both the Lead and Off float are out of the water and open. If the lead pump is not sufficient to control the water level then the lag pump will be started when the Lag float closes. The two pumps will not be turned off until the Lag, Lead, and Off floats are out of the water and open, at which time, all pumps will be turned off. The controller shall have delays built into the software, which will insure that whenever a pump is turned on, the second pump cannot come on for at least 8 seconds. Another delay shall insure that when a pump is turned off the other one cannot turn off for 4 seconds. These delays shall insure smooth pump operation and prevent excessive electrical surges and water hammer.

The controller shall include; selector switch for alternation, HOA switch, and inputs for pump seal fail sensors and motor thermal sensors. If a seal fail is detected the pump with this condition shall be automatically demoted to lag pump until failure is corrected; Indicating lights for pump call, pump

run, temp and seal fail and high alarm. If a motor high temperature condition is detected, the pump shall be disabled in both the Hand and Auto operating modes and a dedicated alarm light shall be activated. Power input for controller shall be fused and transient protected. Float inputs shall utilize intrinsically safe isolation barriers and associated wiring methods. All input and output wiring shall use quick connect removable terminal strips. Duplex Pump Controller to be mounted through inner door of enclosure.

G. Control Panel. Provide properly sized circuit breaker starter to be of the soft starter type with adjustable ramp speed with overload protection, power distribution, ground, and neutral block, 115V control circuit with circuit breaker, phase monitor relay, and lightning arrestor (shipped loose for installation at incoming feed). ETM for each pump, non-reset type, and general-purpose duplex GFCI outlet to be mounted on inner door. Provide circuit breaker for GFCI outlet. Weatherproof exterior 3 ½" diameter flashing alarm light with red Lexan lens to be mounted on top of enclosure. The control panel shall provide dry contacts, rated 10 amps resistive at 120 VAC, for remote monitoring of each of the following statuses: Pump Running (1 each), Pump Alarm/Fault (1 each), High Level Alarm, Control Panel Summary Alarm.

H. Control Floats. Control Floats shall be normally open mercury wide angle type of the weighted design. Conery-2900 or equal.

I. Float Tree. Stainless Steel Float tree shall be provided with bolt down foot and evenly spaced hooks to keep floats from getting entangled.

2.04 Base Elbows

A. Base Elbow will be 4" discharge manufactured by F.E. Myers. Base elbow(s) shall include stainless steel upper guide rail brackets and stainless steel intermediate guide rail brackets if wetwell is greater than 21' in depth. Rail System shall be of the non-sparking design and shall be listed for explosion proof service. Base Elbow Model Number shall be SRA-46.

B. Components. Each lift-out rail system shall consist of: a ductile iron discharge base, cast iron pump attaching and sealing plate, cast iron pump guide plate, and cast iron elbow. All exposed nuts, bolts, and fasteners shall be of 300 series stainless steel. No fabricated steel parts shall be used.

C. Elbow. Discharge elbow shall be 4" x 6". Elbow shall bolt onto base and have standard 125 lb. flanges. Base elbows of a proprietary design will not be considered equal or approved. Rail systems requiring piping increasers to attach larger discharge pipe, which might interfere with pump installation and removal, will not be considered equal.

D. Sealing. A sealing plate shall be attached to the pump. A simple downward sliding motion of the pump and guide plate on the guide rails shall cause the unit to be automatically connected and sealed to the base. The open face of the sealing plate shall have dove-tailed groove machined into the face to hold a sealing "o"-ring. The "o"-ring shall provide a leak-proof seal at all operating pressures.

E. Guide Rails. Two rail pipes shall be used to guide the pump from the surface to the discharge base connection. The guide rails shall be 2 inch schedule 40 304 stainless steel pipe. The weight of the pump shall bear solely on the discharge base and not on the guide rails. Rail systems which require the pump to be supported by legs which might interfere with the flow of solids into the pump suction will not be considered equal. The guide rail shall be firmly attached to the access hatch frame. Systems deeper than 21 feet shall use an intermediate guide for each 21 feet of wetwell depth.

F. Lifting Chain. An adequate length of 3/8" stainless steel lifting chain shall be supplied for removing the pump. The chain shall be of sufficient length and shall include an adequate number of lifting rings for easy removal.

2.05 Hatches

A. Access lid and frame shall be aluminum with stainless steel hardware, designed, sized and furnished by pump manufacturer for the specific access, installation and structural requirements. Lid shall include safety handle to maintain lid securely in an open position. Lid shall be of skid-proof design.

2.06 Piping and Valves

A. Piping and Fittings: Flanged ductile iron ANSI/AWWA C115/A21.15; Class 125 flanges, ANSI/ASME B16.1.

B. Check Valve

1. Flanged swing check, ductile iron body, Class 125 flanges, 150 psi working pressure, stainless steel fitted, equipped with external backflush lever and stainless steel spring.

2. Valve shall be specifically designed for operation on discharge side of sewage pump as recommended by manufacturer. Valve shall be essentially leak free in preventing reverse flow. There shall be no leakage around the shaft.

C. Plug Valve

1. Valves shall be of the 90 degree turn, non-lubricated eccentric type with resilient faced plugs and shall be furnished with end connections as shown on the Drawings. Flanged valves shall be faced and drilled to the ANSI 125/150 pound standard. Mechanical joint ends shall be to the AWWA Standard C111-64, grooved ends per AWWA C-606-87. Screwed ends shall be to the NPT Standard.

2. Valve bodies shall be of ASTM A126 Class B cast iron. Bodies in 4 inch and larger valves shall be furnished with a 1/8 inch welded overlay seat of not less than 90 percent pure nickel, machined to mate with the resilient faced plug. **Valves that do not provide positive mating of the resilient faced plug with the nickel seat SHALL NOT BE ACCEPTABLE.**

3. Seat area shall be raised, with raised surface completely covered with weld to insure that the plug face contacts only nickel. **Screwed-in seats SHALL NOT BE ACCEPTABLE.**

4. Design of the valve shall provide for a rectangular port that allows contact between the welded nickel seat and the plug to occur only in the final 3 degrees of the plug movement. **Round ported valves as well as other non-eccentric action valves SHALL NOT BE ACCEPTABLE.**

5. Plugs shall be of ASTM A126 Class B cast iron. The plug shall have a cylindrical seating surface eccentrically offset from the center of the plug shaft. The interference between the plug face and the body seat, with the plug in the closed position, shall be externally adjustable in the field with the valve in line under pressure. The plug shall be completely coated with Buna-N suitable for use with sewage.

6. Valves shaft seals shall be of the multiple V-ring type and shall be externally adjustable and repackable without removing the bonnet or actuator from the valve under pressure. **Valves utilizing O-ring seals or non-adjustable packing SHALL NOT BE ACCEPTABLE**.

7. Valve pressure ratings shall be 175 psi through 12 inch and 150 psi for 14 inch through 72 inch. Valves shall provide driptight shutoff up to the full pressure rating with pressure in either

direction. Each valve shall be given a hydrostatic and seat test with the test results being certified in accordance with ANSI B16.1.

8. Valve actuators for manual valves shall have lever or gear actuators and tee wrenches, extension stems, floorstand, extended bonnet, etc., as indicated on the Drawings. All extended bonnets must have gear located at the operator. **Stem extensions with handwheel operators ARE NOT ACCEPTABLE EQUIVALENT**.

9. All valves 6 inch and larger shall be equipped with gear actuators. All gearing shall be enclosed in a semi-steel housing and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator. The actuator shaft and the quadrant shall be supported on permanently lubricated bronze bearings.

10. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque and to provide seat adjustment to compensate for change in pressure differential or flow direction change. All exposed nuts, bolts and washers shall be zinc plated.

11. Valve and gear actuators for buried or submerged service shall have seals on all shafts and gaskets on the valve and actuator covers to prevent the entry of water. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals. All exposed buts, bolts and washers shall be stainless steel.

12. Manufacturer: DeZURIK, Sartell, MN; Henry Pratt Co., Aurora, IL; or approved equal.

D. Pressure Gage: See Section 02733.

E. Piping: See Section 02733.

2.07 Spare Parts

A. One complete set of spare parts as recommended by manufacturer shall be furnished.

B. Spare parts shall be delivered to the Owner for storage and use as required, prior to project closeout.

C. Any spare parts consumed during the course of equipment startup shall be replaced by the equipment manufacturer.

D. Complete parts lists, indicating parts recommended for normal stock by the Owner, shall be provided as part of the Operation and Maintenance Manuals provided by the equipment manufacturer.

PART 3 EXECUTION

3.01 Examination

A. Verify site conditions under provisions of Section 01039.

B. Verify that concrete, piping, anchor bolts and all related structural supports are ready to receive Work and dimensions are as shown on Drawings and meeting the approval of the manufacturer.

C. Verify that electric power is available and of the correct characteristics.

D. Verify electrical, mechanical, piping, drives and control equipment are available and ready for installation.

3.02 Preparation

A. Verify all dimensions, elevations, concrete wetwell, piping, concrete foundation, piping and all related items.

B. Verify anchor bolt placement.

C. Verify all concrete work conforming to Drawings and meeting approval of the manufacturer.

D. Clean thoroughly the wetwell. Remove all debris.

E. Inspect all equipment for damage prior to installation. Damaged equipment shall not be installed.

3.03 Installation

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with standards required by authority having jurisdiction.

C. Install in accordance with International Mechanical Code (Latest Edition), National Electrical Code (Latest Edition), NEMA, OSHA and all other codes, regulations and guidelines as applicable.

D. Anchor equipment securely in place.

E. Sequence installation to insure piping and electrical connections are provided in a correct, orderly and expeditious manner.

F. Assemble all components as instructed by manufacturer.

G. Grout in place all installed equipment and facilities as instructed by manufacturer.

H. Shim all equipment as required with machinery wedges as recommended by manufacturer.

I. Level and plumb all equipment and piping. Verify installation elevations.

J. Install all pumps, drives and motors as recommended by manufacturer. Check rotation.

K. Install electrical and control equipment as instructed by manufacturer and in accordance with Division No. 16 and Section 15171. Provide connection to electrical service.

L. Lubricate all mechanical equipment as required by manufacturer prior to start-up.

3.04 Adjusting

A. Adjust Work under provisions of 01650.

B. Check all mechanical components for freedom of movement and rotation.

C. Check all anchors and supports. Tighten as required.

D. Adjust all level control settings as recommended by manufacturer.

3.05 Field Quality Control

A. Perform field inspection and testing under provisions of Section 01400.

B. The Contractor shall be totally responsible for furnishing a complete and fully operational system, including all details, equipment and facilities as required for a total and complete installation with first class workmanship and materials and equipment of the highest quality meeting these Specifications, the Drawings and the intent of the Contract Documents.

C. Electrical controls, switches, conduit, relays, wiring and all related items required for operation of the equipment, shall be of the highest quality with regard to materials and workmanship and shall meet all applicable codes.

D. All pumps shall be tested on-site in accordance with the manufacturers instructions. Certified test results shall be provided to the Engineer indicating that each pump meets or exceeds its required capacity head curve as indicated in the Schedule.

3.06 Start-Up

A. Provide start-up under provisions of Section 01650.

B. The services of a factory trained, qualified service representative of the equipment manufacturer shall be provided to inspect the complete installation to insure that it is installed in accordance with the manufactures recommendations, make all adjustments necessary to place system in trouble free operation and instruct the operating personnel on the proper care and operation of furnished equipment.

C. Start-up services shall be provided for one (1) day by an authorized manufactures representative.

D. Three (3) copies of O & M Manuals will be furnished.

3.07 Schedule

A. Influent Pump Station (Duplex)

1. Pump: Sulzer XFP PE1-PE3 Series Pump.

2. Impeller: One Vane Contrablock Plus Impeller, 7-11/16" diameter.

3. Discharge: Shall be 4" ANSI flange.

4. Motor: Shall be 7.5 460V/60Hz/3Ph Air Filled Motor Design.

5. Controls: Automatic using four mercury float switches. On-Off-Lag-Alarm.

6. Power Cord: Shall be triple sealed and epoxy potted. Each pump shall be equipped with a minimum of 49' of power cord.

7. Pump Operating Characteristics: Each pump shall have factory certified performance test with individual pump performance curve. Pump shall operate at following conditions:

a. O GPM @ 62' TDH

b. 200 GPM @ 50' TDH

c. 316 GPM @ 44' TDH (Design Point)

d. 590 GPM @ 30' TDH

[2280]
[Rev. 11/10]

END OF SECTION

B. Medium pressure or other lamp types with a polychromatic UV output, requiring a higher connected electrical load than that specified to deliver the specified total UV-C (254 nm) output wattage shall not be acceptable.

C. Lamps will be producing a minimum, new lamp (100 hours), output of 150 watts of UV-C energy at a wavelength of 253.7 nm (254 nm). Low pressure-low intensity of low pressure high intensity amalgam UV lamps with less than 150 watts UV-C output at 254 nm shall not be permitted due to increase quantity of lamps required.

D. UV output energy of the lamps shall be variable. The lamp will be capable of maintaining a UV-C output proportional to the variable power settings from the ballast. Low pressure low intensity or low pressure high output lamps with no capability to automatically vary the UV power output in operation shall not be permitted.

E. The manufacturer shall guarantee a minimum of 12,000 hours operating time for each lamp under normal operating conditions which include the following:

1. Maximum 4 on/off cycles per 24 operating hours.

2. Voltage fluctuation no greater than 10%±.

F. In case of premature lamp failure, the client is requested to send the lamp back to the UV System manufacturer together with the information of the UV unit serial number, hours run and on/off cycles. The UV manufacturer shall then offer the following:

1. Lamp failure before 1,000 h: UV manufacturer will send a replacement lamp free of charge.

2. Lamp failure after 1, 000 h: UV manufacturer will issue a credit proportional to the hours not used.

G. The UV manufacturer shall ensure disposal of returned lamps (old/used) at no costs to the Owner upon receipt of the returned lamps at the manufacturing headquarters. Shipping costs however shall be borne by the Owner.

H. UV lamps shall not require a long cool down period prior to re-start should the power to the UV system fail or be interrupted for a short period of time. Systems of lamps that require long cooling periods, (e.g. 10 – 30 minutes) before re-start are not acceptable.

I. The lamp output shall not fluctuate more than 3% due to water temperature variations between 40 - 100˚F.

J. The operating skin temperature of the UV lamp shall not exceed 130˚C in order to minimize the possibility of quartz fouling.

K. The lamp filaments shall be the clamped design, significantly rugged to withstand shock and vibration. Each lamp base shall incorporate a dielectric barrier on pin isolator. The pin isolator shall consist of a non-conductive divider placed between the lamp pins to prevent direct arcing across the pins in moist conditions. The barrier shall be dielectrically tested for 2500 volts.

L. UV lamp maximum arc length shall be 63 inches.

M. Lamp basis shall be of metal and ceramic construction resistant to UV and ozone.

2.06 UV Lamp Assemblies

SECTION 11388

SEQUENCING BATCH REACTOR (SBR) WASTEWATER TREATMENT PLANT

PART 1 GENERAL

1.01 Section Includes

A. Design Parameters

B. Basin Structure.

C. Aeration System.

D. Influent Plug Valve.

E. Decanter Assembly.

F. WAS Pump.

G. Portable Pump Hoist Assembly.

H. Diffuser System.

I. Blowers.

J. Air Control Valves.

K. Dissolved Oxygen Sensors.

L. Pressure Transducer.

M. Level Sensors.

N. Post-Equalization Transfer Pump.

O. Aerobic Digester Sludge Pump.

P. SBR Control Panel with Motor Starters.

Q. Programmable Logic Controller.

R. Software.

S. Spare Parts.

1.02 Related Sections

A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

B. The valves, equipment, materials of construction and controls specified under this section supersedes valves, equipment, materials of construction and controls specified elsewhere in the Contract Documents for the SBR system components specified in this Section.

ADDENDUM NO. 5

1.03 Submittals

A. Submit under provisions of Section 01300.

B. Product Data: Descriptive literature, shop drawings, details, dimensions, specified operating parameters, materials of construction, connections, electrical and control facilities, piping, valves, fittings and all related items.

C. Manufacturer's Installation Instructions: Indicate special installation requirements, configurations, elevations, dimensions, equipment and related items.

1.04 Operation and Maintenance Data

A. Submit under provisions of Section 01700.

B. Maintenance Data: Include all required start-up, operational, routine maintenance requirements, troubleshooting, including specific operational and maintenance instructions.

1.05 Spare Parts and Equipment

A. One complete set of spare parts and equipment as recommended by the Manufacturer shall be furnished (See Paragraph 2.25).

1.06 Delivery, Storage and Handling

A. Deliver Products to site under provisions of Section 01600.

B. Store and protect Products under provisions of Section 01600.

1.07 Project Record Documents

A. Accurately record actual location of all equipment and concealed utilities in accordance with Section 01700.

B. Provide electrical and control drawings reflecting any revisions made during installation or start-up.

1.08. Quality Assurance

A. In accordance with Section 01400.

1.09 Qualifications

A. Manufacturer: The SBR system shall be supplied by a company of good reputation that is regularly engaged in the manufacture and fabrication of SBR wastewater systems. The manufacturer must have a minimum of five years documented experience in manufacturing the specified equipment. The manufacturer's experience shall include a minimum of ten installations in the USA where equipment of similar size and design have been in operation successfully in a similar process for a minimum of five years. As a minimum, the supplier shall be the manufacturer of the following components: decanter, mixers, and controls. All SBR equipment listed in this specification shall be from a single source supplier unless indicated otherwise.

B. Installer: The installer shall have at a maximum five years documented experience in the installation of similar equipment and facilities.

1.10 Responsibility

A. The Contractor shall be responsible for the installation of all SBR equipment. The Contractor shall assign full responsibility for the functional operation of all SBR System components to a single source supplier unless indicated otherwise.

B. The Supplier shall be responsible for all engineering necessary in order to select, furnish, inspect the installing contractors equipment installation and connections, calibrate, and place into operation the SBR system along with all other equipment and accessories as specified herein.

1.11 Regulatory Requirements

A. All components and the completed total assembly installation shall comply with all OSHA Requirements, National Electrical Code (Latest Edition), IBC Mechanical Code (Latest Edition) and all other applicable codes, regulations and guidelines.

1.12 Field Measurements

A. Verify that field measurements are as shown on Drawings and as instructed by manufacturer.

B. Verify that all excavation work, shape, configuration, elevations, dimensions, and related work meeting equipment manufacturer's approval prior to installation of equipment.

1.13 Warranty

A. Except as otherwise specifically indicated herein, the SBR System manufacturer shall provide at least two (2) year parts and labor warranty on all of the SBR System components, including the decanter assemblies, transfer pumps, mixers, diffuser assemblies, valves, pipes, fittings, blowers, dissolved oxygen sensors, pressure transducers, level sensors, control panel, programmable logic controller, software and all related equipment.

B. The warranty period shall begin on the date of the Owner's written acceptance of the completed, installed, and fully operational SBR facility.

PART 2 PRODUCTS

2.01 General Description

A. The SBR System shall be designed to allow a single reactor to function as an equalization basin, aeration basin, and clarifier. The process shall be designed such that one reactor fills, while the other reacts, settles, and decants. Influent flow shall be alternated between two reactor basins. An aerobic digester and post-equalization basin shall be incorporated as part of the SBR System design. Flow-through SBR Systems will not be allowed.

B. The SBR System components shall be from a single source of supply.

C. The System manufacturer shall be completely responsible for the proper design of their system, including but not limited to, diffused aeration equipment, transfer pumps, mixers, decanters, and controls. All equipment shall perform as specified and the completed installation shall operate in accordance with the requirements of the Plans and Specifications.

D. The SBR area electrical classification shall be Class I, Division 2. All components and assemblies installed within the classified environment shall be designed and installed to operate within that environment, including proper seals to prevent the transmission of hazardous gases beyond the boundary of the classified area.

E. These specifications and accompanying drawings are based on the use of the AquaSBR System manufactured by Aqua-Aerobic Systems, Inc. and the ABJ SBR System manufactured by ITT Sanitaire Americas.

F. Manufacturer: The SBR System shall be the AquaSBR System, manufactured by Aqua-Aerobic Systems, Inc., Rockford, IL; the ABJ SBR System, manufactured by ITT Sanitaire Americas, Brown Deer, WI; or approved equal.

2.02 Manufacturer Service

A. The System manufacturer shall furnish the services of a factor trained representative for a maximum of 3 trips and 12 eight-hour days at the jobsite to inspect the installing contractor's equipment installation, supervise the initial operation of the equipment, instruct the plant operating personnel in proper operation and maintenance, and provide process assistance.

B. If additional service is required due to the mechanisms not being fully operational, at the time of service requested by the Contractor, the additional service days will be at the Contractor's expense. The System manufacturer may invoice the Contractor for the indicated service time for travel and living cost incurred and the System manufacturer's standard per diem field service rate.

C. See Paragraph 3.06.

2.03 Design Parameters

A. Average Daily Flow: 0.25 MGD.

B. Peak Hourly Flow: 0.50 MGD.

C. Maximum Daily Flow: 0.312 MGD.

D. Influent Design Loadings:

1. BOD5: 250 mg/l.

2. TSS: 250 mg/l.

3. TKN: 40 mg/l.

4. NH3-N: 28 mg/l.

5. pH: 6 to 9.

6. Phosphorous: 8 mg/l.

7. Alkalinity: 250 mg/l.

E. Effluent Design Loadings:

1. BOD5: 20 mg/l.

2. TSS: 20 mg/l.

3. NH3-N: 2 mg/l.

4. Total Nitrogen: 3 mg/l.

5. Total Inorganic Nitrogen: 2.5 mg/l.

6. pH : 6 to 8.6.

7. Phosphorous: 1 mg/l.

8. DO: 7 mg/l (minimum).

F. Jobsite Elevation: 1,132 Ft. MSL.

G. Ambient Air Temperature: 30˚F to 90˚F.

H. Alpha (maximum value allowed): 0.70.

I. Beta (maximum value allowed): 0.95.

J. F/M Ratio: As recommended by manufacturer.

K. MLSS (at low water level): 4,500 mg/l.

L. Cycles: Maximum cycles at maximum daily flow - 5.

M. Oxygen Requirements:

1. 1.25 lbs O2/lb BOD_5 applied.

2. 4.60 lbs O2/lb TKN applied.

N. Aeration: Maximum Hourly AOR – 43.125 lbs O_2/Hr.

O. System Control

1. Minimum Aeration Time: 1.73 hrs/cycle at maximum daily flow.

2. Minimum Mixing Time: 1.25 hrs/cycle at maximum daily flow.

3. Minimum Settling Time: 1.08 hrs/cycle at maximum daily flow.

4. Control strategy to be time based with level override. Flow and/or level based only control systems are not acceptable.

2.04 Basin Structure

A. The basin shall be of common wall concrete construction. The basins shall be constructed in accordance with the Drawings. See Section 03300 for concrete basin construction specifications. NO CHANGE IN BASIN GEOMETRY WILL BE ALLOWED.

B. SBR Basin

1. The SBR System shall be field erected in two (2) basins as shown on the Contract Drawing.

2. The inside dimensions of the basins shall be 30 feet by 30 feet. The basin shall be 20 feet in total depth.

3. Each basin shall have a minimum operating capacity of 124,540 gallons.

4. The minimum operating depth of the basin shall be 13.9 feet.

5. The maximum operation depth of the basin shall be 18.5 feet.

6. The centerline of discharge shall be 1 foot feet from LWL.

C. Aerobic Digester/Sludge Holding Basin

1. The Aerobic Digester/Sludge Holding Basin shall be an existing pond/basin shown on the Contract Drawing.

2. The basin shall have a minimum operating capacity of 57,600 gallons.

3. The basin shall provide a minimum 40 day SRT.

D. Post-Equalization Basin

1. The Post-Equalization Basin shall be field erected in one (1) basin as shown on the Contract Drawings.

2. The inside dimensions of the basin shall be 30 feet by 15 feet. The total depth of the basin shall be 6 feet.

3. The basin shall have a minimum operating capacity of 21,720 gallons. The basin shall provide a sufficient volume to hold the difference between the peak decant rate and the maximum flow rate of the plant.

4. The minimum operating level of the basin shall be 0 feet.

5. The maximum operation level of the basin shall be 4.0 feet.

2.05 Aeration System

A. The Aeration System is defined as the aeration supplied to the SBR. The Aeration System shall be designed to provide oxygen distribution to the entire basin. It shall also ensure mixing to promote suspension of all biological solids in the basin. The velocity and mixing in the basin shall be sufficient to ensure complete biological solids suspension and dispersion.

B. The Aeration System for the aeration basins shall be capable of providing mixing such that when operated under any combination of the specified design conditions it shall suspend all biological floc and mixed liquor suspended solids throughout the liquid mass in each basin. The Aeration System shall further be capable of maintaining complete aerobic conditions and suspension of biological floc and suspended solids throughout the liquid mass in each basin.

C. The Aeration System shall be designed to operate within a minimum of 13.9 feet and a maximum of 18.5 feet side water depth and shall be capable of transferring a sufficient amount of process oxygen (A.O.R.) into the wastewater.

2.06 Influent Plug Valve

A. Plug valve shall be an 8 inch diameter electrically operated flanged plug valve to control the influent flow to the SBR. Provide one valve for each basin influent line.

B. Valve shall be constructed of an ASTM A-126 Class B cast iron body with welded in nickel seat, neoprene coated cast iron plug, assembled and tested. The valve shall be a non-lubricated type with a port area of at least 80% of full pipe size.

C. Each valve shall include a manual override with limit switch feedback to the micro-processor in both the open and closed positions.

D. Field wiring and junction box/disconnect shall be provided by the Contractor.

E. Electric Actuator

1. The plug valve shall include a 115 volt, single phase, 60 cycle open/close service electric actuator. The valve actuator shall include a compartment heater. Provide one electric actuator for each influent plug valve.

2. The electric valve actuator shall be AUMA Model SG or SA as manufactured by AUMA Actuators, Inc., Canonsburg, PA.

F. Manufacturer: The influent plug valve shall be a Milliken 601-NO 125# flanged end connection as manufactured by Milliken Valve Company, Bethlehem, PA; DeZurik Model PEC as manufactured by DeZurik, Sartell, MC; or approved equal.

2.07 Decanter Assembly

A. One decanter assembly shall be provided for each SBR basin for a total of two decanter assemblies as specified. The decanters shall be designed to remove clarified effluent. The assembly shall be designed and constructed to operate within the Class 1, Division 2 atmosphere.

B. Floating Mechanical Decanter

1. The decanter assembly shall be a 6 x 4 mechanical floating decanter and related equipment accessories as described herein for each basin. Provide one decanter assembly for each SBR basin. Each decanter shall consist of an integral flotation unit, a stainless steel movable weir assembly, and an electric motor-driven actuator to open and close the weir.

2. Each decanter shall be capable of withdrawing decant fluid from 4-6 inches beneath the liquid surface, regardless of liquid depth, down to the minimum allowable water level specified below. The decant liquid shall be drawn through an adjustable weir opening of 2-6 inches. The weir shall be circular in shape and permit liquid to enter the decanter from the entire 360 degrees without obstruction.

3. The decanter shall meet the following conditions:

a. The maximum allowable water depth in the basin is 18.5 feet.

b. The minimum allowable water depth in the basin is 13.9 feet.

c. The centerline of each decant pipe must be located 1 foot below the low water level (LWL) by the Contractor.

d. The decanter shall be rated for an average flow of 710 gallons per minute.

4. Weir

a. The weir shall be constructed of 304 stainless steel, be circular in shape, and shall include vortex control baffles permanently affixed to the weir. The weir shall be attached to the actuator through a removable single shaft which shall also function as the torque restraint.

b. The weir actuator shall include a reversible electric motor operated linear actuator. The actuator shall be capable of operating with a closing force of 1500 pounds and shall operate from a 115 volt, single phase, 60 hertz source. Adjustable limit switches shall be included to permit adjustment of the weir opening. A coil spring shall be included to provide for travel after the weir has closed and provide desired closure pressure.

c. A corrosion resistant removable cover shall be included to provide protection to the actuator and motor during normal operation. The power section is painted steel. A #14 AWG ten-conductor power cable shall be provided from the NEMA 4X junction box of the unit to the basin wall.

d. Supply of junction box/disconnect at the basin wall shall be the responsibility of the Contractor.

5. Flotation

a. Each decanter assembly shall be equipped with a modular float constructed of fiberglass filled with closed cell polyurethane foam having a minimum 2.0 lbs/ft^3 density. Float shall be completely sealed to prevent the foam from being in contact with the external environment.

b. A urethane type seal shall be molded into the bottom of the float assembly to receive the decanter weir.

c. The float shall have 657 pounds of reserve buoyancy to ensure stability and to provide support flotation required during decanter servicing.

6. Restrained Mooring System

a. A restrained mooring system shall be furnished as part of the decanter assembly.

b. The restrained mooring assembly shall be a galvanized steel mooring frame which shall permit the assembly to move up and down following the change in liquid level while retrained within the vertical pylons.

c. The mooring frame shall consist of two – 4 inch diameter Schedule 40 vertical pylons with base plate constructed of galvanized steel. Each pylon and base-plate shall be attached to the basin floor and be filled with concrete by the installing Contractor.

d. Mooring post supports, if specified by the manufacturer, shall be provided for attachment to the basin wall by the installing Contractor.

7. Discharge Hose

a. Each decanter shall include a discharge hose of sufficient size to permit vertical movement of the decanter and provide sufficient capacity to handle the design decant flow rate.

b. Discharge hose shall be an 8 inch diameter EPDM tube, tire chord braided with helix wire reinforcement. A painted cast iron flanged end 90 degree elbow shall be provided. Proper flanged connections to the decanter and the discharge point shall be provided for trouble-free operation while permitting a means for disconnecting for service.

c. Through-the-wall pipe, gaskets, and hardware beyond the 90 degree elbow shall be provided by the Contractor. The Contractor shall provide a 3/4 inch valve with hose bib connection on the decant line between the decanter and the decant valve.

d. All piping, supports, gaskets, and hardware beyond the terminating flange of the decant pipe flexible joint shall be supplied by the installing Contractor.

8. Decant Flow Control Valve

a. The decant flow control valve shall be a AWWA C-504 Class 150B electrically operated butterfly valve to control the decant rate. Provide one decant flow control valve for each basin.

b. The electrically operated butterfly valve shall be 8 inches in diameter with ANSI Class 125# flanged end. The valve shall have an ASTM A-536 ductile iron body, ductile iron disk with a 316 stainless steel edge, fully lined EPDM seat vulcanized in the body, 304 stainless steel shaft assembled and tested with an electric actuator.

c. Each valve shall include a manual override with limit switch feedback to the microprocessor in both the open and closed positions.

d. Each valve shall include a 13 foot valve stem extension constructed of painted steel. Intermediate valve supports and hardware required for mounting of the extension shall be provided by the Contractor.

e. Field wiring, junction box/disconnect and provisions for valve access shall be provided by the Contractor.

f. Electric Actuator

1. Each valve shall include a 115 volt, single phase, 60 cycle open/close service electric actuator. Valve actuator shall include a compartment heater, winding protection, manual override and limit switch feedback in open and closed position. Provide one electric actuator for each decant flow control valve.

2. Actuator(s) include local controls consisting of push buttons, selector switches, and lights.

3. Actuators(s) shall be supplied with extensions and all other necessary hardware to ensure they are located outside of the bounds of the Class 1, Division 2 hazardous environment.

4. The electric actuator shall be a AUMA SG10 as manufactured by AUMA Actuators, Inc., Canonsburg, PA.

g. Manufacturer: The electrically operated decant flow control butterfly valve shall be a Milliken 511A as manufactured by Milliken Valve Company, Bethlehem, PA; or approved equal.

C. Endura® Series DDM Mixer

1. Furnish AquaDDM® mechanical floating mixer(s) and related equipment accessories as described herein for each basin.

2. Each mixer shall consist of a motor, direct-drive impeller driven at a constant speed, an integral floatation unit, and impeller volute. The entire mixer assembly shall be suitable for operation in a Class I Division 2 hazardous environment.

3. The Endura Series shall incorporate design enhancements that provide for three (3) years without routine maintenance (greasing).

   Quantity: 1 per basin.

   Mixer Properties

   Zone of Complete Mix: 55 ft.

   Direct Pumping Rate: 4,520 gpm.

   Recirculation Rate: 149,000 gpm.

   Basin Turnover Time: 0.813 Minutes at HWL.

   MLSS: 4,500 mg/l or less.

   Motor Size: 3 HP.

   Motor RPM: 1200 RPM.

   Efficiency: Premium.

   Mounting Base Material: 304 Stainless Steel.

   Float Diameter: 71 inches.

   Float Shell Material: Fiber Reinforced Polyester Skin (FRP).

   Impeller Volute Material: 304 Stainless Steel.

D. Performance

1. Each mixer shall meet the requirements summarized above. Complete mix shall be defined as maintaining biological suspension of all mixed liquor suspended solids with the specified MLSS concentration without the introduction of air.

E. Mixer Drive Motor

1. The motor shall be vertical P base design, totally enclosed fan cooled TEFC, and generally rated for severe duty. The motor shall in all cases equal or exceed standard NEMA specifications. A minimum factor of 1.15 shall be furnished.

2. The motor winding shall be nonhygroscopic, and insulation shall equal or exceed NEMA Class “F”. A lip seal shall be provided below the bottom bearing to prevent moisture from penetrating around the motor shaft. A condensate drain shall be located at the lowest point in the lower-end

bell housing. Unit shall have a one-piece motor shaft continuous from the top motor bearing, through the lower bearing and down to and through the propeller. The shaft shall be manufactured from 17-4 PH stainless steel.

3. Motor bearings shall be regreasable. Sealed bearings are not acceptable. Top bearing shall be shielded on the bottom side only. Bottom bearing shall be open. The top and bottom motor bearings shall be of combined radial and axial thrust type. The lower motor bearing inner brace shall be locked to the motor shaft via a special washer and locking nut arrangement. The shaft shall be threaded just below the lower bearing and shall have a keyway cut into the motor shaft. This key shall accept a tab from the inner diameter of the locking washer, and the locking nut shall have recesses to accept a tab from the outer diameter of the locking washer to prevent the nut from backing off. Snap ring type bearing retainers will not be acceptable.

4. Submerged motors, jet pumps, submerged gear motors or gearboxes shall not be acceptable.

F. Motor Mounting Base

1. The motor shall be securely mounted onto a solid base which is integral with the motor base extension. All submersed wetted motor mounting base components shall be constructed of 304 stainless steel.

2. The upper portion of the motor mounting base, immediately below the lower motor bearing, shall include two independent acting air seals. The two seals shall be capable of sealing off the flow of air from suction action of the pumped flow, and prevent backflow of liquid during impeller reversal. The lower end of the motor base extension shall be provided with a rotating backflow seal that will prevent grit from being introduced into the anti-deflection insert reservoir, but shall allow liquid to contact the shaft. The backflow seal shall not require scheduled lubrication or maintenance.

G. Floatation

1. Each unit shall be equipped with a modular float with a central float passage of a size to allow installation and removal of the pump impeller. The float shall be foamed full of polyurethane foam of the closed cell type, and shall be totally sealed to prevent the foam from being in contact with the external environment.

H. Impeller

1. The impeller shall be designed to pump the liquid from near the surface and direct it down toward the vessel/basin bottom. The impeller shall be a two-blade marine type precision casting of 316 or 15/5 stainless steel and shall be specifically designed for the application intended. It shall be dynamically and hydraulically balanced. The propeller must be attached to the motor shaft with a hardened stainless steel pin and set screw. Impeller shall be capable of being reversed to cause back flow liquid movement without causing damage to the mixer chassis and without causing upflow liquid damage to the motor bearing and windings. No liquid spray or other liquid leakage upward onto the surface of the motor support surface or flotation chassis will be allowed.

I. Intake Volute Assembly

1. The impeller shall operate in a volute made of stainless steel plate, minimum 3/16 inch thick.

J. Vibration

1. The entire rotating assembly including the motor rotor, shaft, shaft accessories, and impeller shall be dynamically balanced within 2.0 mils peak-to-peak horizontal displacement measured at the upper and lower motor bearing. Measurements shall be taken at a frequency equivalent to the

motor RPM. Measurements shall be taken with the motor in a vertical, shaft down position with the entire power section mounted on resilient pads.

K. Cable Mooring System

1. Each unit shall be provided with a mooring system, as described below:

a. Cable Material: 304 Stainless Steel.

b. Anchor Material: 304 Stainless Steel.

c. Anchor Type: Adhesive anchors by System Manufacturer.

d. Electrical Cable: #twelve-four conductor.

2. Each unit shall be provided with a maintenance cable mooring system complete with mooring cable, clips, thimbles, quick disconnects, anchors (if necessary), and extension springs as shown on the drawings. Field attachment of mooring points to the tank shall be the responsibility of the installing contractor.

L. Electrical Power Cable

1. Each unit shall include power cable wired into the motor conduit box and terminating at the basin wall. Electrical cable shall be supplied with kellems grips at the motor and basin wall terminations.

2. Electrical cable(s) shall be attached with cable ties provided by the equipment supplier.

3. Attachment of cable and supply of junction box/disconnect at the basin wall shall be the responsibility of the installing Contractor. Cables shall be suitable for installation using sealing fittings or connectors at the boundary of the classified and non-classified environments.

2.08 Sludge Wasting Pump (WAS)

A. The WAS pump shall be a submersible non-clog sludge pump located in the SBR basins. The assembly shall be designed and constructed to operate within the Class 1, Division 2 atmosphere. One pump shall be provided for each SBR basin. Pump shall be Flygt Model 3069 (2.4 HP).

B. Each pump shall be equipped with a submersible electrical motor connected for 460 volt, three phase, 60 hertz operation. Pump housing shall be painted cast iron. Pump shall include an adequate length of multi-conductor chloroprene jacketed type SPC cable suitable for submersible pump applications. The power cable shall also be sized according to NEC and ICEA standards.

C. The pump shall be supplied with a mating cast iron discharge elbow and be capable of delivering 40 GPM at 27 feet TDH. Each unit shall be fitted with an adequate length of stainless steel lifting chain of adequate strength to permit raising and lowering the pump.

D. The 3-inch diameter discharge connection elbow shall be permanently installed with the discharge piping. The pump shall be automatically connected to the discharge connection elbow when lowered into place, and shall be easily removed for inspection or service. There shall be no need for personnel to enter the basin or pump well. Sealing of the pumping unit to the discharge connection elbow shall be accomplished by a simple linear downward motion of the pump.

E. A stainless steel upper guide bar bracket shall be provided with each pump. The entire weight of the pumping unit shall be guided by galvanized steel guide bars and pressed tightly against the discharge

connection elbow with metal-to-metal contact. No sealing of the discharge interface by means of a diaphragm, O-ring, or other devices shall be acceptable. The pump, with its appurtenances and cable, shall be capable of continuous submergence underwater without loss of water tight integrity to a depth of 65 feet.

F. Supply of all discharge piping, supports, gaskets, and hardware beyond the flanged connection of the pump discharge connection elbow shall be the responsibility of the Contractor. The discharge piping shall be 3 inch diameter ductile iron. The pump shall be adequately sized to ensure a minimum velocity of 3 feet per second.

G. The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

H. The motor and pump shall be designed and assembled by the same manufacturer.

I. The combined service factor (combined effect of voltage, frequency, and specific gravity) shall be a minimum of 1.15. The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be designed for operation up to 40°C (104°F) ambient and with a temperature rise not to exceed 80°C.

J. Discharge Plug Valve

1. Each pump shall include a manually operated discharge valve to control the design transfer flow rate.

2. The valve shall be a 3 inch diameter plug valve with 125# flanged end connection. The valve shall have a ASTM A-126 Class B cast iron body with welded in nickel seat, neoprene resilient plug facing. The valve shall be non-lubricated type with a port area of at least 80% of full pipe size.

3. Valve shall be provided by the Manufacturer loose for installation within the discharge piping by the Contractor. Valve gaskets and hardware shall be supplied by the Contractor.

4. Valves shall be installed as indicated on the Contract Drawings.

5. Manufacturer: The manually operated discharge valve shall be a Milliken 601-N0 as manufactured by Milliken Valve Company, Bethlehem, PA; DeZurik Model PEC as manufactured by DeZurik, Sartell, MN; or approved equal.

K. Adhesive anchors of 304 stainless steel shall be provided for anchoring the pump.

2.09 Diffuser System

A. One complete diffuser system shall be provided for each SBR basin. Each diffuser system shall be as specified in C. Coarse Bubble Diffuser System.

B. Submittals: Submit information to establish compliance with the specifications in accordance with the provisions of Section 01300.

1. Submittal Drawings showing plan, elevation and cross sections of the equipment.

2. Component details of the aeration equipment showing diffusers, diffuser holders, gaskets retainer rings, supports, threaded union and/or flanged joints and a purge system.

3. Materials and Manufacturing Specifications.

4. Equipment booklet including:

   a. Equipment Data Sheets.

   b. Performance data including oxygen transfer calculations.

   c. Headloss calculations and pressure requirements.

   d. Descriptive literature and pressure requirements.

5. Operation and Maintenance Manual with installation instructions. Submit after approval of equipment and prior to shipment.

6. Detailed list of any exceptions taken to these specifications. Include specification reference and proposed alternative with reason stated for exception.

7. Shop Oxygen Transfer Test

   a. Conduct a performance test to demonstrate capability of the aeration equipment to meet the specified oxygen transfer requirements.

   b. Base all tests on the following criteria:

      1. A minimum of 3 tests for each specified condition in complete accordance with ASCE Clean Water Test Procedure (1192 or latest edition).

      2. Conduct tests by an independent aeration testing firm in a full scale aeration test tank (minimum of 200 sq. ft.) at the specified submergence and water depth with a diffuser density equivalent to the specified tank configuration. Diffuser density is defined as the ratio of the total tank surface area to the total active diffuser surface area.

      3. Conduct shop test with air rate and mass rate of oxygen transfer directly proportional to the ratio of the shop test tank volume and the design tank volume.

      4. Plot pounds of oxygen per day per 1000 cubic feet of tank volume versus air per 1000 cubic feet of tank volume in tap water at 14.7 psia, 20°C and zero dissolved oxygen at the specified submergence.

   c. Certify and stamp all tests by a Progression Engineer.

   d. Include all costs for the testing (exclusive of witness expenses) in the equipment price. All tests may be witnessed at Owner/Engineer option. Cost of travel and living expenses for Owner/Engineer to be paid by the Owner.

   e. Submit all test data from oxygen transfer tests for approval by the Engineer prior to manufacturing equipment.

C. Coarse Bubble Diffuser System

1. The aeration system for the SBR basins shall be a coarse bubble diffuser air system and shall be a fixed configuration as shown on the Drawings. One Coarse Bubble Diffuser System shall be supplied for each basin.

2. The aeration system shall be capable of delivering 605 SCFM for each SBR basin. Pressure at top of drop pipe shall be 8.6 PSIG.

3. The Maximum Oxygen Transfer Efficiency (Standard Conditions) allowable for the coarse bubble diffusers shall be 1% per foot of diffuser submergence.

4. The diffuser system shall consist of diffusers, supports, manifold, and riser pipe. Diffuser quantity is 10 duplex tubes per basin.

5. Each diffuser shall be constructed of cast stainless steel alloy equivalent to 316L SS Schedule 80. The diffuser manifold pipe internal to the basin shall be constructed of minimum 12 ga, stainless steel. Diffuser pipes shall be not less than six-inch nominal diameter. Each diffuser section shall be supplied with uniformly-spaced machined orifices located on the top of each section. Size and number of orifices shall be provided to ensure a uniform air distribution.

6. Each diffuser section and manifold pipe shall be supported at span lengths not greater than 6 feet by stainless steel supports. No unsupported end shall be longer than 2 feet. Diffuser sections shall be secured to the supports with a corrosion resistant retainer. Support brackets shall be adjustable to provide header leveling within ± 1/4 inch of a fixed elevation for each aeration basin.

7. The diffuser system shall be field assembled by the Contractor. All submerged PVC joints 8 inches and smaller shall be socket welded joints. Expansion joints shall be included to compensate for thermal expansion for PVC manifold runs longer than 40 feet. Pipe sizing, location and supports shall be shown on the Drawings. Diffuser sections and internal manifold piping shall have flanged connections for disassembly.

8. The 6 inch diameter stainless steel riser pipe shall terminate in a flanged connection at the top of the basin wall. All piping, gaskets, and hardware beyond the riser pipe's flanged connection shall be provided by the Contractor.

9. Adhesive anchors of 304 stainless steel shall be provided for anchoring the diffuser supports.

2.10 Blowers

A. The blowers shall be rotary lobe type, positive displacement blowers. Each blower shall be 40 HP, three phase, 460 volt, 60 cycle with T.E.F.C. Class F insulation premium efficiency U.S. Electric, Teco Siemens or equal motor. Each blower shall be capable of delivering the required amount of air at the design pressure (605 SCFM per blower discharge pressure of 8.62 PSIG). The blowers shall be manifolded for individual and/or combined operation.

B. Each blower assembly shall be complete and mounted on a base weldment with four-corner anti-vibration mountings, designed for direct application on a concrete slab or other solid foundation. Each assembly shall be suitable for shipment as a complete unit, factory assembled (less discharge pipe fittings) as much as possible to facilitate shipping and handling.

C. Equipment shall include a blower, electric motor, belts and sheaves, inlet filter, inlet silencer, discharge silencer, discharge check valve, rubber inlet sleeve and discharge connection, pressure relief valve, butterfly discharge isolation valve, rubber expansion joint, discharge pressure gauge, inlet vacuum pressure gauge, discharge temperature gauge, and a high temperature shut-down switch. A personnel protection guard shall be included over the belts and sheaves.

D. All inlet and outlet piping shall be installed so that no weight or strain will be imposed on the blower or silencers.

E. All gages and instruments are to be package mounted with all necessary tubing and hardware unless otherwise shown on Drawings. Location, height and angle shall allow ease in viewing by a standing operator.

F. The discharge liquid filled pressure gauge shall be installed on all blower discharge lines as follows:

1. Range: 0-20 psig.

2. Dial: 4 inch.

3. Case: 300 Series stainless steel.

4. Accuracy: ± 2% of span (Grade B)

5. Manufacturer: Equivalent to U.S. Gage, Ashcroft, Aerzen 32 -0053 -02, or approved equal.

G. The discharge pressure relief valve shall be a spring or weighted valve installed on the discharge silencer. Set the valve to 1.5 psig above the blower operating pressure. The relief valve shall be tested during a shop performance test.

H. The discharge butterfly isolation valve shall be installed on the discharge piping to isolate the blower from the air piping. Valve to have lever handle with notched plate.

I. Blower Enclosure

1. A blower enclosure shall be provided for each blower. The enclosure shall be a powder coated carbon steel acoustical hood with oil drip pan to help reduce the resultant noise level for each blower.

2. The enclosure shall be constructed of a powder coated galvanized steel with a sound absorbing internal surface to maintain attenuation levels of the room. Maintenance access doors shall be provided to facilitate servicing of the blower. The heavy duty enclosure shall include latch, and vents.

3. A baffled inlet shall be provided to allow supply and cooling air to enter the enclosure during the operation of the blower. An exhaust fan sized for proper enclosure ventilation will be supplied by the manufacturer.

4. Supply of concrete pad and installation of the blower enclosure shall be the responsibility of the Contractor.

J. System Blower Requirements

1. SBR

a. Blower shall be sized as recommended by the SBR Manufacturer.

b. Provide two blowers for the SBR basins.

c. Blowers shall provide sufficient air to maintain complete mixing as described in Paragraph 2.05 and achieve the required treatment levels indicated in Paragraph 2.03.

d. The butterfly discharge isolation valve shall be sized per the Manufacturer's recommendation.

2. Aerobic Digester/Sludge Holding

a. Blower shall be sized as recommended by the SBR Manufacturer.

b. Provide two blowers for the SBR basins. The SBR blowers can provide sufficient air for the proper operation with the SBR basins.

c. Blowers shall provide sufficient air to maintain complete mixing and provide adequate sludge digestion.

d. The butterfly discharge isolation valve shall be sized per the Manufacturer's recommendation.

K. Sufficient blower capacity shall be provided such that all operations can be performed simultaneously with any one blower off line. An isolation valve shall be included on all cross connection piping to allow blowers to operate in any combination necessary to meet back up supply requirements.

L. The blower package supplier shall supply a certified ASME PTC-9, Method B performance test data based on a factory 1.0 psi shop test. A certified test report, signed by a professional engineer, shall be submitted for record.

M. Manufacturer: The positive displacement blowers shall be Aerzen Model GM 25 S; Roots; Sutorbilt; or approved equal.

2.11 Air Control Valve

A. An electrically operated air control butterfly valve shall be provided by manufacturer – 2 shared for all SBR basins.

B. The valve shall be a 6 inch diameter, AWWA C-504 Class 150B valve, with ANSI class 125# flanged end ASTM A-536 ductile iron disk with a 316 stainless steel edge, fully lined EPDM seat vulcanized in the body, 304 stainless steel shaft assembled and tested. Valves shall be ABZ 397.

C. Each valve shall include a manual override with limit switch feedback to the microprocessor in both the open and closed positions.

D. Field wiring, junction box/disconnect and provisions for valve access shall be provided by the installing Contractor.

E. Electric Valve Actuator

1. The valve actuator shall be 115 volt, single phase, 60 cycle open/close service electric actuator. Provide one actuator for each butterfly valve.

2. The valve actuator shall include a compartment heater, motor winding protection, manual override, and limit switch feedback in the open and closed position.

3. Manufacturer: The electric valve actuator shall be a AUMA Model SG as manufactured by AUMA Actuators, Inc., Canonsburg, PA.

F. Manufacturer: The electrically operated butterfly valve shall be a Milliken Fig. 511 as manufactured by Milliken Valve Company, Bethlehem, PA; ABZ 397 as manufactured by ASC Engineered Solutions, Romeoville, IL; Bray Series 30 as manufactured by Bray Controls, Houston, TX; or approved equal.

2.12 Dissolved Oxygen Sensors

A. A dissolved oxygen sensor, transmitter, and signal converter shall be provided for each basin. The sensor/transmitter package shall be suitable for installation of the sensor within the classified environment, where the transmitter is located beyond the boundary of the classified environment.

B. A 304 SS handrail bracket and pipe shall be provided for each sensor for installation to the side of the basin.

C. Field wiring, conduit, and installation of cable shall be the responsibility of the Contractor.

D. Controller

1. Quantity: 1 per basin.

2. Model: SC4500.

3. Inputs: 2 per controller.

E. Probes

1. DO Quantity: 1 per basin.

2. DO Model: LDO.

F. Manufacturer: The dissolved oxygen transmitter shall be a Danfoss OXY 4100 with OXY 1100 sensor and the signal converter shall be a Danfoss USC 5000 as manufactured by Danfoss Inc., Milwaukee, WI; Aztec ADS420, Hach Model LDO or approved equal.

2.13 Pressure Transducer

A. Provide a submersible pressure transducer unit constructed of stainless steel for each basin. The transducer shall utilize a diffused silicone semiconductor sensor protected by an integral stainless steel diaphragm with seal fluid. The transducer/transmitter package shall be suitable for installation of the sensor within the classified environment, where the transmitter is located beyond the boundary of the classified environment.

B. Transducer output shall be a 4-20 mA signal. Electrical connection shall be to an attached two wire, 24 gauge polyethylene shielded cable. 35 feet of cable per unit shall be provided.

C. Attachment of the cable and supply of junction box/disconnect at the basin wall shall be the responsibility of the installing Contractor.

D. Transducers shall be suspended on a removable 304 stainless steel mounting pipe assembly.

E. Field attachment of the cables and brackets to the basin shall be the responsibility of the installing Contractor.

F. Adhesive anchors of 304 stainless steel shall be provided for anchoring the pressure transducer suspension cables and mounting pipe assembly.

G. Manufacturer: The submersible pressure transducer unit shall be the Keller Level rat as manufactured by Keller America, Inc., Newport News, VA; Wika Model LS-10 as manufactured by F.N. Cuthbert Inc., Toledo, Ohio; or approved equal.

2.14 Level Sensor

A. Equipment manufacturer shall furnish one (1) level sensor assembly consisting of an Anchor Scientific model GSI 40NONC float switch with a smooth, chemical resistant polypropylene casing, and 316 stainless steel mounting bracket for each basin. The assembly shall be designed and

constructed to operate within the Class 1, Division 2 atmosphere or shall utilize listed intrinsically safe isolation barriers and approved wiring methods.

B. Each float switch shall be provided with a three conductor electrical cable.

C. Electrical cable shall terminate at a junction box/disconnect located at the basin wall.

D. Field wiring and junction box/disconnect shall be provided by the installing contractor.

E. Field attachment of the level sensor assembly to the tank shall be the responsibility of the installing contractor.

2.15 Post-EQ Modulating Valve

A. Furnish electrically operated flanged butterfly valve for post-eq basin to control the effluent flow.

1. Valve Quantity: 1 per basin.

2. Valve Size: 8 inch.

3. Valve Model: Milliken 601.

4. Actuator: Auma.

5. Actuator Power: Three phase.

6. Actuator Type: Modulating.

B. Valve shall be a 125# flanged end connection, ASTM A-536 cast iron body with welded in nickel seat, coated non-lubricated ductile or cast iron plug with 80% port opening, assembled and tested with an electric actuator.

C. Valve actuator shall include motor winding protection, manual override, and limit switch feedback in the open and closed position. Actuator(s) include local controls consisting of pushbutton(s), selector switch(es), and light(s).

D. Field wiring and junction/box disconnect shall be provided by the installing contractor.

2.16 UV Flow Control Valve

A. Plug valve shall be an 8 inch diameter electrically operated flanged plug valve to control the effluent flow to the step aerator SBR. Provide one valve for UV unit.

B. Valve shall be constructed of an ASTM A-126 Class B cast iron body with welded in nickel seat, neoprene coated cast iron plug, assembled and tested. The valve shall be a non-lubricated type with a port area of at least 80% of full pipe size.

C. Each valve shall include a manual override with limit switch feedback to the micro-processor in both the open and closed positions.

D. Field wiring and junction box/disconnect shall be provided by the Contractor.

E. Electric Actuator

1. The plug valve shall include a 115 volt, single phase, 60 cycle open/close service electric actuator. The valve actuator shall include a compartment heater. Provide one electric actuator for each influent plug valve.

2. The electric valve actuator shall be AUMA Model SG or SA as manufactured by AUMA Actuators, Inc., Canonsburg, PA.

F. Manufacturer: The influent plug valve shall be a Milliken 601-NO 125# flanged end connection as manufactured by Milliken Valve Company, Bethlehem, PA; DeZurik Model PEC as manufactured by DeZurik, Sartell, MC; or approved equal.

2.17 Influent/Effluent Flow Meter

A. One influent and one effluent flow meter shall be provided. Flow meter shall be 6" Krohne Enviromag 2000 F series. Output shall be 4-20 mA.

B. The flow meter shall be provided loose to be installed and wired by the installing contractor.

2.18 SBR Control Panel with Motor Starts

A. The SBR Manufacturer shall furnish a complete SBR control system. This shall include a master control panel with a Graphic Operator Interface, Programmable Logic Controller, Motor Starts, Variable Frequency Drives, Control Switches, and Pilot Lights. The panel shall also provide monitoring and control for additional process systems as specified below. The panel shall include an internal light, service outlet, and be UL labeled for the intended use.

B. Local control stations shall be included for the Decanters, if required (per Manufacturer's recommendation). The local control station for the decanter shall consist of a 4-position switch enclosed in a NEMA 4X enclosure. The local station shall allow manual raise and lower control as well as off and automatic control.

C. The control system shall be designed to optimize the SBR process while minimizing operator attention and to accommodate the continuous maximum daily flow without adjusting cycle structures. The control software program shall be factory tested prior to installation at the jobsite.

D. The control system shall be a timer based system with level overrides and shall provide control, sequence, monitoring, and alarm annunciation capabilities. The operator shall be able to access the timer values and set points through the operator interface panel to allow for adjustment of cycle times and system flexibility. The control system shall be designed to automatically accommodate the plant's full range of loads and flows.

E. The control system shall include a circuit breaker, disconnect, control transformer, branch protection, motor starters, microprocessor control, indicator lights, HAND-OFF-AUTOMATIC selector switches.

F. Controlled Equipment: The incoming service of the control system shall be 460 volt, 60 hertz, three-phase. Motor starters for the equipment listed below shall be provided within the SBR control panel. Elapsed time indication shall be provided through the operator interface of the SBR control panel for equipment indicated by an asterisk(*).

1. SBR Equipment Description

a. Two – Influent Flow Control Valves – 8" with Actuators

b. Two – Blowers* (40 HP as recommended by Manufacturer)

c. Two – Decanter Valves

d. Two – Air Control Valves (up to two additional air control valves may be required, depending on the recommended manufacturer blower configuration)

e. Two – 4-20 mA D.O. Signals

f. Two – 4-20 mA Pressure Transducers

g. Two – Level Sensors

h. One – Common Alarm

i. Low D.O. Dry Contact Signal

j. High D.O. Dry Contact Signal

k. High Alarm D.O. Dry Contact Signal

l. Two – Aqua Direct Diver Mixers

m. Two – Decanter Assemblies

n. Two – Submersible Sludge Pumps

2. Post-SBR Equipment Description

a. One – 4-20 mA Pressure Transducer

b. One – Level Sensor

c. One – 4-20 mA Effluent Flow Meter Signal

d. One – 6” modulating flow control Valve

G. Additional Controlled Equipment: In addition, power, controls, monitoring, logging and reporting (as shown on the Contract Drawings) for the following equipment shall be included within the SBR control panel:

1. One – 4-20 mA Influent Flow Meter Signal.

2. One – Raw Water Screening and Compactor Control Panel

a. One – “Call to Run” Dry contact, based on Influent Flow Meter,

b. Eight – Dry contact status signals: Include Run Time and Fault for two motors plus four general status/alarm conditions.

3. One – Influent Duplex Pump Station Control Panel

a. Six – Dry contact status signals: Include Run Time and Fault for two motors plus two general status/alarm conditions.

4. Two – UV Disinfection System Control Panels

   a. One each – "Call to Run" Dry contact to activate UV Disinfection, based on SBR effluent flow, alternate activation between systems each time.

   b. One each – "System Disabled" Selector Switch located on the front of the SBR Control panel for input to SBR logic control,

   c. Four each – Dry contact status signals,

   d. One each – Modbus interface to UV controller for additional monitoring and control. Note: Primary control and monitoring shall be done through discrete dry contact hardwired interface.

5. Two – UV Flow Control Valve Actuators

   a. One each – Branch Circuit Power for operation,

   b. One each – Open/Close control and monitoring.

H. SBR Control Enclosure

1. The automatic controls shall be provided in a UL listed, NEMA Type 12 mild steel (12 gauge) floor mount enclosure that provides a degree of protection for electrical controls and components from dust, dripping water and external condensation of non-corrosive liquids.

2. The enclosure is intended for indoor installation. Enclosure shall include gasketed overlapping doors with a 3-point latch mechanism operated by an oil tight key-lock handle.

3. The enclosure shall have white polyester powder paint inside with ANSI 61 gray polyester powder paint outside over phosphatized surfaces.

4. The enclosure shall include a painted white mild steel (10 gauge) sub-panel mounted with collar studs.

5. Enclosure shall be manufactured by Hoffman or approved equal.

6. The control enclosure shall be mounted remotely.

7. Each control enclosure assembly shall be provided with corrosive inhibitors to protect interior electrical components from damage caused by high humidity. The corrosion inhibitors shall be installed prior to shipment to provide protection during shipment and storage of the enclosure. The corrosion inhibitor shall be Hoffman AHCI5E or approved equal.

I. Main Disconnect Circuit Breaker

1. A UL listed, automatic molded case 3-pole disconnect breaker shall be provided in the control enclosure(s). The primary function of the disconnect switch shall be to provide a means to manually open a circuit and automatically open a circuit under overload or short circuit conditions.

2. The disconnect breaker shall have a door mounted operating mechanism with trip indication.

3. Power distribution connectors shall be mounted integrally to the circuit breaker for multiple load connections. Integral connectors shall be provided.

4. The disconnect circuit breaker shall be a Square D/HDL, JDL, LDL, MDL, PDL or approved equal.

J. Branch Circuits

1. Each branch circuit for motors, valves and other remote mounted devices shall have a disconnect in the control encloser that satisfies the requirements of NEC Article 422 and Article 430. In accordance with NEC paragraph 110.25, the disconnect shall be capable of being locked in the open position and the provision for locking shall remain in place with or without the lock installed.

2. Provide branch circuits to power each valve actuator that is controlled by this panel.

K. Motor Starter

1. A full voltage non-versing integrated Motor Starter-Controller shall be provided for motor applications up to 15 kW. Each starter shall provide control, protection and monitoring functions for the motor.

2. The starter shall be NEMA rated IEC form factor and shall have certifications according to UL and CSA standards and shall be NEMA rated IEC form factor and shall have certifications according to UL and CSA standards and shall bear the CE marking.

3. The starter shall have a maximum rated operational voltage of 690V and provide a 42kA @ 480 VAC rated breaking capacity on short circuit.

4. The starter shall have a mechanical durability of 15 million operations.

5. The starter shall provide short circuit trip, thermal overload trip with selectable tripping class, under current trip and phase imbalance trip.

6. A full voltage non-reversing NEMA Style motor starter shall be provided for motor applications over 15 kW. Each starter shall consist of a circuit breaker, contactor and overload relay.

7. The starter shall be NEMA rated and shall have certifications according to UL and CSA standards and shall bear the CE marking.

8. The starter shall have a maximum rated operational voltage of 600V and provide a minimum 18 kA @480VAC and 25 kA @ 240 VAC interrupt rating on short circuit when used in combination with a PowerPact circuit breaker.

9. The starter shall have a mechanical durability of 2 million operations.

10. The solid state overload relay shall have class 10/20 (selectable) tripping characteristics with trip current adjustment, phase loss and unbalance protection.

L. Variable Frequency Drive **– NOT USED.**

1. UL Listed Variable Frequency Drives (VFD) shall be provided to control pumps and/or blowers.

2. The VFD's shall control pump and/or blower speed via an analog signal from the PLC.

3. The VFD output frequency shall be programmable.

4. The VFD shall be provided in a NEMA Type 20 panel mount package and rated for an operating temperature of -4° to 122°F (-20° to 50°C).

5. The VFD shall have a 65 kA maximum short circuit rating when protected with an Allen Bradley 140M motor circuit protector or Class CC/J fuse.

6. The VFD shall be Allen Bradley PowerFlex or approved equal.

M. Solid State Reduced Voltage Motor Starter

1. The solid state reduced voltage starter shall be 480V AC, 3-phase, rated and used for the controlled starting and/or stopping of AC induction motors.

2. The controller shall comply with UL, CSA, EN/IEC standards.

3. Each controller shall have selectable (off, 10, 15 or 20) overload trip class protection, over-temperature monitoring, phase reversal protection, phase loss, and phase imbalance features. The 120/240V AC integral control module provides reset and test pushbuttons with fault LEDs.

4 Each controller provides auxiliary contacts rated for 0.6 Amps at 120V AC. The solid state reduced voltage starter shall be Allen Bradley SMC-3 or approved equal.

N. Transformers

1. A step-down multi-tap transformer shall be supplied when there is a necessity to reduce incoming 3-phase power to 120 VAC single-phase.

2. The transformer power wire connections (incoming and outgoing) shall be protected with a finger safe cover to protect against accidental contact. Primary and secondary fuse protection shall be provided.

3. Transformer shall be UL listed and of continuous wound construction with vacuum impregnated with non-hygroscopic thermosetting varnish.

4. Transformer shall be Square D 9070T or approved equal.

O. Transformer Primary and Secondary Fuse

1. Properly rated fuses and fuse blocks shall be provided for primary and secondary protection of the transformer.

2. Each fuse shall be equipped with a thermoplastic cover to protect against accidental contact.

3. Clip style fuse block shall be rated up to 600 VAC and 100 amps, dual element, time delay fuses shall be rated up to 600 VAC.

4. Fuse blocks and fuses shall be UL listed. Fuses shall be Littelfuse Class CC or approved equal.

5. Fuse blocks and fuse covers shall be manufactured by Marathon or approved equal.

P. Circuit Breaker

1. All single phase branch or supplementary circuits shall be protected with a single-pole, C-Curve rated circuit breaker. Circuit breakers shall be rated for 240 VAC maximum, 50/60 Hz and UL 489 listed. Supplementary and branch protection circuit breakers shall be Merlin Gerin Multi 9 or approved equal.

Q. Fuse

1. Properly rated fuses and fuse holders shall be provided for protection of individual control devices (discrete and analog signals) mounted outside of the enclosure.

2. Each fuse shall be housed in a hinged type fuse block to protect against contact with the fuse.

3. Fuses shall be rated up to 250 VAC and be Littelfuse or approved equal.

4. Fuse holders for discrete devices shall be rated to 600 VAC and 30 Amps.

5. Fuse holders for analog devices shall be rated to 300 VAC and 15 Amps. Fuse holders shall be Allen Bradley 1492 or approved equal.

R. Operator Device

1. Operator devices (pushbuttons and selector switches) shall be mounted through the control enclosure door for all automatic controlled equipment.

2. Transformer type pilot lights and illuminated pushbuttons shall be provided for indication of an operation status.

3. Lights shall be a 6 VAC incandescent type lamp. Color coding shall be as required as follows:

   Amber – Alarm active, caution

   Green – Valve open, motor running

   Red – Valve closed

   White – Information

4. All operator devices shall be UL Listed, 30.5mm style, NEMA Type 4X rated, oil and water tight with finger safe guards located on the contact blocks to prevent accidental contact with wire connections.

5. Operator device function shall be identified with an engraved white Gravoply nameplate with lack letters. Operator devices shall be Square D 9001 or approved equal.

S. High Frequency Noise Filter

1. A UL listed active tracking filter shall be provided to protect the PLC and HMI power feeds from high frequency noise and low-energy transients. It shall be designed for a single phase input voltage of 120VAC operating at 50/60 Hz.

2. The unit shall provide surge capacity of 25,000 amps and provide transient protection in all modes (Line to neutral, line to ground and neutral to ground). The noise filter shall be a SolaHD STFV or approved equal.

T. Ground Fault Duplex Receptacle

1. A UL listed ground fault circuit interrupter (GFCI) duplex receptacle shall be provided within the panel for instrument (e.g. programming terminal, modem, etc.) use only.

2. The receptacle shall be protected with a 5 AMP circuit breaker.

3. The receptacle shall carry a 20A / 120VAC rating.

4. The electro-mechanical circuit interrupter shall be double-pole and trip free (GFCI protection and shall not be overridden by holding reset button). Built-in transient suppression shall protect GFCI's internal circuity from voltage transients. Receptacle shall be Hubbell DRUBGFI20 or approved equal.

U. 24 Volt DC Power Supply

1. A UL listed, industrial grade, compact power supply shall be supplied to provide 24 VDC power to such related components.

2. The power supply shall be DIN rail mounted and functional with input voltage of 100 to 240 VAC (single-phase) incoming control power.

3. The power supply shall have a green LED which shall be illuminated when output voltage is "OK". The power supply shall be an Allen Bradley 1606 or approved equal.

V. Control Relays

1. UL listed control relays for general control purposes shall be supplied with a pilot light to indicate when the coil is in an energized state.

2. The relay socket shall be panel or DIN rail mounted inside the enclosure.

3. The relays shall provide the following ratings: 120VAC coil, 10A contact rating (thermal), 250 VAC insulation rating and 5 million mechanical life cycles. Relays shall be Allen Bradley 700-HK, Square D, or approved equal.

W. Terminal Block

1. Standard feed-through screw terminal blocks, DIN rail mounted, shall be supplied for all point to point wiring connections.

2. All terminals shall be numbered per the wiring schematic printed markers. Terminals shall carry a 600V AC/DC voltage rating. Terminal blocks shall be Allen Bradley 1492; J4 (35A max) and 1492-J16 (85A max) or approved equal.

X. Programmable Logic Controller

1. Automatic operation of the AquaSBR shall be controlled through a programmable logic controller (PLC) mounted inside the main control panel.

2. The PLC components shall consist of a power supply, CPU, discrete input and output modules and analog input and output modules.

3. The processor unit shall include built-in USB and two (2) Ethernet IP communication ports and additional port(s) as required for communication with the UV system controllers - coordinate requirements with UV system supplier. All input and output points supplied (including unused) shall be wired to terminal blocks.

4. Processor design characteristics shall include: 1.0MB user memory size, real-time clock and calendar, battery backed RAM and an operating temperature range between 32°F and 140°F. The PLC processor shall be an Allen Bradley Compact Logix 1769-L30ER or approved equal.

5. Modular equipment shall be provided to complete the PLC system. These Allen Bradley components include: 1769-PA4 – Power Supply, 1769-IA16 – Discrete input (16 point) modules,

1769-OW16 – Discrete output (16 point) modules and 1769-IF8 – Analog input (8 point) modules, 1769-OF4CI – Analog output (4 point) modules.

Y. PLC Power Supply

1. Input voltage range of 85-265 / 170-265 VAC, 47-63 Hz, maximum inrush current of 30 amps, backplane output current of 4 amps @ 5V or 2 amps @ 24V, internal fuse protection, ambient operating temperature of 32°F to 140°F, Class I, Division 2 hazardous location certified, UL Listed.

Z. Discrete Input Module

1. Operating voltage of 79 to 132 VAC at 47 to 63 Hz, backplane current draw at 5VDC = 115mA, off-state current 2.5mA maximum, maximum inrush current 250mA, LED status indication of each point, ambient operating temperature of 32°F to 140°F, UL listed.

AA. Discrete Output Module

1. Operating voltage of 5 to 265 VAC at 47 to 63 Hz / 5 to 125 VDC, backplane current draw at 5 VDC = 205mA, at 24VDC = 180mA, off-state current leakage is 1.0mA, LED status indication of each point, ambient operating temperature of 32°F to 140°F, IL Listed.

BB. Analog Input Module

1. Backplane current draw at 5 VDC = 120mA, at 24VDC = 70mA, LED status indication of each point, ambient operating temperature of 32°F to 140°F, UL Listed.

CC. Analog Output Module

1. Backplane current draw at 5 VDC = 120mA, at 24VDC = 170mA, LED status indication of each point, ambient operating temperature of 32°F to 140°F, IL Listed.

DD. Ethernet Switch

1. An unmanaged Ethernet switch shall be provided inside the control enclosure to provide connectivity between the PLC, operator interface and plant networking.

2. The switch shall support both 10 and 100 Mbit/s operation.

3. The switch shall have five (5) 10/100Base-T ports with RJ-45 sockets and shall support auto-crossing, auto-negotiation and auto-polarity. Maximum distance between devices shall be 100m.

4. The unit shall be DIN rail mounted and required 24VDC power. Diagnostic LEDs for power and connection status shall be included. The Ethernet switch shall be UL listed and manufactured by Allen Bradley Stratix 2000 1783-US5T, or approved equal.

EE. Remote Ethernet Access Gateway

1. A cULus marked, remote access VPN gateway shall be supplied to securely connect to a PLC via the Internet using an Ethernet port and a secure VPN tunnel.

2. The gateway can be DIN rail or wall screw mounting and provide WAN/LAN 10/100 Mb Ethernet ports. The gateway shall be a Ewon Cosy + ETH.

FF. Human Machine Interface

1. The operator interface shall be a NEMA Type 12, 13, 4X rated, 10.4" diagonal, color touchscreen display with Ethernet and serial communications. The interface shall be a liquid crystal display (LCD).

2. The display type shall be color active matrix thin-fil transistor (TFT) with 800 x 600 pixel resolution.

3. The rated operating temperature shall be 32° to 131°F (0° - 55°C). The operator interface shall be an Allen Bradley PanelView Plus 7 Performance 10°.

GG. Control Panel Wiring and Assembly

1. All control enclosures shall be custom assembled and wired in an Underwriters Laboratories (UL) certified cabinet shop using quality materials and labor. Control Panels shall be Underwriters' Laboratories labeled for the intended use, including but not limited to UL 508A and UL 698A , by the panel manufacturer. Short circuit rating of control enclosure shall exceed the Potential Short Circuit Current (PSCC) at the panel; PSCC shall be verified with the local utility prior to development of submittals.

2. All control panel single conductor wire shall be 16 AWG multi-strand machine tool wire (MTW) minimum with PVC insulation.

2.19 Software

A. PLC: The PLC function shall be to control, sequence, and monitor the SBR.

B. Phase Control: The software shall provide for the regulation of the process cycles of the SBR up to the maximum daily flow of the plant.

C. Aeration Control: The software shall provide for the regulation of the aeration system to achieve optimum process control.

D. Component Monitoring: The software shall provide for the monitoring of components for fault conditions and the orderly alarming and logging of the fault.

2.20 Process Guarantee

A. Statement of Warranty: The System Manufacturer warrants to the Owner that if the Treatment System defined as Aqua Aerobic SBR (hereinafter known as The System) supplied by The System Manufacturer, is erected, started up, operated and maintained by the Owner in accordance with the System's Manufacturer's design and drawings, O & M manuals, and instructions, and when the influent wastewater to the System for each calendar month of performance testing is within all of the parameters as summarized in Paragraph 2.03.D. - Influent Design Loadings, and the conditions are met relating to the other unit processes included as a part of the overall treatment scheme, the System shall meet the specified effluent wastewater characteristics as summarized in Paragraph 2.03.E – Effluent Design Loadings.

B. The Process Performance Warranty Testing Program shall begin not less than sixty days from the date of Beneficial use of the Wastewater Treatment Facility in which the System is installed, and shall extend until such time that one of the following occurs:

1. A 30 day testing period shows that both influent wastewater characteristics and effluent values comply with this warranty.

2. A 30 day testing period shows that effluent values comply with this warranty, regardless of the influent characteristics.

3. Any monthly period shows the influent characteristics to exceed the limits specified; retesting is required by the Owner.

4. A 30 day retesting period shows that both influent wastewater characteristics and effluent values comply with this warranty.

C. Process Performance Warranty Testing

1. The Process Performance Warranty Testing shall be initiated following completion of the Preliminary Testing Program and will require the collection and laboratory analysis of not less than twelve nor more than twenty pairs (not necessarily consecutive) of influent and effluent samples as specified herein during a thirty day test period.

2. The System Manufacturer shall be notified in writing by the Owner prior to initiation of the Process Performance Warranty Testing and shall be permitted to witness any or all sampling and laboratory analysis performed.

3. Split samples will be provided as requested by the System Manufacturer.

D. Compliance With Warranty

1. If during the 30 day period of the Process Performance Warranty Testing Program, the monthly effluent wastewater characteristics meet the requirements indicated in Paragraph 2.04, then the Owner shall consider the System to have met all the requirements of the warranty.

2. The Owner shall then so notify the System Manufacturer in writing of compliance with the stipulated Process Performance Warranty.

E. Consequences of Influent and/or Effluent Not Conforming to Specified Limits

1. If during any monthly period of the Process Performance Warranty Testing Program, the influent wastewater characteristics are not within the specified limits and the effluent wastewater characteristics are more than the permitted values, then the Owner shall not deem the System to be in breach of the Process Performance Warranty for that period.

   a. Under these conditions, the Owner may take corrective actions as necessary until the influent wastewater characteristics meet the specified requirements for a minimum period of three weeks, until the system appears to have achieved steady-state conditions.

   b. The Owner may then recommence the Process Performance Warranty Testing.

2. If during any monthly period of the Process Performance Warranty Testing Program, the influent wastewater characteristics are within the specified limits and the effluent wastewater characteristics do not meet the specified limits, the Owner shall deem the System to be in breach of the Process Performance Warranty and shall issue in writing to the System Manufacturer a Notice of Non-Compliance.

3. Upon issuance of Notice of Non-Compliance as provided above, the System Manufacturer will provide a written performance evaluation of the System, and may recommend operational changes to obtain compliance, upon which the Owner shall initiate said operational changes within a reasonable period of time.

4. If installation of additional equipment or modifications to equipment are required, then the System Manufacturer shall initiate said equipment changes within a reasonable period of time, at no cost to the Owner.

5. Following modifications to process operations (operational changes), installation of additional equipment or modifications to existing equipment as recommended by System Manufacturer, and after a minimum period of three weeks, until the System appears to have achieved steady-state conditions, the Owner may then recommence the Process Performance Warranty Testing.

6. If the effluent values are not within those warranted after this retest, then the System Manufacturer shall be deemed in breach of this warranty.

7. The manufacturer herein agrees to continue working with the Owner, during the entire two year warranty period, as required to resolve any operational problems to achieve compliance.

2.21 Spare Parts

A. One complete set of spare parts as recommended by the manufacturer shall be furnished. The recommended spare parts to be furnished are:

1. One – Decanter linear actuator with capacitor.

2. One – Decanter limit switch with arm.

3. One – Input card.

4. One – Output card.

5. Two – Blower inlet filters for each blower supplied.

6. One – Set of bearings for each blower size.

7. One – Drive end cover seal for each blower size.

8. One – Set of gaskets for each blower size.

9. One – Set of V-belts, for each blower supplied.

B. Spare parts shall be delivered to the Owner for storage and use as required, prior to project closeout.

C. Any spare parts consumed during the course of equipment startup shall be replaced by the equipment manufacturer.

D. Complete parts lists, indicating parts recommended for normal stock by the Owner, shall be provided as part of the Operation and Maintenance Manuals provided by the equipment manufacturer.

PART 3 EXECUTION

3.01 Examination

A. Verify site conditions under provisions of Section 01039.

B. Verify that concrete, piping, anchor bolts and all related structural supports are ready to receive Work and dimensions are as shown on Drawings and meeting the approval of the manufacturer.

C. Verify that electric power is available and of the correct characteristics.

D. Verify the location and installation of all related mechanical equipment.

E. Verify the location of SBR equipment and controls.

F. Verify that the site has been prepared in accordance with Division No. 2 – Sitework.

G. Verify that the basins and related items have been constructed according to Division No. 3 - Concrete

3.02 Preparation

A. Verify all dimensions, location, elevations, configuration, foundations, mechanical equipment, supports, structural and all related items.

B. Verify anchor bolt placement.

C. Verify proposed installation conforming to Drawings and meeting the approval of manufacturer of the equipment and any related equipment.

D. Verify all SBR equipment items are on hand and of the correct size, function, and type of material.

E. Inspect all equipment for damage prior to installation. Damaged equipment shall not be installed.

F. Clean basins thoroughly. Remove all debris

3.03 Installation

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with standards required by authority having jurisdiction.

C. Anchor equipment securely in place in accordance with the Drawings.

D. Install in accordance with IBC Mechanical Code (Latest Edition), National Electrical Code (Latest Edition), NEMA, OSHA and all other applicable codes, regulations and guidelines.

E. Sequence installation to insure piping and electrical connections are provided in a correct, orderly and expeditious manner.

F. Assemble all components as instructed by manufacturer.

G. Grout in place all installed equipment and facilities as instructed by manufacturer.

H. Shim all equipment as required with machinery wedges as recommended by manufacturer.

I. Level and plumb all equipment. Verify installation elevations.

J. Install all drives and motors as recommended by manufacturer. Check rotation.

K. Install electrical and control equipment as instructed by manufacturer and in accordance with Division No. 16. Provide connection to electrical service. Coordinate with local electrical utility. . Utilize code compliant wiring methods for all materials and equipment installed in the hazardous area.

3.04 Adjusting

A. Adjust Work under provisions of Section 01650.

B. Check all mechanical components for freedom of movement and rotation.

C. Check all anchors and supports. Tighten as required.

3.05 Field Quality Control

A. Perform field inspection and testing under provisions of Section 01400.

3.06 Start-Up

A. Provide start-up under provisions of Section 01650 and as indicated herein.

B. The equipment manufacturer shall furnish the services of a factory trained representative for a minimum of three (3) trips and a minimum of twelve (12) eight-hour days at the jobsite to inspect the installation, start-up, supervise the initial operation of the equipment and the complete training and instruction of the plant operating personnel in proper operation and maintenance, control system and provide process assistance.

C. The equipment manufacturer shall provide as a minimum the following start-up services and shall include these services in the total cost of the equipment:

1. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence or other conditions which may cause damage.

2. Verify that all items listed in manufacturer's instructions have been checked prior to start-up.

3. Verify that all safety equipment, devices and mechanisms are properly installed, connected and fully operable.

4. Verify that all equipment protective devices including, but not limited to, overload switches/alarms, shutdown switches/alarms, high water level switches and alarms and similar equipment and devices are properly installed, connected and fully operable.

5. Verify that tests, meter readings and specified electrical characteristics agree with those required by the equipment or system manufacturer.

6. Verify wiring and support components for equipment are complete and tested.

7. Verify that all equipment and controls are properly installed, supported, connected and ready for operation.

8. Verify that all equipment and controls are properly set and adjusted for proper operation.

9. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, alarms, safety features, shutdown and all other miscellaneous features of each item of equipment to the Owner.

10. A complete set of operation and maintenance data and manuals shall be furnished to the Owner with the equipment delivery. See Section 01700.

11. Manufacturer shall demonstrate fully to the satisfaction of the Owner and Engineer that the equipment meets the required performance and is properly set and adjusted for its intended purpose in the overall plant operation.

12. If additional service is required due to the mechanisms not being fully operational, at the time of service requested by the Contractor, the additional service days will be at the Contractor's expense.

13. The selected SBR manufacturer shall have a free troubleshooting help line available 24 hours a day, 365 days per year for the life of the plant. The line shall connect to a live service technician who shall have the capability to the control panel via internet, with the operator's permission.

D. Prior to acceptance of the equipment, the manufacturer shall provide the Engineer with a written report stating that the system has been properly installed, properly started-up and is functioning properly.

E. Warranty

1. The Manufacturer shall provide a written warranty against defects in materials and workmanship. Manufacturer shall warrant the goods provided by the Manufacturer to be free from defects in materials and workmanship under normal conditions and use for a period of two (2) years from the date the goods are put into service, or thirty (30) months from shipment of equipment, whichever first shall occur. This warranty shall not apply to any goods or part which has been altered, applied, operated or installed contrary to the Manufacturer's instructions or subject to misuse, chemical attach/degradation, negligence or accident.

[2280]

[Rev. 11/10]

END OF SECTION

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

August 21, 2025

Correspondence ID#: AAL-51516
ALL BIDDING CONTRACTORS
Attn: COST ESTIMATOR

Project: CROSSVILLE WWTP AL
RE: EQUIP SPEC SECTION 11388 SEQUENCING BATCH REACTOR (SBR)
AASI PROJECT ID# 104009B

Enclosed please find our proposal package for the AquaSBR® Sequencing Batch Reactor and Post-EQ equipment, freight and supervision services for the above referenced project.

Aqua-Aerobic Systems, Inc. is offering the proposed equipment to meet the referenced specification(s), including Addendum Numbers 1-4, unless otherwise noted on our Exceptions/Clarifications document included with our proposal package, subject to approval by the Owner or the Consulting Engineer. Aqua-Aerobic Systems is the Basis of Bid Supplier of the equipment. Please take a moment to review our Exceptions/Clarifications document and our proposal notes for Aqua-Aerobic Systems' equipment terminations and items not included in Aqua-Aerobic Systems' scope of supply which are to be provided by the Installing Contractor.

You will be contacted by our local Sales Representative, listed below, on or before the day of the bid. Please contact them if you have any questions prior to that time, or if we can provide additional information.

Sincerely,

Bryce Hatfield
Project Application Engineer

CC: Aqua-Aerobic Systems, Inc.
Jamey Steffen / JSteffen@aqua-aerobic.com

Ferguson Enterprises, LLC d/b/a Templeton & Associates / ph#: 205-500-2168
Tim Boyne

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Proposal#: 175035

TO: All Bidding Contractors

PROJECT: CROSSVILLE WWTP AL

BID DATE: August 27, 2025

ATN: Cost Estimator

PROPOSAL DATE: August 21, 2025

CC: Ferguson Enterprises, LLC d/b/a Templeton & Associates / ph#: 205-500-2168 / fx#: N/A
Tim Boyne

Aqua-Aerobic Systems, Inc.
Jamey Steffen / JSteffen@aqua-aerobic.com

The following Notes apply to Aqua-Aerobic Systems' proposal:

- We are pleased to quote, for acceptance within 60 days of the bid date, prices and terms on equipment listed below.
- Equipment will be furnished by Aqua-Aerobic Systems with unloading of goods, civil work, and installation by the Buyer.
- Reference: Specification Section 11388 Sequencing Batch Reactor (SBR) Wastewater Treatment Plant

AquaSBR

Influent Valves

1 Influent Flowmeter will be provided as follows:

- 6" Krohne Enviromag series 2000 F magnetic inductive flow-meter

2 Influent Valve(s) will be provided as follows:

- 8 inch diameter Milliken 601 electrically operated eccentric plug valve(s) with 125# flanged end connection, ASTM A-126 Class B cast iron body with welded in nickel seat, coated ductile iron plug, assembled and tested with an Auma, single phase open/close service electric actuator.

Mixers

2 AquaDDM Direct Drive Mixer(s) will be provided as follows:

- 3 HP Model FSS Endura® Series AquaDDM® Mixer. Motor base and intake volute assemblies will be of 304 stainless steel. Float is fiber reinforced polyester skin (FRP), filled with closed cell polyurethane foam. Propeller is cast stainless steel. Motor will be premium efficient, TEFC, volt, 3 phase, 60 hertz, 1200 RPM with 1.15 service factor and Class F nonhygroscopic insulation. Motor shaft is one-piece 17-4 PH stainless steel.
- Class I Division II nameplate(s).

Mixer Mooring

2 Mixer Cable Mooring System(s) consisting of:

- #12 AWG-four conductor electrical service cable(s).
- Aerial support tie(s).
- Electrical cable strain relief grip(s), 2 eye, wire mesh.
- 304 stainless steel mooring cable(s).
- Maintenance mooring cable loop(s).
- Stainless steel mooring spring(s).
- 1/2" stainless steel eyebolt assembly(s).
- 1/4" 316 stainless steel wire rope thimble(s).

- 3/8" diameter 316 stainless steel quick disconnect snaphook(s).

Decanters

2 Decanter assembly(ies) consisting of:

- 6x4 Aqua-Aerobics decanter(s) with fiberglass float, 304 stainless steel weir, galvanized restrained mooring frame, and painted steel power section with #14-10 conductor power cable wired into a NEMA 4X stainless steel junction box with terminal strips for the single phase, 60 hertz actuator and limit switches.
- Aluminum band clamp heater integral to the decanter power section(s).
- 8 inch diameter hose with flanged connections.
- 304 stainless steel flanges and combination nipple.
- 8 inch diameter 90 degree 304 stainless steel elbow.
- 8 inch gasket kit(s).
- Mooring post stop assembly.
- Stainless steel anchors.
- 4" schedule 40 galvanized steel mooring post.
- Galvanized steel top mooring post supports.
- 8 inch Milliken Fig. 511A AWWA C-504 Class 150B electrically operated butterfly valve(s) with ANSI Class 125# flanged end ASTM A-536 ductile iron body, ductile iron disk with a 316 stainless steel edge, fully lined EPDM seat vulcanized in the body, 304 stainless steel shaft assembled and tested with an Auma, 115 VAC, 60 hertz, single phase open/close service electric actuator. Valve actuator includes compartment heater.

2 Valve Extension(s) will be provided as follows:

- Valve extension(s) stainless steel.

Transfer Pumps/Valves

2 Submersible pump assembly(ies) consisting of the following items:

- Flygt Model 3069, 2.4 HP, 3 phase, 60 cycle submersible pump(s) with painted cast iron pump housing, discharge elbow and multi-conductor electrical cable.
- 3 inch diameter Milliken 601 manual millcentric plug valve(s) with cast iron body, epoxy seat, flanged end style, EPDM coated ductile iron plug, stainless steel bearings, and manual operator.
- 3 inch diameter Nibco F-918-B check valve(s) with cast iron body with bronze disk.
- Galvanized guide bar(s).
- Stainless steel upper guide bar bracket(s).
- Stainless steel lifting chain(s).
- Stainless steel anchors.

Fixed Coarse Bubble Diffusers

2 Fixed Coarse Bubble Diffuser Assembly(ies) consisting of:

- 304 stainless steel drop pipe(s).
- 304 stainless steel manifold(s) with connection to drop pipe and air distribution header(s).
- Minimum 3" diameter 304 stainless steel air distributor(s).
- 304 stainless steel piping supports with vertical supports, clamps, adjusting mechanism and anchor bolts.
- Coarse bubble diffuser assemblies.

Positive Displacement Blowers

2 Positive displacement Blower Package(s), with each package consisting of:

- Aerzen GM 25S Rotary Positive Displacement Blower(s) with 40HP, three phase, 60 hertz motor will be provided by Aqua. Each blower will include base frame with integrated type silencer, V-belt drive, and guard. Blower accessories provided by Aqua will include intake filter-silencer with maintenance indicator, discharge silencer, integrated check valve, pressure gauge, and rubber expansion joint. Electrical wiring, junction box/disconnect, air manifolds, gaskets, and hardware to be supplied by the installing contractor.
- Acoustic hood made of galvanized steel with oil drip pan and powder coated finish.
- 6 inch ABZ series 397 manually operated butterfly valve(s) with lug style end, cast iron body, stainless steel disk, viton seat, stainless steel shaft with lever handle.
- Stainless steel anchors.

Air Valves

2 Air Control Valve(s) will be provided as follows:

- 6 inch Milliken Fig. 511A AWWA C-504 Class 150B electrically operated butterfly valve(s) with ANSI Class 125# flanged end ASTM A-536 ductile iron body, ductile iron disk with a 316 stainless steel edge, fully lined EPDM seat vulcanized in the body, 304 stainless steel shaft assembled and tested with an Auma, 115 VAC, 60 hertz, single phase open/close service electric actuator. Valve actuator includes compartment heater.

Level Sensor Assemblies

2 Pressure Transducer Assembly(ies) each consisting of:

- Pressure transducer(s).
- 304 stainless steel mounting bracket weldment(s).
- 304 stainless steel transducer mounting pipe weldment(s).
- Stainless steel anchors.

2 Level Sensor Assembly(ies) will be provided as follows:

- Float switch(es).
- 316 stainless steel float switch mounting bracket(s).
- Stainless steel anchors.

2 Junction Box(es) for Level Controls with Intrinsically Safe Relays consisting of:

- NEMA 4X 304 stainless steel junction box(es).
- Intrinsically safe relay(s).
- Intrinsically safe analog barrier(s).

Instrumentation

2 Dissolved Oxygen Assembly(ies) consisting of:

- Hach LDO dissolved oxygen sensing probe. Sensor constructed of stainless steel. Probe includes electric cable.
- 304 stainless steel mounting bracket weldment(s).
- 304 stainless steel transducer mounting pipe weldment(s).
- Stainless steel anchors.

2 Process Controller(s) consisting of:

- Hach SC4500 controller and display module(s).
- Sun shield(s).

Misc/Spare Parts

1 Set(s), Spare Parts will be provided as follows:

- (1) Decanter linear actuator.
- (1) Decanter linear actuator capacitor.
- Limit switch(es).
- (1) Limit switch arm.
- Input card(s)
- Output card(s).
- Analog input card(s).
- Analog output card(s).
- (1) 5 inch Inlet Filters.
- 1 Set, 40 HP blower V-belts.

AquaSBR: Post-Equalization

Transfer Pumps/Valves

1 Modulating Valve(s) will be provided as follows:

- 8 inch Milliken Fig. 511A AWWA C-504 Class 150B electrically operated butterfly valve(s) with ANSI Class 125# flanged end ASTM A-536 ductile iron body, ductile iron disk with a 316 stainless steel edge, fully lined EPDM seat vulcanized in the body, 304 stainless steel shaft assembled and tested with an Auma, three phase open/close service electric actuator.
- Auma actuator will be upgraded from open/close service to modulating service.

- 8" Krohne Enviromag series 2000 F magnetic inductive flow-meter

Level Sensor Assemblies

1 Sensor installation(s) consisting of:

- Pressure transducer(s).
- Stainless steel sensor guide rail weldment(s).
- PVC sensor mounting pipe(s).
- 1 1/2" Flexible hose.
- Top support(s).
- Stainless steel anchor kit(s).

1 Level Sensor Assembly(ies) will be provided as follows:

- Float switch(es).
- 316 stainless steel float switch mounting bracket(s).
- Stainless steel anchors.

1 Junction Box(es) for Level Controls with Intrinsically Safe Relays consisting of:

- NEMA 4X 304 stainless steel junction box(es).
- Intrinsically safe relay(s).
- Intrinsically safe analog barrier(s).

Controls

Controls w/Starters

1 Controls Package(s) will be provided as follows:

- NEMA 12 panel enclosure suitable for indoor installation and constructed of painted steel.
- Circuit breaker with handle.
- Transformer(s) with fuses.
- Fuse(s) and fuse block(s).
- Compactlogix Processor.
- Input card(s)
- Output card(s).
- Analog input card(s).
- Power supply(s).
- PanelView Plus 7 10" color touch screen display(s).
- Control relay(s).
- 115 V power line filter(s).
- Power supply(s).
- Selector switch(es).
- Pilot light(s).
- Size 0 motor starter(s) with motor circuit protector(s).
- Size 3 motor starter(s) with motor circuit protector(s).
- GFI convenience outlet(s).
- Remote access Ethernet modem(s).
- Panel will be UL listed and labeled.

Engineering: AquaSBR

Engineering

1 Set(s) Documentation will be provided as described:

- Operation & Maintenance Manuals (English language) in electronic format.

1 Set(s) Documentation will be provided as described:

- Engineer's Approval Data (English language) in electronic format.

Supervision/Freight

Supervision/Freight Domestic

1 Supervision Services and Freight Package(s) will be provided as follows:

- 4 Day(s) On Site for INSTALLATION SUPERVISION
- 1 Trip(s) for INSTALLATION SUPERVISION
- 4 Day(s) On Site for MECHANICAL SUPERVISION
- 1 Trip(s) for MECHANICAL SUPERVISION
- 4 Day(s) On Site for ELECTRICAL SUPERVISION
- 1 Trip(s) for ELECTRICAL SUPERVISION
- FREIGHT TO JOBSITE

The Following General Notes apply to Aqua-Aerobic Systems' Proposal:

- THE CONSOLIDATED APPROPRIATIONS ACT of 2014: The goods proposed are in compliance with the American Iron and Steel (AIS) requirements of the Consolidated Appropriations Act of 2014 as mandated in EPA's State Revolving Fund Programs as of the date of this proposal.
- SCHEDULE: We expect submittals to be completed and in transit to you within 8-10* weeks after receipt of order with acceptable terms and conditions and guarantee of payment. We expect receipt of approved engineer's submittal with release for manufacture within 4-8 weeks of our transmittal of submittal data. We expect shipment of equipment (transit time excluded) to be approximately 16-22* weeks (or control panel/valve lead times, whichever is more) from our receipt of approved engineer's submittal data and release for manufacture. Schedules may be adjusted at time of order placement, depending upon existing order backlog. *Weeks quoted are actual working weeks.
- We expect shipment of control panels (transit time excluded) to be approximately 24-30 weeks* from our receipt of approved engineer's submittal data and release for manufacture. The extended delivery on control panels is based on unprecedented supply chain delays associated with the COVID-19 pandemic. Schedules will be updated as new information becomes available.
- Schedule changes due to supply chain disruption may impact the above quoted times. Aqua-Aerobic Systems will advise if/when any such disruption applies.
- Aqua-Aerobic Systems will be closed for the Christmas Holidays beginning approximately December 24, through approximately January 2nd.
- PRICE ESCALATION INDEX: Aqua-Aerobic Systems, Inc. reserves the right to re-evaluate the pricing quoted prior to order acceptance if; 1) a purchase order is received after the validity date stated in this proposal or, 2) the lead times stated in this proposal are exceeded. Any pricing adjustments required shall be based on a published materials cost index specific to the materials proposed.
- TARIFF PRICE ESCALATION NOTE: The proposed goods may be affected by the recent U.S. Government proposed tariffs on imported steel and aluminum. Because of this, Aqua-Aerobic reserves the right to re-evaluate the pricing quoted prior to order acceptance if; 1) a purchase order is received past the validity date stated in the proposal or, 2) the total of the quoted lead times stated in this proposal are exceeded. Any pricing adjustments required due to tariff impacts will be based on published material cost indices specific to the affected materials.
- CONTROLS NON-DISCLOSURE / CONFIDENTIALITY AGREEMENT: If applicable, Aqua-Aerobic Systems will provide information relating to software documentation to control the treatment system supplied using Aqua-Aerobic Systems' proprietary and/or trade secret information subject to execution of an Aqua-Aerobic "Controls Non-Disclosure / Confidentiality Agreement".
- INTEGRAL DOCUMENTS: The following documents are an integral part of Aqua-Aerobic Systems' proposal:

1. Aqua-Aerobics' Process Design document dated 8/20/2025.
2. Aqua-Aerobics' Exceptions/Clarifications document dated 8/21/2025.
3. Aqua-Aerobic Systems' notated {contract} drawing numbers Sheet 10 and Sheet 11 and dated July 2025. Clouded items represent Aqua-Aerobic Systems' scope of supply.

The Following Mechanical and/or Electrical Notes apply to Aqua-Aerobic Systems' Proposal:

- Individual blowers are sized with a free air intake. Blowers attached to a common intake manifold or provided with inlet extensions must be evaluated for possible additional pressure and horsepower requirements. Blowers positioned inside a building must be provided with adequate louvered free air intake to prevent negative pressures which may cause poor performance and overheating.
- Blower discharge manifold and piping losses are assumed at 0.3 PSI for coarse bubble and 0.5 PSI for fine bubble from the blower termination flange to the diffuser assembly termination flange. Engineer to verify actual piping losses do not exceed the above. Inlet losses are assumed at 0.25 PSI for inlet silencer and a clean filter. No inlet losses have been assumed for inlet filter piping, and it is assumed that the filter is located on each blower package.

- Valve and line sizes are to be verified by the engineer based on actual line losses.
- Electrical cables provided by Aqua-Aerobic Systems, as stated in our proposal, will terminate at the basin wall at the termination point as shown on the drawings or (if undefined) at the point nearest the powered equipment.
- Motors quoted are direct-on-line start, unless otherwise noted. If Wye start delta run, wire connected, or other special motors are required, this must be clearly stated at time of order. In the event the requirement for a special motor affects the delivery or price quoted, you will be notified at the time of order acceptance.
- Three phase motors will be 460 volt.
- Single phase motors will be 115 volt.

The Following Scope Exclusion Notes apply to Aqua-Aerobic Systems' Proposal:

- Materials and Services not specifically described/itemized in this proposal are not included in the quoted total price, and are to be supplied by the installing contractor/purchaser.
- Equipment vault(s) (if applicable) must be supplied with drain and/or sump.

SCOPE BY PURCHASER/CONTRACTOR:
*Note this is not intended as a complete listing and is provided as a courtesy.
- Unloading and storage.
- Provisions for equipment access.
- Concrete, handrail and all civil works.
- All air and process piping, spool pieces, supports, gaskets and hardware beyond Aqua-Aerobic's equipment terminations.
- Interconnecting piping, wiring and installation.
- All flanges and/or unions in the piping to service the equipment.
- Motor starters and MCC (Motor Control Center).
- Electrical conduit, hardware, supports, attachment of cables, wiring and j-boxes (if any) between motors, electrical valves, instruments and the control panel.
- Installation/field wiring of the control panel(s) that ship loose.
- Electrical wiring and supply power.
- Concrete, volumes as required, to fill mooring posts.
- All costs associated with initial sludge seeding as require for startup, unless otherwise noted.

The Following Commercial Notes apply to Aqua-Aerobic Systems' Proposal:

- WARRANTY AMENDMENT: Aqua-Aerobic Systems warrants the goods provided by Aqua-Aerobic Systems in accordance with the "Warranty; Limitation Of Liability; And Disclaimer" as amended herein:

1. In accordance with Specification Section 11388 Sequencing Batch Reactor (SBR) Wastewater Treatment Plant; Warranty period shall be two (2) years from the date of the Owner's written acceptance of the completed, installed, and fully operational SBR facility.
2. Freight costs for goods repaired/replaced under warranty are included.
3. Labor costs for goods repaired/replaced under warranty are included.
4. Strike "Our warranty on accessories and component parts not manufactured by us is expressly limited to that of the manufacturer thereof."

- PROCESS GUARANTEE: A company backed process performance guarantee in accordance with the terms stated on Aqua-Aerobic Systems' process guarantee will be provided.

- F.O.B. JOBSITE; TITLE AND RISK OF LOSS: All prices and all shipments of goods are F.O.B. Jobsite City Location. It is the responsibility of the Buyer to unload shipments and utilizing the packing list and bill of lading provided with the shipment notate shortages/damages upon receipt of the shipments and notify Aqua-Aerobic Systems in writing within 7 days of the shortages/damages to facilitate filing of a freight claim. Delivery of the goods sold hereunder by the carrier shall be deemed delivered to Buyer, and upon such delivery, title to such goods and risk of loss or damage shall be upon Buyer.

- TAXES: State and/or local taxes are not included in the price but will be charged unless we receive a valid sales exemption certificate, direct pay permit, or other documentation required specifically by the taxing entity prior to shipment.

- PAYMENT TERMS: Subject to credit approval and guarantee of payment, we request the following progress

payments due Net 45 days from invoice issued for the designated event:

25% of total purchase price at our receipt of approved engineer's submittal data.
65% of total purchase price at shipment of goods.
10% of total purchase price at Owner Acceptance following Start-up or 6 months from shipment whichever occurs first.

-SCOPE OF SUPPLY NOTE: Aqua-Aerobic Systems' scope of supply (and pricing) is as described in this proposal, including the listed Integral Documents and the terms and conditions of sale. Please refer to the proposal notes and notated drawings for equipment terminations and items not included in the proposal which are to be provided by the Buyer. Engineer's submittal data will be prepared using these proposed goods and services, and the submittal approved by the Consulting Engineer will become an integral part of the scope of supply under the contract resulting from this offer. Any additions or deletions to the scope of supply will be presented as change orders.

- ASSIGNMENT: If the Project will include Assignment, Novation, Owner Direct Purchase (ODP) or any other type of assignment, the following will apply to that assignment.
- The original mutually agreed upon terms and conditions will apply to the assignment, with the following stipulations:
- Credit approval for the "Assignee" will need to be completed/reviewed and approved.
- The Assignment must occur prior to any shipment of any equipment.
- If a Payment bond providing protection to Aqua-Aerobic Systems in the original contract, confirmation of those bond rights will be required.

With regards to the payment terms:
- Payment Terms will need to be defined prior to "assignment" including identifying the party who will be responsible for which Milestone Payment Terms Events
- In addition, the tax status of each of those payments will need to be confirmed also.
- Is the Exemption part of the assignment, or would taxes apply to the Assignee and/or Assignor.

Once the above information can be confirmed, we can then proceed with the Assignment.
However, if these requirements are not able to be confirmed, then the assignment would not granted.

- TRADEMARKS: Aqua-Jet® Surface Mechanical Aerator, Aqua-Jet II® Contained Flow Aerator, AquaDDM® Direct-drive Mixer, Endura® Series Limited Maintenance Product, OxyMix® Pure Oxygen Mixer, OxyStar® Aspirating Aerator, Fold-a-Float® Self-Deploying Segmented Float, SAF-T-Float® Safe Accessible Float Technology, TurboStar® Directional Mixer, DualStar™ Directional Mixer, Aqua MixAir® Aeration System, Aqua CAM-D® Combination Aerator/Mixer/Decanter, AquaSBR® Sequencing Batch Reactor, AquaNereda®, Aqua MSBR® Modified Sequencing Batch Reactor, AquaPASS® Phased Activated Sludge System, Aqua EnduraTube® Fine-bubble Tube Diffuser, Aqua EnduraDisc® Fine-bubble Disc Diffuser, Aqua CB-24®Coarse-bubble Diffuser, Aqua TruDense™ True Densified Sequencing Batch Reactor, AquaDisk® Cloth Media Filter, AquaDiamond® Cloth Media Filter, AquaDrum® Pressure Series Cloth Media Filter, Aqua MiniDisk® Cloth Media Filter, Aqua MegaDisk® Cloth Media Filter, AquaPrime® Cloth Media Filter, AquaStorm® Cloth Media Filter, OptiComb® Backwash System, OptiFiber® Cloth Filtration Media, OptiFiber PES-13® Cloth Filtration Media, OptiFiber PA2-12® Cloth Filtration Media, OptiFiber PES-14® Cloth Filtration Media, OptiFiber PF-14® Cloth Filtration Media, OptiFiber UFS-9® Cloth Filtration Media, AquaABF® Automatic Backwash Filter, AquaPRS™ PFAS Removal System, Aqua PR-206™ PFAS Removal Sorbent, Aqua MultiBore® P-Series Polymeric Membrane System, Aqua MultiBore®C-Series Ceramic Membrane System, AquaMB Process® Multiple-Barrier Membrane System, Aqua-Aerobic® MBR Membrane Bioreactor System, Aqua ElectrOzone® F-Series Ozone Generator, IntelliPro® Monitoring and Control System. The Aqua-Aerobic logo, registered trademarks and pending trademarks are the property of Aqua-Aerobic Systems, Inc. Nereda® is a registered trademark of Royal HaskoningDHV. All other products and services mentioned are trademarks of their respective owners.

GOODS QUOTED ABOVE WILL BE SOLD SUBJECT ONLY TO THE TERMS AND CONDITIONS OF SALE SET FORTH HEREIN. ANY DIFFERENT OR ADDITIONAL TERMS ARE HEREBY OBJECTED TO.

Total Price:

TERMS AND CONDITIONS OF AQUA-AEROBIC SYSTEMS, INC. (A Metawater Company)
Page 1 of 2

This offer and all of the goods and sales of Aqua-Aerobic Systems, Inc. are subject only to the following terms and conditions. The acceptance of any order resulting from this proposal is based on the express condition that the Buyer agrees to all the terms and conditions herein contained. Any terms and conditions in any order, which are in addition to or inconsistent with the following, shall not be binding upon Aqua-Aerobic Systems, Inc. This proposal and any contract resulting therefrom, shall be governed by and construed in accordance with the laws of the State of Illinois, without regard to conflicts of laws principles. Resale of any products purchased from - Aqua-Aerobic Systems, Inc, is not permitted without prior written agreement with Aqua-Aerobic Systems, Inc expressly consenting to such resale. Any party who sells a product purchased from Aqua-Aerobic Systems, Inc, is subject to the terms and conditions included herein.

DURATION OF QUOTATION
This proposal of Aqua-Aerobic Systems, Inc. shall in no event be effective more than 30 days from date thereof, unless specifically stated otherwise, and is subject to change at any time prior to acceptance.

PROPRIETARY INFORMATION
This proposal, including all descriptive data, drawings, material, information and know-how disclosed by Aqua-Aerobic Systems, Inc. to Buyer in relation hereto is confidential information intended solely for the confidential use of Buyer, shall remain the property of Aqua-Aerobic Systems, Inc. and shall not be disclosed or otherwise used to the disadvantage or detriment of Aqua-Aerobic Systems, Inc. in any manner.

PAYMENT TERMS; ORDERS;
Unless specifically stated otherwise, quoted terms are Net 30 Days from invoice date. Past-due charges are 1.5% per month and will apply only on any past-due balance. Aqua-Aerobic Systems, Inc. does not allow retainage of any invoice amount, unless authorized in writing by an authorized representative of our Loves Park, Illinois office. Terms of payment are within Aqua-Aerobic Systems, Inc's sole discretion, and unless otherwise agreed to by Aqua-Aerobic Systems, Inc, payment terms must be accepted by Aqua-Aerobic Systems, Inc prior to Aqua-Aerobic Systems' acceptance of an order. Payment for the products must be made by approved credit card, check, wire transfer, or some other prearranged payment method unless credit terms have been agreed to by Aqua-Aerobic Systems, Inc. Invoices are due and payable within the time period noted on the invoice, measured from the date of the invoice. Orders are not binding until accepted by Aqua-Aerobic Systems, Inc.

SECURITY
If at any time the financial responsibility of the Buyer becomes unsatisfactory to Aqua-Aerobic Systems, Inc., or Aqua-Aerobic Systems, Inc. otherwise deems itself insecure as to receipt of full payment of the purchase price from Buyer hereunder, Aqua-Aerobic Systems, Inc. reserves the right to require payment in advance or security or guarantee satisfactory to Aqua-Aerobic Systems, Inc. of payment in full of the purchase price.

SHIPMENT
Shipping dates are not a guarantee of a particular day of shipment and are approximate, being based upon present production information, and are subject to change per the production schedules existing at time of receipt of purchase order. Aqua-Aerobic Systems, Inc. shall not be responsible for any delay in shipment for causes beyond its control including, but not limited to, war, riots, strikes, labor trouble causing interruption of work, fires, other casualties, transportation delays, modification of order, any act of governmental authorities or acts of God. Quoted shipment dates in this proposal are approximate dates goods will be shipped and, unless agreed to in writing by Aqua-Aerobic Systems, Inc., Buyer may not postpone or delay the dates of shipment of goods from our plant or from our supplier's plants beyond the dates set forth in this proposal. Buyer is required to notify Aqua- Aerobic Systems, Inc within 7-days of any discrepancies with shipment.

SHIPPING CHARGES; TAXES and OTHER RELATED FEES. Separate fees for shipping and handling will be charged on all purchases unless specifically stated otherwise. Prices quoted do not include any taxes, customs duties, or import fees. The Buyer is responsible for sales use and all other taxes and fees associated with the purchase. If aqua-Aerobic Systems, Inc. is required by any taxing authority to collect or to pay any such tax, duty or fee, the Buyer shall be separately billed at such time for the amounts Aqua-Aerobic Systems, Inc is required to pay

TITLE AND RISK OF LOSS
F.O.B. Destination - Delivery of goods to the destination shall be deemed delivery to the Buyer, and upon such delivery, title to such goods and risk of loss or damage shall be upon Buyer.

F.O.B. Aqua-Aerobic Systems, Inc's plant at Loves Park, Illinois - Delivery of the goods sold hereunder to the carrier shall be deemed delivery to the Buyer, and upon such delivery, title to such goods and risk of loss or damage shall be upon Buyer.

INSURANCE
Unless the goods are sold on a CIF basis, the Buyer shall provide marine insurance for all risks, including war and general coverage. Aqua-Aerobic Systems, Inc will provide evidence of coverage upon request. At no time will Aqua-Aerobic Systems, Inc issue a certificate of insurance listing Buyer as additional insured unless under fully executed contract and Aqua-Aerobic Systems, Inc is providing start-up services.

LIMITATION OF ACTION
No action shall be brought against Aqua-Aerobic Systems, Inc. for any breach of its contract of sale more than two years after the accrual of the cause of action thereof, and, in no event, unless the Buyer shall first have given written notice to Aqua-Aerobic Systems, Inc., of any claim of breach of contract within 30 days after the discovery thereof.

CANCELLATION CLAUSE
No acceptance of this proposal, by purchase order or otherwise, may be modified except by written consent of Aqua-Aerobic Systems, Inc. nor may it be canceled except by prior payment to Aqua-Aerobic Systems, Inc. the following sums as liquidated damages therefore: 1) If cancellation is prior to commencement of production and prior to the assumption of any obligations by Aqua-Aerobic Systems, Inc. for any materials or component parts, a sum equal to 15% of the total purchase price; 2) If cancellation is after the commencement of production or after the assumption of any obligations by Aqua-Aerobic Systems, Inc. for any materials or component parts, a sum equal to the total of the direct, out-of-pocket expenses incurred to the date of cancellation for labor, machine time, materials and any charges made to us by suppliers for cancellation, plus 30% of the total purchase price. All charges and expenses shall be as determined by Aqua-Aerobic Systems, Inc. In the event any items are used by Aqua-Aerobic Systems, Inc. to fill a subsequent order, then upon receipt of payment for such order, Aqua-Aerobic Systems, Inc. shall pay the Buyer a sum equal to the direct out-of-pocket expenses previously charged and received from Buyer.

TERMS AND CONDITIONS OF AQUA-AEROBIC SYSTEMS, INC. (A Metawater Company)

QUALIFIED ACCEPTANCE AND INDEMNITY
In the event the acceptance of this proposal by Buyer either is contingent upon or subject to the approval by any third party such as, but not limited to, a consulting engineer, with respect to goods, parts, materials, descriptive data, drawings, calculations, or any other matter, then upon such approval by any third party, Aqua-Aerobic Systems, Inc. shall have no liability to Buyer or to any third party so long as the goods sold and delivered by Aqua- Aerobic Systems, Inc. conform to this proposal. In the event any such third party requires modifications in the proposal prior to the approval thereof, Aqua-Aerobic Systems, Inc. may at its sole option and without liability to any party elect to cancel this proposal or return the purchase order to Buyer. In the event Aqua-Aerobic Systems, Inc. elects to modify this proposal to conform to the requirements for approval by any third party, Aqua- Aerobic Systems, Inc. in such event shall have no liability to Buyer or to any third party so long as the goods sold and delivered by Aqua-Aerobic Systems, Inc. conform to this proposal as modified.

Buyer agrees to indemnify and save harmless Aqua-Aerobic Systems, Inc. from and against all costs and expenses and liability of any kind whatsoever arising out of or in connection with claims by third parties so long as the goods sold hereunder conform to the requirements of this proposal as approved by any third party.

WARRANTY; LIMITATION OF LIABILITY; AND DISCLAIMER
In return for purchase and full payment for Aqua-Aerobic Systems, Inc. goods, we warrant new goods provided by us to be free from defects in materials and workmanship under normal conditions and use for a period of one year from the date the goods are put into service, or eighteen months from date of shipment (whichever first occurs). If the goods include an "Endura Series" motor, the complete Endura Series unit shall be warranted by Aqua-Aerobic Systems, Inc to be free from defects in materials and workmanship under normal conditions and use for three years from the date the product is put into service or 42 months from the date of shipment (whichever occurs first).

OUR OBLIGATION UNDER THIS WARRANTY IS EXPRESSLY AND EXCLUSIVELY LIMITED to replacing or repairing (at our factory at Loves Park, Illinois) any part or parts returned to our factory with transportation charges prepaid, and which our examination shall show to have been defective. Prior to return of any goods or its parts to our factory, Buyer shall notify Aqua-Aerobic Systems, Inc. of claimed defect, and Aqua-Aerobic Systems, Inc. shall have the privilege of examining the goods at Buyer's place of business or where the goods have otherwise been placed in service. In the event this examination discloses no defect, Buyer shall have no authority to return the goods or parts to our factory for the further examination or repair. All goods or parts shall be returned to Buyer, F.O.B. Loves Park, Illinois. This warranty shall not apply to any goods or part which has been repaired or altered outside our factory, or applied, operated or installed contrary to our instruction, or subjected to misuse, chemical attack/degradation, negligence or accident. This warranty and any warranty and guaranty of process or performance shall no longer be applicable or valid if any product, including any software program, supplied by Aqua-Aerobic Systems, Inc., is modified or altered without the written approval of Aqua-Aerobic Systems, Inc. Our warranty on accessories and component parts not manufactured by us is expressly limited to that of the manufacturer thereof.

THE FOREGOING WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND OF ALL OTHER LIABILITIES AND OBLIGATIONS ON OUR PART, INCLUDING ANY LIABILITY FOR NEGLIGENCE, STRICT LIABILITY, OR OTHERWISE; AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY DISCLAIMED; AND WE EXPRESSLY DENY THE RIGHT OF ANY OTHER PERSON TO INCUR OR ASSUME FOR US ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ANY GOODS PROVIDED BY US. THERE ARE NO WARRANTIES OR GUARANTEES OF PERFORMANCE UNLESS SPECIFICALLY STATED OTHERWISE.

UNDER NO CIRCUMSTANCES, INCLUDING ANY CLAIM OF NEGLIGENCE, STRICT LIABILITY, OR OTHERWISE, SHALL AQUA-AEROBIC SYSTEMS, INC. BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, COSTS OF CONNECTING, DISCONNECTING, OR ANY LOSS OR DAMAGE RESULTING FROM A DEFECT IN THE GOODS. LIMIT OF LIABILITY: AQUA-AEROBIC SYSTEMS, INC.'S TOTAL LIABILITY UNDER THE ABOVE WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT OF ANY DEFECTIVE PART. THE REMEDIES SET FORTH HEREIN ARE EXCLUSIVE, AND OUR LIABILITY WITH RESPECT TO ANY CONTRACT OR SALE, OR ANYTHING DONE IN CONNECTION THEREWITH, WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY, OR OTHERWISE, SHALL NOT, IN ANY CASE, EXCEED THE PRICE OF THE GOODS UPON WHICH SUCH LIABILITY IS BASED.

Final acceptance of this proposal must be given to Aqua-Aerobic Systems, Inc. at their office in Loves Park, Illinois. Please acknowledge acceptance by signing the proposal and returning it to Aqua-Aerobic Systems, Inc.

Accepted by:

Company: _____

By: _____ **Date:** _____

Offer Respectfully Submitted,

Bryce Hatfield, Project Application Engineer
Aqua-Aerobic Systems, Inc.

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Process Design Report

CROSSVILLE WWTP AL

Design# 175035

Option: Process Design

AquaSBR®

Sequencing Batch Reactor

August 20, 2025

Designed By: Bryce Hatfield

6306 N. Alpine Rd Loves Park, IL 61111
(815) 654-2501 www.aqua-aerobic.com

ADDENDUM NO. 5

Upstream Recommendations

- Neutralization is required ahead of the biological system if the pH is expected to fall outside of 6.5-8.5 for significant durations.

- Coarse screening and grit removal is recommended (by others) ahead of the biological system.

- Elevated concentration of hydrogen sulfide can be detrimental to both civil and mechanical structures. If anaerobic conditions exist in the collection system, steps should be taken to eliminate hydrogen sulfide prior to the treatment system.

- Fats, oils, and grease (FOG) removal may be necessary (by others) if the wastewater contains significant amounts of FOG. Historical data suggests levels less than 60 mg/l on a daily average basis (based on a 24 hour composite sample), along with a maximum of 90 mg/l is appropriate for biological treatment. If FOG levels above this are anticipated, please discuss with Aqua-Aerobic Systems to understand the impacts of elevated FOG on the system performance.

Flow Considerations

- The maximum flow, as shown on the design, has been assumed as a hydraulic maximum and does not represent an additional organic load.

Biological Process

- The decanter performance is based upon a free-air discharge following the valve and immediately adjacent to the basin. Actual decanter performance depends upon the complete installation including specific liquid and piping elevations and any associated field piping losses to the final point of discharge. Modification of the high water level, low water level, centerline of discharge, and / or cycle structure may be required to achieve discharge of full batch volume based on actual site installation specifics.

Aeration

- The aeration system has been designed to provide 1.25 lbs. O2/lb. BOD5 applied and 4.6 lbs. O2/lb. TKN applied at the design average loading conditions, while maintaining a residual DO concentration of 2.0 mg/l.

- A common standby blower will be shared among the biological reactors.

- Depending on the actual yard piping from the blowers to the diffuser system and the heat losses associated with the yard piping, additional provisions for cooling of the air (i.e. incorporating heat exchangers) and/or modification of in-basin piping and/or diffuser sleeve material may be required. Aqua-Aerobic Systems, Inc. may need to modify the following equipment offering to ensure compatibility of all in-basin components with actual air temperatures.

Process/Site

- The anticipated effluent nitrogen requirement is predicated upon an influent waste temperature of 10 °C or greater. While lower temperatures may be acceptable for a short-term duration, nitrification and (if required) denitrification below 10 °C can be unpredictable, requiring special operator attention.

- Sufficient alkalinity is required for nitrification, as approximately 7.1 mg alkalinity (as CaCO3) is required for every mg of NH3-N nitrified. If the raw water alkalinity cannot support this consumption, while maintaining a residual concentration of 50 mg/l, supplemental alkalinity shall be provided (by others).

- The average, maximum and peak design flow and loading conditions, shown within the report, are based on maximum month average, maximum day and peak hour conditions, respectively.

Post-Secondary Treatment

-The following processes follow the Biological process:
  - Effluent flow equalization.

Equipment

- The basins are not included and shall be provided by others.

- Influent is assumed to enter the reactor above the water level, away from the decanter, and to avoid splashing or direct discharge in the immediate vicinity of other equipment. If the influent enters the basin below the water level, adequate hydraulic capacity shall be made in the headworks to prevent backflow from one reactor to the other during transition of influent.

- Based on the process requirements and selected equipment, the reactor wall height should be at least 20 feet.

- Provisions should be made, by others, for overflows in each of the recommended basins.

AquaSBR® - Sequencing Batch Reactor - Design Summary

Design#: 175035

Project: CROSSVILLE WWTP AL

Option: Process Design

Designed by Bryce Hatfield on Wednesday, August 20, 2025

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

DESIGN INFLUENT CONDITIONS

Avg. Design Flow (ADF)	= 0.25 MGD	= 946 m³/day
Max Design Flow (MDF)	= 0.312 MGD	= 1,182 m³/day
Peak Hydraulic Flow (PHF)	= 0.50 MGD	= 1,892 m³/day

DESIGN PARAMETERS

	Influent	mg/l	Effluent Required	<= mg/l	Effluent Anticipated	<= mg/l
Bio/Chem Oxygen Demand:	BOD5	250	BOD5	20	BOD5	10
Total Suspended Solids:	TSS	250	TSS	20	TSS	15
Total Kjeldahl Nitrogen:	TKN	40	TKN	--	TKN	--
Ammonia Nitrogen:	--	--	NH3-N	2	NH3-N	2
Total Phosphorus:	TP	8	--	--	--	--

SITE CONDITIONS

	Maximum		Minimum		Elevation (MSL)
Ambient Air Temperatures:	105 F	40.6 C	30 F	-1.1 C	1,132 ft
Influent Waste Temperatures:	68 F	20.0 C	50 F	10.0 C	345.0 m

SBR BASIN DESIGN VALUES

			Water Depth			Basin Vol./Basin		
No./Basin Geometry:	= 2 Rectangular Basin(s)		**Min (LWL)**	= 13.9 ft	= (4.2 m)	**Min (Vlwl)**	= 0.093 MG	= (353.2 m³)
Freeboard:	= 1.5 ft	= (0.5 m)	**Avg (AWL)**	= 17.6 ft	= (5.4 m)	**Avg (Vawl)**	= 0.118 MG	= (447.9 m³)
Length of Basin:	= 30.0 ft	= (9.1 m)	**Max (HWL)**	= 18.5 ft	= (5.6 m)	**Max (Vhwl)**	= 0.125 MG	= (471.5 m³)
Width of Basin:	= 30.0 ft	= (9.1 m)						

Number of Cycles:	= 5 per day/basin (advances cycles beyond MDF)	
Cycle Duration:	= 4.8 hr/cycle	
Food/Mass (F/M) ratio:	= 0.074 lbs. BOD5/lb. MLSS-Day	
MLSS Concentration:	= 4,500 mg/l @ LWL	
Hydraulic Retention Time:	= 0.946 days @ AWL	
Solids Retention Time:	= 15.4 days	
Est. Net Sludge Yield:	= 0.813 lbs. WAS/lb. BOD5	
Est. Dry Solids Produced:	= 423.7 lbs. WAS/day	= (192.2 kg/day)
Est. Solids Flow Rate:	= 40 gpm (5,079 gal/day)	= (19.2 m³/day)
Decant Flow Rate @ MDF:	= 710 gpm (as avg. from HWL to LWL)	= (44.8 l/sec)
LWL to CenterLine Discharge:	= 1.0 ft	= (0.3 m)
Lbs. O2/lb. BOD5	= 1.25	
Lbs. O2/lb. TKN	= 4.6	
Actual Oxygen Required:	= 1,035 lbs./day	= (469.6 kg/day)
Air Flowrate/Basin:	= 605 SCFM	= (17.1 Sm³/min)
Max. Discharge Pressure:	= 8.6 PSIG	= (59 KPA)
Daily Max. Month Avg. Estimated Power*:	= 318.5 kWh/day	

* Power consumption calculations in this document are based on maximum month conditions. Detailed power vs. loading calculations can be provided if requested.

DESIGN INFLUENT CONDITIONS

Avg. Design Flow (ADF) = 0.25 MGD = 946 m³/day

Max Design Flow (MDF) = 0.312 MGD = 1,182 m³/day

		Conc. mg/l	Mass lb/day	kg/day
Bio/Chemical Oxygen Demand:	BOD5	250	521.3	236.5
Total Suspended Solids:	TSS	250	521.3	236.5
Total Kjeldahl Nitrogen:	TKN	40	83.4	37.8
Total Phosphorus:	TP	8	16.7	7.6

SITE CONDITIONS

	Maximum		Minimum	
Ambient Air Temperatures:	105 F	40.6 C	30 F	-1.1 C
Influent Waste Temperatures:	68 F	20.0 C	50 F	10.0 C
Elevation (Mean Sea Level):	1,132 ft	345 m		

EFFLUENT OBJECTIVES

		Conc. mg/l	Mass lb/day	kg/day
Bio/Chemical Oxygen Demand:	BOD5	20	41.7	18.9
Total Suspended Solids:	TSS	20	41.7	18.9
Ammonia Nitrogen:	NH3-N	2	4.2	1.9

BASIN SIZING CALCULATIONS

1. **Mass of Bio-Solids necessary for treatment (lbs MLSS)**

   Based upon an F/M ratio of 0.074/day, the mass of mixed liquor suspended solids (MLSS) is:

   lb MLSS = (lb BOD5/day) / (F/M) = 7,003.5 lb MLSS = (3,176.7 kg)

2. **Total Reactor Volume at Low Level (Vlwl-T)**

   Based upon an MLSS concentration of 4,500 mg/l measured at the lowest water level, the total React Volume at low water level (Vlwl) is:

   Vlwl-T = lb MLSS/(MLSS mg/l x 8.34 lb/gal) = 0.187 MG-Total = 24,948.0 ft³-Total = (706.5 m³-Total)

3. **Reactor Volume for each Basin at Low Level (Vlwl/basin)**

   The AquaSBR shall utilize a 2 reactor system. The resultant unit volume for each reactor at the minimum water depth is:

   Vlwl/basin = (Vlwl-T)/(Number of Reactors) = 0.093 MG/basin = 12,474.0 ft³/basin = (353.2 m³/basin)

4. Average Decantable Volume for each basin (ADV)

Each AquaSBR basin shall perform treatment via 5 Cycle(s)/Day with each cycle comprising 288 Minutes (4.8 Hours). At the average daily flow (ADF) of 0.25 MGD, the batch volume at average conditions is:

ADV = ADF/(No. of Basins x No. Cycles/Day/Basin) = 25,000 gal = (94.6 m³)

5. Reactor Volume per basin at Average Flow Conditions (Vawl/Basin)

Vawl/Basin = Vlwl/Basin + ADV = 0.118 MG/basin = 15,816.2 ft³/basin = (447.9 m³/basin)

6. Maximum Decantable Volume for each basin (MDV)

The AquaSBR has been specifically designed to maintain 5 Cycle(s)/Day/Basin up to the Maximum Daily Flow stated above. Based upon the Maximum Daily Flow (MDF) of 0.312 MGD, the batch volume at maximum conditions is:

MDV = MDF/(No. of Basins x No. Cycles/Day/Basin) = 31,237 gal = (118.3 m³)

7. Reactor Volume per basin at Maximum Flow Conditions (Vhwl/Basin)

The maximum volume of each basin in the AquaSBR system is:

Vhwl/Basin = Vlwl/Basin + MDV = 0.125 MG/basin = 16,650 ft³/Basin = (471.5 m³/basin)

8. Low Water Level (LWL)

The low water level (LWL) must allow proper storage of sludge during the settle phase while providing a reasonable maximum water level. Based upon the design MLSS, the lowest operating water level is:

LWL = 13.9 ft = (4.2 m)

9. Selection of reactor geometry and dimensional requirements

The AquaSBR can be configured for a variety of reactor geometries, quantities, and materials of construction. Typical construction may employ circular, square, or rectangular tanks in concrete, steel, or earthen-sloped basins. The following has been either assumed by Aqua or designated based upon supplied information:

Number of Basins (Nb):	= 2	
Selected Reactor Geometry:	= Rectangular	
Length of Reactor:	= 30.0 ft	= (9.1 m)
Width of Reactor:	= 30.0 ft	= (9.1 m)
Low Water Level (LWL):	= 13.9 ft	= (4.2 m)
Average Water Level (AWL):	= 17.6 ft	= (5.4 m)
High Water Level (HWL):	= 18.5 ft	= (5.6 m)
Minimum Reactor Volume/Basin:	= 0.093 MG	= (353.2 m³)
Average Reactor Volume/Basin:	= 0.118 MG	= (447.9 m³)
Maximum Reactor Volume/Basin:	= 0.125 MG	= (471.5 m³)

PROCESS CALCULATIONS

Cycle Structure

1. Cycle Configuration

In order to perform the necessary physical and biological treatment for the specified conditions, the following treatment phases shall be used:

A.) Mix Fill	- True anoxic mixing, independent of aeration, with influent.
B.) React Fill	- Aeration/Anoxic mixing with presence of influent.
C.) React	- Aeration/Anoxic mixing under true Batch conditions.
D.) Settle	- Quiescent solids/liquid separation.
E.) Decant/Idle	- Effluent withdrawal via solids excluding, dual control decanter.
F.) Sludge Waste	- Removal of excess biological sludge.

2. Cycle Times

The following process segments have been determined specifically for this application based upon a combination of empirical data and established kinetic models adapted for the AquaSBR. The following summarizes the process conditions:

A.) No. Of Cycles (Ncdb)	= 5	E.) Mixing (Tmix)	= 1.25 Hours/cycle
B.) Total Cycle Time (Tc)	= 4.8 Hours	F.) Settling (Tset)	= 1.08 Hours/cycle
C.) Filling Time/Cycle (Tf)	= 2.4 Hours	G.) Decanting (Tdec)	= 0.73 Hours/cycle
D.) Aeration (Tair)	= 1.73 Hours/cycle	H.) Sludge Waste (Tsig)	= 12.7 Minutes/cycle

Hydraulic Rentention Time (HRT)

1. Hydraulic Retention @Average Design Conditions (HRT-avg)

Based upon an average volume of 0.118 MG/reactor and 2 reactor(s), the HRT at an average flow of 0.25 MGD is:

HRT-avg = (Vawl/Reactor x # Reactors)/ADF = 0.95 days (22.7 hours)

2. Hydraulic Retention @ Maximum Design Conditions (HRT-mdf)

Based upon a maximum volume of 0.125 MG/reactor and 2 reactors, the HRT at a maximum flow of 0.312 MGD is:

HRT-mdf = (Vhwl/Reactor x # Reactors)/MDF = 0.8 days (19.1 hours)

Sludge Production

1. Net Sludge Yield (Yn)

Based upon the design MLSS concentration, influent loading, and volume requirements stated above, the AquaSBR shall produce a certain quantity of sludge, as is typical of activated sludge processes. The sludge yield factor, Yn is:

Yn = 0.813 lb Waste activated sludge (WAS)/lb BOD5/day

Please note that the calculated sludge yield, Yn, was estimated via a kinetic model which accounts for the influent organic and inorganic TSS as well as the developed active, endogenous, inert-organic, and inert-inorganic fractions of the MLSS.

2. Net Sludge Production (lb WAS/Day)

The net sludge production (dry solids basis) is:

lb WAS/day = lb BOD5/day x Yn = 423.7 lb WAS/day = (192.2 kg/day)

3. Sludge Volume (Vs)

The volume of sludge produced, assuming a settled sludge concentration of 1.00% is:

Vs = lb WAS/day/(sludge conc. x 8.34) = 5,079 gpd = (19.2 m^3/day)

4. **Mean Cell Retention Time (Ts)**

   The mean cell retention time (Sludge age, Ts, SRT, MCRT) of the proposed system necessary to attain the specified effluent objectives is:

   Ts = lb MLSS/(lb WAS/day + lb TSSe/day) = 15.4 days

5. **Oxygen Utilization Rates for Synthesis, Oxidation & Nitrification**

   Based upon a kinetic evaluation of the influent data with respect to the proposed design considerations, the estimated oxygen uptake rate (OUR) at average conditions is 44.9 mg/l/hr. The process oxygen required is:

   OUR lb/hr = OUR mg/l/hr x Vawl/basin x 8.34 = 44.4 lb O2/hr/basin = (20.1 kg/hr/basin)

AERATION SYSTEM EQUIPMENT REQUIREMENTS

Actual Oxygen Requirement (AOR)

1. **Oxygen Required For Organic Reduction (Rb)**

   The aeration system shall be designed to provide 1.25 lb O2 for each lb BOD5, as influent to the SBR system. This oxygen provision shall account for the oxygen utilization for synthesis, as well as endogenous respiration.

   Rb = 1.25 lb O2/lb BOD5 x lb BOD5 applied/day = 651.6 lb O2/day = (295.6 kg/day)

2. **Oxygen Required For Nitrification (Rn)**

   Additional oxygen may be necessary for nitrification of TKN to NO3-N. While an effluent requirement may or may not exist, it may be difficult to prevent nitrification from exerting an oxygen demand (when nitrogen is present in the influent). Nitrification requires 4.6 lb O2 to oxidize each lb of TKN to NO3-N.

   Rn = lb O2/lb TKN x lb TKN applied/day = 383.6 lb O2/day = (174.0 kg/day)

3. **Carbon Stabilized via Denitrification (Rd)**

   No credits for oxygen recovery via denitrification have been taken (Rd = 0).

4. **Total Actual Oxygen Requirement (AORt)**

   The total oxygen demand under process (field) conditions is:

   AORt = Rb + Rn – Rd = 1,035.2 lb O2/day (total) = (469.6 kg/day)

5. **Hourly Actual Oxygen Requirement (AORh)**

   Based on 1.73 hours of aeration per cycle, 5 cycles/day/basin, and 2 Basin(s), the hourly AORh is:

   AORh = 59.7 lb O2/hr/basin = (27.1 kg/hr/basin)

6. **Actual Aeration Time Required To Meet Average Demand (At)**

   The aeration system has been designed to meet the design maximum oxygen requirement in 1.73 hours/cycle/basin. Since average conditions will not require as much oxygen, the actual aeration time shall be adjusted to generate a power draw reflective of average conditions. The aeration time required at average conditions is:

   At = (OUR/AOR) x Design aeration/cycle/basin = 1.3 hr/cycle/basin

Process Wastewater Conditions (COARSE BUBBLE DIFFUSERS)

1. **Field Oxygen Transfer Factor (FTF)**

   While the AOR quantifies the necessary oxygen to satisfy the biochemical reactions, the process water possesses inherent characteristics that typically inhibit oxygen transfer as it compares to tap (clean) water. The FTF coefficient adjusts the oxygen transfer requirements in field (dirty) conditions to standard (clean) water conditions as follows:

   FTF = Alpha x Theta^(T-20) x [(Beta x Csm) – Cr]/Cstm = 0.522

   Where:

   Alpha = Ratio of mass transfer rate of O2 in process water to clean water = 0.70

   Beta = Ratio of saturation of O2 in process water to clean water = 0.95

   Theta = Temperature correction factor for O2 transfer = 1.024

   T = Design reactor temperature = 20.0 C

   Cstm = Saturation DO at mid-depth and standard conditions = 11.31 mg/l

   Csm = Cstm corrected for site elevation and temperature = 10.98 mg/l

   Cr = Residual dissolved oxygen concentration = 2.0 mg/l

Standard Conditions

1. **Standard Oxygen Requirement (SORh)**

   The oxygen transferred at standard conditions necessary to satisfy the required process oxygen demand at field conditions is:

   SORh = AORh / FTF = 114 lb O2/hr/basin = (51.9 kg/hr/basin)

2. **Standard Cubic Feet of Air per Minute (SCFM)**

   The ability to transfer oxygen into the water under standardized conditions is:

   SCFM = (SOR lb/hr/basin)/(60 x 0.0175 x SOTE/ft x Dsub) = 605 SCFM = (17.1 m³/min)

   Where:

   0.0175 = lb O2 per cubic foot of air at standard conditions.

   SOTE/FT = Standard Oxygen Transfer Efficiency per foot submergence = 1.09%/ft = (3.57%/m)

   Dsub= Average diffuser submergence = 16.6 ft = (5.1 m)

Blower Inlet Conditions

1. **Actual Inlet Pressure (Pa due to elevation and inlet filter/silencer/piping losses)**

   Note: An assumed inlet loss due to blower fittings/piping of 0.25 psig has been assumed.

   Pa = 14.696 – (Elevation, ft/2116.3) – 0.25 = 13.91 P.S.I.A. = (95.99 KPA)

2. **Blower Inlet Air Temperature in Degrees Rankine**

   Ta = Ambient air temp (Deg F) + 460 = 565.1 Degrees R = (313.6 K)

3. **Inlet Cubic Feet of Air per Minute (ICMF)**

   From the perfect gas law, the universal gas constant (MR) can relate standard conditions to inlet conditions, as:

   ICFM = SCFM x (14.696 x Ta)/(Pa x 528) = 683.4 ICFM/basin = (19.3 m³/min/basin)

Blower Discharge Conditions

1. **Discharge Pressure (Pd)**

   The discharge pressure includes the static pressure above the diffusers and dynamic losses from the blower discharge through the diffusers, as expressed by:

   Pd = (0.4333 x Diffuser submergence, ft) + System losses, PSIG,

Where the assumed system losses account for 0.20 PSIG blower discharge losses, 0.30 PSIG piping losses from blower to diffuser, and 0.50 PSIG diffuser losses.

Average discharge pressure (Pda) = 8.18 PSIG = (56.44 KPA)

Maximum discharge pressure (Pdm) = 8.58 PSIG = (59.20 KPA)

Average Blower Power Estimate

1. Estimated Average Power Draw (BHP)

The following is a general equation that estimates the power draw of the blower at the average oxygen demand and average pressure. While the actual blower selection shall be made from manufacturer supplied curves, programs, or recommendations at maximum conditions, this equation shall be used to estimate the annual average aeration power. Unless stated otherwise, a blower efficiency (e) of 0.70 shall be used (typical range 0.60 to 0.70).

BHP = 0.227 x ICFM x [((Pa + Pda)/Pa)^0.283 – 1]/e = 30.5 BHP = (22.8 kW)

2. Estimated Daily Power Required for Blowers (Pwa)

Pwa = (BHP x 0.7457 x At x Ncdb x Nb) = 292.3 kWh/day

Blower Selection

1. Blower Recommendation

The actual blower and motor sizing must consider inlet conditions under operating temperature and pressure extremes. Motor size, for example, must be selected to handle inlet air at maximum density, which occurs at lowest operating temperatures. Blower size must be selected to deliver the required air volume at minimum density (maximum operating temperature) throughout the range of pressures. The following has been recommended to meet the design extremes:

Number of blowers operating/basin:	= 1	
Number of total blowers operating:	= 1	
Number of standby units:	= 1	
Total number of installed units:	= 2	
Motor size of each blower:	= 40 HP	= 29.8 kW
Airflow capacity of each blower:	= 605 SCFM	= 17.1 m^3/min
Maximum design discharge pressure:	= 8.6 PSIG	= 59.2 KPA

MIXING SYSTEM EQUIPMENT REQUIREMENTS

1. **Energy Requirements (HP-mix)**

   To provide uniform mixing of biological solids to a level typically encountered in activated sludge, approximately 25.0 HP/MG is necessary with the AquaDDM mixer. The mixing level required is:

   HP-mix = 25.0 HP/MG x Vhwl/basin = 3.1 HP = (2.3 kW)

   Based upon the above approximate energy requirements, recommend: (1) - 3.0 NPHP AquaDDM mixer(s)

2. **Reactor Turnover Time (Tm)**

   To confirm the unit has been selected appropriately, the reactor contents must be completely mixed within 5 minutes. The selected mixer shall produce a recirculated flow (Qr) of 117,000 GPM, resulting in a turnover time:

   Tm = Vhwl/basin x 10^6/Qr = 1.1 min

3. **Average Power Estimation (Pwm)**

   Pwm = NPHP x Lm x 0.7457 x Mixing hrs/cycle x Nb x Ncdb = 25.8 kWh/day

   Where:

   Lm is the motor loading, typically 88-92% of full nameplate horsepower.

EFFLUENT DECANTING EQUIPMENT REQUIREMENTS

1. **Decant Flow Rate Required at Maximum Design Flow (Qdec)**

   The decanter shall remove effluent via gravity flow, reducing the water level from the maximum depth to the minimum depth in the design decant phase time (Tdec). The decant flow required is:

   Qdec = MDV/(Ncdb x Nb x Tdec) = 710 gpm = (44.8 l/sec)

   The flow rate calculated above is the average rate (from high water level to low water level) at maximum design conditions. The actual decant flow rate will vary depending on the prevailing driving head, assuming the effluent valves are not throttled, flow is not pumped, or an orifice plate has not been employed. Refer to design notes for further decanter notes.

SLUDGE REMOVAL SYSTEM REQUIREMENTS

1. **Sludge Flow Rate required at Average Design Flow (ADF)**

   Sludge flow rate (Qs):

   Sludge will be removed at the end of each cycle at the following rate:

   Qs = Vs/(Ncdb x Nb x Tslg) = 40 gpm = (2.5 l/sec)

2. **Sludge Energy Required (HP-sludge)**

   Based upon an estimated average driving head of 15.0 ft and an assumed pump efficiency of 60%, the sludge removal energy required is:

   HP-sludge = (Flowrate x head)/(3,960 x efficiency) = 0.3 BHP = (0.19 kW)

3. **Average Power Estimation (Pws)**

   Pws = BHP x Tslg x Ncdb x Nb x 0.7457 = 0.4 kWh/day

   Note: Power estimation assumes sludge is pumped. Refer to design notes for discussion if gravity sludge wasting is employed.

   Power consumption calculations in this document are based on maximum month conditions. Detailed power vs. loading calculations can be provided if requested.

POST-SBR EQUALIZATION DESIGN PARAMETERS

Avg. Daily Flow (ADF):	= 0.25 MGD	= (946 m³/day)
Max. Daily Flow (MDF):	= 0.312365 MGD	= (1,182 m³/day)
Decant Flow Rate from (Qd):	= 710 gpm	= (2.7 m³M)
Decant Duration (Td):	= 44 min	
Number Decants/Day:	= 10	
Time Between Start of Decants:	= 144 min	

POST-SBR EQUALIZATION VOLUME DETERMINATION

The volume required for equalization/storage shall be provided between the high and the low water levels of the basin(s). This Storage Volume (Vs) has been determined by the following:

Vs = [(Qd -(MDF x 694.4)] x Td = 21,696 gal = (2,900.5 ft³) = (82.1 m³)

The volumes determined in this summary reflect the minimum volumes necessary to achieve the desired results based upon the input provided to Aqua. If other hydraulic conditions exist that are not mentioned in this design summary or associated design notes, additional volume may be warranted.

Based upon liquid level inputs from each SBR reactor prior to decant, the rate of discharge from the Post-SBR Equalization basin shall be pre-determined to establish the proper number of pumps to be operated (or the correct valve position in the case of gravity flow). Level indication in the Post-SBR Equalization basin(s) shall override equipment operation.

POST-SBR EQUALIZATION BASIN DESIGN VALUES

No./Basin Geometry:	= 1 Rectangular Basin(s)				
Length of Basin:	= 30.0 ft	= (9.1 m)			
Width of Basin:	= 15.0 ft	= (4.6 m)			
Min. Water Depth:	= 0.0 ft	= (0.0 m)	**Min. Basin Vol. Basin:**	= 0.0 gal	= (0.0 m³)
Max. Water Depth:	= 6.4 ft	= (2.0 m)	**Max. Basin Vol. Basin:**	= 21,695.5 gal	= (82.1 m³)

POST-SBR EQUALIZATION EQUIPMENT CRITERIA

Max. Flow Rate Required per Basin:	= 217 gpm	= (0.821 m³/min)
Avg. Power Required:	= 19.6 kW-hr/day	

Aqua-Aerobic Systems, Inc.

Exceptions / Clarifications Document: **8/21/25**

Project: CROSSVILLE WWTP AL

1) **Reference: Addendum 4 Section 11388 - Page 6**

   2.04.D.5 The maximum operation level of the basin shall be 4.0 feet.

   Aqua's Exception/Clarification

   Based on the tank dimensions of 30 feet by 15 feet the tank will have a maximum operation level of 6.4 feet, in lieu of that specified.

2) **Reference: Addendum 4 Section 11388 - Page 13**

   2.09.A One complete diffuser system shall be provided for each SBR basin, the Aerobic Digester, and the Post-Equalization basin for a total of four diffuser systems.

   Aqua's Exception/Clarification

   Diffuser systems for the aerobic digester and post equalization basin are not included in Aqua-Aerobic Systems' scope of supply and shall be provided by others.

3) **Reference: Addendum 4 Section 11388 - Page 16**

   2.10.J.2 Aerobic Digester/Sludge Holding and 2.10.J.3 Post-Equalization

   Aqua's Exception/Clarification

   Blowers for the aerobic digester and post equalization basin are not included in Aqua-Aerobic Systems' scope of supply and shall be provided by others.

Date:	August 18, 2025
Ref.:	S-24-105 Rev A
To:	Bidding Contractors
Project:	Wastewater Treatment System Upgrade and Discharge Relocation Town of Crossville, Alabama
Section:	11368 – Internally-Fed Rotary Drum Screen
Equipment:	One (1) RotoSieve 24 Drum Screen Screen with 3mm perforations (316LSS) One (1) SCP-220 Screenings Compactor (316LSS) One (1) NEMA 4x 304SS Control Panel
Representative:	Tim Boyne – Templeton & Associates
Re:	Proposal

Introduction

We are pleased to provide our proposed scope of supply for the equipment and project as noted above.

Advantages of the RotoSieve

The RotoSieve was the first internally-fed drum screen on the market in 1965 (with continuous improvements throughout the last 55+ years). Research and development investment is continuous on the RotoSieve to provide the highest quality, performance, and efficiency in the market. Additionally, with more than 5000 installations worldwide in virtually every application and location imaginable no other manufacturer can approach the length of experience or number of installations. Please find below the various advantages that the RotoSieve has over the competition:

- The ***advanced carbon fiber belt drive system eliminates the need for trunnion wheels***. This significantly lowers required maintenance and improves reliability. No need to have to regularly replace trunnion wheels that catastrophically fail with little to no warning. The carbon fiber belt does not require replacement for 8 to 10 years and can be easily replaced in less than 1 hour. Replacing trunnion wheels can sometimes be a long and difficult task.
- With ***permanently lubricated bearings*** all located above the wastewater there is no contamination of bearings by the wastewater which can severely shorten their life. This is a common issue with trunnion wheel-based designs. Additionally, there is very little lubrication necessary on each unit.

- ***No chains*** of any kind results in less maintenance issues; no need to adjust chain tension; and no messy automatic chain oilers.
- ***Continuous and two-inch-high spiral flights*** line the inside of the RotoSieve drum. This ensures no solids remain or get stuck in the drum. Many competitors use very short flights that are also not continuous resulting in solids remaining in the drum.
- ***Unique friction driven cleaner brush keeps perforated holes clean without the use of a constant spray wash***. This results in significant water savings. Intermittent spray wash can result in 90% water savings over competitors that use a constant dual bar spray.
- The ***overflow bypass outlet with overflow sensor and alarm prevents unscreened flow from reaching downstream processes during an overflow event***. The sensor alerts the control panel and plant system to allow operators to address an issue sooner rather than later. Logic built into the controls also works to automatically clear the issue causing the overflow without operator intervention. The overflow bypass outlet allows the unscreened flow to be piped back to the front of the plant to protect the downstream process in addition to avoiding wastewater discharging into the conveyors. This functionality was developed by RotoSieve and is a large advantage over the competition.
- ***Parts easily changed*** without removing equipment from site - no special lifting equipment or tools required. Most parts can be changed quickly and easily.
- The ***perforated drum is the strongest and best method for removing solids.*** We can guarantee removal of all solids Larger than the perforation diameter. Additionally, perforated plate removes hair a small chain fibers much more efficiently than wedgewire. The perforated drum will also not have material weave into the drum resulting in permanent blinding, a common issue for wedgewire drums.
- ***Lowest number of moving parts of any drum screen on the market today.***
- The side and end inspection hatch covers of the RotoSieve are fiberglass which is corrosion proof and easy for one operator to remove. Additionally, when open, the inspection hatches are multiple times larger than the competition giving full and easy access to the entire interior of the unit. This makes daily maintenance much more efficient and easier for the operator.
- The RotoSieve is delivered completely assembled and ready for installation. ***No field assembly necessary***. No need to assemble bottom drain pans or support legs. ***Easiest and quickest installation in the industry.***
- ***Proven reliable construction and mechanical operation for over 55 years.*** All manufacturing and assembly completed in-house including items like spiral manufacturing and passivation.

SCOPE OF SUPPLY

One (1) RotoSieve 24 Internally-Fed Rotary Drum Screen

For the design and supply to jobsite of one (1) RotoSieve® 24 Internally-Fed Rotary Drum Screen. Design details for the screen to include the following:

- Screen - Drum cylinder complete with a 3mm diameter perforated openings and internal diverter flights – all 316L stainless steel. Screen drum cylinder equipped with continuous stainless steel diverter flights arranged in a helical pattern throughout length of the screen – 316L stainless steel, 2 inch height, and 8 inch pitch.
- Inlet - Influent distribution headbox/feed pipe 11 gauge 316L stainless steel. Inlet pipe connection is ~10" diameter – plain end. Flexible connection or restraint coupling is recommended for the inlet connection. Non-clogging, pressure-reducing design of the inlet provides positive laminar flow discharging parallel to the drum axis. Design will not allow any areas where solids can settle and accumulate.
- Spray Wash System – Each screen will include one (1) external spray bar mounted parallel to the longitudinal screen axis – 316L stainless steel spray pipe and 316SS nozzles. Inlet connection to the spray header shall be 1" NPT. Spray wash system for each unit to also include one (1) 1" manual bronze body ball valve (Apollo); one (1) 1" normally closed, NEMA 4x, 120V, explosion-proof, bronze body solenoid valve (Magnatrol); and one (1) 1" bronze body wye strainer (Magnatrol). Spray wash is intermittent and not continuous. Intermittent spray wash is 12 gpm at 60 to 80 psi with cycle timing dependent on the application.
- Cleaner Brush – Each screen to include one (1) counter rotating, friction driven, horizontal nylon cleaner roller brush for cleaning the drum perforations. Brush is mounted on 316 stainless steel shaft supported by permanently lubricated stainless steel bearings and stainless steel mounting hardware. The brush located above the perforated cylinder rotates in contact with the drum cylinder as it turns. The angular contact generated by the unique shape of the brush cleans the perforations. The joint cleaning action of the brush and intermittent wash water sprays effectively maintains the open area of the screen cylinder and prevents blinding. The brush provides a more efficient cleaning of the drum as opposed to a constant spray wash and results in significant water savings (up to 90% savings over constant dual spray wash bar systems).
- Drive Assembly - NORD helical gear reducer unit complete with integral NORD 0.5hp, 230/460 volt, 3-phase, 60 Hz, TEFC, CSA/UL certified, inverter duty, continuous duty motor (per NEC, suitable for a Class 1 Div 2 environment). Gear motor drives screen via innovative and proprietary carbon fiber belt drive system. Screen does not use trunnion wheels for drum rotation or support. This significantly reduces wear part replacement and eliminates catastrophic failure the result of trunnion wheel failure.

- Lower Drum Housing – All 316LSS. Lower housing welded unit incorporating side splash guards, sloped drain pan, and effluent outlet pipe. Screen filtered effluent shall be gravity discharged from the inclined collection pan through a 316LSS ~16" plain end discharge pipe. Screen drain pan sloped to ensure liquids run downhill back toward the outlet - all 316L stainless steel. Screen unit and drain pan is supplied as one complete unit. No field assembly is needed or required. If required, a flange for the discharge pipe can be added for a small additional charge.
- Upper Drum Housing – Upper cover housing shall be 316LSS and bolt to the lower housing. Individual UV resistant, reinforced fiberglass, inspection hatches shall be provided to allow inspection of the drum without removing the entire upper cover housing . One (1) inspection hatch will be provided for each side of the housing. Each hatch secured by a keyed lock.
- Screenings Discharge - Screenings discharge end of the drum screen shall be fully enclosed and fitted with an integral discharge chute assembly. Inspection end of the drum screen shall also include a removable inspection cover to allow full access to discharge end of drum. Discharge chute will be 316L stainless steel with a plain end. End inspection cover of UV resistant reinforced fiberglass cast and form molded into one piece is also included. Cover shall be capable of being removed by one operator and shall be secured by a keyed lock.
- Overflow/High Level System – Each screen shall be provided with an automatic overflow divert system. This system detects and separates overflow from screened effluent to prevent unscreened flow from reaching sensitive downstream processes during an overflow event. Overflow outlet shall be 316L SS and shall have a ~8" plain end pipe connection. System shall be complete with standard high level conductive probe to detect overflow condition of the screen and alert the control panel. If necessary, the overflow bypass outlet can be removed for a small additional charge (while still maintaining the function of the overflow sensor).
- Support Legs and Lifting Lugs - Each screen shall be provided with fabricated integral 316L stainless steel support legs and lifting lugs. Field assembly of support legs to unit is not needed as the legs are integral to the unit.
- Odor Control Vents - Each screen shall be provided with a ~6" plain end pipe odor control connection on top of the upper cover housing for connection of available odor control or ventilation systems.
- Fasteners – 316 stainless steel.
- Factory test as required.
- Submittal (electronic)
- O&M Manual
- Standard freight to jobsite is included.

- Site/Start-up Services - One (1) trip by a field technician for a maximum of two (2) days at the jobsite for installation inspection, start-up, and operator training is included.

RotoSieve® Model 24 Rotary Drum Screen Design Requirements:

No. of Screens:	One (1)
Material of Construction:	316L SS
Screened Material:	Municipal Wastewater
Influent TSS:	250 mg/l
Influent FOG:	>40 mg/l (estimate)
Screen Opening:	3mm Diameter Perforations
Screen Capacity:	1500 gpm at TSS=250 mg/l and FOG<40 mg/l
Horsepower:	0.5 HP
Max Influent Flow Velocity:	6.2 ft/sec
Operating Weight:	780 lb – weight of screen at overflow level
Wash Water:	12 gpm at 60 to 80 psi (intermittent water flow controlled by cycle timers on control panel – NOT CONTINOUS)

One (1) SCP-220 Shaftless Screw Screenings Compactor

For the design and supply to jobsite of one (1) SCP - 220 Shaftless Screw Screenings Compactor. Overall length of the compactor will be approximately 9' with a capacity of at least 70 cubic feet per hour of wet screenings with a dry weight of not less than 10% solids. The unit will have one (1) inlet chute to accept screenings from one (1) RotoSieve 24 Drum Screen. Design details to include the following:

- Dry solids out at least 20%
- Shaftless double spiral to be constructed of high strength carbon steel; diameter 7 1/2 inches, 8 5/8 inch pitch, and spiral thickness of 5/8".
- Trough – 11-gauge 316L stainless steel lined with with three (3) 3/8 inch thick Hardox wear bars. The trough including the press zone is approximately 8' in length and 8 5/8" wide.
- Trough angle of inclination – 2 degrees
- One (1) inlet hopper; 14 gauge 316L stainless steel, plain end, sized to exactly fit the discharge of the RS-24 Rotary Drum Screen, welded to the trough with each side a minimum 60 degrees from horizontal.
- Trough Covers – 14 gauge 316L stainless steel, bolted to trough
- One hinged inspection cover – 14 gauge 316L stainless steel
- Trough Support Legs – Two (2) pairs. 11 gauge 316L stainless steel. Approximate height of 28" each.
- Press Zone - Complete with 316L stainless steel cylinder with 2mm slot openings, 11 gauge 316L stainless steel outer shell; spray flush system; and weight adjustable outlet door. Back pressure generated by discharge door with adjustable weights. Dry solids at outlet of at least 20%.
- Press Zone Spray Flush - Spray flush system provided with a 316LSS U-shaped spray bar over press cylinder to flush press zone and drain of organics. System to also normally include a ¾" normally closed solenoid valve (Magnatrol), bronze body manual ball valve (Apollo), and bronze body strainer (Magnatrol). Flow rate of 10 gpm at 60 psig. Solenoid valve is bronze body and rated NEMA 4x, 120V, explosion-proof. Spray flush is intermittent and controlled by cycle timer in control panel.
- Drain water shall discharge via a ~3 inch OD, plain end 316L stainless steel pipe located at the drive end of the unit.
- Drive System complete with NORD helical gear reducer with NORD 2hp direct coupled electric motor, 230/460 volt, 3 phase, 60 hertz, TEFC, 1.15 sf, UL certified, inverter duty (per NEC, suitable for Class I, Div 2 environment).

- Fasteners – 316 stainless steel
- Factory Test
- Submittal and O&M Manuals included with drum screen submittal/O&M.
- Freight to jobsite is included.
- Site/Start-up Services for the compactor is provided concurrently with services for the RotoSieve screen.

SCP-220 Shaftless Screw Compactor Design Requirements:

No. of Screenings Compactors:	One (1)
Material of Construction:	316L SS
No. of Inlets:	One (1)
No. of Outlets:	One (1)
Capacity:	70 ft^3/hr of wet screenings with no less than 8% dry solids
Angle of Inclination:	2 degrees
Wash Water Requirements:	12 gpm at 60 psi (min) - intermittent usage (1 minute every 30 minutes)
Horsepower:	2 HP

One (1) NEMA 4x 304SS Control Panel:

The controls for the one (1) RotoSieve 24 Drum Screen and one (1) SCP-220 Compactor shall be provided in one (1) NEMA 4x 304SS Wall Mounted Control Panel. Supply to the panel shall be 480V, 60 Hz, 3 ph. The control panel shall include the following:

- NEMA 4x 304SS Enclosure
- UL Label
- Fusible Disconnect Switches (2)
- Heater with Thermostat
- Breather/Drain
- Motor Fuses (2 sets)
- ABB Soft Start Screen Motor Starter
- IEC Rated Compactor Motor Starter
- Primary Transformer Fuses
- Control Transformer
- Control Circuit Breakers (2)
- Emergency Stop Pushbutton
- HOA Switches (2)
- Run Pilot Lights (2)
- Aux. Run Contacts (2)
- Compactor Repeat Cycle Timer
- Compactor Off Delay Timer
- Elapsed Run Time Meters (2)
- Overload Alarm Pilot Lights (2)
- Overload Aux. Contacts (2)
- Screen Off Delay Timer
- Screen Overflow Probe Relay – Intrinsic-safe
- Screen Overflow Alarm On Delay Timer
- Screen Overflow Alarm Pilot Light
- Screen Overflow Alarm Aux. Contact
- Manual Reset Pushbutton
- Wash Valve OCA Switches (2)
- Wash Valve Energized Pilot Lights (2)
- Wash Valve Repeat Cycle Timers (2)
- Terminals for Remote Start Contact
- 20% Spare Terminals
- 12 gauge Minimum Power Wire
- 14 gauge Control Wire

- Two (2) NEMA 7 remote pushbutton emergency stop stations will also be supplied. Each to be installed in the field by the contractor near the screen and compactor.

Pricing (standard freight to jobsite included)

Description	Price
One (1) RotoSieve 24 Screen (316L SS); One (1) SCP-220 Screenings Compactor (316LSS); one (1) NEMA 4x 304SS Control Panel; all spray wash system valves, Site/Start-up Services; and freight to jobsite as described above	$

Exclusions:

- Taxes of any kind
- Offloading or storage at jobsite
- Installation or supervision of installation
- Supply or performance bonds
- Liquidated or consequential damages
- Stairs, grating, or hand rails
- Air vent piping
- Odor control or ventilation systems
- Dumpster or bin
- Any piping not integral to the equipment proposed above
- Any valves, gauges, switches, controls, or sensors not noted above
- Anchor bolts
- Concrete work
- Civil design
- Buildings
- Piping connections
- Disconnect switches and junction boxes
- Electrical connections
- Electrical installation and wiring
- Oil and grease
- Engineering redesign
- Finish painting
- Screen support stands
- Spare Parts

Terms:

- 20% due Net 30 after submittal approval and release for fabrication.
- 80% due Net 30 after delivery of equipment to jobsite.
- Credit approval required

Approvals:

- Submittal package provided for approval 3 to 4 business weeks from receipt of fully executed purchase contract.

Delivery:

- Lead time for delivery of equipment to jobsite is currently estimated at 16 to 20 business weeks from the date of submittal approval and release for fabrication.

Warranty:

- 12 months from date of start-up or 18 months upon delivery of equipment (which ever occurs first).

Validity:

- This quote is valid for acceptance within 60 days of the date noted on the first page.

If you have any further questions regarding this proposal please feel free to contact our representative Mr. Tim Boyne of Templeton & Associates. He will also provide you with pricing.

Best Regards,

Cory W. Kopp
CleanTek Water Solutions

STANDARD TERMS and CONDITIONS of SALE

CleanTek Water Solutions, LLC ("CWS") provides the following Standard Terms and Conditions of Sale ("Terms and Conditions"), which apply to all quotations and sales made by CWS. All purchases by customer, owner, or its agent ("Purchaser") are expressly limited and conditioned upon acceptance of the following Terms and Conditions, and no provision, printed or otherwise, contained in any order, acceptance, confirmation, or acknowledgment which is inconsistent with, different from, or in addition to these Terms and Conditions is accepted by CWS unless specifically agreed to in writing by CWS. Acceptance of Purchaser's order by CWS is subject to verification of Purchaser's creditworthiness.

1. TIME LIMIT. All quotations are valid for a period of thirty (30) days, unless otherwise specified.

2. SHIPMENT. Pricing and shipping terms, unless otherwise specified, are F.O.B. the CWS manufacturing facility. Transportation charges, insurance, license fees, customs, duties, and other charges will be paid by Purchaser. Material quoted F.O.B. destination is predicated on shipping cheapest way unless specifically stated in writing to the contrary. Should Purchaser's shipping, crating, or other instructions result in higher costs, such costs will be for the Purchaser's account. If the Purchaser has not issued inspection or shipping instructions by the time the Goods are ready for shipment, CWS may select any reasonable method of shipment, without liability by reason of its selection. Shipments made on Purchaser's behalf shall be insured at Purchaser's expense. Shipment of Goods held by reason of Purchaser's request or inability to receive Goods will be at the risk and expense of Purchaser. Claims for shortages in shipment shall be deemed waived unless made in writing to CWS within ten (10) days from date of invoice.

3. PAYMENT TERMS. Payment terms, unless otherwise specified, are 10% (ten percent) with order, 80% (eighty percent) on shipment, and 10% (ten percent) on acceptance after startup (not to exceed 90 days after receipt of goods). All payments are due net thirty (30) days from date of invoice, unless otherwise specified. Overdue payments will be charged interest at the rate of 1.5% (one and a half percent) per month. Purchaser's failure to make payment when due will be a material breach of the order and these Terms and Conditions. CWS, at its sole option and without incurring any liability, may suspend its performance until such time as the overdue payment is made or CWS receives assurances, adequate in CWS's opinion, that the payment will be promptly made. In the event of such suspension of performance by CWS, there will be an equitable adjustment made to the delivery schedule and order price reflecting the duration and cost resulting from such suspension. Purchaser may only suspend the order upon CWS's written consent. In the event of such Purchaser suspension, the delivery time will be changed, taking into account the suspension, and Purchaser will promptly pay CWS for all costs and related overhead costs resulting from such suspension. CWS will equitably re-price the goods and services if the cumulative suspension exceeds ninety (90) days. If in the judgment of CWS, Purchaser's financial position does not justify the terms of payment specified, CWS may require full or partial payment prior to shipment of the goods. Purchaser agrees to furnish CWS with the required credit information. Payments for all export shipments will be in accordance with the specified payment schedule included herein by way of a confirmed Irrevocable Letter of Credit, established in favor of CWS, drawn on and confirmed by a prime U.S.A. bank that is approved by CWS. This confirmed Irrevocable Letter of Credit is to be established at the time of award of an order. All costs associated with the Letter of Credit will be for the Purchaser's account.

4. TAXES. Federal, state, or local indirect taxes, including but not limited to sales and/or use taxes, VAT taxes, GST taxes, transfer taxes or any similar tax are not included in the prices set forth herein.

5. WARRANTY. In return for purchase and full payment for CleanTek Water Solutions, LLC ("CWS") products, we warrant only that all products manufactured by CWS shall be free from defects in material and workmanship under normal conditions; provided, however, that this warranty shall be limited to products found to be defective within a period of one (1) year from the date product is put into service or eighteen (18) months from the date of shipment, whichever expires first, except as may otherwise be provided by us in writing ("Warranty Period"). This warranty does not cover Purchaser furnished equipment and/or Purchaser furnished materials. OUR OBLIGATION UNDER THIS WARRANTY IS EXPRESSLY AND EXCLUSIVELY LIMITED to replacing or repairing (at our factory, or elsewhere as agreed by us in writing) any part or parts returned to us by Purchaser, and which our examination shall show to have been defective during the Warranty Period. CWS will have no obligation to remedy defect unless, within the Warranty Period, Purchaser provides CWS written notice of its claim within ten (10) calendar days of defect discovery and returns the defective product or part after receipt of shipping instructions from CWS to return such product or part. Upon notification, CWS retains the option to examine the operation of the products at Purchaser's location to verify operating conditions. In the event this examination discloses no defect, Purchaser shall have no authority to return the products or parts to us for further examination or repair. All transportation costs shall be to purchaser's account. This warranty shall not apply to any product or part which has been repaired or altered by others, or applied, operated, or installed contrary to our instructions, or subjected to misuse, negligence, or accident. In no event shall CWS incur any obligation to repair or replace products which are determined by CWS to be defective due to customer misuse, or due to use not in accordance with specified operating conditions, and operating and maintenance instructions. Deterioration by chemical action; improper maintenance; or normal wear does not constitute a defect and are therefore not covered by this Warranty. Consumable items are not covered by this Warranty. Our Warranty on accessories and component parts not manufactured by us is expressly limited to that of the manufacturer thereof, unless as agreed by us in writing.

THE FOREGOING WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND OF ALL OTHER LIABILITIESS AND OBLIGATIONS ON OUR PART, INCLUDING ANY LIABILITY FOR NEGLIGENCE: AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY DISCLAIMED: AND WE EXPRESSLY DENY THE RIGHT OF ANY OTHER PERSON TO INCUR OR ASSUME FOR US ANY OTHER RELIABILITY IN CONNECTION WITH THE SALE OF ANY PRODUCT OR PART BY US. UNDER NO CIRCUMSTANCES, INCLUDING ANY CLAIMS FOR NEGLIGENCE, SHALL CWS BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, COSTS OF INSTALLING OR CONNECTING OR REMOVING OR DISCONNECTING, OR ANY LOSS OR DAMAGES RESULTING FROM A DEFECT IN THE PRODUCT OR PARTS.

CWS WILL NOT ACCEPT ANY CHARGES FOR MODIFICATIONS, SERVICING, REPAIR, ADJUSTMENT, OR ANY OTHER ITEM WITHOUT AUTHORITY IN THE FORM OF A WRITTEN ORDER ISSUED BY US IN ADVANCE OF DOING THE WORK.

LIMIT OF LIABILITY: CWS'S TOTAL LIABILITY UNDER THIS ABOVE WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT OF ANY DEFECTIVE PART.

SPECIAL WARRANTY LIMITATION NOTE: UNDER NO CIRCUMSTANCES WILL CWS ASSUME ANY LIABILITY OR REPAIR RESPONSIBILITY FOR PARTS, MATERIAL OR PRODUCTS PLACED INTO SERVICE AND OPERATED AFTER START-UP PRIOR TO OWNER ACCEPTANCE, UNLESS EXPRESSLY AGREED BY US IN WRITING. THE ACT OF PLACING CWS PARTS, MATERIAL OR PRODUCTS INTO SERVICE PRIOR TO PAYMENT OF OUR INVOICES FOR THE SAME AND WITHOUT OWNER'S ACCEPTANCE, WILL WITHOUT EXCEPTION VOID THE WARRANTY RESPONSIBILITY OF CWS.

6. CONFIDENTIAL INFORMATION. The information, drawings, plans, and specifications being furnished by CWS have been developed at CWS's expense and shall not be used or disclosed by Purchaser for any purpose other than to install, operate, and maintain the goods supplied hereunder. Purchaser acknowledges that the information contained in such documents is valuable property of CWS, and shall not copy, publish, in whole or in part, or otherwise disseminate or make available such documents or their contents to any other party without the prior written permission of CWS.

7. DELIVERIES. The delivery date(s) quoted are based on CWS's best estimate of a realistic time when delivery to the carrier will be made, and are subject to confirmation at time of acceptance of any resulting order. CWS will not be responsible for any loss or liability suffered by Purchaser as a result of delay in delivery of the Goods. Delivery of the Goods to a common carrier will be deemed a satisfactory delivery by CWS to Purchaser. Except for warranty obligations, CWS's responsibility for the Goods ceases and title and risk of loss passes to the Purchaser (regardless of whether the purchase price has been fully paid) upon delivery of the Goods to the common carrier for shipment.

8. EXCUSABLE DELAYS. CWS shall not be liable for loss, damages, detention, or delays resulting from causes beyond its reasonable control or caused by but not limited to strikes, restrictions of the United States Government or other governments having jurisdiction, delays in transportation, inability to obtain necessary labor, materials, or manufacturing facilities, or any other cause reasonably beyond its control, whether similar or dissimilar to those listed.

9. PATENTS. The Purchaser will indemnify and hold CWS harmless against any expense or loss or other damage resulting from infringement of patents or trademarks arising from CWS compliance with any designs, specifications, or instructions of the Purchaser. In addition, all license fees and royalties are the exclusive responsibility and liability of Purchaser.

10. TITLE AND RISK OF LOSS OR DAMAGE. Title, risk of loss and/or damage will pass to the Purchaser upon shipment of the goods.

11. INSTALLATION/SERVICE. Purchaser agrees to obtain, at it's expense, all permit and licenses, if any, required by any regulatory authorities in connection with the installation and operation of the goods. Installation of goods furnished hereunder will be by the Purchaser, unless otherwise agreed to in writing. Field service will be provided on a per diem basis upon written authorization by the Purchaser and will be at the rates in effect at the time such services are provided (applied portal to portal) plus travel expenses, unless otherwise agreed in writing. Field service at the job site to diagnose equipment problems will be provided on a per diem basis at the then-current rates. All field service work will be performed during normal business hours.

12. CANCELLATION. Cancellation of any order must be by written notice to CWS and will be subject to cancellation charges, which will include all expenses incurred by CWS and a reasonable profit on the sale. In the event of such cancellation, the Purchaser shall have no rights to partially completed works. CWS reserves the right to cancel any order when Purchaser fails to meet payment terms on the order, and Purchaser agrees to pay any and all costs incurred by CWS up to the date of cancellation. CWS also reserves the right to cancel an order when it is determined that the Goods ordered cannot meet the Purchaser's specification, capacity, or process requirements.

13. RESTOCKING FEE. If Purchaser orders the wrong material, it may NOT be returned to CWS unless the following conditions have been met: CWS has authorized the return of the material, and has issued a Return Material Authorization Number; the material is unused and undamaged; the material is returned with all freight costs paid for by Purchaser; and purchaser pays a restocking fee of ten percent (10%) of the original purchase price. NOTE: CWS will not authorize or accept the return of any system or cleaning chemicals under any circumstances.

14. LAWS, CODES, TARIFFS, AND STANDARDS. Except as expressly stated herein, the price and schedule included herein are based on United States laws, codes, tariffs, and standards in effect as of the date of this quote. Should such laws, codes, tariffs, or standards change and increase or decrease the cost of performing the work or impact the schedule, CWS will advise Purchaser of such change. Purchaser and CWS will mutually agree to any modification of the order resulting from such change.

15. CONSEQUENTIAL DAMAGES; LIMITATION OF LIABILITY. CWS WILL NOT BE LIABLE FOR ANY LOST PROFITS, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND, WHETHER ARISING UNDER WARRANTY, CONTRACT, NEGLIGENCE, STRICT LIABILITY, INDEMNIFICATION, OR ANY OTHER CAUSE OR COMBINATION OF CAUSES WHATSOEVER. THIS LIMITATION WILL APPLY NOTWITHSTANDING ANY FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY. In no case will CWS's liability exceed the amount paid to CWS by the Purchaser for the specific Goods giving rise to such liability. Any action against CWS must be brought within eighteen (18) months after the cause of the action occurs. Purchaser agrees to indemnify and hold CWS harmless from and against all liabilities, claims, and demands of third parties of any kind relating to the Goods and their use arising after shipment of the Goods.

16. MODIFICATION. No change, modification, or waiver to any terms or scope of the order will be binding and valid unless it is accepted in writing and signed by an authorized representative of CWS.

17. ASSIGNMENT. This order may not be transferred or assigned by operation of law or otherwise, without the prior express written consent of CWS. Any transfer or assignment of any rights, duties, or obligations hereunder without such consent shall be void. Provided, however, that CWS will not be prohibited from subcontracting all or a part of its obligations under this order.

18. EXPORT SALES. No provision of this agreement will be construed to require CWS to export or deliver any technical information, data, and/or equipment if such export or delivery is then prohibited or restricted by any law or regulation of the U.S. Government. Purchaser will comply with all applicable export and reexport control laws and regulations, including without limitation, the Export Administration Regulations (15 C.F.R. Parts 730, et seq.) maintained by the U.S. Department of Commerce and the Office of Foreign Assets Control Regulations (31 C.F.R. Chapter V) of the U.S. Treasury Department. Specifically, Purchaser will not, directly or indirectly, sell, export, reexport, transfer, provide, divert, loan, lease, consign, or otherwise dispose of goods, services, software, source code, or technology received in connection with this order to any person, entity, or destination prohibited by the laws or regulations of the United States, without obtaining prior authorization from the competent government authorities as required by those laws and regulations. Notwithstanding any other provision of this order, Purchaser will not be required to take or refrain from taking any action penalized under the laws of the United States or any applicable foreign jurisdiction, including without limitation, the antiboycott laws administered by the U.S. Commerce and Treasury Departments.

19. FORCE MAJEURE. CWS will not be required to perform its obligations under these Standard Terms and Conditions of Sale, nor will CWS be liable for its failure to perform, for causes beyond the reasonable control of CWS.

20. GOVERNING LAW. All matters involving the validity, interpretation, and application of these Standard Terms and Conditions of Sale will be controlled by the laws of the State of Minnesota, United States of America. Purchaser hereby irrevocably consents and agrees that any legal action, suit or proceeding arising out of or in connection with this Order shall be instituted in the courts of the State of Minnesota, or the United States court sitting in Ramsey County, State of Minnesota, and hereby irrevocably accepts and submits to, generally and unconditionally, the jurisdiction of any such court and to all proceedings in such court. The parties disclaim any applicability of the U.N. Convention on the International Sale of Goods to the order.

21. GENERAL PROVISIONS. All rights and remedies conferred by these Standard Terms and Conditions of Sale shall be cumulative and may be exercised singularly or concurrently. Failure by either party to enforce any term or condition shall not be deemed a waiver of future enforcement of that or any other terms or conditions. If legal action is brought for the enforcement of these Standard Terms and Conditions of Sale, the successful party shall be entitled to recover attorney's fees and other costs incurred in such action.

22. ACCEPTANCE. In the absence of a written acceptance by the Purchaser, an acceptance of any goods offered by CWS will constitute an acceptance of these Standard Terms and Conditions of Sale.

23. HEADINGS. The headings used throughout are for convenience only and will be disregarded for the purpose of construing and enforcing this agreement.

ETS-UV
xylem

FIRM PROPOSAL
ETS - UV SYSTEM

Project Name:	Town of Crossville WWTP
Project Location:	Crossville, AL
Proposal No.:	24 UV 18 PB3
Proposal Date:	27-Aug-2025
Proposal Expires:	25-Nov-2025
Applications Engineer:	Martin Smith
Sales Manager:	Patrick Bollman, P.E.
Manufacturers Rep:	Templeton & Associates
Contact:	Tim Boyne
Phone:	(205) 500-2168
Email:	tim@templeton-associates.com
Consultant:	Ladd Environmental Consultants, Inc.,
Contact:	Adam Lea, P.E.
Phone:	(256) 845-5315
Email:	adam.lea@laddenv.com

BID INFORMATION

Bid Date:	27-Aug-2025
Bid Time:	1:00 pm CDT
Spec Section:	11370
Addendum:	4
Addendum Date:	12-Aug-2025

SCOPE

Evoqua Water Technologies, LLC / Xylem proposes to furnish the equipment specified in this Quotation in accordance with the following technical specification sections of the document entitled 11370 CLOSED CHANNEL ULTRAVIOLET WASTEWATER DISINFECTION, to the extent technically applicable to the scope of supply described in this quotation and subject to the “Clarifications/Exceptions” and “Terms and Conditions of Sale” stated herein:

All of the information set forth in this quotation (including drawings, designs and specifications) is confidential and/or proprietary and has been prepared solely for the recipient’s use in considering the purchase of the equipment and/or services described herein. Transmission of all or any part of this information to others, or use by the recipient, for other purposes is expressly prohibited without Evoqua / Xylem’s prior written consent.

FOR FURTHER INFORMATION:
Questions relative to this Quotation should be directed to Evoqua / Xylem’s manufacturers representative listed above.

PRICE SUMMARY:
Evoqua / Xylem’s price includes only the specific items detailed in this quotation. Items not specifically identified herein are to be furnished by others. Please refer to the “Excluded Items” Section of this quotation for a list of items to be furnished by others..

SCOPE OF SUPPLY

Qty	Description
	DESIGN CONSIDERATIONS
	Average flowrate: 250,000 gpd
	Peak flowrate: 500,000 gpd
	Transmittance (1 cm light cell): 55%
	TSS: <20 mg/L
	Iron concentration: <0.1 mg/l
	Manganese concentration: <0.05 mg/l
	Influent e. coli: <50,000 / 100 ml
	Effluent e. coli: <126 / 100 ml
	Dose: >35 mJ/cm2 (MS2 validated)
	Configuration: 2 parallel UVLW-6800-10 (100% redundancy at peak)
	UVLW-6800-10
	UV Chamber
2	ETS-UV UVLW-6800-10 UV systems complete with:
	8" ANSI flange connections, 316L SS
	(6) 800 W low pressure high output UV lamps parallel to flow
	(6) Quartz thimbles
	Temperature sensor
	Automatic/Mechanical cleaning
	Access hatch
	(1) UV intensity sensor
	(1) Operation and maintenance manual
	Power/Control Cabinet
2	Free standing power/control panels, epoxy coated painted steel, complete with:
	Spectra 3, 7" touch screen
	Modbus RTU to Modbus TCP/IP
	Electronic ballast
	Dimensions: H 79 x W 32 x D 24-in
	Power supply: 480V, 3ø, 4-Wire + GND (Wye), 60Hz
	NEMA12 enclosure
	Cable - UV chamber to power/control cabinet
2	50 ft molded lamp cable sets
2	50 ft cable kits (sensors / motor)
	Miscellaneous
1	Online UVT Transmittance Monitor and Automatic Cleaning
	Supplied Spares
6	UV lamps
2	Electronic ballasts
2	Quartz thimbles
2	Thimble seals
6	Wiper rings
1	UV intensity monitor
1	Wiper ring UV intensity monitor

SCOPE OF ENGINEERING

The following documentation shall be provided by Evoqua:
- Shop Drawing Submittal
  - Detailed Scope of Supply
  - Comments & Clarifications
  - Project Schedule
  - Technical Information / Equipment / Drawings
    Catalog Cutsheets
    Dimensional Drawings / General Assembly Drawings
    Functional Schematics / Piping and Instrumentation Diagrams (when applicable)
    Electrical Schematics (when applicable)
  - Receiving, Handling and Storage
  - Warranty Statement
- Operation and Maintenance Manuals
  - Warranty Statement
  - Introduction
  - Safety Precautions
  - Preventive Maintenance General Information
  - Maintenance Record Card
  - Technical Data
  - Installation
  - Operation
  - Service
  - Illustrations
  - Preventive Maintenance Kits and Spare Parts List

NOTE - In an effort to be environmentally responsible, one (1) hard copy of the submittal and O+M will be supplied and up to eight (8) copies will be supplied on flash drive(s). Additional hardcopies of the submittal and O+M can be supplied at a cost of $50.00 each.

CLARIFICATIONS & EXCEPTIONS

The equipment specified herein shall conform to the specification section 11370 CLOSED CHANNEL ULTRAVIOLET WASTEWATER DISINFECTION to the extent they are technically applicable to Evoqua / Xylem's scope of supply as described in this Quotation and subject to the following clarifications:

Section	Part	Description
NOTICE		The scope of supply and pricing are based on Evoqua / Xylem's standard equipment selection, standard terms of sale and warranty terms. Any variations from these standards may affect this quotation.
11370	1.12.A.	Add, Provide minimum one year warranty in accordance with Section 01700 on all equipment furnished. Warranty period begins at date of plant acceptance by Owner, ***not to exceed 2 years from delivery of equipment.*** (See General Conditions). Note: An end date will be required. The 2 year maximum end date will provide 1 year for construction from delivery of equipment to site.
11370		Note: equipment and components will be manufacturer's standard.

Variations from Evoqua / Xylem's standard Terms and Conditions of Sale and the Clarifications/Exceptions identified above can be negotiated on an individual, as needed basis prior to award of contract. However, please note that this proposal is expressly conditioned upon: (i) acceptance by the Owner or Contractor of the Terms and Conditions of Sale and the Clarifications/Exceptions as described within this proposal, without modification or addition, or a mutually agreed upon set of commercial and technical terms; and (ii) Evoqua / Xylem's satisfactory completion of an anti-corruption due diligence review of the purchaser.

ITEMS NOT INCLUDED IN SCOPE

- Mechanical and electrical installation labor
- Civil work including supply of anchor bolts
- Interconnecting piping
- Interconnecting wiring (unless detailed above)
- Valves, fittings, appurtenances not specifically listed above
- Installation supervision
- All taxes, fees, lien waivers, certificates, bonds and licenses
- Room ventilation, air conditioning, or lighting
- Videotaping (unless a videotape agreement is signed)

ADDITIONAL FIELD SERVICES:

Should the Purchaser feel that additional services will be required, they can be purchased from Evoqua / Xylem. Additional services may be purchased at the per diem rate stated below.

Evoqua / Xylem price does not include service of a factory field service technician during the time of installation of the equipment items.

In the event Purchaser wishes to videotape the Evoqua / Xylem field service personnel during start-up and/or field service, Purchaser must execute Evoqua's standard "Videotape Agreement" in which the Purchaser shall expressly waive any claim against Evoqua / Xylem, for injury or damage caused by inaccuracies or errors in such videotape(s) and acknowledge that such videotaping is done by Purchaser at its sole risk.

TERMS GOVERNING FIELD SERVICES: Services of a factory field service technician to inspect installation and/or first operation of the products specified in the quotation can be furnished by Evoqua at the following rates:

A. Supervision or consultation of a process service technician within the continental limits of the United States: $1,500 per eight (8) hour day, Monday through Friday inclusive.

B. Supervision or inspection of a field service technician within the continental limits of the United States: $1,500 per eight (8) hour day, Monday through Friday inclusive. Overtime Monday through Friday and Saturday work is charged at time and one-half. Time worked on Sunday will be charged double time; time worked on U.S. Holidays will be charged triple time.

C. Traveling, living and incidental expenses at cost, including shipping charges on tools and other equipment which the factory field service technician has shipped to the construction site.

D. Travel time will be charged to and from Purchaser's construction site, and weekend or holiday travel request or required by Purchaser will be charged at the overtime rates.

Rates shown above apply only to additional services performed within twelve (12) months from the date of Quotation. Additional services performed after twelve (12) months from the date of Quotation shall be subject to Evoqua's current rates at the time such service is provided. Except for the direct acts or omissions of the factory field service technician, the responsibility for the installation and/or first operation shall be Purchaser's. Evoqua / Xylem will assume responsibility for workmen's compensation coverage of Evoqua / Xylem employees only, and will provide umbrella liability coverage during installation. All other insurance coverage and necessary materials to accomplish installation shall be provided by Purchaser.

ETS-UV
xylem

FIRM PROPOSAL
ETS - UV SYSTEM

COMMERCIAL OFFERING

Payment Terms: 30% Due on Approval of Submittals
60% Due on Shipment of Equipment
10% Due on Startup (not to exceed 90 days after Equipment Shipment)
All payments are due 30 days from date of invoice and are not subject to retention.
Evoqua / Xylem prices are exclusive of any taxes unless expressly stated in this quotation. If this project is subject to sales or use tax, the Purchaser shall be invoiced for taxes at the current rate of sales or use tax for the jobsite location, at the time of invoice issuance. If this project is not subject to sales or use tax, please send a Tax Exempt Certificate with the issuance of any ensuing P.O. to Evoqua / Xylem.

FCA: Factory
Freight to Job Site: Included
Submittal: 6-8 weeks after receipt and approval of purchase order
Shipment: 20-24 weeks after receipt of full information and approved drawings (when required)
Startup: 3 On-site day(s) included over 2 Trip(s)
Training: Concurrent with startup
Price: **To follow**

Other Conditions:

1) Evoqua Water Technolgies, LLC (Evoqua) / Xylem proposes to furnish materials, and/or equipment for the project identified at the beginning of this proposal. Any items not shown above as detailed under (i) 'SCOPE OF SUPPLY', (ii) 'SCOPE OF ENGINEERING', or (iii) other attachments to this proposal, are EXCLUDED. In addition:

   a. Evoqua' / Xylem' price will be held valid for a period of 90 days from the date of this proposal (Proposal Date); provided, however, in the event (A) Evoqua/Xylem receives an order from Buyer within 90 days from the Proposal Date and the percentage change in the U.S. Department of Labor Consumer's Price Index (all items) (the "Index") as it existed two months prior to the Proposal Date and the Index as it existed two months preceding the month in which Evoqua receives Buyer's order is greater than 10%, then Evoqua shall have the right to reprice this proposal or (B) Buyer's order is received more than 90 days beyond the Proposal Date, then Evoqua shall have the right to reprice this proposal.

   b. Prices are in US Dollars.
   c. Local or state taxes are not included in this proposal.

2) This proposal by Evoqua / Xylem is contingent upon: (i) Evoqua' / Xylem' written acceptance of the purchase order or other contractual document issued in response to this proposal; and (ii) Evoqua' /Xylem' satisfactory completion of an anti-corruption due diligence review, as applicable; and (iii) the enclosed terms and conditions contained in the following page(s) of this proposal, such terms to take precedence in the event of conflict with any other terms or documents incorporated into the contract arising out of this proposal unless otherwise agreed in writing.

3) All of the information supplied by Evoqua /Xylem in connection with this proposal (including drawings, designs and specifications) (the "Information") is confidential and/or proprietary and has been prepared for your use solely in evaluating the purchase of the equipment and/or services described herein. Transmission of all or any part of the Information to others, or use by you for any purpose other than such evaluation, is expressly prohibited without Evoqua' / Xylem' prior written consent.

4) Please:

Neptune Benson Inc.
334 Knight St Ste 3100
Warwick, RI 02886-1286
Attn: Martin Smith
ph: 401.262.4731
fax: 401.821.7129
email: martin.smith@xylem.com

Thank you for your interest in Evoqua Water Technolgies, LLC / Xylem. We are committed to meeting your expectations.

XYLEM AMERICAS - TERMS AND CONDITIONS OF SALE

1-Aug-24

1. Agreement, Integration and Conflict of Terms. "Proposal" means the Seller's quotation, proposal and/or sales form, including any special conditions expressly incorporated by reference, and these terms and conditions. "Seller" means the applicable affiliate of Xylem Inc. that is party to the Agreement. "Buyer" means the entity that is party to the Agreement with Seller. "Agreement" means the definitive agreement, comprised of the Proposal and any other documents expressly included or incorporated by reference will govern the Buyer and Seller relationship. Seller's Proposal is expressly conditioned on Buyer's acceptance of these terms and conditions. Any additional or different terms and conditions contained in Buyer's purchase order or other communication will have no effect on the Agreement unless specifically agreed to in writing by the parties; and Seller hereby objects, and any such proposed modifications will not constitute Seller's acceptance of any such modifications. Seller's commencement of performance or delivery will not be deemed or construed as acceptance of Buyer's additional or different terms and conditions. In the case of any conflict among the foregoing documents, these terms will take precedence with the exception of (i) price and delivery, which will be governed by the order acknowledgment (if any) and invoice; and (ii) the warranty, which will be governed by Seller's product documentation. This Agreement supersedes all prior negotiations, representations, or agreements, either written or oral, between the parties and, further, can only be altered, modified or amended with the express written consent of Seller.

2. Proposal, Withdrawal, Expiration. Unless otherwise stated in writing, Proposals are valid for thirty (30) calendar days from the date of issuance, unless otherwise provided therein. Seller reserves the right to cancel or withdraw the Proposal at any time with or without notice or cause prior to acceptance by Buyer to the Proposal terms, or after Buyer' acceptance if Buyer fails to complete any actions required by the Proposal for Seller to proceed. Seller nevertheless reserves its right to accept any contractual documents received from Buyer after this 30-day period.

3. Prices. Prices apply to the specific quantities stated in the Proposal. Prices include handling fees and standard packing according to Seller's specifications for delivery. Buyer will, as an additional charge, pay all costs and taxes for special packing requested by Buyer, including packing for exports. To the extent allowed under law, prices are subject to change without notice. The price for the goods does not include any applicable sales, use, excise, Goods and Services Tax, Value Added Tax, or similar tax, duties, tariffs, or other governmental charges. Buyer will have the responsibility for the payment of all such applicable levies.

4. Payment Terms. Seller reserves the right to require payment in advance or C.O.D. and otherwise modify credit terms should Buyer's credit standing not meet Seller's acceptance. Unless different payment terms are expressly set forth in the applicable Proposal or order acknowledgment or Sales Policy Manual, goods will be invoiced upon shipment. Buyer's payment must be in Seller's local currency, as determined by Seller's office location to which the order has been submitted. Any payment amount made by Buyer via credit card will be subject to a 3.0% charge. Payment in full is due within thirty (30) days from the invoice date (**"Payment Due Date"**), unless otherwise stated in Seller's documentation. Any Buyer-requested delivery delay solely affects delivery date and will not in any way alter the original Payment Due Date. If Buyer fails to make payment when due, Buyer agrees that Seller may apply a service or finance charge of the lesser of (i) one and one-half percent (1.5%) per month (eighteen percent (18%) per annum), or (ii) the highest rate permitted by applicable law, on the unpaid balance of the invoice from and after the invoice due date. Buyer is responsible for all costs and expenses associated with any checks returned due to insufficient funds. All credit sales are subject to prior approval of Seller's credit department. Export shipments will require payment prior to shipment or an appropriate Letter of Credit. If, during the performance of the Agreement, the financial responsibility or condition of Buyer is such that Seller in good faith deems Buyer insecure, Seller may: (a) request financial assurances; (b) suspend performance and will not be obligated to continue performance under the Agreement; (c) stop goods in transit and defer or decline to make delivery of goods, except upon receipt of satisfactory security or cash payments in advance; and/or (d) terminate the order per Article 11. Seller also retains any/all rights to enforce payment defaults to the full price of the work completed and in process. Upon default by Buyer in payment when due, if Buyer fails to immediately and without demand pay to Seller the entire amount in default for any and all shipments made to Buyer, irrespective of the applicable terms and/or contract under which those shipments were as a debt due to Seller, Seller may withhold all subsequent shipments until the full amount in default is settled. Acceptance by Seller of less than full payment will not be a waiver of any of its rights hereunder. Buyer may not assign or transfer this Agreement or any interest in it, or monies payable under it, without the prior written consent of Seller and any assignment made without this consent will be null and void.

5. Title, Delivery, Risk of Loss, Delay. Delivery dates are estimates, and time is not of the essence. Unless otherwise specified by Seller, delivery and transfer of risk of loss for shipments to Buyers that are not Related Party Buyers will be made Ex Works (Incoterms 2020), Seller's plant or Distribution Center. Title will pass when risk of loss transfers. If Seller is required to warehouse or store goods on behalf of Buyer, due to a Buyer delay or request (see Article 23), warehouse and storage fees will be applied and payable upon invoice, as will any required maintenance throughout the delay. Risk of loss for all stored goods will be borne by Buyer from the start of this period. Seller has no obligation to the Buyer to arrange insurance while Buyer's goods are in storage at named place, with all such responsibility and insurance to be borne by Buyer accordingly. Seller will not be responsible to Buyer for any loss, whether direct, indirect, incidental or consequential in nature, or for any loss of profits or revenue, or liquidated damages, arising out of or relating to any failure of the goods to be delivered by the specified delivery date. In the absence of specific instructions, Seller will select the carrier. Buyer will reimburse Seller for the additional cost of its performance resulting from inaccurate or lack of delivery instructions, or by any act or omission on Buyer's part. Any such additional cost may include storage, insurance, protection, re-inspection and delivery expenses. Buyer further agrees that any payment due on delivery will be made on delivery into storage as though goods had been delivered in accordance with the order.

"Related Party Buyers" means Buyers, directly or indirectly, owned more than fifty percent (50%) by Xylem Inc. or under significant or joint control by Xylem Inc. For export shipments from the U.S.A. to Related Party Buyers, delivery and transfer of risk of loss for the goods will be DAP (Incoterms 2020), port of destination unless otherwise specified. Related Party Buyer will be importer of record for any customs clearance. For shipments to Related Party Buyers that are not export shipments from the U.S.A., delivery and transfer of risk of loss will be FCA (Incoterms 2020), Seller's plant or Distribution Center unless otherwise specified. For all Related Party Buyer transactions, title will pass to Buyer when risk of loss passes to Buyer.

Buyer grants to Seller a continuing security interest in and a lien upon the goods supplied by Seller under this Agreement and the proceeds thereof (including insurance proceeds), as security for the payment of all such amounts and the performance by Buyer of all of its obligations to Seller under the Agreement and all such other sales, and Buyer will have no right to sell, encumber or dispose of the goods. Buyer's respective insurance policy for any such Seller claim will include a waiver of subrogation in favor of Seller. Buyer will execute any and all financing statements and other documents and instruments and do and perform any and all other acts and things which Seller may consider necessary, desirable, or appropriate to establish, perfect or protect Seller's title, security interest and lien. In addition, Buyer authorizes Seller and its agents and employees to execute any and all such documents and instruments and do and perform any and all such acts and things, at Buyer's expense, in Buyer's name and on its behalf. Such documents and instruments may also be filed without the signature of Buyer to the extent permitted by law.

6. Warranty. Except as provided above, for goods sold by Seller to Buyer(s) that are used by Buyer for personal, family or household purposes, Seller warrants the goods to Buyer on the terms of Seller's limited warranty available on Seller's website. For any other purpose, Seller warrants that the goods sold to Buyer under the Agreement (with the exception of software, membranes, seals, gaskets, elastomer materials, coatings and other "wear parts" or consumables all of which are not warranted except as otherwise provided in the Proposal) will be (i) built in accordance with the specifications referred to in the Proposal, if such specifications are expressly made a part of the Agreement, and (ii) free from defects in material and workmanship for a period of one (1) year from the date of installation or eighteen (18) months from the date of shipment (which date of shipment will not be greater than thirty (30) days after receipt of notice that the goods are ready to ship), whichever occurs first, unless a longer period is specified in the product documentation (the "Warranty"). For services, the warranty period will be three (3) months from the date the services are performed unless otherwise expressly set forth in the Proposal or sales form or order acknowledgment.

Seller will, at its option, either repair or replace any goods which fails to conform with the Warranty; provided, however, that under either option, Seller will not be obligated to remove the defective goods or install the replaced or repaired goods and Buyer will be responsible for all other costs, including service costs, shipping fees and expenses.

Buyer's failure to comply with Seller's repair or replacement advice will constitute a waiver of Buyer's rights and render all warranties void. Any parts repaired or replaced by Seller under the Warranty are warranted only for the remaining balance of the warranty period. The Warranty is conditioned on Buyer giving written notice to Seller of any defects in material or workmanship of warranted goods within ten (10) days, or shorter period as dictated by the issue, of the date when any defects are first manifest. Seller will have no warranty obligations to Buyer with respect to any goods or parts of the goods that: (a) have been repaired by third parties other than Seller or without Seller's written approval; (b) have been subject to misuse, misapplication, neglect, alteration, accident, or physical damage; (c) have been used in a manner contrary to Seller's instructions for installation, operation and maintenance; (d) have been damaged from ordinary wear and tear, corrosion, or chemical attack; (e) have been damaged due to abnormal conditions, vibration, failure to properly prime, or operation without flow; (f) have been damaged due to a defective power supply or improper electrical protection; (g) have been damaged resulting from the use of accessory equipment not sold by Seller or not approved by Seller in connection with goods supplied by Seller hereunder; or (h) not sold by Seller or its authorized supplier. In any case of goods not manufactured by Seller, there is no warranty from Seller; however, Seller will extend to Buyer any warranty received from Seller's supplier of such goods.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, GUARANTEES, CONDITIONS OR TERMS OF WHATEVER NATURE RELATING TO THE GOODS PROVIDED HEREUNDER, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY EXPRESSLY DISCLAIMED AND EXCLUDED. BUYER'S EXCLUSIVE REMEDY AND SELLER'S AGGREGATE LIABILITY FOR BREACH OF ANY OF THE FOREGOING WARRANTIES ARE LIMITED TO REPAIRING OR REPLACING THE GOODS AND WILL IN ALL CASES BE LIMITED TO THE AMOUNT PAID BY THE BUYER HEREUNDER.

7. Inspection. Buyer will have the right to inspect the goods upon their receipt. When delivery is to Buyer's site or to a project site ("Site"), Buyer will notify Seller in writing of any apparent shipment shortages, damages, or nonconformity of the goods within three (3) days from receipt by Buyer, unless a shorter period is required in Seller's Proposal. For all other deliveries, Buyer will notify Seller in writing of any nonconformity with this Agreement within fourteen (14) days from receipt by Buyer. Failure to give such applicable notice will constitute a waiver of Buyer's right to inspect and/or reject the goods for nonconformity and will be equivalent to an irrevocable acceptance of the goods by Buyer. Claims for loss of or damage to goods in transit must be made to the carrier, and not to Seller unless different terms are expressly set forth in Seller's Proposal.

8. SELLER'S LIMITATION OF LIABILITY. EXCEPT AS OTHERWISE PROVIDED BY LAW, IN NO EVENT WILL SELLER'S LIABILITY EXCEED THE AMOUNT PAID BY BUYER UNDER THIS AGREEMENT. SELLER WILL HAVE NO LIABILITY FOR LOSS OF PROFIT, LOSS OF ANTICIPATED SAVINGS OR REVENUE, LOSS OF INCOME, LOSS OF BUSINESS, LOSS OF PRODUCTION, LOSS OF OPPORTUNITY, LOSS OF REPUTATION, LIQUIDATED, INDIRECT, CONSEQUENTIAL, INCIDENTAL, PUNITIVE, TREBLE, OR EXEMPLARY DAMAGES. THE FOREGOING LIMITATIONS OF LIABILITY WILL BE EFFECTIVE WITHOUT REGARD TO SELLER'S ACTS OR OMISSIONS OR NEGLIGENCE OR STRICT LIABILITY IN PERFORMANCE OR NON-PERFORMANCE HEREUNDER.

To the extent the Agreement provides a specified remedy for a default or breach, the given remedy will be Seller's sole liability and Buyer's sole and exclusive remedy for the default or breach to the exclusion of any and all other remedies that may be available at law, in equity, or otherwise. The terms of this Article 8 survive expiry or termination of the Agreement and prevail over all other provisions contained in the Agreement.

9. USED GOODS. USED GOODS ARE SOLD IN AN AS IS, WHERE IS CONDITION. SELLER MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AS TO THE NATURE, QUALITY OR CONDITION OF THE GOODS, OR ITS SUITABILITY FOR ANY USE, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, UNLESS EXPRESSLY AGREED UPON IN WRITING BETWEEN THE PARTIES. SELLER WILL HAVE NO LIABILITY TO BUYER HEREUNDER OR IN CONNECTION WITH THE GOODS, INCLUDING WITHOUT LIMITATION, FOR LOSS OF PROFIT, LOSS OF INCOME, LOSS OF PRODUCTION, LOSS OF OPPORTUNITY, INDIRECT, CONSEQUENTIAL, INCIDENTAL, PUNITIVE OR EXEMPLARY DAMAGES.

10. Force Majeure. Seller may cancel, terminate, or suspend this Agreement and Seller will have no liability for any failure to deliver or perform, or for any delay in delivering or performing any obligations, due to acts or omissions of Buyer and/or its contractors, or due to Force Majeure. "Force Majeure" means any event or circumstance beyond Seller's reasonable control, including but not limited to: (A) acts of God, such as natural disasters, drought, fire, flood, earthquake, tsunami; (B) war (declared or undeclared), riots, insurrection, rebellion, acts of the public enemy, acts of terrorism, sabotage, blockades, governmental authorities acts or inactions, embargoes; (C) disease, pandemics, epidemics; (D) currency restrictions; and (E) labor shortages or disputes, unavailability of components, materials, or parts, fuel, power, energy or transportation facilities; failures of suppliers or subcontractors to effect deliveries. In all such cases, the time for performance will be extended in an amount equal to the period necessary for Seller to recover from the event, provided that Seller will, as soon as reasonably practicable after it has actual knowledge of the beginning of any excusable delay, notify Buyer of the delay and of the anticipated duration and consequence thereof; and, to the extent the Force Majeure impacts the pricing specified in the Proposal or Agreement, as the case may be, Seller will notify Buyer of the revised pricing and its basis. Should Buyer reject any such Force Majeure-related pricing increase, the parties will resolve in accordance with the Agreement's dispute resolution process. Seller will resume performance of its obligations hereunder with the least possible delay.

11. Cancellation; Termination. Except as otherwise provided in this Agreement, no order may be cancelled on special or made-to-order goods or unless otherwise requested in writing by either party and accepted in writing by the other. If a cancellation is requested by Buyer, Buyer will, within thirty (30) days of such cancellation, pay Seller a cancellation fee, which will include all costs and expenses incurred by Seller prior to the receipt of the request for cancellation including, but not limited to, all commitments to its suppliers, subcontractors and others, all fully burdened labor and overhead expended by Seller, plus a reasonable profit charge. Return of goods will be in accordance with Seller's most current Return Materials Authorization and subject to a minimum fifteen percent (15%) restocking fee, unless otherwise specified.

Notwithstanding anything to the contrary in the Agreement, if the commencement by or against Buyer of any voluntary or involuntary proceedings in bankruptcy or insolvency, or if Buyer will be adjudged bankrupt, make a general assignment for the benefit of its creditors, or if a receiver will be appointed on account of Buyer's insolvency, Seller may, upon providing Buyer notice that has immediate effect upon issuance, terminate the Agreement. If Buyer fails to make any payment when due under this Agreement, or if Buyer does not correct or, if immediate correction is not possible, commence and diligently continue action to correct any default of Buyer to comply with any of the provisions or requirements of this Agreement within ten (10) calendar days after being notified in writing of such default by Seller, Seller may, by written notice to Buyer, without prejudice to any other rights or remedies which Seller may have, terminate its further performance of this Agreement. If any termination under this Article 11, Seller will be entitled to receive payment as if Buyer has cancelled the Agreement as per the preceding paragraph immediately and without notice as a debt due. Seller may nevertheless elect to complete its performance of this Agreement by any means it chooses. Buyer agrees to be responsible for any additional costs incurred by Seller in so doing. Upon termination of this Agreement, the rights, obligations and liabilities of the parties which will have arisen or been incurred under this Agreement prior to its termination will survive such termination.

12. Drawings. All drawings are the property of Seller. Seller does not supply detailed or shop working drawings of the goods; however, Seller will supply necessary installation drawings. The drawings and bulletin illustrations submitted with Seller's Proposal show general type, arrangement and approximate dimensions of the goods to be furnished for Buyer's information only and Seller makes no representation or warranty regarding their accuracy. Unless expressly stated to the contrary within the Proposal, all drawings, illustrations, specifications or diagrams form no part of this Agreement. Seller reserves the right to alter such details in design or arrangement of its goods which, in its judgment, constitute an improvement in construction, application or operation. After Buyer's acceptance of this Agreement, any changes in the type of goods, the arrangement of the goods, or application of the goods requested by Buyer will be made at Buyer's expense.

13. Confidential Information. Seller's designs, illustrations, drawings, specifications, technical data, catalogues, "know-how", economic or other business or manufacturing information (collectively, "Confidential Information") disclosed to Buyer will be deemed proprietary and confidential to Seller. Buyer agrees not to disclose, use, or reproduce any Confidential Information without first having obtained Seller's written consent. Buyer's agreement to refrain from disclosing, using or reproducing Confidential Information will survive completion of the work under this Agreement. Buyer acknowledges that its improper disclosure of Confidential Information to any third party will result in Seller's suffering irreparable harm. Seller may also seek injunctive or equitable relief to prevent Buyer's unauthorized disclosure.

14. Installation and Start-up. Unless otherwise agreed to in writing by Seller, installation will be the sole responsibility of Buyer. Where start-up service is required with respect to the goods purchased hereunder, it must be performed by Seller's authorized personnel or agents; otherwise, the warranty is void. If Buyer has engaged Seller to provide an engineer for start- up advisory services such engineer will function in an advisory capacity only and Seller will have no responsibility for the quality of workmanship of the installation. In any event, Buyer understands and agrees that it will furnish, at Buyer's expense, all necessary foundations, supplies, labor and facilities that might be required to install and operate the goods.

15. Specifications; Back-charges. Changes in specifications requested by Buyer are subject to Seller's written approval. If such changes are approved, the price for the goods and the delivery schedule will be changed to reflect such changes. Buyer will not make purchases, nor will Buyer incur any labor that would result in a back charge to Seller without prior written consent of an authorized employee of Seller.

16. Buyer's Warranty. Buyer warrants the accuracy of any and all information relating to the details of its operating conditions, including influent quality, temperatures, pressures, and where applicable, the nature of all hazardous materials. Seller can justifiably rely upon the accuracy of Buyer's information in its performance. Should Buyer's information prove inaccurate, Buyer agrees to reimburse Seller for any losses, liabilities, damages and expenses that Seller may have incurred as a result of any inaccurate information provided by Buyer to Seller.

17. Product Recalls. In cases where Buyer purchases for resale, Buyer will take all reasonable steps (including those measures prescribed by the Seller) to ensure: (a) all customers of the Buyer and authorized repairers who own or use affected goods are advised of every applicable recall campaign of which the Buyer is notified by the Seller; and (b) modifications notified to Buyer by Seller by means of service campaigns, recall campaigns, service programs or otherwise are made with respect to any goods sold or serviced by Buyer to its customers or authorized repairers. Should Buyer fail to perform any of the actions required under this obligation, Seller will have the right to obtain names and addresses of the Buyer's customers from Buyer and Seller will be entitled to get into direct contact which such customers.

18. GOVERNING LAW. THE TERMS OF THIS AGREEMENT AND ALL RIGHTS AND OBLIGATIONS HEREUNDER WILL BE GOVERNED BY THE LAWS OF THE JURISDICTION WHERE SELLER'S OFFICE IS LOCATED TO WHICH THIS ORDER HAS BEEN SUBMITTED (WITHOUT REFERENCE TO PRINCIPLES OF CONFLICTS OF LAWS). THE RIGHTS AND OBLIGATIONS OF THE PARTIES HEREUNDER WILL NOT BE GOVERNED BY THE 1980 U.N. CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS. THIS ARTICLE 18 WILL SURVIVE ANY TERMINATION, CANCELLATION, OR EXPIRATION OF THE AGREEMENT.

19. DISPUTE RESOLUTION. Prior to the commencement of any litigation, in the event of any dispute between the Buyer and Seller arising out of or in connection with the Agreement or the good or services contemplated therein; Buyer and Seller agree to first make a good faith effort to resolve the dispute informally. The first attempt at dispute resolution shall be made by the technical project managers (or equivalent) of the parties. Should resolution not be reached within ten (10) business days, senior management of both parties will attempt to resolve the dispute. If the parties are still unable to resolve the dispute, the dispute will be sent to litigation. TO ENCOURAGE PROMPT AND EQUITABLE RESOLUTION OF ANY LITIGATION, EACH PARTY HEREBY IRREVOCABLY WAIVES ITS RIGHTS TO A TRIAL BY JURY IN ANY LITIGATION RELATED TO THIS AGREEMENT

20. Export Regulation. Seller's goods, including any software, documentation and any related technical data included with, or contained in, or utilized by such goods or deliverables, may be subject to applicable export laws and regulations, including United States Export Administration Regulations and Buyer will comply with all such applicable laws and regulations. In particular, the Buyer will not, and will not permit any third parties to, directly or indirectly, export, re-export or release any goods to any jurisdiction or country to which, or any party to whom, the export, re-export or release of any goods is prohibited by applicable law, regulation or rule. The Buyer will be responsible for any breach of this Article 20.

21. Privacy and Customer Data. Buyer acknowledges that Seller may collect and process personal data for the purposes outlined in the Agreement. Seller's data privacy policy is available at https://www.xylem.com/en-us/support/privacy/. Buyer acknowledges that it has read and understood Seller's privacy policy and agrees to the use of personal data outlined herein. The collection and use of personal data by Buyer is Buyer's responsibility. Some Seller goods are equipped with cloud communication capability resulting in these goods automatically transmitting, on an encrypted basis, data to Seller's X-Cloud. Unless otherwise specified in the Agreement, Buyer agrees and authorizes Seller to indefinitely store any data collected from Seller goods ("Customer Data") on Seller's hardware, software, networking, storage, and related technology. Buyer grants Seller and Seller's affiliates a worldwide, royalty-free, non-exclusive, irrevocable right and license to access, store and use such Customer Data to: (a) provide services; (b) analyze and improve services; (c) analyze and improve any Seller or affiliate goods or software; and (d) for any other internal use, provided any such internal use is limited to using the Customer Data in an aggregated and anonymized manner that cannot be reconstituted as Buyer's Customer Data.

22. Titles; Waiver; Severability. The article titles are for reference only and will not limit or restrict the interpretation or construction of this Agreement. Seller's failure to insist, in any one or more instances, upon Buyer's performance of this Agreement, or to exercise any rights conferred, will not constitute a waiver or relinquishment of any such right or right to insist upon Buyer's performance in any other regard. The partial or complete invalidity of any one or more provisions of this Agreement will not affect the validity or continuing force and effect of any other provision.

23. Changes. Any requested change(s) to the work set forth in this Agreement, including to the delivery schedule, requires the parties to enter into a written change order that contains a description of the change(s) and all other applicable terms, including change in price, storage fees, and/or delivery schedule ("Change Order"). A Change Order may be requested by either party. For any Buyer-related change to the delivery schedule, including any due to a Buyer delay, the parties will enter into a Change Order and any such Change Order will state the revised delivery date(s), the revised Agreement price, storage and maintenance fees, and all other respective revisions. Seller will not be obliged to proceed with any change and no such change will be binding or have any effect on Seller or this Agreement unless/until the parties enter into a Change Order; provided, however, that if Seller must store goods due to a buyer delay, all associated risk, expenses, and fee will nonetheless be borne by Buyer from the beginning of the delay period. Should Seller's ability to proceed with the work be altered by Buyer's delay in entering into a Change Order, Seller also will be entitled to assess late fees and suspend performance of all work for the period of delay.

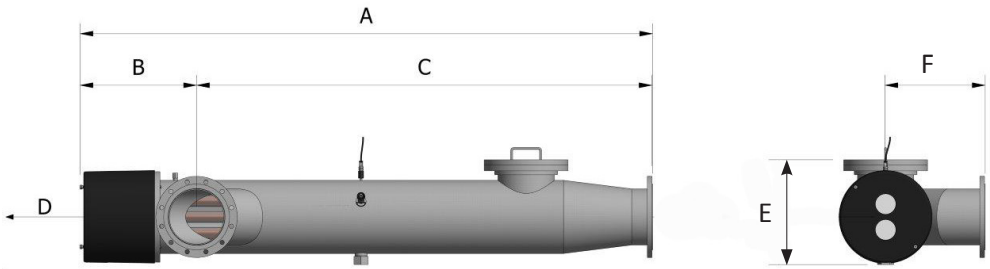
ETS-UV

xylem

SPECIFICATION SHEET
UVLW RANGE

The UVLW is a range of 800W low pressure, high output amalgam UV systems that are validated to the 2003 and 2012 NWRI Reuse Guidelines

Model	Connection (Inches)	# of Lamps (800W)	Dimensions						Panel Dimensions		
			A	B	C	D	E	F	W	H	D
UVLW-6800-10	8	6	105	22	83	75	25	10	32	79	24
UVLW-6800-14	10	6	110	23	87	75	31	12	32	79	24
UVLW-8800-14	10	8	110	23	87	75	31	12	62	79	24
UVLW-16800-20	16	16	121	26	95	75	40	15	62	79	24
UVLW-20800-20	16	20	121	26	95	75	40	15	94	79	24
UVLW-22800-24	20	22	121	27	94	75	47	18	94	79	24
UVLW-30800-24	20	30	121	27	94	75	47	18	94	79	24
UVLW-30800-30	20	30	122	28	94	75	55	21	94	79	24
UVLW-45800-30	20	45	122	28	94	75	55	21	125	79	24



CHAMBER
316L SS
ANSI 150# flanged connections
Install inline, horizontally or vertically
Features:
Acess Hatch
Twist lock lamp connections
Dry UV intensity monitor
High purity quartz thimbles
Low voltage automatic wiper
One piece wiper ring
Temperature sensor
Drain and vent ports

CONTROL SYSTEM
NEMA 12 epoxy coated mild steel enclosure
Operational 32-113°F, RH <90%
Features:
7" HMI
Spectra II control system
MODBUS
Multiple warnings and alarms
Variable power lamps
480V/3-phase

SYSTEM OPTIONS
304 or 316 NEMA 4X enclosures
Effluent flange location
Skid mounted
Containerized
Internal/external polish or electropolish

INSTALLATION NOTES
Provide necessary maintenance space
Install in a dry area
Provide floor drain or sump
Lamps submerged at all times
Minimum of two conduits required
Chamber must be grounded

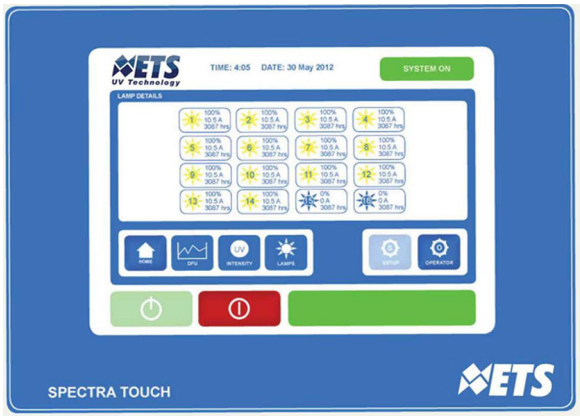
ADDENDUM NO. 5

ETS-UV

xylem

SPECIFICATION SHEET
SPECTRA TOUCH

ETS UV Technology microprocessor control system offers multiple levels of operation from basic controls to full plant system integration. Available on all UV systems. Existing systems can be upgraded to include a TOUCH control panel.



SIMPLE CONTROLS AND DISPLAY

- 7" resistive touch screen human machine interface (HMI)
- Glare free operation
- On screen trending
- STOP soft touch push buttons
- RESET soft touch push buttons
- Simple operation for any level of technical experience and expertise
- All alarm functions have a simple text message display

INTERFACE CONTROLS

- Ethernet connectivity
- Selectable custom input and outputs
- Local and remote operation
- Process interrupt (valves, flow meters or pressure switches)
- Low UV alarm and shutdown
- Bleed temperature
- Flow meter input
- Automatic restart
- Variable power dosing
- Duty/Standby automatic changeover

ADVANCED DISPLAY FEATURES

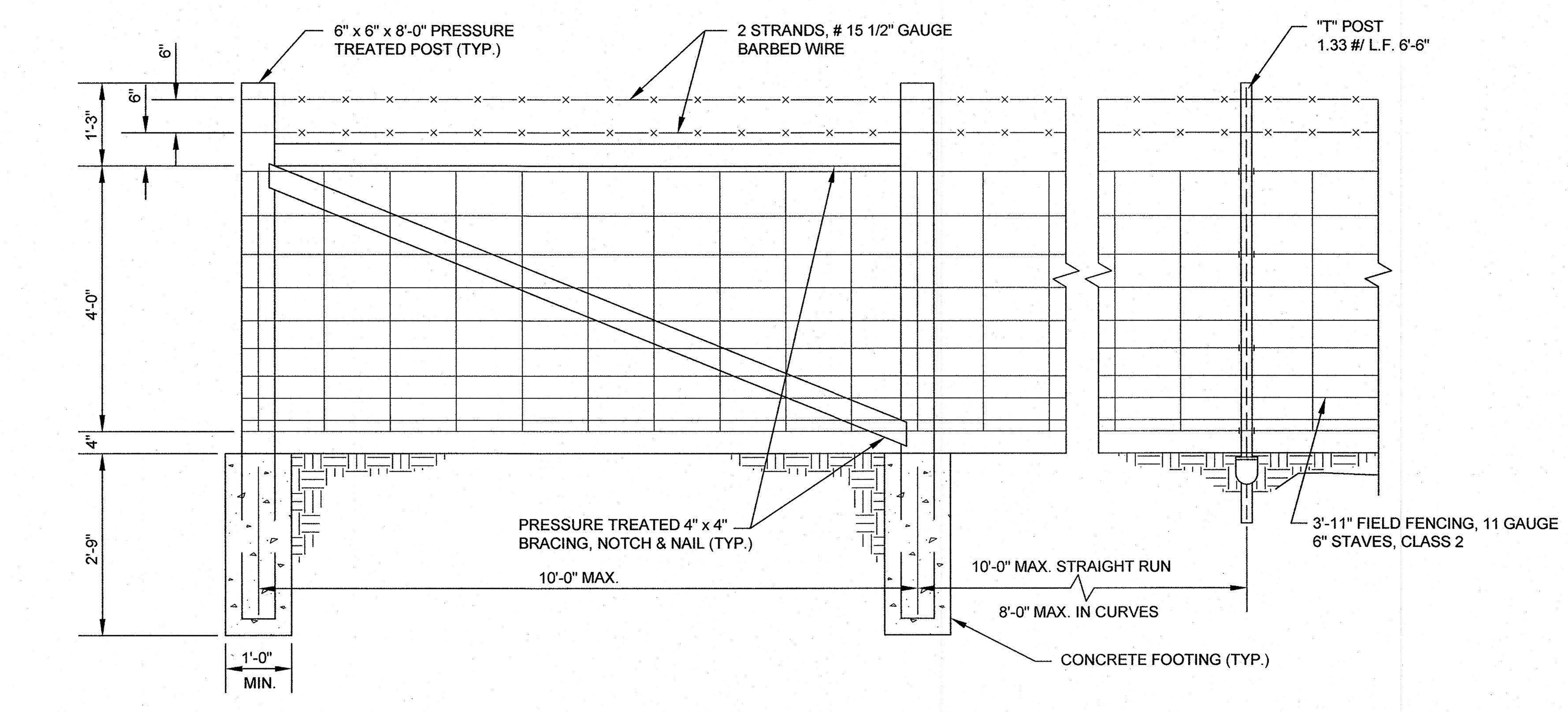
- Improved noise resistance
- Distributed I/O possible
- On/Off control
- Lamp running indication/lamp current
- Power on indication
- Elapsed hours meter
- Lamp failed contact (volt free)
- UV intensity & UV dose mJ/cm2
- Flow rate (accepts a 4-20ma signal from a flow meter)
- Temperature, low UV alarm
- System spares listing
- Ground fault
- Wiper fault

ADVANCED DISPLAY FEATURES

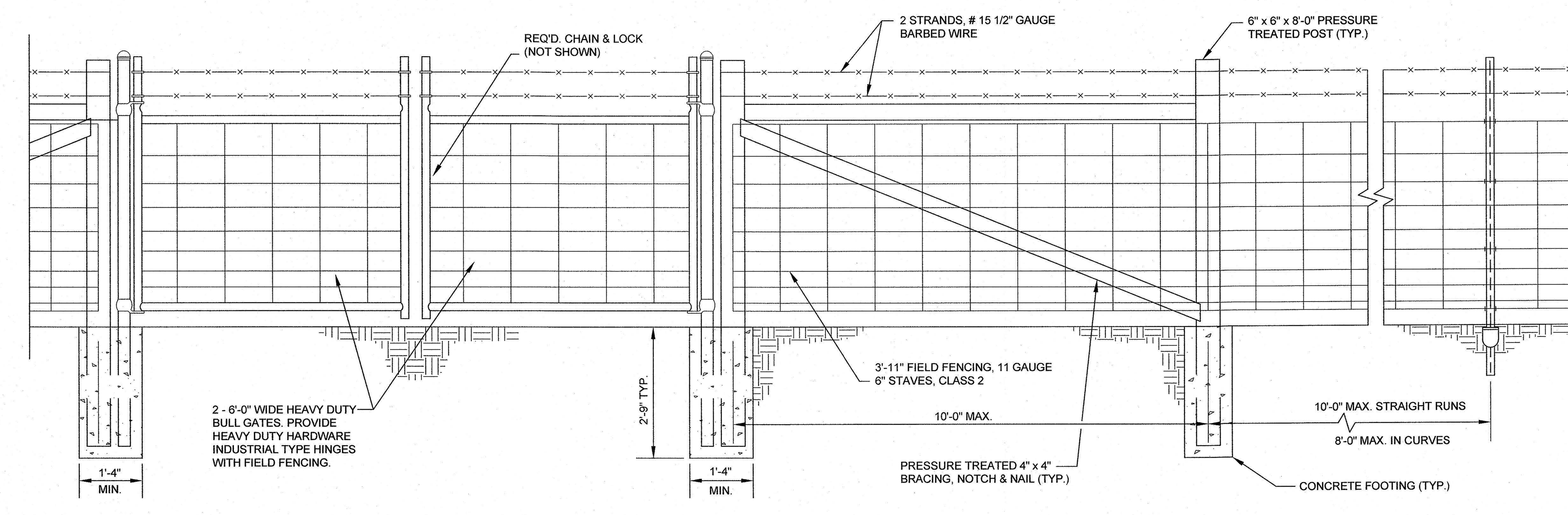
The Touch has a built in data logging facility (retrievable by users on a standard PC or laptop). The parameters logged are:

- UV intensity required (set point)
- UV intensity measured
- Lamp current
- Temperature
- Flow (if flow meter connected)
- Time and date
- Alarms generated: restrike timer, low intensity, low dose, high temperature, PSU temperature, lamp fault and ground fault

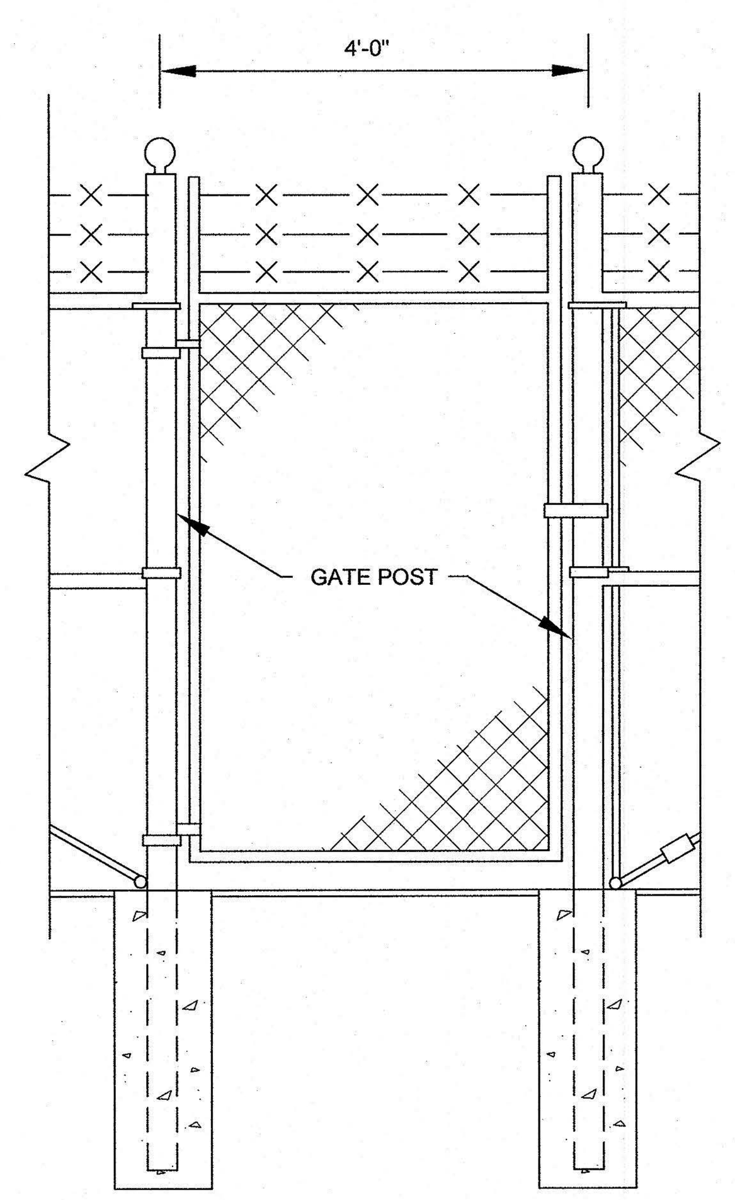
ADDENDUM NO. 5



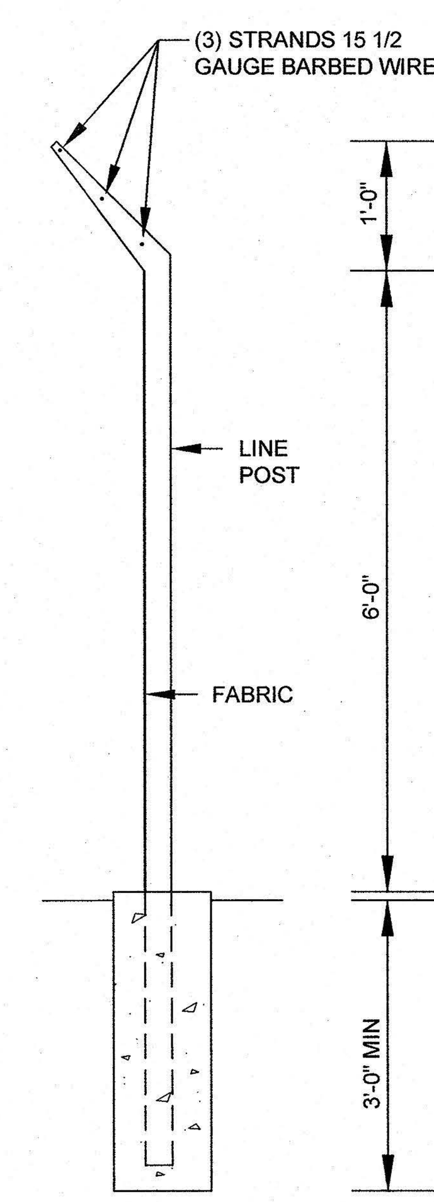
TYPICAL FIELD FENCING CORNER BRACING & LINE BRACING DETAIL (A/14)
(100 FT. O.C. SPACING)



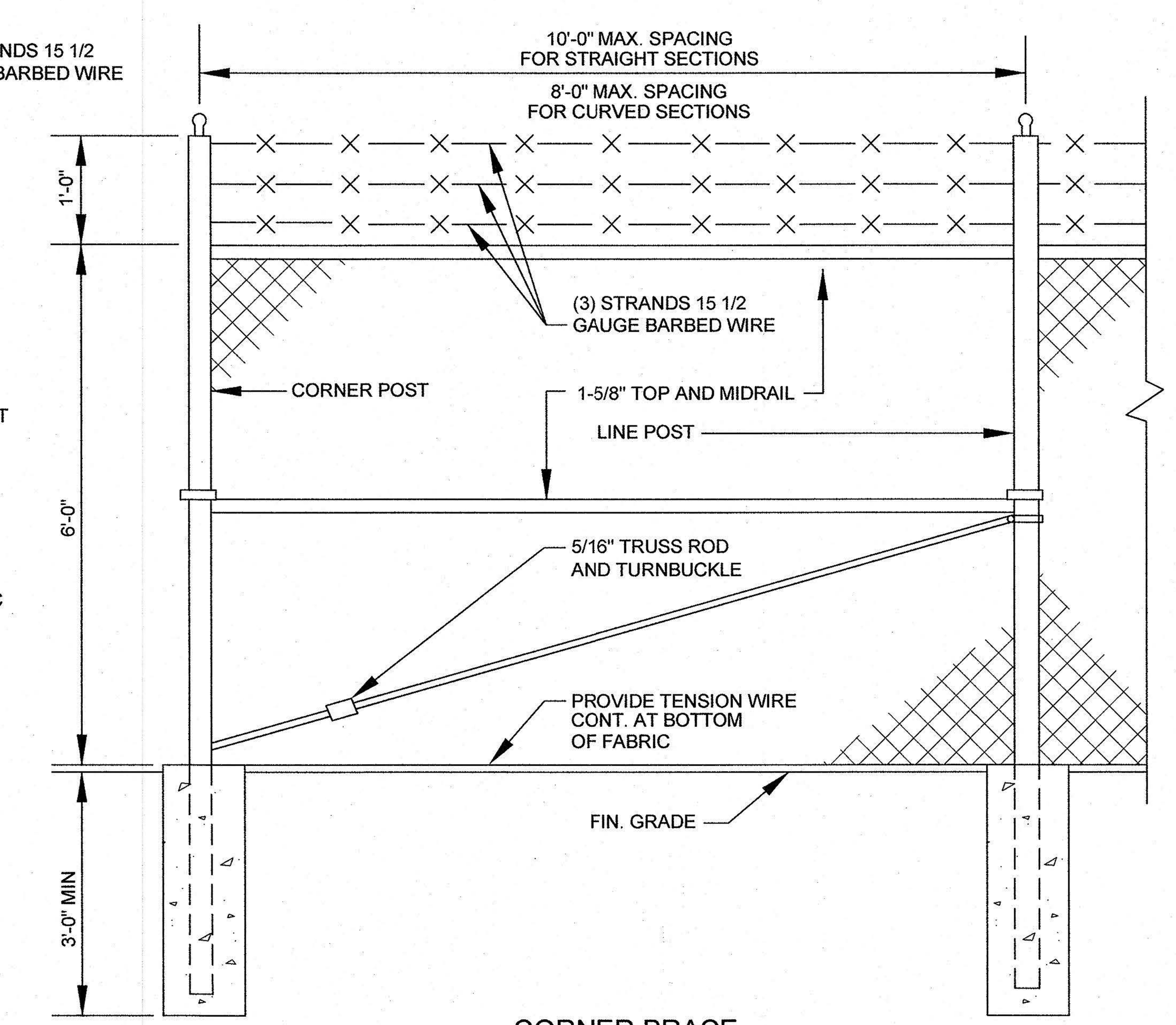
TYPICAL ACCESS GATE FOR FIELD FENCING DETAIL (B/14)
NO SCALE



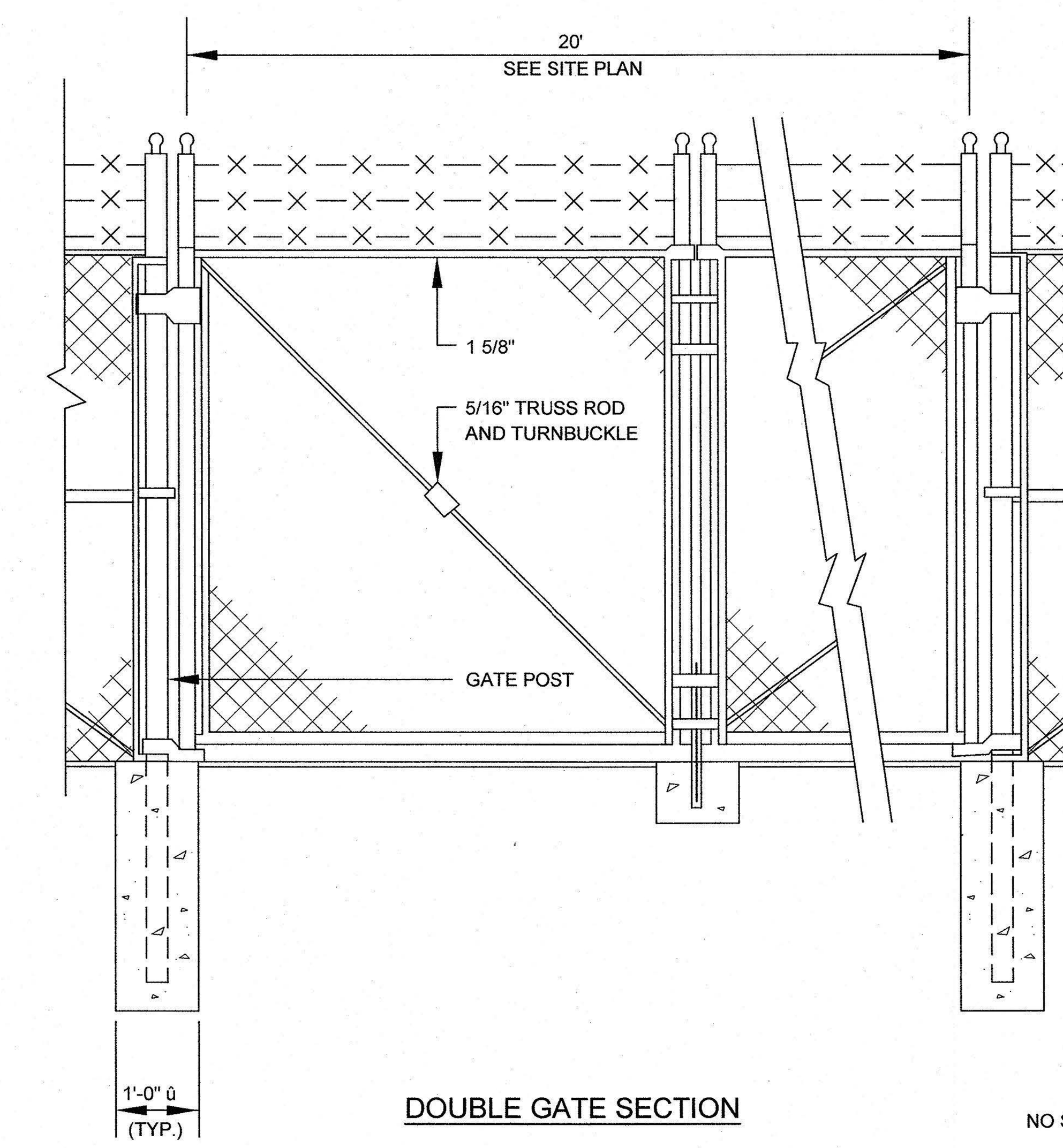
SINGLE GATE



LINE POST



CORNER BRACE



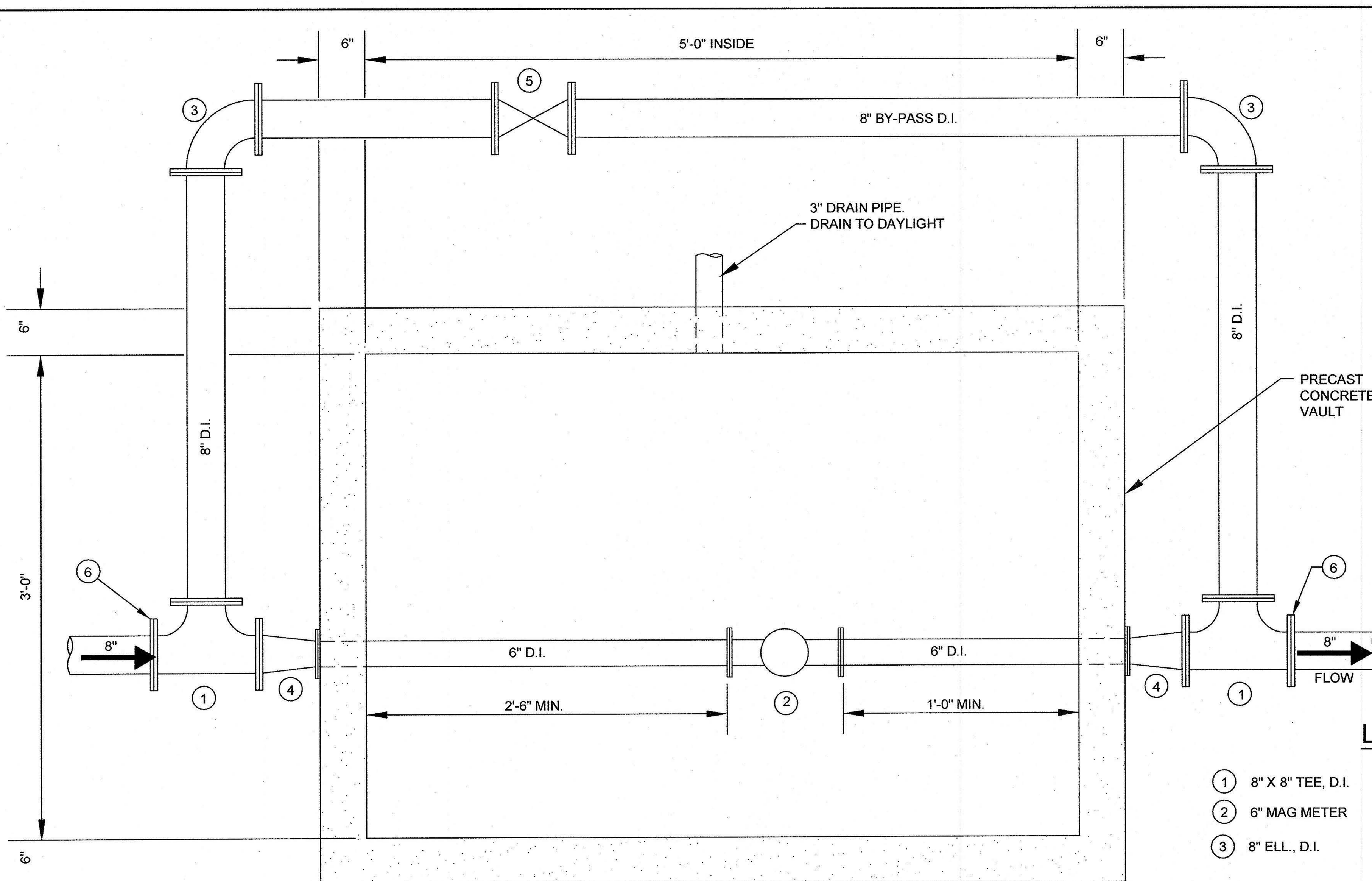
DOUBLE GATE SECTION

NOTES:

1. WIRE FABRIC 9 GA. X 2" MESH
2. BRACING FOR SECTION NEXT TO GATE SAME AS END SECTION
3. PROVIDE ONE PADLOCK PER GATE
4. ALL POST TO BE SS40

NO SCALE

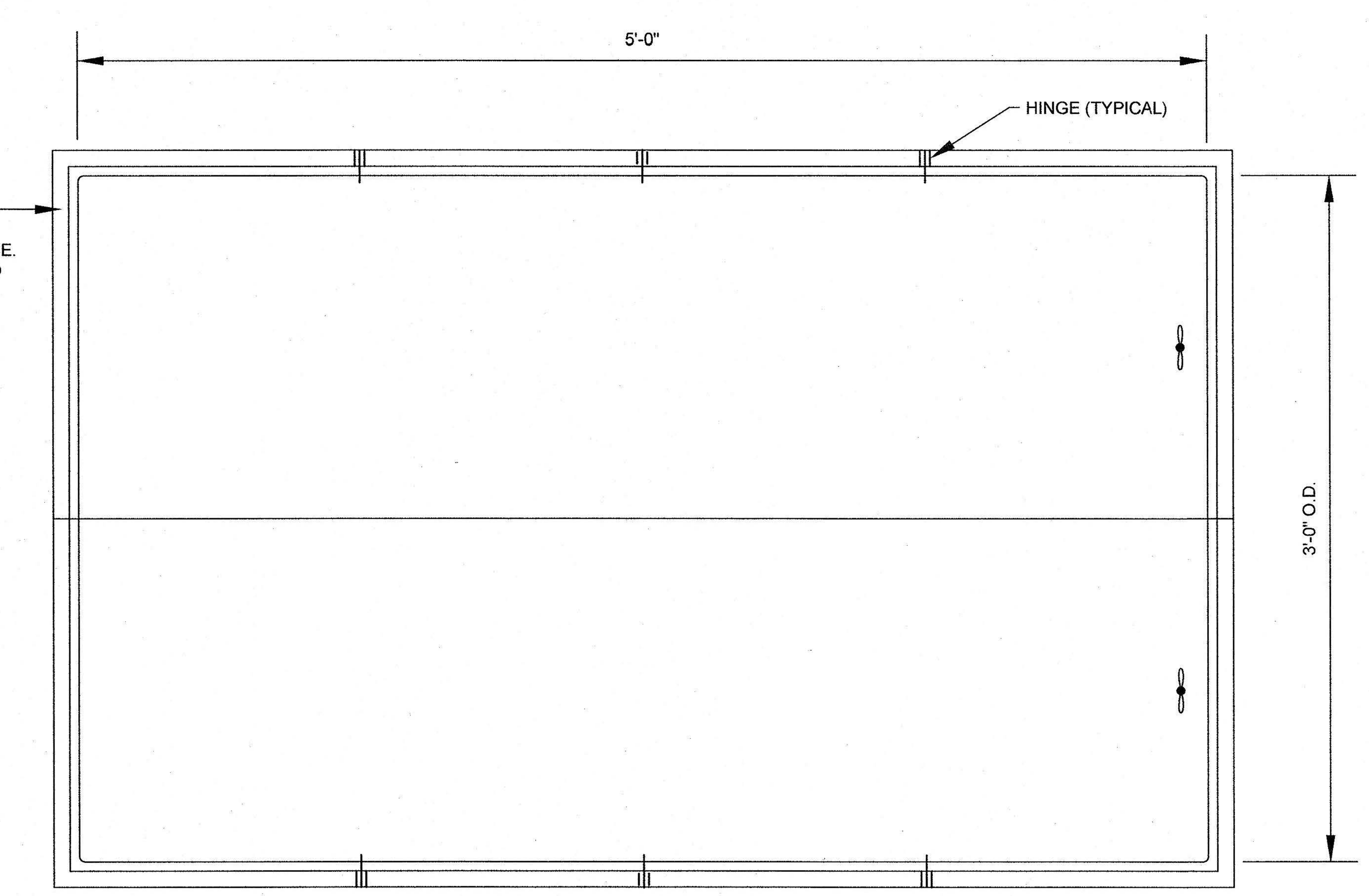
TYPICAL CHAINKLINK FENCE DETAIL (C/14)
NO SCALE



INFLUENT PIPING LAYOUT PLAN

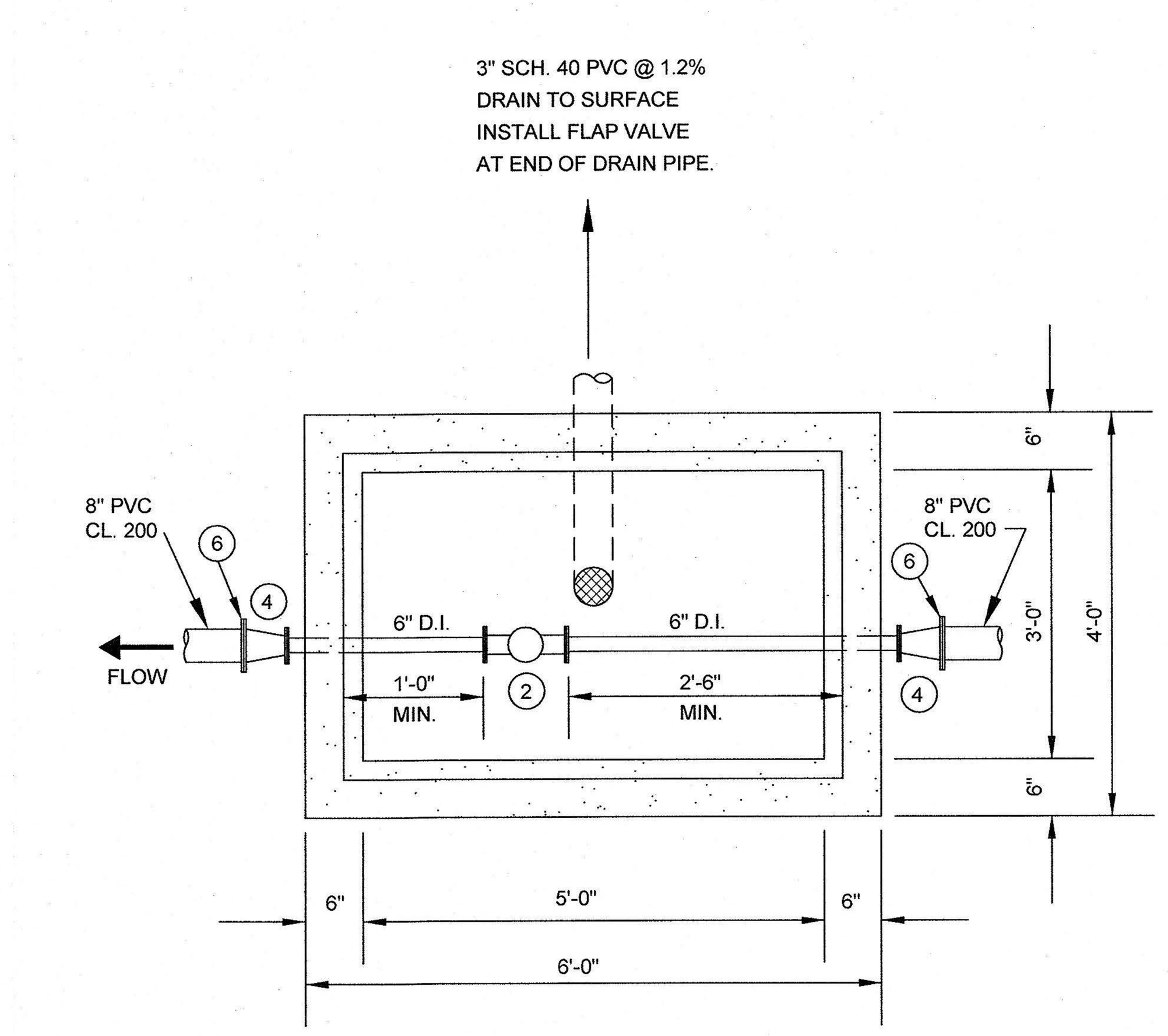
LEGEND

1. 8" X 8" TEE, D.I.
2. 6" MAG METER
3. 8" ELL, D.I.
4. REDUCER 6" X 8" D.I.
5. 8" GATE VALVE W/ VALVE BOX
6. 8" D.I. TO PVC TRANSITION FITTING



COVER PLAN VIEW

TYP. FLOW METER DETAIL (D/14)
SCALE: NO SCALE



EFFLUENT PIPING LAYOUT PLAN
NO SCALE

ADDENDUM NO. 5

MISCELLANEOUS DETAILS

DATE	REVISIONS	BY
AUG. 2025	DETAIL MODIFICATIONS	T.S.

WASTEWATER TREATMENT PLANT UPGRADE AND DISCHARGE RELOCATION
(CWSRF PROJECT NO. CS011036-02)
FOR
THE TOWN OF CROSSVILLE
ALABAMA

LADD ENVIRONMENTAL CONSULTANTS, INC.
P.O. BOX 680869 - FORT PAYNE, ALABAMA 35968
1207 CHITWOOD AVENUE S.E. - FORT PAYNE, AL 35967
PHONE - (256) 845-5315 - FAX - (256)845-5383
ladd@laddenv.com www.laddenv.com
LADD ENVIRONMENTAL Providing Engineering Solutions

CROSSVILLE

JOB NO.: 2280	FILE: S.P. \2280\DET	
DRAWN BY: T.S./SB	CHECKED BY:	
SCALE: NOTED	DATE: JULY, 2025	

SHEET 14